FROM THE CLASH OF GALLEYS IN ANCIENT GREECE TO ENCOUNTERS BETWEEN NUCLEAR-POWERED SUBMARINES IN THE 20TH CENTURY, BATTLE AT SEA LOOKS AT EVERY ASPECT OF THE STORY OF WARFARE ON, UNDER, AND ABOVE THE SEA.

"A ship of war makes the best ambassador."
—Oliver Cromwell

BATTLE AT SEA
R.G. GRANT

Packed with photographs, maps, 3-D battle plans, eyewitness accounts, technology and weapon features, descriptions of life on board, and vivid accounts of the greatest engagements at sea, this is the definitive illustrated account of naval warfare throughout history.

Discover more at www.dk.com
BATTLE AT SEA
<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOREWORD 6</td>
</tr>
<tr>
<td>INTRODUCTION 8</td>
</tr>
<tr>
<td>THE AGE OF GALLEYS 24</td>
</tr>
<tr>
<td>GUN, SAIL, AND EMPIRE 102</td>
</tr>
<tr>
<td>1550–1830 102</td>
</tr>
<tr>
<td>OVERVIEW 26</td>
</tr>
<tr>
<td>EARLY NAVAL BATTLES AND THE RISE OF THE GREEKS 30</td>
</tr>
<tr>
<td>THE PERSIAN WARS 32</td>
</tr>
<tr>
<td>THE PELOPONNESIAN WAR 36</td>
</tr>
<tr>
<td>ROMAN NAVAL WARFARE 42</td>
</tr>
<tr>
<td>THE FIRST PUNIC WAR 44</td>
</tr>
<tr>
<td>ROME ACHIEVES MASTERY OF THE MEDITERRANEAN 48</td>
</tr>
<tr>
<td>NAVAL WARFARE IN ASIA 52</td>
</tr>
<tr>
<td>CHINA, JAPAN, AND KOREA 54</td>
</tr>
<tr>
<td>BATTLES FOR THE MEDITERRANEAN 62</td>
</tr>
<tr>
<td>BYZANTINE–ARAB WARS 64</td>
</tr>
<tr>
<td>THE RISE OF THE ITALIAN MARITIME REPUBLICS 66</td>
</tr>
<tr>
<td>THE WAR FOR SICILY 70</td>
</tr>
<tr>
<td>THE RISE OF SAIL 74</td>
</tr>
<tr>
<td>THE VIKINGS 76</td>
</tr>
<tr>
<td>SEA BATTLES IN NORTHERN EUROPE 80</td>
</tr>
<tr>
<td>THE OTTOMANS 86</td>
</tr>
<tr>
<td>CHRISTIAN NAVIES AGAINST THE TURKS 88</td>
</tr>
<tr>
<td>OVERVIEW 104</td>
</tr>
<tr>
<td>JAPAN AND KOREA 108</td>
</tr>
<tr>
<td>JAPANESE INVASION OF KOREA 110</td>
</tr>
<tr>
<td>OCEANIC EMPIRES 114</td>
</tr>
<tr>
<td>SPANISH WARS 116</td>
</tr>
<tr>
<td>AFTER THE ARMADA 124</td>
</tr>
<tr>
<td>THE RISE OF DUTCH SEA POWER 126</td>
</tr>
<tr>
<td>RIVALRY ACROSS THE NORTH SEA 130</td>
</tr>
<tr>
<td>FIRST ANGLO-DUTCH WAR 132</td>
</tr>
<tr>
<td>SECOND ANGLO–DUTCH WAR 134</td>
</tr>
<tr>
<td>THIRD ANGLO–DUTCH WAR 138</td>
</tr>
<tr>
<td>THE SUN KING’S NAVY 142</td>
</tr>
<tr>
<td>THE FRENCH WARS 144</td>
</tr>
<tr>
<td>BALTI PACIFIC CONFLICTS 150</td>
</tr>
<tr>
<td>SWEDEN FIGHTS FOR DOMINATION 152</td>
</tr>
<tr>
<td>THE GREAT NORTHERN WAR 154</td>
</tr>
<tr>
<td>THE RUSSO-SWEDISH WAR 156</td>
</tr>
<tr>
<td>MAINTAINING BRITISH NAVAL POWER 158</td>
</tr>
<tr>
<td>ROYAL NAVY BATTLES 160</td>
</tr>
<tr>
<td>SEVEN YEARS WAR 162</td>
</tr>
<tr>
<td>THE AMERICAN REVOLUTIONARY WAR 166</td>
</tr>
<tr>
<td>THE AGE OF NELSON 174</td>
</tr>
<tr>
<td>FRENCH REVOLUTIONARY WARS 176</td>
</tr>
<tr>
<td>NAPOLEONIC WARS 186</td>
</tr>
<tr>
<td>EARLY 19TH-CENTURY BATTLES 200</td>
</tr>
<tr>
<td>THE UNITED STATES AT WAR 202</td>
</tr>
<tr>
<td>WARS OF INDEPENDENCE 206</td>
</tr>
<tr>
<td>LATER OTTOMAN BATTLES 208</td>
</tr>
</tbody>
</table>
## STEAM AND STEEL
1830–1918

<table>
<thead>
<tr>
<th>OVERVIEW</th>
<th>212</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW NAVIES OF EUROPE</td>
<td>216</td>
</tr>
<tr>
<td>EUROPEAN WARS: FROM SAIL TO STEAM</td>
<td>218</td>
</tr>
<tr>
<td>GUNBOAT IMPERIALISM</td>
<td>222</td>
</tr>
<tr>
<td>THE AMERICAS AT WAR</td>
<td>226</td>
</tr>
<tr>
<td>THE AMERICAN CIVIL WAR</td>
<td>228</td>
</tr>
<tr>
<td>SPANISH AND LATIN-AMERICAN CONFLICTS</td>
<td>238</td>
</tr>
<tr>
<td>RISE OF THE IMPERIAL JAPANESE NAVY</td>
<td>244</td>
</tr>
<tr>
<td>JAPANESE NAVAL MIGHT</td>
<td>246</td>
</tr>
<tr>
<td>THE RUSSO-JAPANESE WAR</td>
<td>248</td>
</tr>
<tr>
<td>WORLD WAR I</td>
<td>258</td>
</tr>
<tr>
<td>WARSHIP BATTLES 1914–18</td>
<td>260</td>
</tr>
<tr>
<td>THE U-BOAT WAR 1914–18</td>
<td>268</td>
</tr>
</tbody>
</table>

## CARRIERS, SUBMARINES, AND MISSILES
1918–present

<table>
<thead>
<tr>
<th>OVERVIEW</th>
<th>270</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUROPE BETWEEN THE WARS</td>
<td>272</td>
</tr>
<tr>
<td>WORLD WAR II: THE WEST</td>
<td>278</td>
</tr>
<tr>
<td>WARSHIP BATTLES 1939–45</td>
<td>280</td>
</tr>
<tr>
<td>THE U-BOAT WAR 1939–45</td>
<td>290</td>
</tr>
<tr>
<td>EVACUATIONS AND LANDINGS</td>
<td>300</td>
</tr>
<tr>
<td>WAR IN THE MEDITERRANEAN</td>
<td>302</td>
</tr>
<tr>
<td>WORLD WAR II: THE PACIFIC</td>
<td>308</td>
</tr>
<tr>
<td>THE JAPANESE OFFENSIVE</td>
<td>310</td>
</tr>
<tr>
<td>THE BATTLE FOR GUADALCANAL</td>
<td>316</td>
</tr>
<tr>
<td>DRIVE TO VICTORY</td>
<td>320</td>
</tr>
<tr>
<td>POSTWAR CONFLICTS</td>
<td>328</td>
</tr>
<tr>
<td>COLD WAR CONFLICTS</td>
<td>330</td>
</tr>
<tr>
<td>THE VIETNAM WAR</td>
<td>334</td>
</tr>
<tr>
<td>THE FALKLANDS WAR</td>
<td>340</td>
</tr>
<tr>
<td>REGIONAL CONFLICTS</td>
<td>342</td>
</tr>
<tr>
<td>MIDDLE EAST AND TERRORISM</td>
<td>344</td>
</tr>
<tr>
<td>INDEX</td>
<td>354</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>359</td>
</tr>
</tbody>
</table>
Samuel Johnson said in 1759: “No man will be a sailor who has contrivance enough to get himself into a jail; for being in a ship is being in a jail, with the chance of being drowned.” In fact, the great man had understated his case. He was talking of sailors in general, not of those serving in navies in time of war. The naval prayer, first recorded in the 17th century and still part of the church services of Britain’s Royal Navy, asks for preservation not only “from the dangers of the sea” but also “from the violence of the enemy.” It is this “violence” that is the overriding theme of this book.

Naval warfare is almost as old as conflicts between armies on land, and as in land campaigns, it is the great battles that catch the imagination, the titanic clashes that can be said to have changed the course of history. Some, such as Cape Ecnomus between Rome and Carthage, or Leyte Gulf between the US and Japan in Word War II, involved vast fleets; others, such as the battles of Chesapeake Bay or the Nile, were fought by a relatively small number of ships. In spite of this, their strategic consequences were equally momentous.

While most nations have a long history of fighting on land, the list of countries that can be termed “maritime nations” is much shorter. There are certain nations and peoples that appear again and again as participants in the battles recorded in this book: in the Classical world the Carthaginians and the Greeks, in the Middle Ages the Venetians and the Genoese, in the age of European exploration the Spanish, the English, and the Dutch. Geography plays a key role, and some countries have little or no coastline, or difficult access to the high seas. For some, history teaches that the threat to national existence and way of life comes from across a land border, and this ever-present fact naturally colors thinking about defense. For maritime countries the sea looms larger in their national consciousness.

Historically, those nations with strong navies have developed in this way as a result of experience, sometimes harshly taught. They tend to depend on trade. The sea has always been the major highway for international commerce. Transporting goods in ships is much cheaper than moving them by land, and today, by air. International systems throughout the ages have depended on the free passage of people and
things around the world. When these systems break down because the sea lines of communication are severed or threatened, naval action is required. Uninhibited movement of the vast majority of the traded goods around the globe relies, in the last resort, on the famous phrase of the 19th-century American naval officer, and historian, Alfred Mahan: “command of the sea.” The world today is fortunate that trading nations are able to move materials almost anywhere without interference, something we all take for granted.

What naval history tells us, however, is that this freedom, like most others, is not cost-free, and that, periodically, a price has to be paid. The classic way of ensuring command of the sea is to find the battle fleet of the enemy, and destroy it. This has the added benefit for maritime nations of reducing or preventing any chance of invasion. The incidents resulting from the attempts to deny or maintain command of the sea are the battles recorded in this book.

These battles, usually short in duration, tell just a part of what sea power is all about. A key part of historical experience is the ability of maritime powers to project their land power over huge distances, often to a place of their choosing rather than that of their antagonist, to impose a seemingly endless blockade upon an enemy, and to deal with piracy and illegal commerce. They also have the power to do good around the world: working for the abolition of the slave trade, providing assistance to disaster-hit lands, or simply “showing the flag” to reassure friends and deter enemies.

Naval warfare is the story of the use of the most modern, high-tech, and sometimes expensive equipment that a nation can procure. A technological advantage could sometimes define the difference between victory at sea and defeat. The study of naval battles, however, confirms that they are really about people, not just the senior commanders, famous, or notorious, as they might be, but the ordinary man doing extraordinary things under the most stressful of circumstances out of loyalty to his shipmates, his ship, and his country. He is the true hero of this book.

CAPTAIN CHRISTOPHER PAGE
ROYAL NAVY
ANCIENT GALLEYS

THE MEDITERRANEAN was the focus for the early development of warships. The first boats used in battle were civilian vessels turned to military use, such as those made from pitch-coated reeds that the Egyptians utilized in the 12th century BCE. They were used to carry soldiers and served as platforms for archers and spearmen. In the course of the 1st millennium BCE, maritime states around the Mediterranean developed fighting galleys, the first purpose-built warships.

GALLEY WARFARE

Galleys were propelled in battle by banks of oars. The galley’s sail, typically on a single mast in the center of the ship, was generally not used in combat. Greek and Phoenician naval designers created the penteconter, then the bireme (two banks of oars) and trireme (three banks). Fast and maneuverable, these galleys were themselves weapons—a ram at the bow was used to smash the hulls of enemy boats. Over time more oars were added to drive much larger galleys called polyremes, which could be packed with soldiers and with catapults serving as shipborne artillery. Galleys remained the key warships of the Mediterranean throughout the period of the Roman Empire and its successor, the Byzantine Empire, whose dromons were frequently armed with the formidable incendiary weapon known as “Greek fire.”
The mast and sail were not usually carried on board during a battle.

**Greek Trireme (c. 480 BCE)** This was the most specialized early warship, built for speed and ramming power. The largest triremes were powered by as many as 170 oars, arranged in three tiers, with a single oarsman to each oar. Only a few soldiers were carried on board.

Oculus ("eye") painted on ship's bow

Central gangway

Lower oar ports had leather linings

Ropes for hoisting sail

Three banks of oars

Projecting outrigger for upper tier of oarsmen

Central gangway

Lateen sail

Oculus ("eye") painted on ship's bow

Central gangway

Ropes for hoisting sail

Siphon for projecting Greek fire

Forecastle that held archers and other soldiers

Glossary

An explanation of less familiar nautical and military terms used in the book is given below.

**1st Rate** British ship of the line with more than 100 guns on three decks.

**2nd Rate** British ship of the line with 90–98 guns on three decks.

**3rd Rate** British ship of the line with 64–74 guns on two decks.

**4th Rate** British ship of the line with 46–60 guns on two decks.

**5th Rate** British frigate with 36–40 guns on two decks.

**6th Rate** Small British warship with 20–28 guns on a single deck, a small frigate.

**Aft** Toward the stern of the ship.

**Arquebus** Early form of musket, used in 16th century.

**Ark** Roman mechanical device for grappling enemy ships.

**Astrolabe** Nautical instrument used for measuring latitude.

**Balinger** Small shallow-hulled English sailing barge of the late Middle Ages. Could be powered by oars as well as sail.

**Ballista** Roman catapult for firing iron-tipped bolts.

**Ballistic Missile** Medium- or long-range missile for delivering (usually nuclear) warhead. Powered initially by rocket fuel, the missile descends to its target in freefall.

**Barbette** Armored cylinder supporting the large gun turrets of 19th- and 20th-century warships.

**Bar Shot** Cannon ammunition, consisting of two half-cannonballs linked by a solid bar. Used, like chain shot, for attacking spars and rigging of sailing ships.

**Battlecruiser** Class of heavily armed ship developed in years leading up to World War I as a kind of fast battleship.

**Battle Group** Formation of surface ships, originally centered on battleships, but in recent times consisting of a carrier with guided missile destroyers, anti-submarine destroyers, cruisers, and frigates.

**Beam** The breadth of a ship at its widest point.

**Bilge** Lowest part of the interior of the hull, where water collects.

**Binnacle** Mount for a ship's compass, installing ships usually sided on the quarterdeck.
THE DESIGN of medieval warships developed along very different lines in the Mediterranean and the seas of northern Europe. Mediterranean states continued to use oared galleys for warfare. Their shipbuilders made hulls that were carvel-built (had flush-fitting planks) and, under the influence of Arab sailors from the Indian Ocean, adopted the triangular lateen sail instead of the square sail. In northern Europe the Viking longship, the prime warship of the early Middle Ages, was clinker-built (had overlapping planks that needed less caulking than carvel-built hulls) and had a square sail. The longship had oars, like a Mediterranean war galley, but was better suited to rough seas.

North European shipbuilders also used a clinker-built hull and a square sail on the sturdy round cargo ship known as a “cog.” Cogs came to be used in warfare, in the process growing “castles” at both ends of the ship, raised platforms from which soldiers and archers could rain missiles down upon enemy ships and where they could resist attempts to board. Although oared galleys continued to play a part in warfare in northern Europe, sailing ships took precedence.

HYBRID SHIPS
In the 15th century a fruitful cross-fertilization between the Mediterranean and northern European traditions took place. The three- or four-masted carrack combined lateen and square sails to create a larger, more maneuverable descendant of the cog. At the same time the smaller two- or three-masted caravel evolved, mostly with lateen sails but sometimes with a square sail as well. By 1500 the carrack was the dominant warship of northern Europe. It provided a stable platform for cannon, used in large numbers on ships from the late 15th century. With gun ports cut into its hull, the carrack grew into the “great ship”—for example, Henry Grâce à Dieu, launched in 1514, which carried some 180 cannon, distributed along gun decks and in prodigiously high castles.
**GLOSSARY**

**BIREME**
Galley with two banks of oars on each side.

**BLINDAGE**
Protective screen for soldiers on deck of a sailing ship.

**BLOCKSHIP**
Ship deliberately sunk to block river or harbor entrance.

**BOATSWAIN**
Petty officer in charge of crew and sails, rigging, etc.

**BOOM**
Barrier blocking river or harbor entrance.

**BOW**
Fore-end of a ship.

**BOWSPRIT**
Spar projecting from the bow, providing extra sail area.

**BOW CHASER**
Cannon placed in the bow of a sailing ship for firing straight ahead.

**BOMB-KETCH**
Small, strongly built sailing vessels on which a mortar is mounted.

**BREECH-LOADER**
Gun in which shot or shell is loaded into the rear of the barrel (the breech) rather than the muzzle.

**BRIG**
Small sailing ship with two square-rigged masts.

**BRIGANTINE**
Ship with two masts, a fore-and-aft mainsail and a square-rigged foremast, originally used by pirates.

**BROADSIDE**
Simultaneous firing of all the cannon on one side of a warship.

**BULKHEAD**
Vertical partition below deck that separates one part of a ship from another.

**CANISTER**
Container holding small iron or lead balls, fired from cannon as anti-personnel weapon.

**CANNON**
Large artillery piece for firing heavy projectiles over a long distance. A naval cannon is usually referred to as a gun.

**CAPITAL SHIP**
Warship of the first rank in size and armament, such as a battleship.

**CARRACK**
Three- or four-masted sailing ship of 15th and 16th centuries.

**CARAVEL**
Small, maneuverable ship developed in 16th century with lateen sails on two or three masts.

**CARRONADE**
Short-barrelled, short-range cannon developed by Carron Ironworks c.1770.

**CHAFF**
Scraps of metal foil thrown out by planes or ships to confuse enemy’s radar.

**CHAIN SHOT**
Ammunition for cannon consisting of two half-balls chained together for attacking rigging, masts, etc.

---

**INTRODUCTION**

**VENETIAN GALLEY (c.1500)**
Although the Atlantic nations now sailed into battle, oared galleys were still the principal fighting ships of the Mediterranean. Cannon were carried in the bow with smaller guns between the oars.

**CARAVEL (c.1535)**
This kind of ship was used by the Portuguese to explore the West African coast in the 15th century. Its lateen sails were good for maneuvering close to shore. The example shown here is a later type with three lateen-rigged masts and a square-rigged foremost.
THE DEVELOPMENT of ocean-going sailing ships in the 16th century allowed European sailors to make voyages around the world. They encountered countries with independent and highly sophisticated naval traditions. For example, in a war against Japan in the 1590s, the Korean fleet included ironclad “turtle ships,” the likes of which had never been seen in Europe. China had built sailing ships larger than any that Europeans possessed. Yet the momentum of European progress in shipbuilding and arms manufacture was unstoppable.

GALLEONS AND GALLEASSES

In the second half of the 16th century the large carrack or “great ship” was surpassed as a fighting warship by the galleon. Galleons had all the advantages of carracks—they were substantial-size ships with gun ports that could carry a heavy weight of cannon—but their designers reduced the height of the castles and lengthened and streamlined the dimensions of the ships for better handling. The sides of the ships were sloped inward from the lower gun deck to the weather deck, enhancing stability and making them more difficult to board.

While galleons dominated warfare in the Atlantic, in the Mediterranean oared galleys remained in use in battle through the 16th and 17th centuries. The Spanish and Venetians turned galleys into floating gun platforms. Venice invented the galleass, a large warship powered by sails and oars, which could mount a truly impressive quantity of cannon. But although galleasses were used outside the Mediterranean—they formed part of the Spanish Armada in 1588—the future lay with ships that relied entirely on sails.

SHIPS OF THE LINE

In the course of the 17th century the galleon evolved into the ship of the line. Gunnery became the primary means of engaging enemy vessels and the traditional action of boarding only secondary. Guns were arranged almost exclusively along the sides of the ship, to deliver thunderous broadsides. Ships fought in line of battle, and the ship of the line was a warship powerful enough to hold its own in such a gun duel. The forerunner to such ships was England’s Sovereign of the Seas, commissioned by King Charles I of England in 1634. Smaller frigates and sloops played a supporting role.
**GLOSSARY**

**COG** Round-bottomed sailing ship developed in northern Europe in the Middle Ages.

**CONGREVE ROCKET** British self-propelled missile, developed in the early 19th century.

**CORSAIR** Polite word for “pirate.”

**CORVETTE** Small, fast, lightly-armed, three-masted sailing ship, like a small frigate.

**CORVUS** Roman device lowered onto the deck of an enemy ship to enable soldiers to board.

**COTTONCLAD** Confederate ship in US Civil War, protected by cladding of cotton bales.

**CRUISER** Term originally used to describe ship’s role—sailing independently, raiding or attacking merchant shipping. In late 19th century applied to steam warships smaller than a battleship, first the protected cruiser, which had decks armored against explosive shells, then the armored cruiser, with belt of armor around the hull. In 20th century cruisers were usually classed as light and heavy.

**CULVERIN** Narrow smooth-bored cannon of 16th and 17th centuries.

**CUTTER** Small sailing boat with a single mast. Also a kind of ship’s boat carried by larger sailing vessel.

**DAHLGREN GUN** Reinforced muzzle-loading cannon, widely used on gunboats in US Civil War.

**DEAD-RECKONING** Method of calculating one’s position at sea by the ship’s speed, the time that has elapsed, and the direction steered.

**DEPTH CHARGE** Anti-submarine weapon designed to explode near target at depth determined by fuse.

**DESTROYER** Warship conceived at the end of the 19th century as a “torpedo-boat destroyer,” then adapted to deliver torpedoes itself. In World Wars I and II destroyers were widely used as escorts for warships and merchant convoys. Today, they are armed with guided missiles to defend other ships from air, submarine, and surface attack.

**DOUBLE** To attack a single ship with broadsides from both sides.

**DREADNOUGHT** Launched in 1906, HMS Dreadnought gave her name to a new generation of battleships, faster, with more armament and heavier guns than any previous warships.

---

**INTRODUCTION**

**SLOOP-OF-WAR (1652)** This 12-gun sixth-rate sloop-of-war was sometimes called a “galley” because it could be rowed if there were little or no wind. It has a typical 17th-century design, notably a triangular lateen sail on the mizzen mast and a vertical sprit mast on the bowsprit.

**GALLEON (1636)** In the 1630s Cardinal Richelieu developed France’s first regular navy. La Couronne, based on a Dutch design, was the new navy’s most prestigious ship.

**SECOND RATE (1670)** In the 17th century the Dutch fleet was one of the most powerful in the world. Its ships had a characteristically shallow draft needed for navigating Dutch waters. Its second rates had 80 guns on two gun decks.
By the 18th century oar power as a means of propulsion in battle had finally fallen by the wayside in most European navies, although galleys still served effectively in the shallow waters of the Baltic. The three-masted, multiple-gun-deck sailing ship, fighting in line of battle, remained unchallenged as the primary warship.

**The Rating System**

The design of warships became relatively standardized. They were categorized according to a rating system developed by England’s Royal Navy in the mid-17th century, which referred to the number of guns a ship carried. By the mid-18th century a first-rate was a three-deck ship with 100 or more guns, while a second-rater had 90–98 guns also on three decks. The standard ship of the line was a two-decker third-rate, typically around 170 ft (52 m) long and mounting from 64 to 74 guns. Fourth-rate ships, with around 50 guns, were sometimes admitted as ships of the line. The naval ships not considered fit for the line of battle included frigates, sloops-of-war, schooners, brigs, and mortar vessels (variously fifth, sixth and unrated ships), which all nevertheless performed vital support functions. Frigates became especially important in the course of the 18th century. Fast and well-armed for their size, they served to great effect as scouts and commerce raiders. The frigates of the fledgling US Navy, such as Constitution launched at the end of the century, could carry as many as 60 guns and were a match for any fourth-rate ship of the line.

**NEW TECHNOLOGIES**

The warships of the 18th century benefited from some crucial technological advances. Firstly, ships’ wheels had been introduced to replace the previous tiller system of steering. The pulley mechanism allied to the wheel allowed much greater and swifter movement of the rudder, and hence improved maneuverability. During the late 18th century copper sheathing of hulls was introduced. By protecting the hull, the copper plate allowed warships to spend longer at sea before requiring dry-dock maintenance and repairs. The introduction of the carronade in the 1770s provided a short-range but powerful gun light enough to be mounted on the upper deck without destabilizing the ship—the heaviest guns, such as the 32-lb Blomfields, had to be carried close to the waterline to maintain stability.
GLOSSARY

**DROMON** Byzantine warship powered by combination of oars and lateen sails.

**E-BOAT** High-speed torpedo boat used by Germany in World War II.

**ELECTRONIC COUNTERMEASURES** In modern warfare, any electronic devices designed to mislead the enemy’s radar and other detection or targeting systems.

**FIRESHIP** Ship deliberately set on fire and propelled toward enemy ships as an incendiary weapon.

**FLEET IN BEING** A naval force that avoids battle by remaining in port, but remains a theoretical threat to the enemy.

**FLINTLOCK** Firing mechanism that used spark from steel striking a flint to ignite priming powder. Used for muskets from the 17th century and adopted on some cannon in the following century.

**FORE** Toward the front of a ship.

**FORE-AND-AFT RIG** Rig of a sailing ship where the sails are mounted along the line of a ship from stern to bow rather than across as in a square rig.

**FORECASTLE** Originally the raised structure at the front of a medieval ship that served as a fighting platform for archers, marines, etc. Now applied to the front part of a ship’s upper deck.

**FORETOP** Platform for lookouts, marines, situated high on the foremast of a ship.

**FRIGATE** Originally a sailing ship developed in the 17th century that was faster than a ship of the line and had just one gun deck. Used for patrol and escort duties.

**GRAPESHOT** Small metal balls packed in a sack, used as anti-personnel ammunition in cannons.

**GRAPNEL** A metal device with several hooks thrown at the end of a rope for grasping hold of another vessel. Also, a small, multi-hooked anchor.

**GUSTA** Fast, light medieval galley.

**GALLEASS** Large war galley developed by Venetians in 16th century for carrying heavy artillery.

**GALLEON** The principal European warship of the 16th and 17th centuries. Longer and narrower than the earlier carrack.

**GALLIOT** Small galley.

**INTRODUCTION**

**SLOOP-OF-WAR (1828)** Though the term “sloop-of-war” became associated with all unrated combat vessels (rated ships carried 20 guns or more) sloops-of-war were three-masted warships that carried up to 18 guns. They appeared in the 17th century.

**FRIGATE (1840)** In the 19th century frigates were classed as fourth-rate warships. Square-rigged on all three masts, and faster than ships of the line, they were used as scouts and commerce raiders.

**GUNBOAT (1805)** Various kinds of small but heavily armed craft were developed for use in inland and coastal waters and for harbor defense. This British gunboat, carrying a carronade and a long gun, was designed to defend the British on Gibraltar against Spanish attack.
THE DESIGN OF WARSHIPS in the 19th century was revolutionized by the adoption of steam power, the replacement of wood by iron and steel in ship construction, and the development of rifled turret guns firing explosive shells. Change was at first quite slow. The first steam-powered fighting ship was the Demologos, an American paddle-wheel-driven harbor defense vessel of 1814, and the first iron-hulled ships emerged in the 1820s. But until the mid-19th century major navies still consisted primarily of wooden sailing ships. The advent of the screw propeller as an alternative to the paddle wheel was a crucial step forward (the first screw-driven warship was launched in 1843) and by the 1850s almost all new-built warships had steam engines as well as sails. The universal adoption of metal construction took longer. In the 1850s ships with hulls of wood or iron were covered with thick iron plates, creating the “ironclad”. In the 1870s steel began to be used both for hulls and armor, while sails finally disappeared as marine steam engines became more effective. This revolution in ship construction and propulsion was matched by changes in armament. Explosive shells replaced solid shot. Firing in broadside was gradually abandoned in favor of a much smaller number of large breech-loading guns mounted in revolving turrets—the effectiveness of a turret gun having been demonstrated by the American Monitor of 1861. The deployment of torpedoes created new problems for naval tacticians, and gave designers a chance to create new kinds of small, fast torpedo attack craft.

UNEASY TRANSITION
Some of the large warships built during the period of transition from wood and sail to steam and steel were ungainly and even unseaworthy. The positioning of guns, funnels, and masts (still needed for observation posts) often involved unsatisfactory compromises, as did the trade-off between armor and performance.
GLOSSARY

GRAPPLING HOOK A grapnel.
GREEK FIRE Inflammable liquid used as a kind of flamethrower in naval warfare by the Byzantines from the 7th century CE.
GUN PORT Opening in the hull of a ship through which ship’s guns are run out for firing.
HAWSER Heavy rope or steel cable used on board ship.
HEAVE TO To prevent forward movement of a ship, usually by bringing bow into the wind. A ship stopped this way is “hove to.”
HEMMEMA Swedish warship of the 18th century. Powered by oars or sail, it was used in the shallow coastal waters of the Baltic.
HULK Old, wrecked, or abandoned ship, often used as a barrier.
IRONCLAD Warship of the mid-19th century, originally built with wooden hull armored with iron plates.
KABUKSON Medieval Korean oar-powered warship, fitted with heavy cannon and an armored (spiked) upper deck (also known as a turtle ship).
KAMIKAZE The suicide attacks of Japanese pilots who intentionally crashed their airplanes into enemy ships toward the end of World War II. Usually translated “divine wind” after the typhoon that prevented the Mongol invasion of Japan in 1281.
KNOT Speed of one nautical mile per hour (~1.15 mph (1.85 kph)).
LANYARD Cord pulled to fire a gun, e.g. to activate the flintlock firing mechanism of a cannon.
LATEEN SAIL Triangular sail mounted at an angle on the mast.
LEE The side (e.g. of a ship) away from the direction of the wind.
LEE SHORE Shore on the leeward side of a ship, i.e. with the wind blowing toward the shore.
LEEWARD Opposite of windward, the direction downwind of the way the wind is blowing.
LIBURNIAN Small Roman warship.
LINE OF BATTLE Tactic developed in 17th century, where warships line up one behind the other to fire broadsides at the enemy with no risk of hitting their own ships.
LINE ABREAST Ships sailing side by side in a line are said to be “in line abreast.”

INTRODUCTION

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.

IRONCLAD (1862) CSS Virginia (above) was an ironclad Confederate States Navy warship, built on the burned-out hulk of USS Merrimack, which had been scuttled by the Union Navy. Her most famous engagement was against the USS Monitor at the battle of Hampton Roads during the American Civil War.

STEAM BOAT (1823) Lightning (below) was one of the first steam-powered vessels to enter the Royal Navy. She had two paddle wheels for propulsion and masts for sailing if needed. She served mainly as a survey vessel.
In the years between 1880 and the beginning of World War I in 1914, warship design settled into a generally recognizable format. Multiple guns were mounted along the centerline, and moving turrets provided wide arcs of fire. Armor plate, particularly around the magazine and the engine rooms, became critical, especially as guns, shells, propellants, and targeting equipment all went through dramatic improvements. By the end of World War I, battleships were sending shells of large caliber (12-in or even 15-in) accurately out to ranges of up to 60,000 ft (18,000 m).

Types of Warships
Three primary types of major surface vessel equipped the world’s navies from around 1900. Battleships were the capital ships, with multiple batteries of turret-mounted guns. The dreadnoughts, a generic name derived from the eponymous British battleship of 1906, almost exclusively carried very large-caliber guns for long-range ship-to-ship duels. Cruisers were faster and had longer range and lighter armament than battleships. The battlecruiser was designed to combine battleship armament with the speed of a cruiser, at the expense of much reduced armor. Finally, destroyers, developed from early torpedo boats, performed such roles as fleet defense and escort duties, as well as carrying out torpedo attacks. The bane of all surface warships was the submarine that first had a dramatic effect on naval warfare in World War I.

Power Factors
Propulsion also went through important changes from the last decades of the 19th century. The use of steam turbines produced better power more smoothly delivered, and during the second decade of the 20th century the major powers switched from coal-fired engines to oil-burning variants. Oil not only burned cleaner, but could be transferred easily at sea, and could power ships for longer distances.

In the years between 1880 and the beginning of World War I in 1914, warship design settled into a generally recognizable format. Multiple guns were mounted along the centerline, and moving turrets provided wide arcs of fire. Armor plate, particularly around the magazine and the engine rooms, became critical, especially as guns, shells, propellants, and targeting equipment all went through dramatic improvements. By the end of World War I, battleships were sending shells of large caliber (12-in or even 15-in) accurately out to ranges of up to 60,000 ft (18,000 m).

Types of Warships
Three primary types of major surface vessel equipped the world’s navies from around 1900. Battleships were the capital ships, with multiple batteries of turret-mounted guns. The dreadnoughts, a generic name derived from the eponymous British battleship of 1906, almost exclusively carried very large-caliber guns for long-range ship-to-ship duels. Cruisers were faster and had longer range and lighter armament than battleships. The battlecruiser was designed to combine battleship armament with the speed of a cruiser, at the expense of much reduced armor. Finally, destroyers, developed from early torpedo boats, performed such roles as fleet defense and escort duties, as well as carrying out torpedo attacks. The bane of all surface warships was the submarine that first had a dramatic effect on naval warfare in World War I.
GLOSSARY

**LINE AHEAD** Ships sailing in a line, one behind another, are said to be “in line ahead.”

**MAN OF WAR** Large sailing ship armed with cannon on two or three decks, the standard fighting ship of European navies from the 17th to the 19th century.

**MANGONEL** Medieval catapult, widely used in siege warfare.

**MARINE** Soldier carried on board a warship.

**MARQUE, LETTERS OF** License issued by a government to a privateer to engage warships or capture merchant shipping of another nation.

**MATCH, SLOW** Slow-burning cord used by gunners to light the priming powder in the touch-hole of a cannon.

**MIDSHIPMAN** Young boy taken aboard ship as a cadet to be trained up to be an officer.

**MIZZEN MAST** Third mast of a three-masted sailing ship, situated behind the mainmast. Often fitted with a lateen sail.

**MONITOR** Class of 19th-century ironclad warship that took its name from USS Monitor. Often applied to shallow-draft vessels used for shore bombardment.

**MORTAR** Muzzle-loading gun with a short, wide barrel for firing explosive shells at a high angle.

**MUZZLE-LOADER** Gun loaded from the front (muzzle) end, such as cannon where the shot and powder charge have to be rammed down the length of the barrel.

**NAVARCH** Supreme naval commander in Sparta and other Greek city-states.

**NAUTICAL MILE** 1.15 miles (1.85 km). 60 nautical miles = 1 degree of the earth’s circumference.

**OCTANT** Precursor of the sextant as an instrument for measuring angle of sun, moon, and stars to the horizon.

**PANEKSON** Medieval Korean war galley.

**PENTECONTER** Early Greek war galley, powered by 50 oars.

**POLYREME** Large oared galley of the Classical era with several oarsmen pulling on each oar.

**POOP** Highest deck of a sailing ship, situated at the stern, usually above the captain’s quarters.
MAJOR NAVIES entered World War II still preoccupied with developing bigger and better battleships. Ships under construction when the war started included the German *Tirpitz* (right) and *Bismarck*. With their high speed, armor, and 15-in (380-mm) guns, these were among the most advanced ships of World War II.

**BATTLESHIP (1939)** Germany began rebuilding its navy in 1936 with the battleships *Bismarck* (right) and *Tirpitz*. With their high speed, armor, and 15-in (380-mm) guns, these were among the most advanced ships of World War II.

**DESTROYER (1920)** 156 Clemson-class destroyers were mass-produced for the US Navy from 1919. Many of the destroyers were decommissioned as part of the naval treaties but others, including USS Bainbridge (right) served through World War II.

**BATTLESHIP (1939)** Britain’s King George V-class battleships were built with 14-in guns because of the restrictions imposed by the naval treaties. They were faster and better armored than previous Royal Navy battleships, but were outgunned by *Bismarck* and *Tirpitz*.

World War II Warships

**BATTLESHIP (1939)**

Germany began rebuilding its navy in 1936 with the battleships *Bismarck* (right) and *Tirpitz*. With their high speed, armor, and 15-in (380-mm) guns, these were among the most advanced ships of World War II.

**DESTROYER (1920)**

156 Clemson-class destroyers were mass-produced for the US Navy from 1919. Many of the destroyers were decommissioned as part of the naval treaties but others, including USS Bainbridge (right) served through World War II.

**BATTLESHIP (1939)**

Britain’s King George V-class battleships were built with 14-in guns because of the restrictions imposed by the naval treaties. They were faster and better armored than previous Royal Navy battleships, but were outgunned by *Bismarck* and *Tirpitz*.

**INTRODUCTION**

Warships through Time

**WARSHIPS THROUGH TIME**

**WORLD WAR II WARSHIPS**

**BATTLESHIP (1939)**

Germany began rebuilding its navy in 1936 with the battleships *Bismarck* (right) and *Tirpitz*. With their high speed, armor, and 15-in (380-mm) guns, these were among the most advanced ships of World War II.

**DESTROYER (1920)**

156 Clemson-class destroyers were mass-produced for the US Navy from 1919. Many of the destroyers were decommissioned as part of the naval treaties but others, including USS Bainbridge (right) served through World War II.

**BATTLESHIP (1939)**

Britain’s King George V-class battleships were built with 14-in guns because of the restrictions imposed by the naval treaties. They were faster and better armored than previous Royal Navy battleships, but were outgunned by *Bismarck* and *Tirpitz*.

**SUBMARINE WARFARE**

Powered by diesel engines on the surface and electric motors under the sea, submarines remained relatively primitive “submersibles” until relatively late in the war, when the Germans introduced U-boats capable of sustained underwater operations. Yet even these unsophisticated boats had a critical impact in both the Pacific and the Atlantic theaters. A whole new range of anti-submarine weaponry was deployed aboard destroyers, frigates, sloops, and corvettes. Radar and sonar detection technologies became integral to naval warfare, particularly in detecting enemy aircraft or submarines. The importance of amphibious operations in World War II also drove the development of a broad spectrum of landing craft.

**Carriers**

Air carriers had been under development since World War I, and during World War II naval air power came to maturity. Equipped with a mix of dive-bombers, torpedo, and fighter aircraft, fleet carriers proved a dominant force especially in the Pacific theater, where some naval battles were fought exclusively between carriers. Smaller escort carriers provided air cover for convoys.

**Submarine Warfare**

Powered by diesel engines on the surface and electric motors under the sea, submarines remained relatively primitive “submersibles” until relatively late in the war, when the Germans introduced U-boats capable of sustained underwater operations. Yet even these unsophisticated boats had a critical impact in both the Pacific and the Atlantic theaters. A whole new range of anti-submarine weaponry was deployed aboard destroyers, frigates, sloops, and corvettes. Radar and sonar detection technologies became integral to naval warfare, particularly in detecting enemy aircraft or submarines. The importance of amphibious operations in World War II also drove the development of a broad spectrum of landing craft.
LANDING CRAFT (1942) Before 1940, Allied forces had few landing craft capable of putting heavy vehicles onto beaches. The American Landing Craft (Tank) was one of the most successful new designs, proving its worth during large scale amphibious assaults such as the Normandy landings in June 1944.

U-BOAT (1940) The Type VIIc U-boat was the most widely used German submarine during World War II with a total of 568 built. U-boats had diesel engines for operating on the surface but were powered with electric motors when submerged.

PT BOAT (1942) A variety of motor torpedo boat used by the US Navy in World War II. Small, fast, and armed with several torpedoes, they provided an inexpensive way of attacking large surface ships, even battleships, without requiring heavy naval guns.
Since the end of World War II, naval warfare has been dominated by the aircraft carrier, the submarine, and the guided missile. The age of the battleship was over, even if big guns still served a purpose for shore bombardment. Aircraft carriers began to grow in size so that they could operate jet aircraft. By the 1970s, however, only the United States could afford to operate a fleet of full-size carriers—these were virtual floating cities, with enough air power to sustain an independent air campaign and were driven by nuclear powerplants that allowed them to stay at sea for an almost indefinite period of time. Smaller carriers were still deployed by some of the less affluent countries, and by the US Navy as “assault ships,” operating helicopters and vertical/short take-off and landing (V/STOL) jet aircraft.

Guided Missiles
The development of guided missiles dramatically altered the nature of surface warfare at sea. Guns were reduced to a subsidiary role, with most surface vessels retaining only a single automatic cannon on the foredeck. By this point in time warships effectively became floating electronics and missile platforms. The destroyer ceased to have a role as a torpedo-attack ship, assuming a range of roles including fleet defense against air attack using anti-aircraft missiles. Frigates tended to specialize in anti-submarine warfare. Both vessels were driven by gas-turbine engines and were designed to be able to carry at least one helicopter. The offensive role of naval guns, meanwhile, was largely taken over by ship-killing missiles—which could be carried even by quite small patrol boats—and by Cruise missiles that were used for the bombardment of land targets.

To defend against attack, warships began to deploy a range of electronic countermeasures designed to confuse missile guidance systems. Control rooms on modern naval vessels became vastly complex suites of electronic equipment, including links to surveillance satellites.
**FRIGATE (1980)** Frigates were reintroduced during World War II for convoy defense against submarines. Ships like West German Bremen class Rheinland Pfalz served in the Cold War.

**NUCLEAR SUBMARINE (1960)** Submarines powered by nuclear reactors, such as HMS Dreadnought, were capable of staying submerged for weeks while maintaining speeds close to 30 knots. The hull shape, known as a “teardrop hull” was designed to minimize drag under water.

**TYPHOON-CLASS SOVIET SUBMARINE (1980)** Built as rivalry between the US and the Soviet Union increased in the 1980s, the nuclear-powered Typhoon-class is the largest submarine ever built. In the event of nuclear war she could remain submerged for more than 180 days.
THE AGE OF GALLEYS

THE GALLEY WAS INVENTED in the eastern Mediterranean in the early 3rd millennium BCE. Although galleys had a sail or sails, they were distinguished by the fact that they could be propelled by oars alone if required. Oars were used either when the wind was absent or contrary, or when faster propulsion was required or tighter maneuver—as in battle. These extraordinary war machines, propelled by their great gangs of oarsmen, held their place, with variations of design and tactics, as the prime warships of Europe for around 3,000 years. From the 15th century onward galleys were gradually supplanted by ocean-going sailing ships, capable of year-round operation in all weathers and providing a superior platform for heavy cannon.

EARLY GALLEY WARFARE
The first recorded use of a warship was an Egyptian sortie into Lebanon and Palestine around 2450 BCE, when troops were landed by sea, presumably ferried from the Nile delta. By the reign of the great pharaoh Thutmose III a thousand years later, seaborne movement of troops was standard Egyptian practice. By this time another warlike use of galleys was emerging. In Egyptian sources around 1500—1300 BCE there is a record of sea raiders seizing merchant ships, attacking coastal settlements, and blockading ports. There are reckoned by this time to have been galleys that carried marines—including archers and javelin-throwers—and others in which the rowers doubled as fighting men, as they would later in the era of the Vikings.

Actual battles at sea emerge in shadowy form in the historical record around the 12th century BCE. At first there was no evidence of naval maneuvers—these were simply fights between soldiers on water. But the sea-going peoples of the eastern Mediterranean, especially the Phoenicians and the Greeks, developed skills as sailors that could be applied to warfare, using the first specialist warships, the penteconter and the trireme.

PERSIA AND THE GREEKS
Some of the basics of naval warfare became evident very early on. To become a naval power a state needed a population with seafaring skills and the resources to finance a fleet—it has always been very expensive to build and man a body of ships. The Persian Empire was the first state to develop a fleet as an element in large-scale power-projection, buying the services of Phoenician and Greek sailors to provide the necessary expertise. Faced with a Persian invasion in the 5th century BCE,
the Greek city-state of Athens used the silver produced by its richest mine to pay for a countering fleet. Victorious against Persia, Athens became the greatest naval power in the eastern Mediterranean, creating the world’s first maritime empire. It was in the wars between the Greeks and Persians and between Athens and other Greek city-states that naval battles were for the first time fought on a large scale.

**BUILDING BIGGER**
The success of the Athenians was based upon the ramming power of the swift manoeuvrable trireme—the galley itself used as a weapon to sink enemy ships. This was a tactic that exploited the superior skills of Athenian oarsmen. States with more powerful armies and less skilled sailors opted for different tactics using different kinds of galley. From the 4th century BCE rulers such as Dionysius of Sicily, the Ptolemies in Egypt, and the Seleucids in Syria built larger vessels that were powered by vast numbers of less skilled oarsmen. These quinqueremes and even larger polyremes carried artillery in the form of siege machines, capable of hurling rocks at an enemy, and were packed with troops. Instead of the rapier thrusts of the trireme’s ram, battles were won by bludgeoning the enemy’s ships with firepower and boarding them with bodies of soldiers.

When the rising Roman Republic came into conflict with the greatest naval power in the western Mediterranean, Phoenician Carthage, in the First Punic War in the 3rd century BCE, the stage was set for some of the largest naval battles ever fought, involving hundreds of thousands of men. Eventually Rome’s willpower and resources made up for lack of naval experience and it was left as the sole dominant power in the Mediterranean.

**CONTINUING THE GALLEY TRADITION**
In galley warfare there was no sharp transition from the “ancient” to the “medieval” world. Rome’s eastern successor state, the Byzantine Empire, fought Arab fleets from the 7th century in battles whose chief novelty was the use of “Greek fire” as an incendiary weapon. The tradition of galley warfare was maintained in the second millennium above all by the Italian city-states—chiefly Venice and Genoa—which financed fleets from the profits of trade with the Black Sea and the Levant and from selling their services to larger powers. As well as fighting pitched battles, their war galleys also engaged in regular commerce raiding. The Catalans and the sailors of Provence were also involved in wars fought for control of trade routes and for possession of islands and coastal bases.
Nor were they suited to sailing in heavy seas, and marines, galleys could not carry supplies to small ships with a large complement of oarsmen. But what was most remarkable was perhaps the conservatism of combat between galleys: advance to battle in line abreast; a preliminary exchange of missiles; ramming or grappling, followed by boarding of enemy ships. Such tactics served for 2,000 years. The limitations of galley warfare were considerable. Relatively small ships with a large complement of oarsmen and marines, galleys could not carry supplies to stay at sea for periods longer than a few days. Nor were they suited to sailing in heavy seas. Galley warfare was thus restricted to coastal waters, and almost always ceased in the winter months when the weather was too rough. These limitations did not matter much until the rise of the sailing warship in northern and western Europe presented a direct challenge to the reign of the war galley and to the central importance of the Mediterranean as a theater of naval warfare.

**LIMITED WAR**

Through the rise and fall of Mediterranean naval powers, there were inevitably changes in galley construction, tactics, and weaponry. But what was most remarkable was perhaps the conservatism of combat between galleys: advance to battle in line abreast; a preliminary exchange of missiles; ramming or grappling, followed by boarding of enemy ships. Such tactics served for 2,000 years. The limitations of galley warfare were considerable. Relatively small ships with a large complement of oarsmen and marines, galleys could not carry supplies to stay at sea for periods longer than a few days. Nor were they suited to sailing in heavy seas. Galley warfare was thus restricted to coastal waters, and almost always ceased in the winter months when the weather was too rough. These limitations did not matter much until the rise of the sailing warship in northern and western Europe presented a direct challenge to the reign of the war galley and to the central importance of the Mediterranean as a theater of naval warfare.

**NORTHERN WATERS**

Galleys were never confined exclusively to the Mediterranean. The Viking longships that terrorized northern Europe in the 9th century, with their mix of oars and sails, were a kind of galley. Oared ships played an important part in warfare in the Baltic into the 18th century. In medieval times merchant galleys sailed in convoys from the Mediterranean to England and Flanders, and war galleys were used by the kings of France and Castile in battles against the English kings in the English Channel and the Bay of Biscay. But countries with Atlantic shorelines had their own shipbuilding and ship-fighting traditions more suited to rougher, wider waters. The round ships known as cogs, developed initially as merchant vessels, became warships, because navies took over merchant ships in times of war. They provided a high platform for bowmen and men-at-arms in battles such as Sluys, fought between the English and French in 1340—essentially a land battle fought on water. By the end of the 15th century, ships relying on oars for even part of their propulsion had only a subsidiary role to play in warfare in most northern waters, supporting larger sailing ships such as carracks and caravels.

**ASIAN DEVELOPMENTS**

Asia and the Indian Ocean, meanwhile, had their own traditions of naval warfare. Most of this took place in coastal or inland waters and was a direct adjunct to land warfare. By the time a permanent Chinese navy was founded by the Song dynasty in 1132, China had an array of diverse vessels including paddlewheel ships, galleys, and sailing ships. Exploiting the resources of a prosperous and populous state, China became the world’s greatest naval power, although Europeans knew little or nothing about it. In the early 15th century the Ming dynasty embarked on naval power-projection on a vast scale with the voyages of Admiral Zheng He, who took a fleet of massive war junks around southeast Asia and across the

---

**Timeline**

- **1210**: First recorded sea battle between the Hittites and the Cypriots
- **800**: Foundation of Carthage by the Phoenicians, the leading maritime power in the Mediterranean
- **500**: Greek city states such as Corinth and Athens develop the trireme, powered by three banks of oars and designed for ramming
- **1200 BCE**: Foundation of Carthage by the Phoenicians, the leading maritime power in the Mediterranean
- **1190**: Egyptians win sea battle against the “Sea Peoples”
- **31**: Battle of Actium: Octavian’s defeat of Antony and Cleopatra gives Rome mastery of the Mediterranean
- **480**: Battle of Salamis: decisive naval victory of the Greeks over the invading Persians
- **431–404**: Peloponnesian War: Athens defeated by alliance of rival Greek city-states led by Sparta
- **264–241**: First Punic War: Romans build fleet to challenge the Carthaginians for control of the western Mediterranean
Indian Ocean as far as east Africa. The decision of the Ming to withdraw from such maritime adventures after the 1430s was one of the turning points of world history.

**NEW OCEAN-GOING POWERS**

As Ming China turned inward, the states along Europe’s Atlantic seaboard sought to exploit their maritime skills to capture the wealth of the luxury trade that previously had always passed through the Mediterranean from Asia to Europe. At the end of the 15th century the Portuguese found their way around southern Africa into the Indian Ocean, while Christopher Columbus, sailing in the name of the Spanish crown, accidently landed in the West Indies. The result was a total shift in the European—and global—balance of power. The future lay with the ocean-going sailing ships of northern and western Europe, armed with cannon to make them impressive fighting machines engaging in a new kind of naval warfare.

**GALLEY SWANSONG**

As this fundamental change took place, however, an intense power struggle developed in the Mediterranean that brought the age of galley warfare to an epic climax. The rapid rise of the Muslim Ottoman Empire, which conquered the Byzantine capital Constantinople in 1453, confronted the Christian states of the Mediterranean with a formidable new enemy. The Ottomans possessed impressive resources, great organizational skills, and an apparently unstoppable will to power. While the Ottoman sultans created a large galley fleet to support military operations against Christian-ruled Mediterranean islands, their vassals and allies, the Barbary corsairs of North Africa raided and pillaged the coasts of Italy and preyed upon merchant shipping. The vast battle of Lepanto, fought in 1571 between an alliance of Christian states and the Ottomans and the Barbary corsairs, was the last great engagement of the long age of galley warfare in Europe.

Although the ramming, grappling, and boarding at Lepanto would have been familiar to many earlier generations of galley sailor, cannon and firearms had now become crucial elements in combat between galleys. Oared ships could never be as successful a platform for cannon as the much larger sailing ships. War galleys remained in use until the end of the 18th century, but their role in naval warfare became increasingly specialized and localized. The age of the sailing ship had arrived.

---

**Last great galley battle**

The victory of the Holy League over the Ottoman navy at Lepanto in 1571 is generally believed to mark the end of the age of galleys. Nevertheless, galleys continued to play an important part in sea battles in the Mediterranean and the Baltic throughout the 17th and 18th centuries.
EARLY NAVAL BATTLES AND THE RISE OF THE GREEKS

ALTHOUGH THERE WERE other seafaring peoples, notably the Phoenicians, around the coasts of the Mediterranean in ancient times, the development of early naval warfare is especially associated with the Greek city-states. Their wars against the Persians in the 5th century BCE and then against one another in the Peloponnesian War (431–404 BCE), generated sea battles large and small. The trireme, a powerful but nimble war galley armed with a ram at its prow, made naval combat into a contest of maneuver between teams of skilled oarsmen. The Greek cities—especially Athens—put impressive resources of money and manpower into their navies. At the battle against the Persians at Salamis there may have been as many as 34,000 oarsmen on the Greek side.

EARLY SEA POWER
The first sea battle of which record exists occurred in 1210 BCE off the island of Cyprus. Nothing is known of it but the bare fact that the fleet of Hittite King Suppiluliumus II defeated the Cypriots. Our earliest depiction of naval forces in action comes from two decades later, in 1190 BCE, when the Egyptians fought the invaders known as the Sea People in the Nile Delta. The Sea People’s naval force was apparently ambushed, for an Egyptian text states: “Those who entered the river mouths were like birds ensnared in a net.” Egyptian archers on oared river vessels and on shore deluged the invaders’ packed ships with arrows, before the pharaoh’s galleys closed to allow soldiers with shields and spears to board them. There is no evidence that the vessels involved were specifically designed for warfare. This was a battle that could have been fought in similar fashion on land—except that on land it was always possible to run away. Other seagoing peoples in the eastern Mediterranean, such as the Minoans and Mycenaeans, probably fought their sea battles in much the same manner.

The most skilled seafarers of ancient times were the Phoenicians and the Greeks. Their gifted boat-builders and sailors developed specialist warships that depended on experienced crews to operate successfully. In the 6th century BCE Phoenicians and Greeks came into conflict.
The Phoenicians had established a colony at Carthage in North Africa and sought to dominate the western Mediterranean. Various Greek cities challenged this dominance, notably Phocaea, which founded a colony in the South of France that would become Marseilles.

**RAMMING AND TRIREMES**

The encounters between the Carthaginians and Phocaeans—notably the battle of Alalia fought off Corsica around 540 BCE—were ramming combats. Both sides used 50-oar penteconters, purpose-built warships with rams, although the Carthaginians may also have fielded larger biremes. The contest was a draw: the Phocaeans maintained a toehold in southern France and the eastern part of Sicily, while the Carthaginians retained overall superiority in the western Mediterranean.

The penteconter was the first true warship, but it was surpassed in performance by the trireme, made famous by the Athenian-led Greek victory at Salamis in 480 BCE. The trireme was a fast stripped-down vessel packed with oarsmen for maximum rowing power. There was no room to eat or sleep on board, or to carry substantial supplies. The crew went ashore every day, buying food from coastal towns and villages, and eating and sleeping beside their beached ships. In battle, the trireme was designed to crush the hull of an enemy ship with its ram after maneuvering for superior position—it would not actually “sink” the ship, since the waterlogged wreck of a galley would stay afloat to be towed away by the victor. Sails were not used in battle—the mainmast was usually left behind onshore when expecting combat, although a smaller mast might be carried so a sail could be hoisted to flee the field if worsted. Expert oarsmanship was required to get through or around the enemy line. The ideal was to ram from the side, then the trireme had to back oars to disengage from the ship it had rammed—always a tricky performance. The rowing benches were manned by free citizens or hardened professionals from abroad. Even well motivated oarsmen tired easily, so exhaustion was often a major factor in galley warfare.

The Athenians rarely used boarding as a tactic in trireme combat. A handful of hoplite soldiers and archers were carried on board to bombard the enemy with missiles and to cope with a situation in which two galleys accidentally became locked together. Fleets with less skilled crews, however, often carried more marines and hoped to seize a chance to board that would compensate for their shortcomings in maneuver.

**END OF AN ERA**

During the 4th century BCE larger galleys packed with infantry and carrying artillery were introduced into Mediterranean warfare. The trireme, which had been both the emblem and the instrument of the naval dominance of the Greek city-state, was relegated to a secondary role in major battles.

**TRIREME TACTICS**

**RAMMING**

Although Ancient Greek sea battles tended to degenerate into chaos, there were attempts at coherent command at fleet level and at systematic maneuver. The favored tactical ploys were the *diekleps* and the *periplous*.

- **Diekleps**: This straightforward tactic basically involved punching a hole in the enemy line so other ships could follow through the gap and get to the enemy’s rear.  
- **Periplous**: This outflanking maneuver was most easily executed when one fleet was larger than its enemy’s. As with the *diekleps*, its aim was to reach the enemy’s rear.
The Persian Wars

The First of the Wars between the Greek city-states and Persia was provoked by the Ionian revolt in 499 BCE, a rebellion of the Greek cities of Asia Minor, which were under Persian rule. After suppressing this revolt, the Persians embarked on two unsuccessful invasions of Greece itself. The Persian fleets were initially superior at sea, but by 480, under the inspired leadership of Themistocles, Athens had built a formidable force of triremes. This enabled the Greek allies to crush the invaders at Salamis. The Greeks then took the offensive, using their sea power to carry out operations in Asia Minor, Cyprus, and Egypt.

The Persians and Ecbatana

During the Ionian revolt of the early 5th century BCE, Persia laid siege to the city of Miletus by land and sea. The Greeks assembled a substantial fleet, mainly from the islands of Chios, Lesbos, and Samos. According to the historian Herodotus, their commander, Dionysius, and Samos. According to the historian Herodotus, their commander, Dionysius, berated the crews for their slackness, subjecting them to a tough training routine that led to mutinous discontent. The Greeks sailed to confront the Persian fleet at Lade, Miletus’s port. The Phoenicians drew up their ships in a defensive formation, while the triremes from Samos led the Greek attack, rowing toward their enemy in line ahead. The aim of the Greek tactics, carefully rehearsed by Dionysius, was to punch a hole in the Phoenician line by ramming. But the Samians, daunted after their experience in training, had no stomach for the fight. Forty-nine of their 60 triremes never engaged the enemy, instead raising sails and heading for home. The 70 galleys from Lesbos followed suit. Vastly outnumbered, the remaining Greek triremes engaged the enemy, inflicting substantial losses, but were eventually overwhelmed and annihilated. This defeat condemned the Ionian revolt to failure.

THE RAM OF A TRIREME

The bow of an Athenian trireme was equipped with a bronze-sheathed ram just below the waterline. Weighing around 440 lb (200 kg), its function was to smash the hull of an enemy vessel from the side. The ram was designed to avoid locking into the hull it had penetrated. The trireme crew were expected to reverse fast after ramming, pulling back to disentangle their ship from the enemy’s and then attack another victim. Rams may have been deliberately designed to detach if they were subjected to substantial strain, thus preventing attacking ships from being dragged under water by a sinking opponent.

Bronze beaked ram

The ram on the reconstructed trireme Olympia is based on depictions in Greek art and on a well-preserved example from the seabed near Haifa, Israel.

THE PERSIAN EMPIRE

The Persian Empire, founded by Cyrus the Great in the 6th century BCE, expanded westward into the Middle East, Egypt, and Asia Minor, rapidly becoming the dominant power in the eastern Mediterranean. Under Cyrus’s successor Darius, it even extended into Europe. The revolt of the Greek city-states on the Aegean coast of Asia Minor led to the invasions of Greece mounted by Darius (492 BCE) and his son Xerxes (480 BCE).

GRECO–PERSIAN WARS

DATE: c.499—448 BCE

The Athenian-led Delian League was built to keep the Persians out of Asia Minor and establish firm control of the Aegean. After most coastal towns had fallen to the Persians, the Delian League, a fleet under the command of Cimon of Athens, sought to bring the Persian fleet to battle. Cimon’s naval force consisted of some 250 Athenian triremes plus 100 other ships supplied by allies. The Persians had a similar number of ships commanded by Tithraustes, an illegitimate son of Xerxes. They were anchored in the mouth of the Eurymedon River, close to a force of Persian soldiers camped on the coast. According to the Greek historian Plutarch, the Persian fleet was expecting Phoenician reinforcements to arrive from Cyprus, but Cimon attacked as soon as he could. The Persians tried to row away but they were trapped and many of their ships were captured. The survivors joined the soldiers ashore. Landing with his sailors and marines, Cimon then won a second battle, attacking the Persian camp under cover of darkness. These “twin battles” were followed by another naval encounter, in which the Delian League pursued and destroyed the Phoenician reinforcements.

TWIN BATTLES OF EURYMEDON

DATE: c.490 BCE

The Athenian-led Delian League mounted a campaign to drive the Persians out of Asia Minor and establish firm control of the Aegean. After most coastal towns had fallen to the League, a fleet under the command of Cimon of Athens sought to bring the Persian fleet to battle. Cimon’s naval force consisted of some 250 Athenian triremes plus 100 other ships supplied by allies. The Persians had a similar number of ships commanded by Tithraustes, an illegitimate son of Xerxes. They were anchored in the mouth of the Eurymedon River, close to a force of Persian soldiers camped on the coast. According to the Greek historian Plutarch, the Persian fleet was expecting Phoenician reinforcements to arrive from Cyprus, but Cimon attacked as soon as he could. The Persians tried to row away but they were trapped and many of their ships were captured. The survivors joined the soldiers ashore. Landing with his sailors and marines, Cimon then won a second battle, attacking the Persian camp under cover of darkness. These “twin battles” were followed by another naval encounter, in which the Delian League pursued and destroyed the Phoenician reinforcements.

THEMEISTOCLES

A prominent Athenian political leader, Themistocles takes credit for founding the city’s naval power by persuading the popular assembly in 482 to spend the wealth from a newly discovered vein of silver on building a fleet of triremes. The following year he proposed the detailed measures adopted to organize the fleet to meet the Persian invasion, which were codified in the “Decree of Themistocles.” During the key battles of Artemisium and Salamis he showed tactical ingenuity and political subtlety. He held together a fragile alliance with Sparta and his other Peloponnesian allies while discreetly exercising personal command of tactics and strategy. After the threat of Persian invasion had passed, Themistocles was involved in the rebuilding of Athens, which had been sacked by Xerxes, and in the development of Piraeus as the city’s port. Always a controversial figure, he was later ostracized and expelled from Athens, ironically ending his life in the service of his old enemies, the Persians.

GRECO–PERSIAN WARS

THE FIRST OF THE WARS between the Greek city-states and Persia was provoked by the Ionian revolt in 499 BCE, a rebellion of the Greek cities of Asia Minor, which were under Persian rule. After suppressing this revolt, the Persians embarked on two unsuccessful invasions of Greece itself. The Persian fleets were initially superior at sea, but by 480, under the inspired leadership of Themistocles, Athens had built a formidable force of triremes. This enabled the Greek allies to crush the invaders at Salamis. The Greeks then took the offensive, using their sea power to carry out operations in Asia Minor, Cyprus, and Egypt.

THE PERSIAN WARS

The Persians and Ecbatana

During the Ionian revolt of the early 5th century BCE, Persia laid siege to the city of Miletus by land and sea. The Greeks assembled a substantial fleet, mainly from the islands of Chios, Lesbos, and Samos. According to the historian Herodotus, their commander, Dionysius, berated the crews for their slackness, subjecting them to a tough training routine that led to mutinous discontent. The Greeks sailed to confront the Persian fleet at Lade, Miletus’s port. The Phoenicians drew up their ships in a defensive formation, while the triremes from Samos led the Greek attack, rowing toward their enemy in line ahead. The aim of the Greek tactics, carefully rehearsed by Dionysius, was to punch a hole in the Phoenician line by ramming. But the Samians, daunted after their experience in training, had no stomach for the fight. Forty-nine of their 60 triremes never engaged the enemy, instead raising sails and heading for home. The 70 galleys from Lesbos followed suit. Vastly outnumbered, the remaining Greek triremes engaged the enemy, inflicting substantial losses, but were eventually overwhelmed and annihilated. This defeat condemned the Ionian revolt to failure.

THE RAM OF A TRIREME

The bow of an Athenian trireme was equipped with a bronze-sheathed ram just below the waterline. Weighing around 440 lb (200 kg), its function was to smash the hull of an enemy vessel from the side. The ram was designed to avoid locking into the hull it had penetrated. The trireme crew were expected to reverse fast after ramming, pulling back to disentangle their ship from the enemy’s and then attack another victim. Rams may have been deliberately designed to detach if they were subjected to substantial strain, thus preventing attacking ships from being dragged under water by a sinking opponent.

Bronze beaked ram

The ram on the reconstructed trireme Olympia is based on depictions in Greek art and on a well-preserved example from the seabed near Haifa, Israel.
The Persian Emperor Xerxes invaded Greece in 480 with a massive army accompanied by an impressive fleet. While the Spartans confronted the Persian army at Thermopylae, a Greek fleet of 271 triremes, about half of them Athenian, was sent to Artemisium at the northern end of the island of Euboea. The fleet was commanded by a Spartan, Eurybiades, with Themistocles, the mastermind of Athenian naval expansion, as his second-in-command.

Sailing down the Greek coast the Persian fleet suffered heavily in a violent storm that, according to Herodotus, cost them 400 ships. But the force that reached the harbor of Aphaetae, on the mainland north of Artemisium, in mid-August still far outnumbered the Greeks. Sensing the possibility of a crushing victory, the Persian commander Achaemenes sent 200 of his ships down the east coast of Euboea, hoping to sail around the south of the island and cut off the Greek fleet’s line of withdrawal.

The fighting at Artemisium began with a late afternoon sortie by the Greeks, apparently designed to test their enemy’s mettle. The Greeks had by far the better of the resulting skirmish. With skilful rowing they rammed and captured 30 ships before nightfall.

The following day was a fortunate one for the Greeks. Another sudden storm wrecked the fleet of 200 Persian ships traveling along the exposed east coast of Euboea. Meanwhile, the Greek fleet was reinforced by the arrival of 53 more Athenian triremes. The Persians decided to seek a conclusive combat.

The next morning their fleet closed in on Artemisium in a sickle formation designed to block any escape from the bay. The Greeks rowed out vigorously, hoping to smash a way through the Persian line, but, by the time the fleets broke off combat, almost a third of their triremes had been sunk or captured.

Although the Persians had also suffered heavily, the news of the Persian victory on land at Thermopylae persuaded the Greek commanders to withdraw. They pulled back to the island of Salamis, where the decisive battle of the war would be fought.

**The bodies of the slain and broken pieces of the damaged ships drifted in the direction of Aphaetae, and floated about the prows of the vessels there, disturbing the action of the oars.**

HERODOTUS, DESCRIBING THE AFTERMATH OF THE FIRST CLASH OFF ARTEMISIUM

Sea around the island of Euboea

The Persian and Greek fleets clashed in the narrow straits that divide the Greek mainland from Euboea. The battle of Artemisium was fought at the northern end where the straits open out into the Aegean Sea.
In September 480 BCE the Greek city-states resisting invasion by the Persian Emperor Xerxes were facing defeat. As the Persian army pressed southward, Athens evacuated its population to the island of Salamis, where the Greek fleet assembled in Paloukia Bay. Athens duly fell to Xerxes, who felt confident that the conquest of Greece was close to being accomplished.

**FAITH IN THE ORACLE**
The Greek fleet's Spartan commander, Eurybiades, favored withdrawal, but the Athenian Themistocles argued they should stand and fight. He invoked a recent prophecy by the Delphic oracle, that Greece would be saved by a "wooden wall." He claimed that this referred to the Greek ships and, since he controlled the Athenian triremes, around half of the entire Greek naval force, his voice prevailed. Xerxes, meanwhile, was bent upon finishing off the Greeks as quickly as possible. He was only worried that their fleet might slip away before he could crush it.

To stand a chance of victory, Themistocles needed to negate the Persians' numerical advantage—perhaps three ships to one. He planned to induce Xerxes to divide his fleet. An agent was sent to the Persian emperor, pretending to be a deserter. He told Xerxes that the Greeks were on the point of withdrawing. Xerxes responded exactly as Themistocles would have wished. One squadron of Persian ships was dispatched to block the western end of the Megarian Strait, another sent to patrol the southern coast of Salamis. During the night his other two squadrons were ordered out to patrol the eastern end of the strait. At dawn these two Persian squadrons headed into the strait toward Paloukia Bay, but their oarsmen were tired after their night's exertions. The Greeks, who had slept soundly on shore, pushed off from the beach, fresh and ready for battle.

The Persians heard them approaching before they saw them, a cacophony of war songs and bugles echoing out from the sheltered bay. The Greeks emerged from behind the island at the mouth of the bay a little too quickly. Wanting to stay close to shore, where the Persians could not use their numbers to outflank them, the Greeks had to back oars momentarily—giving an impression of hesitation or flight that drew the Persians forward.

**JARRING CLASH**
The Greek triremes maneuvered to smash their bronze rams into the hulls of the larger Persian ships. Where galleys became entangled, armored Greek hoplites fought face to face with Persian soldiers, while arrows and spears rained down on both sides. The sea was littered with broken oars, wreckage, and the bodies of the slain. To the dismay of Xerxes, watching the battle from a hilltop on the shore, his right wing gave way under the battering from the Athenian triremes on the Greek left. His commander, Ariabignes, was killed and central control rapidly disintegrated. As the Athenians swung around to attack the Persian center and right from the flank and rear, the battle turned into a rout, with surviving Persian ships escaping as best they could. Salamis ended Xerxes' attempt to conquer Greece. It was the first decisive naval battle in history.

**Saviors of Greece**
This amber seal is carved with a striking image of a trireme with a row of armed hoplites on its deck. It dates from the time of the battle of Salamis. It is carved with a striking image of a trireme with a row of armed hoplites on its deck. It dates from the time of the battle of Salamis.
35

1. **EARLY MORNING**
   - The Persian fleet blocks the eastern exit from the Salamis channel. Expecting the Greeks to try to escape, they have spent the night on patrol or on watch for Greek ships. The Greeks, however, are well rested after spending the night ashore.

2. **THE PERSIAN PURSUIT**
   - The Persians are lured into the narrow strait between the island of Salamis and the mainland. Despite their overwhelming numerical superiority, the size of their ships is now a handicap and they are at the mercy of the nimble Greek triremes.

3. **GREEK COUNTERATTACK**
   - In the narrow channel, the smaller Greek triremes outmaneuver the Persians, making devastating use of their rams. At least 200 Persian warships are sunk, while the Greeks lose only 40 of their triremes.
THE PELOPONNESIAN WAR

IN THE SECOND HALF of the 5th century BCE Sparta, Corinth, and other city-states of the Peloponnese fought to throw off the dominance of Athens. While the Spartans were superior on land, the Athenians’ superior seamanship generally gave them the upper hand in battles fought at sea. It was only after the disastrous failure of the Athenian expedition to Sicily (415–413 BCE) that the Peloponnesians were able to make a serious bid for naval superiority. When their fleet was destroyed at Aegospotami in 405, the Athenians had lost the war.

<table>
<thead>
<tr>
<th>THE PELOPONNESIAN WAR</th>
<th>431–404 BCE</th>
</tr>
</thead>
</table>
| **CORINTHIAN WAR WITH CORCYRA**

**SYPHOTA**

*Date:* 432 BCE  
*Forces:* Corcyreans and Athenians: 140 ships; Corinthians: 150 ships  
*Losses:* Corcyreans: c.70 ships; Corinthians: c.30 ships  
*Location:* Between Corfu and Sybota  

In 433 BCE Corinth assembled a fleet to subdue its restive colony Corcyra (Corfu). Following a similar conflict two years earlier the Corcyreans had agreed to a treaty with Pericles, the Athenian leader, and now appealed to Athens for help. At first the Athenians sent only 10 triremes to give moral support. According to Thucydides, the Corinthians and Corcyreans fought “in the old-fashioned way,” using their ships for boarding with soldiers rather than for a running contest. The Corinthians came close to routing their enemy, but late in the day 20 more Athenian triremes arrived on the scene, deterring the Corinthians from attempting a landing on Corcyra itself. The inconclusive battle was the prelude to the Peloponnesian War.

**PELOPONNESIAN WAR**

**CYZICUS**

*Date:* 410 BCE  
*Forces:* Athenians: 100–150 ships; Spartans: 60–80 ships  
*Losses:* Athenians: few; Spartans: 60–80 ships  
*Location:* The Hellespont  

The Athenians, with Alcibiades as their principal commander, launched an amphibious operation to recapture the city of Cyzicus from the Spartans. Despite an unfortunate tendency to defect to the other side, Alcibiades was one of Athens most talented military leaders. He had just been reinstated as a general after a political coup in 411 BCE. Sailing from a forward base on the island of Proconnesus, Alcibiades first landed a body of soldiers south of Cyzicus. He then led a squadron of 40 triremes toward the city, while two other squadrons under generals Thrasybulus and Theramenes followed a distance behind, keeping close to shore. When they sighted Alcibiades with such a weak force, the Spartans sensed an easy victory. The Spartan general Mindarus led his triremes out of Cyzicus harbor. As Alcibiades appeared to flee, they pursued. The Athenian trap now closed. Thrasybulus and Theramenes appeared inshore of the Spartans, cutting them off from the harbor, and Alcibiades turned to attack. Many Spartan ships were sunk; the remainder succeeded in reaching a beach. A fierce land battle ensued, which the Athenians won.

**PELOPONNESIAN WAR**

**NAUPACTUS**

*Date:* 425 BCE  
*Forces:* Athenians: 100 ships; Peloponnesians: 6 ships  
*Losses:* Athenians: 1 ship; Peloponnesians: 6 ships  
*Location:* Off Naupactus, Gulf of Corinth  

In the winter of 430, a small squadron of Athenian triremes under Phormio established a base at Naupactus on the Corinthian Gulf. The following summer the Peloponnesian League sent a convoy of 47 ships carrying troops through the gulf. Phormio ambushed the convoy, which was forced into a defensive circle, then attacked and routed.

The Peloponnesians swiftly sought revenge, dispatching a fleet of 77 ships with the bold Spartan general Brasidas among its commanders. Phormio had received no reinforcements, so the Athenians were outnumbered by almost four to one. The two fleets moored opposite one another at the mouth of the gulf. Faster and more skilful at maneuver, the Athenians wanted to fight in open waters; Brasidas was determined to force them to fight in a confined space, where maneuver would be impossible. The Peloponnesians headed into the gulf, moving in column toward Naupactus. Obliged to defend his base, Phormio shadowed them on a parallel course close to the land. Choosing their moment, the Peloponnesians turned and bore down on the Athenian line. Nine of the Athenian triremes—the rear of the force—were trapped and forced to the shore, where fierce hand-to-hand fighting took place. The others fled for Naupactus pursued by some 20 enemy ships. As they reached the base, the rearmost trireme turned in a tight circle around a merchant vessel anchored offshore and rammed its nearest pursuer. Thrown into confusion, the Peloponnesians lost formation. An Athenian counterattack scattered them and put them to flight.

**WITNESS TO WAR**

**THUCYDIDES**  
GREEK HISTORIAN  

“... the enemy’s ships were now in a narrow space, and what with the wind and the small craft dashing against them, at once fell into confusion: ship fell foul of ship, while the crews were pushing them off with poles, and by their shouting, swearing, and struggling with one another, made captains’ orders and boatswains’ cries alike inaudible, and through being unable for want of practice to clear their oars in the rough water, prevented the vessels from obeying their helmsmen properly. At this moment Phormio gave the signal, and the Athenians attacked.”
THE PELOPONNESIAN WAR

In 415 the Athenians dispatched a seaborne expedition to attack the city of Syracuse in Sicily. In the spring of the following year they laid siege to the city, with their ships in the Grand Harbor. By fighting the Athenians in the enclosed waters of the harbor, the Syracusans could deny them the room to maneuver their light, agile triremes in the manner that had won so many naval battles. Also, the Syracusans reinforced the bows of their galleys—following the example of the Corinthians at Naupactus—so they could smash the hulls of the lighter Athenian vessels in a head-on collision.

While the Athenians had the worse of naval encounters within the harbor, they were also defeated in their efforts to enforce a blockade of the city by land. By late summer 413 Syracuse had become a trap for the Athenians from which they needed to escape either by land or sea. Their commander Nicias fatally hesitated, influenced by bad omens. By the time he decided to abandon the siege, the Syracusans had blocked the exit from the harbor with a line of galleys and smaller craft, leaving only a narrow passage clear.

Having decided on a breakout, the Athenians packed their ships with infantry and headed for the passage out of the harbor. The Syracusans had warships covering the passage and others in an arc to both sides. As the Athenians tried to smash through the blockade, the Syracusans fell on them from all sides and a general mêlée ensued. According to Thucydides, “never did so many ships fight in so small a space.” Triremes rammed and counter-rammed, becoming inextricably entwined; javelins, arrows, and stones showered onto decks; soldiers clashed in hand-to-hand combat. The Athenians tried to use grappling hooks but the Syracusans had covered the prows and other upper parts of their ships with hides so the hooks would not grip. After a long, hard fight the Athenians broke. Many of their galleys were lost and the rest driven back to shore. They still had more ships than their enemies, but their sailors were demoralized and a further breakout was not attempted. Instead, their troops tried to escape overland, but the entire force was captured. Those who were not executed were sold into slavery.

---

**FOURTH BATTLE OF SYRACUSE**

Date: September 9, 413 BCE
Location: Grand Harbor, Syracuse, Sicily
Result: Syracusan victory

**COMBATANTS**

ATHENS AND ALLIES

Syracuse and Allies

**COMMANDERS**

Nicias

Ogilpuss

**FORCES**

Ships: c.110

Ships: c.70

Men: unknown

Men: unknown

Ships: c.50

Ships: c.20

**LOSSES**

Hoplite helmet

Soldiers in the Greek city-states of southern Italy and Sicily wore helmets in the ornate so-called “Chalcidian” style.

Beached triremes

Fighting a sea battle in Syracuse harbor ended in disaster for the Athenian ships. When forced to disembark, sailors and soldiers alike were easy prey for the Syracusan troops on the shore.
In 406 BCE Sparta and its Peloponnesian allies assembled a large fleet of triremes. Under the command of the Spartan navarch Callicratidas, it caught up with the Athenian general Conon near Mytilene on the island of Lesbos, and sank 30 of his ships. When Callicratidas blockaded the Athenians in Mytilene harbour, Conon sent a message to Athens detailing his plight. The Athenians reacted by building a new fleet—paid for by melting down the gold statue of Nike—and recruiting slaves and foreigners in the city to serve as oarsmen, since the supply of experienced free rowers was exhausted.

Placed under the command of eight generals, this inexperienced fleet was sent to the relief of Mytilene. Leaving 50 of his ships to maintain the blockade, Callicratidas sailed to meet the Athenians, making camp at Cape Malea, from where he could observe his enemies beached on the Arginusae Islands an hour’s rowing away. The Spartan navarch planned a surprise night attack but this was abandoned because of a squall. Instead, it was at dawn that Callicratidas, positioned in the place of honor on the right wing, led his ships across the channel toward the enemy camp.

The Athenians scrambled to launch their ships, each general leading his own squadron. The Peloponnesians approached with groups of galleys in line ahead, intending to break through or outflank the Athenian line. The inexperienced Athenian crews could not match Callicratidas for speed or nimbleness, so they adopted a novel defensive formation, each Athenian general organizing his triremes into a compact group several lines deep.

The fighting was prolonged, but at some point Callicratidas’s galley was rammed and he disappeared into the sea. The Spartan right then collapsed and fled, leaving the left to sustain the full weight of the Athenian onslaught before it also broke. Athens had a naval victory to celebrate—in fact, its last—and the grateful city granted citizenship.

**AS HIS VESSEL DASHED HER BEAK INTO HER ANTAGONIST, HE WAS HURLED OFF INTO THE SEA AND DISAPPEARED.**

*Xenophon, Describing the Death of Spartan Commander Callicratidas at Arginusae*
Triremes in the Aegean

Triremes could either move forward with their sails raised, sailing with the wind, or under oar power alone. Once two fleets had met and battle was joined, the sails—and often the masts as well—would be lowered.

### THE PELOPONNESIAN WAR

**AEGOSPOTAMI**

<table>
<thead>
<tr>
<th>Date</th>
<th>406 BCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces</td>
<td>Spartans: unknown; Athenians: 170 ships</td>
</tr>
<tr>
<td>Losses</td>
<td>Spartans: none; Athenians: 160 ships</td>
</tr>
</tbody>
</table>

**Location**

The Hellespont

The Hellespont was crucial to Athens, for grain convoys passed through it on their way from the Black Sea and without them Athens would starve. The Spartans were able to threaten this lifeline in 404 BCE because of an alliance with the Persians, which gave them the resources to revenge their losses at Arginusae. They recalled their most successful naval commander, Lysander, to lead the new fleet.

Lysander entered the Hellespont and captured the town of Lampscus. He defeated an Athenian fleet under the collective command of six generals, came after him and reached at Aegospotami opposite Lampscus. It was a wild location that lacked adequate supplies for the thousands of sailors and marines, forcing the Athenians to bring the Spartans immediately to battle. On four consecutive days the Athenian fleet sortied toward Lampscus, but each time Lysander refused to be drawn and remained in harbor.

What happened on the fifth day is a matter of dispute. According to the most likely version, Philocles, the Athenian general commanding that day, sent a small force of triremes toward Lampscus to lure Lysander out. The Athenians were then to launch swiftly from their beach and crush the Spartans. But the plan misfired. The Spartan fleet swiftly smashed the triremes at sea and then destroyed the main force before it could get off the beach and into formation. Only 10 Athenian ships escaped. Lysander had Philocles and 3,000 other Athenian prisoners executed. With its fleet destroyed and no resources to build a new one, Athens surrendered the following year.

**DIED 395 BCE**

**LYSANDER**

**SPARTAN GENERAL AND NAVAL COMMANDER**

Having risen from poor origins, Lysander was appointed nauarch, or admiral-in-chief, of Sparta in 407 BCE. It was a post that could be held only for one year and never twice by the same individual. Lysander cultivated close relations with Cyrus, wealthy son of the Persian emperor Darius II, and thus obtained funds to strengthen the Spartan fleet, creating a naval force capable of challenging Athenian naval might. He defeated an Athenian fleet under Alcibiades at Notium, before his term of office came to an end. After the Spartan defeat at Arginusae Lysander was restored to command, although not accorded the official post of nauarch. His victory at Aegospotami allowed Lysander to make himself the most powerful man in Greece. He was an arrogant and cruel individual, but an inspired naval leader.

### CREW PROFILE

**GREEK TRIREME**

**5TH CENTURY BCE**

A trireme required a crew of around 200 men. In Athens responsibility for recruiting them fell to a trierarch, a wealthy individual who had this task imposed upon him as one of his duties as a citizen. Since the trierarch was unlikely to have much seagoing experience, once at sea he was heavily dependent upon his four naval officers—the helmsman, rowing master, purser, and bow officer—who between them effectively ran the ship. The men on board most similar to the trierarch in social status were the ship’s 10 hoplite soldiers.

#### THE OARSMEN

The oarsmen, who made up the majority of the crew, were usually free men hired from among the poorest citizens. Foreigners were employed when local oarsmen could not be found in sufficient numbers. Only experienced rowers skilled and hardened to the job were really useful, and they could command a good wage. Rowing maneuvers were practiced relentlessly once a crew was assembled. The oarsmen were seated in three rows, the thalamites at the bottom close to the waterline, the sygities in the middle, and the thranites in the highest row at the top. Thrantites had the hardest job, because of the angle at which their oars struck the water. They tended to command higher wages than the others. As free men, the oarsmen were generally decently treated. Although they were occasionally expected to take part in fighting with hand weapons, they were normally considered too valuable to risk losing in close combat. Desertion was often a problem, as oarsmen would leave to join a ship offering higher pay, especially if their trierarch’s money ran out, as sometimes happened.

---

**THE PELOPONNESIAN WAR**

**THE BATTLE OF ARGUSANAE**

<table>
<thead>
<tr>
<th>Date</th>
<th>406 BCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>East of the island of Lesbos</td>
</tr>
<tr>
<td>Result</td>
<td>Athenian victory</td>
</tr>
</tbody>
</table>

**COMBATANTS**

- **ATHENS**
- **SPARTA AND ALLIES**

**COMMANDERS**

Eight generals

**FORCES**

- Ships: 143 triremes
- Ships: 120 triremes

**LOSSES**

- Men: unknown
- Men: unknown
- Ships: 25 triremes
- Ships: 70 triremes

---

Trireme oarsmen.

By the time of the Peloponnesian War, Athens had increased her fleet to 200 triremes, each requiring 170 oarsmen seated in 3 tiers on each side.
A Greek trireme was a lightweight, shallow-draft vessel some 115 ft (35 m) long and less than 20 ft (6 m) wide. Although it cruised under sail, it was propelled in battle by 170 oarsmen in three tiers: 62 thranites highest, 54 zygians in the middle, and 54 thalamians at the bottom. With 30 other men completing the crew, including soldiers and archers, it was a crowded vessel. There was no room for carrying more than basic supplies and insufficient space for the whole crew to sleep on board. The trireme was capable under oar of speeds in excess of eight knots and highly maneuverable.

In sea trials Olympias was turned about at high speed in two-and-a-half times its own length. A fast-manoeuvering trireme did not provide a stable platform for its fighting men—marine hoplites had to learn to throw their spears while sitting down. Even when its hull was smashed by an enemy ram, a trireme would not actually sink, as its wreckage would float.

**Tricreme under sail and oar power**
In this artist’s impression of a trireme, the arrangement of the three banks of ears is more or less accurate, but other details, such as the lateen sails, are incorrect.

---

**Prow and ram**
The business-end of the trireme was the prow with its heavy bronze-sheathed ram for hoiling the hulls of enemy galleys. The weight of the ram on the Olympias is 440 lb (200 kg).

**Oar and anchor**
Projecting on either side of the galley were the epotides (ears). These structures served as protection for the outriggers and oarsmen behind them and as platforms for sailors to drop and weigh anchor.

**Outrigger**
This projection was built out from the sides of the galley, supported by brackets. It allowed the upper tier of oarsmen to row from a position outboard of the other two tiers.

---

The Athenians … learn to use the oar as second nature … when a man is often at sea he must of necessity take an oar himself … and learn the language of the sea.

*Anonymous Athenian Writing in the 5th Century BCE*
The lowest bank of oars, that of the thalamian rowers, was much closer to the waterline than the other two. In order to prevent water from splashing through the holes, they were fitted with a protective leather sleeve.

The inner part of the oar, the loom, is thick and heavy, giving the oarsman greater control when raising the blade from the water and moving it back for the next stroke.

At any point on the Olympia the oars are of the same length for each of the three banks of oarsmen. Where the ship narrows, however, at the bow and the stern, slightly shorter oars are used.

The three tillers can be controlled by a single helmsman, but if extra force is needed, one man can pull on one, while a second man pushes the other.

At the stern of the galley beneath the ornamental sternpost sat the triarch, the man responsible for fitting out and crewing the ship. In front of his chair the handles of the two tillers are visible.

The narrow gangway that runs the length of the ship also serves as a storage area for the masts and spare spars, oars, ropes, and sails.

The topmost tier of oarsmen, the thranites, whose oars passed through the outrigger, were the only ones who could actually see their oars entering the water.

This view shows the extremely cramped positions occupied by the three tiers of oarsmen: the thranites above, the zygians below them, and the thalamians at the bottom.

The narrow gangway that runs the length of the ship also serves as a storage area for the masts and spare spars, oars, ropes, and sails.

The oarsmen crewing the reconstructed Olympia have experimented with various methods of rowing, including this means of securing one foot on the stretcher.
THE AGE OF GALLEYS

ROMAN NAVAL WARFARE

IN THE THIRD CENTURY BCE the Mediterranean was host to a diversity of naval powers large and small. The western part was dominated by Carthage, a North African city founded by the Phoenicians, which continued their great seafaring tradition in trade and war. In the eastern Mediterranean the wealthy Hellenic states of Antigonid Macedonia and Ptolemaic Egypt maintained imposing fleets of outsized warships appropriate to their notions of royal prestige and large-scale warfare. The island of Rhodes, a major maritime trading center, had an efficiently organized fleet of lighter ships, used to suppress piracy and deter the predatory ambitions of larger states. But all of these diverse maritime powers, along with Seleucid Syria, were ultimately subjected to the naval power of Rome, a state with no tradition of shipbuilding or seafaring that created a navy out of nothing in 260 BCE.

INSTANT NAVAL POWER

Rome’s progress to naval dominance began with the defeat of the Carthaginians in the First Punic War (264–241 BCE), continued with the extension of Roman power to the eastern Mediterranean in the 2nd century BCE, and was completed in 67 BCE with the suppression of piracy by Pompey the Great. These successes were not achieved through radical naval innovations, although Roman technical ingenuity did play its part. Rome’s first fleet—100 quinqueremes and 20 triremes built in 60 days—was created partly by copying a galley captured from the Carthaginian enemy.

The Roman quinqueremes were smaller than the huge ungainly warships of the Hellenic states, but they still probably had five men operating each oar and 28 oars to a side. On these heavier and less maneuverable vessels, oarsmen needed muscle power rather than skill. Most important, the quinqueremes could carry some 120 soldiers, enabling the Romans to transfer their proven supremacy in land warfare to the sea. Although most of their ships were still fitted with rams, the Romans’ prime aim in naval warfare was to board the enemy’s galleys. They would first soften them up by bombarding them with missiles from wooden towers that stood at the prow and stern of their ships.
In their war against Carthage the Romans introduced the spiked corvus (see p44) as an aid to grappling and boarding. Later the extraordinary arpax was invented, a catapult used to propel grappling tackle onto an enemy ship. Most of the Romans’ on-board military technology, however, was identical to that used on land. Shipborne artillery consisted of catapults and ballistas, mostly firing darts and stones as anti-personnel munitions, although they could be used to propel heavier rocks to bomb hard city walls during the siege of a port. Roman success at sea cannot be put down to technological superiority. Rather it was a triumph of willpower and organization. When Rome lost an entire fleet to shipwreck during the Punic Wars, it simply built and manned another to replace it. Pompey’s suppression of piracy was achieved by the systematic application of ruthless force, clearing the Mediterranean area by area, leaving no hiding place for the pirates.

WEAPONS ON BOARD

In their war against Carthage the Romans introduced the spiked corvus (see p44) as an aid to grappling and boarding. Later the extraordinary arpax was invented, a catapult used to propel grappling tackle onto an enemy ship. Most of the Romans’ on-board military technology, however, was identical to that used on land. Shipborne artillery consisted of catapults and ballistas, mostly firing darts and stones as anti-personnel munitions, although they could be used to propel heavier rocks to bomb hard city walls during the siege of a port. Roman success at sea cannot be put down to technological superiority. Rather it was a triumph of willpower and organization. When Rome lost an entire fleet to shipwreck during the Punic Wars, it simply built and manned another to replace it. Pompey’s suppression of piracy was achieved by the systematic application of ruthless force, clearing the Mediterranean area by area, leaving no hiding place for the pirates.

Rome’s battles against Carthage were fought on a vast scale. In terms of the sheer numbers of men involved—probably more than 300,000—the battle of Ecnomus ranks as one of the largest naval encounters ever. By the 1st century BCE, however, the only major battles were between Roman forces engaged in civil wars. Sea power proved decisive at Actium in 31 BCE, the battle that enabled Octavian to become sole ruler of the Roman world as the Emperor Augustus.

DOMINANCE AT SEA

Since the Roman world encompassed the entire coastline of the Mediterranean, Augustus and his successors faced no major enemies at sea. But they still had need of a navy. Ships provided military supply and transport, as in the invasion of Britain in 43 CE. They also gave river support for the long military campaigns waged in Germany and Dacia. In the Mediterranean they pursued pirates and protected merchant shipping. Some 10,000 men were stationed at a great naval base on the bay of Naples, with another fleet in the Adriatic based at Ravenna, and provincial squadrons elsewhere—for example, in the Black Sea and at Alexandria. Without major enemies the Romans were able to rely for the most part on smaller galleys—triremes and liburnians. The navy was manned by volunteers signed up for 26 years’ service, many recruited from among the Phoenicians, Greeks, and Egyptians with their long habit of seafaring.

DECLINE AND FALL

The navy participated in the general decline of the Roman Empire from the 3rd century CE. Shipborne Germanic Goths rampaged through the Aegean and British rebels challenged Roman shipping in northern seas. Meanwhile, widespread piracy revived in the Mediterranean as a weakening Roman navy lost its grip.

The 5th century brought a general collapse of Roman authority in the west. Another Germanic tribe, the Vandals, took to the sea and controlled the western Mediterranean from Carthage and other naval bases in North Africa. In 455 the Vanadal king, Geiseric sailed his fleet across to Italy and sacked the city of Rome itself. The Roman navy’s inheritance was to survive, however, in the eastern half of the empire. The Byzantine Empire, centered on Constantinople, would rely on a powerful navy to uphold Rome’s imperial tradition.
THE FIRST PUNIC WAR

THE ROMAN REPUBLIC fought the First Punic War against Carthage for control of the island of Sicily. The Romans were dominant on land, but initially the Carthaginians controlled the seas. To challenge this well-established maritime power the Romans had to build a fleet from scratch and teach themselves the skills of naval warfare. They were so successful that the Carthaginians scored only one sizable victory in the course of the war—at Drepana—while suffering many defeats, including at Mylae and the huge battle of Cape Ecnomus. The Romans used sea power to carry the war into Carthaginian territory in North Africa, although they suffered catastrophic losses when fleets were sunk by storms in 255, 253, and 249. After a final defeat at the Aegates Islands in 241 the Carthaginians could no longer supply their troops on Sicily by sea and were forced to make peace on Roman terms.

WEAPONS AND TECHNOLOGY

CORVUS

The corvus ("raven" in Latin) was an ingenious boarding device adopted by the Romans before the battle of Mylae. Attached by a cable to a pole at the prow of a ship, it was raised and lowered by pulleys. On its underside was a sharp beak-shaped metal spike. When an enemy ship drew near, the corvus was lowered so the spike smashed into its deck. This locked the two ships together, providing a bridge over which Roman soldiers swarmed. Unfortunately ships with a corvus proved dangerously unstable and the device probably contributed to heavy losses in storms. Its use was abandoned before the end of the First Punic War.

Corvus in action

The "beak" of the corvus sticks into the enemy ship's deck as the legionaries march across.
THE BATTLE OF DREPANA

When a Roman fleet was sent to support the army in a siege of the coastal stronghold of Lilybaeum, the Carthaginians sailed reinforcements to the fortress right under the noses of the Romans, repeatedly running ships into Lilybaeum from their nearby base at Drepana. The Romans eventually managed to seal the blockade, but they wanted to avenge these humiliations.

One of the consuls for 249, Publius Claudius Pulcher, decided to launch a surprise raid on Drepana with ships and marines. The Roman fleet sailed up the coast at night, but this led to its losing formation. Dawn found a straggling line of galleys approaching Drepana, with Claudius’s flagship well to the rear. Fearing he would be pinned in harbor, the Carthaginian admiral, Adherbal, boldly set to sea as soon as the Romans were sighted.

Meanwhile Claudius performed one of the most important functions of any Roman leader: he sought evidence of the support of the gods. Sacred chickens were carried on board for the purpose. If they were happy, divine support in battle could be expected. Ominously, when offered grain, the birds sulky refused to eat. Instead of canceling the battle, Claudius had the chickens thrown into the sea, explaining with an irreverent quip that if they would not eat, perhaps they would drink.

CARTHAGINIAN TRIUMPH

Adherbal skilfully led his ships out to sea, rounding two islands at the northern end of the harbor mouth as the first Roman ships were entering the harbor from the south. Claudius realized what they were doing, but had difficulty communicating with his leading galleys. After a period of confusion, in which several ships collided, the Romans were organized into a line with their sterns to the coast, facing the Carthaginians who had swiftly rowed round to attack shoreward. The Punic crews used their rams with deadly efficiency against the cornered Roman ships, many of which ran aground trying to avoid being sunk. Claudius escaped with around 30 ships; the rest were lost. When he returned to Rome Claudius was put on trial and exiled, with his cavalier treatment of the sacred chickens topping the list of his misdemeanors.

HE ONLY RIDICULED THE GODS IN JEST, BUT THE MOCKERY COST HIM DEAR, FOR HIS FLEET WAS UTTERLY ROUTED . . .

CICERO ON PUBLIUS CLAUDIUS PULCHER’S TREATMENT OF THE SACRED CHICKENS

\[\text{THE FIRST PUNIC WAR}\]
\[\text{THE BATTLE OF DREPANA}\]

**Date:** 249 BCE
**Location:** Off Tapari, western Sicily
**Result:** Carthaginian victory

**COMBATANTS**

**ROMAN**
- **Commander:** Publius Claudius Pulcher
- **Forces:** Ships: c.120
- **Losses:** Men: unknown; Ships: 93 ships sunk or captured

**CARTHAGINIAN**
- **Commander:** Adherbal
- **Forces:** Ships: c.120
- **Losses:** Men: unknown; Ships: no losses

\[\text{Drepana}\]

The Roman fleet arrives from the south in a long line with the commander Claudius in one of the ships at the rear. The Carthaginian ships execute a swift turn to turn escape into attack. The Roman ships form a line of sorts to face their attackers, but they are pinned against the shore.
A violent clash

Cape Ecnomus was the largest and fiercest sea battle fought between Rome and Carthage. The Carthaginians were fighting to prevent the Romans from invading their North African homeland.

**KEY**

**ROMAN FLEET**
- 16–20 Roman warships
- 12–15 Roman horse transports

**CARTHAGINIAN FLEET**
- 20–22 Carthaginian warships
- 20–22 Carthaginian warships, under sail

---

**1 CARThAGINIAN SUBTERFUGE**
As the Roman fleet sets sail for Africa, the Carthaginians are there to block their path. But as the Romans sail along the coast to try and force their way through, the Carthaginian center turns and pretends to flee away from the battle.

**KEY**

**ROMAN FLEET**
- 16–20 Roman warships
- 12–15 Roman horse transports

**CARTHAGINIAN FLEET**
- 20–22 Carthaginian warships
- 20–22 Carthaginian warships, under sail

---

**2 THREE BATTLES DEVELOP**
Hamilcar’s plan succeeds and the two leading Roman squadrons are separated from the rest of the fleet. Hamilcar turns his ships to meet them and a fierce battle ensues. The Carthaginian left and right attack the other two Roman squadrons.
**THE BATTLE OF CAPE ECNOMUS**

By 256 BCE the Roman Republic had been fighting Carthage for control of Sicily for eight years. Increasingly confident of their power to challenge Carthaginian dominance at sea, the Romans decided to mount an invasion of North Africa, sailing across the Mediterranean from Sicily to put Carthage itself under threat. They assembled a vast fleet which, according to the historian Polybius, numbered 330 ships. Most were quinqueremes with around 100 rowers. For the invasion attempt each ship also carried 150 soldiers. The Roman consuls Lucius Manlius Volo and Marcus Atius Regulus led the expedition. The Carthaginians were well aware of Roman plans and determined to stop the invasion taking place. They assembled a fleet of broadly similar size, also in Sicily at Heraclea Minoa, under the command of the generals Hanno and Hamilcar. The scene was set for one of the largest battles in the entire history of naval warfare.

### HAMILCAR’S STRATAGEM

As the Roman fleet set out for Africa, the Carthaginians spread theirs out in a line across its path, with its left wing close to the Sicilian shore. Hamilcar was in the center and Hanno on the right. The Romans advanced in a compact formation. In the van were two squadrons, each commanded by a consul. Behind these a third squadron towed horse transports. A fourth squadron protected the rear. Assuming that the Romans would attempt simply to smash through the Carthaginian line, Hamilcar ordered his captains in the center to withdraw as the Romans approached. This would draw the Roman van forward, allowing the Carthaginian wings to outflank them.

At first Hamilcar’s plan worked. The leading Roman squadrons surged forward and a gap opened up between them and the rest of the fleet to the rear. At a signal from Hamilcar, the ships in the Carthaginian center turned back to face the Roman quinqueremes. The ships on the left turned inward to engage the Roman third squadron, whose warships were forced to cast the transports adrift in order to defend themselves. Meanwhile Hanno’s right wing, with the Carthaginians’ fastest ships, fell fiercely upon the fourth squadron in the rear.

Both sides sought to exploit their strengths. The Romans had the better soldiers and, in the spiked corvus, a superbly effective method of grappling and boarding an enemy ship. The Carthaginians, as the more skilled sailors, hoped to outmaneuver the Romans. Their aim was to avoid being boarded and to sink ships by ramming them from the side or rear.

### CRUCIAL TURNING POINT

Hamilcar’s plan fell apart in the center, where the two Roman squadrons had the advantage. The Carthaginian galleys found it difficult to manoeuvre in a dense mêlée. A number of them were captured—a corvus spike smashed into their deck and Roman legionaries were captured—a corvus spike smashed into their deck and Roman legionaries turned and fled. Meanwhile Hanno’s right wing, with the Carthaginians’ fastest ships, fell fiercely upon the fourth squadron in the rear.

After driving off Hanno’s squadron, Regulus sailed to assist Volo in surrounding and capturing the last of the Carthaginian ships. The Romans succeeded in capturing 50 Carthaginian ships.

The Roman fleet was in no condition to pursue the scattered Carthaginian survivors and retired to Sicily for a refit before proceeding with the planned invasion of North Africa. After some initial success, the invasion itself resulted in disaster, but from this point on the Carthaginians could never again hope to achieve dominance at sea.

---

**THE CENTER COLLAPSES**

In the center the Roman ships make highly effective use of the corvus to board and capture enemy ships. As the remaining Carthaginians flee, the victorious Romans are now free to go to the aid of the beleaguered squadrons in the rear.
ROME ACHIEVES MASTERY OF THE MEDITERRANEAN

AFTER THE DEFEAT OF CARthage, Rome turned its attention to the eastern Mediterranean, where regional powers were engaged in their own struggles for dominance. Macedonia and Seleucid Syria possessed imposing fleets, while the island of Rhodes was a major naval power. The mauling of the Macedonian fleet at Chios in 201 BCE opened the way for Roman involvement in the region as an ally of Rhodes. Macedonia and the Seleucids were defeated and Egypt occupied, leaving the Romans with no one to fight at sea except pirates—and one another.

The civil wars in the second half of the 1st century BCE, as Rome made the transition from republic to empire, brought major sea battles that had a crucial impact on the outcome of the struggle for power. The defeat of Sextus Pompeius at Naulochus left Octavian and Mark Antony the only contenders for leadership of the Roman world. This issue between them was settled at Actium in 31 BCE. With Octavian installed as the Emperor Augustus, Roman naval mastery of the Mediterranean was established. It remained virtually unchallenged for the next two centuries.

The unpolicied waters became too hazardous for trade, while the pirates grew ever richer and bolder, raiding Rome’s port of Ostia and kidnapping Roman officials on the Italian coast. After several ineffectual attempts to crack down on piracy, in 67 BCE, the politician and general Pompey, known as “the Great,” was given wide-ranging powers and large-scale resources for a war on the pirates. He divided the Mediterranean into 13 zones, each under a legate with army and naval forces at his command. Pompey himself kept a roving brief, leading 60 ships in pursuit of the most troublesome and persistent offenders.

In a mere 40 days during the spring Pompey swept the western Mediterranean clear of pirates, most submitting virtually without a fight. He then turned to the eastern Mediterranean, the heartland of piracy. On Crete and along the coast of Cilicia in

SECOND MACEDONIAN WAR

CHIOS

Date 210 BCE
Forces Macedonians: 53 large ships; c. 150 others; Rhodians and allies: 65 large ships, 12 others.
Losses Macedonians: 42 ships; Rhodians and allies: 9 ships.

Location Off Chios, Aegean Sea

Philip V of Macedon was fighting for control of the eastern Mediterranean. Rhodes and Pergamon formed an alliance against him, aided by Cyzicus and Byzantium. Philip had landed an army on the island of Chios when he was surprised by a fleet under the Rhodian admiral Theophiliscus and the Pergamene ruler Attalus.

Some of the ships engaged in the ensuing battle were huge polyremes with eight or ten oarsmen to each column of oars. One of these monsters, the Macedonian flagship, was sunk early in the battle when its ram stuck inextricably in a smaller vessel, exposing it to ramming from both sides. The small, nimble Rhodian galleys attacked from the flank, ramming Philip’s ships from the rear or slicing off their oars. But the Macedonians made good use of smaller galleys to protect their larger ships from ramming and held off their attackers with catapults mounted on the high decks.

Both allied commanders were in the thick of the contest. Théophiliscus was wounded three times coming to the aid of one of his quinquemeres that was sinking surrounded by enemy ships—he later died of his injuries. Attalus was forced to run his flagship ashore to escape enemy pursuit. Philip escaped with the majority of his ships, but his losses had been extremely heavy.

PIRACY IN THE MEDITERRANEAN

POMPEY’S CAMPAIGN AGAINST THE PIRATES

Date 67 BCE
Forces Pompey: 500 ships; Pirates: unknown.
Losses Pompey: unknown; Pirates: 846 ships surrendered.

Location Mediterranean

Despite Rome’s nominal sovereignty over the Mediterranean Sea, the seafaring inhabitants of ports and coastal areas were inevitably tempted to make a living preying on merchant vessels, especially during the frequent periods when Rome was preoccupied with civil wars.

The unpoliced waters became too hazardous for trade, while the pirates grew ever richer and bolder, raiding Rome’s port of Ostia and kidnapping Roman officials on the Italian coast. After several ineffectual attempts to crack down on piracy, in 67 BCE, the politician and general Pompey, known as “the Great,” was given wide-ranging powers and large-scale resources for a war on the pirates. He divided the Mediterranean into 13 zones, each under a legate with army and naval forces at his command. Pompey himself kept a roving brief, leading 60 ships in pursuit of the most troublesome and persistent offenders.

In a mere 40 days during the spring Pompey swept the western Mediterranean clear of pirates, most submitting virtually without a fight. He then turned to the eastern Mediterranean, the heartland of piracy. On Crete and along the coast of Cilicia in

ROMAN–SELEUCID WAR

MYONESSUS

Date 190 BCE
Forces Romans and Rhodians: 83 ships; Seleucids: 90 ships.
Losses Romans and Rhodians: 3 ships; Seleucids: 29 ships.

Location Off west coast of Turkey

Between 192 and 188 Rome, in alliance with Rhodes and Pergamon, fought a war against the Seleucid ruler Antiochus III of Syria. The Seleucid admiral Polyxenidas, based at Ephesus, came out to give battle to a combined Roman and Rhodian fleet off Myonnesus. Control of the Aegean was at stake. The Rhodians under Eudoros skillfully maneuvered their lighter, faster galleys, blocking an attempted outflanking move by Polyxenidas by swiftly transferring from one wing to the other. They broke up the Seleucid formation through the aggressive use of incendiary devices. The heavier Roman ships under Lucius Aemilius Regillus punched through the center of the enemy line. In places, with opposing ships locked together, crews and marines fought hand-to-hand. Once the Seleucids realized that there were Roman ships to their rear, they turned and fled. This victory gave Rome command of the sea, enabling its armies to carry the war to a successful conclusion on land.

Legionary helmet

The sight of Pompey’s well-equipped legions was enough to make most pirates surrender. This replica helmet is of a kind widely used in the 1st century BCE.

Asia Minor pirate chiefs held many ports and strongholds. Pompey went after them in person, taking with him a large quantity of siege equipment in the expectation of hard fighting to subdue fortified pirate bases. But as in the west, a show of strength usually sufficed. According to Roman historian Florus, at the approach of Pompey’s galleys the pirate crews would throw down their weapons, relinquish their oars, and clap their hands as a gesture of surrender.

Pompey is reported to have taken just 71 pirate ships in combat, out of 846 captured in the campaign. Pirates were resettled where the Romans could keep an eye on them and there was more chance of making an honest living.

THERE WERE OF THESE CORSAIRs ABOVE

A THOUSAND SAIL, AND THEY HAD TAKEN NO LESS THAN 400 CITIES ...

PLUTARCH, GREEK HISTORIAN OF THE 1st CENTURY CE IN HIS LIFE OF POMPEY
In the course of the civil wars that succeeded the assassination of Julius Caesar in 44 BCE, Sextus Pompeius, son of Pompey the Great, attempted to grab a share of the spoils. In command of the Roman fleet, he captured Sicily, a vital source of grain supplies. Octavian, a member of Rome's ruling triumvirate, entrusted Marcus Vipsanius Agrippa with creating a fleet to retake Sicily.

Agrippa established a naval base, Portus Julius, near modern-day Naples. There he built ships and trained their crews in the latest fighting techniques. They learned to use not only the rock-hurling artillery now standard upon warships, but also a new device known as the arpax, a catapult that projected grappling irons onto an enemy galley. Agrippa also had his ships' hulls reinforced with beams around the waterline to resist ramming.

THE POMPEIANS CRUSHED

In summer 36 BCE, Octavian launched an invasion of Sicily with armies from Italy and North Africa. Agrippa, who was to cover the movement of troops and keep their supply lines open, moved to a forward base on the Lipari islands. From there he made a successful but inconclusive attack on part of Sextus's fleet at Mylae. Sextus then sent his entire naval force to confront Agrippa in a desperate bid to regain command of the sea, which alone offered him a chance of resisting Octavian's invasion.

Almost equal in number, the two forces approached each other in line abreast along the Sicilian coast. Agrippa's ships were, however, slightly more widely spaced. This enabled them to turn Sextus's flank on the seaward side and press their enemy in to the shore. As the battle developed into a close-packed mêlée, Agrippa's well-trained force gained the upper hand. His archers, mounted on towers, shot fire arrows down onto the enemy. His catapults battered hulls and carved deadly paths through crowded decks. The arpax allowed his men to grapple and board ships weakened by the missile barrage.

When the fighting stopped, 28 of Sextus's ships had been sunk and almost all the rest had been captured. Only 17 ships escaped out of a fleet of around 300 vessels. Sicily fell to Octavian. Sextus slipped away to the east, but the following year fell into the hands of one of Mark Antony's followers and was summarily executed.

Agrippa was a friend of Julius Caesar's adopted son Octavian from childhood, and became the future emperor's right-hand man during his rise to power. He made a reputation as a general on land before, in 37 BCE, Octavian made him consul and gave him responsibility for creating a fleet to defeat Sextus Pompeius. His victories over Sextus at Naulochus and Mark Antony at Actium showed a firm grasp of naval tactics as well as great powers of organization and leadership. Much of his later life was spent on campaign in Gaul, Spain, Germany, and Rome's eastern provinces.
The Battle of Actium was the climax of the great power struggle between Mark Antony and Octavian for the leadership of the Roman world following the assassination of Julius Caesar in 44 BCE. In the summer of 31 BCE the forces of Antony and his Egyptian ally Cleopatra were cornered by Octavian at Actium, a Roman colony on the Greek coast. Octavian’s admiral, Marcus Vipsanius Agrippa, who commanded a battle-hardened Roman fleet, pinned Antony’s fleet in harbor with a close blockade and cut his supply line from Egypt. This allowed Octavian to ferry an army from Italy across the Adriatic unchallenged and to confront Antony on land.

**Desperate Measures**

By August, Antony’s soldiers and seamen had run desperately short of food and other supplies, their ranks decimated by desertion and disease. Antony and Cleopatra devised a plan for a breakout by sea, hoping to escape back to Egypt with as much as possible of their treasure and their army. Many of their ships were in poor condition and, even after sending out press-gangs to round up able-bodied locals, they were short of oarsmen. Although the least seaworthy ships were burned, the rest were still undermanned.

The breakout was planned for August 29, but four days of storms delayed the operation until the morning of September 2. Antony led his war galleys out of harbor, while transport vessels loaded with treasure remained in the rear under Cleopatra’s command. Most unusually, all of Antony’s galleys had their masts and sails on board—normally these were never carried into battle. The plan was to exploit the expected offshore breeze from the north in order to sail off to Egypt and safety.

Throughout the morning there was a stand-off, Antony’s fleet staying inshore and waiting for the wind. Then, as Agrippa’s ships attempted to outflank their enemy, battle was joined. The squadron that included Antony’s flagship, on the right of his line, was especially hotly engaged.

**An Unequal Contest**

Agrippa’s host of small warships, mostly liburnians, were far nimbler than Antony’s hefty quinqueremes, however these larger galleys provided a high platform for catapults and for soldiers with bows, spears, and sling-shots. Ships grappled closely, many set aflame by incendiary devices such as fire arrows. In the afternoon the long-awaited breeze got up and Cleopatra seized the opportunity to sail her ships through the center of the blockading line, which had thinned as battle raged on the flanks. Deserting his flagship, which had been grappled by the enemy, for a lighter vessel, Antony sped after the Egyptian queen. Few of his warships were able to follow. The leaderless fleet fought on for a while until, heavily battered, it surrendered. Antony and Cleopatra reached Alexandria with around 60 vessels, but, the following summer, abandoned by almost all his troops, facing defeat, Antony committed suicide. A week later Cleopatra did the same.
Rome achieves mastery of the Mediterranean

At first Octavian’s fleet stays out of range of Antony’s archers and catapults, simply blocking the escape route to the sea. Cleopatra’s galleys are not drawn up in Antony’s battle line, but stay in the rear with the transports. The first clash is between Octavian’s right wing and Antony’s left; Antony’s fleet moves right to counter. Octavian’s left envelops Antony’s right flank. Antony’s flagship is in the thick of the fighting on his right, transfers to a smaller vessel and follows Cleopatra. At first his sailors and legionary marines fight on despite their leaders’ desertion, but after a while are forced to surrender.

Cleopatra, whose flagship is in the thick of the fighting on her right, transfers to a smaller vessel and follows Antony. At first her sailors and Egyptian marines fight on despite their leaders’ desertion, but after a while are forced to surrender.
NAVAL WARFARE IN ASIA

THE DEVELOPMENT OF NAVAL WARFARE in East Asia was in some ways similar to that of Europe. At the time of the Roman Empire, Chinese warships fought using the tactics of ramming or grappling and boarding just as fleets did in the Mediterranean. The Chinese even had an equivalent to the corvus, the Romans’ boarding bridge. Naval warfare in Japan, where samurai contested land battles on water fought with bows and swords, at times resembled the battles fought between seaborne medieval European knights and archers. Yet Asian navies developed a distinctive range of ships, including large numbers of vessels with paddlewheels, a form of propulsion that did not catch on in Europe until the steam era. The Chinese in particular were at the cutting edge of technology, using gunpowder, crossbows, and the compass earlier than Europeans, and by the 15th century building the world’s largest sailing ships.

MASSIVE BATTLES
There is record of naval battles in China dating back to around 400 BCE, but land warfare was understandably the major preoccupation of the Chinese emperors, given their country’s barely defensible western frontier. Battles on rivers and lakes usually accompanied land operations. Japan and Korea also developed naval forces early on. The Koreans largely outfought the Chinese in the Yellow Sea during the wars between the Korean Goguryeo and Chinese Sui dynasties from 598 to 614. The Chinese navy was more successful against Japan in the Baekje War, fought in Korea in 663. Under the Tang Dynasty (618–907) Chinese influence was extended around southeast Asia into the Indian Ocean and across to the east coast of Africa. This brought the Chinese into contact with Arab sailors and with Indian fleets such as that of the southern Indian Chola dynasty in the 11th century. By the time the Song dynasty founded China’s first permanent navy in 1132, southern China almost certainly had the world’s largest concentration of naval forces. The Song fought massive naval battles against Jurchen Jin and Mongol Yuan assailants from the north. After the Yuan triumphed over the Song under Kublai Khan in the 1270s, Chinese naval power was asserted from the Indian Ocean to Japan—although Yuan attempts at a seaborne invasion of Japan failed. The Japanese, meanwhile, were feared as pirates raiding the coasts of the Asian mainland. They also undertook major naval battles during the civil conflict known as the Gempei Wars, fought in the 12th century, when the movement of troops around Japan’s Inland Sea became strategically crucial. A naval victory at Dan-no-Ura ensured that the Minamoto clan would take power in Japan as shoguns in 1185.

SHIPS AND WEAPONRY
The Chinese developed a range of warship types with different tactical roles. These included large multi-deck war junks and “tower ships” with portholes through which crossbows could be fired and lances thrust, and often carrying varieties of catapult. Smaller vessels included “covered swoopers,” fast assault ships covered with thick hides to protect against missiles and incendiary devices, which were designed for aggressive “swoops” on the enemy. “Flying barques” were fast moving galleys with more oarsmen than usual and a smaller
1200 BCE – 1550 CE

Most battles at sea are won by selfless teamwork, but the medieval samurai warrior was able to show off his individual prowess, especially his skill as an archer, just as well on water as on land.

**WEAPONS AND TECHNOLOGY**

**SONG CATAPULT SHIP**

A trebuchet is a sling for hurling missiles, using the principle of the lever to give greater power and accuracy than a torsion device such as a ballista. The Chinese are credited with the invention of the first trebuchets around the 5th century BCE.

The power for these traction trebuchets was supplied by teams of men pulling on ropes attached to the shorter arm of the device, the sling being at the end of the longer arm. The more powerful counterweight trebuchets were introduced to China from Muslim west Asia in the 13th century, first playing a crucial role in the siege of Xiangyang in 1273. In the Song dynasty navy trebuchets were habitually deployed as shipborne artillery, mounted on the larger “tower ships” both as a weapon for ship-to-ship combat and as a siege weapon for bombarding land fortifications from the water. When attacking ships, the trebuchets would often hurl explosive incendiary devices, an effective tactic against highly flammable vessels. Many of the Song catapult ships were driven by paddlewheels, but they could also be propelled by oars.

**MING SEAPOWER**

Naval conflict played a critical role in the warfare that ended in the establishment of the Ming dynasty in China in the 14th century. There were engagements between probably some of the numerically largest fleets ever assembled. Once in power, the Ming at first devoted vast resources to shipbuilding. Since they also had the magnetic compass at their disposal, there was nothing to stop them embarking upon oceanic voyages. Between 1405 and 1433 fleets led by the eunuch Admiral Zheng He cruised around southeast Asia and across the Indian Ocean, entering the Red Sea and voyaging down the east African coast as far as Mozambique. The greatest of the Chinese fleets comprised 63 large war junks—the largest more than 390 ft (120 m) long and almost 160 ft (50 m) broad—plus more than 200 support vessels and nearly 30,000 men. This constituted a thoroughly intimidating assertion of imperial suzerainty. On the few occasions when he encountered resistance, Admiral He did not hesitate to use force to impose respect—for example arresting and executing a Sumatran ruler who objected to paying tribute.

From the 1430s, however, China's Ming emperors turned instead to a policy of inward-looking development that rejected all overseas ventures. The maintenance of an ocean-going navy was completely abandoned. By the time European mariners arrived in Chinese and Japanese waters in the 16th century, they encountered no serious competitors in their bid for control of the world's ocean trade routes.
NAVAL POWER played an important part in East Asian warfare, as a sometimes crucial ancillary to land campaigns. As early as the 3rd century CE, the battle of Red Cliffs established a consistent theme in Chinese history: the ability of the southern Chinese to defend themselves against invaders from the north by resort to river and sea warfare. This pattern was repeated against the Jurchen at Tangdao and initially against the Mongols in the 13th century. The Mongol Yuan dynasty eventually conquered China, Japan, and Korea after adapting to naval warfare. The period of Yuan rule was framed by two naval battles: a Mongol victory at Yamen in 1279 and a defeat at Lake Poyang in 1363. Sea battles were also crucial in the histories of Korea and Japan. The Japanese failed to extend their influence into Korea in the 7th century, repulsed by the Chinese navy, and the Mongols made equally unsuccessful attempts to invade Japan. The outcome of Japan’s civil wars was affected by fighting on water, notably at Dan-no-Ura in 1185.

**SILLA–BAEKJE WARS**

### BAEKGANG

**Date** August 27–28, 663  
**Forces** Japanese: 800 ships; Chinese: 170 ships  
**Losses** Japanese: 400 ships; Chinese: unknown

China’s Tang dynasty occupied the Baekje kingdom of southern Korea in alliance with another Korean kingdom, Silla. Japan’s Yamato government sent a fleet and an army of more than 40,000 men to aid Baekje forces under siege at Churyu. They intended to ferry the troops up the Geum River, but found the river blocked by a Chinese fleet. The Chinese were heavily outnumbered but their ships held a disciplined line from bank to bank. In two days of repeated attacks the Japanese failed to break through. Seeing the Japanese tired and disorganized, the Chinese then launched a counterattack, outflanking and encircling the Japanese fleet. Many of the Japanese ships were burned and thousands of soldiers drowned. Baekje was defeated and, with Chinese aid, the Silla kingdom unified Korea.

### JURCHEN–SONG WARS

**TANGDAO**

**Date** November 16, 1161  
**Forces** Song: 120 ships; Jurchen: 600 ships  
**Losses** Unknown

In 1161 the Jurchen of northern China were attempting to conquer southern China, ruled by the Song dynasty. An invasion force of warships and troop transports was intercepted by the Song navy among the islands of the East China Sea. The Song had developed paddle-wheel craft powered by treadmills, which moved swiftly into the attack. On their decks they had trebuchets that hurled primitive incendiary bombs to explode on the wooden enemy ships. Soon much of the Jurchen armada was ablaze. Its commander, Zheng Jia, jumped into the sea and was drowned. The following month another Jurchen fleet was defeated by the Song at the battle of Caishi on the Yangtze River, ensuring the survival of the southern Song as an independent state for another century.
CHINA, JAPAN, AND KOREA

The Battle of the Red Cliffs, or Chibi as it is sometimes known, was a crucial point in the transition from the Han Dynasty to the Three Kingdoms period in Chinese history. The all-powerful Han minister Cao Cao had embarked on a campaign to unify China under his rule. His army was enormous and initially victorious. But in order to conquer southern China, he needed to gain command of the Yangtze River. This ambition was opposed by the warlords Liu Bei and Sun Quan, who formed an alliance to resist Cao Cao.

FIGHT OR SURRENDER
The warlords looked doomed when Cao captured a powerful river fleet and the Yangtze naval port of Jiangling. Cao loaded his men onto the boats and set off downstream toward Sun’s power base at Chaisang. The majority of Sun’s advisers advocated surrender, but his military commander Zhou Yu argued that Cao’s forces were less formidable than they seemed. Exhausted after a long, hard campaign and unaccustomed to naval warfare, they would be outfought by a fresher enemy skilled in river fighting. What is more, he anticipated correctly that Cao’s northeners would succumb to illness when they were exposed to the disease environment of the south.

Zhou Yu led the combined forces of Sun and Liu upriver. The precise location of their encounter with Cao’s fleet is uncertain. The battle opened with indecisive skirmishing, after which the two sides broke off to rest. Cao was concerned about the spread of disease in his army and the difficulty his soldiers experienced in fighting on water. To provide a more stable platform for his troops, he had his boats lashed together in large groups. This made it impossible for them to maneuver and vulnerable to incendiary weapons, such as fire arrows, that were a feature of Chinese warfare.

It appears that a veteran soldier, Huang Gai, offered to sail fire ships, loaded with dry reeds and inflammable wax, into Cao’s tethered fleet. To confuse the enemy, Huang approached Cao’s boats pretending he wanted to surrender. Then the crews set the ships on fire, disembarked into small boats, and watched as the blazing vessels drifted down on to their immobile target. Enough of Cao’s fleet was destroyed to discourage him from any further naval adventures. His army set off overland on a retreat that turned into a rout. The defeat ended Cao’s chances of unifying China, which entered a period of warfare between conflicting kingdoms.

Unleashing the fire ships
Having ignited theflammable materials aboard the fire ships, Huang Gai’s men escape in rowing boats as the ships drift downriver to collide with their targets.
Beginning in 1180, the Gempei Wars pitted the Minamoto samurai clan against the rival Taira clan in a struggle for control of Japan. In the summer of 1183 the Minamoto seized the upper hand in the civil war. Minamoto no Yoshinaka defeated the Taira at the battle of Kurikara and surrounded the imperial capital, Kyoto. The Taira were forced to flee and take refuge in their traditional power base in western Honshu and Shikoku, where they had a number of fortresses around the shores of the Inland Sea.

Taking the offensive, Minamoto no Yoshinaka sent an army to attack the Taira fortress at Yashima, a small island off the coast of Shikoku. The army was put under the command of a general, the unsophisticated Yada Yosiharu, since Yoshinaka himself was preoccupied with power struggles in his own clan.

The Minamoto army embarked at Mizushima on Honshu to cross the Inland Sea, but was surprised by a Taira fleet sent to intercept them. This force was commanded by Taira no Tomomori and Taira no Noritsune, experienced fighters with victories to their name. They ordered their ships to be tied together with hawser at the stern and stern, and planks laid across them, so the whole fleet was a level surface for the samurai and their followers to fight on. The Taira then drew their bows and deluged the Minamoto ships with a rain of arrows. When the fighting came to close quarters, men attacked one another with swords and daggers, while some infantry with long rakes tried to pull enemy warriors into the water. As the battle turned against him, Yada Yoshiharu led a desperate foray forward with a few followers in a small boat, but the vessel was overturned and all aboard drowned. Desperate Minamoto soldiers splashed to shore through the shallows, but they were pursued by the Taira, who had horses on board their ships. The Taira horsemen rode down upon the Minamoto remnants and scattered them in flight. This spectacular victory could not prevent Yoshinaka from seizing Kyoto for the Minamoto the following year.

### TAIRA NO TOMOMORI

**COMMANDER OF THE FORCES OF THE TAIRA CLAN**

The son of a famous father—the clan leader Taira no Kiyomori—Tomomori was the most successful of the Taira military commanders in the Gempei War. He won battles against the Minamoto on land at Uji in 1180 and Sumonata in 1181 and on the sea at Mizushima in 1183. Although primarily a soldier, he also seems to have possessed considerable experience in the use of ships in war. He committed suicide after the final defeat of the Taira at the sea battle of Dan-no-Ura, jumping into the water with an anchor tied to his feet.

### XIANGYANG

The Mongol warrior Kublai Khan made himself ruler of northern China in 1260, establishing the Yuan dynasty. The wealthy and populous lands of southern China, however, remained under the rule of the Song dynasty.

The Mongols were steppe horsemen with no knowledge of naval warfare, but in order to conquer the south they had to learn to fight on rivers and lakes. The lengthy struggle to reduce the fortified city of Xiangyang, held by the Song, was in effect a battle for control of the Han river, a major tributary of the Yangtze. Xiangyang was surrounded on three sides by mountains and on the fourth by the river. The Mongols had already realized the need for naval power in the conquest of the Song and recruited a vast fleet of river craft. This enabled them to impose a river blockade, as well as besieging Xiangyang by land.

One Song flotilla managed to break through the blockade to resupply the city’s defenders, but this was not enough to save Xiangyang. Once it fell, the Yuan fleet could sail down the river system to capture the major Song cities.

### YASHIMA

By 1185 Japan’s Gempei Wars between the Minamoto and Taira clans were approaching their climax. Minamoto no Yoshitsune was pursuing the Taira in their last remaining fortresses in Shikoku. While crossing the Inland Sea, however, Yoshitsune ran into a storm and much of his fleet was lost. Although he was resupplied by his ally Kajiwara Kagetoki, he no longer had a clear advantage. By lighting hundreds of fires around the fortress of Yashima, Yoshitsune tricked the Taira into thinking that he had a much larger army. They abandoned the fortress, embarking on ships with their most precious possessions, the child emperor Antoku and the imperial treasure. As the Taira fled, one of the Minamoto samurai, Nasu no Yoichi, rode into the sea and shot a fan off the masthead of one of the departing ships—a celebrated feat of archery.

**Aftermath of Yashima**

Although most of the Taira escaped with the child emperor, some fell into the hands of the enemy. Here a Taira lady is discovered by Yoshitsune.

### YAMEN

After years of stubborn resistance, in 1278 southern China, ruled for 300 years by the Song dynasty, was finally overrun by the armies of Kublai Khan, Mongol founder of the Yuan dynasty. The surviving officials and members of the Song imperial family became fugitives, seeking a base from which to begin organizing resistance. In March 1279 they were on board ship in a bay at Yamen, on the Guangdong coast, when they were located by a Yuan fleet under the command of Kublai’s general Zhang Hongfan. The Song fleet and soldiers were commanded by grand general Zhang Shijie. Instead of advancing his ships to defend the mouth of the bay, which would have left the option of fleeing in case of defeat, Zhang Shijie adopted a passive formation inside the anchorage. He had his ships tied together and awaited the Yuan attack.

Zhang Hongfan first sent fire ships into the bay, but the Song coped successfully with this time-worn tactic. So the Yuan divided their fleet in order to attack from three directions. They were apparently heavily outnumbered by the Song, but their ships were equipped with primitive gunpowder weapons and stone-hurling catapults.

The Song soon lost heart. Zhang Shijie attempted to stage a breakout with a few ships carrying the seven-year-old emperor and the imperial entourage. When this failed, a senior official picked up the emperor and jumped overboard with the boy in his arms. Other officials and concubines followed his example. Zhang Shijie himself survived the battle but was drowned in a storm shortly after.
FAILED MONGOL INVASION OF JAPAN

Date: June–August 1281
Forces: Mongols: 4,400 ships; Japanese: unknown
Losses: Mongols: c.3,000 ships

The Mongol emperor of China, Kublai Khan, demanded that the Japanese acknowledge his suzerainty. In 1274 he raided Japan, sending a substantial force across from Korea to land in Hakata Bay. The attack failed to cow the Japanese, but it did stimulate them to organize new coastal defences. In 1281 Kublai mounted a full-scale invasion, assembling more than 4,000 ships from China and Korea to carry some 150,000 troops. The 900 Korean ships were thoroughly seaworthy vessels, but the Chinese ones were mostly flat-bottomed river or coastal craft. Kublai’s fleet formed two squadrons, the smaller sailing from Korea and the larger from northern China. The force from Korea arrived first, but was unable to land its soldiers because of the coastal fortifications built and manned by the Japanese since 1274.

Anchored offshore, the Mongols were harassed by Japanese samurai in small craft, who set fire to ships and killed crew and soldiers. The Mongols withdrew to Iki island to rendezvous with the squadron from China. They then attacked Takashima island, while the Japanese awaited an assault on the mainland. The invasion never came, however, for a typhoon—known to the Japanese as the “divine wind” or “kamikaze”—struck the Mongol fleet, sinking most of the Chinese ships.

Hit-and-run tactics
Before the Mongol invasion fleet was struck by a typhoon, it was attacked by waves of attacks by samurai archers in fast, light boats.

FALL OF THE YUAN DYNASTY

LAKE POYANG

Date: August 30–September 2, 1363
Forces: Ming: unknown; Han: unknown
Losses: Unknown

By the mid-14th century the rule of the Yuan dynasty in China was disintegrating. Rebel peasant bands known as the Red Turbans took control of the Yangtze River region, and two of their leaders, Chen Youliang and Zhu Yuanzhang, became rivals for power. Chen declared himself emperor and founder of the Han dynasty. Zhu, leader of the Ming, ruled a large area of southern China from his capital city, Nanjing. The war between them lasted from 1360 to 1363, climaxing in a large-scale naval battle on China’s largest freshwater lake, Lake Poyang.

Zhu Yuanzhang voyaged up the Yangtze from Nanjing with a large number of ships to confront the Han fleet blockading Ming forces in the lakeside town of Nanchang. Some sources claim that a million men were present in the two fleets, making this possibly the largest naval battle in history, although such immense figures have to be doubted. Chen Youliang had the largest vessels, three-decked “tower ships” propelled by sails and oars, with high sterns and iron-armored turrets. The Ming ships were smaller but more numerous and maneuverable, many of them treadmill-powered paddle ships.

The lake battle lasted four days. The initial Ming attack came close to disaster. Zhu’s flagship ran aground on a sandbank and was set on fire by incendiary weapons. His other ships rescued him, but Ming attempts to close and board Han vessels failed.

On the second day, Zhu exploited a favorable wind to send in fire ships—small boats packed with straw and gunpowder. These had considerable success against the tower ships, whose deep draft limited their mobility in the shallow waters of the lake. After a day spent on repairs, battle was resumed on September 2. This time the Ming ships penetrated the weakened Han formation and a number of ships were boarded and taken.

The battle ended inconclusively and there followed a month-long stand-off between the two fleets. In a skirmish on October 4, Chen Youliang was shot through the head with an arrow and killed. The Han cause collapsed without its leader. Zhu Yuanzhang went on to overthrow the Yuan and founded the Ming dynasty four years later.
Battle of Shimonoseki Strait

It was a challenge for both sides to negotiate the fast-flowing waters of the strait. At first the Taira had the advantage of the tide, but once they lost this, their cause was doomed.

The Minamoto galleys, which have the tides against them, are drawn up in line abreast across the entrance to the strait

The Taira divide their fleet into three squadrons and make use of the powerful tides to launch an attack on the stronger Minamoto fleet.

The Minamoto maintain their line, but the Taira start to outflank them.

The Taira attack goes well as they hit the enemy line on both its flanks and in the center, raining down arrows on the Minamoto ships. As battle is joined more closely, the Taira fight bravely and nobody can predict the outcome.

The Taira advance in three squadrons, hoping to outflank the Minamoto both on their left and their right.

The battle begins with exchanges of arrows at long range.

1 CONTRASTING BATTLE LINES

The Minamoto draw up a defensive line across the entrance to the Shimonoseki Strait. The Taira, who plan one last, desperate action to escape their pursuers, split their fleet into three to launch an attack, making use of the favorable tide.

The Taira hold their own

The Taira divide their fleet into three squadrons and make use of the powerful tides to launch an attack on the stronger Minamoto fleet.
By 1185 the Gempei Wars, in which the Minamoto and Taira clans fought for control of Japan, had turned decisively in favour of the Minamoto. The Taira had possession of the child emperor Antoku and the sacred imperial treasure, but they were on the run from the samurai Minamoto Yoshitsune after being driven from their fortress of Ichi-no-Tani in March 1184. The Taira only escaped massacre at Ichi-no-Tani by taking to sea, driving them from an anchorage at Yashima later in the same year. In April 1185 he caught up with them again in the strait of Shimonoseki between Honshu and Kyushu.

The vessels employed by both sides in the battle were oared galleys, carrying samurai armed with bows, swords, and daggers. The Taira were outnumbered but had the advantage of familiarity with local weather and tides. They adopted a well-organized formation in three squadrons, while the Minamoto came forward in a single line abreast. Like squadrons, while the Minamoto came in a well-organized formation in three squadrons, and the Taira in a single line abreast. Like squadrons, while the Minamoto came

**THE BATTLE OF DAN-NO-URA**

The vessels employed by both sides in the battle were oared galleys, carrying samurai armed with bows, swords, and daggers. The Taira were outnumbered but had the advantage of familiarity with local weather and tides. They adopted a well-organized formation in three squadrons, while the Minamoto came forward in a single line abreast. Like squadrons, while the Minamoto came forward in a single line abreast. Like squadrons, while the Minamoto came forward in a single line abreast.

**THE TAIRA BETRAYED**

The battle was evenly poised until two events—one predictable, the other not—swung the tide in favor of the Taira. The tide turned, giving the advantage formerly enjoyed by the Taira to their opponents. And one of the Taira commanders, Taguchi Shigeyoshi, suddenly defected and attacked his own side. More important than his contribution to the fighting was information he brought with him. The Taira had concealed the child emperor, his female relatives, and the sacred treasure on an unremarkable ship. Shigeyoshi indicated which vessel this was. The Minamoto closed in to capture this most valuable of prizes.

The end of the battle is the stuff of legend. Facing certain defeat, the Taira apparently chose mass suicide rather than captivity. Taira no Tomomori set the example in spectacular fashion. Facing certain defeat, the Taira apparently chose mass suicide rather than captivity. Taira no Tomomori set the example in spectacular fashion. Faced with certain defeat, the Taira apparently chose mass suicide rather than captivity. Taira no Tomomori set the example in spectacular fashion. Faced with certain defeat, the Taira apparently chose mass suicide rather than captivity. Taira no Tomomori set the example in spectacular fashion.

**Suicide of Taira no Tomori**

Tomomori (center) has tied himself to an anchor, which carried him to the bottom. The Taira commander Taira no Tomomori has tied himself to an anchor, which carried him to the bottom. The Taira commander Taira no Tomomori has tied himself to an anchor, which carried him to the bottom.

**The Turning of the Tide and the Treachery of Taguchi Shigeyoshi change the course of the battle.**

The Minamoto start to overwhelm the Taira galleys, and, when Taira no Tomomori and the emperor's family commit suicide, the battle comes to an end.
THE GEMPEI WARS

The wars fought in medieval Japan between the rival Minamoto and Taira clans became the subject of a popular epic sung by blind musicians. In this detail from a screen that shows the last great battles, the Taira ships are being attacked by the mounted warriors of Minamoto at Yashima in March 1185. The Taira managed to escape their pursuers for a time, but were defeated at the decisive naval battle of Dan-no-Ura in April 1185.
DURING THE THOUSAND YEARS between 500 and 1500 CE maritime powers rose and fell in the Mediterranean. The initial dominance of the Byzantine Empire, the successor state to Rome, was first challenged by the Muslim Arabs, then supplanted by the Italian maritime republics, Venice, Genoa, and Pisa, and by the Catalan galleys of the kingdom of Aragon. With no single state capable of achieving command of the sea, outbreaks of naval warfare were inevitable. Innovative weaponry, from Greek fire to the crossbow, produced important changes in combat at sea, as did variation in ship design and rowing systems. But galleys still predominated and boarding the enemy remained the essential goal in battle, as it had been in Roman times.

TACTICS AND TECHNOLOGY

The dominant warship of the period of Byzantine-Arab wars was the dromon. This was a formidable platform for marines, catapults, and flamethrowers, heading into battle propelled not only by up to 100 oarsmen but also by sails—a radical departure from the practice of the ancient world. The raised beak at the prow of the dromon would smash through an opponent’s oars and provide a bridge for boarding soldiers to swarm across. Oarsmen were expected to take up arms and join the fighting once the enemy was engaged at close quarters. From the 12th century the crossbow was introduced as an important element in Mediterranean sea battles. The Genoese and the Aragonese were especially famed for their use of this weapon. It added a deadly new element to the array of missiles hurled against an enemy as galleys closed for combat—which included incendiary grenades, darts, containers filled with soap thrown onto the opponent’s deck to make it slippery under foot, and lime dust intended to blind the enemies’ eyes. Galleys entered battle in line abreast, each ship protecting its neighbor’s vulnerable flank. Maintaining formation was considered of far greater importance than maneuver—galleys were sometimes loosely linked together with cables, to keep them in line and prevent an enemy from penetrating between them.

SHIFTING POWER

Similar tactics and technology were used by all sides in medieval Mediterranean naval conflict. For example, the dromon and its style of warfare—including the use of Greek fire—was invented by the Byzantines but was over time adopted by the Arabs as well. Relative success in naval warfare depended upon material resources and seafaring and fighting skills. Once it had resisted the initial Arab onslaught in the 7th and early 8th centuries, which briefly threatened to overrun Constantinople, the Byzantine Empire remained a dominant presence at sea in the eastern Mediterranean because it could afford a large fleet and dockyards. From the end of the 11th century the balance of naval power shifted as maritime trade brought rising wealth to relatively small states further west. The Italian republics of Venice and Genoa had populations of only a few hundred thousand, but their involvement in the Crusades in the 12th and 13th centuries brought them a dominant position in the trade of the Levant and the Black Sea. This provided them with the...
funds to develop powerful navies to defend their trade routes and fight their competitors—chiefly one another. There was in this period only relatively minor conflict between Christians and Muslims at sea, but intense armed rivalry between Christian states, much of it fought out around the coasts of Italy and Sicily between galleys from Catalonia and Provence as well as various Italian ports.

**VENETIAN EMPIRE**

Of all medieval Mediterranean states, Venice was the quintessential naval power. The shipbuilding and repair facilities of the Venetian Arsenal, founded around 1200, grew into the biggest industrial enterprise in Europe—it was said they could build and fit out a galley in a single day. Venetian galleys were rowed “alla sensile”—with oarsmen grouped in threes, each with a single oar—and proved successful, highly maneuverable warships. The Venetians were generally reckoned the first to adopt such innovations as the compass, the stern rudder, and the lateen sail. Their oarsmen—volunteers or conscripts—were honored seamen rather than galley slaves, some earning promotion through long careers to captain. By the 15th century Venice had created a Mediterranean empire based on sea power, as Athens had done in ancient times. But by the end of that century profound changes were under way, both in the naval balance of power with the rise of the Ottoman Empire, and in technology with the introduction of cannon into naval warfare.

**Portolan chart**

From the 13th century Mediterranean sailors used a distinctive kind of map, the portolan. Coasts and ports were well charted and the maps were criss-crossed with a network of lines projecting from compasses.

**Provisioning the Crusades**

The larger items of cargo are being loaded aboard a cog, while the galley in front of it is filled with armed men. Among the banners of the various crusading states involved, those of England and France are most prominent, along with the crossed keys of the papacy.
BYZANTINE–ARAB WARS

When the Arabs, inspired by the newly founded religion of Islam, embarked upon their campaigns of conquest around 630 CE, the Byzantine Empire was the dominant naval power in the Mediterranean. This status was swiftly challenged by the victory of an Arab fleet at the battle of the Masts in 655. Although the technologically innovative use of Greek fire helped the Byzantines drive back Arab ships from under the walls of Constantinople two decades later, the fall of Carthage to the Muslims at the end of the 7th century extended Arab sea power into the western Mediterranean. Fierce naval battles were fought over the following two centuries in struggles for control of major islands such as Sicily, Cyprus, and Crete. In the 11th and 12th centuries the strategic situation began to shift, with Turks replacing Arabs as the dominant force in the Muslim world and the Byzantines becoming increasingly dependent upon the navies of the Italian city-states of Genoa and Venice.

The Mediterranean World c.650—950

Following the conquest of Egypt in 639–646, it took Arab armies just 70 years to extend the lands of the Caliphate across North Africa into the Iberian Peninsula. Since the Arabs had no experience of seafaring, conquests by sea were less spectacular. In the east the Byzantine Empire remained a powerful block to Arab expansion, but in the 9th century the Byzantines were ejected from Sicily and Arab raids extended into Italy and the South of France, where Arab corsairs established bases.

Key

- Abbasid Caliphate c.850
- Other Islamic states
- Byzantine Empire
- Arab invasion/raid
- Arab victory
- Byzantine victory

Battle of the Masts

Date: 655
Forces:
- Byzantines: c.500 ships; Arab: c.200 ships
Leses:
- Byzantines: c.400 ships; Arab: unknown

Location: Off Lycia, southern Turkey

The Arab conquests of the 7th century gave them control of ports and seafaring populations on the coasts of Egypt and Syria. Muawiya, the governor of Syria, urged the development of naval warfare but Caliph Omar, a man bred in the Arabian desert, was unconvinced, describing people on board ship as like “a worm in a log of wood.” When Uthman succeeded to the caliphate in 644, however, Muawiya was authorized to develop a fleet, as was the governor of Egypt, Abdullah bin Saad bin Abi Sarh. This took two years, after which the Arabs began conquering or raiding Byzantine-ruled islands throughout the eastern Mediterranean.

With the fall of Rhodes in 654, the young Byzantine Emperor Constans II woke up to the threat and sought to organize a counter-offensive. The following year he sailed south in command of an imperial fleet possibly numbering 500 ships. At the same time, the combined Egyptian and Syrian fleets, under the command of Abdullah bin Saad, were advancing along the coast of Asia Minor, intending to raid the shores and islands of the Aegean.

The Arabs came upon the Byzantine fleet anchored off southwest Turkey. The Arabs were probably outnumbered by more than two to one, but after some hesitation they decided to attack. Both fleets carried archers and as the distance between the ships closed, showers of arrows fell upon both sides, causing substantial casualties. The Byzantine were more skilled in naval maneuver and this, together with their superior numbers, at first gave them the advantage. At one point the Arab flagship was grappled by a Byzantine dromon and almost captured. But soon ships became so packed together that men fought with swords and daggers from deck to deck. The forest of masts gave the battle its name—in Arabic, Thal al-Sawari.

The tide of battle turned in favor of the Arabs. Amid scenes of carnage, many Byzantine dromons were boarded and captured. Constans himself escaped after prudently changing clothes with one of his men. The Byzantine navy was shattered. Fortunately for the empire, the following year the Arab world was thrown into political turmoil, ending further naval ventures until the establishment of Muawiya as caliph in 661.
### The Siege of Constantinople

The establishment of the Umayyad Caliphate in Damascus, Syria, in 661 was followed by a reinvigoration of Arab efforts to conquer the Byzantine Empire. Caliph Muawiyah understood the importance of sea power and in 672 sent a fleet through the Dardanelles into the Sea of Marmara, where it established a base at Cyzicus, about 80 km (50 miles) from Constantinople. Four years later Muawiyah's son Yazid led a full-scale naval attack on the Byzantine capital.

#### A Four-Year Campaign

The Byzantine ruler, Constantine IV, was a vigorous leader who ensured the city's defenses were in excellent repair. The Arabs used their ships as artillery platforms, sailing up to the city walls and bombarding them with rocks from giant catapults mounted on deck. The Byzantines responded with harassing sorties by small, fast-moving galleys, some of them probably employing the newly invented Greek fire as a shock tactic. The Byzantine fleet also prevented the Arabs sailing into the Bosphorus, which remained a lifeline for grain supplies from across the Black Sea.

The Arab attacks on Constantinople were maintained through the summer of 674 without much effect on the impressive fortifications. In October the Arab fleet withdrew to Cyzicus, where they refitted their ships and rested their crews, ready to renew the fight in the spring. This pattern was repeated stubbornly through to fall 677, before the Arabs finally gave up. In that year they suffered two disasters. They were defeated by a Byzantine fleet at Sylleum, a site probably in the Sea of Marmara, and a large part of a force returning to Syria was sunk in a storm.

### The Walls of Constantinople

The siege of 674–677 was the most sustained Arab attempt to take Constantinople. How far its failure was due to the innovative use of Greek fire is impossible to estimate. In any case, the strategy of a naval siege was flawed, since there was neither shipborne artillery powerful enough to destroy the fortifications nor the means to enforce a total blockade.

### The Byzantine–Arab Wars

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>674–677</td>
<td>Sea of Marmara, near Istanbul, Turkey</td>
<td>Byzantine victory</td>
</tr>
</tbody>
</table>

#### Combatants

- **Byzantine Empire**
- **Umayyad Caliphate**

#### Commanders

- Emperor Constantine IV
- Caliph Muawiyah I

#### Forces

- Ships: unknown
- Men: unknown

#### Losses

- Ships: unknown
- Men: unknown

---

**BYZANTINE–ARAB WARS**

**CARTHAGE**

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Forces</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>698</td>
<td>Carthage, near present-day Tunis</td>
<td>Byzantines: unknown; Arab: unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

When the port of Carthage was lost in the Arab advance across North Africa, Byzantine Emperor Leontius sent a large fleet under Ioannes the Patrician to retake the city. Caught by surprise, the Arabs were defeated at sea and Carthage returned to Byzantine rule—but not for long. The Arabs mounted a siege by sea and land. The city held out while resupplied by sea, but eventually the Arab fleet broke through the line of ships defending the harbor. Carthage fell but Ioannes escaped with much of the fleet, only to be murdered by his second-in-command, a German called Apismarius. With the support of his mutinous crews, Apismarius then sailed to Constantinople and seized the throne as Emperor Tiberios III.

**BYZANTINE–ARAB WARS**

**CALABRIA**

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Forces</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>864</td>
<td>Off Calabria, southern Italy</td>
<td>Byzantines: unknown; Arab: unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

In 827 Arabs and Berbers invaded Byzantine-ruled Sicily from North Africa. The struggle for control of the island lasted for more than a century, during which time Byzantine naval forces based in southern Italy fought a number of battles with an Arab fleet based in Palermo. By 964 Byzantine resistance was at an end and Patriarch Nicetas organized a squadron of ships to evacuate the last Byzantine forces from eastern Sicily. Unfortunately the squadron was intercepted by a superior Arab force off the coast of Calabria. The Arabs reportedly used swimmers to attack the Byzantine ships with incendiary devices, an unconventional tactic that contributed to the total destruction of the patriarch’s squadron.
THE AGE OF GALLEYS

THE ITALIAN CITY-STATES of Venice, Genoa, and Pisa grew rich on seaborne trade and providing transport and naval support for the Crusades. Their rivalry for control of trade routes from the Levant and the Black Sea led inevitably to conflict. Pisa was knocked out of the competition by defeat at the hands of Genoa in 1284, while Venice and Genoa fought one another to exhaustion in four inconclusive wars between 1253 and 1381. The battles between Venetian and Genoese galleys often resulted in crushing losses for one side or the other, but defeat had little long-term effect as new galleys were built and fresh crews were recruited. Losses of merchant convoys to commerce raiders often had more strategic significance. By the 15th century Genoa was becoming exhausted while Venice faced the task of defending its scattered possessions in the eastern Mediterranean against the rising power of the Ottoman Empire.

THE ITALIAN MARITIME REPUBLICS

Although their territorial possessions were negligible, the Italian maritime republics gained extraordinary wealth through trade with the east—especially in silks and spices. Venice acquired a string of ports on the Adriatic and the coasts of Greece, while Genoa had trading posts in Greece and even on the Black Sea.

THE ITALIAN MARITIME REPUBLICS c.1050–1400

KEY
- Venetian Republic and possessions c.1270
- Republic of Genoa
- Republic of Pisa
- Genoese victory
- Venetian victory
- Inconclusive battle

1. NORMAN-BYZANTINE WAR
   DURAZZO
   Date: June 1081
   Forces: Venetians: 59 ships; Normans: 150 ships
   Losses: unknown

   Location: Adriatic, off modern-day Albania

   When Norman adventurer Robert Guiscard conquered Sicily and southern Italy, threatening Venetian shipping in the Adriatic, Venice agreed to an alliance with the Byzantines. In spring 1081, Guiscard sailed with 30,000 men from Brindisi, captured Corfu, and besieged the city of Durazzo. A Venetian fleet under Doge Silvio arrived to confront the Normans anchored in the city's harbor. During the night the doge had his largest ships anchor in a line, with cables looped from ship to ship, making an impassable barrier described as a “sea harbor.” Behind this he positioned his war galleys.

   In the morning the Normans, led by Guiscard’s son Bohemond, attacked. The Venetians had built towers on their ships, which were manned by soldiers armed with heavy timbers studded with iron spikes. When the Norman ships were halted by the Venetian barrier, the soldiers hurled the timbers down to smash holes in their hulls. Bohemond’s ship was one of those sunk. Retreating from this bombardment, the Normans were pursued to shore. Three of the Genoese galleys were burned and the rest captured.

2. PISAN-GENOESE WAR
   MELORIA
   Date: 6 August 1284
   Forces: Genoese: 93 galleys; Pisani: 72 galleys
   Losses: Genoese: unknown; Pisani: c.40 galleys, c.10,000 casualties and prisoners

   Location: Off Livorno, Italy

   Genoa and Pisa went to war in 1282 over control of the islands of Corsica and Sardinia. In the summer of 1284 the Genoese sent part of their fleet to Sardinia under the command of Benedetto Zaccaria. Seeing an opportunity to catch their enemy at a disadvantage, the Pisans dispatched their entire fleet to attack Genoa. Unfortunately for them, Zaccaria returned just as their ships reached the city. The outnumbered Pisani fled for home, with the Genoese, under the overall command of Oberto Doria, in pursuit. The Pisans reached the safety of Porto Piombo, in the safety of Porto Piombo.

3. FIRST VENETIAN-GENOESE WAR
   TRAPANI
   Date: June 1266
   Forces: Genoese: 27 ships; Venetians: 24 ships
   Losses: Genoese: entire fleet; Venetians: none

   Location: Off western Sicily

   During the first war between Genoa and Venice, Venetian admiral Jacopo Dandolo’s galleys sailing round Sicily met Lanfranco Borbonino’s Genoese fleet sailing south from Corsica. Aware that most of his crews were Lombards with no seafaring skills and no battle experience, Borbonino adopted a static defensive formation, cabling his galleys together with their sterns to the shore. The Venetians, experienced sailors inspired by patriotic fervor, launched a vigorous and noisy attack, exciting terror in the Lombards who abandoned ship in droves, making for the nearby shore. Three of the Genoese galleys were burned and the rest captured.

4. NORMAN-GENOESE WAR
   MELORIA
   Date: 6 August 1284
   Forces: Genoese: 93 galleys; Pisani: 72 galleys
   Losses: Genoese: unknown; Pisani: c.40 galleys, c.10,000 casualties and prisoners

   Location: Off Livorno, Italy

   Genoa and Pisa went to war in 1282 over control of the islands of Corsica and Sardinia. In the summer of 1284 the Genoese sent part of their fleet to Sardinia under the command of Benedetto Zaccaria. Seeing an opportunity to catch their enemy at a disadvantage, the Pisans dispatched their entire fleet to attack Genoa. Unfortunately for them, Zaccaria returned just as their ships reached the city. The outnumbered Pisans fled for home, with the Genoese, under the overall command of Oberto Doria, in pursuit. The Pisans reached the safety of Porto Piombo, in the safety of Porto Piombo.

Pisano, at the mouth of the Arno, but were lured out by a ruse. Doria drew up his own 63 galleys in a line offshore; Zaccaria’s 30 galleys lurked behind with their masts lowered. Believing they had the numerical advantage, the Pisans’ Venetian commander Alberto Morosini and his second-in-command Ugolino della Gherardesca led their 72 galleys out to sea. By the time they saw Zaccaria’s galleys coming up to join Doria, it was too late to retreat.

The Pisans fought fiercely against the odds. The opening exchange of missiles—bolts fired from crossbows, stones hurled by mangonels—was followed by boarding and murderous hand-to-hand combat. Many of the Pisans wore armor, which exposed them to heat exhaustion under the summer sun; the Genoese fought stripped to their shirts and lasted better. Morosini’s flagship, eventually under simultaneous attack from Doria and Zaccaria, was overcome and the standard cut down. Ugolino escaped with a handful of galleys. After this catastrophic defeat, Pisa lacked the resources to build and crew a new fleet. It never regained its status as a naval or commercial power.
The battle of Curzola occurred during the Second Venetian-Genoese War (1294–99). In 1298 Genoa mounted a bold raid into Venetian home waters. Sailing from La Spezia on the west coast of Italy, a fleet of Genoese galleys made its way round to the Adriatic via Tunisia and Sicily. It was commanded by the veteran Admiral Lampa Doria, younger brother of the Doria who had triumphed over the Pisans at Meloria 14 years earlier. Entering the Adriatic Doria’s galleys were scattered by a storm, but most of them reassembled and proceeded up the coast of Dalmatia, burning and plundering the Venetian-ruled towns of the mainland and offshore islands. On the afternoon of 6 September they were busy pillaging the island of Curzola when a large Venetian fleet suddenly appeared on the scene. Venice had been caught off guard by the attack on its Dalmatian possessions. A squadron of galleys commanded by Maffeo Querini was brought back from the Ionian islands and joined with freshly equipped and crewed galleys from Venice and Dalmatia to form the largest war fleet the Venetians had ever assembled. Quality had, however, been sacrificed to quantity.

Deadly crossbow
The principal Genoese weapon both on land and at sea was the crossbow. The highly trained Genoese crossbowmen were feared across Europe and the Middle East.

The hastily conscripted soldiers and sailors did not have the skills usually expected of Venetian galleymen. The fleet was commanded by Andrea Dandolo, son of a former Doge.

The Venetians found the Genoese galleys in a sheltered bay near the eastern tip of the island late on 6 September. Battle was joined early the following morning and lasted through to evening. It was a savage combat. The Genoese suffered heavy casualties, including Lampa Doria’s son Octavian, killed by an arrow while fighting on the forecastle of his father’s flagship. Seeing his men waver, the admiral had his son’s body thrown unceremoniously into the sea and ordered the fight to continue. The Venetians, however, came off worse. At a crucial moment, 16 Genoese galleys that had become detached from the main body in the earlier gale returned to attack the Venetians from the flank. Only Querini’s experienced crews had the skills to maneuver out of the ensuing debacle, but led back into the mêlée in an attempt to rescue Dandolo, they too were overcome.

Only a handful of galleys returned to Venice to report the disaster. Taken prisoner and bound in chains, Dandolo committed suicide by dashing his head against one of the rowing benches. Among other prisoners taken by the Genoese was Marco Polo, who had commanded one of the Venetian galleys.

An indirect legacy of the battle
It is said that Marco Polo began dictating his famous memoirs while in Genoese captivity after the battle of Curzola. He is seen here departing from Venice with his father and uncle on his journey to China.
The conflict known as the War of Chioggia (1378-81) was the last fling in the long struggle between Venice and Genoa. In alliance with Hungary and Padua, the Genoese came close to inflicting a humiliating defeat on their Venetian enemies.

Venice's problems began in the spring of 1379. A fleet commanded by Vettor Pisani—nephew of the Niccolo Pisani defeated at Modon and one of Venice's most successful admirals—had wintered at Pola in the northern Adriatic. The galleys were still there on May 7, refitting and taking on supplies, when a Genoese squadron appeared at the harbor mouth. Pisani had only 16 galleys ready for action, but this seemed enough since the Genoese galleys in sight numbered 14. When the Venetians went out to give battle, however, 10 more enemy galleys appeared from behind a headland. After fierce fighting most of the Venetian galleys were captured along with their crews. Pisani survived but, on his return to Venice, was permanently banned from holding a command and, for a time, clapped in irons.

The destruction of its galleys at Pola put Venice at great risk. Its other major fleet, commanded by Carlo Zeno, was far away, commerce raiding in the eastern Mediterranean. Doge Andrea Contarini hastily improved the defenses of the city, but could do nothing to prevent a reinforced Genoese fleet of 47 galleys under Pietro Doria entering the Venetian lagoon in early August. With the aid of the land forces of Francesco da Carrara, lord of Padua, Doria seized the port of Chioggia at the southern end of the lagoon.

Pisani was immensely popular with his sailors—he was known as the “chief and father of all the seamen of Venice.”
At this moment of crisis, many refused to serve under anyone else. The Venetian authorities gave in to popular pressure and reinstated the fired admiral, placing him in control of the defense of the city.

VENICE STRIKES BACK
The Genoese did not attempt a direct attack on Venice, depending instead on a blockade by land and sea to reduce the city to surrender. Doge Contarini did seek peace terms from the enemy, but found the price too high to pay. Pisani naturally had no intention of surrendering. On December 21 he launched an operation to turn the tables on the Genoese. Under cover of darkness he sank stone-filled hulks in the channels leading from Chioggia to the open sea. The original besiegers were now the besieged. It still seemed possible that the hungry, demoralized Venetians would be forced to give up the fight when, on January 1, 1380, Carlo Zeno’s ships were sighted on the horizon. This tipped the balance of forces decisively in favor of Venice. A Genoese relief fleet led by Matteo Marufo arrived on May 12, but could find no way through to Chioggia.

On June 24, the Genoese and their allies inside Chioggia surrendered. When a peace treaty was signed the following year, the terms were equitable, but Genoa’s attempt to win control of the lucrative trade routes through the eastern Mediterranean had failed. Venetian naval power would not be challenged again until the rise of the Turkish Ottoman Empire.

FRANCESCO DA CARRARA RULER OF PADUA, REFUSING THE VENETIAN PEACE OFFER

"TAKE BACK YOUR PRISONERS ... I SHALL BE AT VENICE IN A FEW DAYS TO RELEASE THEM ... FROM YOUR DUNGEONS."
THE WAR FOR SICILY

WHEN THE PEOPLE OF SICILY rose in rebellion against their hated ruler Charles of Anjou in 1282, King Peter III of Aragon landed troops in Sicily to fight the Angevins. The complex conflict that followed the uprising known as the “Sicilian Vespers” brought a number of naval engagements, from the battle of Malta in 1283 to Ponza in 1300, in which Aragonese admiral Roger di Lauria proved himself a ruthless master of galley warfare. The war ended in 1302 with the Aragonese in control of Sicily and the Angevins ruling Naples and southern Italy.

WAR OF THE SICILIAN VESPERS 1282—1302

Southern Italy and Sicily had been part of the domains of Holy Roman Emperor Frederick II. When he died in 1250, the papacy was determined that the kingdom should not pass to his son, and in 1259 gave it to Charles of Anjou, brother of Louis IX of France (St Louis), eager to demonstrate his courage and fighting prowess. He was humiliated to stand by passively as di Lauria’s fleet captured incoming ships and carried out raids around Naples. On June 5 the Aragonese admiral succeeded in luring Charles of Salerno out of harbor with the apparent offer of an easy victory. Making a conspicuous show of sending a dozen of his galleys away to the south, di Lauria approached the harbor with a weakened force. Charles could not resist the temptation to engage a numerically inferior enemy and led his Neapolitan and Provencal galleys out to attack. Di Lauria turned and fled with Charles in pursuit.

As the galleys approached Castellammare the trap was sprung. The group of Aragonese galleys that had sailed southward rejoined the main body of di Lauria’s ships. The opposing forces were now roughly equal in numbers, but the Aragonese were far superior in organization and fighting experience. Forming a crescent in line abreast, they turned and bore down on Charles’s galleys, which had been pursuing in no particular formation. The Neapolitan galleys had lagged behind and were thus able to flee in disordered fashion back to the harbor. The Provencal galleys, including Charles’s own ship, were outflanked and attacked from the sides and rear. Outnumbered and outfought, the galleys were captured after a short, sharp action. Charles’s ship was the last to surrender, deluged with the bolts of the Catalan crossbowmen and assailed by combat swimmers.

The capture of Charles was the crucial outcome of a victory otherwise lacking in strategic significance. He was carried off to Aragon, where he was held prisoner until 1288. He was then released after swearing that he would cede Sicily to the Aragonese, but this was a promise he felt free to renounce once he had returned to Naples.

Coronation of Charles of Anjou
This French manuscript illumination shows Charles arriving in Rome by sea in 1265 and being crowned king of Naples and Sicily by Pope Clement IV.

The Gulf of Naples
The spectacular bay dominated by Mount Vesuvius was the scene of three of Roger di Lauria’s great naval victories, the first being over Charles of Anjou’s son Charles of Salerno in 1284.
In 1285 Philip III of France invaded the kingdom of Aragon, a rapacious enterprise declared a crusade by a partisan pope. French troops advanced down the coast of Catalonia, supported by a force of Provencal and Genoese galleys. Roger di Lauria’s fleet sailed from Sicily to help resist the invasion.

Arriving in Barcelona at the end of August, di Lauria led his own 40 galleys from Sicily and 10 Catalan galleys north toward Gerona, which was under siege. At the same time, unaware of di Lauria’s arrival, the French fleet advanced south toward Barcelona, hoping to annihilate the small Catalan galley force. The two fleets met, to their mutual surprise, some time before daybreak on September 4.

In the darkness the action must have developed into a confused close-quarters mêlée, with boarding the only effective tactic. A lucky dozen of the outnumbered French galleys escaped back to Aigues-Mortes. Roger di Lauria’s flagship, but despite inflicting a vengeful enemy. The wounded were massacred by the Catalan crossbowmen, as was the use of the astrolabe as an astronomical aid. This one is from the late 13th century.

By 1287 the original contenders for the throne of Sicily had disappeared from the scene. Charles of Anjou died in 1265, leaving southern Italy to his son Charles of Sulerno, still a prisoner of the Aragonese after his defeat at the battle of the Gulf of Naples. In 1286 Peter III of Aragon also died. He left his Aragonese kingdom to his eldest son Alfonso III, but Sicily to his second son James II. In the absence of the imprisoned Charles II, the Angevin cause was led by Count Robert II of Artois. He assembled substantial land and naval forces in Naples for an invasion of Sicily, hoping to prevent James II’s succession.

The Aragonese defense of the island still lay primarily in the hands of Roger di Lauria and his experienced fleet. In the spring of 1287 di Lauria sailed from Naples to relieve Augusta.

The Count of Artois was willing to send his galleys out to fight. He had a far more substantial galley force than the one defeated by di Lauria off Naples three years before. There was also an impressive array of military leaders at his side, including Reynald III Quarrel, Count of Avella; Hugh, Count of Brienne, who was ruler of the Principality of Taranto; and Guy de Montfort, Count of Nola, son of ruled England. But these counts, for whom the battle is named, were no match for di Lauria in a sea fight. Far superior at maneuver, his experienced and highly motivated Sicilian galleys attacked their opponents from the beam, destroying their oars and leaving them immobilized, to be massacred by the Catalan crossbowmen and boarding parties of fierce Spanish almogavers.

More than half the Angevin galleys were captured, along with some 5,000 crew and soldiers. Those taken prisoner included Hugh of Brienne, and Guy de Montfort, who did not survive his captivity. The planned invasion of Sicily was abandoned, enabling James II to confirm his hold on the throne.

When the Sicilians arrived, an onshore breeze made it hard for di Lauria to leave the bay where he was moored. Instead he adopted a tight defensive formation, his galleys drawn up in line close to the shore and linked by cables. Frederick entered the bay on the morning of July 4, also placing his fleet in a cable-linked line. The galleys exchanged missiles at distance until a Sicilian captain, tiring of the punishment his crew was taking from the Catalan crossbowmen, cut his cables and plunged forward to engage the enemy at close quarters. Others followed suit and the battle became a mêlée. In the heat and exhaustion of combat Frederick, in the center of the Sicilian line, fainted and was rowed from the battle. Di Lauria got some of his galleys behind the Sicilians, who were gradually ground down in fierce fighting. Only 12 Sicilian galleys escaped. As at Las Hormigas, di Lauria was savage in victory, slaughtering the crews of captured galleys out of hand.

Roger di Lauria was born into the nobility of Calabria, southern Italy, but was driven into exile at the court of Peter III of Aragon when the Angevins seized his family’s lands in 1266. He proved his worth as a soldier before his appointment as admiral at the start of the War of the Sicilian Vespers in 1282. His energy and administrative skill were demonstrated in strengthening the Aragonese fleet, but he is respected above all for his leadership in combat. He never lost a single sea battle, showing a cunning, good judgement, and boldness that have earned him a reputation as the finest of medieval naval commanders. Ruthless toward his enemies, he remained unswervingly loyal to the Aragonese throne.
Battles for the Mediterranean

The outbreak of the War of the Sicilian Vespers in 1282 set Charles of Anjou, Count of Provence and ruler of Naples and Sicily, against King Peter III of Aragon, whose domains included Catalonia. Initially the Aragonese had the better of the Angevins at sea, so Charles ordered the creation of a new galley fleet at Marseille—to be manned by Provencal crews and soldiers, and commanded by two Marseillais admirals, Guillaume de Corrutz and Bartolomé Bonvin. In June 1283 these Provencal galleys arrived in Malta to aid an Angevin garrison besieged in Fort St. Angelo on the Grand Harbor.

In the Sicilian port of Messina, Aragon’s newly appointed admiral Roger di Lauria was informed of the Angevin move and set off in pursuit. The Aragonese fleet was considered the best in the western Mediterranean. Its oarsmen were Sicilians in revolt against Angevin rule, and therefore highly motivated. Each galley carried 30 or 40 Catalan crossbowmen and some 50 almogavers—tough fighters recruited from wild areas of Spain bordering on Muslim territory.

Give the Enemy a Chance

Di Lauria reached Malta on June 7. That night, under cover of darkness, he slipped an armed boat into the harbor to reconnoiter. It found the Angevin galleys beached with oars unshipped in a narrow inlet under the castle walls. Di Lauria decided to draw them out into the open harbor to fight. Sacrificing the chance to surprise a sleeping enemy, he announced his presence with a blast of trumpets. While the startled Angevins rushed to man and launch their galleys, di Lauria organized his fleet in line abreast across the harbor. Heavy cables were strung from galley to galley, making it impossible for enemy ships to pass between them.

At daybreak the Angevin galleys emerged into the harbor, their complement of marines augmented by a hundred armored knights from the castle. They deluged the Aragonese galleys in a hail of missiles—crossbow bolts, stones, javelins, darts, and pots containing a variety of substances from burning pitch to lime (intended to blind its victims). Di Lauria told his men to take cover and return fire only with crossbows. Ranging from heavy winched machines to light hand-held weapons spanned using a foot-stirrup, these were cruelly effective. A chronicler says the Catalan archers “did not discharge a shot without killing or disabling the man they attacked. When the Angevins had exhausted most of their supply of missiles, di Lauria ordered his galleys forward. They crashed into the prows of the enemy ships with a splintering shock. Then Aragonese missiles rained down on the enemy decks, including pots filled with soap that shattered, making the pitching decks treacherous for armored soldiers. The fierce almogavers, nimble and lightly clad in leather, sure-footedly stormed the Angevins’ galleys.

The Sicilian oarsmen joined in the fight, leaving their benches to take up sword and shield. The Angevins were overwhelmed and slaughtered. Only a handful of their galleys evaded capture. Bonvin was among those who escaped, but de Cornut was killed along with the majority of those he commanded. Roger di Lauria had laid the foundations of his reputation as the greatest naval commander of his age.

Valletta Harbor

The harbor today is still dominated by Fort St. Angelo. It retains its medieval appearance, but has been completely rebuilt since the time of Roger di Lauria.
73

THE WAR FOR SICILY

FORT ST ANGELO

An Angevin galley is beached close to the fort. With their sterns to the shore, the fort's position is easily defended.

A few Angevin galleys manage to escape the carnage in the harbor and return to Marseille.

The Aragonese galleys reach the harbor on the night of July 7. Di Lauria orders them to remain outside the harbor while he sends a small boat inside to reconnoiter. The Angevins have posted two guard boats, but these fail to spot the intruder.

The Angevins place two boats to guard the harbor entrance, moored close to the shore.

Di Lauria's galley fleet arrives from Sicily during the night.

NIGHT BEFORE THE BATTLE

Di Lauria decides to fight in open water rather than attack the Angevins on shore. Taking up a position at the harbor entrance, he orders his trumpeters to wake the Angevins. The latter hastily board their galleys and row out to do battle.

CLASH IN THE HARBOR

Just before sunrise, Di Lauria deploys his galleys in line abreast across the harbor entrance. The ships are tied together with strong cables to stop the enemy from breaking through.

The Angevins, roused from their slumbers by the Aragonese trumpets, sail out to do battle with the enemy.

The Angevins attack the Aragonese with spears, crossbows, and other projectiles.

The Aragonese close on their defenseless foe, unleashing a hail of missiles, then start boarding the Angevin ships.

The Angevins start to run out of crossbow bolts and other ammunition.

CRushing VICTORY

The Angevins attack fiercely but eventually run out of ammunition. Di Lauria's men now emerge to start firing themselves, then grapple and board the enemy galleys, capturing most of them and slaughtering their crews.

A few Angevin galleys manage to escape the carnage in the harbor and return to Marseille.

GRAND HARBOR

The Aragonese boat slips into the harbor under cover of darkness. Rowing with muffled oars, the crew spies out the Angevins' strength and positions.

An Angevin galley is beached close to the fort. With their sterns to the shore, their position is easily defended.

The Angevins, roused from their slumbers by the Aragonese trumpets, sail out to do battle with the enemy.

The Angevins attack the Aragonese with spears, crossbows, and other projectiles.
THE RISE OF SAIL

THE EVOLUTION of the three-masted sailing ship in the 15th century was a turning point in history. Armed with cannon, it was to give Europe global reach and maritime dominance. It also brought a fundamental change to naval warfare within Europe. Large sailing ships rendered maneuverable by a combination of square and lateen sails could outfight galleys, providing a superior platform for large numbers of cannon. These ocean-going ships began to shift the focus of European seapower from the Mediterranean to the Atlantic. Portugal showed the way in voyages down the African coast in the 15th century, but Spain was best placed to take the lead in ocean sailing because it was both a Mediterranean and an Atlantic power. Northern Europe had a long sailing tradition but its states rarely had the resources and political organization to maintain substantial fleets of warships until the 16th century.

LONGSHIP RAIDERS

The first distinctive contribution of northern Europe to naval history was provided by the Viking warriors of Scandinavia from the 8th century. Their longships used sails and oars, like Mediterranean galleys, but were better able to function in heavier seas. Warriors doubled as oarsmen. Viking raiders devastated coastal settlements around the British Isles, besieged Paris, and even sailed into the Mediterranean and penetrated the Black Sea via the river systems of the Ukraine. Raiding parties grew into fleets as political consolidation created powerful Scandinavian kingdoms.

Viking ships were mostly employed in amphibious operations—the fighting took place on land—but crude sea battles occasionally took place with exchange of missiles and boarding with hand weapons. Although Anglo-Saxon England in particular tried to develop naval strength, there was little that any country—at least any as undeveloped as the states of northern Europe were at this time—could do to stop the Vikings landing forces or settlers whenever they wanted. England was invaded twice in 1066, by Scandinavians and their Frenchified descendants the Normans, without succeeding in mounting a response at sea.

ANGLO-FRENCH RIVALRY

The development of England and France as naval powers was slow. Medieval English fleets were improvised from a few king’s ships, vessels provided by port towns and merchant cogs—round sailing ships—pressed into service for the purpose. Under French King Philip le Bel in the late 13th century the “clus des galées” for a while functioned as a kind of royal dockyard at Rouen, but there was nothing in northern waters that was remotely comparable with the size and sophistication of the great arsenals at Venice and Genoa. Henry VII finally established a permanent dock for the English king’s ships at Portsmouth at the end of the 15th century. Nevertheless, Anglo-French rivalry ensured that the English Channel became a focal point of naval operations from the 13th century onward. Large numbers of ships were sent in both directions to land troops, horses, and supplies, and for coastal raids, as when Southampton was sacked by French galleys in 1338. During the Hundred Years War, English military operations in northern France and Aquitaine would have been impossible without maritime support. Sea battles as such, however, were infrequent, and when they did take place, consisted mostly of fights between knights, men-at-arms, and archers on board ships.
Portuguese carracks

Having explored the entire west coast of Africa, the Portuguese reached their true goal when Vasco da Gama completed his historic voyage to India in 1498. Carracks were the mainstays of their long-distance voyages of exploration.

COGS AND CARRACKS

The French used galleys for cross-Channel raiding and in the battles of the Hundred Years War—the oared vessels were often supplied by Genoese mercenaries. The Castilians also used galleys successfully against the English, who for their part had balingers, small single-masted vessels powered by a combination of oars and sails. But ships powered by sails alone were becoming increasingly important in northern wars. Sturdy single-masted cogs were the trusty workhorses of maritime trade in the Baltic and North Sea. With high castles added fore and aft, these merchant ships provided excellent platforms for the archers who played a major role in combat at sea, as well as spacious holds for the purposes of military transport.

The carrack emerged in the 15th century as a large hybrid of the cog and sleeker Mediterranean lateen-sailed ships. The Genoese brought carracks into the Channel in support of the French fighting England’s Henry V in 1416. Henry himself built the massive Grace Dieu, a carrack as large as a first-rate ship of the line of the Nelson era. Such “Great Ships” appealed to monarchs for their prestige value. Initially, their fighting advantage lay primarily in how difficult they were to board, with their high inward-sloping hull. But by the start of the 16th century they were being equipped with cannon in large numbers, with gun ports cut into the hull. Purpose-built warships such as England’s Mary Rose were a new kind of fighting machine whose firepower would make earlier forms of naval warfare redundant.
The Vikings

During the Late 8th and 9th centuries, Viking sea warriors from Scandinavia terrorized much of Europe, devastating sites along coasts and up rivers. At first small-scale hit-and-run raids mounted by single war bands, these attacks grew into sustained operations involving hundreds of longships, and led to permanent Viking settlement in France and the British Isles. From around 980 a new wave of Viking expansion, led by warriors such as Olaf Trygvasson, struck in particular at Anglo-Saxon England, which came under the rule of the Danish King Canute from 1017. In Scandinavia, the kingdoms of Norway, Denmark, and Sweden were consolidated and their warrior kings, or claimants to their thrones, fought one another repeatedly in shifting alliances. Longships were central to Viking invasions and raids, but actual battles on water were rare. When forces clashed at sea, the style of fighting differed little from a battle on land, with an exchange of missiles followed by close combat with axe, sword, and spear.

The Viking raids of the late 8th and early 9th centuries were followed by a period of conquest and settlement, with Vikings settling in Iceland as well as in conquered areas of France, Britain, and Ireland. As the regions ruled by the Vikings grew to become powerful states, wars between rival Viking leaders became increasingly frequent as they quarreled over their inheritance.

The Viking raids on Northern England

RAID ON LINDISFARNE

Date: June 793
Forces: Vikings: unknown
Losses: Unknown
Location: Lindisfarne Island, off Northumbria

In the 8th century the monastery on Lindisfarne was a famed center of Christian learning. Its remote coastal location showed the security felt by a people unsuspecting of seaborne attack. The Viking raiding party that crossed the North Sea and beached its longships near the monastery in 793 met little or no resistance. According to the Anglo-Saxon Chronicle, the raiders “devastated God’s church on Lindisfarne island by looting and slaughter.” The Vikings stole the treasures of the church and either killed the monks or carried them off in chains to be sold as slaves.

Viking leader’s helmet

Elaborate bronze helmets contributed to the terrifying spectacle of sudden landings of groups of Viking raiders.

RAID ON PARIS

Date: November 855 – October 886
Forces: Vikings: c.300 longships; Franks: 200 men-at-arms
Losses: Unknown
Location: Paris

In 885 a vast Viking fleet, led by the chieftain Sigtryg, sailed up the River Seine, bent upon pillaging inland France and Burgundy. The Frankish town of Paris, built on the Île de la Cité, was joined to each bank of the Seine by bridges, one of wood and one of stone. To the surprise of the Vikings, the handful of Frankish warriors in the town, led by Count Odo, defended the bridges, blocking the raiders’ progress up the river. A prolonged siege ensued. The Vikings were determined not to be thwarted by a few Frankish warriors; they used siege engines to bombard the fortifications; they attempted to burn the wooden bridge with fire ships; they filled moats with dead bodies.

King Olaf was traveling on board Long Serpent, a ship 165 ft (50 m) long, powered by 70 oars and carrying 200 warriors. As the opposing fleets closed for battle,

SVOLD

Date: September 1000
Forces: Norwegians: 11 ships; Coalition: c.70 ships
Losses: Norwegians: 11 ships; coalition: unknown
Location: Baltic Sea

Olafr Trygvasson, king of Norway, was opposed by a coalition of Danish king Sven Forkbeard, Swedish king Olaf Eriksson, and the Earl of Lade, Eirik Hakonarson, a pretender to the Norwegian throne. Olaf was sailing home from Wendland when his small fleet was intercepted by a far superior coalition force. The battle that followed is best described by Icelandic chronicler Sonni Sturluson in his sagas of the Norwegian kings, the Heimskringla.

Earl Eirik led the attack on Olaf’s floating fortress. Sailing alongside and grappling the smaller ships, Eirik’s warriors boarded them and cleared their decks in tough hand-to-hand fighting. They then cut the hawser and the Norwegian fleet began to drift and eventually to founder. The Earl gained the victory. Olaf was captured, taken to a bank of land, killed and his body hanged. Eirik took over the kingdom, dividing it among his three sons. The victors divided Norway between them, with Earl Eirik taking the lion’s share.

King Olaf was captured, taken to a bank of land, killed and his body hanged. Eirik took over the kingdom, dividing it among his three sons. The victors divided Norway between them, with Earl Eirik taking the lion’s share.
Harald III Sigurdsson, also known as Harald Hardrada, was one of the most celebrated of Viking warriors. He served in the elite Varangian Guard of the Byzantine Empire before returning to become king of Norway in 1047. He also claimed the throne of Denmark, held by Svein Estridsson, a nephew of Canute. There was warfare between the two for 15 years. In summer 1062 Harald sailed south to seek battle with the Danes. He laid waste the Danish coast to draw Svein out to fight. The Danish king appeared with a far larger fleet than Harald’s, but many of his followers seem to have been lacking in confidence. On either side of Svein’s own vessel ships were tied together with cables, but many other Danish ships were loose and disorganized, some hanging back while others pressed forward to fight. The battle was joined late in the day and continued through the night. Enemies assailed one another with stones and arrows, as well as closing to clash with swords and shields. The loose Danish vessels were mopped up by aggressively-led groups of Norwegian longships. Svein’s ship and those tied to it in the center were finally overrun after savage fighting, although the king escaped capture. Despite the scale of the Norwegian victory, Harald made peace with Svein in 1064. Instead he pursued a flimsy claim to the English throne. Harald was killed leading an invasion of England at Stamford Bridge in 1066.
RELIGION AND SUPERSTITION

THE HAZARDOUS AND UNPREDICTABLE nature of any seaman’s life, subject to the vagaries of weather and waves, is compounded in naval service by the uncertainties of warfare creating fertile ground for superstition of all kinds. Religious belief at sea has in some of its aspects been hard to distinguish from superstition, although religion has often developed a very different role as a motivating and bonding force, and a source of spiritual comfort on board.

OMEN AND SACRIFICE

In ancient times any enterprise, whether in peace or war, would be preceded by animal sacrifice and the consultation of omens, often by examination of burned entrails. On important occasions renowned professionals were employed for the purpose, like Euphrantides the Soothsayer who allegedly advised Themistocles to sacrifice three Persian prisoners to the gods before the battle of Salamis. When Roman consul Publius Claudius infamously refused to heed the omen presented by sacred chickens before the defeat at Drepana, Rome was in uproar and it nearly cost him his life. The Viking warriors, worshipers of Odin and Thor, practiced human sacrifice and divination from examining the remains of the victims. Omens could also be accidental, however. At Lepanto a number of crows were seen over the Turkish fleet before the battle, and their admiral had great difficulty persuading his men to enter the fight.

SUPERSTITIONS

Sailors maintained into modern times many beliefs that are widely though to be pagan in origin. For example, death was believed to come with the ebb tide. If a dying man survived one ebb tide, he would live until the next. Possessing a caul from a newborn baby was believed to ensure a man against drowning—sailors were still known to buy caulds into the 20th century. It was also unlucky to kill a seagull or, especially, an albatross, since they embodied the souls of lost mariners. This prohibition was not universally observed—sailors were known to make tobacco pouches out of albatrosses’ webbed feet. It was bad luck to carry a corpse on board. If unavoidable, it should always be carried sideways onto the ship, not end on. Whistling was generally disapproved of as likely to cause a storm, although soft whistling might be indulged in a dead calm as a way of summoning a wind. Placing a silver coin under the mast might ensure good fortune, while it was taboo to launch a ship on a Friday.

Now Friday came. Your old wives say, Of all the week’s the unluckiest day.

RICHARD FLECKNOE, Diarium (1656) on the belief preventing ships launching on Fridays.
RELIGION ON BOARD

Clergymen, monks, or nuns on board were traditionally regarded as unlucky. In the 16th century Spanish royal galleys, which operated close to shore and were never at sea for long periods, had clergy assigned to them, but the oceangoing sailing fleet did not. The celebration of mass on board was banned because the consecrated wafer or wine might be spilled in the sea. The ship’s master led services on board and the ship’s boys sang the Ave Maria at sunset. Spanish sailors wore medallions of the saints and Virgin around their necks as charms, and made ex-voto offerings in churches to give thanks for a safe voyage. English sailors of Francis Drake’s time, affected by Protestantism, would sing hymns on deck, while denouncing their Catholic enemies as merely superstitious. Religious services on board Royal Navy ships in the 18th century were mostly conducted by the captain. The growth of Christian evangelicalism in the early 19th century affected Royal Navy officers, who were more likely to take their religious duties seriously. From 1812 the official policy of the Royal Navy was that every ship from a sixth-rate upward should have a chaplain, but until the mid-19th century there were never enough chaplains to fulfill this aspiration. Eventually, in the course of the 19th century, religious personnel on board were generally provided by navies around the world as part of a concept of a well-run ship caring for its sailors.

**ORTHODOX CHAPEL** Many ships had their own chapels, where a chaplain could perform services and rites. This Orthodox chapel from the Greek WWII-era battleship Georgios Averof came with its own icons.

**PRAYER SERVICE** Sailors often attended religious services before and after battle. Here British officers and men pray for their fallen comrades after the battle of the Nile (1798).

**BLESSED CEREMONY** Clergy inspect a submarine after a ceremony. Another maritime tradition views a priest on board as bad luck.

**ORGAN** Specially built organs for submarines, such as this WWII model, were issued for religious services until the 1980s.

**HORATIO NELSON** Prayer written before battle of Trafalgar on October 21, 1805

May the great God... grant to my country and... Europe in general, a great and glorious victory: and may no misconduct, in anyone, tarnish it...

Sailors often attended religious services before and after battle. Here British officers and men pray for their fallen comrades after the battle of the Nile (1798).
In 1066 Anglo-Saxon England was the target of no less than three seaborne attacks, all concerned with contesting the accession to the Anglo-Saxon throne of Harold Godwinson at the start of the year. In May Harold’s exiled brother Tostig landed on the Isle of Wight with a fleet from Flanders and went on to raid Harold’s main naval base at Sandwich. In early September a fleet of some 300 ships commanded by Norwegian King Harald Hardrada, with Tostig as his ally, landed an army in northern England. This invasion failed because King Harold defeated King Harald’s land forces at Stamford Bridge. The third seaborne operation, mounted by William Duke of Normandy, was a resounding success.

DAUNTING LOGISTICS
Whatever the merits of William’s claim to the English throne, his preparations were thorough and determined. William had to transport an army of 7,000 men or more, along with some 2,000 horses, and equipment that included the components for a prefabricated wooden fort. At Dives-sur-Mer on the Normandy coast he assembled a fleet that has been estimated at around 700 ships. Some of these were built from scratch, a process shown in the Bayeux Tapestry. Most of the ships were probably much broader in the beam and deeper in draft than a Viking longship. It has been estimated that one such ship would have taken a team of 12 shipwrights three months to build. Given the scale of the enterprise, most vessels must surely have been existing craft supplied by the duke’s seagoing subjects.

The fleet was ready by August 12, but the weather would not cooperate and a north wind kept the ships firmly bottled up in harbor for a month. On September 12, the fleet moved to St Valéry-sur-Somme, losing several ships en route through stormy weather. This placed William’s invasion force closer to England, enabling him to target a landing site nearer London. King Harold was well informed of William’s preparations and waited with his own ships and army on England’s south coast. The long delay worked against Harold, however. Firstly, on September 8, most of his forces were sent home. Then the invasion by Harald Hardrada required a hasty march.
northward. When a southerly wind finally set in that could carry the Norman fleet to England, coastal defences were almost nonexistent. Soldiers and horses boarded the ships on September 27—probably ten horses to each transport—and at high tide around 3:00 p.m. they rowed out to an assembly point at sea. There, sails were raised and the fleet set off with the duke’s ship in the lead. When night fell, there was no moon, so lanterns were hoisted to keep the ships in formation. A few became detached, but the main body came ashore—unopposed—on the pebble beach at Pevensey on the morning of September 28. Such ships as Harold had on duty were stationed in the Solent, far to the west.

William went on to defeat Harold at Hastings and replace him on the English throne, an event that radically altered the structure of English society and England’s relation to mainland Europe.
On June 22, 1340, the English king, Edward III, set sail across the North Sea from the Orrell estuary on board *Cog Thomas*, bound for the Scheldt in Belgium. His large fleet of round ships, balingers, galleys, and barges was packed with troops, although a party of high-born English ladies was also on board, being carried to the court of Edward’s Flemish wife at Ghent. Joined by the English North Sea squadron under the command of Sir Robert Morley, Edward arrived off the Flanders coast to find a large French fleet anchored in the Scheldt estuary.

**DEPLOYMENTS BEFORE THE BATTLE**

According to the French chronicler Froissart, the king was astonished by the number of French ships, whose “masts resembled a forest.” Commanded by Admiral Hugues Quiéret and by a lawyer, Nicolas Béhuchet, the French force had been assembled for an invasion of England. It included a contingent of Genoese galleys under the experienced mercenary naval commander Egidio Bocanegra, known as Barbavara. While the English waited for a favorable wind and tide to enter the estuary, the French placed their ships in a defensive formation, anchored in lines tied together with cables. The idea was to create a stable floating platform to be defended by the crossbowmen and men-at-arms. The *Christopher*, one of five large English ships recently captured by the French, was stationed in front of this mass, with Genoese crossbowmen manning her high castles. Barbavara, a true sailor, kept his own ships separate and maneuverable.

The English fleet was arranged with one ship packed with men-at-arms between each two ships of longbowmen. Maneuvering to approach with the sun and wind behind them, the English attacked at around noon on June 24. Both sides sounded trumpets, horns, and drums to encourage resolve as battle was joined. According to Froissart, “fierece fighting broke out on every side, with archers and crossbowmen shooting arrows and bolts at each other pell-mell, and men-at-arms struggling and striking in hand-to-hand combat.” Iron grappling hooks were used to hold the enemy ships fast for boarding. The *Christopher* was one of the first vessels to be taken, and all her defenders were killed or captured.

**CONTROL OF THE SEA**

According to a letter written by King Edward after the battle, the fighting continued “all that day and the night after.” The French clearly had the worst of it, possibly because of the rapid rate of fire and accuracy of the English king’s longbowmen, or because the English ships were free to move around their anchored adversaries. It is no doubt significant that Barbavara’s galleys were the only ships on the French side to escape the debacle, taking two prizes into the bargain.

**THE FRENCH SHIPS WERE ALL CHAINED TOGETHER, SO THAT THEY COULD NOT BE SEPARATED FROM ONE ANOTHER: THUS ONLY A FEW ENGLISH SHIPS WERE NEEDED TO GUARD ONE GROUP OF THOSE WHICH HAD BEEN ABANDONED.**

**GEOFFREY LE BAKER DE SWYNEBROKE, ENGLISH CHRONICLER**

**Commemorative coin**

This gold noble was issued by Edward III in the year of the battle of Sluys. It shows the king standing in a ship armed with a sword and shield.

Both Quiéret and Béhuchet were killed.

The latter was possibly executed after the battle on Edward’s orders, though for what reason is not known.

The sea was red with blood and thick with the bodies of French soldiers and sailors who had sought vainly to escape. The English victory, establishing naval dominance at the outset of the Hundred Years War, was strategically decisive, ensuring that the conflict would be fought in France, with little risk of a counter-invasion of England.

**A land battle fought on the sea**

Sluys was not a battle of naval maneuver: the ships were effectively static and it was fought out by two armies of knights, men-at-arms, and archers.
**HUNDRED YEARS WAR**

**LES ESPAGNOLS SUR MER**

Date: August 29, 1350  
Forces: English: 50 ships; Castilians: 40 ships  
Losses: English: 2 ships; Castilians: 14 ships sunk or captured

Location: Off Winchelsea, S. England

English King Edward III decided to intercept a fleet of France’s ally Castile, as it sailed from Flanders for Spain. He assembled a naval force at Winchelsea under his personal command aboard Cap Thomas. Castilian commander Carlos de la Cerda was happy to give battle. He had larger ships, their fighting tops crammed with crossbowmen and soldiers armed with various missiles. The English sailed forth to meet the Castilians as they sailed into the Channel. King Edward ordered the master of his ship to sail directly into one of the enemy ships. Damaged by the impact, Cap Thomas began to founder. Edward succeeded in grappling another Castilian vessel and transferred his men across before his cog sank. Although the king’s son, the Black Prince, also lost his ship, the English generally had far the better of a hot engagement.

**HUNDRED YEARS WAR**

**LA ROCHELLE**

Date: June 22-23, 1372  
Forces: English: unknown; Castilians: 12 galleys  
Losses: English: entire fleet; 8,400 captured; Castilians: none

Location: La Rochelle

The Earl of Pembroke led a large convoy of round ships carrying troops, horses, and money to reinforce the English army at La Rochelle, which was under siege by the French. France called upon its ally Castile to intercept the English convoy. A Castilian squadron of 12 galleys commanded by Genoese mercenary Ambrosio Bocanegra, met the English in the mouth of La Rochelle harbor.

The first encounter was indecisive, but on the second day the Spanish galleys exploited their superior maneuverability and ability to operate in shallow water. Many of the English ships were grounded. The Castilians sprayed their decks with oil and set them ablaze with burning arrows. The Earl of Pembroke and all his men were captured, along with £20,000. It was a striking example of a victory for galleys over sailing ships. The English had now clearly lost the control of the sea, which had been theirs since their victory over the French at Sluys in 1340.
In 1543 English king Henry VIII went to war with France as an ally of Emperor Charles V. After the English seized Boulogne, French king François I planned an invasion of England. He assembled a fleet at Le Havre in the summer of 1545, bringing 25 Mediterranean galleys north to join his Channel ships. In June English admiral John Dudley led an attempted preemptive strike against the French invasion fleet but failed to do significant damage. Dudley arrived back at Portsmouth on July 13 with his ships in need of resupply and repair. The English fleet was far from ready when the French invasion force arrived.

AN INAUSPICIOUS START

The man appointed admiral in charge of the French expedition was Claude d’Annebault, a soldier with great experience of land warfare but no experience at sea. He suffered an early setback when his flagship Carraquon caught fire before leaving harbor and had to be abandoned. He then shifted his flag to La Grande Maîtresse, which subsequently ran aground as the invasion fleet left the French coast on July 15. The Maîtresse continued across the Channel but was shipping water, and had to be sent home before battle was joined.

The French reached the Sussex coast on 18 July and sailed west to the mouth of the Solent, off the Isle of Wight. The English were distracted by the presence of their king, who had come to visit his fleet and inspect the defenses of Portsmouth.

Sunday, 19 July was a fine, still day. With sailing ships becalmed, some

WHEN SHE HEELED OVER WITH THE WIND, THE WATER ENTERED BY THE LOWEST ROW OF GUN PORTS WHICH HAD BEEN LEFT OPEN AFTER FIRING.

VAN DER DELFT, IMPERIAL AMBASSADOR, REPORTING THE ACCOUNT OF A SURVIVOR FROM THE MARY ROSE
The Mary Rose was a state-of-the-art warship when she was launched in 1511, a carrack fitted with gun ports on the main deck to deliver broadsides. But she was an aging vessel when she sank in 1545, having undergone two extensive refits.

French galleys rowed into the Solent toward Portsmouth. When they were sighted, the king was dining on board the great ship Henry Grace à Dieu with various officers, including Sir George Carew, Dudley’s newly appointed vice-admiral. The king departed to view events from the ramparts of Southsea Castle, while his fleet prepared to fight.

The English ships had great trouble extricating themselves from their crowded anchorage with barely a breath of wind to aid them. In the afternoon, however, a wind arose and they began to emerge, sailing out toward the French galleys in the Solent. The large but aged carrack Mary Rose, with Vice-Admiral Carew on board, took the lead. The vice-admiral’s wife Lady Mary Carew was among the spectators alongside King Henry who were watching the action from Southsea Castle.

THE MARY ROSE SINKS

Witnesses to the battle saw the Mary Rose fire her starboard broadside at the galleys and come about to bring the guns on the port side to bear. As she did so, a gust of wind caused the ship to heel over, plunging her open gun ports below water. The Mary Rose sank with awesome swiftness. The cries of the trapped crew were momentarily audible to the onlookers on the castle ramparts, before they were stifled by the waves. Lady Carew fainted, while King Henry cried out in anguish at the sight. All but 30 of the 415 people on board the Mary Rose were drowned. Sir George Carew was not among the survivors.

The French failed to capitalize upon this shocking disaster. There were some long-range exchanges of fire between the two fleets the following day and French soldiers briefly went ashore on the Isle of Wight. But while the English vainly attempted to salvage the sunken Mary Rose, the French then withdrew eastward along the coast. Dudley eventually came out in pursuit, but d’Annebault had had enough of the sea and tamely headed for home, to the great displeasure of his king. The battle, like the war of which it formed part, was entirely inconsequential.
THE OTTOMANS

AT THE BEGINNING of the 14th century the Ottoman Turks were a small band of Muslim warriors in northern Anatolia. In a remarkably short time they made themselves rulers of a great land empire and a major naval power. The capture of Constantinople in 1453 completed their conquest of the Byzantine Empire. This was followed by expansion westward and southward that gave them control of the eastern Mediterranean, coastal areas of North Africa, and the Red Sea. Through most of the 16th century the Christian states of the Mediterranean could do little to counter Ottoman naval operations, which threatened Italy and Provence with invasion and filled the slave markets of the Islamic world with Christians carried off by Muslim privateers. Victory at Lepanto in 1571 gave the Christian powers a breathing space, but the Ottoman navy remained a major force into the 18th century.

FIGHTING CORSAIRS
The Ottoman navy was a hybrid force that drew strength from its diversity. The empire was run by a well organized bureaucracy and had impressive financial resources. Once these were devoted to constructing, equipping, and manning a navy in the late 15th century, a formidable fleet was the almost inevitable result. But the Ottomans also relied heavily upon the skills and initiative of privateers. The Barbary corsairs of Algiers and other North African ports, officially sanctioned by the Ottoman sultans, not only preyed upon Christian merchant shipping and raided the coasts of Christian states, but also provided a considerable percentage of the galleys found in Ottoman war fleets. The daring and aggression of their commanders was a vital adjunct to the more formal fighting style of the official Ottoman navy. The Ottoman state always tended to regard sea power as a support to land operations, best used for transporting large armies such as the 100,000 soldiers employed in the successful siege of Rhodes in 1523, or the 40,000 used in the failed siege of Malta in 1565.

CHRISTIAN DISUNITY
The Christian states around the Mediterranean struggled to mount a unified response as the Ottomans pressed westward. No country alone was sufficiently strong to stand up to the Turks. Venice suffered first and worst. After they had suffered defeat at the hands of the Ottoman navy at the end of the 15th century, the Venetians found all their possessions and trade in the eastern Mediterranean under threat. The Knights of St. John, who operated as Christian predators upon Muslim shipping, were driven out of their stronghold on Rhodes but survived precariously in a new base at Malta. Emperor Charles V and subsequent Habsburg rulers of Spain fought, with little success, to contest Ottoman control of the Muslim states of North Africa. Even when the Christians achieved sufficient unity to send out a combined fleet, they were defeated at Preveza in 1538 and Djerba in 1560, before a victory for the Holy League in the great galley battle of Lepanto in 1571 sent the whole of Christendom delirious with relief.

FIREFLAME REVOLUTION
The rise of Ottoman naval power coincided with the introduction of cannon and handguns into naval warfare. On land the Turks were not at all backward in the deployment of gunpowder weapons, but their Christian opponents were definitely more thoroughgoing in their use at sea. Even the Venetians’ low and nimble galleys would have a bow gun firing
straight ahead—aimed by pointing the galley at the target—augmented by swivel guns to rake the enemy decks. Other Christian vessels might carry a much heavier weight of armament. Large galleasses—converted merchant ships—were even capable of firing broadsides. Christian fighting men often wore armor and fired arquebuses instead of crossbows, while the Muslims remained lightly clad and equipped with traditional missile weapons. An Ottoman fleet often had the advantage of superior maneuverability, however. In the course of the 16th century most Christian states resorted to a scaloccio rowing—very large oars, each pulled by four, five, or even more rowers. These were operated mostly by slaves and criminals condemned to the galleys. Venice alone maintained a predominance of free oarsmen. The a scaloccio system militated against deft and skilful maneuver, as did the increasing size of galleys viewed as gun platforms. Christian fleets typically advanced in line abreast to defend their flanks and maximize forward fire. Handled aggressively, Ottoman galleys could break up the Christian line and win in a pell-mell battle.

AFTER LEPANTO

Lepanto, the last major battle in which galleys overwhelmingly predominated, was a major Ottoman defeat. But it was far from ending Ottoman naval efforts, because the empire had the resources to build a new fleet to replace the one it had lost. The Ottomans were long able to hold their own against Christians in the eastern Mediterranean, beating Venice in a war for control of Crete in the mid-17th century and besting a combined Christian fleet at Matapan in 1717. Meanwhile, the Barbary corsairs extended their activities into the Atlantic, their nifty xebecs even raiding the coasts of the British Isles—almost the entire population of the Irish village of Baltimore was carried off by the North African raiders in 1631. The depredations of the Barbary pirates continued largely unchecked until the early years of the 19th century.
CHRISTIAN NAVIES AGAINST THE TURKS

THE FIRST CHRISTIAN STATE to feel the effects of Ottoman naval power was Venice, thoroughly defeated in a war fought between 1499 and 1503. From then until the battle of Lepanto in 1571, the Christians were unable to challenge Ottoman command of the eastern Mediterranean. However, the galleys of Malta, under the Knights of St. John, harassed Turkish communications, and the failure of the Ottoman siege of the island in 1565 was a major relief for Christian Europe. Efforts to wrest control of North Africa from the Muslims repeatedly failed and the Barbary corsairs of Algiers, Tunis, and Tripoli, acting as Ottoman privateers, were a constant threat in the western Mediterranean. The Ottoman cause was aided by lack of unity between the Christian powers, with Venice and the Habsburgs fixed enemies, and the French mostly allied with the Turks. The battle of Diu, which extended Christian-Muslim conflict into the Indian Ocean, was a reminder that the Mediterranean powers were fighting for control of a backwater as oceanic voyages opened up new trade routes and ocean-going ships transformed naval warfare.

The overall result was a clear defeat for the Venetians. Grimani was accused of failing to come to Loredano’s aid. Further actions were fought between the two fleets on August 20, 22, and 25. The overall result was a clear defeat for the Venetians. Grimani was arrested on his return to Venice, but survived to become doge later in life.

In spring 1499 a Venetian force under Antonio Grimani met an Ottoman fleet under Kemal Reis off Lepanto. Both fleets had a number of great galleys and carracks that provided a high platform for breach-loading iron cannon and primitive handguns, as well as men armed with bows and other traditional missiles. Kemal Reis’s flagship, Göke, could reputedly carry 700 soldiers. In the first engagement on August 12 Gôke was boarded by two Venetian carracks, one of them commanded by Andrea Loredano. A fire broke out on Gôke and all three vessels were burned. Grimani was accused of failing to come to Loredano’s aid.

Further actions were fought between the two fleets on August 20, 22, and 25. The overall result was a clear defeat for the Venetians. Grimani was arrested on his return to Venice, but survived to become doge later in life.

Grappling and boarding

This contemporary woodcut shows the central event of the battle of Zonchio, when two Venetian ships grappled the Ottoman flagship, resulting in hand-to-hand fighting and deadly exchanges of arrows.
The Battle of Preveza

In 1537 the Ottoman admiral-in-chief Kheir-ed-Din (Barbarossa) launched a campaign to annex Venetian possessions around the coasts of Greece. He also raided the Italian coast, ravaging the Papal States and the domains of the Spanish Habsburgs. In desperation the Christian states united to face a common enemy, forming a Holy League under the leadership of Pope Paul III. In summer 1538 they assembled a large fleet under the overall command of the Habsburg admiral, the Genoese Andrea Doria.

Barbarossa, who was in the Aegean when he heard that the Christian fleet had appeared in the Ionian Sea, sailed around Greece to confront it. The Holy League attacked Preveza, an important Ottoman base on the Greek mainland at the mouth of the Gulf of Arta. The attack failed and Barbarossa reinforced Ottoman control of the coast by seizing the fortress of Actium on the opposite shore of the gulf. With the guns of these two strongholds under his command, he was able to shelter his fleet inshore while the Christian ships were forced to keep out to sea.

The Ottomans were greatly inferior in numbers and firepower. Their 122 galleys and light fustas faced more than 130 Christian galleys with a host of other vessels in support. The Holy League may have had as many as 60,000 fighting men, outnumbering the Ottomans by three to one. Yet Barbarossa had no intention of avoiding battle. The Ottomans attacked at dawn on 28 September, a still day that virtually immobilized the sailing ships that made up a substantial part of the Christian fleet. Much of the fighting consisted of lightweight Ottoman galleys and fustas maneuvering deftly around relatively static but heavily armed Christian ships in order to board them.

Doria’s conduct during and after the battle was controversial. He organized his fleet in depth rather than exploiting the opportunity for outflanking that numerical superiority provided. He also failed to engage the Ottoman center with any vigor, maneuvering to avoid close contact. The Papal and Venetian galleys on the flanks were meanwhile heavily engaged and the sailing ships exposed to capture. By the end of the day the Ottomans had suffered substantial casualties but had taken 36 ships as prizes and some 3,000 prisoners.

Hidden Agenda

The Venetians wanted to continue the fight the following day, but Doria insisted on withdrawal to Corfu. He may have been influenced by financial considerations, since he owned many of the galleys under his command. But he was probably obeying secret orders from his Habsburg masters, who were not at all sorry to see Venice lose territory, the immediate consequence of the battle.

Terracotta grenades

The Ottomans were very innovative in their use of gunpowder weapons. As well as powerful cannons, they used arquebuses and exploding grenades made of terracotta.

Crushing victory for the Turks

Barbarossa and his captains exploited the speed and mobility of their galleys to outmaneuver the heavier Christian ships, inflicting heavy material losses.

The most famous Christian admiral of his day, Andrea Doria was admired and distrusted in equal measure. Born into one of Genoa’s most distinguished families, he earned his reputation fighting for the French in the 1520s before changing sides and selling his services to the Habsburgs. A military entrepreneur who rented out his galleys to his employer, he was always suspected of putting his business interests first in the struggle against the Turks. He did not retire from fighting until the age of 89. His great nephew Giovanni Andrea Doria inherited his role as Habsburg admiral.
Holy Roman Emperor Charles V, who was also king of Spain, organized regular campaigns against the Muslim states of North Africa to try to curb the depredations of Christian shipping by Kheir-ed-Din and other Barbary corsairs. In 1535, Charles led a force of 60,000 soldiers, with a Genoese fleet commanded by Andrea Doria, to take the port of Tunis. The Spanish held on to a base at Tunis until 1574, when it was recaptured by the Ottomans.
In spring 1565 the Ottoman sultan Suleiman the Magnificent sent an expedition to capture Malta. The navy was commanded by Grand Admiral Piyale Pasha, aided by the Barbary corsair Turgut Reis and an Egyptian fleet under Uluç Ali. Some 40,000 soldiers were landed, including at least 6,000 janissaries, the Ottomans’ crack troops. Cannon and gunpowder was shipped to the island in enormous quantities to besiege the Knights of Malta in their fortresses around the Grand Harbor. A relief force gathered in Sicily, but Spanish commander Don Garcia de Toledo knew his fleet was not strong enough to take on the Turks.

The first fortress to suffer the onslaught of the Turkish artillery was Fort St. Elmo at the entrance to Grand Harbor. The defenders held out valiantly for over a month, but Turgut Reis was killed during the siege. An attempt to attack St. Michael fort across the Grand Harbor failed, the Turkish ships blocked by a boom and blasted by cannon at water level.

In September the Ottomans admitted defeat and headed for home. The failed siege was the first significant reverse for the Ottomans in the Mediterranean.

---

**CREW PROFILE**

**RENAISSANCE GALLEY**

**16TH CENTURY**

**THE CREW OF A RENAISSANCE WAR GALLEY** was typically assembled by a captain of high social status, appointed to his command by the state. On the other hand, a galley might also be the private venture of a mercenary or corsair. The captain did not necessarily have any nautical experience, relying on a team of experienced seamen to navigate and run the ship. Spanish royal galleys had a chaplain to look after the crew’s spiritual welfare and a governor to maintain order and discipline. Although sailors and even oarsmen might at a push take part in combat, the fighting force was a separate body of men—a land army at sea that included gentleman volunteers, infantry, and specialist artillerymen.

**CONVICTS AND SLAVES**

Oarsmen made up the great majority of the crew. Some were free men, either signing on as volunteers or recruited by conscription—the latter common in Ottoman and Venetian fleets. But in the 16th century free oarsmen became increasingly rare, especially in the Spanish galley fleet, partly because they were too expensive to employ. Their place was taken by convicts or slaves. A spell in the Spanish galleys was the punishment for offences such as murder, robbery, blasphemy, rape, bigamy, and vagrancy, with sentences ranging from a few months to life.

**CONDITIONS ON BOARD**

The slaves were usually prisoners of war, although more likely to have been seized by marauding privateers than taken prisoner in battle. Slaves in Christian galleys were chiefly Muslims, and vice versa. Free oarsmen were not chained and might have a weapon so they could fight if needed. But convicts and slaves were shackled to their benches. Life below deck on a crowded galley was miserable. A drum was beaten to give the rhythm for their strokes, but the lash was often used freely on any man thought to be slacking. An oarsman was a valuable item and intelligent captains kept their ships clean and the crew well fed. But more often sanitary arrangements were poor, ships stank, disease was rife, and gross ill-treatment common. Average life expectancy for a convict in a Spanish galley has been estimated at two years.

**VENETIAN GALLEY SLAVE**

As the Venetian fleet lost its possessions in the Ionian and Aegean to the Ottomans, there were fewer free men to recruit as oarsmen, so it relied more and more on slaves and convicts.
On September 16, 1571, a large Christian fleet set sail from Sicily on an expedition to relieve Venetian-owned Cyprus, then under attack by the Ottoman Empire. Most of the men and galleys had been supplied by Venice and Habsburg Spain, but Genoa, the Papacy, Savoy, and Malta’s Knights of St. John had all made contributions. In command was the Habsburg prince Don John of Austria.

As his fleet drew near to where the Ottomans lay at Lepanto in western Greece, Don John organized the galleys into four squadrons: that on the right commanded by Genoese Giovanni Andrea Doria, the left under Venetian Agostino Barbarigo, the center under Don John himself. Spanish admiral Santa Cruz was placed in reserve.

Facing the Christian fleet, the Ottoman forces advanced in a crescent, with the admiral Ali Pasha in the center, the right wing under Suluc Mehmed Pasha, and the left under the feared corsair Uluç Ali, an Italian-born convert to Islam. As the moment for combat approached Don John had the Holy League’s banner of Christ crucified raised above his flagship, Real. Ali Pasha sailed under a banner embroidered 29,800 times with the name of Allah.

Cannon and Arquebus

The Christians placed their faith in firepower. Most of their galleys had a centerline cannon or culverin in the bows firing up to a 60 lb (25 kg) iron shot, flanked by up to four smaller cannon, plus many swivel guns and soldiers with arquebuses. The Ottoman galleys were smaller than the Spanish ones, but similar to the Venetian. They had fewer and less powerful cannon and their soldiers depended more on composite bows than on firearms. The Ottomans hoped to maneuver, ram, and board the Christian vessels. Both sides hoped to maintain formation and avoid being attacked on the flank.
Crucially, the Venetians also provided six galleasses—large transport galleys turned into floating gun platforms. These were so unwieldy they had to be towed into position, but their massed guns packed a formidable punch. The presence of the galleasses was a surprise to the Ottomans. They were unsure of their tactical function, but soon found out as the thunder of the galleasses' guns sent a savage hail of iron balls lashing into the galleys of the Ottoman center.

Although his fleet was thrown into disorder and two galleys had been sunk, Ali Pasha pressed on past the galleasses and through the fire from the galleys behind to engage the Christian center at close quarters. On the flanks a desperate battle was joined as the horns of the Turkish crescent attempted to outflank the Christian line. The Venetian galleys on the Christian left were close to shore, but some of Suluc's ships succeeded in rowing through shallow water beyond the edge of their line. Barbarigo's galleys skillfully backed to turn outward facing toward the shore, presenting their bow guns to the Ottoman ships, which were forced to turn to face them. A close-quarter mêlée ensued, in which Barbarigo was hit by an arrow and killed.

On the Christian right there was open water. Uluç Ali tried to outflank Doria's squadron, and Doria shifted further to the right to block him. This stretched the line between the Christian right and center. Choosing his moment, the wily Uluç Ali turned swiftly back to attack the straggling Christian galleys left behind by Doria's rightward move.

The key to the outcome was the use of the reserve squadron made by Santa Cruz. Feeding his galleys into the action where they were needed, he enabled the Venetians on the left to hold and then put to flight their adversaries—many Ottoman troops escaping through the shallow water onto land.

Santa Cruz then decisively intervened in the struggle in the center. The Sultana was stormed and taken. Ali Pasha's severed head was displayed on a pike and the Ottoman standard struck from the mast. As the Ottoman center collapsed, fighting turned to massacre and plunder. Only Uluç Ali was able to extricate his galleys from the debacle, leading perhaps a sixth of the original force back to Constantinople.

The Ottomans quickly built a new fleet—their grand vizier bragged that the Christians had merely shaved the Ottoman beard that "would grow all the better for the razor." But Christian jubilation at victory in one of the largest sea battles ever fought was justifiable, for it stemmed the tide of Ottoman expansion that had threatened to engulf the whole Mediterranean.

Commemorating the victory
Lepanto became a favorite subject for art all over Catholic Europe. This colorful Spanish version is painted on tiles. Between the Christian fleet (below) and the Ottomans (above), the huge Christian galleasses open fire at the start of the battle.

The individual ships engaged in the center are clearly identifiable by their banners. At this early stage of the battle several of the Christian galleys have been boarded by Ottoman troops.
The Christian fleets, commanded by Don John of Austria, confront the Ottoman fleet, commanded by Mehmed Pasha, in the Battle of Lepanto. The Christian galleys are more numerous and better armed than the Ottoman galleys. The fleets line up in three squadrons, with the Christian left squadron, commanded by Giovanni Andrea Doria, on the right, the Christian right squadron, commanded by Venetian Agostino Barbarigo, in the center, and the reserve squadron under Spanish admiral Santa Cruz remaining at the rear of the Christian line.

As the Christian galleys sail past Scropha Point, the Ottoman fleet is sighted around 9 miles (14 km) to the east. The fleets line up and into the Gulf of Patras, the Ottoman fleet is isolated. The galleasses are towed in a crescent formation with Ali Pasha in the center. The galleasses launch a devastating hail of iron shot against the Ottoman left. The guns of the huge Christian galleasses cause havoc as the two sides engage. The Ottoman wings attempt to outflank their Christian counterparts, while fierce battles develop as the galleys in the center close with the enemy.

As the fleets clash in the center, a crucial battle develops around the two flagship's masts. Troops engage in fierce hand-to-hand fighting as they attempt to board enemy galleys. The galleys on the Christian right wing succeed in preventing the Ottomans' ships from coming close to the shore. Some Turkish soldiers escape onto the shore. The collapse of the Ottoman right wing frees up some of Santa Cruz's galleys to join in the battle for the center. Don John's galley, commanded by Andrea Doria, is boarded from Ali Pasha's Sultana, but then the tables are turned, the Ottoman flagship captured, and Ali Pasha killed. Two galleasses move up to help prevent threatened breakthrough on the Christian right.

Seeing the Ottoman standard cut down from the flagship's mast, the Turkish center collapses. The Ottoman line finally collapses. A few Ottoman galleys escape but most are captured. A few galleasses become isolated from Doria's squadron. As Doria's squadron advances, most of his galleys move to the right to counter Uluç Ali's outflanking maneuver. Uluç Ali's squadron attempts to outflank the Christian right wing initially. Uluç Ali abandons attempt to outflank Doria and makes for gap that has opened in Christian line. The Ottomans advance in a crescent formation with Ali Pasha in the center. The Christian left is commanded by Venetian Agostino Barbarigo. The Christian right is commanded by Genoese Giovanni Andrea Doria.

The collapse of the Ottoman right wing frees up some of Santa Cruz's galleys to join in the battle for the center. Don John's galley is boarded from Ali Pasha's Sultana, but then the tables are turned, the Ottoman flagship captured, and Ali Pasha killed. Two galleasses move up to help prevent threatened breakthrough on the Christian right. Doria's right wing turns to assist the isolated galleys that had been under attack from Uluç Ali. Some Turkish soldiers escape onto the shore. Don John's galley is boarded from Ali Pasha's Sultana, but then the tables are turned, the Ottoman flagship captured, and Ali Pasha killed. Two galleasses move up to help prevent threatened breakthrough on the Christian right.
The Palatial Royal Flagship was 197 ft (60 m) long and 24 ft (6.2 m) wide and carried a crew of as many as 400 men. Of these, 236 were required simply to row the galley, with four men manning each oar. In addition, there were a number of skilled sailors to steer and manage the two lateen sails, as well as a large detachment of soldiers. The galley was armed with a large central cannon in the bow, flanked by four medium-sized guns. There were also four much smaller guns sited between the oarsmen’s stations, two on each side of the ship.

This replica of the galley was made for the Maritime Museum in Barcelona to mark the 400th anniversary of the Holy League’s victory at the battle of Lepanto on October 7, 1571. The ship’s most striking feature is the sheer richness of its decoration, from the figurehead of Neptune to the paintings and statues on the stern. These were painstakingly recreated from a description written at the time. Many of them feature the Classical heroes Hercules and Jason.

The choice of these two figures was significant: in his quest for the Golden Fleece Jason sailed with the Argonauts to Colchis on the Black Sea, while legend placed the Pillars of Hercules at the Strait of Gibraltar—the two extremes of the vast length of coastline controlled by the Ottoman Empire.

In action at Lepanto
Don John’s galley fought a close-quarters duel with the Ottoman flagship Sultana. Turkish soldiers boarded the galley, but were driven back.

The galley raised its sails when crossing open sea with a favorable wind, but in battle relied on its 236 oarsmen. The main battle tactic was to board and capture enemy ships.

In action at Lepanto
Don John’s galley fought a close-quarters duel with the Ottoman flagship Sultana. Turkish soldiers boarded the galley, but were driven back.

The Great Banner of the League, Displaying Christ Crucified, ... The Coats of Arms of Habsburg Spain, the Pope, and the Republic of Venice, Was Hoisted on the Real’s Mainmast.

Niccolò Capponi describing the opening of the battle of Lepanto

Classical figurehead
The prow ends in this magnificent figurehead of a gilded Neptune, the Roman god of the sea, riding on a dolphin and brandishing a trident. The statues and reliefs on the original galley were created by the leading sculptors of Renaissance Spain.

Prow
The galley’s long prow is decorated with the coat of arms of Philip II of Spain, supported by two mermaids. Before Lepanto Don John had the end of the prow cut off so that the central cannon could be depressed to shoot down on the Ottoman ships.
**Imperial ambition**
The gilded eagles on the stern are a reference to the Roman Empire and Christian Europe's desire to win back Rome's former possessions from Ottoman domination.

**Head of Medusa**
The gorgon Medusa stares out from the stern, deflecting evil and bringing destruction to Don John's enemies.

**Gilded baluster**
Every tiny detail around the stern of the ship, where the admiral and his officers were housed in the poop, is richly carved and decorated.

**Fancy scuppers**
The ports that could be opened to let excess water run off the decks, contributed to the decorative scheme of Don John's galley.

**Entry ports**
The pair of curved ladders on either side of the poop were used for embarking and disembarking. Like everything else at the stern end of the galley, they are richly decorated with gilded reliefs.

**Paintings with a moral**
The painting of Time's chariot suggests that the leader must seize any opportunity when it comes, while the elephant and the rhinoceros about to do battle express the idea "be ready for victory or death."

**Stern lantern**
The poop deck, where the helmsman controlled the tiller, is crowned with three ornate lanterns, beacons for keeping the fleet together at night.

**Statues on the stern**
The frieze at the top shows Hercules in the Garden of the Hesperides. Below, the two lions hold the coats of arms of Austria and the Order of the Golden Fleece, while the four female figures represent Christian virtues.

**Latin motto**
The motto engraved at the top of the rudder extols the virtues of prudence and strength, essential qualities needed to control the power of the sea.

**Rudder**
The rudders fitted on Mediterranean galleys were smaller than those found on sailing ships of comparable size. It was always possible to use the oars to alter course.

**Fancy scuppers**
Even the scuppers, the ports that could be opened to let excess water run off the decks, contributed to the decorative scheme of Don John's galley.
Above Deck

The Galera Real mounted five cannon on the raised fighting platform or forecastle at the prow and four lighter artillery pieces. Going into battle, soldiers were stationed around the galley from the bow to the stern, many of them armed with arquebuses. The galley was rowed a *scaloccio*, with four men to a single oar. Although elaborately decorated, the poop functioned as the center of armed resistance if the galley was boarded in battle, fighting men clustering there to defend their flag and their commander. At Lepanto the galley was rammed by the Turkish flagship, the enemy prow penetrating as far inboard as the fourth oarsman.

Interior of the poop

The poop deck, where Don John and his officers spent most of their time, was richly decorated with marquetry. The scenes on the backrest of the bench are episodes from Greek mythology, most having a nautical angle as well as a moral point to make.

Cross-section of galley

The galley has 30 oars on the starboard (right) side and 29 on the port (left) side, with four oarsmen to each oar. As the men rowed the inside oarsman had to move further than the others, rising to his feet as he pressed on the foot brace in front of him to pull the oar through the water.

Canopy and awning

The admiral’s quarters on the poop deck did not have a permanent roof. When necessary the canopy would be covered with a large cloth to keep out the sun or the wind and rain. This covering was also used in battle.
THE GALERA REAL had a wider and deeper hold than ordinary war galleys, and although there was not much headroom, there was plenty of space for stores. Below the poop deck were the armories and the majordomo’s pantry, where food and drink were prepared for Don John and his advisers and officers. Foreward of this were storerooms for bread and fresh vegetables, which would be taken on board whenever possible. Then there were the basic stores of water, wine, and grain for the oarsmen. More or less amidships was the gunpowder room and beneath the mainmast an extensive area given over to spare sailcloth, spars, and ropes. At the front of the hold was the surgeon’s dispensary and a cramped surgery where he could set the bones or amputate the limbs of the wounded.

The hold contained sacks of grain and barrels of wine and water. The oarsmen were fed on simple gruel and given wine and water to drink. When fighting in the heat of summer, it was essential to keep the crew well watered.

Auxiliary gun
Unlike the cannon in the prow, the small breech-loading guns on either side of the galley could twist. They would be loaded with small shot and used as anti-personnel weapons against the crew on the deck of an enemy galley.

Stores in the hold
Besides food, the spacious hold contained spare clothing, armor, and weapons. This recreated scene includes a selection of rapiers and a lockable chest of the kind that would have been used by the gentlemen on Don John’s staff.

Essential gear
Buckets were in constant use on the galley: for carrying food and water, for washing the filth from the decks and the oarsmen’s benches, and on occasions for putting out fires during battle.

Below decks

The binding of the oars
The oars are made of beechwood and 37 ft (11.4 m) long. Oars were sometimes made from a single piece of wood, but these broke easily and more often they were made of two lengths bound together.

Rowing bench and oar
The most experienced and trusted oarsman took the position on the inside, from where he dictated the timing of the stroke to the other three oarsmen, who were normally less skilled. These each grasped one of the three handhold battens.

Range on the deck
One of the luxury extras on Don John’s galley was a fire for cooking. On the replica of the Galera Real one of the oarsman’s benches on the port side has been removed and the space created used for a fire with a metal bar above it for suspending cooking pots. This leaves the ship with 30 oars on one side and only 29 on the other.

Basic stores
The hold contained sacks of grain and barrels of wine and water. The oarsmen were fed on simple gruel and given wine and water to drink. When fighting in the heat of summer, it was essential to keep the crew well watered.
DISCIPLINE AND PUNISHMENT

A SHIP IS AN ENVIRONMENT in which problems of order and discipline are naturally acute. Men are crammed together for long periods of time, in boredom, danger, and discomfort. The lower orders always outnumber the officers, who are poorly placed to call for help in case of trouble. Crews also need to be drilled to work together as a tight-knit team in case of combat or to face crises such as storms at sea. The danger of their situation made most sailors favor good discipline, which would contribute to their survival.

STICKING TOGETHER

At best a ship’s crew became its captain’s bonded followers—a self-sufficient band owing allegiance primarily to one another and to their leader. Divisions between officers and men, normally rigid in class terms, were often less sharp in practice once at sea, simply because crew were so clearly all in it together. But a badly run ship with a sadistic captain was a hell-hole in any age. Naval warfare is studded with stories of desertion and mutiny—the latter often a systematic, almost formalized response to bad practice by a captain or officers, or to perceived breaches of customary law. Yet even in a good ship, where officers and men practiced mutual respect, there was a need for punishment to enforce discipline.

It is (the captain’s) indispensable duty to see that the poor seaman be not wronged of his due, nor the service carried on by noise, stripes or blows.

CAPT. CHRISTOPHER O’BRIEN, Advice on Sea-Discipline & from a Father to his Son in Naval Tactics

PECULIAR PRACTICES

Some ingeniously cruel punishments have been unique to navies. At the time of the Ancient Greek galleys, a malefactor might be lashed with his head sticking out of one of the lower oar ports—an uncomfortable public humiliation in port, but torture if at sea. Keel-hauling was a practice particularly associated with the Dutch navy from the 16th century, although also occasionally practiced by others. A man was tied to a rope slung under a ship and dragged from one side of the vessel to the other under the hull. Keel-hauling was not officially abolished in the Dutch navy until 1853. Ducking was a punishment much practiced by the French: a man was tied to a rope attached to one of the mainmast cross-trees and dropped into the sea, then heaved up again to repeat the exercise. There is little evidence to suggest “walking the plank” occurred.

LEG IRONS Also known as bilboes, these were fixed to the deck, and could be used either for punishment or to hold a man awaiting trial. The prisoner, who was locked in for several days, was fed on bread and water.

FLOGGING Public flogging was the most widespread form of corporal punishment for breaches of naval code, with the number of lashes dependent on the severity of the crime.
In general, though, punishments at sea have always tended to reflect the norms of the society from which the navy is drawn. For example, Britain’s 18th-century navy used public corporal and capital punishment just as Britain did on land—but with less capital punishment because one could not afford to lose the men. Mutiny, treason, desertion, and sodomy were capital offences for which a man could be hanged from the yard-arm. Flogging with the cat-o-nine tails was the punishment for many other serious offenses. It was carried out with formal ceremony, the ship’s crew drawn up to watch and a roll of drums to add drama. Boys were exempt from flogging, instead made to “kiss the gunner’s daughter”—they were tied over a gun and caned on their bare behinds. Theft from shipmates was usually punished by running the gauntlet, with the crew themselves whipping the offender in turn. Much resented by sailors was casual “starting”—bosun’s mates hitting a man with a rope or cane when he was felt not to be working hard enough. Starting was banned in the Royal Navy in 1809.

During the 19th century social norms altered away from corporal to custodial punishment. These changes were inevitably reflected at sea, although navies have often lagged behind reforms on shore. The last man in the US Navy hanged on board ship was Midshipman Philip Spencer, son of the secretary of war, allegedly guilty of mutiny in 1842. Britain’s Royal Navy suspended flogging in 1881. At the same time there was more formality in public with great theatricality to ensure the maximum deterrence. The crew would be formed up on deck, with the officers separated from the seamen.
2
1550 – 1830
GUN, SAIL, AND EMPIRE
FOR APPROXIMATELY THREE CENTURIES, from the early 1500s through to the 1830s, naval warfare was dominated by three-masted ocean-going sailing ships, armed with cannon. Although the tactics of grappling and boarding continued to hold their place in war at sea, from the 17th century the dominant mode of combat became the exchange of broadsides—volleys of cannon fire designed to bring down masts and rigging, hole the hull, and kill or wound the crew of an enemy vessel. European navies fought battles in the East Indies, the Caribbean, and the mid-Atlantic, as well as the Mediterranean and north and west European coastal waters. Sea power grew from an adjunct to land operations into a major source of imperial dominance in its own right.

FIGHTING MACHINES

The design of warships and combat tactics evolved subtly rather than dramatically through the age of sail. During the course of the 16th century ungainly carracks, conceived as large floating fortresses, were supplanted by sleeker galleons. The need to bring guns to bear in broadsides led to the adoption of the line of battle, and by the late 17th century the dominant warships were “ships of the line”, graded into first-, second-, and third-rate by their weight of cannon. These were extraordinary fighting machines. Even in the 16th century there were “great ships”—large vessels built for prestige as much as combat—carrying more than 50 guns, but by the late 18th century a three-deck first-rate ship of the line would carry from 100 to 130 guns. Such ships needed large crews packed into their decks because of the number of hands required to sail the vessel and to man the cannon in battle. In order to stay at sea for long periods they also had to carry substantial supplies of all essentials.

MANNING SHIPS

Fleets of sail were extremely expensive to build, maintain, and supply. Any country that wanted to have a dominant navy needed an extensive organization of dockyards for repair and shipbuilding, an administrative system to supply munitions and food, and a pool of sailors to draw on, since only experienced seamen were really useful on board. No country could afford to maintain a full navy in peace and war. Until the mid-17th century, merchant ships, under their peacetime captains, were pressed into frontline service when war broke out. This practice was discontinued because of the superior performance of purpose-built warships.
under military command, but sailors remained a general body of men who might sail in naval ships or merchant ships, or as privateers. Every sea power had to have a system for transferring its seagoing population into naval service in wartime. The Dutch banned merchant ships from sailing, forcing seamen to opt for naval employment. France registered its sailors, who were called up in “classes” and served their share of conscription. Britain used “press-gangs” to forcibly recruit sailors on shore and at sea, or tried to attract volunteers by offering bonuses to those who signed on. In a crisis, landmen had to be accepted as extra muscle on board, a dilution of seafaring expertise that became acute for Britain during the Napoleonic Wars. Permanent bodies of naval officers developed very gradually. Until the late 17th century senior commanders were usually not seamen and the senior seamen on board were often merchant captains or privateers. A career structure for naval officers emerged only slowly.

**PRIVATEERS**
The expense of maintaining navies encouraged states to turn to private enterprise as a way of financing sea warfare. Privateering ranged from the authorization of individual captains to prey upon the commerce of an enemy nation, to the mounting of major operations in which rulers, from England’s Elizabeth I to France’s Louis XIV, took a financial stake along with other wealthy individuals. At times, the marauding of privateers amounted to what we would now call state-backed terrorism. The exploits of Jean Bart, Piet Heyn, Francis Drake, and other famous “sea dogs” made them national heroes, but they were understandably denounced as pirates by the victims of their depredations. The distinction between privateer and naval vessels was not always clear, not only because they might fight alongside one another—as in the English resistance to the Spanish Armada in 1588—but because naval ships also operated with a profit motive, most navies offering prize money for the capture of enemy vessels and their cargoes.
PEACE AND WAR
In the age of sail, life on board ship was harsh as a matter of course. Crews suffered heavy losses, even in peacetime, to disease, accident, fire, and weather. In many ways life on ships was chaotic. Often, for example, there were children on board, as well as farm animals to provide food. Ratings had no uniforms and on many ships neither did officers. Yet by the 18th century, a well-run warship could equally be regarded, by contemporary standards, as a model of organization and efficiency—the regular processes of navigation, the handling of the sails, the keeping of watches, the maintenance of cleanliness, and frequent gunnery drill. The experience of sea combat, although infrequent, was intense by any standards. Broadside duels were bloody affairs, ships battering one another at close range with their cannon while sailors and marines with muskets fired down onto the enemy’s deck from the rigging. Amid scenes of unutterable carnage, traditional principles of honorable conduct were maintained. Officers disdained to take cover, standing at great risk on the exposed quarterdeck. The convention of striking colors—lowering the flags—to signal surrender put a limit to the sufferings of a defeated crew, although honor dictated that a captain should not “strike” until his ship was a shambles. Surrender was usually conducted with great ceremony, the defeated commander handing his sword to his victorious opponent who would formally return it to its owner with a few polite words of respect. Such ceremonies took place on blood-spattered decks strewn with the dead.

BATTLE TACTICS
Naval engagements fought by sail were always subject to the influence of the wind, which could change direction, rise, or drop altogether in the course of a battle, confounding planned maneuvers. A contrary wind might trap a fleet in harbor or prevent an entire division from joining a combat in which their comrades were hotly engaged within sight of them. The ships that held the weather gage were well situated to attack—it was the position the British always preferred. The slow movement of the ships meant that hours passed between sighting an enemy and opening fire. Once an engagement started, the fighting was usually quite static for long periods, with opposing ships sometimes locked together or even anchored opposite one another. Rowing boats might be sent from ship to ship around a fleet in battle carrying messages. Until the mid-17th century, tactics involved little more than a scrimmage in which fleets might show a greater or lesser inclination for boarding or for reliance on firepower. The adoption of the line of battle brought more order into naval combat, but no less savagery as each ship chose an enemy to set alongside and duel with. Although its formality could appear stultifying, fighting in line allowed for aggressive maneuvers such as sailing around the enemy van to trap ships between two fires. In the 18th century more adventurous commanders used variants on line tactics such as the “general pursuit” and “breaking the line.” But even the famous Admiral Horatio

Saluting the flagship
A 17th-century Dutch states yacht (right) fires a salute to the admiral’s flagship (left), possibly belonging to the popular Admiral Michiel de Ruyter. Following naval tradition, a salute usually consists of an odd number of shots. An even number denotes a death. A 21-gun salute is reserved for heads of state.

1568
Start of 80 Years War, Dutch struggle for independence from Spain
1588
Defeat of the Armada prevents invasion of England by Philip II of Spain
1628
Dutch privateer Piet Heyn succeeds in capturing Spanish silver fleet at Matanzas in northern Cuba
1652–73
Anglo-Dutch Wars: series of three wars fought for control of the English Channel and North Sea
1653
Line-of-battle tactics used at the battle of the Gabbard, between England and the United Provinces

1550
1572
Group of privateers, known as the Sea Beggars, capture port of Brielle (Brill) from the Spanish
1578
1592–98
Japanese invasion of Korea thwarted by naval victories of Yi Sunshin
1628
The Vasa, pride of Sweden’s navy, sinks on her maiden voyage
1639
Dutch under Maarten Tromp defeat Spanish fleet at battle of the Downs (French Gloire and British Warrior)
1690
War of the League of Augsburg: newly built French navy defeats Dutch and English at the battle of Beachy Head

Musketeer’s powder flask
The matchlock musket was the standard firearm of marines in the 17th century.

Cat-o’-nine tails
This rope whip was used on board ships for administering corporal punishment.
Nelson, whose pursuit of the “pell-mell” battle gave a less formal and more decisive quality to naval warfare, for the most part adhered to the broad principles of the line of battle.

**RISE AND FALL**

Their sailing ships guaranteed European powers dominance in the oceans of the world and the ability to found overseas empires. Korea triumphed in an intensive naval war with Japan in the late 16th century, but even the Koreans could not begin to challenge the Europeans as oceanic sailors. Different European countries rose and fell in the naval pecking order through the resources they had available for—or were prepared to devote to—their navies and the quality of the seamen they had available to man their ships. Spain was the first dominant naval power of the sailing ship era, especially after incorporating Portugal in 1580. England was one of the first countries to organize a naval infrastructure and bureaucracy, but at first could not match the resources of the Spanish Empire. The Dutch proved themselves superb seamen and built a trading empire in the early 17th century, but they were slow to build a naval administration, relying for too long on merchantmen and privateers. France devoted major resources to naval power under the Sun King Louis XIV, but the counter-demands of land warfare always militated against French concentration on sea power.

By the late 17th century Britain had established itself as the world’s leading naval power, a status it maintained—not without serious challenges from the French—through the 18th century, but then triumphantly reaffirmed in the Napoleonic Wars.

United States, founded in 1776, showed signs of naval potential but was still a minor sea power when the age of sail ended.

**PROGRESS AND CHANGE**

Many changes occurred over the 300 years of the sailing ship era. There were enormous improvements in navigation and nautical charts, in sailors’ nutrition and health, and in the design of ships—copper bottoms in particular vastly increased the time wooden sailing ships could stay at sea. By the later part of the period navies fought almost exclusively in purpose-built warships and privateering had been supplanted by the marauding of naval frigates. There was an increasingly formal structure of naval careers and hierarchies. Yet the era holds together in retrospect as a time of extraordinary conflicts and exploits that made naval battles central to the historical identity of European seagoing nations.
JAPAN AND KOREA

JAPAN INVaded KOREA TWICE in the late 16th century, precipitating epic naval conflicts between two countries with very different seafaring traditions. Since the 1220s Japanese pirates had plagued the Korean coasts. This forced Korea to organize a naval defense system, with large, well-armed ships, to protect merchant convoys and coastal settlements. In Japan, by contrast, despite a thriving population of fishermen, pirates, and sea traders, naval development was limited. Accounts of Japan’s long drawn out civil wars of the 16th century include few references to fighting on water. When Japan’s warrior leader Toyotomi Hideyoshi mounted a large-scale invasion of Korea in 1592, he saw ships merely as troop transports. But for the Koreans their naval strength proved to be a trump card, allowing them to achieve decisive victories at sea that forced the Japanese invaders to withdraw in 1593 and again in 1598.

CHINESE ABSENCE
The naval war between Japan and Korea in the 1590s was fought without the intervention of the major regional power, China. Ming China was the most sophisticated, technologically advanced society in the world, but its decision, taken in the 15th century, to get rid of large warships and abandon long-distance voyages left a naval vacuum in Asian waters. Japanese pirates—known as wako (“dwarf raiders”) to their victims—were free to raid China’s defenseless coasts, while the Portuguese, once they were well established in the Indian Ocean, sought further trading opportunities in China and Japan. When Japan invaded Korea, the Chinese sent an army to support the Koreans, but, because of their naval weakness, only intervened on a small scale in the conflict at sea.

JAPANESE SEA POWER
The Japanese were able to assemble a fleet large enough to transport 160,000 soldiers to Korea in 1592. The fleet consisted chiefly of pirate or merchant vessels turned to military use. For sea
fighting, Japanese raiders traditionally employed swift-moving boats crammed with warriors, who would board and overwhelm larger, slower-moving craft. The larger Japanese ships would also be packed with fighting men, armed with missile weapons to soften up the enemy, prior to boarding and fighting with sword and spear. One striking advantage the Japanese held over the Koreans was the possession of firearms. The arquebus, the precursor of the matchlock musket, which had been introduced by the Portuguese, was enthusiastically adopted by the Japanese during their 17th-century civil wars. Deployed at sea, it was a highly effective complement to traditional bows. But the Japanese lacked larger gunpowder weapons. They had lagged behind China and Korea in the development of cannon, and their ships were in any case too flimsy and unstable to provide a good platform for guns.

**KOREAN VICTORY**
The Koreans had learned the use of gunpowder weapons from Ming China, but they had quickly surpassed the Chinese in the manufacture of cannon for naval use. By the late 16th century they had the most advanced shipborne artillery in Asia. Their key warship, the _panokseon_, was a robustly constructed ship that functioned as a stable gun platform. It carried cannon capable of delivering a variety of missiles, including gunpowder-based incendiary devices known as “fireballs.” While Japanese ships had only square sails, the _panokseon_ could be propelled by oars in combat, giving it impressive speed and maneuverability. With an admiral of genius in charge, Yi Sunshin, the Koreans repeatedly outmaneuvered and outfought the Japanese. Yi Sunshin used local knowledge of currents, tides, and winds to gain a huge advantage for his ships, even in situations where they were vastly outnumbered by the enemy.

**JAPAN TURNS INWARD**
Although its invasions of Korea were defeated at sea, it still seemed that Japan might emerge as an Asian naval power. The Japanese had galleons built under European influence in the early 17th century, one of which carried a Japanese embassy to Europe. But like Ming China before it, Japan then turned its back decisively on oceanic travel. It is said that, by order of the Japanese shoguns, all ships had to be built with a hole in the hull so as not to survive an ocean voyage. Japan’s next foray into naval history was not until the 19th century.

**Korean turtle ship in action at Hansando**
Yi Sunshin’s most spectacular victory over the Japanese was at Hansando in August 1592. Cannon and fire arrows wrought incredible destruction among the enemy ships, of which 47 were destroyed, while the Koreans lost none.
AFTER UNIFYING WAR-TORN JAPAN in 1590, warrior leader Toyotomi Hideyoshi then devised a megalomaniac plan to conquer Ming China and India. When the Koreans refused to allow his army free passage through their country, in 1592 Hideyoshi embarked upon the conquest of Korea as a prelude to an invasion of China. Japanese troops were largely successful on land, advancing north as far as Pyongyang, but the Korean Admiral Yi Sunshin organized a naval campaign that severely disrupted Japan’s supply lines. The Japanese suffered a crushing defeat at Hansando, but avoided total catastrophe in a defensive sea battle at Pusan. Hideyoshi was put under so much pressure, however, that he was forced to withdraw his troops in 1593. A second invasion in 1597 was no more successful. Although Japan scored a naval victory at Chilchonryang—in the absence of Yi Sunshin—the subsequent defeat at Myongyang was a setback from which Hideyoshi’s project of conquest never recovered. The Japanese leader had died by the time Yi Sunshin inflicted the final humiliation on Japanese naval forces at Noryang in 1598, a battle that cost the Korean admiral his life.

**JAPANESE INVASION OF KOREA**

**PUSAN**

**Date** September 1, 1592  
**Forces** Koreans: c. 250 ships; Japanese: c. 470 ships  
**Losses** Unknown

In spring 1592 a vast Japanese fleet set off from Naguya on northern Kyushu island carrying an army some 160,000 strong for the invasion of Korea. The first 700 boats landed their troops near the fortified port of Pusan on April 13. The Koreans were caught unprepared. Their warships in the Pusan area, commanded by Won Kyun, simply fled when confronted by the Japanese armada. Toyotomi Hideyoshi’s soldiers, battle-hardened after years of civil war in Japan, swiftly took Pusan by assault. As the Japanese fought their way up the Korean peninsula, Pusan became the gateway for supplies and reinforcements brought by sea from Japan.

Fortunately for Korea, Admiral Yi Sunshin, commander of the Cholla Left Naval District at Yosu, to the west of Pusan, was better prepared to react to the Japanese invasion. He had a force of cannon-armed warships, known as *panokseon*, and had recently completed construction of three iron-armored “turtle ships” or *kobukson*. With these ships he mounted a counterattack in the offshore islands between his base at Yosu and Pusan. In a five-day period in early May at and around Okpo, he sank 44 Japanese ships without loss. Further successes followed at Sachon, Tangpo, and Tanghangpo. When the Japanese attempted a major naval counterattack in August, they were shattered at the battle of Hansando.

After Hansando, Yi felt strong enough to attempt an attack on the Japanese base at Pusan. He was joined by the fleet of Won Kyun, creating a formidable force with more than 70 substantial warships. Pusan Bay was crowded with Japanese ships, which were landing a second wave of troops. Yi hoped to destroy the Japanese fleet and recapture or at least blockade Pusan. He was not successful. Although the Japanese lost many ships, they held off the attack using cannon captured from the Koreans. The Korean fleet was forced to withdraw but, with its supply lines insecure, the first Japanese invasion was doomed.

**Multiple rocket-launcher**

The Koreans possessed an array of ingenious artillery weapons. These included the *hwacha*, a rocket-launcher used with great success both against Japanese land forces and for firing volleys of incendiaries at enemy ships.
In 1597, command of the Korean navy was entrusted to Won Kyun, promoted in place of the disgraced Yi Sunshin. Urged by the royal court to take an aggressive stance, Won Kyun led the entire Korean fleet to attack the Japanese at Pusan. The Japanese appeared in overwhelming strength and brought the Koreans to battle on their own terms. As the Korean fleet was ill-coordinated, the Japanese were able to impose a close-quarters mêlée in which the Koreans could not use their cannon, while the Japanese were able to grapple and board the ships of their enemies. Korean ships that attempted to flee were pursued and captured. Those who sought to escape to shore on nearby Kojedo Island, including Won Kyun, were massacred by the island’s Japanese garrison. Only 13 Korean warships, which had prudently fled before the fighting began, survived the debacle.

Encouraged by their overwhelming victory at Chilchonryang, the Japanese sought to destroy the remnants of the Korean navy and to take control of the Yellow Sea, opening up a maritime supply line along the west coast of Korea to their armies, which were advancing to the north. There was no time to rebuild the Korean navy; but on the advice of his counselors the king belatedly reinstated Yi Sunshin to the command of what was left of it. On his way to resume his duties as admiral, Yi wrote to the Korean royal court: “As I am alive, the enemies will never gain the Western Seas.”

Korean quiver
Archers played a major role in Korea’s naval victories over Japan, making extensive use of fire arrows to attack the flimsy Japanese ships.

In the autumn of 1598, with their leader Toyotomi Hideyoshi dead and with the Chinese having now entered the war in support of Korea, the Japanese were hastening to extricate themselves from their ill-judged Korean adventure.

On November 18 some 200,000 Japanese troops had embarked on a large fleet of transport ships, their aim to join up with other Japanese forces and return to Japan. A combined fleet of Korean and Chinese warships was blockading the Japanese-held fortresses along the southern coast of Korea. Chen Lin, commanding the Chinese squadron of 65 warships, favored making a deal to let the Japanese go. But Yi Sunshin, with 85 Korean panokseons and turtle ships, was not prepared to allow the enemy to escape unmolested, and his view prevailed. The combined fleet waited at the entrance to the narrow Noryang Strait.

Yoshihiro, the vast Japanese convoy approached the strait at night and blundered into the Korean and Chinese ships in the early hours of the morning. With large numbers of ships clashing in darkness in confined waters, the conflict was inevitably confused. The Japanese fought desperately to open a passage through the strait; the Koreans could not use their cannon, while the Japanese could bring their arquebus fire to bear at close quarters. One Chinese ship was taken by the Japanese and all on board slaughtered. Chen Lin’s flagship was boarded and only narrowly saved from capture. Yet dawn revealed that the allied fleet had triumphed, with hundreds of Japanese transports captured or sunk.

Yi led the pursuit of the Japanese ships that had broken through and were heading for Pusan, but in the course of the action, he was shot dead. This fact was concealed until the combat was over. One week after the battle, the Japanese army sailed from Pusan back to Japan, and the war came to an end.

Death of Yi Sunshin
Like Nelson, Yi was killed in his hour of triumph, struck by a stray shot fired by an enemy arquebusier. The captain on his flagship had been lucky to escape with his life when an arquebus ball hit his helmet.
The major ty of the Korean ships deploy in a "crane's wing" format. This allows interlocking fields of fire—they can fire on the enemy ships from several angles.

The Japanese fleet, led by the scout ships, pursues the decoy ships into open water. As the Korean "crane's wing" formation encircles the Japanese, reserve ships move up to plug the gaps in the expanding line.

The "turtle ships" hold the Korean center, their spiked decks making it impossible for the Japanese to board them.

The wings close in around the Japanese fleet, causing their ships to collide with each other, making it harder and harder for them to maneuver.

The impetuous Japanese commander Wakizaka orders his ships straight into the waiting Korean trap.

1. **THE LURE AND THE TRAP**
   
   Yi Sunshin sends six ships forward to lure the Japanese fleet into following them into open water, where he carefully deploys his fleet in a "crane's wing" formation. The Japanese commander Wakizaka obliges by taking the bait.

2. **CLOSING THE TRAP**
   
   The impetuous Japanese fleet, led by the scout ships, pursues the decoy ships into open water, where the Japanese ships are soon set on fire or sunk and many of their soldiers are killed.
THE BATTLE OF HANSANDO

When Japanese shogun Toyotomi Hideyoshi embarked upon the invasion of Korea in May 1592, he seems to have anticipated little resistance from the Koreans at sea. His mistake was soon evident, as Korean ships inflicted heavy losses on the Japanese in a series of encounters through June and July, of which those at Okpo and Sacheon were the most notable.

As Korean naval power threatened Japanese supply and reinforcement of its land army on the Korean peninsula, Hideyoshi called on one of his boldest warlords, Wakizaka Yasuharu, to lead a counter-offensive. Wakizaka sailed from the Japanese base at Pusan with 73 ships, in search of the Korean fleet. The Koreans were equally keen on a battle. Their inspired admiral Yi Sunshin had also assembled a large fleet and was confident of victory.

Using information from local people, Yi located the Japanese fleet at anchor in Kyonnaeryang strait. He sent six ships into the strait, hoping to lure the Japanese into more open water. Half the Japanese ships were multiple-decked atakebune, the rest smaller vessels, but all were packed with fighting men, armed with bows, swords, and arquebuses. Their aim was to board Korean ships. But Yi planned to keep the fighting at a distance. Most of his ships were panokseons, stoutly-built galleys mounting 10 to 20 cannon on their upper decks. There were also two or three kobuksons, the iron-spiked vessels known as “turtle ships,” that deployed even more firepower and were almost impossible to board.

Falling into the Trap
As the Japanese advanced into the “crane’s wing,” they became targets for ships to the front and on both sides. The Korean cannon were slow to reload, but the oarsmen kept their ships turning so that both broadsides and stern were brought to bear in succession, maintaining a constant fire. The panokseons also carried large complements of archers, whose composite reflex bows had greater range than Japanese bows or arquebuses. Wakizaka himself was hit several times by arrows, his life saved by the quality of his armor.

Inexorably the Koreans drew their formation tighter around the Japanese fleet, driving the enemy ships closer together so they could no longer maneuver and offered a dense-packed target for the gunners and archers. Incendiary weapons were also apparently used – a Japanese source speaks of “fireballs shot at our ships, which were burned and destroyed”. The carnage was awesome. Several Japanese commanders committed ritual suicide aboard their sinking ships. Wakizaka was on board one of only 14 Japanese vessels to escape the scene of destruction.

The annihilation of the Japanese fleet had a decisive effect on the invasion. Unable to guarantee the seaworne supply of his army, Hideyoshi had to scale back his plans and the Japanese eventually evacuated Korea in 1593 – although Admiral Yi would be called upon to save his country from invasion again before the century’s end.

THE REMAINING JAPANESE BOATS … SEEING FROM AFAR THE HORRIBLE SIGHT OF BURNING VESSELS AND FALLEN HEADS, ROWED THEIR BOATS FAST AND FLED IN ALL DIRECTIONS.

YI SUNSHIN, DESCRIBING THE END OF THE BATTLE IN HIS WAR DIARY

3 VICTORY IS COMPLETE
Yi Sunshin’s plan works to perfection. The “crane’s wing” encircles the Japanese fleet and concentrated cannon fire completes the destruction. Only 14 Japanese ships, including Wakizaka’s flagship, manage to escape.
GUN, SAIL, AND EMPIRE

OCEANIC EMPIRES

**THE OCEANIC VOYAGES** of European sailors wrought fundamental changes in world trade and power politics in the 16th century. The Portuguese played a leading part in the initial voyages of exploration, establishing bases in Africa, Brazil, and India, and reaching as far as Japan by the 1540s. Trade in Asian spices and other luxury goods brought wealth flooding into the coffers of the Portuguese monarchy. But it was Spain that emerged as the first oceanic imperial power. After backing Christopher Columbus’s transatlantic voyage of 1492, the Spanish took control of areas of Central and South America rich in precious metals. Silver from mines in Peru, carried across the Atlantic by an annual treasure fleet, financed a bid by the Spanish monarchy to achieve dominance in Europe. Resistance to Spanish power bred wars in which Dutch and English sailors proved themselves doughty sea fighters against the odds.

**SPANISH ASCENDANCY**

Spain was unquestionably the strongest European naval power in the second half of the 16th century, especially after it annexed Portugal in 1580. Despite having simultaneously to maintain a Mediterranean galley fleet to fight the Ottomans, the Spanish monarchy had the resources and the bureaucratic organization to build and supply a fleet of sail on a scale beyond the reach of any other European state. The Dutch, in revolt against Spanish rule, and the English, determined to remain free of it, had relatively puny resources. What they did possess, however, was a large number of adventurous, independent-minded seamen. The foundations of a permanent English Royal Navy were laid under Henry VIII (reigned 1509–47) and the later Tudors, especially Elizabeth I (reigned 1558–1603), maintained a royal interest in the navy that, by contrast, was only intermittently present in France. But even the English were far from achieving the level of naval organization and funding present in Spain—England typically could not afford to pay the sailors who fought off the Spanish Armada in 1588. Both the Dutch and English depended to a large degree on privateers to wage war upon the Spanish Empire. Men such as Francis Drake and Piet Heyn operated sometimes as licensed pirates or maritime guerrilla fighters, sometimes as conventional naval commanders.

**GUNS AND GALLEONS**

During the second half of the 16th century the galleon replaced the carrack as the purpose-built warship in European fleets. A leaner, sleeker vessel, it was built for speed, especially in the low-hulled version favored by the English. How best to use these ships in combat was still a matter for experiment. The English, who had the best cannon, favored gun duels, chiefly targeting the opponent’s hull. The Spanish, although fully aware of the importance of guns in naval warfare, regarded cannon fire as a prelude to boarding—their galleons carried large numbers of soldiers. The English, in their smaller, nimbler ships, hoped to avoid being boarded by holding the weather gage and thus dictating the range at which the encounter was fought. The battles of the Spanish Armada campaign showed that English guns were not powerful enough to inflict serious damage upon large Spanish galleons. It is worth noting that the Dutch, using even smaller ships than the English, favored boarding as a tactic.
DUTCH GLORY

Spanish naval predominance survived the maritime disaster of the 1588 Armada. Further expeditions were planned against England and magnificent ships built for new Armadas. But in the 17th century, as Spanish financial and military resources began to decline, the Dutch seized the opportunity not only to win their independence but to become a global sea power.

Dutch privateers and irregular coastal forces had performed well against the Spanish in the 16th century, but the Dutch flowering in the first half of the 17th century was on an altogether different scale. The ships of the Dutch East India Company ruthlessly supplanted the Portuguese in much of Asia, most profitably in Indonesia, creating a fabulously wealthy trading empire.

In the Americas the Dutch attacked Portuguese and Spanish colonies and their privateers stole a fortune in Spanish silver.

By the 1630s Spain could no longer communicate with its forces fighting in the Netherlands by sea, having to send arms, supplies, and pay for their troops overland from Italy. Dutch dominance of their home waters was confirmed in spectacular fashion by their total annihilation of a Spanish fleet at the Downs in 1639, a battle that marked the eclipse of Spain as a major naval power.

Galleon against galley

In a clash off the coast of the Netherlands in the early 17th century, a Dutch galleon gets the better of two Spanish galleys, sinking one of them by ramming.
THE DUTCH REVOLT of 1568 against the rule of Spanish Catholic king, Philip II, started a war that would last for 80 years. With William of Nassau, Prince of Orange, as their leader, the Dutch fought a desperate struggle for survival against the might of Spain, greatly aided by the skill and courage of their sailors, whose small ships fought a seaborne guerrilla campaign against Spanish naval might. The English queen, Elizabeth I, tried to avoid war with Spain, but she could not resist backing privateers preying on Spanish colonies in the New World. England was also drawn into support for the Dutch rebels. By 1585 Philip had decided that the heretical English queen must be subdued. Victory over French-backed mercenaries in the Azores in 1583 encouraged him to believe that he could defeat the English navy with an oceanic fleet. The Spanish Armada operation of 1588, intended to allow an invasion of England by Spanish troops from the Netherlands, was an ambitious but ill-conceived exercise in the use of naval power. The skill and courage of English sailors ensured its failure, although the subsequent destruction of the Armada by storms was fortuitous.

**ENGLISH PRIVATEERING EXPEDITION**

**SAN JUAN DE ULÚA**

- **Date:** September 24, 1569
- **Forces:**
  - English: 5 ships
  - Spanish: 13 ships
- **Losses:**
  - English: 3 ships captured
  - Spanish: none

**Location:** Veracruz, New Spain (Mexico)

After two years’ illegal trading and piracy around the coasts of Spain’s American colonies, in September 1569 English privateer John Hawkins and his cousin Francis Drake entered the port of Veracruz, with the reluctant permission of the Spanish authorities. They were anchored in the harbor off San Juan de Ulúa island when a fleet from Spain arrived, bringing a new viceroy. At first the viceroy pretended to accept the English presence, but on September 24 he ordered a surprise night attack. Hawkins and Drake escaped on board two small ships, Minion and Judith. After much hardship, they reached home the following year.

**DUTCH REVOLT**

**ZUIDERZEE**

- **Date:** October 5–12, 1573
- **Forces:**
  - Spanish: 18 ships
  - Dutch: 24 ships
- **Losses:**
  - Spanish: 6 ships captured
  - Dutch: none

**Location:** Zuiderez, near Hoorn, Netherlands

In 1569 William of Nassau, Prince of Orange, issued letters of marque to a motley assembly of sea captains prepared to offer their services to the Dutch revolt. As the rebels in the Netherlands had adopted the ironic nickname of “the Beggars,” these privateers became known as the Sea Beggars. Operating out of safe havens provided by the Protestant French in La Rochelle and by Queen Elizabeth in southern England, they raided the Netherlands coast and inhibited the seaborne trade of the Spanish-ruled provinces. The Sea Beggars’ indiscriminate plunder of merchant shipping led Elizabeth to ban them from English ports in spring 1572, whereupon they seized new bases on the Dutch coast.

The Spanish fought back and in the summer of 1573 retook the rebel city of Haarlem. They then planned to regain control of the Zuiderez, the inland water between Spanish-held Amsterdam and the North Sea. Maximilien de Henin, Count of Bosu, assembled a war fleet at Amsterdam. In October he sailed out aboard his provocatively named 34-gun flagship, *Inquisition*. The Sea Beggars emerged from their bases around the Zuiderez to give battle, with Cornelis Dirkszoon, mayor of Monnickendam, in command.

The Spanish were superior in firepower, but Dirkszoon hoped to close with them with his smaller ships and take them by boarding. The first encounter, on October 5, went badly for the Sea Beggars. In adverse winds they were unable to board the enemy ships and suffered heavily from cannon fire. There followed a standoff until October 11, when the wind shifted in Dirkszoon’s favor. His ships bore down upon the Spanish, three of them engaging *Inquisition*, which ran aground on a sandbank. The fighting was fierce. Dirkszoon was wounded, command passing to his captain Jan Floor. Several Spanish ships were taken, while the rest fled back to Amsterdam. *Inquisition* held out the longest but was captured after more than 24 hours’ combat. Bosu was among those taken prisoner.

**Sea Beggars in action**

The Sea Beggars made a surprise landing in a coastal town, putting the Spanish and the Catholics among the local residents to flight.
In 1580 the Spanish king, Philip II, took over Portugal. His claim to the throne was contested by Don Antonio, Prior of Crato. Basing himself in the only remaining independent Portuguese territory, the Azores, Don Antonio won the backing of France. Filippo Strozzi, a Florentine who had been commander-in-chief of the French army, recruited a multinational mercenary force that sailed from France for the Azores in June 1582.

Philip II reacted by sending the Marqués de Santa Cruz with a fleet of galleons and armed merchantmen, which reached the Azores on July 22. The Spanish were outnumbered, but their ships were larger. For four days the fleets maneuvered in light winds. On the morning of July 26 they were sailing in opposite directions a few miles apart when Don Lope de Figueroa, commander of the galleon San Mateo, made a death-or-glory dash toward the enemy. Five of Strozzi’s ships surrounded the isolated galleon, battering it with cannon fire for two hours, but were unable to board the high-sided vessel. Meanwhile, the rest of the Spanish fleet maneuvered to come to Figueroa’s aid. The armed merchantmen of their rear squadron arrived first and soon disabled Strozzi’s flagship with their powerful guns. A confused mêlée ensued. Santa Cruz, on board San Martín, sought out Strozzi’s limping ship and bombarded it until most of those on board were dead or wounded. The Spanish boarded the vessel and took Strozzi off, but he was badly injured and soon died. The survivors of his fleet fled in all directions, bringing the battle to a close. Victory in the Azores convinced Santa Cruz that a Spanish Armada could defeat the English.

Spain’s takeover of Portugal
The Spanish fleet under Santa Cruz sails into Lisbon to back up Philip II’s claim to the Portuguese throne in 1580. Santa Cruz sailed on to defeat the only pocket of resistance to Spanish rule in the Azores in 1582.

The Azores

**MARQUÉS DE SANTA CRUZ**
SPANISH ADMIRAL, VICTOR AT LEPANTO AND THE AZORES

Don Álvaro de Bazán was born in Granada, southern Spain. He followed in the footsteps of his father, who was commander of Spain’s Mediterranean galleys. Bazán was created Marqués de Santa Cruz in reward for his outstanding performance as a galleys commander at Lepanto in 1571. Appointed Admiral of the Ocean in 1583, he showed equal aptitude for warfare under sail at the battle of the Azores. The original idea of sending a fleet to attack England was his, and he would have led the Armada but for his death in February 1588.

**ANGLO–SPANISH WARS**

**CADIZ**

**AZORES**

Date July 26, 1582
Forces French: 56 ships; Spanish: 32 ships
Losses French: 11 ships; Spanish: none

**Location** Terceira island, Azores

**Date** April 29–May 1, 1587
Forces English: 21 ships; Spanish: 8 galleys
Losses English: 1 ship captured; Spanish: 24

**Location** Cadiz, southern Spain

In spring 1587 Spain was preparing an Armada to invade England. Sir Francis Drake, on board Elizabeth Bonaventure, sailed from Plymouth with a force of warships and armed merchantmen to carry out a preemptive strike against the Spanish. On the afternoon of April 29, Drake’s ships appeared off Cadiz and immediately entered the harbor. Brushing aside the galleys defending the port and sinking a Genoese merchant ship that had the audacity to put up a fight, the English settled in among the crowd of ships at anchor, emptying them of their cargoes and setting them on fire. The Spanish galleys harassed the English with hit-and-run attacks and succeeded in capturing one ship that had become isolated. The next day Drake explored further reaches of the harbor, in particular destroying a large galleon belonging to the Marqués de Santa Cruz. But the Spanish brought up heavy guns on shore and began to fire on the English ships. Golden Lion, commanded by Drake’s vice admiral, William Borough, had to manoeuvre briskly to avoid serious damage. An unfavorable wind confined Drake’s ships in the harbor for another night, but they skillfully fended off attacks by Spanish fireships, as well as the persistent attentions of the galleys. Drake sailed out of Cadiz the following day, claiming to have “singed the king of Spain’s beard.” In practical terms, perhaps the expedition’s greatest achievement was the destruction of thousands of barrel staves, making it hard for the Spanish to make sufficient barrels for the food and water required for the Armada.

**MAN-OF-WAR TACTICS**

**GIVING THE PROW**

Making maximum use of the wind

Guns on 16th-century ships were very slow to reload. A ship would typically sail toward an enemy, firing the powerful guns mounted in the prow; and then turn to allow the broadside and stern guns to be fired. If the maneuver was possible, the captain might turn his ship about to fire the other broadside. The ship would withdraw to a safe distance to reload. The guns in the prow were considered the prime armament, rather than the broadside cannon.

The attacking ship is now vulnerable, as it tries to sail away into the wind

The ship then draws alongside the enemy to deliver a broadside

The attacker makes full use of the wind to close with its intended victim

As the ship veers away, it fires a final volley from the guns in its stern

When close enough, the ship fires its bow chasers, often the most powerful guns on board

The enemy ship returns the broadside

The ship fires its broadside, often the most powerful guns on board

**THE LOSS WAS NOT VERY GREAT, BUT THE DARING OF THE ATTEMPT WAS VERY GREAT INDEED.**

King Philip II of Spain, commenting on Drake’s raid on Cadiz
CAPTAIN AND OFFICERS
The captain of a galleon would be at least a gentleman and often a nobleman. Many were experienced soldiers but in no sense men of the sea. In the Spanish navy the captain might be supported by a hierarchy of commissioned officers, but on board an English galleon he held command alone. The only other officer on board was likely to be the commander of the body of soldiers carried in the forecastle. The captain’s only social equals on board were likely to be gentleman adventurers who pressed forward to serve in pursuit of glory. Regarded as rank amateurs who drove admirals to despair, many were nonetheless taken on board with varying degrees of usefulness.

PROFESSIONAL SEAMEN
The captain was not necessarily expected to know anything about sailing a ship, a job which fell to his most important subordinate, the master, an experienced mariner, along with the pilot and the boatswain. The bulk of the crew—some of them volunteers but most pressed into service—were in theory experienced seamen. The Spanish used convicts to row galleys but not to man galleons. Crew were taken in time of war from the population of fishermen, merchant seamen, and privateers in port towns. However, Sir Walter Raleigh complained of men being taken on “so ignorant in sea service, as they know not the name of a rope.” There was always a flock of ship’s boys on board learning their trade. One of their duties on the ships of the Armada was to sing out the changes of the watch.

Sir James Lancaster
A typical captain of the era, Lancaster was part merchant, part privateer. In 1588 he commanded an armed merchantman in the battle against the Armada.
The defeat of the Spanish Armada

On May 28, 1588, Spanish king Philip II’s “Invincible Armada” sailed from Lisbon on the “Enterprise of England.” Goaded by English privateers’ attacks on his colonial possessions and treasure fleets, and by Queen Elizabeth’s support for Dutch rebels in the Netherlands, Philip had decided that England must be taught a lesson. The Armada was to sail through the English Channel and escort a Spanish army from the Netherlands across the North Sea to land in Kent. The original leader of the enterprise was the Marqués de Santa Cruz, Spain’s most distinguished admiral, but on his untimely death in February 1588 command had been most reluctantly assumed by the Duke of Medina Sidonia—who, by his own account, “did not understand it and knew nothing about it.”

The assembly, equipping, and supply of this vast fleet had been a long and arduous task, rendered more difficult by English raids on Spanish ports. It took the Armada a further three weeks to reach Coruña in northern Spain, and it did not weigh anchor again until July 21. The English were not inclined to wait for the slow-moving Spanish to arrive. The fiery Francis Drake persuaded his commander-in-chief, Lord Howard of Effingham, to attempt the destruction of the Armada before it sailed, but three times ships sent south toward Spain were driven back by bad weather. The English commanders then resolved to base their main force in Plymouth, ready to tackle the Armada as soon as it approached the Channel.

The country alerted

The Spanish were spotted off the Lizard on July 29, news conveyed by the lighting of a string of beacons along the coast from Devon to the Scottish border. The Armada was an awesome sight—some 130 ships carrying possibly 18,000 soldiers as well as their complement of sailors. But it was a heterogeneous collection of vessels. Less than 50 of them could be described as fighting ships, the rest being transports. The fleet’s Spanish and Portuguese galleons were state-of-the-art warships, although they were slower and less maneuverable than their English equivalents. The English had about 65 galleons and armed merchantmen at Plymouth, with another contingent waiting at the eastern end of the Channel.

On the day the alarm was raised Howard and Drake were pinned in Plymouth Sound by the wind, but the following morning the wind turned off shore. For most of the next eight days, while they shadowed the Spanish along the Channel, the English held the weather gage. The Armada advanced in a well-disciplined crescent, the fighting ships sheltering the transports in the center. The nimble English ships buzzed tirelessly around the Spanish flanks, harassing them with largely ineffective long-range cannon fire. Whereas the English saw their galleons as gun platforms, the Spanish regarded cannon as ancillary weapons, useful for softening an enemy prior to boarding. Keeping the advantage of the wind, however, the English had no intention of letting the enemy get close enough to board.

By the time the Armada anchored off Calais on August 6, Howard was thoroughly satisfied with his fleet’s performance. “We have so daily pursued them at heels,” he wrote, “that they never had leisure to stop at any place along our English coast.”
Yet Medina Sidonia had lost only two major ships in the course of the run up the Channel. *Nuestra Senora del Rosario* was damaged in a collision and snapped up by the indisciplined Drake as his personal prize, and *San Salvador* was destroyed by an unexplained explosion. Philip’s great “Enterprise of England” fell apart not because of the efforts of the English sailors, but because the intended coordination with the Duke of Parma’s army in the Netherlands never happened. The Duke informed Medina Sidonia on arrival that he did not have the barges ready with which to ferry his troops to England.

With no suitable harbor at its disposal, the Armada was left waiting in the exposed Calais roads. At a council on board Howard’s flagship *Ark Royal*, the English captains agreed upon a night attack using fireships. It was a familiar tactic and the Spanish had a screen of boats with grapnels—barbed anchors—prepared to haul the burning hulks off course. The British, however, were helped that night by a stiff wind and a following tide, and most of the eight blazing ships bore down into the anchorage. Although not a single Spanish ship was set on fire, panic seized the fleet and ships slipped their cables, fleeing in disorder in the darkness.

The following morning, August 8, found the ships of the Armada scattered northward off Gravelines, between Calais and Dunkirk, and pressed toward dangerous shoals by an onshore wind. The English, led by Drake’s squadron, sailed into the attack while Medina Sidonia gallantly marshaled a defensive formation. The cannon fire was, according to one observer, “the greatest that was even seen or imagined.” The Spanish could not match their opponents’ rate of fire and were again given no chance to board, although the fighting was often within musket range. The flagship *San Martin* was especially hard hit, with shot tearing the rigging and sails, holing the hull, and killing and wounding many on board. The galleons *San Matio* and *San Felipe* were so badly shot up that they had to be run aground. Most of the other Spanish front-line fighting ships were damaged, although only the armed merchantman *Maria Juan* was actually sunk by cannon fire.

**AFTERMATH OF THE BATTLE**

The English broke off the battle after about nine hours, because they were running low on ammunition and confident that the battered Spanish were facing imminent catastrophe, as a rising gale drove them inexorably toward the shoals. The following morning, however, the wind veered as if by miracle and blew the Armada clear into the North Sea. Howard shadowed them as far as the Firth of Forth before turning back, short of supplies and with rapidly sickening crews. Medina Sidonia decided to return to Spain by sailing around the north of Scotland and down the west coast of Ireland.

For English sailors the aftermath of the fighting was a disillusioning experience. Kept in service in case the Armada returned, they were unpaid and short of food, adequate clothing, and shelter. Thousands of them died of epidemic diseases. The fate of the Spanish was worse. Freak storms turned their voyage home into a naval catastrophe. Ships disappeared without trace in the ocean or were wrecked upon the wild Irish coast. Those who survived experienced extremes of deprivation and exhaustion. Just 67 ships out of the original fleet of 130 succeeded in returning to Spanish shores, most of them limping to the port of Santander, where they were repaired and refitted.
1 THE FIRESHIP ATTACK
Following a series of inconclusive engagements in the English Channel, the Armada anchors off Calais, waiting to be joined by the Duke of Parma’s invasion force. During the night of August 7 the English attack the Spanish with eight fireships.

2 THE POSITION AT DAWN
The English close in to exploit the confusion caused by the fireship attack. A few galleons under the command of Medina Sidonia manage to hold off the attacks of Sir Francis Drake’s squadron, while the other Spanish ships struggle to regroup.

3 THE BATTLE OF GRAVELINES
Many Spanish ships are damaged, a few run aground, but only one ship is sunk. After nine hours’ fighting, bad weather forces the English, who are low on ammunition, to break off the action. The wind changes and forces the Spanish northward.
DEFEAT OF THE SPANISH ARMADA

Philip II of Spain's "Invincible Armada" sailed up the English Channel in order to ship an army across from the Spanish Netherlands to conquer England. In the end it was defeated in this battle, fought off Gravelines, and failed to rendezvous with the army. The Spanish fleet consisted of all kinds of ships, including galleons, armed merchantmen, and even Mediterranean galleasses, heavy oar-powered galleys, like the one shown in the center of the foreground.
**AFTER THE ARMADA**

**THE SPANISH ARMADA** of 1588 was a military fiasco and a maritime disaster, but in the 1590s Spain reasserted its status as the leading oceanic naval power. The English “Counter-Armada” of 1589 failed to exploit Spain’s temporary weakness, and after that the willpower and resources of the Spanish state were marshaled to restore the strength of the Spanish navy. The overwhelming force sent to attack an English fleet off the Azores in 1591 was indicative of Spanish recovery, even as the resistance put up by Sir Richard Grenville and the *Revenge* exemplified the best of English fighting spirit. The Spanish were capable of sending further Armadas to attack England in 1596 and 1597. Although both were defeated by the weather before reaching their objective, they were a more serious threat to England than the English raid on Cadiz in 1596 was to Spain. For England, the deaths of Sir John Hawkins and Sir Francis Drake on a vain expedition to the Caribbean symbolized the end of an era. The accession of James I to the English throne in 1603 led to peace with Spain and a period of decline for the English navy.

---

**THE COUNTER-ARMADA**

**Date** April–June 1589

**Forces**
- English: c.120 ships;
- Spanish: unknown

**Losses** Unknown

**Location** Coruña, Spain and Lisbon, Portugal

Flush with victory over the Armada, England sought to strike a decisive blow against a weakened Spain. An expedition was mounted with three ambitious goals: to destroy the Spanish ships refitting in northern Spain; to seize Lisbon and restore Portugal’s independence; and to capture the Spanish treasure fleet from the Americas. Since the English state was broke, the expedition was financed as a joint-stock venture, with Queen Elizabeth as one of the investors. After endless delays a large fleet carrying 20,000 troops set out from England in April, with Sir Francis Drake and Sir John Norreys in command. Also on board, against the Queen’s wishes, was her courtier the Earl of Essex.

The Counter-Armada was a fiasco from start to finish. It failed to attack the port of Santander, where most of the refitting Spanish fleet lay defenseless, instead taking Coruña, where the most notable prize was a damaging quantity of wine. The attempt to take Lisbon failed dismally: the population refused to rise against the Spanish and the expedition had no siege engines with which to breach the city’s walls. The interception of the Spanish treasure fleet was foiled by Atlantic storms. Decimated by disease—as many as 10,000 men may have died—the fleet struggled home, to the special distress of its disappointed financial backers.

---

**SIR JOHN HAWKINS**

**1532–1595**

Born in Plymouth, Hawkins was a privateer who pioneered English participation in the Atlantic slave trade in the 1560s. In 1577 he was appointed treasurer to the queen’s navy. He was a fine administrator, making improvements in ship design and showing an admirable concern for sailors’ welfare. Hawkins fought against the Armada as a vice admiral on board *Victory*, a service for which he was knighted. In the 1590s he was a leading advocate of an offensive strategy in the war with Spain. He died of disease on an expedition to the Caribbean in 1595.

---

**The port of Lisbon**

The Portuguese capital, under Spanish rule since 1580, was one of the main targets of the Counter-Armada, but the English failed to cause any damage.
In spring 1591 an English fleet under Lord Thomas Howard set sail for the Azores, hoping to intercept the annual Spanish treasure fleet. Howard's second-in-command was Sir Richard Grenville, a soldier and privateer of an arrogant and violent disposition, feared by his enemies and his own men alike. Grenville was on board Revenge, widely respected as one of the finest galleons in the world. While Howard waited at Plymouth to attack the Spanish port of Ferrol, commanded by Don Alonso de Bazán, a brother of the deceased Marqués de Santa Cruz. Bazán reached the Azores in late August. The English were weary with waiting, many of their crew struck down by disease. They had landed their sick on Flores island and were taking on water and cleaning out their bilges when they learned that a Spanish fleet was approaching. Bazán had cleverly split his force in two, sending ships around both sides of the island to catch his enemy in a pincer movement. The English were just ready to make sail when the Spanish appeared around a headland at 5:00 p.m. Howard led a dash to open sea between the pincers of Bazán's trap. One ship lagged behind: Grenville's Revenge. As the trap closed, Grenville attempted to break through the mass of Spanish ships. Rammed by the galleon San Felipe, he was trapped, while Howard led the rest of the English fleet away to safety.

The struggle that followed was an epic of resistance by Grenville's crew. Grappled by another galleon, San Barah內, and surrounded by four others, she fought off repeated attempts to board, even succeeding in sinking one Spanish ship. Wounded in the head, Grenville insisted on continuing resistance, although it was evidently hopeless. The following morning his crew disobeyed his order to blow up the ship and surrendered. Grenville died of his wounds; Revenge sank in a gale two weeks later.

In 1595 the ageing Sir Francis Drake and Sir John Hawkins planned a return to privateering. They would raid Spanish colonies in the Caribbean, combining private profit with damage to the Spanish war effort. The two leaders of the expedition, strong-willed contrasting characters, soon fell to arguing. Drake insisted on attacking Grand Canary island en route, but an attempted landing failed in the face of stiff resistance. They then crossed the Atlantic to attack the port of San Juan in Puerto Rico, hoping to capture a disabled Spanish treasure ship sheltering in the harbor. When they arrived off San Juan, Hawkins died of a fever. The Spanish authorities on the island had been warned of their approach and the defenses were too strong for Drake's force to overcome. In search of easier prey they shifted to the mainland, going ashore at Nombre de Dios, but when the expedition's land commander, Sir Thomas Baskerville, led a march on Panama he met stiff resistance and had to turn back. Drake refused to give up, saying: “We must have gold before we reach England.” He died of dysentery off Puerto Bello on January 28, 1596. The expedition was a fiasco, although Baskerville brought most of the ships home.
GUN, SAIL, AND EMPIRE

IN THE FIRST HALF of the 17th century the sailors of the Dutch United Provinces, in rebellion against the rule of Habsburg Spain, were the world’s most formidable sea fighters. Their best commanders—men such as Piet Heyn and Maarten Tromp—showed a combination of seamanship and ruthless aggression that their enemies, although sailing in larger warships, could not match. Dutch naval victories helped force the Spanish to conclude a 12-year truce in 1609. Meanwhile the fleet of the Dutch East India Company supplanted the Portuguese in the Indian Ocean and East Asia, forcibly seizing control of the valuable spice trade. By the time the war with Spain resumed, the Dutch had used increasing wealth to finance naval expansion. The Dutch West India Company, established in 1621, harassed the Spanish and Portuguese in the New World, occupying part of Brazil and, in 1628, capturing the entire Spanish treasure fleet. A stunning victory over the Spanish at the Downs in 1639 confirmed Dutch naval supremacy and rendered inevitable Spain’s eventual acknowledgement of Dutch independence.

On April 23, 1601, five ships sailed from the Netherlands for Indonesia—then known as the East Indies or simply the Spice Islands. Calling itself the Moluccan Fleet, this flotilla was commanded by Admiral Wolphert Harmsz and consisted of three armed merchantmen and two yachts—fast lightly armed ships used as scouts. The Moluccan Fleet was intended to break the Portuguese monopoly of the spice trade. Portuguese sailors had dominated the Indian Ocean for almost a century, but they were ill-prepared to meet a ruthless challenge from an aggressive European arrival. Harmsz’s ships appeared off the Javanese port of Bantam, a major center for the export of pepper, at Christmas 1601. The Portuguese had a superior force of galleons and fustas—light galleys—in harbor, but when skirmishing began they had the worst of it. On January 1, the Portuguese abandoned the port, which became the Indian Ocean headquarters of the newly formed Dutch East India Company.

On April 23, 1601, five ships sailed from the Netherlands for Indonesia—then known as the East Indies or simply the Spice Islands. Calling itself the Moluccan Fleet, this flotilla was commanded by Admiral Wolphert Harmsz and consisted of three armed merchantmen and two yachts—fast lightly armed ships used as scouts. The Moluccan Fleet was intended to break the Portuguese monopoly of the spice trade. Portuguese sailors had dominated the Indian Ocean for almost a century, but they were ill-prepared to meet a ruthless challenge from an aggressive European arrival. Harmsz’s ships appeared off the Javanese port of Bantam, a major center for the export of pepper, at Christmas 1601. The Portuguese had a superior force of galleons and fustas—light galleys—in harbor, but when skirmishing began they had the worst of it. On January 1, the Portuguese abandoned the port, which became the Indian Ocean headquarters of the newly formed Dutch East India Company.

Death by fire and water
The battle of Gibraltar saw the total destruction of the Spanish fleet. Here, one of the Spanish galleons explodes as it is hit in the powder magazine.
The convoy was led by Juan de Benavides y Bazan, a man with influence at court but little personal merit. One of Heyn’s ships ran into the fleet during the night and at dawn, firing a quick broadside, hastened away to report the contact. Although the Dutch ships were much smaller than the galleons, their collective firepower was formidable. Benavides did not rate his chances in a fight. Abandoning the merchantmen to capture, the galleons sought refuge in Matanzas Bay. But they were too heavily laden with cargo and passengers, and all four ran aground. The Dutch ships fired a few broadsides and then sent in boats that received the surrender of the galleons—from which senior officers had fled ashore—with hardly a shot fired. The captured treasure included 90 tons of silver and gold and was valued at 11.5 million guilders.

**1577–1629**

**PIET HEYN**

**DUTCH NAVAL COMMANDER AND PRIVATEER**

Born in Delfshaven, Heyn was a seafarer from boyhood. Twice captured by the Spanish, he served four years as a galley slave before joining the Dutch East India Company in 1607. He rose to captain and then, in the 1620s, vice admiral in the Dutch West India Company. He raided Spanish and Portuguese settlements and shipping in Africa, South America, and the West Indies, famously seizing the Spanish treasure fleet in 1628. Made Lieutenant Admiral of Holland in March 1629, he died fighting Dunkirk privateers three months later.

**EIGHTY YEARS WAR**

**MATANZAS BAY**

*Date* September 12–13, 1631

*Forces* Dutch: 50 boats; Spanish: 90 boats

*Losses* Dutch: unknown; Spanish: c. 60 boats

**Location** Stadskanaal, Scheldt estuary

The Spanish mounted an amphibious operation to seize strongpoints on the border between rebel Holland and Zeeland, embarking soldiers, under the Marquis of Aytona, on shallow-draft boats and sailing from Antwerp into the Scheldt. Forewarned of the incursion, the Dutch assembled 50 boats under Marinus Hollaar to intercept the convoy. Their attack on the evening of September 12 took the Spanish by surprise. The Dutch used their superior knowledge of the narrow channels and sandbanks to outmaneuver their enemy. Hundreds of Spanish drowned, jumping into the water in an attempt to escape. Aytona was among the few to return to Antwerp. The Admiralty of Amsterdam wanted the Spanish prisoners killed, but Dutch stadtholder Frederick Henry would not allow it.

**PRIVATEER ACTION**

**DUNKIRK SORTIE**

*Date* August 14–September 8, 1635

*Forces* Dunkirkers: 21 ships; Dutch: 35 warships

*Losses* Dunkirkers: unknown; Dutch: c. 120 fishing boats

**Location** North Sea

Through most of the Dutch war of independence Dunkirk was controlled by the Spanish. They authorized the Dunkirkers to sail as privateers raiding Dutch merchant convoys and fishing fleets. The Dutch attempted to blockade Dunkirk to stop these attacks, but failed to prevent the privateers inflicting heavy losses. Jacob Collaert, vice admiral of the Dunkirk privateers, succeeded in running the blockade with 21 ships on August 14, 1635. Over the following five days he savaged two Dutch fishing fleets, driving off their armed escorts and sinking more than 120 herring boats. The Dutch sent every available warship in pursuit of the marauders.

On August 21, a squadron of 20 Dutch ships under Lieutenant Admiral Filips van Dorp engaged the Dunkirkers near the Dogger Bank. They inflicted little damage and four of them were crippled by the Dunkirkers’ guns. When 15 more Dutch warships arrived, Collaert skilfully disengaged. Taking advantage of poor weather, he slipped back into Dunkirk on September 8, carrying 975 Dutch fishermen as prisoners.

**Dunkirk harbor**

Throughout the 17th century Dunkirk was a hotbed of privateers, encouraged—first by the Spanish, then by the French—to attack Dutch and English convoys.

**MAN-OF-WAR TACTICS**

**MÊLÉE TACTICS**

**Making Maximum Use of the Wind**

Before Europe’s navies all started to adopt line-of-battle tactics in the mid-17th century, a naval battle in the open sea was a disorderly affair that could easily degenerate into a series of duels between individual ships. A skilful captain and crew would use their superior seamanship to outmaneuver an opponent, using the wind to wear and tack around the enemy, getting in as many shots as possible while avoiding the enemy’s fire. The Dutch were particularly formidable opponents when this kind of mêlée developed.
THE BATTLE OF THE DOWNS

In 1639 Spain’s long struggle to suppress the Dutch revolt was in its desperate final phase. At war with France, the Spanish could only reinforce and pay its troops in the Netherlands by sea. Antonio de Oquendo was put in command of a fleet of around 40 Spanish and Portuguese warships and a similar number of troop transports to sail from Spain to Flanders.

The Spanish fleet sailed from La Coruña on September 16. Nine days later Dutch Admiral Maarten Tromp, on board Aemilia, spotted them heading along the Channel toward the Catholic (i.e. pro-Spanish) port of Dunkirk. Tromp had only 13 ships, one of which he soon lost. He was joined by Witte Corneliszoon de With, vice admiral of Holland and West Frisia, with five more, but was still heavily outgunned by the Spanish, whose men-of-war were much larger as well as more numerous than the Dutch. Yet Tromp engaged his enemy in a running duel, adopting a line of battle firing broadsides. Many of Oquendo’s ships took damage. Concerned above all for the safety of his transports, the Spanish commander took refuge in the Downs, an anchorage on the English coast. He expected the protection of the English, who were officially neutral but covertly pro-Spanish.

SPAIN IN ECLIPSE

Tromp established a blockade of the Downs and gathered reinforcements. The Dutch authorities increased the blockade force to over 100 ships. English vice admiral John Pennington was sent with a squadron to observe proceedings, and English merchant ships began ferrying Spanish troops and treasure to Flanders. Tromp ordered English ships to be stopped and searched. The situation was delicate, for the Dutch did not want to go to war with England but wanted to destroy the Spanish fleet. With winter drawing near, Tromp knew he could not sustain the blockade indefinitely.

On October 31, with an easterly wind in their favor, the Dutch decided to attack. Leaving one squadron to deter Pennington from intervening, Tromp sailed into the Downs. By accident or design, some of the Spanish ships ran ashore, where they were gleefully plundered by English crowds that had gathered to see the fighting. Others followed Oquendo’s flagship Santiago in an attempted dash for

Before the battle of the Downs

The Dutch fleet assembles off the straits of Dover. In the foreground is Tromp’s flagship Aemilia. The coat-of-arms on the ship’s stern belongs to Prince Frederick Henry of Orange-Nassau.
The release of Dutch fire ships into the crowded waters spread panic. The Portuguese ship Santa Teresa, the largest vessel in the battle, was set ablaze and destroyed with heavy loss of life. Only a dozen ships, including Santiago, reached Dunkirk and safety.

The battle of the Downs was a landmark in the precipitous decline of Spanish power. In 1648 Spain was obliged to acknowledge Dutch independence after an 80-year conflict. The battle also triggered an uprising against Spanish rule in Portugal. England, meanwhile, had been humiliated by its failure to react to a violation of its coastal waters. The desire to avenge this insult contributed to the outbreak of the first Anglo-Dutch War in 1652.

Dutch admiral Maarten Tromp was born into a seagoing family in Briel. Twice in his early years he was captured by pirates — the first time at the age of 12 — but on both occasions he regained his freedom. He proved his worth as a naval officer serving under Piet Heyn in the 1620s, and was appointed lieutenant admiral commanding the Dutch fleet in 1637. His victory at the Downs in 1639 made him a Dutch national hero. He was, however, too independent-minded to suit the States-General, which dismissed him from office in the summer of 1652. By the end of the year he was reinstated, only to be killed on August 10 at the battle of Scheveningen.

WEAPONS AND TECHNOLOGY

CULVERIN

The culverin was a long-barreled cannon typically firing a solid round shot of 17–18 pounds weight. A muzzle-loader, it was the longest-range gun on a 16th–17th century warship. Demi-culverins, firing roughly half the weight of shot, were also common. Culverins and demi-culverins were much favored by the Dutch and English, whereas the Spanish tended to prefer heavier guns with shorter range. A long-barreled gun posed problems for loading in a confined space, but the small truck carriage made the culverin relatively easy to handle. The stepped side of the carriage provided a fulcrum for the lever used to raise and lower the barrel.

This 18-pounder culverin, dating from the English Civil War, has a caliber of 5.2 in (13.2 cm) and a range of some 3,280 yds (3,000 m).
RIVALRY ACROSS THE NORTH SEA

IN THE THIRD QUARTER of the 17th century the English and the Dutch fought one another in three wars that rank among the most intensive naval struggles of all time, with many large fleet encounters and heavy loss of life on both sides. The toll of casualties was partly a result of the massive firepower deployed, with a single ship carrying a larger weight of cannon than an entire 17th-century land army, but also a consequence of the close proximity of the opposing fleets, facing one another across the southern North Sea. The Anglo-Dutch Wars forced both sides to improve their navies at every level. The wars established the importance of fighting in line and made reliance on armed merchantmen, rather than purpose-built warships, obsolescent.

COMMERCIAL WARFARE

Each of the Anglo-Dutch Wars—the first lasting from 1652 to 1654, the second from 1665 to 1667, and the third from 1672 to 1674—had its own specific origins. The third war also involved France, for once in alliance with England. But the common root of the series of conflicts lay in commercial and colonial rivalry between two maritime nations.

The Dutch were regarded as Europe’s leading naval power, and their prowess at sea had enabled them to accumulate enormous wealth through the control of trade and colonies. English governments and merchants envied Dutch success and hoped by war to steal trade and colonies for themselves. Despite raiding and small-scale fighting in Africa, Asia, and the Americas, however, the decisive battles were all fought in the “Narrow Seas”—the English Channel and southern North Sea. By asserting their sovereignty over these waters, the English threatened Dutch commerce, which depended on free passage through the Narrow Seas. England had the geographical advantage in the wars, being better placed to block Dutch trade, although the conflict cut England off from essential nautical supplies from the Baltic. One geographical advantage that the Dutch enjoyed over the English was that their coastline was protected by shoals and sandbanks that provided a safe haven for their ships.

IMPROVEMENTS IN GUNNERY AND COMMAND

After the First Anglo-Dutch War had demonstrated the clear superiority of English guns and gunnery, the Dutch had to build bigger, more heavily armed ships. It was a sign...
Although the theatre of action sometimes switched to the Mediterranean, the coast of West Africa, and North America, the most destructive fleet engagements of the Anglo-Dutch Wars took place in the North Sea and the English Channel. The three wars that England and the Dutch fought between 1652 and 1674 were forgotten when the two states allied to face the threat of the expansionist policies of Louis XIV’s France.

**KEY**
- England
- United Provinces
- Spanish Netherlands
- Borders 1650
- Dutch convoy route
- English victory
- Inconclusive battle

**ESCALATING DEMANDS OF WAR**
Both sides struggled to meet the material and financial demands of naval warfare. The docks at Chatham were by far the largest industrial enterprise in England, and a sea battle used up shot and powder at a phenomenal rate. A fleet of ships contained as many people as a major enterprise in England, and a sea battle used up shot and powder at a phenomenal rate. Racked by political conflicts, both states struggled to keep up with these demands. England had just been torn apart by civil war, the king executed and replaced by the Lord Protector, Oliver Cromwell. The Restoration of the monarchy under Charles II came between the First and the Second Anglo-Dutch Wars.

When the monarchy’s money ran out during the second war, sailors were not paid and supplies could not be bought. Sustaining warfare was made more difficult because it interrupted trade, both through enemy commerce raiding and the transfer of seamen from merchant to naval service, thus cutting into the revenues available.

The difficulties experienced by both sides in financing the war effort helped make these conflicts, despite their savagery, totally indecisive. Yet a fundamental shift in the naval balance of power was under way. Before the end of the century, the once dominant Dutch would become the junior partner of the English in their joint wars against the French.

**Holmes’s Bonfire**
In August 1666 the British fleet lay off the Dutch coast and watched as a small squadron of frigates and fire ships under Sir Robert Holmes raided the town of Terschelling. They not only burned the town, but also destroyed 140 merchantmen.
The English provocatively asserted the right to be saluted by foreign ships in the Channel and the North Sea. Admiral Maarten Tromp, escorting a Dutch merchant convoy down the Channel in May 1652, had been authorized by his government to dip his flag in salute if necessary. On May 29, Tromp met an English squadron commanded by General-at-Sea Robert Blake, whose warning shots hit Tromp’s flagship. Under the overall command of General-at-Sea Robert Blake, the English came out to fight, but bad weather delayed the start of the battle. The two fleets finally met near the sandbank of the Kentish Knock late in the afternoon of October 8. Blake held the weather gage and chose to attack, but the battle started badly for the English when two of their largest ships, Sovereign and James, ran aground in the shallow channels. While Blake, on board Resolution, led an onslaught against de With, the rear English squadron under Rear Admiral Nehemiah Bourne was surrounded by a superior force of Dutch ships commanded by Michiel de Ruyter. Bourne’s ships were “very much maimed” before Blake came to their rescue. But the Dutch suffered worse. One ship, Booghe van Alkmaar, exploded, and another, Maria, was captured. De With was obliged to move his flag after Prins Willem lost two masts.

Darkness brought the fighting to a close and saved the Dutch from an even worse defeat. De With failed to convince his captains to continue the battle on the following day, and both he and de Ruyter succeeded in withdrawing without further loss.

On December 10, 1652, reinstated in command of the Dutch fleet, Admiral Maarten Tromp inflicted a significant defeat on the English at Dungeness. As a result, he was able to escort a large convoy of merchant vessels down the Channel to the Atlantic. Tromp then waited at La Rochelle to gather more ships and shepherd them back to the Netherlands—a delay that gave the English time to recover.

The English and Dutch sighted one another at dawn on February 28. Tromp had the weather gage and chose to attack, rather than passively shield his merchant convoy. The English were scattered and General-at-Sea Robert Blake at first had to engage around 30 Dutch ships with only a dozen of his own. Blake’s flagship Triumph was battered at close range by broadsides from Tromp’s Breda, suffering over 100 casualties. But only one English frigate was sunk, while the Dutch lost eight ships as the main body of the English fleet joined the combat.

Over the following days a running battle ensued. Though short of powder, the Dutch saved most of their warships and more than half the merchant convoy from capture or destruction.

Running battle
In defense of its merchant convoy, the Dutch fleet descended on the English in the Channel. By the third day, the battle had drifted as far as Kent.
which imposed strict rules of discipline of their navy by the Anglo-Dutch War still keen for Close quarters

The spring of 1653 found both sides in the Anglo-Dutch War still keen for battle. The English had improved the discipline of their navy by the adoption of the Articles of War, which imposed strict rules of conduct upon captains. They had also laid down the principles of fighting in an orderly line of battle that would maximize the impact of their broadsides. Dutch Admiral Maarten Tromp, however, was still confident that his lighter ships could outmaneuver the English with superior seamanship and force them into a mêlée in which the firepower of his marines would be crucial.

The two fleets met near the Gabbard Bank, some 25 miles (40 km) east of the Suffolk coast on June 12, 1653. The battle opened disastrously for the English when one of their two commanding Generals-at-Sea, Richard Deane, was killed by almost the first shot fired. But a light wind made it hard for the Dutch to maneuver and exposed them to steady attrition by broadsides fired by the disciplined English line at medium range. Late in the day Tromp succeeded in trapping part of the English fleet between two of his squadrons, but the balance of damage in the day’s fighting was very much in England’s favor.

**ENGLISH VICTORY**

The English fleet was strengthened on the evening of June 12 by the arrival of Admiral Robert Blake with 18 more ships. Tromp nonetheless attacked the next day, which proved unwise. Many Dutch ships were running low on powder and some of Tromp’s captains were far keener to escape than to fight. Tromp’s flagship Breederode was badly holed but avoided capture, its withdrawal covered by the lieutenant admiral’s more devoted captains. Eleven Dutch ships were taken by the English, however, and probably as many as 11 destroyed. The survivors found refuge from a pursuing enemy in the shoals off the Dutch coast, where they were put under blockade. Morale on board Tromp’s ships was so poor that he did not dare send them into port for repair, for fear of mass desertion. Nonetheless, with trade stopped, Tromp would have to challenge the English again.

**WAR-UP-WAR TACTICS**

**THE LINE OF BATTLE**

Although casually used on earlier occasions, notably by the Dutch in the prelude to the battle of the Downs in 1639, line-of-battle tactics were first adopted systematically by the English in 1653, during the First Anglo-Dutch War. The line usually consisted of three squadrons, with the senior admiral commanding the center, and vice and rear admirals commanding the van and the rear. It soon became an assumption of naval warfare that both sides would use essentially the same formation. Typically the fleet to windward would approach in line abreast, and then wear together with each ship placing itself alongside an enemy. In a perfect battle, the two lines would sail on the same tack exchanging broadsides, with ships matched to opponents from the lead ship of the van to the rearmost vessel. Only warships from fourth-rate upward were reckoned powerful enough to act as ships of the line. These tactics could be a straitjacket for captains, with more attention focused on keeping alignment than on attacking the enemy. Yet they enabled commanders to keep some control of their fleets and execute coherent maneuvers such as doubling the enemy line if there were spare ships in the van.

**Firing on the downward roll**

This tactic was especially associated with the English. By firing shot into the enemy’s hull, they spread death and destruction through the gun decks.

**Firing on the upward roll**

Some navies preferred directing chain-shot and canister upward to sails and rigging and kill men on the upper decks. The disabled ship would then be open to boarding.
SECOND ANGLO-DUTCH WAR

THE RESTORATION OF THE English monarchy under Charles II in 1660 did nothing to improve relations with the Dutch. A faction at the English court associated with Charles’s brother James, Duke of York, was determined to challenge Dutch dominance of world trade. In 1664 the English attacked Dutch slave trading posts on the west coast of Africa, captured New Amsterdam in North America, which they renamed New York, and seized Dutch merchant ships. War was formally declared in March 1665. The Dutch were building a new navy with larger warships, although this was still incomplete. Hostilities opened with a stunning defeat for the Dutch at Lowestoft. Vigorous action by Dutch leader Johan de Witt and the return of Admiral Michiel de Ruyter from colonial duties then shifted the balance in favor of the Dutch. England was struck by the disasters of the Plague and the Fire of London, while royal finances collapsed. The bold Dutch raid on the Medway in 1667 was a final humiliation for England’s rulers, who hastily signed a peace that left them no gains but the little-valued possession of New York.

1607–1676

MICHIEL DE RUYTER

DUTCH ADMIRAL

Spending more than six decades at sea and fighting in over 40 maritime battles, Michiel Adriaanzoon de Ruyter was the greatest Dutch naval commander of the 17th century. Going to sea as a boy, he worked his way up to merchant captain before proving his worth as a naval commander in the First Anglo-Dutch War. He fought the English in West Africa and the Caribbean, and liberated some 2,500 Christian slaves from the Barbary pirates in the Mediterranean, before returning to take command of the Dutch navy in August 1665. He led his fleet to a hard-fought victory in the Four Days Battle, but only held nominal command in the raid of the Medway. His finest hour came fighting against the odds in the Third Anglo-Dutch War. He was fatally wounded in a battle with the French off Sicily in 1676.

SECOND ANGLO-DUTCH WAR

LOWESTOFT

Date: June 13, 1665
Forces: English: 14 warships; Dutch: 10 ships
Losses: English: 1 ship lost; Dutch: 17 ships lost

Location: Off Suffolk, eastern England

When war broke out the Dutch government had great confidence in the strength of its new navy. Admiral Jacob van Wassenaer Obdam was sent to seek out the English fleet and give battle. Aware of Dutch intentions, the English were waiting for Obdam when he appeared off East Anglia. There was little tactical coherence to a battle fought in shifting winds. The English commander James, Duke of York, struggled to maintain a formation but the Dutch engaged pell-mell. The combat grew in ferocity. James, on his flagship Royal Charles, narrowly escaped death when chain-shot decimated several courtiers standing alongside him. Obdam was less fortunate. After a lengthy duel with Royal Charles, his flagship Eendracht exploded, killing Obdam and almost all those on board. After Obdam’s death, the Dutch had no overall commander.

SECOND ANGLO-DUTCH WAR

BERGEN

Date: August 13, 1665
Forces: English: 14 warships; Dutch: 60 merchant ships
Losses: none

Location: Bergen, Norway

After the English victory at Lowestoft, a Dutch merchant fleet took shelter at Bergen in Norway, then ruled by the king of Denmark. On attempting to capture the fleet, the English, commanded by Rear Admiral Thomas Teddiman, failed to win the Danes’ cooperation and were battered by the guns of a fortress commanding the bay. The Dutch also kept up a brisk fire, forcing the English to withdraw.

SECOND ANGLO-DUTCH WAR

FOUR DAYS BATTLE

Date: June 11–14, 1666
Forces: English: 79 ships; Dutch: 84 ships
Losses: English: 10 ships; Dutch: 4 ships

Location: Between England and Flanders

By June 1666, France had gone to war with England and the Dutch had strengthened their navy with a substantial shipbuilding program. So when George Monck, Duke of Albemarle, came upon the Dutch fleet anchored off Dunkirk on June 11, he had only 56 ships to Michiel de Ruyter’s 84. Monck nonetheless attacked, precipitating the bloodiest battle of the Anglo-Dutch Wars.

In the first day’s fighting English Vice Admiral William Berkley was killed by a musket ball in the throat as he resisted the boarding of his ship, Swiftsure. Dutch Lieutenant Admiral Cornelis Evertsen was cut in half by a shot from Rear Admiral John Harman’s flagship Henry, which had refused to strike despite being on fire and part of its crew jumping overboard in panic. By the end of the second day, with only 29 ships in fighting condition, Monck was desperately trying to disengage. Late on the third day Prince Rupert’s ships tardily arrived to even the odds, but when Rupert’s flagship Royal James was disabled the following morning his squadron left Monck to face de Ruyter unaided. After further heavy losses (totalling 2,000 killed) the English disappeared into a fog bank and de Ruyter abandoned the pursuit.

English sloop
This 12-gun, sixth-rate English sloop was 64 ft (19.5 m) long, 19 ft (5.8 m) in the beam, and could be rowed if needed.
**THE RAID ON THE MEDWAY**

In the winter of 1666–67, with peace negotiations with the Dutch under way, King Charles and his advisers decided to keep the fleet laid up in dockyards when spring came. Meanwhile, the Dutch political leader Johan de Witt wanted to inflict a humiliating defeat on England that would enable him to dictate peace terms. He ordered an expedition to raid the Thames and the Medway, placing his brother Cornelis in charge to ensure bold aggressive action. The Dutch fleet appeared in the Thames estuary on June 7. Overcoming the objections of his cautious sea captains, Cornelis de Witt ordered his ships into the mouth of the Thames, where they failed to capture 20 merchantmen that took refuge in the direction of London. An attack on Sheerness three days later was more successful, Dutch marines capturing the poorly defended fort without difficulty.

A clutch of English commanders, including George Monck (Duke of Albemarle), gathered at Chatham to organize the defense of the dockyards. Blockships were hastily sunk at various points in the Medway’s navigable channels. The chain was defended by the frigate Unity, two captured Dutch merchantmen renamed Matthias and Charles V, and the ship of the line Monmouth. When the Dutch ships advanced into the Medway on 12 June they made short work of these defences. The Unity’s crew rapidly jumped ship, leaving their vessel to be taken. Fireships daringly sailed over the chain and set Charles V and Matthias ablaze. Dutch engineers dismantled the chain and worked to haul off the blockships, soon clearing the passage upriver.

The 80-gun first-rate Royal Charles had been left in an exposed position with a skeleton crew and was easily taken. Numerous other English vessels—including the great ships Loyal London, Royal James, and Royal Oak—were scuttled to prevent them too being captured. Half sunk, the three great ships were set on fire by the Dutch to complete the scene of destruction. Only Monmouth escaped. The Dutch took some casualties from the fire of shore batteries and guns in Upnor Castle. On June 14 they decided to withdraw, without having destroyed the dockyard stores. Royal Charles was towed back to the Netherlands, to be shown off to foreign visitors over the following years. Peace was soon made on terms highly favorable to the Dutch. But, rather like the United States after Pearl Harbor in 1941, England was soon able to rebuild its fleet and plot its revenge.

**A DREADFUL SPECTACLE AS EVER ENGLISHMAN SAW AND A DISHONOUR NEVER TO BE WIPED OFF.**

*JOHN EVELYN, WRITER AND DIARIST, JUNE 1667*
FIRESHIP ATTACK

Fireships, which played a major role in the Anglo-Dutch Wars, are known to have been used in Classical times, and remained in use well into the 19th century. Here, French fireships attack the British fleet off Quebec in June 1759, during the Seven Years War. Though spectacular, the attack was largely ineffective, most of the fireships being towed away before they could cause any damage.
THIRD ANGLO-DUTCH WAR

IN 1670 England’s King Charles II made a secret alliance with France’s King Louis XIV to attack the Dutch Republic. A declaration of war was delayed until April 1672, giving Lieutenant Admiral Michiel de Ruyter time to train the Dutch fleet in disciplined battle tactics. The combination of the English fleet and the French navy, recently strengthened and expanded by Louis’s chief minister Colbert, gave the allies an overwhelming superiority of numbers. But they cooperated poorly and quarrels disrupted their naval operations. De Ruyter, in command of the French fleet, steered to the south, despite a signal from the Duke of York to follow him northward. The allied line was thus split in two. De Ruyter detached the 15 ships of his rear squadron to keep d’Estrees’ 30 ships occupied in a long-range duel, while his center and van went for the English fleet, now deprived of their numerical advantage.

At the outset of the war, the Dutch planned to attack the English fleet before it could join with its French allies, but they delayed too long. By early June 1672 the allied fleets, under the overall command of King Charles’s brother James, Duke of York, had met up and were anchored in Solebay, careening hulls and taking on supplies. They heavily outnumbered the Dutch, but de Ruyter decided to attack, with the advantage of surprise and an onshore wind behind him.

At 2.30 on the morning of June 7, a French frigate reported sighting the Dutch approaching Solebay. The allies were totally unprepared, moored in no particular order, and with many sailors sleeping ashore. Ships hastily made ready for battle and strove to get out to sea against the breeze. Whether through a misunderstanding or a deliberate decision, the Comte d’Estrees, in

THE BATTLE OF SOLEBAY

The power of Royal Prince’s guns kept the Dutch at bay, but after two hours’ battering the Duke was forced to shift his flag from the crippled ship. A worse fate befell Royal James, the 100-gun flagship of the Earl of Sandwich. She was grappling by the 60-gun Groot Hollandia, which raked her with broadsides point blank until she was disabled. The Earl refused to strike his colors, and got away from the panic to abandon the blazing vessel, the Earl of Sandwich was drowned, his body washing ashore a few weeks later, identifiable only by his Order of the Garter. The Dutch had also suffered losses and toward nightfall de Ruyter broke off the engagement.

Friesland
This model of the Dutch second-rater Friesland shows the shallow draft characteristic of Dutch warships. It was needed for sailing in Holland’s coastal waters.

Comte d’Estrees
The French admiral’s flag ship, which was engaged at close range by de Ruyter’s flagship Zeven Provincien and the 76-gun Eendracht. The power of Royal Prince’s guns kept the Dutch at bay, but after two hours’ battering the Duke was forced to shift his flag from the crippled ship. A worse fate befell Royal James, the 100-gun flagship of the Earl of Sandwich. She was grappling by the 60-gun Groot Hollandia, which raked her with broadsides point blank until she was disabled. The Earl refused to strike his colors, and got away from the panic to abandon the blazing vessel, the Earl of Sandwich was drowned, his body washing ashore a few weeks later, identifiable only by his Order of the Garter. The Dutch had also suffered losses and toward nightfall de Ruyter broke off the engagement.

End in fire
Dutch and English sailors shoot at each other with pistols as men-of-war engage with broadsides. To the right, Royal James burns after a Dutch fireship attack.
The fighting was so stubbornly contested by both sides that one could not count either side as having the advantage...

In 1673 the French army was invading the Dutch Republic. The English intended to land troops to support the French, but first needed to defeat de Ruyter or blockade him in port. In May, the Dutch moored in the Schooneveld, an anchorage protected by shoals.

The following day the Duke of York ordered a pursuit as the Dutch headed for home. The French, in the van, overtook the Dutch rear but unaccountably failed to engage and the pursuit was soon abandoned. Both sides had suffered heavy casualties, yet the moral victory clearly lay with the Dutch. Allied officers indulged in bitter recriminations, even between opposing factions within the national fleets, and the Comte d’Estrees’ second-in-command Abraham Duquesne refused to serve under him again.

De Ruyter remained in his safe haven at Schooneveld until August 1673, when concerns for the safety of the incoming Dutch spice fleet made him sail north to the Texel and contest the Anglo-French blockade. As in the previous battles in this war, the tactical dexterity of the Dutch and the failure of coordination between different divisions of the allied fleet negated the Anglo-French numerical superiority. The opposing rear divisions were commanded by Admiral Sir Edward Spragge and Lieutenant Admiral Cornelis Tromp. Spragge had developed a feud with Tromp and had given King Charles his word that he would kill the Dutch admiral. Pursuing his vendetta with no regard for the overall shape of the battle, he allowed his squadron to become detached from the center under Prince Rupert. Spragge and Tromp fought their personal duel with such ferocity that both had to shift their flags twice from corpse-strewn, dismasted ships. Transferring for the second time, Spragge was killed when a cannonball struck his boat.

Meanwhile, the French in the van became totally detached from the fight. De Ruyter initially sent a handful of ships under Adriaen Banckert to take on the Comte d’Estrees’ division. At a chosen moment, Banckert disengaged and turned to join the battle in the center, where de Ruyter was engaged with Prince Rupert. Unable or unwilling to follow Banckert, the French were left with no one to fight. At the end of the day the Dutch disengaged and returned to safe anchorage. The allied naval command subsequently disintegrated in a storm of accusations of cowardice and treachery, focused chiefly upon the Comte d’Estrees’ failure to come to Prince Rupert’s aid.

“I went aboard Sir Edward Spragge … and found his ship extremely disabled, and as we set our boat from his ship, down fell his main mast within a yard of our boat … after this, Sir Edward Spragge came on board the St. George where he put up his flag … at two of the clock St. George was so disabled too that Sir Edward Spragge took boat to go on board the Royal Charles … but a bullet came through the St. George and broke his boat; they made back again as fast as they could … but the boat sunk, and Sir Edward Spragge drowned being taken up dead, his head and shoulders above water having taken so dead hold of the boat, they could hardly disengage him from it.”

Royal Prince dismasted
English and Dutch sailors fight each other with oars, daggers, and cutlasses. In the background, Tromp’s flagship Gordon Leeuw sails to the right of Royal Prince, Spragge’s dismasted flagship.
REST AND RECREATION

OFF-DUTY SAILORS have often had a deserved reputation for excess and disorder. Naval towns were known for their drinking establishments, brothels, gambling dens, and tattoo parlors, where seamen could be relieved of their hard-earned pay during a brief spell of shore leave, ending back on board with empty pockets and a severe hangover. But sailors, of course, have not all been drinkers and brawlers in their leisure time. They might be as likely to spend their free hours making music, sketching caricatures, or even writing poetry.

LEISURE AT SEA

At sea in the age of sail, the forecastle was the place where sailors relaxed in their off-duty hours during the week, and on Sundays after a religious service and the reading of the Articles of War. Sailors sprawled on the deck in fine weather, combing and plaiting one another’s hair. They also danced and sang songs—known as fo’c’le songs. These were distinct from sea chanties that were sung to relieve the tedium and keep rhythm while working. Younger sailors might indulge in skylarking, playing and chasing in the rigging high above the deck, a dangerous sport generally disapproved of. In a calm, the captain might have a sail let down over the side to make a swimming pool. Gambling games with dice and cards were always popular, although they were usually officially banned as counter to religious principle and a potential source of disorder—many fights on board were caused by gambling disputes.

DRUNKENNESS

Drinking alcohol to excess was always a favorite off-duty activity for sailors. While navies of the sailing-ship era issued men with alcohol as part of their daily rations, they clamped down with a heavy hand on men who drank any more than their ration on board—drunkenness was a major cause of accidents and was incompatible with the good running of a ship. Official disapproval and severe punishments did not prevent men going to extreme lengths to procure drunkenness, either illegally saving up their ration for a binge or smuggling drink on board. The ban on excessive drinking never applied to officers, who were often the most flagrant offenders, indulging in spectacular drinking bouts involving the consumption of extraordinary quantities of wine and brandy.

HORN OF PLENTY Alcohol has often fueled sailors’ lives both on board and off. Beer, wine, and rum have been served by many navies as part of regular rations, although the authorities at the same time have attempted to suppress outright drunkenness.

RELAXING ON DECK Off-duty German sailors in the late 1800s are permitted some time off on a Sunday afternoon to take advantage of the fine weather and take in the fresh air before disappearing back below deck to their service.

PLAYING MAH JONG The Chinese game of Mah Jong was popular with sailors who were responsible for its introduction to Britain.

UCKERS BOARD A more complex form of Ludo, Uckers has a long tradition in the Royal Navy and is still played widely below decks today.
WOMEN

In the age of sail the need of hundreds of young men crowded on ships to find sexual relief once in harbor was widely—though not universally—accepted by their officers. Port towns were notorious sites of debauchery and it is no surprise that venereal diseases were commonplace in all navies. When captains were reluctant to let men ashore for fear of desertion, they frequently allowed women to come on board while in port. Officially tolerated as “wives,” sometimes hundreds would be accommodated on a warship’s gun deck at one time. In the absence of privacy, this led to scenes that shocked more religious consciences.

HARRIS’S LIST OF LONDON LADIES (1758)

Many a man of war hath been her willing prisoner, and paid a proper ransom … [she] loves to fight yard arm … and be briskly boarded.

PORT OF PLEASURE

The expansion of London’s maritime trade during the 18th century, and the presence of two Royal Navy dockyards, created an increasing demand for prostitution in the capital.

MODERN TIMES

In the 20th century the maritime authorities made increasing efforts to regulate leisure activities. They encouraged more salubrious games by organizing official competitions—racing ship’s boats was a favorite of the pre-World War I Royal Navy. The US Navy tried to clean up its act by, for example, banning all alcohol consumption on ships along with indecent tattoos—an edict that sent many sailors scurrying to tattoo parlors to “dress up” their naked ladies. During World War II the ban on alcohol was subverted on some US ships by the operation of illegal stills, refining alcohol from various cleaning substances or fuels. Gambling also flourished unchecked by official disapproval. Radios and record players replaced group singing, while increasing literacy made reading a favorite pastime.

READING

A midshipman reads a Sunday lesson to marines and sailors on the gun deck of a 19th-century frigate. One of the leisure activities of the literate sailor was reading.
IN THE COURSE of the 17th century the kings of France made their country the dominant land power in Europe, but maritime affairs traditionally had less importance for the French than for the English or the Dutch. It was not until the reign of the “Sun King” Louis XIV that a thoroughgoing effort was initiated to turn France into an oceanic power. From the 1660s the Sun King’s principal minister, Jean-Baptiste Colbert, embarked on a programme of naval expansion that went hand in hand with the development of overseas colonies and maritime commerce. France had a sufficient population of seamen, greater resources than any other contemporary European state, and a powerful centralized administration. What it turned out to lack was the political will to sustain world-beating naval forces. After promising beginnings, the Sun King’s navy in effect conceded command of the seas to the British.

COLBERT’S ACHIEVEMENT
Cardinal Richelieu, principal minister of King Louis XIII, had made an initial move to build up French naval forces in the 1620s, but both ships and shore facilities had subsequently fallen into disrepair. Colbert thus had to start almost from scratch. His aim was to create a formidable force of warships with efficient crews and officers, supported by an effective infrastructure. To build the ships he at first brought in expertise from abroad, chiefly employing Dutch master shipwrights, but also the Englishman Anthony Deane and the Neapolitan Biagio Pangallo. Through this transfer of technology the French soon became fine shipbuilders in their own right. They favoured large three-deck ships of the line, decorated with magnificent figureheads and carvings by noted artists such as sculptor Pierre Puget. France’s great military engineer Vauban was entrusted with the building and fortification of naval bases. Toulon was developed as the main Mediterranean port and Brest as the principal Atlantic naval base. These were backed up by less satisfactory facilities at Rochefort and Le Havre, and by Dunkirk, sold to France by the English in 1662. Colbert also promoted improvements in navigation and hydrography. Appearing after Colbert’s death in the 1690s, the Neptune Français charts produced by French maritime surveyors were the best in Europe.

MEN AND OFFICERS
In 1668 Colbert instituted a rational system for the conscription of sailors into the navy. All seamen in France had to register – the “Inscription Maritime” – and men from the register were called up by rotation in “classes”. Each class performed naval service for a fixed number of years. To make this compulsory service more palatable there were social benefits. The children of seamen on naval duty were educated free and there was also provision for sick pay. The sailors’ wages were sent to their homes rather than paid on ship, preventing the men from spending it all on drink and loose women. Some officers were transferred from the army to the navy; others were recalled
from service with the galley fleet of the Knights of St John in Malta, where many French gentlemen had gained naval experience. A path for the sons of the well-born to enter naval service was opened by the creation of the Garde de Marine, training them to become commissioned officers. The structure of French society required senior commanders to be noble, but merit was usually rewarded. Abraham Duquesne had been born into a Dieppe merchant family, but was ennobled so that he could hold a high command. French officers’ seamanship was not always faultless – Admiral Jean d’Estrées lost an entire fleet through bad navigation, running onto rocks in the West Indies in 1678 – but they usually showed a high level of courage and fighting spirit.

TEST OF BATTLE
The Sun King’s fleet was blooded as an ally of the English in the Third Anglo-Dutch War of 1672-74. It fought the Dutch and Spanish in the Mediterranean, and then took on the English and Dutch together in the War of the League of Augsburg from 1689. The English and Dutch were ill-prepared for this conflict and at first the French scored notable successes. An army was landed in Ireland and victory at Beachy Head in 1690 gave France temporary command of the sea. Yet a major war soon put the structure that Colbert had created under severe strain. Orderly conscription failed to deliver sufficient sailors and soon press-gangs were in action, although ships still remained undermanned. As France was both a Mediterranean and an Atlantic power, concentrating all its naval forces to fight for control of the English Channel proved impossible. A major defeat at the twin battles of Barfleur and La Hogue in 1692 convinced Louis that major fleet engagements were a costly and fruitless indulgence.

COMMERCE RAIDING
Renouncing the struggle for command of the sea, the king ordered his sailors to focus on commerce raiding. They did so very successfully, with bold captains such as René Duguay-Trouin from St Malo and Jean Bart from Dunkirk sailing at the head of small hunting packs. By the time the war ended in 1697 some 4,000 English and Dutch ships had been captured, including the immensely valuable Smyrna convoy ambushed by the French Mediterranean fleet in 1693. When fighting resumed in 1702, in the War of the Spanish Succession, French commerce raiding was again effective, but there was no disguising the overall decline of the French navy. Increasingly short of money, Louis was reduced to fitting out fleets of privateers by sharing the cost and the profits with wealthy businessmen. In truth, as a continental land power, France logically had to give priority to its army in the allocation of resources. Colbert’s vision of France as the hub of a maritime trading empire was never more than partially realized.
THE FRENCH WARS

THE AMBITIONS OF French King Louis XIV generated a series of wars in which to test his freshly expanded navy. After England made peace with France in 1674, Louis remained at war with the Dutch, who allied themselves with their former enemies the Spanish. A series of sharp sea battles were fought in the Mediterranean, which ended in a notable success for the French navy under Admiral Duquesne. However, the War of the League of Augsburg (1688-97) brought France into conflict with England, which was supported by the Dutch, now fielding a distinctly inferior naval force. An early victory at Beachy Head, under the excellent Admiral de Tourville, gave the French navy command of the sea, but this was soon reversed by a disastrous defeat at the twin battles of Barfleur and La Hogue. For the rest of the war, and through the subsequent War of the Spanish Succession (1701-14), the French made no further serious attempt to contest the dominance of the English fleet, although France’s seamen demonstrated their skill and boldness in commerce-raiding and other small-scale actions.

1. FRANCO-DUTCH WAR

ALICUDI

Date January 6, 1676

Forces Dutch and Spanish: 19 ships of the line; French: 20 ships of the line

Losses Dutch and Spanish: 1 ship; French: none

Location Aeolian islands, Sicily

In 1674 the people of Messina in Sicily rose up in revolt against Spanish rule and invited the French to come to their aid. King Louis XIV sent a squadron to Messina, installing a viceroy to rule the island. When the Spanish fleet attempted to intercept a troop convoy sent to Sicily in February 1675, it was roundly defeated off Stromboli. The Spanish called on the Dutch for help and Dutch Admiral Michiel de Ruyter was sent with a weak squadron of 18 ships to link up with the Spanish fleet. He found Spain in a hapless state of disorganization, however, and sailed for Sicily with only a single Spanish ship of the line to augment his squadron, plus a handful of galleys.

De Ruyter encountered a French force under Admiral Duquesne off the island of Alicudi. The French had a similar number of ships but far superior firepower and de Ruyter was reluctant to give battle, but once the wind shifted to Duquesne’s advantage the French attacked. Approaching the Dutch line obliquely, the French van took a pounding and several ships were forced to withdraw. Nonetheless, once the two lines were closely engaged the French guns did their work. After six hours the fighting ceased. The Spanish galleys towed off the most badly damaged Dutch ships, one of which sank during the night. The French had suffered the heavier casualties, however, in a thoroughly inconclusive encounter.

2. FRANCO-DUTCH WAR

AGOSTA

Date April 22, 1676

Forces Dutch and Spanish: 27 ships of the line; French: 29 ships of the line

Losses none

Location Off Agosta, eastern Sicily

After the battle of Alicudi, Michiel de Ruyter’s Dutch squadron was belatedly joined by a further eight Spanish ships under Admiral Don Francisco de la Cerda. Admiral Duquesne entered Messina. The total French strength still exceeded that of the combined Spanish and Dutch fleet, but they allowed themselves to be blockaded in harbor by de Ruyter, so little confidence did they have in their ability to defeat the legendary Dutch admiral.

In April, despairing of the French ever coming out, the Spanish and Dutch sailed to threaten the French-controlled harbor of Agosta. Duquesne felt bound to respond and the two fleets met on April 22. The haughty Matchlock musket

Musket

Muskets were brought to bear when ships came within 220 yards (200 m) or so of each other. Matchlocks remained in use in Europe until about 1700.

Eendracht

The Dutch ship Eendracht was de Ruyter’s flagship at Agosta when the admiral was mortally wounded by the French guns.

Admiral de la Cerda insisted on being recognized as overall commander of the combined fleet and thus holding the position of honour in the center of the line. He also insisted that his Spanish squadron remain together under his command. Thus the Dutch were split, de Ruyter leading half of their ships in the van and the rest of the Dutch ships making up the rear division.

De Ruyter closely engaged the French van, but the Spanish held off, limiting themselves to some token long-range exchanges with the French center. The Dutch in the rear, under Admiral den Haen, mostly focused on the Spanish, although they did succeed in engaging the rearmost French ships. At first the Dutch van had the better of the fighting, but once Duquesne realized the Spanish were not going to fight he began moving ships forward from his center. Isolated and outgunned, the Dutch van suffered grievously. De Ruyter was wounded in the leg, and his flagship was shattered.

Both sides were happy to break off the fight at the end of the day. De Ruyter died a week later of gangrene; a sad end for an admiral who deserved to fall in a more distinguished combat.

3. FRANCO-DUTCH WAR

PALERMO

Date June 2, 1676

Forces Dutch and Spanish: 27 ships of the line; French: 28 ships of the line

Losses Dutch and Spanish: 7 ships; French: none

Location Palermo, Sicily

The combined Dutch and Spanish fleet was in poor shape after the battle of Agosta. Demoralized by the loss of Admiral de Ruyter, they anchored in a defensive line across Palermo Harbor. The French, largely at the inspiration of the Comte de Tourville, conceived a bold plan of attack. The Marquis de Preuilly took nine ships to attack one end of the enemy line at close quarters. The rest of the French fleet maintained a barrage from longer range while sending fireships down on the harbor.

In panic the Dutch and Spanish ships cut their cables, drifting into shore. Three Dutch ships and four Spanish ships were destroyed by fire, including both flagship’s. Satisfied with this triumph, the French fleet subsequently withdrew from Sicily, allowing the island to return to Spanish rule.

THE DUTCH FLEET UNDER DE RUYTER CAN ENTER A MOONLESS NIGHT IN HEAVY WIND AND FOG AND EMERGE THE NEXT DAY IN PERFECT LINE AHEAD.

FRENCH ADMIRAL ABRAHAM DUQUESNE, REPORT TO KING LOUIS XIV, 1676
Encouraged by the French victory over the English and Dutch fleets at Beachy Head in 1690, French King Louis XIV planned an invasion of England in 1692 to reinstate the deposed King James II. Admiral de Tourville was to concentrate the French fleet at Brest, then sail on to Le Havre where French and Jacobite soldiers would embark in transports to be escorted across the Channel.

The project was from the outset plagued by delays. Originally planned for April, it had to be postponed because the transports were not ready in time. Even with an extra month, the French Mediterranean fleet, held up by bad weather, never arrived to join Tourville, who also had to sail without 20 of his own ships for lack of crews to man them. His fleet was thus woefully inadequate to confront the combined forces of the English and Dutch, who had been given ample time to gather in the Channel.

Tourville sighted the allied fleet off Cape Barfleur on the morning of May 29. Although it was twice his strength, he opted to give battle, perhaps hoping that English captains of Jacobite sympathies would change sides. None did. Holding the weather gage, Tourville no doubt hoped to exploit skillful seamanship and gunnery to inflict damage on a superior force and disengage at will.

**BROADSIDES AND FIRESHIPS**

Tourville laid his center, including his superb flagship Soleil Royal, alongside the allied center and a brutal exchange of broadsides began. The French van avoided envelopment by the Dutch ships of the allied van by continually giving way until at right-angles to the center. Tourville’s attempt to control the battle was undermined by the caprice of the wind, which first shifted to deny him the advantage, and then dropped altogether. In a flat calm, ships of the line maneuvered under tow from their boats, sailors straining at the oars, or were carried by the tide if they opted not to anchor. The French center, unable to disengage, heroically fought a prolonged gunnery duel against the odds, while the allied rear strove to bring them under fire from both sides.

Fighting continued in an increasingly confused mêlée after nightfall. The English sailed fireships toward the enemy on the tide but the French coped with them efficiently. Exhaustion brought the battle to an end around 10:00 p.m.

Both sides suffered heavy casualties, but no ship was sunk or taken. If the French had escaped the following day, they could have celebrated a fine performance against a superior force. But too long was spent trying to save the crippled Soleil Royal and it was evening before Tourville ordered a general flight. Twenty-two ships used local knowledge to navigate a dangerous channel past Alderney to safety. Twenty-two ships used local knowledge to navigate a dangerous channel past Alderney to safety. Twenty-two ships used local knowledge to navigate a dangerous channel past Alderney to safety. Twenty-two ships used local knowledge to navigate a dangerous channel past Alderney to safety. Twenty-two ships used local knowledge to navigate a dangerous channel past Alderney to safety. Twenty-two ships used local knowledge to navigate a dangerous channel past Alderney to safety.
The War of the League of Augsburg, sparked by the Protestant William of Orange’s accession to the English throne in 1688, set the navy of Louis XIV’s Catholic France against the formidable maritime power of the English and the Dutch. On June 21, 1690, the French Mediterranean fleet commanded by the Comte de Châteaurenault sailed into Brest to join the Atlantic fleet commanded by the Marquis de Tourville. This combined fleet had a local numerical advantage over its enemies, for the English had dangerously dispersed their forces, with detachments in the Mediterranean and the Irish Sea, as well as numerous ships on convoy escort duties.

Tourville entered the English Channel with 70 magnificent ships of the line, intending to attack the depleted English in their anchorage at Spithead. But English admiral Arthur Herbert, the 1st Earl of Torrington, did not wait to be attacked, advancing cautiously westward along the south coast of England, where he was joined by a squadron of 22 Dutch ships under Cornelis Evertsen. Encountering the French off the white cliffs of Beachy Head, Torrington held the weather gage of his ships into a gap that had opened up between the hesitant Torrington’s center and the van, the Dutch ships were surrounded.

The French rear squadron, vigorously attacked by the third English squadron under Sir Ralph Delaval, took some heavy punishment. Three French ships had to withdraw from the line, one with its poop blown off when cartridges exploded on deck. But their losses were as nothing to those suffered by the Dutch. Only one ship, Friesland, struck and was sunk, but all were shattered, their decks littered with the dead and wounded. In the afternoon the wind dropped and the ships drifted with the current. As the tide began to ebb, Torrington gave the signal to anchor. Caught unawares, the French drifted away from the allied ships, bringing the day’s fighting to an end.

The aftermath brought controversy on both sides. Torrington fled for the Thames, abandoning any ships too badly damaged to follow (all but one of them Dutch). Tourville contented himself with finishing off these defenseless wrecks and then, after sacking the port of Teignmouth, returned to France to unload his wounded and refit his mauled ships. Torrington was imprisoned in the Tower of London. Although a court martial cleared him of treachery, he was dismissed from the service. Tourville was also criticized for failing to pursue the defeated English. His great victory failed to have any decisive consequence.

Dutch ship ablaze: A Dutch ship catches fire after sustained bombardment from the French. The battle saw the complete destruction of the Dutch fleet that formed the van.
70 French warships carrying 4,600 guns meet the Anglo-Dutch fleet off Beachy Head.

TORRINGTON'S CENTER SQUADRON

CHÂTEAURENAULT'S VAN SQUADRON

ENGLISH CHANNEL

The two fleets engage. Tourville arrives in the Channel with 70 ships of the line. His intention to attack the British in Spithead is foiled by Torrington, who sails west along the coast. Joined by the Dutch under Evertsen, they encounter the French near Beachy Head.

The French line is longer than the Anglo-Dutch. Arc in French line makes center squadrons difficult to engage.

D'ESTRÉES' REAR SQUADRON

TOURVILLE'S CENTER SQUADRON

Dutch squadron engages the French van.

DELAVAL'S REAR SQUADRON

EVERTSEN'S VAN SQUADRON

The French rear mauled by encounter with English squadrons.

Unable to match French, English ships draw out of battle by dropping anchor.

Outnumbered Dutch van caught between two fires.

Two Dutch ships sunk. Seven are damaged and later scuttled.

French center squadrons complete the encirclement of the Dutch van.

French victory.

By 4:00 p.m. the French have won the battle. The English withdraw by dropping anchor, allowing the French to drift downwind, while the Dutch are surrounded and destroyed. The French then sack the port of Teignmouth.
1651–1702

JEAN BART
FRENCH PRIVATEER AND ADMIRAL

The son of a Dunkirk fisherman, Jean Bart proved from an early age an outstanding sailor and fighter. He was the leader of the Dunkirk privateers by 1676 and rose to the rank of admiral in the French navy despite his lack of noble birth. In 1689 he was captured by the English but escaped after three days and crossed from Plymouth to Brittany in a rowing boat. He was ennobled after saving France from starvation by the rescue of a grain convoy captured by the Dutch in June 1694. A supreme commerce raider, Bart repeatedly defied English efforts to blockade him in port and is credited with capturing over 300 ships in his career. His exploits made him a French national hero.

With the French people facing starvation after bad harvests, Jean Bart was dispatched to escort a large grain convoy crossing the North Sea. He met the convoy off Texel—in the possession of a Dutch flotilla that had captured it. Bart held the weather gage and, although outnumbered, attacked the Dutch ships fiercely. His flagship Maure was almost disabled by the guns of the Dutch flagship Prins Friso, but he nonetheless boarded and captured her. Two other Dutch ships were also taken and the rest fled. Bart brought the 120 ships of the convoy with their invaluable cargo safely to port in France.

AN ANGLO-DUTCH fleet commanded by Admiral Sir George Rooke was sent to attack the Spanish port of Cadiz. At the same time French Vice Admiral Louis Rousselet de Chateau-Renault was escorting a Spanish treasure fleet across the Atlantic from Cuba. Hearing of the presence of enemy ships at Cadiz, the treasure fleet prudently diverted to Vigo, where the unloading of its silver bullion got under way.

Rooke’s raid on Cadiz was a failure, but on his way home he learned of the arrival of the treasure ships in Vigo and seized the opportunity to redeem himself. The harbor was well defended, its entrance blocked by a boom of masts chained together, covered by the fire of shore batteries and the guns of ships anchored inside. Rooke landed troops to attack the Spanish forts and ordered the British and Dutch vice admirals Thomas Hopsonn and Philip van der Goes to sail in and break through the boom. The Allied ships came in for very heavy punishment. Hopsonn’s Torbay was especially hard hit and he was obliged to shift his flag to Monmouth. But the boom was breached and the Allies broke into the harbor. Believing he had no chance in a fight, Chateau–Renault ordered his captains to fire their ships. The harbor was soon an amazing spectacle of blazing and exploding vessels. The Allies succeeded in capturing some of the ships before fire took hold, including galleons that still had bullion and other valuables worth £14,000 on board. Apart from ships and treasure, the disaster cost the French and Spanish some 2,000 casualties. English and Dutch dead and wounded numbered around 800.

An Anglo-Dutch fleet commanded by Admiral Sir George Rooke was sent to attack the Spanish port of Cadiz. At the same time French Vice Admiral Louis Rousselet de Chateau–Renault was


despite their lack of noble birth. In 1689 he was captured by the

English but escaped after three days and crossed from Plymouth to Brittany in a rowing boat. He was ennobled after saving France from starvation by the rescue of a grain convoy captured by the Dutch in June 1694. A supreme commerce raider, Bart repeatedly defied English efforts to blockade him in port and is credited with capturing over 300 ships in his career. His exploits made him a French national hero.

With the French people facing starvation after bad harvests, Jean Bart was dispatched to escort a large grain convoy crossing the North Sea. He met the convoy off Texel—in the possession of a Dutch flotilla that had captured it. Bart held the weather gage and, although outnumbered, attacked the Dutch ships fiercely. His flagship Maure was almost disabled by the guns of the Dutch flagship Prins Friso, but he nonetheless boarded and captured her. Two other Dutch ships were also taken and the rest fled. Bart brought the 120 ships of the convoy with their invaluable cargo safely to port in France.

AN ANGLO-DUTCH fleet commanded by Admiral Sir George Rooke was sent to attack the Spanish port of Cadiz. At the same time French Vice Admiral Louis Rousselet de Chateau–Renault was escorting a Spanish treasure fleet across the Atlantic from Cuba. Hearing of the presence of enemy ships at Cadiz, the treasure fleet prudently diverted to Vigo, where the unloading of its silver bullion got under way.

Rooke’s raid on Cadiz was a failure, but on his way home he learned of the arrival of the treasure ships in Vigo and seized the opportunity to redeem himself. The harbor was well defended, its entrance blocked by a boom of masts chained together, covered by the fire of shore batteries and the guns of ships anchored inside. Rooke landed troops to attack the Spanish forts and ordered the British and Dutch vice admirals Thomas Hopsonn and Philip van der Goes to sail in and break through the boom. The Allied ships came in for very heavy punishment. Hopsonn’s Torbay was especially hard hit and he was obliged to shift his flag to Monmouth. But the boom was breached and the Allies broke into the harbor. Believing he had no chance in a fight, Chateau–Renault ordered his captains to fire their ships. The harbor was soon an amazing spectacle of blazing and exploding vessels. The Allies succeeded in capturing some of the ships before fire took hold, including galleons that still had bullion and other valuables worth £14,000 on board. Apart from ships and treasure, the disaster cost the French and Spanish some 2,000 casualties. English and Dutch dead and wounded numbered around 800.
An English convoy of 80 transport ships sailed from Plymouth, bound for Portugal with men and supplies for the war then being fought in Spain. On the following day the convoy was intercepted off the Lizard by two French squadrons, one led by the Saint-Malo privateer Captain René DuGuay-Trouin and the other by Admiral Claude de Forbin.

With only five ships of the line to his opponents’ 13, the commander of the English convoy escort, Commodore Richard Edwards, stood little chance. The English ships nonetheless formed up in line of battle and mounted a spirited resistance, hoping this would allow at least some of the transports to escape. Edwards’ flagship, the 80-gun Cumberland, was captured after being attacked by DuGuay’s 74-gun Lys and two smaller ships. The other 80-gun English ship, Devonshire, defended herself against overwhelming odds until dusk, when the ship exploded, killing more than 800 men on board. Royal Oak was the sole English warship to escape, reaching Kinsale in southern Ireland with a handful of transports.

In early August 1704 an Anglo-Dutch fleet under Admiral Sir George Rooke captured Gibraltar from the Spanish. A French fleet under the Comte de Toulouse sailed from Toulon to retake it. Rooke met the French south of Malaga. The action was an indecisive slaughter, two powerful forces in formal line of battle battering one another with broadsides. Occasionally a ship withdrew because of the scale of the damage and casualties suffered, but no vessel had been lost by either side when they disengaged at the day’s end. The Anglo-Dutch fleet was overall in worse shape and desperately short of powder and shot. But the French did not renew the battle next morning, instead sailing back to Toulon. Both sides claimed victory, even though the English retained Gibraltar.
THE BALTIC WAS A STRATEGICALLY crucial area of Europe in the Age of Sail, for it was a source of vital nautical supplies—timber, tar, flax, and hemp—as well as of other important trade goods. Yet the naval conflicts in the region fought in the 17th and 18th centuries were almost exclusively contests between the countries around the Baltic shores. The Dutch intervened in Baltic warfare to protect their naval supplies and trading interests in the 17th century, as the British later did during the Napoleonic Wars, but mostly the combatants were Sweden, the kingdom of Denmark-Norway and, in the 18th century, Russia. The battles they fought often took place in the shallow waters around the inlets and islands of the Baltic coast. Thus in Baltic navies large sailing ships were often less decisive in combat than shallow-draft oared galleys and flat-bottomed boats.

POWERFUL SWEDES

Sweden established its independence from Denmark and Norway in the 1520s. A navy was founded under King Gustav Vasa (ruled 1523–60), but when his famous grandson Gustavus Adolphus came to the throne in 1611 it consisted only of small and aging vessels. To serve both his military ambitions and sense of personal prestige, in the 1620s the king had a new fleet built at the Royal Dockyard in Stockholm, under the direction of Dutch master shipwright Henriks Hybertszoon. This included some of the largest warships in the world, but was far from a total success. The mighty Vasa, intended to be the pride of the new navy, sank ignominiously in Stockholm Harbor on her maiden voyage in August 1628. This was not untypical of the general performance of the Swedish navy.

The Danes benefited from the income generated by the tolls on the straits they controlled at the mouth of the Baltic. They were also aided by the formidable
RUSSIAN ASCENDANCY
The rise of Russia under Tsar Peter the Great fundamentally altered the power balance in the Baltic. The Great Northern War in the first two decades of the 18th century brought victories not only for Russian armies but also for the newly created Russian navy at the battles of Ezel and Grengam. Peter’s absolute power in Russia enabled him to build fleets and naval facilities in the Baltic and Black sea. The lack of a Russian seafaring tradition was more difficult to overcome. For many decades the officers of the Russian navy were recruited abroad. Like the Swedes, the Russians maintained two separate forces in the Baltic, a conventional sailing ship fleet for open waters and a fleet of galleys and prams—flat-bottomed ships carrying a heavy gun—to serve in coastal waters.

SWEDEN’S LAST THROW
Russia replaced Sweden as the major power in the Baltic after the Great Northern War, but through the 18th century Sweden put substantial effort into upgrading its navy, especially the coastal fleet. The traditional galley and prams were augmented by varieties of gun sloop and coastal frigate—udemas, turumas, and hemmemas—the largest capable of mounting up to 48 guns. Sailing ships designed to be rowed when necessary, these innovative British-designed vessels performed well when Sweden went to war with Russia again in 1788–90. There were large-scale battles, ending with the mighty but indecisive encounter known as Second Svensksund. It was Sweden’s most impressive naval performance, but the size and population of Russia inevitably meant it would dominate the Baltic in the future.

1672–1725
PETER THE GREAT
LIEUTENANT-ADMIRAL OF THE UNITED PROVINCES

Tsar Peter the Great was the ruler who turned Russia into a major military power. An absolute monarch and ruthless modernizer, he looked to western Europe for examples to follow and for expertise to import. Peter created the Russian navy out of nothing. Fascinated by boats from an early age, he traveled to the Netherlands and England in the 1690s to study shipbuilding and navigation. He worked at the East India Company shipyard in Amsterdam and at the Royal Dockyard in London to gain personal experience of maritime technology. He took back with him shipwrights, experienced seamen, and designs for ships. Peter’s conquests on land gave Russia access to the Black Sea and the Baltic, where he founded the city of St Petersburg in 1703 with the naval base of Kronstadt alongside. By the time of his death in 1725 the Russian navy had 48 ships of the line and some 800 galleys.

Peter the Great
Emperor Peter I was physically imposing, loud, violent, and a keen learner. He transformed Russia into a modern European state.
**152**

**GUN, SAIL, AND EMPIRE**

For the Dutch United Provinces access to the Baltic for naval supplies and trade was commercially and militarily crucial. Sweden wished to exclude the Dutch from the Baltic by forcing the Danes to block their passage through the Oresund, the narrow sound between Denmark and Sweden. In 1658 Sweden’s king Karl X Gustav put the Danish capital Copenhagen under siege by land and naval blockade. The Dutch sent a fleet to prevent the Swedes from defeating the Danes.

On the morning of October 29 a north wind allowed the Dutch commander Lieutenant Admiral Jacob van Wassenaer to sail into the Oresund and confront the Swedish blockade squadrons. There were seven Danish warships in Copenhagen, but they were unable to join the fighting because the wind that filled the Dutch sails kept them pinned in port. This left the Dutch substantially outgunned, with around 1,300 cannon to the Swedes’ 1,600, although they could claim the advantage of being upwind.

**A DISORDERED CONFLICT**

Strong currents prevented ships maintaining much order on either side and a savage piecemeal battle ensued. Wassenaer’s flagship Eendracht was surrounded by Swedish ships and took some heavy punishment, but was rescued by Dutch captains coming to their admiral’s aid. Four Swedish ships were boarded and taken in the close-quarters fighting, while one ran ashore.

In the course of battle the Dutch lost one of their most famous—and controversial—admirals, the choleric and notoriously insubordinate Witte Cornelizoon de With. His flagship Brederode ran aground and, lying defenseless, was battered for two hours by enemy fire before being boarded. De With was injured by musket fire and died of his wounds—his embalmed body was exhibited by the Swedes as a trophy, before being returned to the Dutch for burial.

At around 2:00 p.m. the Dutch broke contact to sail into Copenhagen. The Swedes withdrew to the Swedish port of Landskrona. Both fleets were in a battered state and both claimed a victory. But the Dutch had achieved their objective, for the blockade and the siege of Copenhagen was lifted, and a Dutch and Danish squadron blockaded the Swedes in Landskrona.

**THE BATTLE OF THE SOUND**

For the Dutch United Provinces access to the Baltic for naval supplies and trade was commercially and militarily crucial. Sweden wished to exclude the Dutch from the Baltic by forcing the Danes to block their passage through the Oresund, the narrow sound between Denmark and Sweden. In 1658 Sweden’s king Karl X Gustav put the Danish capital Copenhagen under siege by land and naval blockade. The Dutch sent a fleet to prevent the Swedes from defeating the Danes.

On the morning of October 29 a north wind allowed the Dutch commander Lieutenant Admiral Jacob van Wassenaer to sail into the Oresund and confront the Swedish blockade squadrons. There were seven Danish warships in Copenhagen, but they were unable to join the fighting because the wind that filled the Dutch sails kept them pinned in port. This left the Dutch substantially outgunned, with around 1,300 cannon to the Swedes’ 1,600, although they could claim the advantage of being upwind.

**A DISORDERED CONFLICT**

Strong currents prevented ships maintaining much order on either side and a savage piecemeal battle ensued. Wassenaer’s flagship Eendracht was surrounded by Swedish ships and took some heavy punishment, but was rescued by Dutch captains coming to their admiral’s aid. Four Swedish ships were boarded and taken in the close-quarters fighting, while one ran ashore.

In the course of battle the Dutch lost one of their most famous—and controversial—admirals, the choleric and notoriously insubordinate Witte Cornelizoon de With. His flagship Brederode ran aground and, lying defenseless, was battered for two hours by enemy fire before being boarded. De With was injured by musket fire and died of his wounds—his embalmed body was exhibited by the Swedes as a trophy, before being returned to the Dutch for burial.

At around 2:00 p.m. the Dutch broke contact to sail into Copenhagen. The Swedes withdrew to the Swedish port of Landskrona. Both fleets were in a battered state and both claimed a victory. But the Dutch had achieved their objective, for the blockade and the siege of Copenhagen was lifted, and a Dutch and Danish squadron blockaded the Swedes in Landskrona.
In 1627 Sweden was at war with the Polish-Lithuanian Commonwealth. In May the Swedish navy sent 15 ships to blockade the Polish port of Gdansk. Outbreaks of disease and wear and tear to the ships took its toll on the blockading squadron. By November 10 ships were left on station. Sweden had no naval tradition, but it had assembled a scratch naval force under the command of a Dutch merchant captain resident in Gdansk, Arend Dickmann. On November 28 Dickmann attacked the Swedish squadron with four galleons and six smaller vessels. His flagship Sankt Georg tackled the Swedish flagship Tigern. Swedish commander Nils Stjernskjold was killed; Tigern was captured. Another Swedish galleon, Sol, was blown up by her captain to avoid capture. The rest of the Swedish squadron fled. Dickmann, however, was killed, his legs shot away by a cannonball on Tigern’s deck. It was the Polish navy’s most famous victory.

In 1644 Sweden and Denmark were on opposite sides in the Thirty Years War. A Swedish fleet under Finnish admiral Klas Fleming landed troops on the Danish island of Femern. Danish king Christian IV responded by leading a fleet out from Copenhagen. The Dutch presented themselves with ships bearing the red Danish ensign. In the background more ships, possibly enemy reinforcements, approached to join the engagement.

In spring 1677 the Swedish navy sought to attack the Danes in the absence of their Dutch allies, who were slow to send ships to the Baltic. The Danes had more ships but were significantly outgunned by the Swedes. Fleming had the best of the initial manoeuvres. His flagship Scepter led an attack by several ships upon Danish admiral Jorgen Wind’s Patientia heading the Danish van. King Christian’s Trefoldighed came to Wind’s aid but was also battered. The king suffered a head wound, which would cost him the sight of one eye, but stayed on deck. Wind was mortally injured and Patientia withdrew. Overall, however, the Danes had the better of the action, which ended with sunset. The badly mauled Swedish fleet was blockaded in Kiel Fjord for a month, during which time Fleming was killed.
The Great Northern War

**FOUGHT BETWEEN** 1700 and 1721, the Great Northern War was a contest between Sweden and a coalition of other countries determined to end Swedish domination of the Baltic region. Russia under Tsar Peter the Great and Denmark-Norway—at that time united under the Danish crown—were Sweden’s major opponents at sea. The naval battles, which were contested by a mix of deep-sea sailing fleets and inshore galley fleets, mostly centered on the need for both sides to reinforce and resupply land forces fighting around the shores of the Baltic and North Sea. Through roughly the first decade of the war Sweden had the upper hand, but a series of defeats inflicted both by the Russians and by Denmark-Norway decisively turned the tide in the second half of the conflict. The overall outcome of the war was to establish Russia as a significant European naval and land power at the expense of Sweden.

**THE GREAT NORTHERN WAR 1700—1721**

Sweden’s chief rival was Peter the Great’s Russia, which gained a foothold in the Baltic with the founding of the city of St. Petersburg in 1702. By the end of the war a newly confident Russia was well established in the region with significant territorial gains around the Baltic coast. Sweden also lost all its possessions in Germany, mainly to another emergent power, Brandenburg-Prussia.

### GANGUT

**Date** August 7, 1714

**Forces** Russians: c. 100 galleys; Swedish: 1 pram, 6 galleys, 3 smaller boats

**Losses** Russians: 1 galley captured; Swedish: all ships lost

In summer 1714 Russian tsar Peter the Great’s army was campaigning in Finland. The Russians wanted to open a line of supply and reinforcement to their land forces by sea, but the presence of the Swedish fleet off southern Finland blocked the passage of their vessels out of the Gulf of Finland.

In July Admiral Fyodor Apraksin led a strong force of galleys packed with soldiers as far as the Hanko Peninsula—known as Gangut to the Russians—where Swedish Vice Admiral Gustav Wattrang was waiting with 15 ships of the line supported by galleys and other smaller vessels. The Russians also had a sailing fleet commanded by the tsar himself, but Peter shifted to a galley, intending to mastermind the outflanking of the Swedish ships. The Russians planned to drag their galleys overland across the peninsula and refloat them behind the Swedish line, thus slipping through to join the army to the northwest. Gaining word of this plan, Wattrang sent Rear Admiral Nik Ehrenskjöld with the pram Elefant—a shallow-draft ship with heavy guns—and a few galleys and skerries (rowing boats) to attack the Russian galleys as they reached the northern shore of the peninsula.

**MAIDEN VICTORY**

Unfortunately for Ehrenskjöld, the Russians changed their plan. Taking advantage of a dead calm, Apraksin rowed his galleys past the flanks of the line of Swedish sailing ships, which were unable to move or bring guns to bear. Only one Russian galley ran aground and was captured. The swarm of galleys then fell upon Ehrenskjöld’s isolated squadron. The Swedish admiral arranged his ships across a narrow channel with Elefant in the center, broadside on to the enemy, and his galleys on the flanks. In the limited space the Russians could not bring all their galleys into the battle at once and Elefant’s guns drove off two attacks. On the third occasion, however, the Russians focused on the flanks, boarding the Swedish galleys with so many men that one was swamped and sank. Isolated and surrounded, Elefant was on fire with her admiral wounded. She surrendered as Russians swarmed aboard from all sides.

The Swedish lost 361 men killed on the spot, and about 400 more died of their wounds in Russian captivity. Russian dead and wounded numbered 466. Gangut was the first victory of the Russian Navy and allowed the tsar’s fleet to operate freely in support of the land forces in Finland.

#### Closing in for the kill

Among the islands and narrow straits of the Baltic coast, oared galleys could often get the better of large sailing ships. At Gangut the Russian galleys scored a notable victory, even though it was against a much smaller and isolated Swedish force.
THE GREAT NORTHERN WAR

DYNEKILEN

King Charles XII of Sweden invaded Norway in 1716, besieging the citadel of Frederikstad. A squadron of Danish-Norwegian ships of the line in the Kattegat was unable to prevent the Swedish ferrying men and supplies from Gothenburg to their army, as transports and their escorts hugged the coast where the water was too shallow for the big sailing ships. Peter Tordenskjöld was sent from Copenhagen with a flotilla of Norwegian-crewed, shallow-draft vessels to break the Swedish supply line. On his way Tordenskjöld learned that a Swedish convoy was sheltering in Dynekilen fjord. He entered the narrow fjord on the morning of July 8 and found the Swedish sheltering under the protection of the 12-pounder guns of an island fort. Tordenskjöld’s flotilla anchored and opened fire at around 7.30 a.m. After a lengthy exchange the fort was captured in the early afternoon. The Swedish pram Stenbock surrendered and the crews of her accompanying galleys fled. As Tordenskjöld secured his prizes he came under heavy fire from Swedish land forces. He made his escape late in the evening and anchored next day off Frederikstad. Sweden soon abandoned the siege and the invasion.

In summer 1720 General Mikhail Golitsyn was commanding a large force of galleys in operations around the Åland Islands. Admiral Karl Wachtmeister, the Swedish commander-in-chief, sent a squadron under Erik Sjoblad to the islands with orders to cover the withdrawal of Swedish ships from the area. However, Sjobald chose instead to attack Golitsyn’s galleys near Grengam Island. Confronted by Swedish ships of the line and frigates, the galleys hastily withdrew toward the shallow waters of Flisesund. There they formed up in line abreast and turned to face their pursuers. The Swedish cannon inflicted heavy damage on the Russian galley fleet but, maneuvering in the treacherous sound, two of the Swedish frigates soon ran aground. Russian galleys swarmed around the grounded ships and boarded them. Two other Swedish frigates were also chased and captured as the Russians took the offensive. Sjoblad’s flagship, the 52-gun Pommern, had a narrow escape, saved only by the outstanding seamanship of its crew.

More than two-thirds of the Russian galleys were so badly damaged they had to be scuttled, leading Sweden to claim victory in the battle. However, there was no question that the Swedish had been put to flight, leaving Golitsyn in possession of the four frigates as prizes. The balance of casualties was also in Russia’s favor, with the Swedish losing 103 men killed and 407 captured, compared with the Russians’ 82 killed and 236 wounded.

Triumphal medallion
The capture of the Swedish frigates is commemorated on this wooden medallion from the workshops of Peter the Great.

1691–1720

PETER TORDENSKJÖLD

Born Peter Wessel in Trondheim, Norway, Tordenskjold ran away to sea as a boy and was a merchant seaman and privateer before becoming an officer in the Danish navy in 1711. He attracted the favour of Danish King Frederick IV through the boldness of his attacks on Swedish shipping, although his unorthodox style alienated his conservative naval superiors. He was ennobled with the title Tordenskjöld (“thundershield”) shortly before his great victory at Dynekilen in 1716. His capture of the Swedish fortress at Marstrand in 1718 was another notable feat. He was killed in a duel with a Livonian colonel he had accused of cheating at cards.

GRENGLAM

The newly built Russian deep-sea sailing fleet recorded its first victory at Ezel on May 24, 1719, when it captured three Swedish warships. The galley fleet, however, continued to play a leading role in Russia’s Baltic war.

Moment of victory
The battle of Grengam ended with the Swedish sailing ships overwhelmed by the sheer numbers of Russian galleys.
THE RUSSO-SWEDISH WAR

KING GUSTAV III OF SWEDEN was an unpopular ruler who hoped to draw up support for his rule by success in war. Seeking to profit from the involvement of Russia’s empress Catherine II in a conflict with Ottoman Turkey in the Black Sea, he pre-emptorily demanded that Russia hand over Finland. When the Russians refused, in June 1788 he faked a Russian attack on Sweden and declared a war of self-defense. As usual in the Baltic the conflict that ensued was fought both by coastal fleets, including galleys, and by deep-sea sailing ships. Foreign naval officers, especially British, played a prominent role in the conflict. Gustav hoped to seize St. Petersburg, the Russian capital, in a swift campaign, but a setback for his ships of the line at Hogland dashed hopes of a quick victory. Despite a success at Svensksund in 1798, Sweden mostly had the worse of the war and narrowly escaped total disaster at Vyborg Bay in July 1790. Yet a stunning victory at Second Svensksund unexpectedly restored Swedish fortunes, allowing them to negotiate a peace without gains on either side. King Gustav was assassinated two years later.

THE RUSSO-SWEDISH WAR

HOGLAND

Date: July 17, 1788

Forces: Russians: 17 ships of the line; Swedish: 15 ships of the line

Losses: Russians: 1 ship captured; Swedish: 1 ship captured

Location: Off Hogland Island, Gulf of Finland

Early in the war a Swedish sailing fleet commanded by King Gustav III’s brother, Prince Karl, entered the Gulf of Finland. The Russians hastily sent out their own ships of the line from Kronstadt, commanded by Scottish-born admiral Samuel Greig. The two fleets met off Hogland Island on a day of light winds that made maneuver painfully slow. The Russians were superior in firepower. Fighting in traditional line of battle, the two sides inflicted considerable losses on one another to little decisive effect. The 70-gun Prince Gustav, flagship of Swedish vice admiral Gustav-Wachmeister, was so battered that it surrendered to Greig’s 100-gun Rostislav. The Russian 74-gun Vasiliss was surrounded by Swedish ships and taken. After six hours night fell and the battle ended. Russian casualties were heavier—1,800 against the Swedes’ 1,200—but the Swedish force withdrew, allowing Russia to claim a strategic victory.

THE RUSSO-SWEDISH WAR

FIRST BATTLE OF SVENSKSUND

Date: August 24, 1789

Forces: Russians: 86 ships; Swedish: 49 ships

Losses: Russians: 2 ships; Swedish: 8 ships

Location: Svensksund, Gulf of Finland

Admiral Carl August Ehrensvärd, commanding a Swedish squadron of small sailing ships, gunboats, and galleys, was trapped in Svensksund harbor by two squadrons of Russian coastal vessels. Prince Charles of Nassau-Siegen, in overall command of the Russian forces, attacked from the north with 66 vessels, while a much smaller squadron attacked from the south. Ehrensvärd blocked the northern entrances to the harbor with sunken ships and, posting a few gunboats to cover them, concentrated his forces against the Russian southern squadron. The Russians failed to coordinate their movements, the northern squadron starting far too late, so Ehrensvärd was able to rout the southern squadron before turning to engage Nassau-Siegen. But the Swedes ran low on ammunition and had to retreat under hot pursuit, losing a number of ships in the process. The way was open for the Russian fleet to support land operations in Finland.

THE BREAKOUT FROM VYBORG BAY

Swedish king Gustav III began the third year of his war with Russia boldly, with a bid to land troops on the Russian coast at Vyborg and to establish naval dominance of the Baltic. However, a Swedish attack on part of the Russian fleet in its anchorage at Reval in May mired, and, in a further action in early June, the Swedes failed to prevent the junction of the main Russian fleet from Kronstadt with the Reval squadron. As a result, the Swedish battle fleet under Grand-Admiral Prince Karl was bottled up in Vyborg Bay with the galleys flotilla and troop transports commanded by King Gustav—around 400 ships and 30,000 men under naval siege.

Dangerously short of food and water, and fearing a Russian attack, the Swedish forces needed to break out of the bay. Both feasible channels through the shallow seas were blocked by Russian ships anchored broadside-on with mortar vessels in support. The Swedes decided to break out through the western channel by Krivserrot after a feint toward Bjorko in the east. It was not until early July that the wind shifted to the east and the attempt could be made.

On the morning of July 3 the ship of the line Dristaritien, commanded by Colonel Johan af Puke, led the Swedish battle fleet toward the line of Russian blockade ships, accompanied by the flotilla of coastal galleys inshore to the west. Braving the Russian broadsides, Puke sailed through the blockade between the ships of the line Selsar and St. Peter, raking them with his cannon as he passed. Overwhelmed by the number of ships bearing down upon them, the Russian blockade vessels were badly shot up as the Swedish ships of the line and oared gunboats came through.
The Second battle of Svenskund was an immediate sequel to the battle of Vyborg Bay. The Russians under Prince Charles of Nassau-Siegen pursued the Swedish galley flotilla, commanded by King Gustav, to Svenskund. There the king’s force was joined by a squadron under Colonel Carl Cronstedt and anchored in a strong defensive position. They spread out in a crescent formation blocking the entrance to Svenskund Harbor, with their galleys on the wings and their sailing ships and galleys in the center.

Nassau-Siegen prepared to attack on July 9 and went ahead with his plan on the Swedish naval reward medal. Inscribed to King Gustav III, this medal depicts Victory standing on a two-masted galley with a wreath in each hand.

ships ran aground, King Gustav’s British naval adviser Sidney Smith needing to be rescued from one of them.

Despite these losses, both the Swedish battle fleet and galley flotilla broke out into the Baltic; the former sailed for Sveaborg in Finland for repairs; the latter took shelter at Svenskund, where it anchored in a strong defensive position. Russian admiral Chichagov mounted a tentative and tardy pursuit of the battle fleet, succeeding in capturing Retvisan, one of Duke Karl’s ships of the line. Within days the Swedish galleys were the target for a determined Russian attack in the Second Battle of Svenskund.

**Russian ships of the line**

Prince Charles of Nassau-Siegen arrives with the Russian fleet to face the Swedish force anchored at Svenskund Harbor.

day, despite the fact that a fresh wind and choppy sea created conditions that were far from ideal for galley warfare. He arranged his ships in four squadrons, one on each flank and two in the center. The battle was hard fought but soon turned in Sweden’s favor. On both flanks the Russians were met with determined fire from the Swedish galleys, supported by shore batteries, and were gradually pushed back. By the afternoon the Swedes, first on the left and then also on the right, had achieved a position from which to turn inward and rake the Russian galleys and sailing ships in the center from both sides. The galleys were soon in desperate trouble, taking damage and being swamped by waves. As rowers left their benches to man the pumps, some vessels drifted aground or sank. Around 7:00 p.m. Nassau-Siegen ordered a withdrawal. Many of his sailing ships could not get away and were boarded—either taken as prizes or burned. Night ended the day’s combat, but fighting resumed the following morning, this time with the Swedes on the attack and the Russians striving to escape. Several more Russian ships were lost in the confused flight. Although exact figures for losses sustained in the battle are hard to establish, the Swedes had inflicted a major defeat on a superior enemy. Unable to crush Sweden, Russia accepted the need to make peace the following month.

---

**CAPTAIN DENISON ... HAD HIS HEAD SHOT OFF BY A CANNONBALL ... CAPTAIN AIKEN HAD HIS THIGH-BONE SHATTERED SO AS TO RENDER AMPUTATION NECESSARY ...**

WILLIAM TOKE, HISTORIAN, WRITING IN 1798 OF BRITISH OFFICERS IN RUSSIAN SERVICE AT VYBORG BAY

---

The gauntlet of Vyborg Bay

Swedish oared galleys run the gauntlet of Russian ships blockading Vyborg Bay. The Swedish ship Enigheten explodes as she accidentally becomes entangled with a Swedish fireship.
BY THE START of the 18th century, Britain had established itself as the world’s dominant naval power. But maintaining this status was at times a close-run thing. France and Spain pushed Britain hard, especially when they fought together. The French in particular had the potential to challenge British naval supremacy, although they were usually distracted by land wars in Europe. The responsibilities the Royal Navy had to shoulder in war—defense of overseas colonies, protection of merchant shipping, prevention of an invasion of the British Isles—meant resources were thinly spread. The British rarely fought battles with any great numerical advantage, but in the last resort no one could match them for bold aggressive leadership allied to seafaring of a high order.

PRACTICAL KNOWLEDGE
The administration of the Royal Navy was efficient for the time but the system of recruitment was far from ideal. The use of press-gangs to transfer seamen from merchant ships in time of war was clumsy and haphazard compared with the French system of “classes”—the conscription of registered seamen. The training of British officers by taking young boys on board as midshipmen meant their formal education was minimal, whereas the French developed a body of well-educated naval officers with a scientific knowledge of navigation and gunnery. Yet the British officers’ practical knowledge of the sea was incomparable.

Although promotion in the Royal Navy was governed by a mix of personal patronage and strict seniority, men of talent were able to rise to the top by merit—outstanding commanders such as Edward Hawke, Edward Boscawen, and George Rodney.

MAJOR WARS
Between the death of French King Louis XIV in 1715 and the outbreak of the French Revolution in 1789, Britain and France fought

Opening exchange of broadsides
The battle of Negapatam (1782) was one of five actions fought by the French and British East Indies squadrons during the American Revolutionary War. The British line, commanded by Sir Edward Hughes, is on the left.
on opposite sides in three major wars: the War of the Austrian Succession (1740–48), the Seven Years War (1756–63), and the American Revolutionary War (1775–83). After a shaky start, Britain’s navy was clearly superior in the first of these. The Seven Years War was a hard-fought but overwhelming triumph of British naval power, allowing a major expansion of Britain’s colonial empire. But the French navy achieved a remarkable recovery in the 1760s under the direction of Louis XV’s chief minister the Duc de Choiseul, with a shipbuilding program funded by the French public inspired by patriotic enthusiasm. During the American Revolutionary War, facing a coalition of European powers supporting the rebellious American colonists, Britain suffered a crucial naval defeat at the hands of the French at Chesapeake Bay in 1781, although Rodney’s victory at the Saints the following year redeemed the Royal Navy’s reputation.

TECHNOLOGY AND TACTICS

During the 18th century two-deck 74-gun or 80-gun warships became established as the key ships of the line alongside 100-gun three-deckers. The French introduced a new breed of sleek frigate that became crucial to naval warfare, both as scouts and raiders. Cannon became more reliable, with a range of different shot, and experiments were made with replacing linstocks by flintlocks. The introduction of carronades by the Royal Navy in the 1770s—a lightweight upper deck gun potent at short range—increased the deadliness of close combat, as did improved muskets. The tactics employed in naval battles remained broadly unchanged, with broadsides forced by ships sailing in line, but some British commanders chafed at the formality of established rules and introduced the “general pursuit,” allowing captains, when appropriate, to chase and engage the enemy in a free-for-all. Rodney’s breaking of the French line at the Saints pointed forward to the Nelson era.
ROYAL NAVY BATTLES

AT THE END of the War of the Spanish Succession in 1713 Britain was indisputably Europe’s dominant naval power. In a brief war with Spain from 1718 to 1720, it crushed the Spanish navy almost effortlessly. British merchants urged their government to use sea power aggressively to advance the nation’s trade. The severing of the ear of Captain Robert Jenkins, master of the trading brig Rebecca, by Spanish coast guards in the Caribbean in 1731 provided ammunition for those arguing for action against Spain’s empire in the Americas. The War of Jenkins’ Ear, launched by Britain on a tide of jingoistic enthusiasm in 1739, began well with the capture of Porto Bello, but soon ran into disaster in the failed expedition against Cartagena de Indias. This ignominious defeat severely dented British prestige. The war of the Austrian Succession (1740–48) brought Britain once more into conflict with its old enemy France, as well as with Spain. The French navy was in no condition to challenge British supremacy, and the British found themselves fighting, with varying degrees of competence, engagements in which they held a clear superiority.

WAR OF THE QUADRUPLE ALLIANCE

CAPE PASSARO

Date: August 11, 1718

Forces:
- British: 21 ships of the line
- Spanish: 18 ships of the line

Losses:
- British: none
- Spanish: 11 ships of the line captured or burned

Location: Cape Passaro, south east Sicily

In 1718 Britain sent a fleet to the Mediterranean under Admiral Sir George Byng to oppose Spanish ambitions in Sicily. Although Britain and Spain were not officially at war, Byng pursued a Spanish squadron under Vice Admiral Don Antonio Castaneta down the east coast of Sicily. At daybreak on August 11 battle was joined. Byng’s 90-gun Barfleur and the other largest British ships overcame one Spanish division, including Castaneta’s flagship Real San Felipe, while Captain George Walton led the chase of another, laconically reporting: “We have taken or destroyed all the Spanish ships which were upon this coast the number as per margin.”

The British Mediterranean squadron

British ships of the line under Admiral Byng stop at Naples en route to Sicily. They engaged the Spanish near Cape Passaro, south of Messina.

WAR OF JENKINS’ EAR

CARTAGENA

Date: March 14–May 20, 1741

Forces:
- British: 29 ships of the line, c.150 other vessels
- Spanish: 6 ships of the line

Losses:
- British: 6 ships of all kinds
- Spanish: 6 ships of the line

Location: Cartagena de Indias, Colombia

The success at Porto Bello in 1739 inspired the British to prey further upon Spain’s colonial possessions. A massive force, requiring a quarter of the entire strength of the Royal Navy, was sent to the Caribbean the following year. The death of the expedition’s overall commander, Lord Cathcart, en route left the naval force under Vice Admiral Edward Vernon, victor of Porto Bello, and the troops under Major-General Thomas Wentworth, with no one to arbitrate if they disagreed.

Britain’s target was Cartagena, the major port in Spanish-ruled New Grenada. Leading its defense was Admiral Bas de Lezo, one of Spain’s most gallant naval commanders, who had lost a leg, an arm, and an eye in a distinguished fighting career. He had only six ships of the line to face the British armada, but had no intention of giving in. The British arrived off the city in mid-March and settled down to a bombardment of its walls. The entrance to the harbor was defended by shore batteries and the guns of de Lezo’s six ships anchored inside. On April 15, the British attempted a sea and land assault on these defenses. After a sharp fight de Lezo scuttled his ships to keep them out of British hands and fell back on the port’s inner fort. As time passed and tempers frayed, cooperation between Vernon and Wentworth broke down. Land assaults proved to be costly failures, while Vernon’s ships bombarding the walls came under damaging fire from shore guns. Caribbean epidemic diseases raged, decimating naval crews and troops. After 67 fruitless days the British sailed away on May 20, burning some of their ships because they had no crews left to man them. De Lezo did not enjoy his triumph for long, dying of a wound sustained in the siege. The British government was embarrassed by this ignominious defeat because the operation had been prematurely hailed as a triumph and victory medals struck.

Victory medal

The Vernon medal was struck by the British to celebrate the taking of Cartagena—which in fact never happened.

Spanish fortifications

The fort of Cartagena, where the British attack of 1741 was repulsed. As a result, Spain retained control of its highly lucrative colony.
In February 1744 Britain was at war with Spain and Spain was an ally of France, but France was not at war with Britain. This complicated background prepared the way for a confused and unsatisfactory naval encounter. Twelve Spanish ships of the line commanded by Admiral Don José Navarro were trapped in the French port of Toulon by Admiral Don José Navarro were Spanish ships of the line commanded.

The Allied fleet sailed out of Toulon with French ships making up the van and most of the center and the Spanish in the rear. Holding the weather gage, Admiral Mathews brought his line down upon the enemy, but with his van opposite their center, and his center opposite the Spanish in the rear. The British rear, under Vice Admiral Richard Lestock, totally failed to engage the enemy. The choleric Mathews, feeling his ships were holding off, took his flagship Namur out of the line to engage the Spanish more closely, but few of his captains followed his example. There was much damaging fire exchanged between Namur and Admiral Navarro’s Real Felipe. One Spanish ship, Poder, was captured by Captain Edward Hawke, although she was too badly shattered to be a manageable prize and was later abandoned for the Spanish to scuttle. The battle ended inconclusively with an impression on both sides that it had been conducted incompetently. A score of British officers faced court-martials, including Mathews and Lestock. Remarkably, Lestock was acquitted on a technicality while Mathews was dismissed from service.

**THE BATTLE OF CAPE FINISTERRE**

Recently appointed governor-general of French Canada, Admiral Jacques-Pierre de la Jonquière set sail from France with 24 transport ships and an escort of three ships of the line and two frigates. He was joined by a convoy sent out by the French East India Company with two ships of the line and a number of armed merchantmen. A strong British squadron commanded by Vice Admiral George Anson, sent out to intercept French shipping in the Bay of Biscay, spotted the French ships off northern Spain. De la Jonquière formed all his warships and some of the armed merchantmen into a line of battle, hoping to hold the British off for long enough to allow the slow-moving transports to escape. On his flagship Prince George Anson also signaled his ships to form a line, but, at the urging of Rear Admiral Sir Peter Warren, changed the order to a general chase.

The British thus came down upon the outnumbered French led by the 50-gun Centurion, which engaged the French rear while other ships came up. Although hopelessly outgunned, the French fought valiantly in a battle that lasted five hours. La Jonquière’s flagship Sérieux had every officer wounded. The 40-gun Gloire held out for three hours, until her captain was dead and most of her crew injured, before surrendering. But the weight of British broadsides battered the French into submission before nightfall. Through their brave resistance most of the transport ships escaped, only six being taken. The East Indiamen yielded £300,000 in booty for the victors.

A second, broadly similar, battle of Cape Finisterre was fought later in the same year. On October 25 a British squadron of 14 ships of the line under Admiral Edward Hawke intercepted a French convoy bound for the Caribbean with an escort of eight ships of the line under the Marquis Desherbiers de l’Etanduère. Again the British admiral ordered a general chase; once more the French fought against overwhelming odds; and again the convoy was saved at the expense of its escorts. Six French ships of the line were taken.
The Seven Years War of 1756 to 1763 has been described as the first true "world war" because it was contested on three continents. The British fought colonial campaigns against the French in North America, the West Indies, and India, while a major land war took place in Europe. Britain’s Royal Navy began the conflict in some disarray and suffered an initial setback at the battle of Minorca on May 20, 1756. With Admiral George Anson installed as First Lord of the Admiralty in 1757, however, British naval fortunes soon revived. A close blockade of French ports executed by superb admirals such as Edward Hawke and George Boscawen inhibited France from defending its colonies. British naval victories at Lagos Bay and Quiberon Bay in 1759 scotched French plans for an invasion of Britain and put the Royal Navy in such a dominant position that it was in no way disturbed by the entry of Spain into the war alongside France in 1761. The peace that was reached in 1763 left Britain as clearly Europe’s leading colonial and commercial power, with the French effectively driven out of North America and India.

**Execution of Admiral Byng**

Admiral Byng is executed by firing squad aboard HMS Monarch in the Solent on March 14, 1757. He had been accused of "failing to do his utmost."

The opposing squadrons sighted one another on May 19. The French admiral aimed only to prevent the British interfering with the land operations, and thus adopted a purely defensive stance. Byng sought to attack and on May 20, having gained the weather gage, came down upon the French line. The British approached at an angle, a tactic known as "lasking," designed to reduce the time during which the attacking line was exposed to enemy fire it could not return. But the approach went disastrously wrong.

While the five ships of Byng’s van engaged the enemy closely, the rest of his line fell behind, its progress hampered by a ship dismasted by French fire. Byng, on board Ramillies, lacked the flexibility to revise his plan on the spot. The French came close to surrounding the isolated ships in the British van, but mindful of his defensive responsibilities la Galissonière exploited the British confusion to withdraw from contact. Demoralized, with heavy casualties and half his ships badly damaged, Byng headed for Gibraltar to refit. Fort St. Philip fell to the French and the need for a scapegoat led to the court-martial and execution of the hapless Byng the following year. His death prompted Voltaire’s famous remark; “In this country, it is wise to kill an admiral from time to time to encourage the others.”

**MINORCA**

<table>
<thead>
<tr>
<th>Date</th>
<th>May 20, 1756</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces</td>
<td>British: 13 ships of the line; French: 12 ships of the line</td>
</tr>
<tr>
<td>Losses</td>
<td>none</td>
</tr>
</tbody>
</table>

Minorca, a British possession from 1708, had a splendid harbor that was considered a key asset for the British navy in the Mediterranean. In spring 1756 French troops landed on the island, quickly overrunning all but Fort St. Philip in Port Mahon. The landings were covered by a French squadron under the Marquis de la Galissonière. Admiral John Byng sailed from Gibraltar with orders to relieve the fort. His squadron of 11 ships was numerically comparable to that of la Galissonière, but many of his ships were in poor repair and undermanned.
In the summer of 1759 France was preparing for an invasion of Britain. Admiral Jean-François de la Clue-Sabran was ordered to bring the French Mediterranean fleet from Toulon to join the Atlantic fleet at Brest. The combined force would then escort troops to landing places in Scotland and England. A British squadron under Admiral Edward Boscawen was maintaining a blockade of Toulon, but in late July Boscawen was forced to sail to Gibraltar to refit damaged ships and take on supplies. La Clue seized the opportunity to set sail with 12 ships of the line on August 5.

Reaching Gibraltar on August 17, the French squadron was spotted by a British observation ship. Boscawen gave chase while La Clue raced through the night into the Atlantic. Daybreak revealed that the French squadron had become divided, only seven ships remaining with their admiral while the others made for Cadiz. Boscawen had ordered a general pursuit and his ships engaged the enemy as they came up. The 74-gun Centaure, in the French rear, attempted to hold off the pursuit and give the other French ships a chance to escape. She fought for five hours before surrendering, half shot to pieces. La Clue’s flagship Océan fought fiercely against Boscawen’s Namur but by nightfall she had suffered some 200 casualties, the wounded including La Clue himself.

During the night two French ships escaped, dawn revealing the remainder at Boscawen’s mercy. La Clue sailed the remnant of his squadron into a bay to the west of Lagos in neutral Portugal, hoping that a shore battery might scare the British off. But Boscawen followed the French into the bay regardless and opened fire. The French crews got ashore as best they could, abandoning their ships into British hands. The three worst damaged were set ablaze and the other taken back to Gibraltar as a prize.

Gunner’s quadrant
A quadrant was used to determine the elevation of a gun’s barrel. A spirit level attached to the pivot arm marked the horizontal, while a plumb-bob measured the required angle.

Crew profile

THE MAJORITY OF THE CREW of an 18th-century Royal Navy ship of the line were ordinary seamen and able seamen, the latter being trained up to skilled tasks such as working aloft or steering the ship. Sailors usually first went to sea as boys—it was believed that a grown man could never learn to work high above the deck without dying in the attempt. In peacetime naval vessels were manned largely by volunteers, but in wartime sailors had to be pressed into naval service from merchant vessels or other maritime occupations. Though subject to harsh discipline, seamen on a well-run ship would feel a bonded part of a skilled team, and, in battle, would enthusiastically man the guns or take up arms to repel boarders.

WARRANT OFFICERS
The master, although still a significant figure on the ship, had lost importance compared with a century earlier, because commissioned officers were now trained in seamanship and rivaled the master for knowledge of navigation and sailing. The purser and the surgeon were the other warrant officers of wardroom rank. Below them came the boatswain, carpenter, sailmaker, and gunner, solid characters of lower-class origin traditionally attached to a single ship in which they served for long periods. They were sometimes unofficially allowed their wives on board.

COMMISSIONED OFFICERS
Although in the Royal Navy progress from warrant officer or even able seaman to commissioned rank was not unknown, officers were usually gentlemen. The sons of socially respectable families were taken into naval service as boys, usually recommended to a captain by a relative or family friend. When old enough they became midshipmen, hoping to pass the examination required for appointment as lieutenant, probably after six years at sea. The next step was to be made post-captain, with command of their own ship, after which promotion to admiral was strictly by seniority. A captain’s authority was absolute, although his own behavior was subject to the Articles of War.
In 1759 France hoped to reverse the course of the Seven Years War by launching an invasion of the British Isles. An army of 20,000 men and troop transports were assembled at Quiberon Bay. The Comte de Conflans, then the commander the French fleet in Brest, was to escort the army to Scotland. The Royal Navy was maintaining a close blockade of Brest, a feat of seamanship, organization, and endurance. But in November a westerly Atlantic gale forced Admiral Edward Hawke to withdraw his blockading squadron to shelter in Torbay. Conflans seized the opportunity to sail for Quiberon Bay.

Hawke returned to Brest as soon as the weather permitted and, finding Conflans gone, pursued him southward. Delayed by erratic winds, the French were approaching the bay when the British hove into view. Conflans was not greatly outnumbered—27 ships of the line to 21—but he knew his officers and crews were far inferior. His sole advantage was possession of local pilots with an intimate knowledge of the reefs and shoals of the treacherous coast. With a gale rising from the northwest, he formed a line and sailed for the shelter of the bay. Conflans assumed Hawke would not dare to follow him in. But the British admiral signaled a “general chase” and his ships, crowding on all the sail they could bear in the howling wind, tailed the French into the narrow mouth of the bay.

**THWARTED INVASION**

The risk Hawke took was astonishing. Caught in a gale off a lee shore, his ships could have been shattered on the jagged rocks, leaving Britain defenseless against invasion. Instead, it was the French squadron that met disaster. The British van, commanded by Viscount Howe aboard *Magnanime*, savaged the ships of the French rear before the rest of the squadron came up to join in a mêlée made even more chaotic by the heavy seas. The captain of the French 74 *Thésée* opened his lower gun ports to bring his heaviest battery into action, only for a sudden squall to plague the ports under water, the ship sinking instantly under full sail. Another French ship, *Superbe*, also foundered, its hull shattered by a broadside from Hawke’s flagship *Royal George*. *Formidable* and *Héros*, battered into submission, struck their colors, although the raging seas prevented the British getting a prize crew aboard the latter, which was later

---

**THE BATTLE OF QUIBERON BAY**

The most decisive battle of the Seven Years War, and one of the Royal Navy’s greatest victories, the battle of Quiberon Bay saw the destruction of the French fleet off the coast of Brittany. The fleet was making ready for an invasion of England.
run aground. The French fleet was only saved from destruction by the early nightfall on a dark November day. At around 5:00 p.m. firing ceased and ships anchored where they lay.

Dawn brought a renewal of the battle with the elements, but not between the fleets. Two British ships had been dragged onto a shoal and could not be saved. The French ship Juste, badly damaged in the fighting, was wrecked fleeing toward the Loire. Surrounded by the enemy, Conflans ran his flagship Soleil Royal aground and fired it to save it from falling into British hands. Seven other French ships exploited the effect of the high tide and an onshore gale to attempt to cross the usually impassable sandbar at the mouth of the Vilaine River. To do so, the sailors threw their cannon overboard to reduce their draft. Six ships made it to the shallow water beyond, thus escaping the British ships but trapping themselves in the estuary for the following year.

Hawke’s victory shattered the French navy, ended the prospect of an invasion of the British Isles, and exposed French colonies and merchant shipping to the depredations of the Royal Navy for the rest of the war.

Despite the reign of the cannon in the age of sail, boarding was still an essential tactic, whether to seize a valuable prize or to end the resistance of a battered enemy. Either men crossed between two vessels side by side or boats were sent out with a boarding party to swarm up the hull of an enemy ship. Although musket-armed marines took part in boarding and repelling boarders, sailors bore the brunt of the action. They were issued with a range of weapons from pistols and blunderbusses to swords and axes. The cutlass was favored over longer-bladed, more refined swords, as a robust and compact weapon suitable for use by unpracticed swordsmen fighting in a confined space. The boarding ax, or tomahawk, could be driven into the hull of an enemy ship to provide a step for climbing up — as well as being used to smash skulls. Boarding pikes were especially handy for holding off boarders from a defensive position.

**Decisive victory**

Admiral Hawke’s Royal George (left) is shown engaging with Soleil Royal (right). The latter is erroneously portrayed as a three-decker; she was in fact an 84-gun third-rater, with two decks.

**HAD WE BUT TWO HOURS MORE DAYLIGHT, THE WHOLE [ENEMY FLEET] HAD BEEN DESTROYED OR TAKEN.**

Admiral Hawke, describing his victory at Quiberon Bay, 1759

**Edward Hawke**

**BRITISH ADMIRAL**

Joining the Royal Navy at the age of 15, Hawke took 27 years to reach the rank of rear admiral, his progress inhibited by a shortage of naval warfare. Establishing his reputation at Cape Finisterre in 1747, he was an advocate of individual initiative and the “general chase” in preference to formal line tactics. Victory at Quiberon Bay made him a national hero, and the taking of Spanish treasure ships made him rich. Retired from seagoing, he was First Lord of the Admiralty from 1766 to 1771.
GUN, SAIL, AND EMPIRE

THE REVOLT OF 13 North American colonies in 1775 led to war with Britain and the founding of the United States. The American rebels created a Continental Navy that lacked the resources to challenge the might of the Royal Navy, but did find a naval tradition. Its most significant action was the lake battle at Valcour Island in 1776, which at heavy cost delayed a British advance from Canada. Raiding and harrying actions by enterprising captains such as John Paul Jones raised spirits but had limited effect. Major naval conflict developed only when France, Spain, and the Dutch Republic entered the war against Britain. Battles were then fought in the West Indies, in European waters, and in the Indian Ocean, as well as off the United States. In the end naval power was crucial, for the British army in North America was dependent on supply by sea. The French victory at Chesapeake Bay in 1781 caused the surrender of the British at Yorktown and hence American triumph in the war. Yet Admiral Rodney’s tactically innovative victory at the battle of the Saints was a reminder that the era of British naval dominance was very far from over.

WEAPONS AND TECHNOLOGY

TURTLE SUBMERSIBLE

American patriot David Bushnell (1742–1824) of Saybrook, Connecticut, devised a submersible vessel to counter the Royal Navy’s coastal blockade. His egg-shaped Turtle had ballast water tanks that were filled to make it dive, then emptied with a hand pump to return to the surface. It carried an underwater gunpowder charge to be attached to the hull of a ship at anchor and detonated by a time fuse. The Turtle went into action on September 7, 1776, with volunteer Sergeant Ezra Lee at the controls. It was launched into New York Harbor to attack the British flagship, HMS Eagle. Lee brought the Turtle up against the underside of Eagle’s hull undetected, but failed to attach the explosive charge to the ship’s copper-sheathed bottom. The Turtle made three attempts to sink British ships but never achieved a successful attack.

Revolutionary submersible

Seated in the cramped interior, the operator maneuvered the Turtle underwater using screw propellers, operated by foot pedals and a handle.
The Royal Navy’s Western Squadron, commanded by Admiral Augustus Keppel aboard the newly commissioned first-rate Victory, met the French Atlantic fleet under the Comte d’Orvilliers about 100 miles (160 km) off Ushant. Keppel attacked against the wind and the two lines cannonaded each other on the same tack. The French began to draw lines cannonaded each other on the wind and the two lines cannonaded each other on the same tack. The French began to draw lines cannonaded each other on the wind and the two lines cannonaded each other on the same tack. The French began to draw

In August 1779 American captain John Paul Jones led a small squadron to raid shipping around the British Isles. Jones was on board the 42-gun converted merchant ship Bonhomme Richard, accompanied by the frigates Alliance and Pallas, both under French captains, and two smaller vessels.

On September 23, Jones surprised a convoy of 50 merchant ships escorted by the 44-gun frigate Serapis and a 20-gun escort ship, Countess of Scarborough. The first broadside was fired at 7:00 p.m., with Serapis and Bonhomme Richard within hailing distance. The British frigate’s guns were more effective and it was the nimbler ship. Jones’ only chance was to grapple Serapis. Carnage ensued, Bonhomme Richard scorieng Serapis’s deck with grapeshot and musket fire while the frigate’s guns battered her hull. Alliance and Pallas forced the Countess to strike, but they could find no way to support Jones—when Alliance fired at Serapis, it caused equal damage to Bonhomme Richard. The fight continued by moonlight. Bonhomme Richard was on fire and sinking; Serapis was also ablaze after a grenade ignited powder below decks. As Jones refused to surrender—apparently saying “I may sink, but I’ll be damned if I strike”—Serapis’s captain decided to give in and end the slaughter. Jones transferred his crew to the more seaworthy British frigate to return triumphantly to port.

Spain’s chief war aim in the American Revolutionary War was to regain Gibraltar from Britain. They placed the Rock under siege and naval blockade. In January 1780 British admiral Sir George Rodney was sent to relieve Gibraltar with a strong force of ships of the line and frigates. Commodore Don Juan de Lángara, a strikingly brave and competent Spanish officer, was at sea to the west of Gibraltar, hoping to intercept a merchant convoy bound for the West Indies. A winter storm blew two of his ships of the line off station, leaving him with a weakened squadron of nine ships of the line when he had the misfortune to encounter Rodney’s superior British force. As the British bore down upon him, De Lángara had no choice but to run for Cadiz, the nearest safe port.

Rodney ordered a general chase and within two hours, at around 4:00 p.m., the fastest British ships had got among the fleeing Spanish. The 70-gun Santo Domingo exploded, killing all on board, but the rest of de Lángara’s outclassed ships fought on with notable courage. The battle continued long after night fell. With a strong westerly blowing and a treacherous rocky coast to the lee, there was a serious risk of ships running ashore, but Rodney had no intention of allowing the Spanish to escape and stuck tenaciously to the pursuit. De Lángara’s battered flagship El Felix was the last of six to be taken, striking its colors in the early hours of the morning. In the aftermath of the battle two of the prizes taken were lost, for in stormy weather off an unfamiliar coast the British could not sail them without using the captured Spanish crews, who eagerly seized back their ships and joined the other escapees in Cadiz.
Buoyed by their success at Chesapeake Bay, by 1782 the French were on the offensive in the West Indies, hoping to seize control of valuable British colonies. In early April the Comte de Grasse, with 33 ships of the line and two 50-gun ships, escorted a large convoy of merchant ships from Martinique. His mission was to deliver the merchantmen safely to Havana and join with the fleet of France’s ally Spain to capture Jamaica. De Grasse was shadowed by the 36 ships of the line of the British fleet under Admiral Sir George Rodney.

On April 9 the two fleets clashed off Dominica. Straining ahead to snap at the heels of the French, the British van, commanded by Admiral Samuel Hood, found itself briefly exposed to attack by de Grasse’s entire force. It was an opportunity the French failed to exploit and the exchange ended with one French ship badly shot up. De Grasse’s misfortunes continued as he sailed between Dominica and the rocky islets known as the Saintes.

On the night of April 11 the 74-gun Zélée collided with de Grasse’s flagship Ville de Paris. The next morning, seeing Hood launch in pursuit of the crippled Zélée, de Grasse came about and gave the order to clear for action.

**BREAKING THE LINE**

Since Hood needed time to recall his ships, Rodney formed a battle line with his rear division in the van and Hood’s division in the rear. Despite this hasty reorganization, the British line was more compact than the straggling line formed by the French. At 7:45 a.m. the exchange of broadsides began, ships passing in opposite directions within musket range. The French came off worst, partly because many of the British guns had been newly equipped with flintlocks.

The decisive moment of the battle came at 9:00 a.m. As the wind shifted southerly, Rodney sailed his flagship, the 100-gun Formidable, through a gap in the French line, blasting two French ships as he went. As other British ships followed their admiral’s example, de Grasse’s center division was split into incoherent fragments. The French van, badly knocked about by British broadsides, had sailed clear of the battle and showed little inclination to return. This left Hood free to plunge into the mêlée in the center. The French rear under the Marquis de Vaudreuil made an effort to aid de Grasse, but in vain. The slaughter on the French admiral’s flagship was extreme, with some 400 men dead by the time de Grasse struck at 6:00 p.m. His was the fifth French ship to be taken. As darkness fell one of the captured vessels, César, was destroyed by a massive explosion.

Rodney controversially failed to order a pursuit of the beaten enemy, although two more French ships of the line were taken in the following week. Still, the revenge for the British defeat at Chesapeake was sweet. French aspirations to control the Caribbean were crushed and Rodney’s bold breaking of the line—which may not even have been intentional—initiated a new phase in naval tactics.
**AMERICAN REVOLUTIONARY WAR**

### PROVIDENCE

**Date:** April 12, 1782  
**Forces:** French: 12 ships of the line; British: 11 ships of the line  
**Losses:** None

**Location:** Off east coast of Sri Lanka

French admiral Pierre André de Suffren appeared off southeast India in February 1782 commanding a squadron of 12 ships. His mission was to contest the British takeover of French colonial outposts by cooperating with Indian Prince Hyder Ali. After an indecisive encounter with a British force under Vice Admiral Sir Edward Hughes at Sadras, Suffren sailed for Trincomalee in Ceylon (Sri Lanka), which he hoped to seize as a naval base. Vice Admiral Hughes intercepted him with 11 ships near the islet of Providien.

Suffren held the weather gage and pinned the British against a rocky coast. He closed with the British in line abreast, turning to line ahead to begin firing broadsides. But some of his captains, lacking stomach for a fight, hung back on the approach and only Suffren’s flagship Héros and four other ships in the French center engaged at close range. In fierce fighting the British 64-gun Monmouth was disabled while Héros lost her foretopmast and the French 74-gun Orient caught fire. The onset of a violent rainstorm brought a general ceasefire as both sides strove to avoid running ashore or colliding in the crowded seas. The French ships withdrew the next day in serious need of repair, but after an improvised reef resumed operations.

### 1729–1788

**PIERRE ANDRÉ DE SUFFREN**

Suffren de St Tropez took part in all France’s wars against Britain from the 1740s to the 1780s, fighting at Toulon in 1744, Minorca in 1756, and Lagos Bay in 1759, as well as in many lesser actions. He was twice taken prisoner by the British. A fiery, impetuous character, he was critical of French naval tradition, believing lack of energy and initiative was responsible for repeated poor performances. Taking command in the Indian Ocean in 1782, he resolved to redeem his navy’s honor with a display of fighting spirit. Although he won no outright victories, he kept his ships committed to combat under most difficult circumstances, earning the praise of friend and foe alike.

### AMERICAN REVOLUTIONARY WAR

### TRINCOMALEE

**Date:** September 3, 1782  
**Forces:** French: 14 ships of the line; British: 12 ships of the line  
**Losses:** None

**Location:** Off east coast of Sri Lanka

In August 1782 Suffren captured the port of Trincomalee from the British. Hughes sailed his squadron offshore, inviting the French to come out. Reinforced, Suffren now had clearly superior numbers, so he gave battle hoping for a crushing victory. As at Providien, many of Suffren’s captains did not share his enthusiasm. Only Suffren’s flagship Héros, along with Ajax and Illustre, initially engaged at closest range. In three hours’ savage combat these ships suffered heavy losses. At one point Héros’ flag was shot away, but Suffren bellowed: “Flags, flags, hoist them all around the ship.” More French ships belatedly joined the fighting and the British suffered enough damage to feel the need to disengage, leaving the French in possession of Trincomalee.

### CUDDALORE

**Date:** June 20, 1783  
**Forces:** French: 15 ships of the line; British: 18 ships of the line  
**Losses:** None

**Location:** Off Coromandel coast of India

In 1783 French army reinforcements arrived in India. The soldiers were soon trapped at Cuddalore, besieged by land and under naval blockade. Suffren sailed to contest the blockade, though his ships were in poor shape, undermanned, and outnumbered. He cleverly maneuvered to draw the British out of the Cuddalore roadstead and occupy it himself. Then, taking on board sepoys to help man his guns, he boldly went out to attack the superior British force. Both sides maintained a steady line through several hours’ broadsides, ended by nightfall. The moral victory went to the French, still ready to take the offensive despite their patched sails and depleted crews. The news arrived shortly after that peace had already been declared.
GUN, SAIL, AND EMPIRE

"Promiscuous" line of French ships sets sail to engage British fleet. Van pulls ahead of center and rear squadrons.

"Promiscuous" line of French ships sets sail to engage British fleet. Van pulls ahead of center and rear squadrons.

Exchange of fire
The vans of the French (left) and British (right) fleets engage at Chesapeake Bay. The center and rear squadrons remain unengaged due to the angle at which the two lines approached.

The British fleet arrives
After finding the Chesapeake unoccupied by the French, the British under Rear Admiral Hood set sail for New York to report to Admiral Graves. When they return, they find the French blockading the bay. De Grasse immediately attacks.

British fleet arrives
After finding the Chesapeake unoccupied by the French, the British under Rear Admiral Hood set sail for New York to report to Admiral Graves. When they return, they find the French blockading the bay. De Grasse immediately attacks.

Sir Samuel would be glad to send an opinion, but knows not what to say in the truly lamentable state we have brought ourselves.

Sir Samuel would be glad to send an opinion, but knows not what to say in the truly lamentable state we have brought ourselves.

Rear Admiral Sir Samuel Hood, in a communication to Admiral Graves
In the summer of 1781 the heads of the French and American land forces fighting the British in North America appealed for support from the French fleet in the West Indies. The fleet’s admiral, the Comte de Grasse, set off with 28 ships of the line for Chesapeake Bay, where a British army under Cornwallis was besieged at Yorktown. Part of the British West Indies fleet, 14 ships of the line commanded by Sir Samuel Hood, was sent in search of de Grasse, but arrived at Chesapeake Bay ahead of him. Finding no French ships, Hood continued north to report to Admiral Thomas Graves in New York. Hood’s ships had barely disappeared over the horizon when, on August 29, de Grasse arrived and anchored inside Cape Henry, blocking Cornwallis from supply or evacuation by sea.

Underestimating the size of de Grasse’s fleet, Graves added five ships of his own to Hood’s 14 and sailed for the Chesapeake. On the morning of September 5 a lookout spotted the French fleet at anchor, revealing to Graves that he was outgunned and outnumbered. Nonetheless the British cleared for action and, in the words of a French officer “came down on us with … an assurance that made us think they did not know our strength.” The French showed equal spirit. De Grasse had 24 of his ships available for battle, although he was short of some officers and crew who were currently ashore. Slipping their anchors, they emerged from behind the cape barely 45 minutes after sighting their enemy.

De Grasse ordered his captains to form a “promiscuous” line; whoever had his ship ready first would lead the van, the rest following when they could. Competing for the honor of leading the fleet, five of the fiercest captains had their ships well ahead of the rest. But Graves let slip the opportunity to attack this isolated van. He sought a formal battle in line. In order to sail in the same direction as the French (which was essential for a prolonged exchange of broadsides) Graves had to wear his ships together, a maneuver that reversed the sailing order. Hood, previously commanding the van, now found himself in the rear, while the former rear, composed of the least seaworthy ships, became the van.

It was around 4:00 p.m. before Graves signaled for close action, though he also maintained a signal to hold the line ahead. The British and French columns met at an angle, which averaged the ships in the van were fiercely engaged, while the center and rear stayed well apart. The boldest French commanders with the best trained crews duelled with British ships, some of which were having trouble staying afloat. In an hour of close fighting, the British suffered the worst of the damage. The captain of Shrewsbury, the lead ship, lost a leg, and Intrepid, the next ship in line, had 65 holes shot in her hull, as well as her rigging cut and masts shattered.

With Graves and Hood bickering over the way the battle had been fought, the British fleet went back to New York, missing a chance to intercept French transport ships bringing siege guns to the Chesapeake. By the time Graves returned with a relief expedition in October, the blockaded General Cornwallis had surrendered, ensuring the independence of the United States. Tactically indecisive, Chesapeake Bay was strategically one of the most decisive sea battles in history.
LIVING CONDITIONS

LIFE ON BOARD a warship has at times been compared unfavorably with life in prison—both involving large numbers of men confined in a very restricted space with no privacy and primitive facilities, but prison offering better chances of escape and less risk of death. In the age of galley warfare, although living conditions could be appalling in terms of sanitation and overcrowding, the problem was mitigated by the shortness of voyages and frequent landfall. But in the age of sail men would live on board for months at a time. To man their guns and handle their sails, the ships required large crews relative to their size. Work was hard, food often poor (though also poor ashore), and comforts few—a naval tradition maintained into the 20th century.

SLEEPING CONDITIONS

Through most of history ships had few or no special spaces for the crew to sleep. On an ancient galley the density of crew and soldiers made it impossible to sleep on board with any comfort, and men slept ashore if they could. By the early modern period, with longer voyages in sailing ships, men usually slept on the deck on rolled-up bedding. Hammocks were a Native American invention encountered by European sailors at the end of the 15th century, although they were still not widely adopted on ships until the 17th century. Their many advantages, including comfort and ease of stowage, were eventually appreciated. On an 18th-century ship of the line men slept in hammocks slung from the roof of the gun deck. The hammock hooks were around 15 in (38 cm) apart, so in harbor the men’s bodies were in contact while sleeping. At sea the situation was improved by the watch system, which meant that only half the crew was sleeping at the same time. Still, the state of the air in such a crowded, unventilated space, especially when in the tropics, can easily be imagined.

FIGHTING DIRT

The need for cleanliness and hygiene was appreciated by navies in the age of sail. Sailors were required to keep themselves and their clothes clean, but this was hard to achieve. The use of the heads, opening over the sea, as toilets was strictly enforced, yet men, whether wilfully or accidentally, failed to reach them on many occasion. The shingle ballast in the bilges at the bottom of the hull collected detritus from the decks above, turning over time into a cesspool that infected the ship with stinking fumes. The substitution of iron pigs for shingle as ballast in the early 19th century largely solved this problem. Humidity was a plague below deck on wooden ships, with no sunlight to dry out the water that seeped in. Dampness was often worsened by the pursuit of cleanliness which led to the decks being over-frequently washed down.

DITTY BOX Wooden boxes, such as this one, were part of every sailor’s gear during both World Wars. They used them to store their personal possessions, such as photographs, letters, and wash kit.

GUN-DECK ACCOMMODATION
Space was at a premium in Napoleonic-era warships, so sailors slept in storable canvas hammocks among the cannon. Half worked while the others slept.

TUB This wooden tub, situated in the sick berth of an 18th-century ship of the line, was large enough for a man to bathe in.

SUBMARINE TOILET
Underwater toilets had to be designed differently to prevent the external water pressure from flinging the contents right back. A flooded airlock ejected the waste safely.

DITTY BOX

WOODEN BOXES, SUCH AS THIS ONE, WERE PART OF EVERY SAILOR’S GEAR DURING BOTH WORLD WARS. THEY USED THEM TO STORE THEIR PERSONAL POSSESSIONS, SUCH AS PHOTOGRAPHS, LETTERS, AND WASH KIT.
STEAM ERA

The era of steam and steel changed living conditions, not always for the better. With no gun ports there was even less air below deck than previously, and the heat, noise, and fumes from the engines could become intolerable. Artificial ventilation was only slowly introduced. Many men found the motion of a steamship cutting through the waves more upsetting than the subtler movement of an old sailing ship, with the result that seasickness became a worse problem. The introduction of bunks took a while. It was still common in World War II for hundreds of men to sleep in hammocks hanging in the mess halls and perform their morning ablutions, including cleaning teeth and shaving, in a single bucket of cold water.

BUNK BEDS The African American Corps of Engineers being transported in 1942 temporarily experience the same crowded conditions the average sailor endured, bunking “on the shelf” on canvas beds.

OFFICER’S ROOM This officer’s room aboard the 910 ft (277 m) long WWII-era aircraft carrier, the USS Lexington, afforded some privacy and had its own sink.

In the cockpit of a line of battle ship, where all the gentlemen mess, they never have any daylight ... dirty screens, cots and hammocks hanging in all directions ...

JAMES LOWRY, Fiddlers and Whores A surgeon in Nelson’s fleet gives his first impressions of his living quarters

HUNG OUT TO DRY Away at sea for long periods, it was important for crewmen to maintain good hygiene. The French navy in the early 1900s used to allot Tuesdays and Fridays as laundry days, and hoist the wet clothing above the deck to dry.

SLEEPING QUARTERS Launched in 1954, the Nautilus was the world’s first nuclear-powered submarine. In contrast with the cramped crew’s quarters on the lower deck, with their three-tiered bunks, the officers’ quarters on the upper deck, I has a single bed and a table.

UNDERWATER

Submarines always presented special problems, being by their nature claustrophobic and cramped. Some early World War I types had no toilet facilities except a bucket. German U-boat crews in World War II normally shared bunks, one man rising for his watch as the other occupant turned in. The boats spent most of their time on the surface, where they pitched and rolled mercilessly—diving often came as a sweet relief, both from seasickness and the clattering of the diesel engine. With only seawater available, most men did not bother to wash their clothes or themselves, and no one shaved. The smell of unwashed bodies and diesel fuel was masked by generous application of eau de cologne. On modern nuclear submarines showers are obligatory—although carried out with the minimum use of water—and bunks are individual, but with nine men sleeping in a room sometimes shared with a missile tube, the sailor’s life remains short on the luxuries of space and privacy.
THE FIGURE OF HORATIO NELSON. Britain’s greatest admiral, dominates the period of the French Revolutionary and Napoleonic Wars. Nelson embodied the principles that had been instilled into the Royal Navy by its best admirals over previous generations: attack at all costs, seizing the initiative, and pursuing decisive victory. But he carried these principles to unsurpassed extremes. Building on the new tactics pioneered by Admiral Sir George Rodney at Les Saintes in 1782, Nelson set out to break the enemy line and create a “pell-mell” battle in which superior gunnery would carry the day and the enemy would be as far as possible annihilated. His two greatest victories, at the Nile and Trafalgar—the battle in which he died—not only contributed to the eventual defeat of France but ensured British domination of the world’s oceans for the rest of the 19th century.

NAVIES UNDER STRAIN
Between 1793 and 1815 Britain’s Royal Navy was almost continuously at war, fighting not only the French but, at various times, the Spanish, Dutch, Danes, and Americans as well. The triumph of British sea power in this long period of conflict was in no sense predictable or easily gained. The Royal Navy frequently fought against numerically equal or superior enemy forces. If the British were widely recognized as best at gunnery, the French generally had better ships, and the Spanish bigger ones.

The British were greatly aided by the impact of the French Revolution of 1789 upon their most dangerous opponent. The French navy never fully recovered from the chaos of the revolutionary period, when mutinies were commonplace and many experienced naval commanders were lost, either fleeing into exile or persecuted as counter-revolutionaries. Yet the British navy was also operating under great strain. The authorities’ fear of revolution made issues of discipline on board ship acute. Simmering discontent spilled over into large-scale fleet mutinies at Spithead and the Nore in 1797. The lack of shore leave—denied for fear of desertion—the unfair allocation of prize money, poor food and pay, and excessive punishments were the mutineers’ main grievances. To the relief of the British government the mutinies were suppressed through punishment and concessions, and never recurred on a similar scale. Yet the sheer extent and duration of the conflict threatened traditional systems of recruitment and discipline. Britain’s policy of permanent blockade of French ports meant sailors remained at sea for unprecedented periods of time. The pressing of men into service, usually a workable system of conscription, became oppressive because of the massive demand for crew. Too many landsmen, including convicts, were recruited.

DISCIPLINE AND INITIATIVE
The Royal Navy overcame its problems, largely through finding the right leadership at the right time. Admiral Sir John Jervis—ennobled as Earl St. Vincent after his victory over the Spanish at Cape St Vincent in 1797—was a major influence as commander of the Mediterranean and Channel fleets, then First Lord of the Admiralty. Jervis was a severe disciplinarian, but his insistence on smartness, cleanliness, and daily gunnery
While Napoleon’s armies swept all before them in mainland Europe, the war at sea was a different matter. The Royal Navy blockaded the major ports such as Toulon and Brest, restricting trade and keeping the French from bringing their own naval forces out to do battle. On the few occasions they succeeded, they were defeated.

Nelson was in a sense a product of the Jervis school of leadership, forming his officers into a “band of brothers” who could be trusted to take the initiative in battle. Nelson himself sometimes went further, acting directly counter to orders. This earned him official disapproval, but in general officers were rewarded for showing offensive spirit. Apart from victories in battle, the British blockade of French ports was an astonishing feat of seamanship and organization. The French often fought well, but they were up against a navy rising to an unprecedented dominance of the world’s oceans.

Battle of Copenhagen
In 1801 a fleet under Admiral Sir Hyde Parker with Nelson as his second-in-command was sent to Copenhagen to deal with the threat posed to Britain by the Russian-led League of Armed Neutrality. Nelson disobeyed Parker’s orders, opening fire on the Danish fleet, sinking three ships and capturing 12.

Practise sharpened up the navy. He was most demanding of his officers, believing that captains should lead by example to form well-drilled, motivated crews.
On May 17, 1794, the French Atlantic Fleet commanded by Louis Thomas Villaret de Joyeuse sailed from Brest. Its mission was to ensure the safe arrival in France of a food convoy from the United States, desperately awaited by a hungry people. The Royal Navy's Channel Fleet under Lord Howe had been sent to intercept the food convoy, but Howe was more concerned with seizing an opportunity to engage the French navy. He sighted Villaret's ships on May 25 and gave chase.

On May 28, Howe caught up with the French rear, which was defended by the 110-gun *Révolutionnaire*. The next day a more substantial skirmish ended with damage to ships on both sides. Thick fog then interrupted the engagement, but June 1 dawned clear. Villaret could no longer evade battle. Howe, holding the weather gage, adopted a bold and unconventional plan that envisaged the annihilation of the enemy fleet. Each of his ships was to pass individually through the French line and come up in the lee of an opponent. The French ships would be raked as their line was crossed, and then blocked from escape to leeward. Superior British gunnery would do the rest. But Howe's attack did not go to smoothly, for he apparently failed to persuade his captains to follow his plan. Only seven of his ships in fact crossed the French line, making no attempt to do so. This was sufficient, however, to break up the French formation and ensure a brutal pell-mell battle. Howe's flagship *Queen Charlotte* passed behind Villaret's *Montagne* and simultaneously engaged the French flagship and the 90-gun *Jacobin*. *Brunswick*, captained by John Harvey, collided with *Vengeur du Peuple* and the two ships became entangled, firing broadsides hull-to-hull. Harvey was mortally wounded amid the general

---

**FRENCH REVOLUTIONARY WARS**

**THE FIRST OF JUNE**

<table>
<thead>
<tr>
<th>Date</th>
<th>June 1, 1794</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Atlantic Ocean, west of Ushant</td>
</tr>
<tr>
<td>Result</td>
<td>British victory</td>
</tr>
</tbody>
</table>

**COMBATANTS**

<table>
<thead>
<tr>
<th>BRITAIN</th>
<th>FRANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard Howe</td>
<td>Louis Thomas Villaret de Joyeuse</td>
</tr>
</tbody>
</table>

**FORCES**

<table>
<thead>
<tr>
<th>Ships:</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men:</td>
<td>1,200 casualties</td>
</tr>
<tr>
<td>Ships:</td>
<td>none</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ships:</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men:</td>
<td>4,000 casualties, 3,000 captured</td>
</tr>
<tr>
<td>Ships:</td>
<td>7</td>
</tr>
</tbody>
</table>

**LOSSES**

Blunderbuss pistol

With its bell mouth ensuring a wide spread of shot at close range, the blunderbuss pistol was a perfect boarding weapon. This example has a spring-loaded bayonet, operated by the rear trigger.
CAMPERDOWN

The Dutch were driven into an alliance with revolutionary France in 1795. Britain responded by blockading the Dutch coast with a naval force under the command of Admiral Adam Duncan. In summer 1797 the difficulty of maintaining a permanent close blockade was rendered almost impossible as mutinies spread through the Royal Navy, leaving Duncan with only two loyal ships under his command. Meanwhile the Dutch assembled a fleet off the island of Texel, intended to escort troops for an invasion of the British Isles.

Fortunately for the British nothing came of these plans. By October all thought of invasion had been abandoned for the year, but the Dutch government unwisely instructed Vice-Admiral Jan Willem de Winter to stage a sortie from Texel. By this time order had been restored in the British fleet. Most of Duncan’s ships were taking on supplies in Yarmouth when news arrived that the Dutch had come out. Duncan immediately set sail for the Dutch coast. He found de Winter around 9:00 a.m. on October 11. The Dutch sailed toward Texel in line ahead. Desperate to catch them before they reached the shallows off the Dutch coast, Duncan ordered a general pursuit. In two ragged groups, one led by Duncan in Venerable and the other by Vice-Admiral Richard Onslow in Monarch, the British bore down upon the Dutch line. Onslow’s group engaged and broke the Dutch rear, but Duncan’s had a far tougher fight with the center and van. Venerable was engaged by three Dutch ships and nearly overwhelmed. Duncan was saved by British ships sailing forward from the rear to help their hard-pressed colleagues—one captured by William Bligh, later to face mutiny on the Bounty.

1775–1831
JACK CRAWFORD
SAVIR HERO OF CAMPERDOWN

Born in Sunderland, northern England, Jack Crawford worked at sea from boyhood. In 1796 he was pressed into the Royal Navy to serve on board Venerable, the flagship of Admiral Adam Duncan. At Camperdown he distinguished himself when Venerable was surrounded by enemy ships, including the Dutch flagship Vrijheid, and the top of its main mast was shot off, bringing down the admiral’s flag. It was supererogatory to restore the flag aloft, for a failure to do so would be taken as a signal of surrender. Under intense gunfire, at great risk to his life, Crawford climbed the broken mast under fire and nailed the flag to the top of the shattered stump. On his return home Crawford was awarded a silver medal by the people of Sunderland. He was later presented to King George III, who gave him a pension of £30 a year. He died of cholera in 1831.

Eventually, superior British gunnery prevailed. The Dutch were subdued after more than two hours’ battering. De Winter was taken prisoner on his flagship Vrijheid, the surrender of his sword gravely refused by Duncan. The defeat ended Dutch pretensions to be a major naval power.
In early 1797 the Spanish fleet sailed from its Mediterranean harbor at Cartagena, aiming to join the French fleet in Brest. This would create a combined naval force powerful enough to cover a French invasion of Ireland. British admiral Sir John Jervis was stationed off Cape St. Vincent to intercept the Spanish on their way north to France. Spanish admiral Don José de Córdoba intended to pause at Cadiz, but as he left the Mediterranean an easterly gale blew his fleet out into the Atlantic. When the wind permitted he turned back toward Cadiz on a course that brought him into sight of the British fleet early on the misty morning of February 14.

**THE DIE IS CAST**

Jervis had 15 ships of the line, and when the count of Spanish ships sighted rose to 27 he reportedly said: “Enough of that; the die is cast and if there are 50 sail I will go through them.” The Spanish, despite their large numerical advantage, had no desire to fight. Their ships were large but their crews included few experienced sailors. Jervis had ensured that his men were superbly trained and led by able captains keen for action. The British ships formed a line ahead and astern of Jervis’s flagship Victory. With Captain Thomas Troubridge’s Culloden in the lead, they sailed into a gap between two columns of the approaching Spanish fleet, firing broadsides as they passed through the enemy formation. Once they were beyond the rearmost Spanish ship they tacked around in succession to pursue de Córdoba’s fleet still keeping course for Cadiz. This maneuver was complicated by the intervention of ships from the Spanish column to leeward, which briefly attempted to break through the British line to join their colleagues to windward.

**THE PATENT BRIDGE**

Commodore Horatio Nelson had only joined Jervis’s fleet the night before the battle, transferring from a frigate to Captain Ralph Miller’s 74-gun Captain. He was near the rear of the British line. As his turn approached to tack in succession he instead ordered Miller to wear ship, reversing direction out of the line. This was contrary to orders, but a justifiable initiative, since Nelson could see that the Spanish were threatening to reassemble their split force and escape to Cadiz. Captain boldly engaged the center of the Spanish windward column, which included the 130-gun Santísima Trinidad, fighting alone until joined first by Culloden and then by Captain Cuthbert Collingswood’s Excellent. At the climax of the battle the Spanish first-rate San José and the second-rate San Nicolas, both with shattered masts and corpse-strewn decks, became inextricably entangled. Although Captain was by this time uncontrollable, with its foretopmast over the side and wheel shot away, the ship’s marines (and Nelson himself) boarded first San Nicolas and from there took San José—the dramatic double-boarding becoming known as “Nelson’s patent bridge for boarding first rates.” The slaughter ended with the ceremonious surrender of swords by Spanish officers.

Jervis’s ships were in no fit shape to prevent the main part of the Spanish fleet reaching Cadiz. But four Spanish ships had been taken by a numerically inferior enemy and France’s hopes of combining its naval forces with those of Spain were dashed. It was a fine victory that brought Jervis an earldom and Nelson a knighthood.
The line of battle used by fleets in combat from the 17th century was intended to ensure that each ship came alongside an enemy for a broadside duel. By the late 18th century many British naval commanders had become convinced that breaking the enemy line offered better opportunities for a decisive victory. First used by Admiral George Rodney at the Saints in 1782, breaking the line was brought to perfection by Admiral Nelson at the battle of Trafalgar and Duncan at Camperdown. Although this tactic exposed the attacking ships to fire they could not return during the approach, they could rake enemy vessels from stern to stern as they passed through and also prevent enemy ships withdrawing by engaging them from the leeward side. The attacking fleet would hope to outnumber the ships in the sections of the enemy line that they attacked, while the rest of the enemy ships were left out of the fight. Nelson favored breaking the line above all as a way of precipitating a “pell-mell” battle in which captains could use individual initiative to take on and destroy their opponents.

Cutting through the line
The attacking fleet, holding the weather gage (the windward position), bears down upon the enemy in columns. One by one, as they reach the line, the ships attempt to pass through it to leeward.

Column reaches enemy line
As the attacking ships approach the enemy line, they are exposed to broadsides without being able to return fire.

Raking fire
As a ship cuts through the enemy line, it can unleash a broadside in either direction, while the enemy is unable to return fire. Raking fire sent shot and splinters through the entire length of a ship’s decks, causing maximum casualties to the crew.
On May 19, 1798, General Napoleon Bonaparte set sail from Toulon for Egypt, his army transports escorted by 13 ships of the line and four frigates commanded by Admiral François-Paul Brueys. Bonaparte was fortunate to avoid interception by a Royal Navy force under Admiral Horatio Nelson, which was vainly criss-crossing the Mediterranean in search of the French convoy. Bonaparte landed his army in Aboukir Bay at the start of July, and it was there, a month later, that Nelson at last came upon Brueys.

Nelson found the French ships anchored in line in the sandy bay with their port side to the shore. Although it was dusk he signaled an immediate attack. His captains were ordered to concentrate on the French van and center; because of the wind direction, the ships at the French rear would find it impossible to join the fight and could be rolled up later. The British ships, all 74s except the 50-gun Leander, entered the bay with Goliath leading. Probably on his own initiative, Captain Thomas Foley took Goliath around the head of the French line and into the shallow inshore water; four others followed him. This was a maneuver for which the French were wholly unprepared. The gun ports on their landward sides were closed and the decks uncleared.

As darkness fell a savage fight was joined. Thirteen British ships (one, Culloden, having run aground on a reef) anchored to hold position alongside the French. The five 74s of the French van were battered by broadsides from both port and starboard. The larger ships in the center of the French line, including Brueys’s three-decker 120-gun flagship L'Orient, at first fared better. The Bellerophon took terrible punishment from the flagship’s guns, drifting dismasted out of the fighting.

The horrors and heroism of that night were to become legendary. The captain of Le Tonnant, Dupetit-Thouars, with one arm and both legs shot away, had himself propped up in a barrel of bran to continue the fight. Le Guerrier, first in the French line, went on fighting with only one gun left firing, until the British sent a boat across to the shattered ship to persuade her captain to strike. Nelson, aboard his flagship Vanguard, had his forehead cut open by grapeshot and, temporarily blinded, thought he was dying. The climactic moment came at around 10 p.m. Battered by broadsides from Alexander and Suffren, L'Orient caught fire. When the flame spread to her magazine, she was destroyed by a gigantic explosion. The hundred survivors from L'Orient did not include Brueys or his flag captain Casabianca, whose son, refusing to leave the doomed ship, would later be immortalized in verse as “the boy who stood on the burning deck.”

The ships in the rear of the French line, under Villeneuve, were impotent spectators of this immense carnage. When the sun rose on a bay floating with dead bodies and wreckage, the futility of continuing resistance by the French was apparent. Villeneuve seized a chance to slip away, thereby saving two ships of the line and a couple of frigates, only to face unfair accusations of cowardice that he would seek to efface seven years later at the battle of Trafalgar. Nelson’s phenomenal victory (nine French ships of the line taken, two destroyed) made him a national hero.

THE WHOLE BAY WAS COVERED WITH DEAD BODIES, MANGLED, WOUNDED, AND SCORCHED, NOT A BIT OF CLOTHES ON THEM EXCEPT THEIR PANTS.

JOHN NICOL, A SAILOR ABOARD HMS GOLIATH
1 **THE BRITISH FLEET ARRIVES**

The British attack the French fleet at anchor in two squadrons. Of Nelson's 14 ships, two (Swiftsure and Alexander) are still on their way from Alexandria, one (Culloden) has run aground, and a fourth (Leander) has been delayed.

**FRENCH FLEET AT ANCHOR**

**BRITISH FLEET**

**KEY**

- FRENCH FLEET
  - 1 French ship of the line
  - 1 French frigate
- BRITISH FLEET
  - 1 British ship of the line

2 **FRENCH OVERWHELMED**

The first five British ships pass inside the French van, while the rest attack from the seaward side; these are soon joined by the three delayed British ships. The ensuing mêlée sees the French van and center largely destroyed.

**MEDITERRANEAN SEA**

- Wind

3 **BRITISH VICTORY**

After a pause, the British attack the French rear, which is now commanded by Rear Admiral Villeneuve. While the rest of his fleet is overpowered, Villeneuve escapes with two ships of the line (Guillaume Tell and Généreux) and two frigates.

**FRENCH FLEET AT ANCHOR**

**MEDITERRANEAN SEA**

- Wind

---

**FRENCH REVOLUTIONARY WARS**

**FRENCH FLEET**

**BRITISH FLEET**

**MEDITERRANEAN SEA**

- Wind

---

**THE BRITISH FLEET ARRIVES**

The British attack the French fleet at anchor in two squadrons. Of Nelson's 14 ships, two (Swiftsure and Alexander) are still on their way from Alexandria, one (Culloden) has run aground, and a fourth (Leander) has been delayed.

**MEDITERRANEAN SEA**

- Wind

---

**FRENCH OVERWHELMED**

The first five British ships pass inside the French van, while the rest attack from the seaward side; these are soon joined by the three delayed British ships. The ensuing mêlée sees the French van and center largely destroyed.

**MEDITERRANEAN SEA**

- Wind

---

**BRITISH VICTORY**

After a pause, the British attack the French rear, which is now commanded by Rear Admiral Villeneuve. While the rest of his fleet is overpowered, Villeneuve escapes with two ships of the line (Guillaume Tell and Généreux) and two frigates.

**MEDITERRANEAN SEA**

- Wind

---

**THE BRITISH FLEET ARRIVES**

The British attack the French fleet at anchor in two squadrons. Of Nelson's 14 ships, two (Swiftsure and Alexander) are still on their way from Alexandria, one (Culloden) has run aground, and a fourth (Leander) has been delayed.

**MEDITERRANEAN SEA**

- Wind

---

**FRENCH OVERWHELMED**

The first five British ships pass inside the French van, while the rest attack from the seaward side; these are soon joined by the three delayed British ships. The ensuing mêlée sees the French van and center largely destroyed.

**MEDITERRANEAN SEA**

- Wind

---

**BRITISH VICTORY**

After a pause, the British attack the French rear, which is now commanded by Rear Admiral Villeneuve. While the rest of his fleet is overpowered, Villeneuve escapes with two ships of the line (Guillaume Tell and Généreux) and two frigates.
DESTRUCTION OF L'ORIENT

The French warship L'Orient explodes during the Battle of the Nile, on May 19, 1798, killing Vice Admiral Brueys and most of his crew. Both sides were so shocked by the explosion that firing ceased for several minutes. In the center of the picture, British warship Swiftsure is rocked by a wave caused by the blast. In the foreground sailors cling to wreckage, while others are hauled from the water.
NAVAL CANNON

CANNON WERE FIRST USED at sea in the 14th century, and evolved through wrought iron, cast bronze, and cast iron production methods. The very earliest of these were breech-loaders, but muzzle-loaders quickly took over and held sway for four centuries until the advent of shell-firing breech-loaders in the 19th century. Naval cannon varied enormously in terms of caliber and size, the largest being the “cannon royal” that fired a 66 lb shot, down to smaller guns such as the culverin, which had a shot of around 17 lb.

GUN DRILL

Naval cannon were usually mounted on wheeled wooden carriages, allowing them to run backward under recoil. The backward motion was controlled by restraining ropes running around the breech or the carriage. The ropes were critical—a 32-pounder gun could fly 50 ft (15 m) across a deck if allowed to freewheel. Carriages were often made of elm, which produced less splinters than other woods if struck by an enemy shell. Despite such precautions, being a gunner was an extremely dangerous job, with recoil and accidental explosions being just two of the hazards.
ROUND SHOT

A single iron ball the size of the cannon’s bore, used for its penetrating effect against the ship’s thick wooden hull.

CHAIN SHOT

Two or more cannon balls linked together—when fired, chain shot would scythe down enemy crew.

BAR SHOT

Two or more pieces of shot linked by either a fixed bar or by extendable bar sections. Bar shot was designed to hack away at lines and rigging as it flew over the top of the ship’s deck.

GRAPESHOT

Balls of metal inside a tin or canvas bag. The container shattered when cannon were fired, producing a hideous shotgun-like effect against enemy crew.

SHELL TYPES

Naval ammunition generally had three purposes: punch holes in the sides of an enemy ship’s hull; bring down the masts and sails; and kill enemy personnel. For these contrasting goals, various types of cannon shot were developed. Accuracy and range with anything other than round shot was generally poor, but these munitions were principally used when ships were in close quarters.

LOADING AND FIRING A NAVAL CANNON

The barrel was “wormed” to remove debris from the previous shot, then “swabbed” with a damp sponge to put out any burning embers. A fabric powder charge was loaded down the muzzle into the chamber, followed by a rope wad, then the shot, and then another wad. The gun captain pushed a long wire down the vent hole to prick open the charge, and poured gunpowder down the vent. To fire, a burning slow match was applied to the vent hole, or a gunlock (like a large flintlock mechanism) was triggered.
Hoping to detach Denmark from the Russian-led League of Armed Neutrality, Britain assembled a fleet at Yarmouth in eastern England under Admiral Sir Hyde Parker, with Vice Admiral Nelson as second-in-command. Parker's orders were to see if the Danes would agree to abandon the league and, if not, open hostilities. Once Denmark was overcome, he was to enter the Baltic and attack the Russians. Nelson was for speedy and decisive action; Parker prevaricated. Even he was aware, though, that the question of Denmark must be settled before the winter ice melted, releasing the Russian fleet from its ports.

On March 30, the British fleet sailed through the narrows between Sweden and Denmark to confront the Danish fleet in front of Copenhagen. The Danes took up a strong defensive position with a line of ships and floating batteries anchored in the King's Channel in front of Copenhagen. The attackers would have to sail through shallow waters and past treacherous shoals, and would also come under fire from the powerful Trekroner shore battery at the northern end of the channel. This mission was entrusted to Nelson with 12 ships of the line—those with the shallowest draft—supported by frigates, sloops, and bomb-ketches. Nelson's plan was simple. His ships would sail in line and each would anchor opposite an opponent to blast it with broadsides. When enough of the Danish guns were silenced, the bomb-ketches would move forward and threaten Copenhagen with mortars, obliging the Danes to cede.

“DOWNRIGHT FIGHTING”
The operation began on the morning of April 2. Initially it was a disaster. Captain Hardy had spent the previous night in a rowing boat taking soundings of the channel, but to no avail. One of Nelson's ships of the line ran aground immediately and two more were stuck on the shoal known as the Middle Ground. Nelson pressed on regardless. His flagship Elephant and the other ships duly anchored a cable's length from their

Pocket telescope
Legend relates that Nelson lifted his telescope to his blind eye at Copenhagen, allowing him to ignore Admiral Parker's signal to withdraw. The story is almost certainly apocryphal.
Admiral Charles-Alexandre Durand-Linois, bound for Cadiz with three ships of the line and a frigate, found the port under blockade by a superior British force. He moored in Algeciras Bay, under the protection of shore batteries. On July 8, British rear admiral Sir James Saumarez led six third-rates to attack the French, but lack of wind and tricky shoals made it difficult to engage. The British suffered damage from the shore guns and Spanish gunboats as well as Linois’ broadsides. The 74-gun Hannibal ran aground at the northern end of the bay and stuck. After five punishing hours Saumarez withdrew to nearby Gibraltar, with his damaged flagship Caesar under tow, leaving Hannibal to be captured. While Linois refitted, one French and four Spanish ships of the line arrived to help him escape from the bay. On July 12, Linois headed for Cadiz with Saumarez in pursuit. The British admiral had been joined by the 74-gun Superb. Fresh and undamaged, Superb pulled ahead and, during the night, got between two Spanish first-rates, firing broadsides against both. In the darkness the Spanish ships went on firing long after Superb had gone, pouring shot into one another. Both sank with heavy loss of life. One French ship was also captured, but Captain Aimable Troude’s Formidable distinguished itself by fighting off four British pursuers to reach Cadiz.

**Volley gun**

Multi-shot firearms such as this seven-barreled volley gun, produced for the Royal Navy in 1795, allowed marines to fire several bullets at once.
In summer 1805 Emperor Napoleon was encamped with his Grande Armée at Boulogne, ready to invade Britain. He required the French navy and its Spanish allies to guarantee the non-intervention of the Royal Navy for sufficient days to get his army across the Channel. The French Mediterranean squadron under Vice Admiral Pierre-Charles Villeneuve succeeded in joining up with the Spanish under Admiral Federico Gravina, but failed to help France’s Atlantic squadron escape the British blockade at Brest. Pessimistic about his chances of victory against the Royal Navy, Villeneuve took refuge with the Spanish at Cadiz. Napoleon abandoned his invasion plan.

Furious with Villeneuve, he ordered another admiral take over his command. Through September the British assembled a fleet off Cadiz. Admiral Nelson arrived to take command of this blockade force on September 29. His frigates kept watch on the Spanish port while his ships of the line waited beyond sight of shore. Despite having an inferior force by any count of ships, guns, or men, Nelson planned a battle of annihilation. He intended to attack in two columns, cutting the French-Spanish line so the center and rear squadrons were isolated from the van. His captains would then use their initiative to win a “pell-mell” battle.

Meanwhile, Villeneuve decided to sail before his replacement arrived, hoping to redeem his honour. On October 19, with much delay and confusion, the 33 French and Spanish ships of the line began to leave Cadiz. The following day, they headed for Gibraltar with Nelson’s ships in pursuit. After some confused maneuvering, daybreak on October 21 found the two fleets near Cape Trafalgar. At around 7:30 a.m. Villeneuve ordered his fleet to wear together and turn back for Cadiz. He did not in fact
intend to avoid a battle, but to fight closer to a friendly port. Nelson, however, was worried that his prey was going to escape him and urgently sought to engage the combined fleet.

Through the morning the British sorted themselves into two groups, one (to windward) led by Nelson on Victory and the other (to leeward) led by Vice Admiral Collingwood on the 100-gun Royal Sovereign. They bore down at a right-angle to the line of the combined fleet. It was a day of light wind and the British ships, painted with a yellow and black checker pattern to distinguish them from the enemy, made slow progress.

As the fleets closed Nelson hoisted a series of signals, including the famous “England expects that every man will do his duty.” Once the fighting finally started, the terrifying risks involved in Nelson’s battle plan became plainly evident. Aiming to cross the line behind Villeneuve’s flagship Bucentaure in the French-Spanish center, Victory was under fire from enemy broadsides for 40 minutes during its agonizingly slow approach, able to reply only with its few forward guns. Collingwood’s faster Royal Sovereign took less punishment approaching the enemy line but was then isolated, fighting five enemy ships at once while slower British ships came up to join her. Yet both flagships made excellent use of the opportunity presented by cutting the line. Victory raked Bucentaure with a devastating broadside through its stern that killed almost 200 men. Royal Sovereign did the same to Santa Anna, flagship of Spanish admiral Alava, causing some 400 casualties at a stroke.

As more British ships came up, the pell-mell battle Nelson had envisaged developed in the center and rear of the French-Spanish line. In a series of close engagements the British used superior gunnery to batter the French and Spanish ships, causing huge casualties and silencing their guns. The French and Spanish fired high to dismast British ships, which they then tried to board.

Santisima Trinidad surrenders
The Battle of Trafalgar at 3:00 p.m. on the left, with her masts destroyed, the Spanish flagship Santisima Trinidad (painted orange) surrenders to Neptune. At the time she was the largest warship in the world.

1758-1805
HORATIO NELSON
BRITISH ADMIRAL

Although Nelson’s father was an undistinguished Norfolk clergyman, the family had excellent connections in British naval administration. At sea from the age of 12, Nelson became the youngest captain in the Royal Navy in 1779. He saw service in the Caribbean during the American Revolutionary War, but it was his performance during the French Revolutionary and Napoleonic Wars that brought him undying fame. Nelson was particularly recognized for employing the battle tactic of cutting through the enemy’s lines, which although not entirely novel, had never been adopted to such successful effect. Always leading from the front, he lost the sight of his right eye in the siege of Calvi, Corsica, in 1793 and his right arm in a raid on Tenerife four years later.

BIRTH OF A LEGEND
He first won renown for his initiative at the battle of Cape St. Vincent in 1797, and his stunning victory at the battle of the Nile in 1798 made him a national hero. Nelson’s tendency to obey orders only when it suited him, displayed most famously at Copenhagen in 1801, was not to everyone’s taste, and his liaison with Lady Emma Hamilton damaged his reputation, but he won the devoted admiration of the captains who served under him. After his death at Trafalgar, he was accorded a state funeral of unparalleled splendor.

Death of Nelson
Nelson dies below decks aboard HMS Victory, three hours after being mortally wounded by a French sniper.
Men on both sides fought with the utmost courage amid the indescribable carnage of the battle.

In the attempt to cross the line, Victory became entangled with the 74-gun Redoutable, commanded by the able Captain Jean-Jacques Lucas. Redoutable’s rigging was swarming with infantry armed with muskets and grenades, intent on clearing Victory’s upper decks preparatory to boarding. At about 1:15 p.m. a musket ball struck Nelson, who was standing in full view on the quarterdeck, overseeing the battle. It passed down through his shoulder and lodged alongside his spine. He was carried below, where he would die more than three hours later.

Victory was saved from being taken by the arrival of the 98-gun Temeraire, which hit Redoutable with a broadside that killed or wounded some 200 men. Temeraire then drifted into Redoutable, while disabling Fougueux with a broadside from its disengaged side. Both Redoutable and Fougueux struck their colors to Temeraire. A similar pattern of hard-fought combat and eventual surrender was being played out everywhere in the French-Spanish center and rear.

Some of the first British ships to engage took severe punishment. Belleisle, which followed Royal Sovereign, was engaged at different times by seven French and Spanish ships and left as a dismasted hulk with 126 men dead or wounded. The captain of Mars, George Duff, had his head struck off by a cannonball, fought combat and eventual surrender was being played out everywhere in the French-Spanish center and rear. Some of the first British ships to engage took severe punishment. Belleisle, which followed Royal Sovereign, was engaged at different times by seven French and Spanish ships and left as a dismasted hulk with 126 men dead or wounded. The captain of Mars, George Duff, had his head struck off by a cannonball, one of 300 casualties the ship suffered. But the French and Spanish were overwhelmed as fresh British ships came up. Santa Anna struck to Royal Sovereign after an engagement that also left Collingwood’s flagship disabled. The Spanish giant Santisima Trinidad surrendered after losing all her masts. Although barely able to fight from the moment it was raked by Victory, Bucentaure held out for three hours before Villeneuve struck his colors. Amid the slaughter, the surrenders were conducted with dignity and exchange of compliments.

Meanwhile 10 ships in the French-Spanish van had been left out of the fight, as Nelson planned. By 2:30 p.m. they had with difficulty maneuvered back against the wind and were approaching the scene of combat. By then seven ships of the combined fleet had already surrendered, but the fighting had left many of the British ships in poor shape. If Dumanoir had led a determined counterattack it might have turned the battle around. But after a half-hearted exchange of fire the French admiral fled southward with four ships. Two other ships from the van were captured by the British, while the rest were among a small band of survivors led by Spanish admiral Gravina back to Cadiz.

Before Nelson died Victory’s captain was able to inform him that his final battle had been a triumphant success. Nelson’s final words were: “Now I am satisfied. Thank God, I have done my duty.” By the end of the day eight French and nine Spanish ships had been captured—more than half the entire fleet. One French ship, the Achille, had exploded. No British ships had been lost.

The victory won at the Battle of Trafalgar was a great one for the Royal Navy, establishing as it did a dominance over the world’s oceans that would last virtually unchallenged for over a century.
NAPOLEONIC WARS

BLOOD RAN IN STREAMS ABOUT THE DECK ... AND THROUGH A THOUSAND HOLES AND CREVICES IN HER HULL THE SEA SPURTED IN AND BEGAN TO FLOOD THE HOLD.

SPANISH OFFICER, DESCRIBING THE SCENE ABOARD THE STRICKEN SANTISIMA TRINDAD

191

THE TWO FLEETS ENGAGE
At 11:00 a.m. Nelson orders the attack.

The British advance in two columns. Collingwood, commander of the leeward division breaks the Allied line at noon. Nelson, commander the windward division in Victory, follows soon after.

PELL-MELL BATTLE
As the British break the Allied line a pell-mell battle ensues. By 5:30 p.m., in spite of superior numbers, the Allies have been destroyed. The British lose no ships, but half are badly damaged. They gain 17 Allied prizes.

FRANCO–SPANISH LINE

BRITISH WINDWARD DIVISION

BRITISH LEE DIVISION

ATLANTIC OCEAN

KEY

FRANCO–SPANISH FLEET

1 French ship of the line

1 Spanish ship of the line

BRITISH FLEET

1 British ship of the line

Wind

As the British break the Allied line a pell-mell battle ensues. By 5:30 p.m., in spite of superior numbers, the Allies have been destroyed. The British lose no ships, but half are badly damaged. They gain 17 Allied prizes.
On December 13, 1805, the best part of the French fleet at Brest profited from bad weather to slip past the British close blockade. One squadron, commanded by Rear Admiral Leisegges on board the magnificent 130-gun Impérial, had orders to sail to Santo Domingo in the West Indies. A month later, Vice Admiral Duckworth, commanding the British squadron blockading Cadiz, learned that the French ships had been sighted heading for the Caribbean. He promptly set off across the Atlantic in pursuit. On February 1, 1806, Duckworth’s squadron was taking on water at St. Kitts when Duckworth formed his ships into windward and leeward divisions and raced to bar the French escape. The three ships in the van of the windward line (Superb, Northumberland, and Spencer) made far better speed than the rest and engaged the French in a running battle. Northumberland in particular took heavy punishment from Impérial’s thundering broadsides, before the rest of the British ships came up and overwhelmed the fierce and stubborn French resistance. Harried by Superb and Canopus (the latter captained by Francis Austen, the brother of the novelist Jane Austen), Impérial deliberately ran on to the shore, as did the 74-gun Diomède. The other three French ships of the line, Alexandre, Jupiter, and Brave, were all disabled and obliged to strike their colors. British casualties were 74 killed and 264 wounded; the French lost some 1,500 men. Impérial and Diomède were burned two days later to prevent them falling into British hands.

In February 1809 Admiral Jean-Baptiste Willaumez sailed from Brest with eight ships of the line, eluding the blockading squadron of Admiral James Gambier. Willaumez reached the Rochefort roads, where three more ships awaited him, but delays allowed Gambier to catch him up. Since the British admiral refused to risk his ships in the narrow channels of the roads, and Willaumez would not come out to fight, a stalemate ensued. The aggressive Captain Thomas Cochrane, agitating for more positive action, arranged for himself to be sent from Britain to join Gambier with a score of fireships—a move the admiral did not welcome. In the roads the French were prepared for a fireship attack, anchoring their ships in two lines between the islands of Aix and Oleron, behind a defensive boom of spars and chains. Cochrane launched his attack on the night of April 11. He packed four vessels with explosives and took them in first to blow holes in the boom. The explosions were so spectacular that they completely destroyed French morale. In panic the French captains cut their cables and fled for the safety of the Charente River. In the darkness and confusion many ships collided and all but two of them ran aground. The fireship attack itself proved to be a damp squib, but morning broke to reveal French ships grounded at the mercy of British guns. But Gambier was in no hurry to enter the roads and proceeded with great caution. As a result, seven of the French ships were refloated and escaped upriver. Two ships of the line were destroyed by the British and two were scuttled by their crews.

On the night of September 2, Gambier began a bombardment of the city to intimidate the population into surrender. Newly introduced Congreve rockets were among the weapons used to rain destruction upon the Danes. An eyewitness in the city described how “bombs, grenades, fireballs … rockets and shells flew about our ears.” The bombing continued for three nights, flattening a third of Copenhagen and killing thousands of civilians. Powerless to resist, the Danes surrendered both the city and their fleet. Denmark became an ally of France but the British took the Danish ships and were able to maintain access to the Baltic.

### NAPOLEONIC WARS

#### SANTO DOMINGO

- **Date**: February 6, 1806
- **Forces**
  - British: 7 ships of the line, 2 frigates
  - French: 5 ships of the line, 2 frigates
- **Losses**
  - British: none
  - French: 2 ships wrecked, 3 captured

Location: Off Santo Domingo, Dominican Republic

#### BASQUE ROADS

- **Date**: April 11–13, 1809
- **Forces**
  - British: 11 ships of the line, 1 frigate
  - French: 11 ships of the line, 4 frigates
- **Losses**
  - British: none
  - French: 4 ships of the line, 1 frigate

Location: Off Rochefort, Bay of Biscay

In February 1809 Admiral Jean-Baptiste Willaumez sailed from Brest with eight ships of the line, eluding the blockading squadron of Admiral James Gambier. Willaumez reached the Rochefort roads, where three more ships awaited him, but delays allowed Gambier to catch him up. Since the British admiral refused to risk his ships in the narrow channels of the roads, and Willaumez would not come out to fight, a stalemate ensued. The aggressive Captain Thomas Cochrane, agitating for more positive action, arranged for himself to be sent from Britain to join Gambier with a score of fireships—a move the admiral did not welcome. In the roads the French were prepared for a fireship attack, anchoring their ships in two lines between the islands of Aix and Oleron, behind a defensive boom of spars and chains. Cochrane launched his attack on the night of April 11. He packed four vessels with explosives and took them in first to blow holes in the boom. The explosions were so spectacular that they completely destroyed French morale. In panic the French captains cut their cables and fled for the safety of the Charente River. In the darkness and confusion many ships collided and all but two of them ran aground. The fireship attack itself proved to be a damp squib, but morning broke to reveal French ships grounded at the mercy of British guns. But Gambier was in no hurry to enter the roads and proceeded with great caution. As a result, seven of the French ships were refloated and escaped upriver. Two ships of the line were destroyed by the British and two were scuttled by their crews.

#### COPENHAGEN

- **Date**: September 2–5, 1807
- **Forces**
  - British: 17 ships of the line, 21 frigates
- **Losses**
  - British: none
  - Danish: 18 ships of the line, 11 frigates

Location: Copenhagen, Denmark

In July 1807 Britain feared that neutral Denmark was about to ally itself with Napoleon, giving France control of the Danish fleet and of the entrance to the Baltic Sea. Such a situation would be intolerable as it would prove ruinous to British trade and block the Royal Navy’s access to two of its allies against France—Sweden and Russia. In response, on July 26, a British fleet sailed from Yarmouth for Copenhagen under Admiral James Gambier aboard the 98-gun Prince of Wales. After the Danes refused to hand over their fleet to Britain for the duration of the war, British troops landed and laid siege to Copenhagen, while the warships stayed out of range of shore batteries.

On the night of September 2, Gambier began a bombardment of the city to intimidate the population into surrender. Newly introduced Congreve rockets were among the weapons used to rain destruction upon the Danes. An eyewitness in the city described how “bombs, grenades, fireballs … rockets and shells flew about our ears.” The bombing continued for three nights, flattening a third of Copenhagen and killing thousands of civilians. Powerless to resist, the Danes surrendered both the city and their fleet. Denmark became an ally of France but the British took the Danish ships and were able to maintain access to the Baltic.

#### GRAND PORT

- **Date**: August 23–24, 1810
- **Forces**
  - British: 4 frigates
  - French: 5 frigates
- **Losses**
  - British: none
  - French: 2 ships destroyed, 2 captured

Location: Grand Port, Mauritius

French frigates based on Mauritius were preying upon British merchant ships crossing the Indian Ocean. In response, in the summer of 1810 British frigates launched an attack on the island’s east coast, capturing the Ile de la Passe at the entrance to the lagoon off Grand Port. On August 20, the French frigates Bellone, Minerve, and Victor, under the command of Commodore Guy-Victor Duperré, arrived at Grand Port, unaware of the British presence, and broke through to the lagoon. Three days later, largely on the initiative of Nesbit Willoughby, captain of Nereide, the four British frigates sailed into the lagoon to engage the French at anchor. Two of the British ships, Sirius and Magicienne, quickly ran aground. Nereide was left exposed to the full force of the French broadsides. In a static encounter at close range the frigate was reduced to a shambles. Willoughby had an eye torn out of its socket by a splinter. More than 220 of Nereide’s 280 crew were killed or wounded before she struck the following morning. The immovable Magicienne and Sirius were scuttled and the surviving British frigate, Iphigenia, was trapped by the arrival of two more French frigates as she made to escape. It was the only defeat of a British squadron during the Napoleonic Wars.

#### TREKRONER FORT

Part of the formidable coastal defenses faced by Nelson in the Battle of Copenhagen in 1801, the Trekroner fort could do nothing to prevent the bombardment of 1807.

### NAPOLEONIC WARS

#### FLINTLOCK SWIVEL GUN

This flintlock swivel gun was mounted on the front of the ship to guard against boarders. It was loaded and fired in the same way as a musket or pistol.
NAVAL COMMUNICATION

BEFORE THE INTRODUCTION OF RADIO, visual signals were the prime means of fleet communication. Sailing-era navies chiefly relied upon flags, although these had many drawbacks. The admiral’s flags could only be seen by ships close to him, and had to be passed on by others raising the same signal. Complex instructions could not be easily conveyed, and once in battle, smoke rendered flags invisible.

FLAG SYSTEMS
During the 17th-century Anglo-Dutch Wars, Britain’s Royal Navy introduced a system using five large flags to convey 25 possible signals. The number of signals had grown to 45 by the 1690s, but there was no substantial progress until the mid-18th century, when the French introduced number flags. These allowed hundreds of different signals to be conveyed and were belatedly adopted by the Royal Navy in 1799, which was employing a telegraphic system of communication by the early 1800s. Flags representing letters, and also specific messages, permitted almost unlimited communication.

CURRENT MERCANTILE CODES
In the International Code of Signals each flag stands for a letter as well as a message.

DSTRESS SIGNAL
Flare pistols were developed in World War I to be used by ships in distress.

MORSE CODE
The code invented by American Samuel Morse in the 1840s allowed any letter to be represented by two symbols, for example a dot and a dash, in different combinations. Morse was adopted by navies using flashing signal lights for communication and then for wireless telegraphy at the end of the 19th century. The most famous Morse code message is SOS, adopted as an agreed international distress signal in 1908.

PENNANTS
The tapered type of flag known as a pennant is used primarily to indicate numbers.
HMS VICTORY

HER ROLE AS HORATIO NELSON’S FLAGSHIP at the battle of Trafalgar in 1805 made *Victory* the world’s most famous first-rate ship of the line. Preserved as a museum ship at Portsmouth, England, she is now also the oldest commissioned naval vessel. *Victory* was a typical warship of its time, although one of the largest in the Royal Navy.

MORE THAN 6,000 trees, mostly oak, were felled for *Victory’s* construction. She cost £63,175 to build, probably equivalent to US $100 million today. This expensive ship was launched in 1765, but was not commissioned until war with France broke out in 1778. She saw her first action as the flagship of Admiral Keppel at the battle of Ushant in that year and was notably Admiral John Jervis’s flagship at the battle of Cape St. Vincent in 1797. By that time *Victory* was showing her age and was retired to serve as a hospital ship for prisoners of war. This decision was, however, soon reconsidered. After extensive repair and reconstruction, *Victory* was recommissioned as Nelson’s flagship in 1803, remaining in active service until 1812.

*Victory* was operated by a crew of 850 men and mounted 104 smoothbore, muzzle-loading cannon (including four carronades). Even with solid shot, this was formidable firepower—for comparison, at the great battle of Austerlitz in the same year as Trafalgar, the entire French Army fielded 139 cannon.

Sailing for the Downs
HMS *Victory* sails past Dover on her way to the Downs. Sailors can be seen high in the rigging lowering topgallant sails, while lower down a course sail is unfurled on the mizzenmast.

**Figurehead**
*Victory’s* figurehead shows two cupids supporting the royal coat of arms (then featuring the escutcheon of Hanover) surmounted by a crown. The arms are surrounded by the motto of the Order of the Garter, “Honi soit qui mal y pense” (“Shame on he who thinks evil of it”).

**Ship’s name**
Nelson’s flagship at Trafalgar was the sixth Royal Navy ship to bear the name *Victory*. The first was a 42-gun ship originally called *Great Christopher* and purchased by the Royal Navy in 1569.

**Stern galleries**
The rear of the ship housed the cabins of the admiral, the captain, and other senior officers. The stern of *Victory* was less decorated than earlier ships of her kind.

THE DEAD LAY ALONG THE DECKS IN HEAPS ...
MORE THAN FOUR HUNDRED HAD BEEN KILLED AND WOUNDED ... AN EXTRAORDINARY PROPORTION HAD LOST THEIR HEADS.

CAPTAIN JAMES ATCHERLY, DESCRIBING THE CARNAGE ABOARD BUCENTAURE AFTER HER ENGAGEMENT WITH VICTORY AT TRAFALGAR
A skylight (here covered) stood in the middle of the poop deck, allowing light to enter the great cabin below.

The bell in the belfry was rung every half hour. Two sandglasses kept the time, one lasting half an hour, one lasting four hours. Both were set at the beginning of each four-hour watch, at which the bell was rung eight times.

Located under the poop deck, the double wheel was operated by four men in calm weather, and up to eight men in a storm. The binnacle in front of the wheel contains two compasses and a lantern for taking readings at night. The copper flue on top of the binnacle allowed smoke from the lantern to escape, keeping the binnacle clean.

Victory’s main mast reaches 220 ft (67 m) above sea level. Halfway up is a platform; this was used by musketeers in battle, and by the crew when access to sails was needed.

Standing rigging
The ropes which hold the masts in place are known as standing rigging. Of these, “shrouds” are tied to the sides of the ship, forming a ladder up the masts.

Running rigging
The ropes which raise, lower, and manipulate sails are known as running rigging.

Heavy anchor and gun ports
Victory had seven anchors, the heaviest weighing more than 4.5 tons. Raising the latter required the effort of 144 men turning two interlinked capstans. The anchor was hung above the upper gun deck.

Carronade
Victory had two carronades mounted on her forecastle. They were lethal at close range, as shown by their contribution to the mauling of the French ship Bucentaure at Trafalgar.

Rigging
A total of 26 miles (42 km) of rope (or “cordage”) was used to rig Victory, along with 788 blocks, or pulleys. All sailors learned how to mend rope, which easily frayed at the ends.

Main mast
Double wheel and binnacle
Skylight
Belfry

Running rigging
Standing rigging
Carronade
Heavy anchor and gun ports

All sailors learned how to mend rope, which easily frayed at the ends.
**AS WELL AS THREE GUN DECKS,** *Victory* had, below the waterline, the orlop deck and the hold. To keep the ship stable, the heaviest guns were toward the bottom of the ship. There were 32-pounder guns on the lower gun deck, 24-pounders on the middle gun deck, and 12-pounders on the upper gun deck. The gun decks also provided living quarters for most of the crew, in airless, damp, and overcrowded conditions. The orlop deck was safe from enemy fire, and thus the chosen site for the powder magazines and the surgeon’s operating room.

**Gun decks**  
The *Victory* had 88 guns arranged on its three gun decks, the lowest of which contained the heaviest Blomfield 32-pounder guns. Other lighter guns (including carronades) were arranged on the poop deck and the forecastle.

**Gun lock**  
*Victory’s* guns were fired with flintlock mechanisms. Pulling the lanyard (cord) made the flint spark, igniting the primer, which in turn ignited the main charge in the barrel.

**Great cabin**  
Situated at the rear of the upper gun deck, the great cabin served as the admiral’s quarters. The most comfortable part of the ship, it was divided into a day cabin, a dining cabin, and a bed space.

**Day cabin**  
The day cabin was the admiral’s private study. It was here that he wrote letters and kept his most valuable personal effects.

**Admiral’s cot**  
The admiral and other high-ranking officers slept in box-like cots that hung from the ceiling. The cot also served as a coffin in the event of the officer’s death.

**Capstan**  
*Victory* had two capstans, one for raising and lowering anchors, and another for lifting stores. Over a hundred men could be needed to haul in a cable, which wrapped around a drum on the deck beneath.

**Marines’ quarters**  
The middle gun deck was home to *Victory’s* 146 Royal Marines, who, like the sailors who occupied the other decks, all ate and slept between the guns. They were the ships’ soldiers, and were trusted to protect the ship’s officers in the event of a mutiny.
**Hanging magazines**

Two hanging magazines were situated on the orlop deck above the hold. The 24 lb gunpowder cartridges were kept towards the bow, the 12 lb cartridges towards the stern. They were located beneath the waterline to protect them from enemy fire, and were suspended from the deckhead to keep them from being damaged by water.

**Shot lockers**

There were four shot lockers in the hold, each containing 80 tons of shot; a further 40 tons were stored near the grand magazine, also in the hold. At the battle of Trafalgar, Victory fired 2,667 rounds of shot, weighing a total of 27 tons.

**Mess table**

At mealtimes the crew were grouped into messes of either four or eight men, one of whom would collect and serve the food. Some messes ate at tables hung from the beams of the deck above.

**Hard tack**

Since bread would not keep for long, seamen were supplied with biscuits called “hard tack.” They were often home to maggots.

**Galley**

The ship’s galley, on the middle gun deck, had a cast-iron Brodie stove and a copper distiller that could produce 2 gallons (9 liters) of water a day. Its two copper kettles could produce 250 gallons (1,135 liters) of stew.

**Storage and ballast**

The hold was the largest storage area of the ship and contained up to six months worth of food and drink. The floor was lined with 457 tons of ballast, which was needed to keep the ship level and upright. The ballast was made of iron ingots and shingle.

**Bosun’s storeroom**

The boatswain (or bosun) was a warrant officer in charge of the ship’s anchors, cordage, rigging, colors, boats, and deck crew. His storeroom contained all the stores necessary for the repair and upkeep of the ship, including plenty of spare rope.

**Elm tree pumps**

Two elm pumps located by the mainmast drew water up from the sea when it was needed for fighting fires and for washing down the decks. Two or three men manned the pump handle, while another caught the water in a bucket.

**Hammocks**

While senior officers had cabins of their own, most of the crew slept in hammocks which were no more than 28 in (71 cm) in width. They were slung above the guns on all three gun decks.

**hard tack**

Since bread would not keep for long, seamen were supplied with biscuits called “hard tack.” They were often home to maggots.

**Shot lockers**

There were four shot lockers in the hold, each containing 80 tons of shot; a further 40 tons were stored near the grand magazine, also in the hold. At the battle of Trafalgar, Victory fired 2,667 rounds of shot, weighing a total of 27 tons.

**Mess table**

At mealtimes the crew were grouped into messes of either four or eight men, one of whom would collect and serve the food. Some messes ate at tables hung from the beams of the deck above.

**Hard tack**

Since bread would not keep for long, seamen were supplied with biscuits called “hard tack.” They were often home to maggots.

**Galley**

The ship’s galley, on the middle gun deck, had a cast-iron Brodie stove and a copper distiller that could produce 2 gallons (9 liters) of water a day. Its two copper kettles could produce 250 gallons (1,135 liters) of stew.

**Storage and ballast**

The hold was the largest storage area of the ship and contained up to six months worth of food and drink. The floor was lined with 457 tons of ballast, which was needed to keep the ship level and upright. The ballast was made of iron ingots and shingle.

**Bosun’s storeroom**

The boatswain (or bosun) was a warrant officer in charge of the ship’s anchors, cordage, rigging, colors, boats, and deck crew. His storeroom contained all the stores necessary for the repair and upkeep of the ship, including plenty of spare rope.

**Elm tree pumps**

Two elm pumps located by the mainmast drew water up from the sea when it was needed for fighting fires and for washing down the decks. Two or three men manned the pump handle, while another caught the water in a bucket.
DISEASE, MEDICINE, AND SURGERY

THROUGHOUT MOST OF the history of naval warfare, disease took a far heavier toll on sailors’ lives than actual combat. Until the 18th century there was little any navy could do about it, because medical knowledge remained too primitive. Gradually, common-sense application of principles of hygiene and nutrition by good captains became systematized to good effect. Treatment of those injured in battle also remained a crude business until modern times.

SICKLY SAILING SHIPS

Although conditions on board galleys were often unhygienic and overcrowding chronic, galleys stayed at sea for only short periods at one time. They suffered epidemics like any accumulation of men in pre-modern times—the Venetians lost 20,000 crew in their fleet, probably to typhoid fever, in June 1570. But once sailing ships started going to sea for long periods death rates regularly soared. It was common for ships on oceanic voyages to lose a third to a half of their crew to disease. A lengthy operation such as a blockade was virtually impossible because disease inevitably decimated the crews after a time. Large numbers of men were cooped up together in overcrowded conditions, in humid, unventilated spaces between decks, with food supplies short on freshness and variety. Scurvy was a typical sailor’s disease. Typhus—often brought on board by recruits from jails—and tuberculosis were great killers, as was yellow fever in the tropics.

When a patient dies from a local injury, with the limb on, we are apt to blame ourselves … but it does not follow that the operation would have saved him.

Lancelot Haire, Remarks on Mr Lucas’s practical observations on amputations, 1786

SHIPS’ DOCTORS

Medical staff on ships were rarely properly trained. A barber surgeon on a sailing ship would be expected to deal in a rough-and-ready way with a steady stream of fractures and hernias gathered through the heavy and hazardous nature of the work on board, as well as venereal disease after a spell in port. His real challenge, of course, came in battle. Men who might survive mostly had limbs shattered by solid shot or gouge wounds caused by flying splinters of wood. Amputations were performed in two minutes, the limbs collected in a basket by the surgeon’s assistant, the loblolly man. Speed was the most appreciated quality as there were no anaesthetics except alcohol. Surgery was performed below the waterline, if the ship was big enough to permit it, so as to be safe from shot. Wounds almost always became infected, but various primitive techniques ensured reasonable survival rates.
MEDICAL PROFESSIONALS

In the 18th century health at sea increasingly became a subject of systematic inquiry and naval medicine was slowly professionalized. Theories of disease were still woefully inadequate—the fumes from smelly cheese were thought a serious health risk by the Royal Navy. But systematic studies by ships’ surgeons such as James Lind, whose *Treatise on Scurvy* was published in 1753, encouraged action by captains and administrators to improve cleanliness and nutrition. The role of citrus fruit and fresh vegetables in preventing scurvy was known from at least the early 17th century, but organizing a general policy to eradicate the disease was a slow business. Still, by 1800 the British fleet blockading Brest could keep 24 ships at sea all through a summer without crippling death rates.

**SICK BERTH** Located far away from living quarters to prevent the spread of disease, the sick berth on an 18th-century sailing ship was constructed out of canvas screens. During battle the screens were taken down and patients moved to the orlop level for safety.

**SURGEON’S INSTRUMENTS** A typical naval surgeon’s chest contained instruments for amputation, trephination, draining, dentistry, probing wounds, and bleeding, as well as copious bandages and cloth for tourniquets.

**I shall here only observe that the result of all my experiments was that oranges and lemons were the most effectual remedies for this distemper at sea.**

*James Lind, A Treatise of the Scurvy, 1753*

**CUTTING THE DEATH RATE**

The introduction of steamships was a boon. They were healthier above all because they cut voyage times. Food on board improved sharply through the 19th century, and water quality was ameliorated by storage in iron tanks. The general progress of medicine and provision of properly qualified medical staff reduced deaths from disease and wounds radically by the 20th century. The nature of wounds in battle altered, with the treatment of flash burns an unexpected problem for ships’ medical staff in World War I. But as in the wider body of society, epidemic disease became a radically diminishing threat.

**HOSPITAL SHIP** Wounded US marines lie in their bunks in close quarters aboard the USS *Bolivar* which transferred casualties in the course of its service during World War II.

**SUNRAY TREATMENT** Submarine crews back from patrol take sunray treatment in the depot ship to compensate for their lack of exposure to daylight when on active duty. The goggles are to protect their eyes.

**ONBOARD OPERATION** Cooperation between navies means that an injured American sailor can be taken 300 miles (480 km) to a British aircraft carrier where surgeons perform damage control surgery on his fractured ankle in an onboard operating room.
EARLY 19TH-CENTURY BATTLES

THE EARLY DECADES of the 19th century were the final years of the age of sail. Up to 1815 this was a time of major warfare—not only the Napoleonic Wars in Europe but also a stiff contest between the United States and Britain in the three-year War of 1812. After 1815, however, a period of comparative peace ensued, especially at sea. The position of superiority enjoyed by Britain’s Royal Navy on the world’s oceans was overwhelming and unchallenged. The French, still with the world’s second largest navy, had neither the power nor the inclination to stop Britannia ruling the waves. The destruction of an Ottoman fleet at Navarino in 1827 was the last major fleet engagement of the 19th century, because a full-scale challenge to British hegemony was impossible.

FOUNDING A TRADITION
The United States founded a naval tradition by fits and starts in this period. Antimilitarist instincts, which had seen the Continental Navy disbanded after the Revolutionary War, were overcome in 1794 when Congress agreed to build six frigates, which were soon supported by more warships as threats to American merchant shipping mounted. The US Navy saw action against France in the undeclared Quasi-War of 1798 to 1800 (responding to French attacks on American merchant ships trading with France’s enemy Britain) and against the Barbary pirates in the Mediterranean. War with Britain in 1812 presented a challenge on a quite different scale. It gave the American heavy frigates a chance to show their exceptional fighting qualities in a series of successful duels with British warships, while American victories in lake battles played an important role in inhibiting British military operations inland. Inevitably the power of the Royal Navy predominated by the end of the conflict, but the United States emerged with a valuable stock of naval heroes, such as Stephen Decatur and Oliver Hazard Perry, and tales of derring-do to provide inspiration for the future. The US Navy remained a small force to the end of the age of sail—it never commissioned a ship of the line—but it had won acceptance as a necessary and respected institution.

ROYAL NAVY AT PEACE
The advent of peace with France and the United States in 1815 inevitably brought sharp cutbacks in Britain’s war-swollen Royal Navy. By 1817 Royal Navy officers in active service stood at below a quarter of wartime numbers, and naval seamen at around a sixth of the full wartime complement. The number of British naval ships in commission fell from 713 in 1814 to 121 in 1818. This was still considered sufficient muscle for Britain to undertake the role of policeman of the oceans, in which capacity it attempted to impose a unilaterally declared ban on slave trading and took action to suppress piracy, most famously in the bombardment of Algiers, a nest of Barbary pirates, in 1816.

LIBERATION WARS
Much of the warfare in the aftermath of the Napoleonic Wars arose from the birth of national liberation movements that sought freedom from foreign rule. In South America, a series of wars was fought, firstly for independence from the colonial rule of Spain, and subsequently to define the frontiers of the new states. In Europe the Greeks fought a liberation war against the Ottoman Turks from 1821 to 1828. The independence movements could only assemble makeshift naval forces, placed under the command of imported officers such as the ubiquitous British admiral Thomas Cochrane, who served...
in Chile, Brazil, and Greece. The fact that such improvised forces performed with considerable success in the independence wars was powerful evidence of the decline of those once-great naval powers, Spain and the Ottoman Empire. The weakness of Ottoman sea power had been exposed by a series of defeats at the hands of Russia in the late 18th century. This process of humiliation was completed at the Battle of Navarino in 1827.

ON THE BRINK OF CHANGE
Navarino was still a battle from the age of sail. But the transition to a new era of naval warfare was already under way. The introduction of steam ships into warfare was slow because their usefulness was at first limited. In 1814 the United States built the first steam-powered warship, Demologos, designed by the prolific inventor Robert Fulton, but it was only suitable for use as a floating gun battery in harbor. The British adopted steamships as tugs, initially only to tow sailing ships in and out of harbor, but later as armed support vessels for use in combat. By 1829 the Royal Navy had built eight armed paddle steamers. The Karteria, built and manned by the British, saw action with the Greeks in their independence war.

Meanwhile, in 1824, French general Henri-Joseph Paixhans showed the effectiveness of a naval gun firing explosive shells. Between them, steam power and the exploding shell spelled the end of battle between wooden sailing ships. The latter would soon be replaced by ironclads.
THE UNITED STATES AT WAR

DURING THE OPENING DECADES of the 19th century, the United States fought a major war against Britain and two lesser conflicts against the Barbary pirates. These wars had in common a concern to maintain the freedom of the seas. The Barbary pirates were the naval forces of rogue North African Muslim states that preyed upon shipping in the Mediterranean. The United States was one of the countries that paid protection money to these states until President Thomas Jefferson threw doubt upon the practice, provoking Tripoli to declare war on America in 1801. An American squadron fought Tripoli until a compromise was reached in 1805, but a second round in 1815 was required to finish off the pirate menace. The war with Britain was largely the result of the high-handed actions of the Royal Navy during the Napoleonic Wars. When the conflict began the United States had 17 warships to Britain’s 719. The Americans distinguished themselves in battles on Lake Erie and Lake Champlain and in frigate actions at sea, although the Royal Navy was able to blockade the American coast, burn Washington, and bombard Baltimore.

First Barbary War

TRIPOLI HARBOR

<table>
<thead>
<tr>
<th>Date</th>
<th>August 3, 1804</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces</td>
<td>Americans: 1 frigate, 6 gunboats, 2 bomb-ketches; Libyans: 11 gunboats</td>
</tr>
<tr>
<td>Losses</td>
<td>Americans: none; Libyans: 3 boats sunk, 3 captured</td>
</tr>
<tr>
<td>Location</td>
<td>Tripoli harbor, Libya</td>
</tr>
</tbody>
</table>

In June 1803, Commodore Edward Preble was put in command of the squadron of ships sent by the United States to the Mediterranean to deal with the problem of piracy promoted by North African Barbary states. Where previous US naval commanders had concentrated on protecting American ships, Preble was determined to take the fight to the most obdurate of the pirate cities, Tripoli, which had declared war on the United States.

In the fall an American frigate, Philadelphia, ran aground off Tripoli while in hot pursuit of two pirate ships. It was captured and taken into the harbor for use as a floating battery. On February 16, 1804, a young lieutenant, Stephen Decatur, took a raiding party into the harbor at night and stormed Philadelphia, setting it ablaze so that it could be of no further use to the enemy. This action, hailed by Lord Nelson as “the most bold and daring act of the age,” made Decatur an American national hero.

On August 3, 1804, Preble launched his most determined assault on Tripoli. He sent Decatur, now a captain, with a small force of gunboats and bomb-ketches (borrowed from the Bourbon Kingdom of the Two Sicilies) to enter the shallow waters of the harbor, while the frigate Constitution bombarded Tripoli’s shore batteries and castle at long range. In the event only three of Decatur’s six gunboats succeeded in entering the harbor, where they were bounced off but her solid shot opened fire first, Constitution’s live oak hull—earning the American frigate the nickname “Old Ironsides.” When the two ships came to close action, Guerriere’s mizzenmast was quickly brought down, lying over the side of the ship. Partially out of control, the British frigate was raked by the American heavy guns and the two ships tangled together but, despite their greater numbers, the Americans failed to board, driven back by British musket fire. Casualties were heavier on Guerriere’s decks, however, with Dacres among those wounded by American musketry. When the ships eventually broke apart, Guerriere lost its other two masts and lay a defenseless hulk. Dacres struck to avoid further loss of life. The ship was too badly damaged to be saved and the Americans scuttled it the following morning.

Constitution vs Guerriere

<table>
<thead>
<tr>
<th>Date</th>
<th>August 19, 1812</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces</td>
<td>Americans: 1 frigate; British: 1 frigate</td>
</tr>
<tr>
<td>Losses</td>
<td>Americans: none; British: 1 frigate</td>
</tr>
<tr>
<td>Location</td>
<td>Off Halifax, Nova Scotia</td>
</tr>
</tbody>
</table>

Early in the War of 1812, on August 2, 1812, Captain Isaac Hull took the American heavy frigate Constitution out of Boston to harass British shipping around the Gulf of St. Lawrence. Seventeen days later, sailing back southward, he ran into the smaller 38-gun British frigate Guerriere. With full confidence in British naval superiority, Guerriere’s captain, James Dacres, was happy to fight, even though Constitution mounted 52 guns and had 476 men on board to the British frigate’s 280.

The Guerriere opened fire first, but her solid shot bounced off Constitution’s live oak hull—earning the American frigate the nickname “Old Ironsides.” When the two ships came to close action, Guerriere’s mizzenmast was quickly brought down, lying over the side of the ship. Partially out of control, the British frigate was raked by the American heavy guns and her deck swept by grapeshot. The Guerriere’s fallen mizzen mast snagged on Constitution and the two ships tangled together but, despite their greater numbers, the Americans failed to board, driven back by British musket fire. Casualties were heavier on Guerriere’s decks, however, with Dacres among those wounded by American musketry.

When the ships eventually broke apart, Guerriere lost its other two masts and lay a defenseless hulk. Dacres struck to avoid further loss of life. The ship was too badly damaged to be saved and the Americans scuttled it the following morning.

War of 1812

Constitution vs Guerriere

1779–1820

STEPHEN DECATUR

AMERICAN NAVAL COMMANDER

Born in Maryland, Decatur became a naval midshipman in 1798. After his bold action in Tripoli Harbor in 1804 he was made a captain, the youngest ever in the US Navy. Commanding the frigate United States, he captured the British frigate Macedonian in October 1812. Three years later, as commodore of a squadron in the West Indies, he was overcome by a British force and taken prisoner. After the war he commanded the American Mediterranean squadron and secured a final peace treaty with the Barbary pirates. He was killed in a duel with Commodore James Barron.
In March 1813, 27-year-old Master Commandant Oliver Hazard Perry arrived on the southern coast of Lake Erie, charged with creating a squadron of warships to win control of the lake from the British. Building ships and procuring guns and crews was a difficult task in such a remote region, but by the end of July Perry had two 20-gun square-rigged brigs, *Lawrence* and *Niagara*, supported by smaller vessels. The British, based at Amherstburg, experienced the same difficulties in building, equipping, and manning a lake fleet. Royal Navy commander Robert Barclay, a one-armed veteran of Trafalgar, had two ships that could take on Perry’s brigs, the 19-gun *Detroit* and the 15-gun *Queen Charlotte*.

**American Victory**

On the morning of September 10, the British came upon Perry’s squadron in Put-in-Bay, in the lee of South Bass Island. Sailing out of the bay in line ahead, the Americans tacked for hours to gain the weather gage. Perry and Barclay both sought a conventional battle, in which each ship would place itself alongside an opponent of similar firepower and slug it out. However, for the Americans the approach went badly wrong. Perry placed his flagship *Lawrence* alongside Barclay’s flagship *Detroit*, but Lieutenant Jesse Elliot on the *Niagara* failed to engage *Queen Charlotte*. Thus Perry soon found himself occupied with both of the largest British ships. The carnage on board *Lawrence* after two hours’ close fighting was horrendous, although the American carronades visited similar punishment upon the British. With most of his portside guns out of action, Barclay attempted to turn his ship to present the starboard broadside to the approaching American brig. For *Detroit* and *Queen Charlotte*, badly damaged and manned by mostly inexperienced crews now decimated by cannonfire, it was too complex a maneuver. The two ships ran into one another and became inextricably entangled. *Charlotte* had already lost her captain and first lieutenant; now Barclay was seriously wounded and his first lieutenant killed. Defenseless against *Niagara*’s broadsides, the two ships struck. The smaller British vessels either followed suit or were pursued and captured attempting to slip away.

The battle gave the Americans undisputed control of Lake Erie, and made a hero of Commander Perry.

**Spyglass telescope**

Retractable to a portable size, telescopes such as these were vital to the functioning of a warship. By 1813 they had impressive magnification.

**THE DECK WAS IN A SHOCKING PREDICAMENT ... THE DEAD WERE STREWED IN EVERY DIRECTION ... IT WAS IMPOSSIBLE TO TAKE THE WOUNDED BELOW AS FAST AS THEY FELL.**

DAVID BUNNELL, AMERICAN SAILOR, DESCRIBING THE SCENE ABOARD *LAWRENCE* IN HIS MEMOIRS
In summer 1814 Sir George Prevost led a British army from Canada south into New York. He halted outside Plattsburgh, waiting to be joined by a naval force under Commodore George Downie. The British naval squadron appeared off Plattsburgh on the morning of September 11, borne up the lake by a light northwesterly breeze. It was faced by a roughly comparable force of American vessels commanded by Master Commandant Thomas Macdonough. Macdonough had his four main ships—his flagship Saratoga, the brig Eagle, the schooner Ticonderoga, and the sloop Preble—anchored in a line across a shoal and a headland, with gunboats in support. Downie advanced to attack aboard the newly built 39-gun frigate Confiance, the most powerful ship in the battle. With him were the brig Linnet and two sloops, the Chub and the Finch, plus a dozen gunboats.

Saratoga and Ticonderoga were soon engaged in a ferocious exchange of broadsides in the center of the line. Macdonough was temporarily disabled twice, once when a splintered boom struck him briefly unconscious, and a second time when the head of a decapitated sailor knocked him across the deck. Downie, less fortunate, was killed when struck by a long gun that had been blown off its carriage.

DESPERATE STRUGGLE
Meanwhile, at the south end of the line, Finch was crippled by broadsides from Ticonderoga and went aground on Crab Island, but on the American side Preble took a drubbing from British gunboats and drifted out of the battle. On the other flank fighting was no less fierce. The sloop Chub drifted dismasted into the American lines and was boarded, but in an encounter between the two brigs, Eagle and Linnet, the American Eagle came off worse. After two hours’ fighting the fire began to slacken. Too many guns had been put out of action and too many men were dead or wounded. Saratoga was in poor shape, being raked by Linnet as well as facing what were left of Confiance’s guns. But Macdonough would not accept defeat and summoned a last effort to gain the initiative. His starboard batteries, facing the British, were wrecked, but his port guns remained unused and largely intact. By hauling on cables his anchored frigate was turned around so its port broadside was brought to bear upon the Confiance. The British desperately strove to turn their own frigate but the exhausted remnants of the crew could not get the ship around. At the mercy of Saratoga’s guns, Confiance struck, followed shortly by the battered Linnet.

The aftermath of the slaughter was handled with ceremonious dignity, the British officers handing their swords to Macdonough only to have them returned as a gesture of respect. As a result of the battle, Prevost abandoned his invasion of New York and the Americans were able to resist British claims to Lake Champlain and the Great Lakes in the peace negotiations.
**CONGREVE ROCKETS**

The British discovered the effectiveness of rockets in war when the weapon was used against them by the army of Mysore in India in the late 18th century. Working at the Royal Arsenal at Woolwich, William Congreve developed the type that bears his name between 1801 and 1805. Propelled by black powder, Congreve rockets had a range of up to 2 miles (3 km), although accuracy was poor and the warhead frequently exploded prematurely. The rockets could be fitted with a variety of warheads, including shrapnel and incendiary, ranging in size from 3 to 24 pounds. They were used by the Royal Navy in the Napoleonic Wars, notably at Copenhagen in 1807, and in the bombardment of Baltimore during the 1812 war with the United States—as immortalized in the line "And the rockets' red glare, the bombs bursting in air." Congreve's rockets were employed as weapons during the First Opium War, used against them by the army of Mysore in India in the late 18th century. The British discovered the effectiveness of rockets in war when the weapon was used against them by the army of Mysore in India in the late 18th century. Working at the Royal Arsenal at Woolwich, William Congreve developed the type that bears his name between 1801 and 1805. Propelled by black powder, Congreve rockets had a range of up to 2 miles (3 km), although accuracy was poor and the warhead frequently exploded prematurely. The rockets could be fitted with a variety of warheads, including shrapnel and incendiary, ranging in size from 3 to 24 pounds. They were used by the Royal Navy in the Napoleonic Wars, notably at Copenhagen in 1807, and in the bombardment of Baltimore during the 1812 war with the United States—as immortalized in the line "And the rockets' red glare, the bombs bursting in air." Congreve's rockets were employed as weapons during the First Opium War, used against them by the army of Mysore in India in the late 18th century.

**BOMBARDMENT OF BALTIMORE**

**Location** Baltimore, Maryland

After capturing and burning Washington in August 1814, the British chose Baltimore as their next target. The city was a shipbuilding center and the home port of privateers raiding British merchant shipping. The Americans had no naval force adequate to resist Vice-Admiral Sir Alexander Cochrane's North American Station fleet, but the entrance to the harbor was covered by the guns of Fort McHenry and blocked by a line of sunken merchant ships.

**DURATION** September 13–14, 1814
**FORCES**
- British: 19 ships; Americans: none
- Losses: British: none; Americans: none

**WITNESS TO WAR**

**LIEUTENANT COLONEL GEORGE ARMISTEAD**

**COMMANDER OF THE GARRISON AT FORT MCHENRY**

"One of the 24 pounders on the south-west bastion, under the immediate command of Capt. Nicholson, was dismounted by a shell, the explosion from which ... wounded several of his men; the bustle produced in removing the wounded and remounting the gun, probably induced the enemy to suspect we were in a state of confusion, as he brought in three bomb-ships to what I believed to be good striking distance. I immediately ordered a fire to be opened ... within half an hour those intruders again sheltered themselves by withdrawing beyond our reach. We gave three cheers and again ceased firing.”

**SECOND BARBARY WAR**

**ACTION OF 17 JUNE**

**Date** June 17, 1815
**FORCES**
- Americans: 3 frigates, 6 other ships; Algerians: 1 frigate
- Losses: Americans: none; Algerians: none

In March 1815 the US Congress authorized the dispatch of a naval force to North Africa, where the Barbary pirates had resumed attacks on American shipping and the capture and ransom of American sailors. Commodore Stephan Decatur reached Gibraltar with a squadron of nine ships in mid-June. Hearing that Algerian raiders were at sea, he immediately set off and on June 17 had the good fortune to sight the Meshuda, the 46-gun flagship of the Algerian admiral Rais Hammidia. They gave chase as the Algerians raced for their home port, the 38-gun frigate USS Constellation leading the pursuit.

**THE UNITED STATES AT WAR**

The Constellation succeeded in overhauling the Meshuda and her broadsides soon inflicted enough damage to convince Hammidia that Algiers was an impossibly distant refuge. The admiral turned his ship toward Spain, hoping to shelter in a neutral port. With the sloop Ontario joining the Constitution, however, Meshuda was soon closely engaged. Decatur then brought his flagship Guerriere alongside the Algerian ship and devastated it with point-blank broadsides. The Algerian admiral was killed but the crew fought on, inflicting casualties with musket fire from aloft. Finally the American sloop Epervier fired broadside after broadside into the Algerian ship, persuading the survivors to strike the colors.

Decatur sailed on to Algiers, whose bey soon accepted American terms, as did the rulers of Tripoli and Tunis. The following year, after the bombardment of Algiers by an Anglo-Dutch fleet, the privateering of the Barbary states was definitively brought to an end.
**WARS OF INDEPENDENCE**

**independence wars of independence** played the leading part in the wars of independence against Spain, naval which then fought wars among themselves to define their new borders.

Argentina was able to take control the fight. As a result of this naval victory, his squadron got by far the better of occurred on May 16. Brown had his blockade, luring the Spanish ships into May, Brown pretended to lift the protected by shore batteries. In mid-May, Brown pretended to lift the blockade, luring the Spanish ships into setting to sea, where he forced them to give battle. The fiercest engagement occurred on May 16. Brown had his leg shattered by a cannonball, but his squadron got by far the better of the fight. As a result of this naval victory, Argentina was able to take control of Montevideo.

Despite the victories of Simón Bolívar, in 1823 the independence of Colombia was still contested by Spain. Spanish forces were holding the key town of Maracaibo, by the eponymous salt-water lake. José Prudencio Padilla, commander of a Colombian naval force comprising a corvette, three brigantines, and a variety of small vessels, entered the lake from the Gulf of Venezuela to attack Maracaibo. Crossing the bar into the lake under the Spanish guns of Fort San Carlos, one of Padilla’s ships was destroyed after running aground. The Spanish sent a squadron under Angel Labrador into the lake to pursue Padilla. On July 24, in a fierce close-quarters mêlée fought more with machetes than with cannon, the Spanish were defeated despite superior numbers. Maracaibo was recaptured and Spanish forces in Colombia laid down their arms.

In 1823 the independence of Colombia was briefly comprised also Venezuela and Ecuador. The Argentinian defeat at Monte Santiago was a key step toward the foundation of Uruguay as a separate country.

**URUGUAYAN WAR OF INDEPENDENCE**

**MONTEVIDEO**

**VALDIVIA**

**CHILEAN WAR OF INDEPENDENCE**

**LAKE MARACAIBO**

**MONTE SANTIAGO**

**ARGENTINA-BRAZIL WAR**

**1775–1860**

**THOMAS COCHRANE**

**BATTLE OF LAKE MARACAIBO**

In 1814 the Argentinians, engaged in an independence war against Spain, decided they needed a naval force to contest Spanish dominance at sea. William Brown, an Irish-born seaman who had recently settled in Argentina, was placed in command of the fledgling navy. He assembled a force of seven ships, taking as his flagship the frigate Hercules. The Argentine navy was blooded on March 8 in an attack upon Isla Martin Garcia, a Spanish stronghold in the mouth of the River Uruguay. Brown then established a blockade of Montevideo, his naval force augmented by three armed merchant ships. A Spanish squadron was in the harbor, protected by shore batteries. In mid-May, Brown pretended to lift the blockade, luring the Spanish ships into setting to sea, where he forced them to give battle. The fiercest engagement occurred on May 16. Brown had his leg shattered by a cannonball, but his squadron got by far the better of the fight. As a result of this naval victory, Argentina was able to take control of Montevideo.

In Chile’s War of Independence against Spain, British admiral Sir Thomas Cochrane commanded the Chilean fleet in dashing style. He was convinced that the Spanish forces would crumble if subjected to unremitting aggression. Valdivia was the best defended Spanish stronghold in Chile – it had been compared to Gibraltar. Corral Bay, the approach to Valdivia from the sea, was protected by forts and other strongpoints mounting some 120 guns and manned by around 1,600 soldiers. Cochrane, with little over 300 men under his command and a leaky frigate O’Higgins as his sole effective warship, decided to take-Valdivia by a nighttime amphibious assault. Achieving complete surprise, the Chilenos landed in the darkness and attacked Fort Ingles, which was swiftly abandoned by its garrison. In the confusion Cochrane’s men mingled with Spanish soldiers, compounding the problems of Spanish officers attempting to organize resistance. By the end of the night the four forts on the south side of the bay were in Cochrane’s hands. Utterly demoralized, Valdivia itself surrendered shortly afterward.

Despite the victories of Simón Bolívar, in 1823 the independence of Colombia was still contested by Spain. Spanish forces were holding the key town of Maracaibo, by the eponymous salt-water lake. José Prudencio Padilla, commander of a Colombian naval force comprising a corvette, three brigantines, and a variety of small vessels, entered the lake from the Gulf of Venezuela to attack Maracaibo. Crossing the bar into the lake under the Spanish guns of Fort San Carlos, one of Padilla’s ships was destroyed after running aground. The Spanish sent a squadron under Angel Labrador into the lake to pursue Padilla. On July 24, in a fierce close-quarters mêlée fought more with machetes than with cannon, the Spanish were defeated despite superior numbers. Maracaibo was recaptured and Spanish forces in Colombia laid down their arms.

Admiral William Brown defeated a Brazilian river flotilla at Juncal in February 1827. The following April he took the brigs Republic Argentina and Independencia, plus a corvette and a schooner, out of his base at Los Pozos, evading a Brazilian blockade by hugging the coast (the Brazilian ships could not operate in the shallows). But Brown’s two brigs ran aground. Captain James Norton, commanding the Brazilian blockade squadron, brought in four shallow-draft schooners and had a frigate towed into range to bombard the grounded ships. After a hard fight they were destroyed. Brown’s other two ships escaped with heavy damage.
NAUTICAL INSTRUMENTS

BY THE 19TH CENTURY navigation at sea had reached a high level of accuracy. Previously, seamen had mostly kept within sight of shore, depending upon observation of the sun and stars for orientation. The introduction of the compass and of instruments such as the astrolabe by Chinese and Arab mariners in medieval times were major advances on which European navigators systematically built.

TYPES OF INSTRUMENT
The compass was a difficult instrument to use at sea because of subtle and complex variations between readings of magnetic and true north. European mariners had made great progress in adjusting compass readings to true north by the end of the 16th century. The navigator's other prime instruments were devices such as the astrolabe, or the more advanced sextant for measuring the altitude of heavenly bodies such as the Pole Star or the Sun at noon. With the aid of astronomical almanacs this allowed him to calculate his latitude—how far his ship was north or south of the equator. It took until the mid-18th century for longitude to be calculated accurately.

COMPASS
The magnetic compass was in use in China from the 11th century. It needed skill and experience to use a compass accurately on oceanic voyages.

MEASURING LONGITUDE
Until the 18th century calculations of longitude depended on dead reckoning—the measurement of the ship’s speed and direction of travel. This was often wildly inaccurate. A more precise calculation required the use of a clock that would keep accurate time at sea, but conventional timepieces could not cope with the movement of the ship. In response to a reward offered by the British government for solving this problem, clockmaker John Harrison produced a series of chronometers of increasing accuracy. His H4, tested on a voyage to the West Indies in 1761–62, allowed longitude to be calculated to within one nautical mile.

Marine chronometer
This sea clock was built by John Harrison in 1730–35. It was designed to achieve accurate timekeeping at sea through a series of checks and balances.

QUADRANT
The quadrant was a primitive instrument for finding the altitude of stars, including the Sun. It was hard to use accurately on a rolling ship.

SEXTANT
Invented in the mid-18th century, the sextant was a great improvement over the astrolabe for measuring the altitude of the Sun.

ASTROLABE
The astrolabe was used by medieval astronomers to observe the stars. A simplified version was adopted by mariners.

Calculating longitude
To calculate longitude, navigators used a clock set to the time at a fixed location such as Greenwich, England (GMT). If the clock was accurate, the difference between the time shown by the clock and noon corresponded to the number of degrees they had sailed east or west of Greenwich.
Later Ottoman Battles

The Ottoman Empire declined during the 18th and 19th centuries as it found itself unable to match the technological and organizational progress made by the European powers. Although still capable of defeating the similarly stagnant Venetians in the Mediterranean, the Turkish Navy had its weaknesses exposed during the wars with the expanding Russian Empire in 1768-74 and 1787-91. With the aid of foreign naval advisers, the Russians achieved a level of fighting efficiency and tactical flair far superior to that of the timidity led Ottoman fleet. Russian warships entered the Mediterranean for the first time to defeat the Turks at Chesma in 1770, and got the better of a series of engagements in the Black Sea, culminating in the victory at Tendra in 1790—despite simultaneously fighting Sweden in the Baltic. The one-sided battle of Navarino in 1827, the last fleet engagement of the age of sail, completed the humiliation of the once proud Turkish navy. The Ottomans continued to spend heavily on warships—in 1875 they had the third largest navy in the world—but they never again fought a battle at sea.

### Russo-Turkish War

#### Chesma

**Date** July 5–7, 1770  
**Location** Near island of Chios, Aegean Sea  
**Forces** Russians: 9 ships of the line, Ottomans: c.20 ships of the line  
**Losses** Russians: 1 ship of the line, Ottomans: c.19 ships of the line

After war broke out between Imperial Russia and Ottoman Turkey in 1768, two squadrons of Russian warships were sent from the Baltic Sea to the Mediterranean, under the command respectively of Admiral Grigory Spiridov and Rear Admiral John Elphinston, one of many British naval officers serving with the Russian navy. Count Alexei Grygorievich Orlov, an important figure at court, was given overall control of the naval force. His ultimate mission was to encourage a Greek revolt against Turkish rule.

On July 5, 1770, the two Russian squadrons found a Turkish fleet in Chesma Bay between the island of Chios and the Anatolian mainland. Lacking confidence in their seamanship, the Turks were anchored in two lines to form a floating battery, the ships in the second line positioned to fire through the gaps in the first. Although outnumbered, the Russian ships sailed in to attack. Spiridov's flagship Yeysafy closely engaged the Turkish flagship Real Mustafa, setting its mast on fire. Unfortunately for the Russians the blazing mast fell onto the Yeysafy and both ships were destroyed in the ensuing conflagration. Admiral Spiridov escaped, but more than 500 Russian sailors were killed.

After this engagement the Turkish fleet withdrew further into the bay, which was crowded with the ships of the line and a host of frigates, xebecs, galleys, and other smaller craft. The Russian and British officers decided to attempt a night attack. A force of four ships of the line, two frigates, a bomb boat, and four fireships was put under the command of Scottish-born commodore Samuel Greg. The force advanced into the bay at around midnight while other ships targeted shore batteries and gave supporting fire.

The mortars of the bomb boat and broadsides of the ships of the line soon took their toll and by the time the fireships were sent in, several Turkish ships of the line were destroyed or on fire. Soon the bay was a mass of blazing ships, many set alight by explosions on board their neighbors. The entire Ottoman fleet at Chesma was destroyed except for one 60-gun ship and five galleys captured by the Russians. The battle left the Russian navy in command of the Aegean Sea.

#### Tendra

**Date** September 8–9, 1790  
**Location** Off Tendra Island, Black Sea  
**Forces** Russians: 10 ships of the line, 6 frigates; Ottomans: 14 ships of the line, 8 frigates  
**Losses** Russians: none; Ottomans: 2 ships of the line

During the Russo-Turkish War of 1787-91, Russia found an inspired naval commander in Rear Admiral Fyodor Fyodorovich Ushakov, who distinguished himself in victories at Fidonisi in 1788 and the Kerch Strait in July 1790. In September 1790 Ushakov surprised the Turkish fleet at anchor off Tendra Island in the Black Sea. He immediately attacked their rear, seizing the tactical initiative. The Ottomans had a clear numerical advantage, which Ushakov countered by including three frigates in his line of battle and positioning three other frigates alongside his ships in the van, to block any Turkish effort to double the line. The Russians had the better of the exchange of broadsides and the Turks, whose ships were copper-bottomed, used their superior speed to disengage. Ushakov pursued vigorously, inflicting significant damage on a number of the departing Turkish ships.

The following day Ushakov caught up with two ships of the line. One was easily captured but the other ship, the flagship of Admiral Said Bey, held out for hours despite being surrounded by Russian guns. The ship eventually caught fire and exploded before most of the 800 crew could be taken off. This victory, costing the Ottomans 1,400 casualties and 733 prisoners, gave the Russians command of the Black Sea which was confirmed by a victory at Kaliakra the following year.

### Greek War of Independence

**The Battle of Navarino**

**Date** October 20, 1827  
**Location** Off west coast of the Peloponnese  
**Result** British, French, and Russian victory  
**Combatants**  
**Commanders** Edward Codrington, Ibrahim Pasha  
**Forces**  
**Losses**

Victory for the Great Powers  
British, French, and Russian ships attack the Ottoman-Egyptian fleet, anchored three-deep in a crescent formation at Navarino.
In July 1827 Britain, France, and Russia signed the Treaty of London, agreeing joint action to end the war in Greece, where Greek nationalists were fighting for independence from the Ottomans. The British commander-in-chief in the Mediterranean, Sir Edward Codrington, was ordered to demand that both sides observe an immediate armistice.

In September an Egyptian fleet from Alexandria anchored in Navarino Bay, the principal Ottoman naval base in the Peloponnese. Nominally part of the Ottoman Empire, Egypt had achieved a notable degree of modernization under French influence and its navy was now superior to the Turkish fleet. Admiral Codrington blockaded the harbor and sought assurances that the Egyptian ships would not be used against the Greeks. Nonetheless the ships twice sortied out of the bay and had to be shepherded back into port by Codrington.

In October Codrington was joined by the French admiral Henri de Rigny and the Russian admiral Login Heyden, creating an allied force of 10 ships of the line plus a 60-gun frigate, de Rigny’s flagship *Sirène*. Hoping to avoid a prolonged winter blockade, the admirals agreed on a bold plan of action: they would sail into the bay and anchor opposite the Ottoman-Egyptian fleet, whose commanders would be forced either to implement an armistice or have their fleet destroyed.

**NO WAY BACK**

At 2 p.m. on October 20, Codrington’s flagship *Asia* led two columns of British and French ships into the harbor, with the Russians following in the rear. It was on the face of it a desperately risky operation. The allied ships sailed between shore batteries to anchor in the middle of a horseshoe-shaped formation of Ottoman and Egyptian ships, with an onshore wind making any escape from the bay virtually impossible. But the allied commanders’ faith in the superiority of their guns and gunnery was well founded.

*Asia* anchored with a band playing on deck, hoping the Ottomans and Egyptians would not put up resistance.

In fact the fighting started almost immediately. Conducted at close range in a crowded harbor, the cannonade of the allied ships proved fearlessly effective. The Turks and Egyptians fought with courage and determination, but they lacked both adequate guns and training. Codrington’s *Asia* took on the Ottoman flagship and an Egyptian 60-gun frigate simultaneously and shattered both. It was the same story elsewhere: three-quarters of the Ottoman and Egyptian ships were sunk by enemy gunfire or by their own crews, who set them on fire or blew them up to avoid them falling into enemy hands.

The news of the Ottoman defeat at Navarino was greeted with joy by the Greeks and with defiance by the Ottoman sultan, who declared a jihad against the infidel. This precipitated a war with Russia, which the Ottomans lost, and Greece eventually gained its independence. The battle is above all remembered as the last major naval encounter of the sailing ship era.
3
1830 – 1918
STEAM AND STEEL
NEW SHIPS
The usefulness of a steam engine for making a vessel independent of the wind was obvious in the early 19th century, but the first steam boats were only suitable for rivers, lakes, and coastal waters. Steam gunboats were in use by the 1820s, but it was not until the 1860s that the new face of naval warfare began to emerge. The introduction of the first ocean-going steam warships—although fitted with sails as a supplementary form of propulsion—more or less coincided with the development of naval guns firing explosive shells and the use of iron cladding to protect wooden hulls from this augmented firepower. This revolution in warship design, which threw up numerous strange configurations and combinations, eventually settled down with the Royal Navy’s Devastation of 1873, a screw-driven steamship with an iron hull, armor, no masts or sails, and guns mounted in turrets instead of broadside. Devastation set the style for battleships, which replaced ships of the line as the fleet’s capital ships. Frigates were supplanted by cruisers, designed for duties such as convoy escort and commerce raiding. The development of torpedoes led to the introduction of light torpedo boats and also of the torpedo-boat destroyer—soon shortened to “destroyer”—which defended larger ships against torpedo attack and served as a form of torpedo boat itself. When submarines emerged as submersible torpedo boats, the basic outline of a new kind of fleet was complete.
SMARTENING UP
Crews changed as well as ships. The press-gang disappeared and was replaced either by the signing up of volunteers for long-term service, or short-term conscription as part of a wider system of universal military service. It became standard practice for navies to have uniforms for their men. The old idea of training officers and men through practical experience at sea from boyhood died out. The United States set up the Naval Academy at Annapolis in 1850; the Japanese established a cadet academy at Etajima; and even the tradition-bound British felt obliged to create a Royal Naval College at Dartmouth in the early 20th century. Special training ships came into use for ratings. Men were still taken on board at a young age and given a hard time, with lots of caning and flicking with ropes. In general, naval punishment remained harsh, although milder than in the 18th century. The German navy was atypical in still flogging its conscript ratings in 1914. But discipline in some ways became far more rigorous than before, with meticulous regard for details of personal appearance and the cleanliness and painting of ships. Harassment over such relatively minor matters, along with complaints over pay and conditions, caused occasional outbreaks of mutiny below decks. Officers in general tended to become more remote from the men than in Nelson’s day. Victorian and Edwardian navies were acutely class-conscious and promotion from the ranks was virtually non-existent.

STEAMING TO WAR
Coal-fired engines meant a new breed of engineers and stokers appeared on board, keeping the machinery going in often difficult and unpleasant conditions deep inside the ship. Armor plating left even less chance for air or natural light below decks than previously, although the introduction of electricity was a boon. Fire was less of a hazard than on wooden ships and there were no falls from rigging. But there were disturbing losses of warships to explosions, a consequence of problems with coal stocks or boilers, or with the new propellants and high explosives that sometimes proved unstable. Taking on coal was back-breaking manual labour, and the need for it limited ships’ tactical flexibility, requiring breaks from action to replenish fuel stocks from coaling ships or to put in at coaling stations. In war, engagements were fought at ever increasing range but lost none of their savagery. New munitions produced new wounds, especially flash burns that proved a major source of casualties in World War I. Officers could no longer afford to stand exposed on an open deck swept by the blast of explosions and shards of steel. The old wooden ships had been hard to sink in battle, however much punishment they took, but a steel ship might go to the bottom in minutes, especially if a magazine was hit, taking most of the crew with her.
GUNBOAT DIPLOMACY
Steam gunboats received their baptism of fire in a scattering of conflicts around the world from the 1820s to the 1860s—from the Opium War through the Crimean War to the American Civil War, which exhibited the strengths and limitations of their varieties. A complex relationship developed between the evolution of these steam warships and the rampant imperialism of the 19th century. These new technologies increased the ability of the European powers, later joined by the United States and Japan, to bully less developed nations into submission. “Sending in the gunboat” became the answer to most popular assertions of anti-imperialism. But steamships also necessitated imperial conquest, as the ships’ frequent need for refueling with coal required a global naval power to possess secure coaling stations around the world. Its later replacement with oil led Britain to put a high value upon controlling Iraqi oilfields during World War I.

RISING NAVAL POWERS
Growing rivalry between the imperialist powers gave the impetus to accelerating naval programs from the late 19th century. Up to that point Britain enjoyed unparalleled maritime dominance, not only through the Royal Navy but also through the overwhelming size of its merchant fleet and the output of its shipyards. By the 1890s, however, Britain’s naval pre-eminence was being increasingly contested, even though world trade continued to be carried mostly in British ships. The influential writings of the American naval historian Alfred Mayer Mahan voiced a widespread view that a nation’s global standing depended upon the strength of its navy. In an era of global competition, naval expansion became a popular cause promoted by jingoistic nationalists, even...
in countries with no tradition of maintaining large fleets, such as the United States and Germany. Thus a global naval arms race gathered momentum. America and Japan in particular embarked on major naval construction programs, followed by Germany. By 1914 the French had become the world’s fifth-ranking naval power. The United States flexed the muscles of its new navy in a one-sided war with Spain in 1898, and then proudly sent the “Great White Fleet” around the world in 1907–09 in a pageant of American seapower. But it was the Russo-Japanese war of 1904–05 that provided the first thorough test of the new steam-and-steel navies. At the battle of Tsushima the Japanese were triumphant in a fleet encounter consciously inspired by Trafalgar.

Big Ships and Sneaky Devices

Early 20th-century navies were involved in an arms race that led to every ship launched being bigger and more heavily armed than the last. The intense rivalry between Britain and Germany, in particular, triggered an astounding burst of naval construction, which proved one of the main causes for Britain entering World War I on the side of France.

The race started in 1906 when the Royal Navy’s HMS Dreadnought set a new standard for battleships. However, the Dreadnought was soon surpassed by the oil-fired super-dreadnoughts, such as Conqueror, while cruisers put on weight to become battlecruisers, faster ships with more powerful guns. These mighty ships attracted huge public and press interest possibly in part because of the great expense involved in their production. The main threats to these great ships—that naval commanders were well aware of—were mines and torpedoes. These were relatively cheap weapon systems against which ships had little protection.

When the long-awaited Great War came in 1914, the mighty fleets disappointed naval enthusiasts, avid for a repeat of the Battle of Trafalgar. Just as in the land war on the Western front, the new maritime technology favored defensive tactics. The threatening presence of submarines and mines militated against the bold, aggressive use of large warships. Even when sailing with a defensive screen of destroyers, battleships and battlecruisers proved vulnerable to these devices. The Royal Navy’s Grand Fleet spent much of the war out of U-boat range, only occasionally risking a foray into the North Sea. While the one full-scale encounter between the British and German fleets at Jutland in 1916 was indecisive, commerce raiding, in the form of U-boat attacks on merchant shipping, almost crippled Britain’s war effort. By the end of World War I, with experiments in flying aircraft off ships becoming more successful and techniques of submarine and anti-submarine warfare becoming ever more sophisticated, a new profile of naval war was emerging that was no longer dependent on ships engaging with another at close quarters.
BRITISH PREDOMINANCE

Britain’s Royal Navy enjoyed an overwhelming dominance at sea, but the British nonetheless had to respond to developments in naval technology if they were to stay ahead. In the mid-19th century the transition from wood and sail to steam and steel brought a period of experimentation as designers and strategists juggled with the new technological possibilities. Emperor Napoleon III’s France at first led the way with the construction of the battleship Gloire in 1859, the first ocean-going ironclad warship, sparking a brief naval race with the British—a race Britain’s industrial superiority ensured she would easily win. The success of the Monitor in the American Civil War put European navies in a flurry in the 1860s and led to a brief fashion for ramming as a style of combat. Gunports and broadsides were gradually supplanted by turret guns, and sails were somewhat reluctantly abandoned—the Royal Navy battleship Devastation launched in 1871 was the first all-steam capital ship.

By the 1880s warship design was settling down, but an arms race between the major European powers was beginning. Fear of the

NAVIES PLAYED A MARGINAL ROLE in European warfare for most of the 19th century, and sea battles were few. In the Crimean War of 1854–56 sea power was essential in enabling Britain and France to install armies in the Black Sea, but the Russian navy refused to come out and fight. The battle of Lissa in 1866 was fascinating as a ramming combat between ironclads, but irrelevant to the outcome of the war between Austria and Italy. In the Franco-Prussian War of 1870–71 French naval superiority was impotent to offset the dominance of the Prussian army. Yet navies were central to European states’ view of themselves as great powers and competition between nations provided the impetus for rapid innovation in warship design and naval armament. When new countries wanted to assert their status—Italy, unified in the 1860s, and Imperial Germany after 1871—they inevitably built fleets.

Siege of Sevastopol
The largest naval operation in the early years of steam power was the Anglo-French expedition to the Black Sea in the Crimean War. Some 89 warships and 300 transports were sent to besiege the Russian naval base at Sevastopol.

The power of naval guns
With their powerful long-range guns, warships were often used to bombard targets on shore. Here, the British paddle sloop Bulldog joins in the attack on the Russian fort at Bomarsund in the Baltic during the Crimean War.
combined naval strength of France and Russia led Britain to formally adopt the “two-power standard.” The Naval Defence Act of 1889 decreed that the Royal Navy should always be strong enough to defeat any other two navies, and pledged vast sums of public money to the construction of new battleships and cruisers. But Germany was to provide the real challenge to British naval superiority from the 1890s, when it placed its expanding industrial power behind a massive shipbuilding programme under Admiral Alfred von Tirpitz.

IMPERIAL ASSERTION

Sea travel became far more secure in the second half of the 19th century after the great powers formally renounced privateering and most piracy was quelled. As the arm of the world’s dominant shipbuilding and commercial power, the Royal Navy took the lead in charting the seas—a major project that led to safer navigation for all—and the suppression of the slave trade. But European dominance of the oceans was most often experienced by the rest of the world as straightforward bullying. This was seen at its worst in the mistreatment of China by Britain and France from the 1840s to the 1880s. As long as European powers did not fight one another, however, there was little chance for the expensive steam fleets to show their worth in battle.

**WEAPONS AND TECHNOLOGY**

**EARLY NAVAL STEAM ENGINES**

The standard propulsion system for early steamships was a paddle wheel driven by a double-acting steam engine (see below). Steam entered the cylinder alternately on the left and right, pushing the piston forward and back. The first ironclad battleships—the French *Gloire* of 1859 and British *Warrior* of 1861—combined double-acting engines with screw propellers. In the 1880s the introduction of triple-expansion engines, with three cylinders instead of one, led to a major improvement in efficiency. Whereas *Warrior’s* engine needed 5 lb (2.2 kg) of coal to generate one horsepower for an hour, the triple-expansion engine of the British pre-dreadnought *Canopus* in 1899 needed only 1.7 lb (0.75 kg). In the early 20th century Charles Parsons’s steam turbine would take steam propulsion to its peak of efficiency.
DURING THE PERIOD from 1850 to 1870, navies struggled to adapt their tactics as the switch was made to steam power, ironclad ships, and rifled guns firing explosive shells. There were few changes for the European powers to experiment with new technology in action. In 1854 Britain and France went to war against Russia in support of Ottoman Turkey. Although known as the Crimean War, this conflict was fought in the Baltic as well as the Black Sea. Confronted by the world’s two leading naval powers, Russia refused to commit its fleet to battle. Anglo-French command of the sea was essential to their land operations, but the allies had less success than hoped with the naval bombardment of land fortifications. In the 1860s Prussian ambitions to rule Germany and Italian aspirations to nationhood provoked a series of wars in which sea power was marginal. Nonetheless there were a couple of intriguing naval battles. The encounter at Heligoland was the last significant conflict between wooden ships, and the battle between Austrian and Italian fleets at Lissa was a remarkable instance of the brief fashion for ramming as the prime means of attack.

**EUROPEAN WARS: FROM SAIL TO STEAM**

**CRIMEAN WAR**

**SINOPE**

- **Date:** November 30, 1853
- **Forces:** Russians: 11 ships; Ottoman Turkish: 12 ships
- **Losses:** Russians: none; Ottoman Turkish: 11 ships sunk

Location Sinope, northern Turkey

A month after the Russian and Ottoman Empires had gone to war, a powerful Russian naval squadron under Admiral Pavel Nakhimov attacked an Ottoman force of seven frigates and five smaller ships in harbor at Sinope. Nakhimov’s squadron included Exploding shells Nakhimov’s warships open fire on the Turkish fleet in an action that, with its use of exploding shells, saw an end to the era of unarmored ships.

**SEVASTOPOL FORTS**

- **Date:** October 17, 1854
- **Forces:** British and French: 27 ships
- **Losses:** British and French: 340 casualties; Russians: 1,100 casualties

Location Sevastopol, Crimea

The siege of the Russian naval base of Sevastopol was the gruesome centerpiece of the Crimean War. The British and French fleets landed some 50,000 troops in September 1854 to besiege the city on land. The sea approach to Sevastopol Harbor ran up a narrow creek, the mouth of which was guarded by forts Constantine and Alexander and blocked by five ships of the line and two frigates sunk there by the Russians. On October 17 a combined land and sea attack on Sevastopol was attempted. The task of the British and French fleets, under Vice Admiral James Dundas and Vice Sevastopol besieged

A map of the siege of Sevastopol as it was on June 18, 1855. The Allied fleet enters the harbor to the north, while Russians flee from ruined fortifications.

**SECOND SCHLESWIG WAR**

**HELIGOLAND**

- **Date:** May 9, 1864
- **Forces:** Danish: 2 frigates, 1 corvette; Prussians and Austrians: 2 frigates, 3 gunboats
- **Losses:** Danish: none; Prussians and Austrians: 1 frigate badly damaged

Location Off Heligoland, North Sea

In 1864 Denmark fought Prussia and Austria over control of the duchies of Schleswig and Holstein. The Danes, who were superior to the Prussians at sea, blockaded ports in northern Germany with a squadron under Commodore Edouard Suenson. Captain Wilhelm von Tegelshoff took a small Austrian squadron to the North Sea to break the blockade. It encountered Suenson’s force on May 9 off the island of Heligoland, then a British possession.

Each side had two wooden-hulled steam-powered screw frigates: the Danish Niels Juel and Jylland, and the Austrian Schwarzenberg and Radetzky. The Danish steam corvette Heindall also took part in the fighting. The hostile squadrons first steamed past one another on opposite tacks shelling furiously, then maneuvered to follow a parallel course. Suenson’s Niels Juel taking on Tegelshoff’s Schwarzenberg while Jylland and Heindall engaged Radetzky. After more than two hours’ fighting, Schwarzenberg burst into flames. Unable to continue fighting, Tegelshoff fled for neutral British territorial waters around Heligoland. The Danes had also suffered damage, especially to Jylland, and withdrew for repairs. Both sides claimed a victory, the Danes having inflicted heavier casualties but the Austrians having succeeded in lifting the blockade.

Russian naval sword Though originally designed as a boarding weapon, by 1860 the naval sword was only used when going ashore or on ceremonial occasions.

Admiral Ferdinand Hamelin, was to destroy the forts at the harbor mouth. They deployed a mix of steam and sailing ships of the line, the latter moved into position by small steamers used as tugs. In a long-range exchange of fire with the shore batteries, the unarmored wooden ships proved excessively vulnerable to the Russians’ shells and red-hot shot, several being forced to leave the line. Fort Constantine suffered severe damage when a magazine exploded, but the shore batteries were still firing when the Allied fleet withdrew to lick its wounds. The long siege lasted until September 1855, when Sevastopol was finally taken by Allied land forces after heavy loss of life.
In 1866 Italy went to war with Austria in alliance with Prussia. From an Italian point of view the main aim of the war was to free Venice from Austrian rule. On July 20 an Italian fleet under Count Carlo di Persano was preparing to land troops on the island of Lissa, then part of the Austrian Empire. An Austrian fleet under Wilhelm von Tegetthoff was sent to prevent the landings.

Occurring at a transitional time in naval technology, the battle was fought by a mix of ironclads and wooden ships, all with both steam propulsion and sails, and most with guns in broadside. Tegetthoff had the weaker force, but he hoped to compensate by breaking the battle into a mêlée in which his ships might win individual duels. He arranged his fleet in a V formation, advancing toward the Italians with the ironclads in the van. Due to a confusion of orders, the Italians ended up in a ragged line with ironclads and wooden ships interspersed and a large gap between the van and the center. Toward this gap Tegetthoff gratefully plunged, braving the Italian broadsides that decapitated one of his captains but otherwise caused only limited damage.

Once at close quarters the Austrians fought with outstanding skill. Tegetthoff’s ship Erzherzog Ferdinand Max rammed two ironclads, Re d’Italia (twice) and Palestro, as well as battering them with close-range gunfire. Re d’Italia was gougéd open below the waterline by Tegetthoff’s second ramming attack and sank in two minutes. Palestro eventually exploded, killing most of its crew who had gallantly refused a chance to abandon ship. Meanwhile, the large Austrian wooden battleship Kaiser, under Captain Anton von Petz, engaged no less than four ironclads in the Italian rear. Von Petz lost his stem and bowispire ramming the Re di Portogallo and had his smokestack and mainmast shot off, but successfully withdrew his crippled ship from the battle. For his victory, Tegetthoff justly became an Austrian national hero.
**SHOT TO SHELL**

Until the 19th century naval cannon fired varieties of solid shot. Explosive shells—hot shot filled with gunpowder—were employed in land warfare, but they were thought unsafe for use at sea. From the 1830s, navies adopted shells as part of their munitions. The introduction of iron armor on warships around 1850 made solid shot obsolete—it simply bounced off the cladding. By the 1880s rifled breech loading guns firing high-explosive shells had become standard.

**OFFSHORE BOMBARDMENT**

Bombarding targets on shore has always been a major application of ships’ guns. In land warfare, mortars and howitzers were developed for the bombardment of besieged towns and fortresses. These were guns firing in a high arc, using “bombs” or explosive shells as their munitions. The French navy was the first to develop vessels designed to mount mortars in the 1680s, and was soon imitated by other navies. These bomb galiots or bomb ketches were built with reinforced structures to cope with the forces released by the guns. To avoid the danger of keeping stores of explosive shells on a vessel that had guns firing, the shells were usually carried by tenders that accompanied the bomb vessels.

**SHIP VERSUS SHIP GUN DUELS**

In the age of sail, guns on warships had a limited range. While an 18th century cannon could fire traditional solid shot up to 1 mile (1.6 km), its flat trajectory (the most accurate part of its flight) was about 656 ft (200 m). Just to be sure of the shot, however, vessels would frequently close to half that distance before opening up with huge broadsides. Different navies employed different tactics in gun engagements. The Royal Navy, for example, preferred to shoot into the enemy’s hull to kill men or sink the craft, while the French Navy frequently concentrated on masts, sails, and rigging in an attempt to hinder a ship’s maneuverability.
**GUN FOUNDING**

As the power requirements of cannon increased over the centuries, guns required corresponding strengthening to cope with the greater pressures on the breech. The search for the best cannon-founding method produced two main variants during the 18th and 19th centuries—bore drilling and Rodman casting (here seen applied to a Dahlgren Gun).

**BORE DRILLING**

The bore-drilling method was pioneered during the mid-18th century, and was a major improvement over the earlier hollow-casting method (casting the gun around a solid core, which was then removed). In bore drilling, the barrel was cast in one solid piece. Then the bore of the gun was drilled out of the metal. The problem with bore drilling was that the gun cooled from the outside in, creating weaknesses in the gun’s structure through an outer tension in the metal. This would then place limitations on the power and range of the gun.

**RODMAN CASTING**

Rodman casting was designed by Thomas Jackson Rodman, an American artilleryman. Rodman overcame the problems of bore-drilled guns by casting the cannon over an inner cooling core. This consisted of a cast iron tube, closed at one end but with inflow/outflow valves at the other, a design that allowed the operator to pump a constant flow of cooling water through the tube. The result was that the gun cooled from the inside out, meaning that each successive layer of metal that cooled contracted onto the one beneath it. The subsequent barrel was held together by compression rather than tension, making the gun much stronger and capable of taking heavier charges.

**DAHLGREN BATTERY**

Designed by American naval officer John A. Dahlgren, the bulbous breech of the Dahlgren gun allowed shells to be fired at a higher velocity and, consequently, much farther.
In November 1839, tensions arose between the British East India Company and Chinese officials, who were attempting to stop the import of opium through Canton (Guangzhou). This led to open hostilities when Chinese war junks exchanged fire with the frigate *Volage* and sloop *Hyacinth*. The British government sent a force of warships and troop transports to blockade Canton and other Chinese ports. There were further clashes with junks, but the most decisive operations involved the experimental gunboat *Nemesis*. A flat iron-hulled steam-driven paddleboat, commanded by William Hall, *Nemesis* could negotiate the shallow waters of Chinese rivers, landing troops and bombarding strongpoints. Defeat in the war forced the Chinese to cede Hong Kong to Britain and open its ports to British traders.

**HMS Nimrod**
The 18-gun sixth-rate sloop *Nimrod*, launched in 1828, was commanded by Joseph Pears during the First Opium War.

The *Nemesis* (far right) destroys a Chinese war junk with a Congreve rocket in Anson’s Bay, 1841. Also armed with 32lb and 6lb guns, she played an outstanding part in the reduction of China’s defenses during the First Opium War.

**First Opium War**

**Date**
1839–1842

**Forces**
British: 16 sailing ships, 4 steam ships, 1 iron gunboat; Chinese: unknown.

**Losses**
Unknown

**Location**
Southern China

The tradition of “sending in a gunboat” to intimidate a non-European state was established by Britain in its first Opium War with China from 1839 to 1842. The flat-hulled steam-powered iron boats became a symbol of European imperialism because of their unique effectiveness in penetrating Asian or African rivers and coastal waters that otherwise might have offered some shelter from European naval power. Yet it was the overall strength of their fleets, rather than any specific type of vessel, that allowed Britain and France in particular to project power on a global scale in the 19th century. By using their navies, these imperialist European states could often achieve their objectives by limited punitive actions, without the need for costly campaigns of conquest. Non-European countries sometimes courageously resisted intimidation—the reverse suffered by the British at the hands of the Chinese at the Dagu forts in 1859 was a reminder that the outcome of battle was never inevitable. But most encounters were one-sided, European fleets crushing technologically inferior opposition with arrogant and ruthless efficiency.

**Date**
1839–1842

**Forces**
British: 16 sailing ships, 4 steam ships, 1 iron gunboat; Chinese: unknown.

**Losses**
Unknown

**Location**
Southern China
On October 8, 1856, the Chinese authorities stopped and searched a merchant vessel, Arrow, that was later alleged to have been flying the British flag. On this flimsy pretext Britain launched a punitive action against China, soon abetted by France. On May 20, 1858, a dozen British and French gunboats bombarded the Dagu forts at the entrance to Peiho River, under Rear Admiral James Hope. This time the Chinese were better prepared. They had blocked the river in front of the forts with three lines of obstacles, including iron stakes in the riverbed and a chain stretched across the narrow channel. The forts’ guns were protected by thick earth ramparts.

The night before the assault on the forts, Hope sent a party to blow up the obstacles in the river, but it had little success. In the morning, the nine gunboats and two larger gun vessels headed into the river mouth on the flood tide. Under the guns of the forts only a few hundred yards away, they had become a slaughterhouse, only nine of her 40 crew still functioning. The gun vessel Cormorant and gunboats Kestrel and Lee were also sunk; an attempt by marines to storm the forts was a costly failure. The surviving boats withdrew in the evening. This was an unusual reverse for the Royal Navy which was avenged the following year when an Anglo-French force sacked Beijing.

**OCCUPATION WOULD GO FURTHER TO PROCLAIM OUR POWER AND ACCOMPLISH OUR ENDS.**

*Lord Palmerston, Authorizing the Occupation of Beijing*

**SECOND OPIUM WAR**

**ATTACK ON THE DAGU FORTS**

**Date** June 25, 1859  
**Forces** British: 2 gun vessels; 9 gunboats; Chinese: shore batteries  
**Losses** British: 4 ships; Chinese: unknown

Location Peiho River, northern China

owe our ends. to proclaim our power and

In 1857, during the Second Opium War, British and French warships bombarded and then occupied the port of Canton.

**Bombardment of Canton**

In December 1857, during the Second Opium War, British and French warships bombarded and then occupied the port of Canton.

**GATLING GUN**

Patented by American inventor Richard Jordan Gatling in 1862, the Gatling gun was an early machine gun that found favor with the British Royal Navy. It had multiple barrels rotated by a hand-operated crank. As each barrel came round a cartridge automatically dropped into place and the gun fired. By this method the gun could achieve an effective rate of fire of 400 rounds a minute. The Royal Navy adopted the Gatling gun as an ideal weapon to repel boarders. It was never employed in this role, but Gatling guns were fired against Egyptian forts during the bombardment of Alexandria in 1882, and Naval Brigades used them on land in various colonial wars. They were superceded by Gardner guns in the late 1880s.

**WEAPONS AND TECHNOLOGY**

Percussion pistol  

Percussion pistols shared the same design as flintlocks, but had a different firing mechanism. The hammer struck a cap containing an explosive that lit the charge in the barrel.

**Anglo-Egyptian War**

**BOMBARDMENT OF ALEXANDRIA**

**Date** July 11–13, 1882  
**Forces** British: 15 ships; Egyptians: shore batteries  
**Losses** None

Location Alexandria, Egypt

In 1882 a government took power in Egypt opposed to Anglo-French dominance of the country. In June there were riots in Alexandria and many foreign residents took refuge on British and French warships offshore. The Egyptians set about reinforcing the forts defending the port. British admiral Sir Frederick Seymour interpreted this as a hostile act and issued an ultimatum. The French dissociated themselves, leaving the Royal Navy to fight alone. The British had a varied force of ironclads, including the giant turret ship Inflexible, the most powerful warship afloat, whose captain was the future admiral of the fleet John Fisher. Seymour chose the center-battery ironclad Invincible as his flagship.

The British opened fire on the Egyptian forts at 7:00 a.m. on July 11. The shore guns returned fire and the action continued for the next ten and a half hours. Invincible and the corvette Penelope, which advanced into the harbor, both took hits, as did Inflexible, but the ships’ armor provided good protection and casualties were light. The Egyptians, by contrast, suffered grievously under the fire of the big naval guns, losing about a quarter of their defending force. The shore guns were silenced the following morning.
In search of an Asian empire, France was extending its influence over Vietnam, traditionally regarded by the Chinese as under their suzerainty. In 1883 the French took control of Tonkin, the area of Vietnam closest to the Chinese border, after a French naval squadron commanded by Rear Admiral Amédée Courbet blockaded the Vietnamese capital, Hue. Although France and China officially remained at peace, Chinese troops were sent to fight the French in Vietnam.

In August 1884 Courbet, promoted to vice admiral, took his squadron of warships north to the Chinese port of Foochow (Fuzhou). Lying on the Min River, this was the base of the Fukien Fleet, one of China’s four regional navies. After a series of humiliating defeats by European forces, the Chinese government had embarked on a policy of “self-strengthening,” which aimed to modernize its army and navy with the help of European experts. The condition of the Fukien Fleet revealed how limited the progress had been. Most of its few steamships had unarmored wooden hulls. Its only large-caliber guns were carried by its two Rendel gunboats, “flatiron” coastal defense vessels which provided a platform for one 10in gun each. Antiquated sailing junks still made up a large part of the fleet.

**IMPERIAL POWER**

Because France and China were at peace, the French were permitted to anchor their warships in the Min River among the ships of the Chinese fleet and various other European vessels. Courbet kept two of his three armored cruisers (the most powerful ships in his squadron) at the mouth of the Min River, where they played no part in the subsequent battle. One armored cruiser, *Triomphante*, and three unprotected cruisers—*D’Estaing*, *Villars*, and *Dugay-Trouin*—anchored opposite the gunboat *Chen Wei* and two Chinese wooden warships. The smaller French ships moored further up river, where the rest of the Chinese fleet, including the flagship *Yang Wu* and the flatiron gunboats, were clustered.

At 1:56 p.m. on August 23 the French opened fire without warning. Together *Triomphante* and the three unprotected cruisers mounted over 40 guns, most of larger caliber than the Chinese guns. They made short work of *Chen Wei* and the two wooden ships. On the face of it, the French ships up...
river faced a more difficult task. But the Chinese flagship was lost within minutes of the start of the action. The French had equipped two small steam launches with spar torpedoes (mines hung on long poles projecting from their bows). One of these exploded against Yang Hu's hull, sinking the vessel. The flatiron gunboats were also sunk by the fire of French guns. Some Chinese ships ran aground attempting to flee up river. The sailing junks proved perfectly useless. In an hour every Chinese ship in Foochow had been sunk or disabled and the arsenal and docks were ablaze.

News of this display of imperial naval power was greeted with joy by a jingoistic French public. Vietnam was secured for France after some harder bargaining. Britain fought three wars against the Burmese kingdom of Burma in the 19th century, the first in 1823–26, the second in 1852, and the third in 1885. The first two wars ended in compromise, but the third was followed by the annexation of Burma. The 1885 war was rooted in colonial rivalry between Britain and France. The British government suspected that Burmese King Thibaw Min was allowing his country to slip under French influence. To forestall the French they launched a military expedition to take over the country. Major General Harry Prendergast was sent from Madras to the Burmese border with an army and naval force numbering some 9,000 men. They could not advance on land through the Burmese jungle, but the Irrawaddy River offered a clear highway from the Bay of Bengal to the royal capital of Mandalay. The British-owned Irrawaddy Flotilla Company provided river steam boats and pilots for the expeditionary force. Prendergast had brought with him 24 Maxim guns, the first ever appearance of these belt-fed machine guns in military service. They were mounted on steamers to provide formidable firepower.

Min was allowing his country to slip under French influence. To forestall the French they launched a military expedition to take over the country. Major General Harry Prendergast was sent from Madras to the Burmese border with an army and naval force numbering some 9,000 men. They could not advance on land through the Burmese jungle, but the Irrawaddy River offered a clear highway from the Bay of Bengal to the royal capital of Mandalay. The British-owned Irrawaddy Flotilla Company provided river steam boats and pilots for the expeditionary force. Prendergast had brought with him 24 Maxim guns, the first ever appearance of these belt-fed machine guns in military service. They were mounted on steamers to provide formidable firepower.

The Anglo-Zanzibar conflict of 1896 was the shortest war in recorded history and the ultimate exercise of “gunboat diplomacy.” The island of Zanzibar was a British protectorate, its sultan Hamud bin Muhammed, was preempted by Hamid bin Thuwaini’s nephew Khalid bin Bargash, who established himself in the royal palace with several thousand armed followers in what amounted to a coup d’état. The Royal Navy had two ships at Zanzibar, the third-class cruiser Philomel and the gunboat Thrush. These were joined by the sloop Sparrow and a body of Royal Marines was put ashore. Rear Admiral Harry Rawson then arrived on board the Cape Station flagship St. George, a thoroughly modern first-class cruiser with 9.2in main armament, accompanied by the torpedo cruiser Raison. The Zanzibar navy consisted of a single British-built armed yacht, Glasgow, which was anchored in front of the palace.

Rawson presented an ultimatum: if Bargash didn’t surrender by 9:00 a.m. on August 27, the Royal Navy would open fire. The bombardment began at 9:02 a.m. The Glasgow was soon sunk and the royal palace and harem were pulverized. After some 40 minutes of destruction by the naval guns, Bargash fled to seek refuge at the German consulate and his followers raised the white flag. Around 900 people lay dead amid the ruins of the royal buildings. Hamud bin Muhammed became sultan and, out of gratitude to the British, abolished the slave trade. Zanzibar was also obliged to pay the cost of the war.
THE AMERICAS AT WAR

FROM A BROAD PERSPECTIVE of world naval history, the 19th century in the Americas is important as the period when the United States began its emergence as a major naval power. This development was slow to occur, however. Until the last decade of the century, naval operations in the Americas were on a relatively modest scale, whether involving the United States or not. Naval power played a significant role in the American Civil War of 1861 to 1865, and that conflict provided a test-bed for new technologies such as iron armor and turret guns. Yet naval encounters never involved more than a handful of ships. Some intriguing naval battles were also fought in the seas and rivers of Southern America. But it was the creation of the “New Navy” of the United States from the 1880s that was to give the continent its first world-class fleet.

LIMITED FORCE

For much of the 19th century Americans simply saw no need for substantial naval forces. The United States was not seriously threatened by external enemies and Britain’s dominant Royal Navy saw to it that the seas were safe for merchant shipping. The United States did make a gesture toward the imperialist use of naval power with the dispatch of a squadron under Commodore Matthew Perry to intimidate Japan in 1854, but Perry’s four paddle steamers would not have impressed even one of the lesser European powers. At the outbreak of the Civil War in 1861 the US Navy comprised some 90 vessels, mostly of indifferent quality and condition. The conflict was the occasion for improvisation on both sides, the South showing particular ingenuity and boldness in taking on a naval struggle for which it could hardly have been worse prepared. The Union government converted a host of steam merchantmen to naval use and instituted a blockade of Southern ports.
GLOBAL NAVY

Once the Civil War ended, the monitors, ironclads, converted merchantmen, and cruisers were sold off, mothballed, or scrapped. American naval power was allowed to run down as the country concentrated on opening up the West through railroad building and the defeat of Native American tribes.

In 1879, when the United States considered intervening in the War of the Pacific between Chile and Peru, it was unable to do so because it had no warships to match Chile’s British-supplied battleships. Yet the rapid growth of American industry was creating the technological and financial basis for a major fleet and for overseas imperial expansion. In 1883 Congress authorized the building of the United States’ first three steel cruisers, the starting point for an accelerating program that would create the New Navy. An ideology for this modern force was supplied by historian Alfred Thayer Mahan, who argued that naval power was the key to global domination and thus essential for the United States if it was to take its rightful place among the world’s great powers.

When the United States went to war with Spain in 1898, a conflict triggered by an accidental explosion on board the US battleship Maine in Havana Harbor, it gave the New Navy a chance to flex its muscles against distinctly inferior European opposition. After crushing victories at Manila Bay and off Cuba, the United States came out of the war with a permanent involvement in the Philippines and a string of island bases for its Pacific fleet, as well as assured dominance in the Caribbean. When President Teddy Roosevelt sent the “Great White Fleet” to show the Star and Stripes on a world tour in 1907, it included 16 battleships. The United States had arrived as a serious naval power.
THE AMERICAN CIVIL WAR

THE WAR Fought in 1861–65 between the 11 Confederate secessionist states of the South and the Union forces of the United States government (the North) was fueled by their opposing views on slavery. Although largely decided on land, naval warfare also played a part. The Union, by far the stronger in naval terms, established a blockade of the Southern coast. The South used fast ships to run the blockade and commerce raiders to attack Northern shipping at sea. Small flotillas of paddle-wheel steamers fought for control of the major rivers. Occurring at a transitional point in naval technology, the war spawned a variety of experimental craft, from proto-submarines—used by the South to challenge the blockade—to ironclad “monitors.” Overall, the Union had the better of the conflict at sea, as on land, because of superior resources of every kind.

A major strategic objective of the Union in the early stages of the war was to wrest control of the lower Mississippi River from the Confederates. In February 1862 Flag Officer David Farragut was entrusted with the capture of New Orleans. He was to take a task force, the West Gulf Blockading Squadron, across the sandbars at the mouth of the Mississippi and up the river past the Confederate strongholds of Fort Jackson and Fort St. Philip. The Confederates had blocked the river at the line of the forts with sunken hulls linked by a chain. In principle Farragut’s unarmored sloops would be stopped by this obstacle and pulverized by the forts’ heavy guns.

RUNNING THE GAUNTLET

Farragut had 19 barges mounting mortars capable of firing shells of up to 200 lb. He also had transports carrying 15,000 troops to attack forts on land if needed. The mortars began their bombardment on the morning of April 18. More than a thousand shells a day raining down on the forts caused much damage, but showed no signs of silencing their guns. Farragut decided to force a passage regardless.

In the early hours of April 24, in total darkness, his 17 sloops and gunboats weighed anchor and steamed up river toward the barrier. Two gunboats had earlier succeeded in raiding the obstacle and opening a small navigable passage. Through this gap the Union ships began to pass in single file. At 3:40 a.m. the moon rose and more than a hundred guns opened up from the forts upon the sloops and gunboats revealed below. The Union mortars provided counter-fire upon the batteries; a rag-tag assemblage of Confederate gunboats behind the barrier joined in the firing; and rafts heaped with burning pitch and pine were released to float down on the Yankees’ wooden ships. The ships in the center and rear of Farragut’s file took a heavy battering from the forts’ guns, but only one was disabled and two others forced to turn back.

CSS Governor Moore and CSS Jackson, cottonclads (gunboats with bales of cotton as armor) succeeded in ramming USS Varuna. The oddest vessel in the battle, CSS Manassas, a cigar-shaped ironclad ram, carried out a series of attacks before she ran aground and was destroyed by fire from the steamer USS Mississippi. On April 25 the Union squadron steamed into New Orleans. The fall of the city was a major blow to the Confederacy. Farragut was rewarded with the rank of rear-admiral—the first officer in the US Navy so designated.

THE FORCING OF THE MISSISSIPPI FORTS

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Result</th>
<th>CONFEDERACY</th>
<th>UNION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 24, 1862</td>
<td>Mississippi River near New Orleans</td>
<td>Union victory</td>
<td>John K Mitchell</td>
<td>David G Farragut</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Union</td>
<td>12 vessels including 2 ironclad rams</td>
<td>8 steam sloops, 9 gunboats, 19 mortar shrapnels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confederate state</td>
<td>Men: 782 dead and wounded</td>
<td>Men: 37 killed, 149 wounded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Union attack/landing</td>
<td>Ships: 13</td>
<td>Ships: 1</td>
</tr>
</tbody>
</table>

Pennant

This pennant belonged to the Confederate navy vessel CSS McRae which fought Farragut’s fleet at the Mississippi forts. Each star represents a Confederate state.
DAVID FARRAGUT, UNION FLAG OFFICER, WRITING IN HIS MEMOIRS

THE PASSING OF FORTS JACKSON AND ST. PHILIP WAS ONE OF THE MOST AWFUL SIGHTS I EVER SAW ...

In May 1862 Union forces advancing down the Mississippi were threatening Memphis. In their path lay Fort Pillow. Union mortar boats, defended by ironclad gunboats, bombarded the fort. Captain James E. Montgomery of the Confederate River Defense Fleet commanded a small flotilla of paddle steamers that had been converted into fighting rams by the addition of one or two guns and an iron prow. They lacked iron cladding but had cotton bales functioning as light armor.

Steaming up river, Montgomery’s ironclads encountered the Union ironclad Ciminiatti, one of the paddle-wheel gunboats known as “Pook’s Turtles” after their designer Samuel Pook. Steaming through Ciminiatti’s broadsides, three of the ironclads rammed the gunboat, which sank in shallow water. Another ironclad, Mound City, was also sunk by ramming, setting half-submerged on a sandbar. As more Union gunboats rushed to the scene, the Confederates withdrew.

The skirmish at Plum Run Bend gave a welcome boost to Confederate morale but failed to affect the course of the river war. Fort Pillow was abandoned within a month.

Battle of the ironclads
Union ironclad gunboats fired salvos into the Confederate fleet, bringing a swift end to the battle of Memphis.

Montgomery’s ironclads, victors of Plum Run Bend, steamed out to meet them, watched by a crowd of Memphis residents ready to cheer a Confederate triumph. But it was not to be.

Union rams, captained by Charles Ellet and his brother Alfred, collided with the van of the Confederate force at 15 knots. Two ironclads were holed and crippled. The Union ironclads gunboats followed, firing salvos that sank one Confederate vessel and disabled three others. After two hours’ fighting, the Confederate fleet had ceased to exist, losing 180 men and only one ship escaping down river. Charles Ellet was the only casualty on the Union side. Memphis was occupied and stars and stripes raised over the Confederate city.

Mississippi Forts
After a week-long barrage of the forts by Union mortar schooners, Farragut’s plan came to fruition on April 20, when an opening was made in the barrier crossing the river. The Union ships then had to pass the forts, which together mounted 139 guns, 39 howitzers, and 25 mortars.
In preparation for an attack upon the Confederate port of Charleston, Rear Admiral Samuel Francis du Pont’s South Atlantic Blockading Squadron attempted to overcome the defenses of Charleston harbor by naval bombardment. Seven monitors and the ironclads New Ironsides and Keokuk crossed the harbor bar on April 6, 1863, but poor visibility delayed the attack until the following morning. The Confederate defenses were excellently prepared. The channel into the harbor was blocked with obstacles and “torpedoes” (mines), while the gunners in Fort Sumter and Fort Moultrie had taken measures to ensure that their fire was accurate and deadly. The monitor Weehawken was first to open fire on the forts with her Dahlgren guns, but she was soon taking hits on her armor, as well as having a torpedo explode beneath her. The unfortunate Keokuk found herself swept into the van on the flood tide. Her experimental armor (she was dubbed a “tinclad”) was quickly holed. In all, the shore batteries fired 2,200 shots, achieving 440 hits, while the ships only managed to fire 154 shots before retiring for the day. Keokuk sank the following morning and the assault on the forts was abandoned.

The Confederate steam sloop Alabama was a highly successful commerce raider. Commanded by Captain Raphael Semmes, she sank more than 60 merchant ships. On June 14, 1864 she was trapped in the French port of Cherbourg by the Union sloop Kearsarge under Captain John Winslow. Five days later Semmes boldly came out to fight. The engagement lasted 70 minutes. The two ships steamed in opposite directions in narrowing circles, pounding one another with shot and shell. Kearsarge was armored with iron chains; Alabama was not. Holed and taking water, Alabama struck shortly before sinking. Semmes was among the 38 men saved by a private yacht.
SHOT AFTER SHOT WAS SEEN TO STRIKE, AND SHELLS TO EXPLODE ... BUT THEIR SIDES BEING HEAVILY PROTECTED ... NO VITAL BLOW COULD BE INFlicted.

GENERAL RICHARD L PAGE, COMMANDER OF FORT MORGAN

proved a tough opponent to overcome. Three of the Union screw-sloops, including Farragut’s Hartford, rammed the Confederate levathan, but suffered more damage than they caused. The monitors Chickasaw and Manhattan moved in to fire their heavy guns at point-blank range, finally succeeding in blowing a hole in Tennessee’s armor.

Buchanan, himself wounded, at last ordered a white flag flown from the battered, disabled ironclad, bringing the battle of Mobile Bay to a close. Over the following weeks, Union army and naval forces captured the forts at the mouth of the bay, completing the blockade of Mobile, which itself stayed in Confederate hands.

1801–1870
DAVID G. FARRAGUT
THE FIRST ADMIRAL OF THE US NAVY

Tennessee-born David Farragut was a midshipman in the US Navy aged nine, and, during the 1812 War with Britain, commanded a prize vessel at the age of 12. He saw further action in the Mexican War of 1846–48. Although born and bred a southerner, in the Civil War he opted for the Union and distinguished himself in the running of the forts to New Orleans in 1862. The assault on Mobile Bay, in 1864, was his finest hour. He was rewarded with the title of admiral in 1866, the first man to hold that rank in the US Navy.
On April 24, 1862, Commodore Farragut of the United States Navy sent his West Gulf Blockading Squadron of nine gunboats, eight steamboats, and several mortar vessels up the Mississippi to wrest New Orleans from Confederate control. The city fell peacefully, but Farragut's squadron endured a vicious bombardment from the Confederate strongholds, forts Jackson (left) and St. Philip.
Point-blank range
Monitor (right) opens fire with one of its Dahlgren guns at point-blank range. The Virginia’s barbette is riddled with damage, and its smokestack is shattered. It also takes fire from Union frigates.

Crew of USS Monitor
The Monitor had a crew of 59 officers and men, some of whom are gathered here on its deck. A gunner stands on the turret, which houses two 11in Dahlgren smoothbores.
THE AMERICAN CIVIL WAR

Faced with overwhelming Union naval superiority and a blockade of its coasts, the Confederacy sought salvation in new technology: ironclad warships. Building upon the half-burned hull of the steam frigate USS Merrimack, captured at Gosport in the first days of the Civil War, the Confederates created a ship completely covered down to the waterline in 4in (102mm) thick iron plates. On March 8, 1862, this sinister, ungainly fighting machine, renamed CSS Virginia, steamed out from Norfolk Navy Yard to challenge the Union frigates blockading the Hampton Roads.

HISTORIC ENCOUNTER

Although it carried 12 assorted guns (four rifles, two howitzers, and six Dahlgren smoothbores), Virginia’s chief weapon was an iron ram, created in response to rumors that the Union, too, had an ironclad—one that might resist Virginia’s guns. Virginia’s captain, 61-year-old Franklin Buchanan, had orders to effect “prompt and successful action.” Without hesitation he set his course directly for the wooden frigate USS Cumberland. Steaming inexorably forward, immune to Cumberland’s broadsides, Virginia smashed its ram into the frigate’s hull. As Cumberland sank, the ironclad was almost dragged to the bottom, disengaging at the expense of snapping the ram. Virginia’s next victim was USS Congress. Deliberately run aground to escape ramming, the frigate provided target practice for Virginia’s gunners. Congress eventually struck its colors but Virginia’s acceptance of the surrender was interrupted by fire from Union soldiers on shore. Buchanan himself was shot in the leg—the limb was later amputated. Before handing over command, he angrily ordered his gunners to fire on Congress with heated iron shot, setting it aflame.

By the end of the day yet another Union frigate, Minnesota, was aground and at Virginia’s mercy. The ironclad, now under Lieutenant Catesby ap Roger Jones, retired to rest its crew, intending to finish the job the following day. This it would undoubtedly have done but for the timely arrival (for the Union) of an even stranger vessel. Aware of the Confederates’ progress with Virginia, the Union had indeed rushed to complete its own revolutionary ironclad. USS Monitor, towed south from New York, with no time for sea trials and an inexperienced crew, reached the Hampton Roads on the

DURING THE ACTION THEY CHEERED AND CHEERED AGAIN. THEIR COOLNESS AND SKILL WERE THE MORE REMARKABLE FROM THE FACT THAT THE GREAT MAJORITY OF THEM WERE UNDER FIRE FOR THE FIRST TIME.

LIEUTENANT CATESBY AP ROGER JONES, WRITING OF HIS CREW ABOARD VIRGINIA
night of March 8–9. She was a semi-submerged armored raft designed by Swedish engineer John Ericsson, driven by Ericsson’s novel marine screw, and topped by a revolving iron gun turret containing two 11 in smoothbore Dahlgren guns. The latter had reinforcing muzzle swells that permitted large amounts of explosives to be used without fear of the guns exploding (and gave them a soda-bottle shape), the pair aboard Monitor being of a higher caliber than the two aboard Virginia. Unlike her opponent, which was simply a wooden ship dressed in iron, Monitor was the first truly semi-submersible warship, having all of her features underwater save for the turret and a tiny pilothouse up front.

that permitted large amounts of explosives to be used without fear of the guns exploding (and gave them a soda-bottle shape), the pair aboard Monitor being of a higher caliber than the two aboard Virginia. Unlike her opponent, which was simply a wooden ship dressed in iron, Monitor was the first truly semi-submersible warship, having all of her features underwater save for the turret and a tiny pilothouse up front.

The duel that followed the next day, when Virginia steamed out and found Monitor defending Minnesota, may rank as the oddest in naval history. For four hours the two ships blasted at one another at close range, producing little more than dents in their iron armor. Visibility was poor for commanders and gunners on both ships. Monitor suffered problems with its turret, which had to be kept permanently rotating, firing as it turned. Virginia had the disadvantage of a V-shaped hull (Monitor was flat-bottomed) and at one point ran aground, refloating with a supreme effort of her overstretched engines. Ramming proved as ineffectual as gunfire. A shell exploded on the eyeslit of Monitor’s cramped pilothouse, and its captain, John L. Worden, was burned in the face and blinded. But his first officer, Samuel D. Green, continued the fight, and in the afternoon Virginia withdrew to port.

Over the following two months Virginia made occasional sorties into Hampton Roads, but the epic duel was not repeated. Both sides claimed victory, but with the blockade still intact, the strategic balance remained in the Union’s favor. When he heard of the engagement, Monitor’s designer John Ericsson criticized the crew for firing only solid shot at Virginia’s upper works, claiming that firing explosive shells beneath the waterline would have sunk the Confederate ship. Nevertheless, neither ironclad survived the year. Virginia was scuttled by her commander in May 1861 when the course of the land battle forced the Confederates to abandon Portsmouth. Monitor, which was never truly seaworthy, sank on December 31 while under tow in an Atlantic gale.

Duel in Hampton Roads
Virginia (right) fires its 7 in stern and casemate guns, while Monitor fires its 11-in turret equivalents. Virginia’s use of molten shot enhanced the need for ships to be made of iron.
THE AMERICAN CIVIL WAR

THE FIRST DAY
On the morning of March 8, 1862, Confederate ironclad CSS Virginia steams into Hampton Roads in an attempt to break the Union blockade. The Virginia sinks two Union frigates before retreating under the protection of the guns at Sewell’s Point.

MONITOR VS VIRGINIA
During the night, Union ironclad USS Monitor arrives at Hampton Roads. The next morning, as the Virginia steams out to finish off the damaged Union frigate Minnesota, the Monitor and the Virginia meet in the first clash of the ironclad warships.

IRONCLAD DEADLOCK
After freeing herself from the shoals, the Virginia attempts to ram the Monitor. With neither ironclad able to cause significant damage to the other, the ships finally withdraw. The inconclusive battle leads to a standoff lasting several months.

NEWPORT NEWS

Shoals

Congress

Minnesota

Shoals

Virginia

Monitor

Shoals

Hampton Roads

St. Lawrence

The Virginia rams and sinks the Union frigate Cumberland before firing on the Congress, which later explodes.

While Virginia engages the Union squadron, several ships of the James River Squadron slip past the Union gun batteries to the safety of Sewell’s Point.

Virginia’s consorts obey the call to come to the aid of the grounded ironclad.

When the Monitor withdraws, Virginia steams toward Minnesota for a final attack, before abandoning the attempt due to falling water levels.

The Monitor and the Monitor duel for several hours before Virginia runs aground.

The Monitor takes up a position behind the Virginia and pours fire into the grounded ironclad.

The Virginia moves to attack the grounded Minnesota, before retreating for the night past Sewell’s Point.

The Virginia and the Monitor duel for several hours before Virginia runs aground.

The Virginia moves to attack the grounded Minnesota, before retreating for the night past Sewell’s Point.

The Monitor takes up a position behind the Virginia and pours fire into the grounded ironclad.

Virginia’s consorts obey the call to come to the aid of the grounded ironclad.
SPANISH AND LATIN-AMERICAN CONFLICTS

FROM THE 1840s to the 1890s the countries of Central and South America fought a number of wars that involved naval action. None of the naval conflicts was contested on a large scale, but some were of technical interest, providing a testing ground for the latest naval technology—the firing of a warship by a torpedo—that took place during the Chilean Civil War of 1891. The war that broke out between Spain and the United States in 1898, however, marked a major historical transition. The war was precipitated by the explosion of the battleship Maine in Havana Harbor—an event that was almost certainly an accident, but which was blamed by the Americans on the Spanish authorities, thus providing the former with a pretext for war. Two one-sided naval battles, at Santiago de Cuba and Manila Bay, to a large degree determined the war’s outcome. As a result of the conflict the United States effectively replaced Spain as the imperial power in Cuba and the Philippines. At the same time, the naval battles confirmed the terminal decline of the Spanish navy and the emergence of the United States as a potentially major naval power.

**TEXAS-MEXICAN WARS**

**CAMPECHE**

Date: April 30 and May 16, 1843

**Forces**

- **Texans**: 4 sailing ships
- **Peruvians**: 1 armored frigate

**Location**

Bay of Campeche, Mexico

In 1843 Texas was a self-declared republic whose independence was not recognized by Mexico. The Texan navy was in poor shape, its crews unpaid and mutinous. Its commander, Commodore Edwin Ward Moore, sought to fund the navy by selling its services to Yucatán, also fighting for independence from Mexico. In April 1843 Moore sailed from New Orleans for the Yucatán port of Campeche, under blockade by the Mexican navy. Mexico had recently bought the British-built, iron-hulled, paddle-wheel frigate Guadalupe, the largest iron ship in the world. Guadalupe was supported by the ironclad steamer Moctezuma. Commanded by Commodore Thomas Marin, the Mexican ironclads were mostly manned by British officers and crews. The Texans had only wooden sailing ships, including Moore’s flagship, the sloop-of-war Austin, and the brig Wharton. Joined by two schooners of the Yucatán navy, Moore met the Mexican steamships off Campeche on April 30. The two-hour running battle was indecisive, but the Texans broke through the blockade and entered Campeche for rest and repairs.

Over the next two weeks the Texan sailing ships had long-range guns added to their armament, for they had had difficulty closing with the steam-driven ships. On May 16 Moore led his ships out of Campeche to renew battle. This time the fighting lasted three hours. Austin was badly damaged, but the Texan broadsides caused far heavier casualties. The Texans had the better of the two encounters, justifying the description of Campeche as the only battle in which sail defeated steam.

**WAR OF THE PACIFIC**

**QUIQUE**

Date: May 21, 1879

**Forces**

- **Chilians**: 1 corvette
- **Peruvians**: 1 armed frigate

**Location**

Iquique, Peru

During the war between Chile and Peru in 1879, the Chilean navy left two obsolescent wooden steamships, the corvette Esmeralda and the schooner Covadonga, blocking the Peruvian port of Iquique. They were surprised by two Peruvian ironclads, the armored frigate Independencia and the monitor Huascar. Esmeralda became trapped between the Peruvian shore batteries and Huascar, and although most of her crew were killed or wounded, her captain, Arturo Prat, refused to surrender. When Huascar rammed the corvette, Prat led his surviving crew in an attempt to board the monitor. He was killed on its deck with a blow from an ax. Meanwhile, Covadonga fought a skilful running battle with Independencia, exploiting its shallow draft to lure the Peruvian ship into going aground. Covadonga was then able to batter Independencia with her guns. The Peruvians scuttled the ship while Covadonga escaped southward. On balance, the battle was a victory for Chile.

**Battle hero**

This medal commemorates the death of Chilian captain Arturo Prat, who died boarding the Peruvian monitor Huascar.
When war broke out between the United States and Spain in April 1898, Spanish admiral Pascual Cervera was ordered to protect his country’s West Indian colonies from American attack. This was a poor decision, for the forces at Cervera’s disposal were inadequate to confront the battleships of the US “New Navy”—deficiencies ranging from faulty boilers to missing guns and dud ammunition. Nevertheless, Cervera anchored his squadron of armed cruisers and destroyers at Santiago de Cuba, where it was swiftly blockaded by the Americans.

The commander of the American Atlantic Squadron, Admiral William T. Sampson, had no intention of attacking the Spanish in harbor, where they were defended by shore batteries and mines, leaving Cervera with the slim hope that bad weather might interrupt the blockade. By July, however, American land forces were also threatening Santiago, so the Spanish admiral made the decision to attempt a breakout. Cervera chose the morning of July 3 for the attempt. He had the good fortune of selecting the morning when Admiral Sampson, aboard the armored cruiser New York, was heading off to meet with US Army commanders. New York was far from its blockade station when, at around 9:30 a.m., the Spanish were spotted steaming out of harbor, with Cervera’s flagship, the cruiser Infanta Maria Teresa, leading the line.

Cervera’s only hope lay in speed. In principle, the Spanish ships had a fair chance of outrunning the blockade force once they were clear. In Sampson’s absence, command of the American squadron devolved to Commodore Winfield Scott Schley aboard the armored cruiser Brooklyn. As the Spanish steamed southward close to the shore, Schley maneuvered so radically that he nearly collided with the battleship Texas. But Brooklyn was soon engaging Maria Teresa, which sought to hold off the enemy as the other ships slipped away. The battle quickly degenerated into a debacle for the Spanish. Cervera’s flagship was battered by Brooklyn’s guns and ran aground. Another armored cruiser, Vizcaya, valiantly duelled with Brooklyn and the battleship Texas for over an hour, until it too was grounded. Oropesa was disabled and scuttled. The Spanish destroyers succumbed to the battleships Iowa and Indiana, and of New York hurrying to join the action. Only the cruiser Cristóbal Colón broke the blockade, but was overhauled by Oregon after a 50-mile (80km) chase.

American medal
Commemorating the destruction of the Spanish fleet at Santiago de Cuba, this medal shows a broadside view of USS Brooklyn under steam.

The battleship Texas. But Brooklyn was soon engaging Maria Teresa, which sought to hold off the enemy as the other ships slipped away. The battle quickly degenerated into a debacle for the Spanish. Cervera’s flagship was battered by Brooklyn’s guns and ran aground. Another armored cruiser, Vizcaya, valiantly duelled with Brooklyn and the battleship Texas for over an hour, until it too was grounded. Oropesa was disabled and scuttled. The Spanish destroyers succumbed to the battleships Iowa and Indiana, and of New York hurrying to join the action. Only the cruiser Cristóbal Colón broke the blockade, but was overhauled by Oregon after a 50-mile (80km) chase.

Nothing can be expected of this expedition except the total destruction of the fleet or its hasty and demoralized return.

Spanish admiral Pascual Cervera, before the battle of Santiago de Cuba.

Spanish wreck
The Spanish unprotected cruiser Reina Mercedes was one of the ships trapped by the American blockading force in Santiago de Cuba. It was sunk during a bombardment on 6 June 1898.
WEAPONS AND TECHNOLOGY

BREECH-LOADING GUNS

In the mid-19th century the breech-loading rifled cannon began to replace the muzzle-loader, which took longer to load, was difficult to clean, and could mistakenly be double-loaded, as happened aboard HMS Thunderer in 1879, causing terrible loss of life. But breech-loaders had dangers of their own, and only became reliable with the invention of the interrupted screw and the French-designed De Bange obturation system. The former allowed the breech to be opened and closed quickly, while the latter created an airtight seal, preventing dangerous propellant gases escaping through the breech when firing.

Interrupted screw
This features a screw thread that has sections cut away lengthwise. This allows the breech block to be fully inserted into the barrel before being quarter-turned shut.

Sealing the breech
Both the interrupted screw and the obturator pad are visible in the breech of this gun aboard HMS Ganges.

Interrupted screw
This features a screw thread that has sections cut away lengthwise. This allows the breech block to be fully inserted into the barrel before being quarter-turned shut.

De Bange obturation
The explosion of the propellant throws pressure against a mushroom-shaped spindle in the center of the breech block. This forces the spindle against a rubber obturator pad, which expands, sealing the breech.

Mushroom-shaped spindle
in center of breech block
presses against rubber pad

Explosion applies pressure to spindle

Rubber obturator pad

Direction of shell

Interrupted screw

A quarter-turn of handle turns screw

Breech block

Handle to insert or withdraw screw

Section of thread cut away

Interrupted grooves in barrel walls accept sections of thread from interrupted screw

BREECH OPEN

BREECH CLOSED

THETHE BATTLE OF MANILA BAY

Date
May 1, 1898

Location
Off Cavite, Philippines

Result
American victory

COMBATANTS

UNITED STATES
George Dewey

SPAIN
Patricio Montojo y Pasaron

FORCES

Ships: 6 warships,
3 support vessels

Men: 9 minor casualties

Ships: none

Men: 381 men killed or wounded

Ships: 7 ships lost

LOSSES
On April 27, 1898, Commodore George Dewey, commanding the US Asiatic Squadron anchored in Mirs Bay, China, received a cable from Navy Secretary John D Long: “War has commenced between the United States and Spain. Proceed at once to Philippine islands.” Dewey had been expecting this order, but his preparations had been hampered by logistical problems. The nearest US base was in California, and his cruisers had only 60 percent of their optimum ammunition supply—even less than the standard peacetime allotment. Dewey’s mission was to attack Spain’s fleet in the Philippines, which, it was correctly assumed, would stay inshore, depending on land batteries, for defence against the better-armored, heavier-gunned American ships. Spanish admiral Patricio Montojo originally planned to anchor in Subic Bay, north of Manila, but as shore batteries had negligently not been mounted there, he instead awaited the Americans in Manila Bay. Montojo chose not to fight in front of Manila, where a battle would have caused many civilian casualties. Instead, he anchored off Cavite Naval Yard, in shallow water so that his sailors would have a better chance of survival when their ships sank. Defeating the Americans was not an objective; for Montojo the fight was for the honor of the Spanish Empire.

On the night of April 30, on board the protected cruiser Olympia, Commodore Dewey led his squadron into Boca Grande channel, steaming in column with all but stern lights extinguished. Tension was high, for there had been reports that the channel was mined and defended by shore batteries. Their presence was revealed when a support vessel’s smokestack flared with fire, but this brought only a brief exchange with guns on El Fraile island. By 1:00 a.m. Dewey’s squadron was safely inside Manila Bay. The battle between the two ill-matched naval squadrons began after dawn. After finding only merchant ships at Manila, Dewey led his cruisers toward Cavite in line ahead, a leadsman calling the depth at Olympia’s bow.

**The Storm of Shot and Shell Launched Against the Spaniard Was Destructive Beyond All Description.**

*J.L. Stickney, Lieutenant Aboard Olympia, in a Newspaper Article, 1898*
The Spanish battery on Sangle Point and Montojo’s ships opened fire while still well out of range. Aware of his shortage of shells, Dewey waited half an hour before giving the laconic order to *Olympia*’s captain “You may fire when ready, Gridley.” The American cruisers steamed back and forth on a course parallel to the static Spanish line, battering the enemy ships successively with port and starboard guns. By the fifth pass, just after 7:00 a.m., the Americans, peering through dense smoke, saw little sign that their guns were having any great effect. And indeed their fire was woefully inaccurate, 99 out of 100 shots missing their target, the increased range of contemporary guns having outstripped techniques for aiming. Nonetheless, Montojo’s ships had taken appalling punishment.

At 7:35 a.m. Dewey received the startling news that his 5in guns were running short of ammunition. He signaled for a withdrawal to the center of the bay. His surprised crew were told this was a halt for breakfast, and took the chance to rest and eat.

**FINAL PHASE**

During the break, the smoke cleared, and the dire condition of the Spanish ships was revealed; most had been fatally mauled. And to make matters worse, the Americans’ ammunition turned out to be plentiful; only 15 rounds per 5in gun had been fired, while the report had suggested only 15 rounds per 5in gun remained. American casualties were also minimal; nine men had been injured, and one, Chief Engineer Randall, had died of heart failure when the fleet had entered the bay.

At 11:15 a.m., led by the cruiser *Baltimore*, Dewey’s squadron returned to finish the job. With little resistance they pummeled the ships and shore batteries into surrender. In the afternoon, the Americans anchored off Manila and entertained Spanish sightseers gathered on the waterfront with the music of their bands.
THE AMERICANS ARRIVE
After taking fire from the Spanish battery on El Fraile island, the Americans head for Manila. Finding no Spanish warships there, they continue to the port of Cavite where the Spanish fleet is waiting. The engagement begins at 5:15 a.m.

BREAKFAST BREAK
After five passes, which effectively destroy the Spanish fleet, Dewey breaks off the attack, fearing he is low on ammunition. Meanwhile, the Spanish flagship Reina Cristina is scuttled, and Montojo transfers his flag to the Isla de Cuba.

SPAIN DEFEATED
After a four-hour break, the Americans return. A report by the Petrel is followed by a second American attack; this time led by the Baltimore. The remaining Spanish vessels are destroyed and the guns of the Cavite fortifications are silenced.
JAPAN’S IMPERIAL NAVY had an extraordinarily brief lifespan. Created in the late 1860s and first blooded in battle against China in 1894, it grew to be the world’s third greatest naval force before abruptly ceasing to exist after the total defeat of Japan in 1945. The Imperial Navy was conceived as part of a wider project to modernize Japan and challenge the supremacy of the European powers and the United States. Its great victory over the Russian navy at Tsushima in 1905 was a stunning rebuff to prevailing assumptions of white racial superiority. The Imperial Navy embodied both Japan’s impressive ability to adopt Western technology and its own warrior tradition, which gave Japanese forces their particular spirit of disciplined, sometimes fatalistic self-sacrifice.

BORN OF HUMILIATION
When Commodore Matthew Perry anchored four American steam warships off Edo—modern-day Tokyo—in July 1853, Japan had no national navy with which to repel this foreign intrusion. Its defenselessness was soon exploited, as the United States was joined by Britain, France, and the Netherlands in bullying a country for whose traditions they had no respect. In 1863 the British Royal Navy bombarded the Japanese city of Kagoshima, and the following year an international force shelled rebels opposed to foreign influence at Shimonoseki. These humiliations set in train a process of upheaval in Japan that resulted in the restoration of a strong central government under Emperor Meiji and the crushing of the samurai clans who opposed this. Japan then embarked on a breakneck rush to modernization in order to take on the West on its own terms.

During the civil strife surrounding the Meiji Restoration, an ad-hoc Imperial Navy was created from assorted ships of samurai clans...
supporting the emperor. The foundations for a modern navy were laid after the establishment of a Navy Department in 1872, which set about creating Western-style naval dockyards, a naval academy, and an arsenal. At first Japan was totally dependent upon a transfer of technology and skills from the West. Britain’s Royal Navy provided cadet training and British shipyards supplied most of Japan’s early warships. The Japanese proved supremely good learners in naval as in other matters and the scope of their ambitions was soon apparent. In 1885 Japan took delivery of two steel cruisers that were the largest and most advanced vessels of their type in the world. By the 1890s Japanese shipyards had begun delivering home-built armored warships.

NAVAL POWER
The ethos of the new Imperial Japanese Navy was formed through a mix British influence—Japan’s greatest admiral Togo Heihachiro consciously modeled himself upon Nelson—and of the samurai tradition of loyalty to the death. Japan was historically inclined to value its army far above its navy; only the Satsuma samurai clan had a naval tradition. But the defeat of China at sea in the Sino-Japanese war of 1894–95 raised the reputation of the Imperial Navy at home and abroad. Naval strength became the key to the acceptance of Japan as a major power on the world stage, in defiance of Western racial prejudice. The British, worried by the Royal Navy’s inability to match combined French and Russian sea power in the Pacific, concluded a defensive alliance with Japan in January 1902. From Britain’s point of view this was a practical solution to the problem of finding a Pacific naval ally. To the Japanese it was above all about achieving the right to respect as equals of the West.

Bolstered by the alliance with Britain, in 1904–05 Japan took on and beat the Russian Empire both on land and at sea—beginning the conflict with a surprise attack on Port Arthur without a declaration of war, an ominous prefigurement of Pearl Harbor in 1941. The Russo-Japanese War was a triumph for Japan and a proving ground for cutting-edge naval technology, at least on the Japanese side. The war showed the importance of wireless communications, possessed by the Japanese but not by the Russians. It showed the frightful potential of mines, which sunk battleships on both sides, and the possible uses of torpedofiring destroyers. Above all, it showed the devastating effect of the latest naval guns with advanced fire control, delivering concentrated fire at long range with explosive shells.

The period of peace in Japan after 1905 saw cutbacks in naval spending, but even so the first Japanese-built dreadnought was launched in 1910 and bigger and better warships followed. The startling reversal of Japan’s naval weakness of only half a century before was illustrated in World War I, when Japan was able to help out its overstretched ally Britain by sending destroyers to carry out anti-submarine duties in the Mediterranean. By then, however, potential conflicts of interest with Britain and the United States in the Pacific were already brewing.

WARSHIP TACTICS
CROSSING THE T

The naval battles of the 1904–05 Russo-Japanese War demonstrated the new naval tactics of fleet encounters between steam-powered warships with their guns mounted in rotating turrets. As in the age of sail, ships entered battle in line astern and they might steam parallel to each other exchanging salvoes. However, the fleet with the faster warships could potentially maneuver to cross in front of the enemy line, bringing to bear enfilading fire (directed along the enemy line) from all the guns of its line simultaneously, while the enemy could only reply with its forward guns. The range of effective fire at this period was over 3 miles (5 km). The tactic, known in English as “crossing the T” and in Japanese as sōsaku, was a textbook ideal aspired to by naval commanders the world over, but it was rarely put into practice with complete success.
Japanese naval might started its life as an ad-hoc force of mostly wooden steam warships assembled to fight the civil conflict known as the Boshin War, in which Emperor Meiji triumphed over Tokugawa loyalists in 1868-69. Over the next two decades Japan founded a modern navy complete with organizational structures copied from the British and the latest styles of warship from European shipyards. The Chinese had also been modernizing their navy and, although European observers were sceptical about the ability of either force, they were inclined to see China as the stronger naval power. In July 1894 a small-scale naval clash at Asan brought China and Japan to open war—as well as causing a diplomatic row with Britain over the Japanese sinking of a British-crewed ship carrying Chinese troops. The subsequent Japanese naval victories at the Yalu River and Weihaiwei revealed the gulf between an Asian power that was successfully modernizing and one that was not. At the end of the war Russia refused to allow Japan to take the Liaodung Peninsula and Port Arthur, which China had agreed to cede, sowing the seeds for the Russo-Japanese War of 1904-05.
After the punishing battle at the Yalu River, Chinese admiral Ting Ju-ch’ang withdrew his fleet to the fortified harbor at Weihaiwei. Here his turret ships, cruisers, and torpedo boats were protected by shore guns and a barrier of tethered mines and steel hawser cables across the harbor mouth. The Japanese fleet arrived at the end of January 1895 to blockade the harbor while troops attacked Weihaiwei by land. The weather was appalling with prolonged blizzards and on several occasions sailors froze to death at their posts. The Japanese ships engaged in gun duels with the Chinese shore batteries and warships day and night, with no decisive results.

Seeing that they would have to enter the harbor, the Japanese carried out risky minesweeping operations and cut one of the steel hawser cables. They then sent torpedo boats into the harbor several times at night, sinking the armored turret ship Ting Yuen and the cruisers Ching Yuen and Lia Yuen. In a desperate gesture, Admiral Ting sent all his torpedo boats out of the harbor in a daylight sortie that resulted in all of the boats being sunk or captured. By February 12 the Chinese had had enough of the extreme cold, continual bombardment, and terrifying night raids. Admiral Ting sent a surrender note to the Japanese admiral. Before the Japanese could take possession of the enemy fleet, the Chinese admiral committed suicide. Shortly after, China sought peace negotiations with Japan.

**OFFICER CLASS**
Commissioned officers were more numerous in the steam era than in the age of sail, and more diverse. Many were given responsibility for specialist areas, such as gunnery, engines, or torpedoes. The first wave of Japanese officers was mostly recruited from the Satsuma samurai clan, and the founding ethos of the Imperial Navy mingled the samurai tradition with attitudes and practices learned from Britain’s Royal Navy. The Etajima Naval Academy soon became the route into the Japanese naval officer corps. Entrants were picked by rigorous nationwide examinations, with many more applicants than places available. Those who passed were then subjected to four years of intensive training, with an emphasis on physical fitness as well as academic education. Graduates from Etajima entered the navy as a self-conscious elite.

**DISCIPLINE AND AUSTERITY**
Despite holding a high sense of status and personal honor, Japanese officers tended to be frugal and spartan, sleeping on rush mats on the deck. When the men had to clean decks barefoot in freezing weather, Admiral Togo would reportedly come on deck barefoot himself. Obedience and loyalty were highly valued qualities society and transferred well to the formal hierarchical world of a warship.

**CREW PROFILE**

**JAPANESE IMPERIAL WARSHIP**

**1870s TO EARLY 1900s**

**WHEN THE JAPANESE SET OUT** to create the Imperial Navy almost from scratch in the 1870s, they received most of their training and ships from Britain. The result was a service in most ways similar to Western navies of the time. All ranks were uniformed and formal discipline such as saluting of officers was strictly enforced. The navy was in the forefront of the headlong modernization of Japan, well ahead of most of civil society, so it was on board ship that many Japanese recruits first got to grips with technologies such as steam engines and electricity. Discipline was often enforced with slaps or punches, but this was apparently acceptable to the average Japanese sailor, brought up in an ordered and disciplined society.

**Imperial Japanese officer**
Smartly uniformed Japanese officers look on as well-drilled sailors of the Imperial Japanese Navy fire on a Chinese warship at the Yalu River.
THE RUSSO-JAPANESE WAR

The Russian and Japanese Empires went to war in 1904 over their rival ambitions in northern China and Korea. In the naval war, the Japanese were from the outset more aggressively led and better trained and motivated than their opponents. The Russians also suffered from the dispersal of their naval forces—the squadrons in Port Arthur and Vladivostok never succeeded in joining up, and when the Baltic fleet was sent on an epic voyage around the world to the Pacific in 1905, it was crushingly defeated at Tsushima. The victory for an Asiatic over a European power upset assumptions of white racial superiority. Japan gained control of Port Arthur and soon took over Korea. The Japanese were confirmed as valuable allies for Britain in the Pacific, while defeat plunged Russia into the 1905 revolution that the tsarist regime barely survived.

The Battle of Port Arthur

The Russian First Pacific Squadron in harbor at Port Arthur was a potential threat that Japan decided to eliminate at the outset of hostilities. Admiral Togo planned to launch a night attack that would enjoy total surprise since it would precede a declaration of war.

An attack squadron of 10 Japanese destroyers armed with Whitehead torpedoes reached Port Arthur shortly after midnight on February 8. Most of the Russian fleet was lit up, as was the town behind it. Confusion and terror followed as torpedoes exploded against the hulls of the American-built pre-dreadnought Retvizan and the protected cruiser Pallada. The battleship Tsesarevich was also hit. But the operation was less effective than Togo had hoped. Many torpedoes were caught in Russian torpedo nets and failed to explode. Once Russian searchlights and guns were manned the destroyers found it hard to press home further attacks. The action was broken off at around 2:00 a.m. No Russian ships had sunk.

The Daylight Action

The following morning, believing the Russian ships were more damaged than they were, Togo led his fleet toward Port Arthur to complete the destruction of the Russian fleet. He was to be disappointed. The Russians remained in harbor, drawing the Japanese within range of shore guns. A brisk exchange of long-range fire brought further damage to a number of Russian ships, but Togo’s flagship Mikasa was also hit. After an hour the Japanese turned away.

The inconclusive result to the naval attack forced the Japanese to mount a prolonged siege of Port Arthur by both sea and land. However, the arrival of the vigorous Russian admiral Stepan Makarov to take over command in Port Arthur put fresh heart into the Russian fleet. Maintaining a blockade over succeeding months the Japanese lost a number of ships to mines. Stepan Makarov was also a victim of a mine, going down on board his flagship Petropavlovsk during a rare sortie outside Port Arthur on April 13.

Assault on Port Arthur

A line of Japanese battleships steams toward Port Arthur, the bombardment from the Russian shore defenses sending up plumes of water around them.
After being blockaded in harbor for six months, on August 10, 1904, the Russian First Pacific Squadron steamed out into the Yellow Sea. Its commander, Rear Admiral Vasily Karlovich Vitgeft, was obeying a personal order from Tsar Nicholas II to join the rest of the Russian Pacific fleet in Vladivostok. Vitgeft personally considered the breakout attempt doomed to failure.

Admiral Togo, commanding the Japanese blockade from the battleship Mikasa, prepared to engage the Russians as they came out, but surprisingly missed them. Executing maneuvers designed primarily to keep his own flagship in the van, he found himself pursuing the Russians from a good distance behind. Fortunately for Togo the Russian ships were slow and by 5:00 p.m. his four battleships and two armored cruisers were in position to engage the six Russian battleships. Steaming in line ahead on a parallel course, the ships bombarded one another ferociously. Eyewitnesses described the gigantic columns of water thrown up by the shells, the noise of explosions, clouds of foul smoke, and decks streaming with blood. Mikasa was hit repeatedly but it was Vitgeft’s flagship Tsesarevich that suffered worst. The key moment in the battle occurred when two shells struck Tsesarevich’s bridge. Vitgeft and all his senior officers were killed. Out of control, the battleship was stuck in a turn to port that many other Russian ships blindly followed, looping pointlessly.

As night fell most of the Russian fleet headed back to Port Arthur. Tsesarevich and some other ships sought refuge in neutral ports, where they were interned. The First Pacific Squadron would play no further part in the war.
In October 1904 five divisions of the Russian Baltic Fleet, renamed Second Pacific Fleet, set off on a journey of 18,000 nautical miles (30,000 km) to join the defense of Port Arthur against the Japanese. Commanded by Admiral Zinovi Rozhdestvenski, the squadron showed its inexperience by firing on British trawlers in the North Sea, taking them for Japanese torpedo boats. Slow and grueling, the long and difficult voyage took a heavy toll on the laboring ships’ engines and on crew morale. Rozhdestvenski was joined by Admiral Nikolai Nebogatov with more Baltic warships, designated Third Pacific Squadron, to create a fleet of impressive size, but dubious quality.

Port Arthur had fallen by the time this Russian armada reached East Asia, so Vladivostok became its substitute goal. Short of coal, Rozhdestvenski chose the shortest route past Japan, through the Tsushima Strait. Admiral Heihachiro Togo, commanding the Japanese Combined Fleet, had anticipated this choice. But on the night of May 26–27, in fog and mist, the Russians might have slipped past had not the Japanese auxiliary cruiser *Shinano Maru* spotted a Russian hospital ship with its navigation lights lit. On board his flagship *Mikasa* in Chinae Bay, Admiral Togo was immediately informed by radio—then still a novel technology. Togo in turn informed his government: “The Russian fleet has been sighted. I will attack it and annihilate it.” The admiral’s confidence, shared by his officers and men, contrasted markedly with the state of mind of the Russians after their arduous journey. Togo’s only fear was that the enemy fleet might escape in the mist and gloom. Once visual contact was made in the early afternoon, the Russians were doomed.

**RELENTLESS PURSUIT**

Togo was a great admirer of Nelson and, recognizing this as his Trafalgar, announced the start of the battle by hoisting the “Z” flag, conveying the signal: “The Empire’s fate depends on the outcome of this battle, let every man do his utmost duty.” Where the Russians had difficulty holding a line of battle in a chaos of confused orders and poor seamanship, the Japanese maneuvered with precision and daring, exploiting to the full their speed advantage over the Russian ships. In the gunnery duel between battleships the Japanese proved far superior, due to better training and range-finding technology. Their high-explosive shells devastated the superstructure of Russian ships, scattering deadly steel splinters, starting fires, and ripping open armor. A Russian officer described how “iron ladders were crumpled into rings and guns hurled from their mountings.”

By nightfall four Russian battleships had been sunk, with appalling loss of life. Rozhdestvenski was wounded by a shell fragment in the skull, leaving the inexperienced Nebogatov in command. Through the night attacks by Japanese destroyers and torpedo boats took a further toll, and morning found scattered remnants of the Russian fleet struggling for survival. At 10:30 a.m. Nebogatov abjectly surrendered the ships under his immediate command. Other Russian warships were hunted down through the day. Only three made it through to Vladivostok.

The battle forced Russia to accept defeat in the war with Japan and led to the 1905 revolutionary uprising against the tsarist regime.

**KEY**

- Japanese pursuit continues through the night
- Japanese fleet circles close to the Russian mihora
- Russian fleet in the gloom in disorder
- *Oslyapa* Russian fleet circles in the gloom
- *Knyaz Suvorov* Russian fleet
- *Korabel* Russian fleet
- *Borodino* Russian fleet
- *Aleksandr III* Russian fleet

---

**Prizes of war**

Captured Russian warships, with the Japanese Rising Sun flying proudly over the Russian naval ensign, are towed back to Japan after the crushing Russian defeat at Tsushima.
Togo orders his ships to turn in sequence. Despite being slower than a parallel turn and placing his ships in greater danger, this turn in sequence keeps his flagship Mikasa and his other battleships at the front of the Japanese line.

The Japanese ships use their superior speed to cross the T of the Russian line and head off their escape.

Admiral Rozhdestvenski finds it difficult to organize the disordered Russian ships into a line of battle against the Japanese.

The Russian fleet turns north in an attempt to escape toward Vladivostok.

The Russian battleship Oslyabya is sunk and Admiral Rozhdestvenski’s flagship Knyaz Suvorov loses control. Rozhdestvenski is badly injured.

The Japanese chase the disordered Russian fleet throughout the night.

The Japanese pursues with a parallel turn to avoid torpedoes and stay ahead of the Russians.

Togo’s Second Division breaks away to keep the Russians from escaping south.

It is absurd to think of steaming victoriously into Vladivostok, or of getting command of the sea! The only possible chance is a dash through ... after two, three, or at the most four sallies, we shall have burned all our supplies of coal ...

Flag Lieutenant Filippovskiy aboard Knyaz Suvorov, on the Russian fleet’s prospects on reaching the Far East.
**Hijms Mikasa**

**The Japanese Battleship Mikasa** was Admiral Togo’s flagship at the decisive battle of Tsushima in 1905. She has survived to be preserved as a museum ship at Yokosuka in Japan, the only pre-dreadnought battleship still in existence. When delivered by English shipbuilders Vickers in 1902, Mikasa was the most advanced warship in the world.

**Mikasa’s Main Armament** consisted of four impressive 12-in guns mounted in pairs in centerline turrets. There were also 14 smaller 6-in guns arranged in broadside and 20 Quick Firing (QF) 3-in guns distributed around the ship, intended for defense against torpedo boats. The battleship also had four submerged torpedo tubes. She was heavily armored with Krupp steel plates, especially in a belt around the hull above the waterline and around the gun turrets. Mikasa proved capable of taking a lot of punishment. Some 30 hits from Russian guns at Tsushima failed to put her out of action. Ironically she was sunk in harbor shortly after the war with Russia ended, through an accidental explosion in a magazine. Although refloated, Mikasa was soon rendered obsolete as a new generation of dreadnought battleships took center stage. She was decommissioned in 1923.

**Victor of Tsushima**

Admiral Togo’s flagship Mikasa pictured around 1905, the year of the Japanese victory against the Russian fleet at Tsushima. The smoke from her powerful coal-powered engines billows through the ship’s funnels.

---

**JAPAN BLOSSOMED FORTH LIKE HER OWN CHRYSANTHEMUM ... HER BATTLESHIPS ARE PERHAPS THE FINEST IN THE WORLD.**

*NAVY AND ARMY ILLUSTRATED, BRITISH MAGAZINE, 1902*
Funnels and ventilators
The smoke produced by Mikasa’s 25 coal-fired Belleville boilers exited the ship through two large funnels in the center of the deck. Several smaller ventilation shafts brought fresh air below deck.

Stern walkway
The admiral’s cabin enjoyed direct access onto a narrow walkway around the stern end of the ship. The Japanese characters on the metal plate spell out the name of the battleship Mikasa.

Rangefinder
A Barr & Stroud FA3 rangefinder is mounted on the deck of the topgallant forecastle, behind the compass. A number of Russian ships at Tsushima were fitted with similar models, but better training meant the Japanese rangefinding proved far superior during battle.

Mainmast
Mikasa’s fore- and aft- masts were used primarily as a mounting point for signal, lookouts, and radio apparatus. Fortified “fighting tops” on the masts were armed with light guns for raking fire.

Broadside guns
Mikasa’s armored sides bristle with two rows of 3-in and 6-in broadside guns for use against smaller ships or to target the lightly armored superstructure of larger warships.

Electric searchlight
A pair of long “wings” of decking extend on either side of the forecastle, down which the two large 35-in (90 cm) searchlights can be rolled. Powerful searchlights were essential at night and in fog to locate and target enemy ships and to prevent collisions.

Togo’s command post
Admiral Togo commanded the fleet at Tsushima standing on the deck of the topgallant forecastle in front of this compass. Speaking tubes allowed him to send orders to the bridge below.

Forecastle
Underneath the forecastle, looking toward the prow of the ship, are the main navigation and command areas: the pilothouse and bridge, the topgallant forecastle on the deck above, and two long “wings” on either side.

Bridge and chart room
This portside view of the forecastle shows the door to the pilothouse on the left and the chart room on the right. Steps lead up the topgallant forecastle with the compass and rangefinder. On the deck in front of the steps, the rails allowing the searchlights to be moved up and down the “wings” are just visible.
THE ACCOMMODATIONS FOR Mikasa’s 840 officers and men was quite austere. Even the admiral’s living space was simple, if comfortable. The other ranks slept in hammocks among the guns, as in Nelson’s day. The ship could carry 2,000 tons of coal to fuel the triple expansion steam engines, which gave a maximum speed of 18 knots. Working conditions in the depths of the ship, amid the heat and noise of the engine rooms, were harsh. In battle men were acutely aware that a ship of this kind could be an iron coffin, sinking in minutes if badly holed. The upper deck where Admiral Togo stood in battle was protected only by sandbags from enemy fire. The ship was equipped with the newly invented wireless (radio) giving the Japanese fleet an advantage over the Russians in communications.

Life ring
Mikasa carried several cork life rings in case of man overboard, as well as 14 lifeboats and launches of various sizes.

Entrance to 3-in casemate
After the battle of Tsushima, the Russian Rear Admiral Nikolai Nebogatov entered the Mikasa through this door in the armored casemate to present his sword and the surrender of his five remaining ships to Admiral Togo.

Ship’s wheel
The polished wood and brass wheel from Mikasa’s pilothouse. A second wheel was located in an armored conning tower for the helmsman to use during battle.

Pilothouse
The ship was steered from the pilothouse using the wheel and engine order telegraphs. A compass is mounted inside a large brass binnacle case.

Morse key
Messages were tapped in using this Morse key and transmitted using Mikasa’s new wireless telegraphy equipment—a novel technology at the time Mikasa was launched in 1900.

3-in gun casemate
Eight 3-in Quick Firing (QF) guns are mounted along the sides of the ship in armored casemates. Too light to penetrate the armor of opposing battleships, the guns provided a defense against fast torpedo boats and destroyers.

6-in broadside gun
Underneath each of the 3-in gun casemates, fixed in place behind 6-in (15-cm) of steel plating, was a line of three 6-in Quick Firing (QF) guns. Several more were fitted on the corners of the gun decks, bringing the total number to 14.

6-in Quick Firing gun breech
The Quick Firing (QF) guns on Mikasa used a breech-loading mechanism and single-piece ammunition containing both the shell and propellant to enable more rapid loading.
1830 – 1918
Togo's pocketbook
Admiral Togo's handwritten notebooks provide an intriguing window into the mind of the man who oversaw Japan's greatest naval victory.

Admiral’s desk
The portrait of Admiral Togo on the desk in his cabin is inscribed with the only known example of his signature in English.

Admiral's bathroom
The washing facilities for the admiral and officers were simple but adequate—and more comfortable than those for the sailors.

Admiral’s cabin
Admiral Togo's personal quarters are located on the second deck toward the stern of the ship. The admiral’s cabin is austere but comfortably furnished with a desk and a high bed and drawers below for storage.

Admiral’s saloon
The saloon is simply but comfortably furnished with carpets, cabinets, and a fireplace. Two Hotchkiss 3-pounder gun mounts on either side of the cabin provide the only reminder that the saloon is part of a ship of war.

Officer’s wardroom
The large wardroom was used for meetings and as a dining area and recreation room for officers.

Hotchkiss gun in admiral’s saloon
Four Hotchkiss QF 3-pounder guns protrude from the rooms at the fore and stern of Mikasa—the admiral's saloon and the enlisted berthing—turning living areas into makeshift gun emplacements.

Pantry
The petty officers' pantry was where the officers' food was prepared. Enlisted crewmen ate their meals in berthing areas in the bows of the ship.

Skylight over officers’ quarters
Deck skylights connect directly to the admiral’s cabin and captain’s saloon below, allowing in light and fresh air. The skylights could be fixed shut during battle or in stormy weather.
TRIUMPH OF THE JAPANESE NAVY

The French-built protected cruiser Matsushima, flagship of the Imperial Japanese Navy during the first Sino-Japanese War, fires a devastating broadside against a Chinese warship. Naval scenes such as this were a popular subject for Japanese artists of the period who reveled in the big ships and the imposing new technology of the rapidly modernizing Japanese Navy.
WORLD WAR I

PUBLIC INTEREST IN NAVAL AFFAIRS has never been greater than in the lead-up to World War I. German naval expansion, perceived as a threat to British security, triggered an expensive arms race in which the two countries competed to build bigger and better battleships. This growing hostility led to an agreement between Britain and France to split responsibility for naval defense in case of war, Britain taking on the English Channel and North Sea while France looked after the Mediterranean. Given this build-up, World War I undoubtedly proved a disappointment to naval enthusiasts. Although major engagements between surface warships did occur, a decisive Trafalgar-style battle simply did not come off. Instead the British and German battle fleets sparred and shadow-boxed indecisively while struggling to come to terms with the deadly threat posed by unglamorous submarines and mines.

DISTANT BLOCKADE

Britain entered World War I with clear naval superiority over Germany. The Royal Navy had 52 dreadnoughts, pre-dreadnoughts, and battlecruisers, as against 34 comparable German warships. Inevitably the German High Seas Fleet was unwilling to steam out and engage in a full-scale battle in the face of such unfavorable odds. Yet the Royal Navy could not bottle up the German navy with a close blockade of enemy ports as it had in the Napoleonic Wars, because of the extreme vulnerability of its large surface warships to submarines, mines, and torpedo boats. British naval dominance of the entrances to the English Channel and the North Sea was enough to close Germany off from world trade, but this blockade was so distant that squadrons of German warships were able to sortie from harbor and shell the east coast of England.

German strategy was to weaken the Royal Navy by piecemeal sinkings until numbers were even enough for a showdown. The caution of Admiral Sir John Jellicoe, commander of the Grand Fleet, ensured that this never happened. His determination to keep the British fleet intact was matched by Kaiser Wilhelm’s concern to preserve his prized warships. The German High Seas Fleet was more aggressively led for a time after Admiral Reinhard Scheer took command in January 1916, and the British succeeded in luring Scheer into a fleet battle at Jutland the following May. The battle revealed defects in the Royal Navy—for instance, much of its gunnery was inferior to that of the Germans—and was claimed as a German victory in terms of ships lost and damaged. Yet it was fought as a defensive battle by a German fleet running for home and German surface warships hardly left port again for the rest of the war.

U-BOAT MENACE

The ease with which capital ships could be sunk by mines and submarines had been predicted before the war, yet navies were slow to develop countermeasures. They had continued to create ever bigger, faster, and more heavily gunned battleships, which over

WEAPONS AND TECHNOLOGY

DREADNOUGHTS AND SUPER-DREADNOUGHTS

The launch of the British battleship Dreadnought in December 1906 ignited an international naval arms race. With ten 12-in guns and steam turbine engines giving a maximum speed of 21 knots, Dreadnought outclassed every other warship afloat. Its name became the general term for the new generation of battleships that started to appear around the world, including the South Carolina class in the United States, Germany’s Nassau class, and France’s Courbet class. The Royal Navy was determined to stay ahead of the competition and introduced even more powerful battleships dubbed “super-dreadnoughts.” The first of these, Orion, launched in 1910, had 13.5-in guns, but the much admired Queen Elizabeth class, built between 1912 and 1915, mounted astonishing 15-in guns. Combined with heavy armor and oil-fired engines generating a maximum speed of 24 knots, this made for a truly formidable fighting machine.
time would become irrelevant. Allied losses of warships to mines were grievous, for example at the Dardanelles in 1915, and German U-boats continued to be a threat even after the adoption of destroyer screens to protect battleships and cruisers.

It was when U-boats were deployed as commerce raiders, first in 1915 and then on a larger scale in 1917, that they threatened to change the course of the war. At the start of the war U-boat attacks on merchant shipping were conducted for the most part according to prize regulations, the traditional rules for cruisers attacking unarmed civilian shipping. In February 1915, however, Germany declared the waters around Britain a war zone and authorized U-boat captains to attack merchant vessels, including neutrals, without warning. The only large-scale fleet action of the war, what became clear at the battle was that the British fleet was still much more powerful than the German one. Realizing this, the Germans tried to win the war by means of a U-boat campaign against Allied and neutral shipping, aimed at starving Britain into submission, a plan in which they very nearly succeeded. After Jutland the German High Seas Fleet never again ventured out into the North Sea.

The reluctance of the British to adopt a convoy system led to a period of unsustainable losses of merchant ships to U-boat attack. This continued up until May 1917, when the phasing in of convoys reversed the trend. But indiscriminate sinkings by U-boats brought America into the war against Germany, ensuring the eventual victory of the Allies.

Morale in the German High Seas Fleet suffered from its years of inactivity in port. When the German commanders planned a sortie to engage the Grand Fleet in a death-or-glory final battle in October 1918, the sailors mutinied. Interned at Scapa Flow, the German fleet was scuttled by its crews in protest against the Versailles peace treaty in June 1919.
WARSHIP BATTLES 1914–18

MUCH OF THE NAVAL ACTION early in World War I concerned the Royal Navy’s efforts to track down German surface raiders, which posed a serious threat to Allied shipping. After the British victory over Admiral Graf von Spee’s squadron at the Falklands in December 1914, German commerce raiding was restricted to submarines, the U-boats proving a fearful menace for merchant shipping and warships alike (see pp 268–269). An attempt to use Allied naval power to decisive effect against Germany’s ally Turkey in the Dardanelles was a painful failure. Meanwhile, for almost two years the Royal Navy’s Grand Fleet and the German High Seas Fleet, stationed at opposite ends of the North Sea, did not meet. After an early reverse at the Heligoland Bight, the Kaiser forbade his fleet to venture into the North Sea, although this prohibition was not absolutely respected. Probing raids by German squadrons met with some success, despite a serious setback at the Dogger Bank, before the British at last trapped their opponents into a full-scale fleet engagement at Jutland in May 1916—without, however, achieving the victory which Britain craved.

POOR DEVILS! THEY FOUGHT THEIR SHIPS LIKE MEN AND WENT DOWN WITH COLOURS FLYING LIKE SEAMEN AGAINST OVERWHELMING ODDS ...

VICE-ADmiral David Beatty DESCRIBING THE GERMAN SAILORS AT HELIGOLAND BIGHT IN A LETTER TO HIS WIFE, 1914

Commodore Roger Keyes, in command of British submarines based at Harwich, conceived a plan for an impudent raid on German ships on patrol near their naval base at Heligoland. The raid was to be carried out by the light cruisers and destroyers of Commodore Reginald Tyrwhitt’s Harwich Force, along with Keyes’ submarines. It was decided at the last minute to provide back-up for the raid from Vice-Admiral David Beatty’s 1st Battlecruiser Squadron and the 1st Light Cruiser Squadron of Commodore William Goodenough.

As Keyes had planned, early on the morning of August 28, the presence of British submarines off Heligoland was detected by the Germans, who promptly sent out a flotilla of torpedo boats. These were then engaged by Tyrwhitt’s destroyers and two light cruisers, Arethusa and Fearless. Fought in mist, the ensuing battle was characterized by confusion on both sides. The German light cruisers Stettin and Frauenlob arrived on the scene and duelled with Fearless and Arethusa respectively. Arethusa, with Tyrwhitt on board, suffered heavy damage and withdrew to attempt repairs. Four more German light cruisers turned up, attacking in an uncoordinated fashion as Tyrwhitt’s destroyers screened Arethusa.

Fortunately for the British, the arrival of Goodenough’s light cruisers, followed by Beatty’s battlecruisers, swung the balance of forces decisively in their favour. Rear-Admiral Leberecht Maass’s Mainz was sunk after being caught between the Harwich Force destroyers and Goodenough’s cruisers. The light cruisers Kibo and Ariadne were destroyed by the heavy guns of Beatty’s Lion, looming unexpectedly upon them out of the mist. The British withdrew across the North Sea, Arethusa reaching home under tow.

Despite “friendly fire” incidents resulting from poor communication and worrying malfunctions of guns and fire-control systems, the British had scored an unquestionable victory, achieved with great boldness in German home waters.

863–1928

REINHARD SCHEER
GERMAN ADMIRAL

Born in Oberschlesien, Hanover, Scheer joined the Imperial German Navy in 1879. By 1907 he had risen to be chief of staff of the High Seas Fleet. On the outbreak of World War I he advocated the use of surface ships to lure British warships into the path of submarines lying in ambush. On being promoted to Admiral of the Fleet in 1916, he used a similar tactic at Jutland. The skill of his maneuvers in the battle enabled the German fleet to escape and even to claim victory.
The light cruiser *Emden*, commanded by Karl von Müller, was one of Germany’s most successful commerce raiders, paralyzing trade in the Indian Ocean and destroying oil tanks at Madras. Müller earned a reputation for the most successful commerce raiders, *Karl von Müller*, was one of Germany’s, commanded by *Emden*.

**SINKING OF SMS EMDEN**

Date: November 9, 1914

**Forces**
- Australians: 1 light cruiser
- Germans: 1 light cruiser

**Losses**
- Australians: none
- Germans: 1 light cruiser

The light cruiser *Emden*, controlled by Karl von Müller, was one of Germany’s most successful commerce raiders, paralyzing trade in the Indian Ocean and destroying oil tanks at Madras. Müller earned a reputation for the most successful commerce raiders, *Karl von Müller*, was one of Germany’s, commanded by.

**Emden**

The German and British squadrons met in heavy seas off the coast of Chile in the late afternoon of November 1. Steaming to the east of the British, Spee exploited the superior speed of his ships to stay out of range until the sun had set. With Cradock’s ships silhouetted against the afterglow, the German ships opened an accurate fire to which the British were barely able to reply. *Good Hope* and *Mammoth*, battered by salvo after salvo in the gathering darkness, sank with all hands, including Cradock. *Otranto* had been sent away at the start of the battle and the badly damaged *Glasgow* escaped into the night. It was a humiliating defeat that the Royal Navy was determined to avenge.

**CONOREL**

Date: November 1, 1914

**Forces**
- Germans: 2 armored cruisers, 3 light cruisers; British: 2 armored cruisers, 1 light cruiser, 1 armed liner

**Losses**
- Germans: none; British: 2 armored cruisers

From the start of the war Vice-Admiral Graf Maximilian von Spee was at large in the Pacific with a powerful squadron that included two impressive armored cruisers, *Scharnhorst* and *Gneisenau*. Rear Admiral Sir Christopher Cradock, based in the Falklands, was tasked with seeking out and destroying Spee’s squadron, despite having far inferior ships and crews. His armored cruisers *Good Hope* and *Mammoth* were slower than their German equivalents, had obsolescent guns, and were crewed by recalled reservists and half-trained boys. His light cruiser *Glasgow* was at least a fully modern ship, but his armed liner *Otranto* was effectively useless.

**WEAPONS AND TECHNOLOGY**

**SEA MINES**

Contact mines were chained to the seabed and exploded when a ship’s hull struck one of the protruding spikes. They were used to great effect by Germany, sinking a greater tonnage of British warships than any other weapon. The Royal Navy entered the war without minelayers or purpose-built mineweepers and did not use mines effectively until 1917.

**Contact mine**

The length of chain was adjusted so that the mine floated at the desired depth below the surface.

**SINKING OF SMS CANOPUS**

Date: December 8, 1914

**Forces**
- British: 2 battlecruisers, 3 armored cruisers, 2 light cruisers, 1 pre-dreadnought battleship; Germans: 2 armored cruisers, 3 light cruisers

**Losses**
- British: none; German: 2 armored cruisers, 2 light cruisers

After the defeat at Coronel, Vice Admiral Frederick Sturdee was sent from Britain with two battlecruisers, *Invincible* and *Inflexible*, to destroy Spee’s victorious armored cruisers *Scharnhorst* and *Gneisenau*. Sturdee joined up with the five cruisers of Rear-Admiral Archibald Stodart’s South Atlantic Squadron and steamed to the Falkland Islands, arriving at Port Stanley on December 7. The next day, unaware of the British ships, Spee’s squadron appeared, having rounded Cape Horn from the Pacific.

As *Gneisenau* and the light cruiser *Nürnberg* approached Port Stanley they were fired on by the antiquated pre-dreadnought battleship *Canopus*, grounded at the harbor mouth as a shore battery. The British warships, caught in harbor and some in the middle of coaling, were vulnerable to attack, but the Germans fled at the sight of the unexpected battlecruisers. The British had time to get up steam and set to sea in pursuit. Spee realized he had no chance of outrunning the battlecruisers. He decided to engage them with *Scharnhorst* and *Gneisenau*, hoping to buy time for the light cruisers at least to escape.

**THE SQUADRON DESTROYED**

The German admiral fought a cunning delaying action against an enemy with superior guns and armor, but the end was inevitable. On fire and listing heavily, Spee’s flagship *Scharnhorst* sank with her admiral and all hands just after 4:00 p.m. *Gneisenau* lasted longer. She went down at around 6:00 p.m. after taking more than 50 hits. Some 200 of her crew were rescued from the icy waters. The light cruisers *Nürnberg* and *Leipzig* were pursued, engaged, and sunk by the armored cruisers *Kont* and *Cornwall* and the light cruiser *Glasgow*. The only German ship to escape was the light cruiser *Dresden*, but she too was eventually hunted down. It was a crushing British victory, achieved by the application of overwhelming force.
Vice Admiral Franz von Hipper, commanding the German 1st Scouting Group, planned a raid across the North Sea against English coastal towns. If the Royal Navy responded by coming out in force, Hipper hoped to draw them onto mines laid in the area, or toward the guns of the High Seas Fleet advancing behind him. The British were forewarned of the raid by codebreakers in the Admiralty’s Room 40, but unaware the High Seas Fleet was involved.

For over an hour on the morning of December 16, Hipper’s battlecruisers and light cruisers bombarded Hartlepool, West Hartlepool, Scarborough, and Whitby, causing much damage and killing more than 100 civilians. Shore batteries at Hartlepool hit three of the ships.

A much larger naval engagement was narrowly avoided. British forces sent to intercept Hipper blundered into sight of the High Seas Fleet, but Admiral Frederich von Ingenohl, fearing this was the Royal Navy’s Grand Fleet, fled for home. This left Hipper exposed, surrounded by British battlecruisers and battlecruisers, yet he was allowed to slip past and escape to safety. Outrage in Britain was directed equally at the Germans for shelling civilian targets and at the Royal Navy for failing in its duty to protect the country from attack.

**Sinking of the Blücher**

German sailors scramble onto the hull of the stricken German cruiser Blücher as she rolls over following heavy British fire at Dogger Bank.

**CUXHAVEN RAID**

On Christmas Day 1914 the Royal Naval Air Service executed the first air raid launched from the sea. Three converted cross-Channel steamers carried nine Short seaplanes to within flying range of Cuxhaven, escorted by Commodore Reginald Tyrwhitt’s Harwich Force. The seaplanes were lowered onto the sea by cranes. Seven succeeded in taking off. Their objective was to bomb Zeppelin airship sheds, but they missed their target in low cloud. They caused some panic in Wilhelmshaven, where a battlecruiser and cruiser collided taking evasive action. Three of the seaplanes found their way back to their tenders. The pilots of the others were all rescued, three by British submarines and one by a Dutch trawler.

**Naval bombardment**

The pre-dreadnought battleship HMS **Blücher** fired her 12-in guns to bombard Turkish gun positions on the Gallipoli Peninsula. **Blücher** fired the first shell of the first naval bombardment of the Turkish forts on February 19, 1915.

**IT WAS ONE CONTINUOUS EXPLOSION...**

... the wounded Blücher settled down, turned wearily over and disappeared in a swirl of water.

**GERMAN SURVIVOR FROM SMS BLÜCHER, 1915**
In January 1915 the Royal Navy drew up plans for an ambitious operation designed to drive Ottoman Turkey out of the war. British and French warships would force a passage through the Dardanelles into the Sea of Marmara. There they would menace the Ottoman capital Constantinople with their guns, obliging the Turks to surrender.

The passage through the Dardanelles was blocked by minefields covered by the batteries of a series of forts and mobile howitzers. Admiral Sackville Carden began the naval attack on these defenses on February 19. He had a substantial force of British and French battleships at his disposal, although most of these were aging pre-dreadnoughts whose heavy guns proved far less effective against shore batteries than had been anticipated. However, the greatest weakness of the Allied forces was a lack of efficient minesweepers.

On February 25 the Turks abandoned the forts at the entrance to the strait, but Carden made no further progress. Through the first two weeks of March the inner forts were shelled almost daily, but the minefields remained uncleared and the navy began taking casualties.

FORCING THE STRAIT

With Carden in poor health, it was Admiral John de Robeck who assumed command for the decisive bid to force the straits on March 18. Almost the entire force of heavy warships advanced in three lines, one of them consisting of four French pre-dreadnoughts under Rear Admiral Emile Guépratte.

Opening around 11:00 a.m. the exchange of fire between sea and shore was intense. Ordered forward to engage the forts at close range, the French ships took heavy punishment, especially Gaulois, which ran aground to avoid sinking. At 2:00 p.m. de Robeck ordered the French to withdraw so he could bring other ships forward to cover the mine clearing. As the French wheeled right, Bouvet struck a mine and quickly sank. Only 35 of the 674 crew were saved. One disaster followed another. The battlecruiser Inflexible was next to hit a mine, withdrawing with a heavy list. Then it was the turn of Irresistible and Ocean; both were immobilized by mines and abandoned. With night approaching, de Robeck signaled for all the ships to retire. There was no further attempt to force a passage through the straits. Instead it was decided to land troops at Gallipoli—an operation that was to prove an even more costly failure.
**WWEVS AND TECHNOLOGY**

**WWI TURRET GUNS**

The large caliber naval guns on World War I capital ships were mounted in turrets protected by armored barbettes and supported on a bed of rollers to allow the guns to rotate. A gunhouse above deck was linked by a tube, known as the main trunk, to the magazine and shell room deep inside the ship. The shells were too heavy to lift by hand, so to load the gun the shells and propellant charges were placed on a hoist that carried them up the trunk to a working chamber. From there they were raised to the top of the turret and rammed into the breech of the gun for firing. A series of doors and scuttles was installed to prevent flash traveling from the gunhouse down to the magazine if the gunhouse was hit by a shell—although Royal Navy procedures at Jutland were defective in this regard.

Dreadnought Texas

The battleship's ten 14-in guns, mounted in five turrets along her centerline, could fire 1,500-lb (680-kg) shells a distance of 13 miles (21 km).

**US Battleship Turret Gun**

The turret guns on most American battleships of the period were divided into two sections with separate hoists for the shells and the propellant. Royal Navy turret guns typically had just one hoist.

- **Gunhouse**
- **Powder magazine**
- **Powder transfer room**
- **Upper shell hoist**
- **Lower shell hoist**
- **Gun breech containing shell and four powder charges**

**PROFILING A FUTURISTIC NAVY**

**1859–1935**

**SIR JOHN JELLINEK**

**ADMIRAL OF THE BRITISH FLEET**

Jellicoe joined the Royal Navy as a cadet in 1872 and saw action in the colonial wars of the late 19th century. As a senior administrator, he participated in the reform of the Royal Navy before World War I, specializing in gunnery. Appointed commander-in-chief of the Grand Fleet at the outset of the war, he pursued a cautious strategy, ever-conscious of being, in Winston Churchill's words, "the only man on either side who could lose the war in an afternoon." No politician, he was outmaneuvered by his critics, who were numerous after the battle of Jutland. In November 1916 he was appointed First Sea Lord, only to be precipitately dismissed 13 months later, a scapegoat for Admiralty failings.

**THE JELLINEK TOUCH**

Admiral John Jellicoe's image is borrowed to add a patriotic touch to this collection of "Naval Fantasia" sheet music.

**WITNESS TO WAR**

**COMMANDER HUMPHREY WALWYN**

**EXECUTIVE OFFICER ON HMS WARSPIE**

**BATTLE OF JUTLAND**

Very soon after the turn, could see leading ships of High Seas Fleet, hardly discernible but I counted six or eight. Long lines of orange flame seemed to ripple along continuously, and I realised they were firing at us. Felt heavy shakes but didn't think much of it … Crossed Cook's lobby to port side and was just going forward to the fo'c'sle deck, when a 12-inch shell came in through the starboard side and burst with a terrific sheet of flame, impenetrable dust, smoke, stink, and everything seemed to fall from everywhere at once. Called for number two fire brigade and several rushed out and we got the fire out fairly easily, but place was full of smoke and several men were sick—awful stench.”
At 2:00 a.m. on May 31, 1916, a scouting force of five battlecruisers under Admiral Franz von Hipper headed into the North Sea. An hour and a half behind him, Admiral Reinhard Scheer followed with 16 battleships of the German High Seas Fleet. With light cruisers and torpedo boats in support, almost a hundred German ships were at sea. Scheer’s plan was for Hipper’s scouting group to draw out part of the British Grand Fleet, which would then be surprised and destroyed by the German battleships.

Unbeknownst to the Germans, the Grand Fleet was already at sea. Royal Navy signals intelligence had detected that the High Seas Fleet was preparing to come out. With Admiral John Jellicoe in command, the Main Battle Fleet had set out from Scapa Flow after dark on May 30. Jellicoe intended to rendezvous with Sir David Beatty’s Battlecruiser Force and destroy the High Seas Fleet. Instead of surprising an inferior Royal Navy force, Scheer would himself be surprised by an overwhelmingly superior British force of 151 warships, including 28 modern battleships.

Into the early afternoon of May 31, Jellicoe and Beatty’s ships proceeded in quite leisurely fashion toward their rendezvous off Jutland, misled by a message from the Admiralty indicating that the High Seas Fleet had not yet left port. German commanders were equally ignorant of the movement of the Grand Fleet. U-boats in the North Sea had missed the British ships entirely while bad weather prevented the use of zeppelins for aerial reconnaissance. It was a surprise to both sides when, at around 2:20 p.m., two of Beatty’s light cruisers sighted and engaged two of Hipper’s torpedo boats.

**BATTLECRUISER ACTION**

As the first shots were fired, Beatty was steaming the wrong way, having just turned north to meet up with Jellicoe. He hastily turned south, a maneuver his 5th Battle Squadron was slow to follow. This was unfortunate, for the squadron’s four Queen Elizabeth-class battleships would have given Beatty a clear superiority over Hipper. The five German and six British battlecruisers steamed on converging courses and sighted one another about an hour later. Hipper turned southeast to draw Beatty toward the High Seas Fleet. But since Scheer had inexplicably brought with him six slow-moving Deutschland-class pre-dreadnoughts his progress was not fast and there was time for Beatty to take on the German battlecruisers.

**SUDDENLY MY PERISCOPE REVEALED SOME BIG SHIPS, BLACK MONSTERS; SIX TALL, BROAD-BEAMED GIANTS STEAMING IN TWO COLUMNS.**

**COMMANDER GEORG VON HASE, GUNNERY OFFICER OF BATTLECRUISER DERFFLINGER, 1916**

---

**THE BATTLE OF JUTLAND**

**DATE**
May 31–June 1, 1916

**LOCATION**
North Sea off the coast of Denmark

**RESULT**
Inconclusive

**BRITAIN**

- **COMBATANTS**
  - 28 battleships, 9 battlecruisers, 9 armored cruisers, 106 other ships

- **COMMANDERS**
  - John Jellicoe

- **FORCES**
  - Ship: 2 battlecruisers, 3 armored cruisers, 8 destroyers

- **LOSSES**
  - Men: 6,094
  - Ships: 3 battlecruisers, 3 armored cruisers, 8 destroyers

**GERMANY**

- **COMBATANTS**
  - 16 battleships, 5 battlecruisers, 6 pre-dreadnoughts, 72 other ships

- **COMMANDERS**
  - Reinhard Scheer

- **FORCES**
  - Ship: 1 battlecruiser, 1 pre-dreadnought, 4 light cruisers, 5 destroyers

- **LOSSES**
  - Men: 2,551
  - Ships: 1 battlecruiser, 1 pre-dreadnought, 4 light cruisers, 5 destroyers

---

**World War I**

**The Battle of Jutland**

Sudden my periscope revealed some big ships, black monsters; six tall, broad-beamed giants steaming in two columns.

**Commander Georg von Hase, Gunnery Officer of Battlecruiser Derfflingor, 1916**

---

**Webley Mark VI revolver**

The Mark VI was a standard sidearm issued to British officers and boarding parties during WWI. The owner of this example served at Jutland on the Temeraire.
The battlecruisers were soon engaged in bitter earnest. Beatty closed with the German force at speed, neglecting to exploit the superior range of his guns. Hipper’s ships opened fire first, with a clear view of their targets silhouetted against the westerly sun. With good range-finding equipment and armor-piercing shells, the Germans recorded hit after hit on the Royal Navy ships. First Indefatigable and then Queen Mary exploded and sank, each taking almost her entire crew to the bottom. Beatty’s flagship Lion and the other battlecruisers all took hits. It was some relief when the battleships of 5th Battle Squadron tardily arrived, but before they could have any decisive impact the High Seas Fleet loomed into view.

Still unaware of Jellicoe’s Grand Fleet drawing ever closer, Scheer believed a major victory was in his grasp. Beatty’s battlecruisers turned northward, both to flee Scheer’s battleships and lead him to Jellicoe, but the balance of losses continued to tip heavily against the Royal Navy. As elements of the Grand Fleet caught up with the battle, the battlecruiser Invincible and the armored cruiser Defence were sunk as they charged heroically into the thick of the action. Meanwhile Jellicoe, still unsure of the exact location of the German ships in worsening visibility, deployed the Grand Fleet in line of battle behind the battleship King George V.

**THE MAIN FLEETS ENGAGE**

Scheer emerged from the mark to be confronted by the capital ships of the Grand Fleet spread out across his bow in a line 6 miles (10 km) long. From the moment the guns of the British battleships opened up on his leading ships, the German admiral had only one objective: to escape back to harbor. The High Seas Fleet turned 180 degrees behind a smokescreen to disengage. As Jellicoe maneuvered to cut off their retreat to the south, the German battleships ran into the Grand Fleet again, then dodged to the west, deploying a screen of torpedo boats and cruisers to deter pursuit.

Controversially, Jellicoe turned away to avoid the torpedoes, letting Scheer’s fleet disappear in fog and smoke. As night fell, Jellicoe was confident that he could force a decisive battle the following morning. But in the darkness Scheer drove his fleet full tilt through the rear of the Grand Fleet’s line. The night was sporadically lit by searchlights, star shells, gunfire, and burning ships as confused clashes occurred here and there. There were more losses on both sides. However, Jellicoe failed to grasp that Scheer was escaping and remained on the wrong course until the following morning, when he received the disappointing news that the German fleet was all but home.

In the immediate aftermath of the battle, the Germans were jubilant, and the British bitterly disappointed. The performance of the Grand Fleet drew howls of rage from the jingoistic British press. While the Germans had materially the better of the encounter, however, the Royal Navy remained in command of the North Sea.

**1900–1916**

**“JACK” CORNWELL**

**HERO OF JUTLAND**

A working-class boy from the East End of London, John Travers Cornwell volunteered for the Royal Navy at the age of 15. He qualified as a Boy Seaman First Class and was assigned to the light cruiser Chester. At Jutland on May 31, 1916, he was a sight setter on one of the ship’s 5.5-in guns. Chester came under heavy fire from four German warships, reducing her deck to a shambles. By the time the cruiser withdrew from the action, Cornwell was one of only two survivors of his gun crew. Although badly wounded by shell splinters, he was still at his post awaiting orders. Cornwell died two days later, aged just 16. He was posthumously awarded the Victoria Cross and celebrated as a British war hero.

**THERE’S SOMETHING WRONG WITH OUR BLOODY SHIPS TODAY.**

_SIR DAVID BEATTY, COMMANDER OF THE BRITISH BATTLECRUISER SQUADRON_
THE BATTLECRUISER ACTION

The battle of Jutland begins at about 3:45 p.m. on May 31 when the German and British scouting forces clash. The Germans have the better of the exchange and succeed in leading the British toward the bigger guns of the main German fleet.

1:00 p.m. Beatty becomes aware of German main fleet and gives the order to turn back for the safety of his own ships and to lure the enemy toward Jellicoe.

1:05 p.m. Indefatigable explodes after being hit in gun turret and sinks.

4:45 p.m. Hipper’s battlecruiser squadron turns south to lure British into the path of the High Seas Fleet.

11:05 p.m. Jellicoe orders his dreadnoughts to deploy to port and form a single battle line.

NORTH SEA

MAIN ENGAGEMENT

Hipper’s pursuit of Beatty’s battlecruisers draws the German fleet into the path of the main British fleet under Jellicoe. Realizing he is heading into a trap, Scheer disengages, turning away from the British fleet under cover of a smokescreen.

4:05 p.m. Indefatigable and Queen Mary both sink, each with the loss of over 1,000 men.

6:33 p.m. Mist and smokescreen allows the German fleet to turn away from Jellicoe’s guns.

NORTH SEA

GERMAN ESCAPE

Briefly Scheer turns back toward the British Grand Fleet, but then turns away a second time, disappearing in the fog and smoke. There is no further significant action, and the Germans slip through the British lines at night and escape.

7:15 p.m. British battleships are in position to deliver a devastating broadside, but the sun is setting, visibility poor, and Jellicoe is concerned about a torpedo attack.

9:00 p.m. Jellicoe orders fleet south to keep Germans from their home ports, but the Germans manage to pass through the British lines in the dark.
BRITAIN’S ROYAL NAVY was made inescapably aware of the threat posed by German U-boats on September 5, 1914, when U-21 sank the cruiser Pathfinder off eastern Scotland—the first warship ever sunk by a submarine-fired torpedo. Allied naval commanders were slow to face up to the full implications of this event, sometimes disastrously failing to provide large warships with protective destroyer screens. Laxness was eventually replaced by paranoia, with fear of submarines severely inhibiting the operation of surface fleets. The most effective role for U-boats, however, was as commerce raiders. In February 1915 Germany began sinking without warning, merchant ships in the waters around the British Isles, a practice halted in the face of American protests, but resumed with a vengeance in 1917. U-boats based at Austrian ports in the Adriatic played havoc with Allied merchant shipping in the Mediterranean. The Allies tried various responses from creating anti-submarine barriers across the entrance to the Channel and the exit from the Adriatic to raids on U-boat bases in Belgium. They were inexplicably slow to adopt the best solution: a system of merchant convoys.

The U-boat war 1914–18

SINKING OF ABOUKIR, CRESSY, AND HOgue

In September 1914, in the area known as the Broad Fourteens, between the Netherlands and Dogger Bank, a force of British submarines, destroyers, and armored cruisers was on permanent patrol. Their role was to block any attempt by German surface warships to interfere with communications between Britain and continental Europe across the Narrow Seas. The cruisers were obsolescent ships manned mostly by reservists and cadets fresh out of naval college. Their position in the southern North Sea was so obviously exposed that they had been sardonically dubbed the “Live Bait Squadron.” By the third week of September heavy seas had led to the withdrawal of their destroyer screen, while the need of one of the cruisers for coaling left only three on patrol: Aboukir, Cressy, and Hogue.

THREE BEFORE BREAKFAST

Around 6:00 a.m. on September 22, Lieutenant Commander Otto Weddigen, commanding the submarine U-9, sighted the cruisers steaming in line ahead. He dived close to fire a single torpedo at Aboukir. This struck home to such effect that the ship sank within 20 minutes. The captains of the other cruisers, assuming that Aboukir had run into a mine, stopped and sent out boats to pick up survivors. At 6:45 a.m. the submarine unleashed more torpedoes against Hogue, now a sitting target. The cruiser was struck amidsthips twice in quick succession, almost breaking her in half. The captain of Cressy belatedly attempted to flee, steaming away from the scene of disaster where his ship’s boats were still collecting survivors. It was too late, however, for the U-boat immobilized Cressy with one torpedo, then sent it to the bottom with a second. There were men rescued from Aboukir by Hogue, then from Hogue by Cressy, who were sunk three times.

Weddigen was awarded the Iron Cross for his exploit. He was killed in March 1915 when his submarine U-29 was rammed by the battleship Dreadnought in Pentland Firth.

SINKING OF THE LUSITANIA

The luxury passenger ship Lusitania left New York for Liverpool on May 1. She had more than 1,900 passengers and crew on board and a very small quantity of ammunition in her cargo hold. On the afternoon of May 7, Lusitania was sighted off southern Ireland by Walther Schwieger, commander of the submarine U-20. A single torpedo struck the liner amidsthips. The ship sank in 18 minutes, killing 1,198 people including 128 Americans and almost 100 children. The sinking was a propaganda disaster for Germany, contributing greatly to the eventual entry of the United States into the war on the Allied side.

SUBMARINES ARE UNDERHAND. UNFAIR. AND DAMNED UN-ENGLISH. THE CREWS OF ALL SUBMARINES CAPTURED SHOULD BE TREATED AS PIRATES AND HANGED.

SIR ARTHUR WILSON, CONTROLLER OF THE ROYAL NAVY, 1901
WORLD WAR I
RAIDS ON ZEEBRUGGE AND OSTENDE

Date: April 22–23, 1918

Forces: British: 75 ships; Germans: unknown

Losses: British: 5 cruisers, 1 submarine; Germans: unknown

A bold but over-optimistic operation was planned by Commodore Sir Roger Keyes to block the exits from German submarine pens in occupied Belgium. The main effort was focused on Zeebrugge. The plan was to scuttle three blockships loaded with concrete in the mouth of the Bruges Canal, linking the U-boat pens to the sea. The approach to the canal was protected by batteries on Zeebrugge mole, a stone breakwater. These were to be disabled by a party of seamen and Marines landed on the mole by the cruiser *Vindictive* and two modified ferries. The raid was executed on the night of April 22–23. The attack went badly from the start. *Vindictive* was battered by gunfire and ran against the mole in the wrong place. The landing party could not take the batteries, making it hard for the blockships—the aged cruisers *Iphigenia*, *Intrepid*, and *Thetis*—to reach the canal entrance. With heroic effort two of the them were scuttled as planned, but one sank short of its target. The raid on Ostende was less successful, the blockships failing to reach the harbor entrance. The raids were immensely popular in Britain. Keyes was knighted and 11 Victoria crosses were awarded. But it cost 214 lives and failed significantly to inhibit U-boat operations.

Zeebrugge blockships

Although the Zeebrugge raid did briefly block the route of the U-boats down the Bruges Canal, the Germans simply created a channel to move the U-boats around the sunken blockships at high tide.

OTRANTO STRAIT

Date: May 15, 1917

Forces: Austrians: 3 light cruisers, 2 destroyers, 3 U-boats; Allies: 2 light cruisers, 8 destroyers

Losses: Austrians: none; Allies: 2 destroyers, 14 trawlers, 1 supply ship

The Allies attempted to block U-boats in the Adriatic by establishing a barrier from Otranto in Italy across to the Dalmatian coast. Consisting of trawlers with steel “indicator nets” to detect and entangle submarines and of minefields, the Otranto Barrage was not especially successful, but the anti-submarine trawlers did present a tempting target for raids by Austrian destroyers. In May 1917 Austrian Captain Miklos Horthy planned a heavier raid using three light cruisers, *Novara*, *Helgoland*, and *Saida*. Leaving the port of Cattaro at nightfall on May 14, the cruisers reached the barrage around 3:30 a.m. and steamed along blowing hapless Allied trawlers out of the water. Two accompanying destroyers sank an Italian munitions ship and its destroyer escort. Heading for home, the Austrians were pursued by an Allied force including the cruisers *Dartmouth* and *Bristol*. *Dartmouth* and two destroyers succeeded in pounding *Novara* to a standstill and Horthy was badly injured. But reports of the approach of a stronger Austrian force led the Allies to break off the action. On the way back to Brindisi, *Dartmouth* was badly damaged by the lurking submarine U-25 and a destroyer was sunk by a mine. *Saida* towed the crippled *Novara* back to Cattaro. The Allies subsequently abandoned night patrols by trawlers on the barrage. Horthy survived to become an admiral and, eventually, dictator of Hungary.

Special Service Vessels, code-named Q-ships by the British Admiralty, were created in response to U-boat attacks on merchant shipping. The Royal Navy took old tramp steamers and other vessels and fitted them with concealed guns. A U-boat coming upon such a vessel would not waste a torpedo on it, but instead closed with it on the surface. Once the U-boat approached, the Q-ship would unveil its guns and open fire. Manned by volunteers, the Q-ships achieved their first success in July 1915. In the course of the war they sank 14 U-boats. One of their unintended effects, however, was to encourage U-boats to sink any merchant vessel without warning.

*Q-ship* Volunteers man a hidden gun on board a Special Service Vessel or Q-ship.

German Imperial naval ensign

Taken from the submarine U-155 when she surrendered at Harwich in 1918 after a career in which she sank 42 ships.
4
1918 – PRESENT
CARRIERS, SUBMARINES,
AND MISSILES
The long-established tradition of naval warfare fought between ships armed with guns was rendered increasingly obsolete in the 20th century by a series of technological innovations. Fleets found a new focus in the form of the aircraft carrier, which replaced the battleship as the capital ship. The introduction of missiles made guns largely redundant and missile-armed submarines became a crucial element in the awesomely destructive nuclear forces of the major powers. The successive transformations of naval warfare in the course of the century brought sea battles to an unprecedented climax in World War II—viewed as a whole, by far the greatest naval conflict in history—then appeared more or less to have abolished them, at least as large-scale engagements between opposing naval forces.

Limitation and Expansion

After World War I, defeated Germany was temporarily banned from possessing a navy by the terms of the Versailles Treaty. In an attempt to avoid an expensive arms race between the remaining naval powers, an international agreement on fleet sizes was negotiated at the Washington Conference in 1922. Britain and the United States were accorded parity, with a fleet tonnage of 535,000 tons each, Japan was allowed 315,000 tons, and France and Italy 175,000 tons each. The British Royal Navy's acceptance of equality with America was a stark acknowledgement of Britain's waning power.

Nothing of this worthy attempt at arms limitation survived the rise of aggressive nationalist regimes in Japan, Germany, and Italy in the 1930s. The Japanese became increasingly restive at their restriction to third place in the pecking order and, after trying in vain to overturn this at the London Conference of 1930, amphibious landing

US troops disembark from a landing ship onto the Normandy beaches in June 1944. Amphibious operations, often conducted on a vast scale, made a crucial contribution to the Allied victory in WWII.
abandoned adherence to the Washington Treaty. The rise to power of Adolf Hitler in Germany in 1933 was inevitably followed by German naval rearmament, which Britain tried to control by agreeing to accept construction of a German fleet a third of the size of its own.

**DESCENT INTO WAR**

Facing the possibility of having to take on Germany, Japan, and Italy simultaneously, with only France as an ally, Britain was acutely aware that the Royal Navy was no longer adequate to the challenge it might confront. Fortunately for the British, Nazi Germany was only in the early stages of naval expansion when war broke out in 1939. The United States, which had become accustomed to view Japan as its major potential rival at sea, committed itself in 1940 to the creation of a “Two Ocean Navy”—capable of fighting simultaneously against the Japanese in the Pacific and Nazi Germany in the Atlantic. But the expansion of the US Navy was barely under way when the Japanese attack on Pearl Harbor brought America fully into the war at the end of 1941, its destroyers having already begun contributing to Atlantic convoy defense.

**TRANSITIONAL TECHNOLOGY**

World War II started at an uncertain transitional moment in the evolution of naval technology and tactics. Submarines had proved their effectiveness in World War I, yet they remained in practice only “submersibles”—craft that could dive but had to spend most of their time on the surface. Even in Germany, there was a reluctance to accord the U-boats top priority, and naval commanders used to focusing on surface warships were often complacent about their ability to cope with the underwater threat.

Aircraft meanwhile, although appreciated, were underrated. The United States and Japan had experimented in exercises with the aggressive use of aircraft carriers as a prime strike force capable of crippling an enemy fleet at long range. But there was still a tendency even in those air-conscious fleets to revert to regarding carriers as ancillary to the battleships and cruisers, simply providing reconnaissance or air defence for the big-gun battlewagons. Japanese naval aviation was the most advanced in the world, yet at the end of the 1930s Japan devoted vast resources to building the largest battleships ever seen, the ill-fated Yamato class. A vision of decisive battles between surface fleets with their great guns continued to dominate naval thinking.

In the event, World War II did involve a good number of battles in which exchange of gunfire between large surface warships was crucial, or even the sole action, and in most engagements it played at least a part. But the overwhelming importance of naval air power was clear from start to finish of the conflict.

**Sweetheart of the Marianas**

Naval air power proved decisive in World War II—the F-4U Corsair fighter-bomber was nicknamed the “sweetheart of the Marianas” by US ground forces for its role in the conquest of the Pacific Islands.
DECLINE OF THE GUNS

It was the Japanese strike on Pearl Harbor that first fully realized the potential of the aircraft carrier. Soon Japan and the United States were fighting naval battles conducted by shipborne aircraft at ranges of several hundred miles. In the Carrier Task Force, surface ships became escort screens for carriers, providing anti-aircraft and anti-submarine defense. Meanwhile submarines, as well as sinking a lot of warships, proved again their effectiveness as commerce raiders, especially for Germany in the Atlantic and the United States in the Pacific—although even submarines proved vulnerable to air power.

Whether under, on, or over the ocean surface, there was no doubting the importance of sea power in World War II. The Allies established dominance over the Atlantic, Mediterranean, and Pacific only after epic struggles. Amphibious operations, both landings and evacuations, were carried out on an unprecedented scale—the big guns of the battleships and cruisers proved above all important for shore bombardment in support of landings. The Allies won the race for technological development, with crucial progress in the use of radar, plus increasingly sophisticated systems of command and control, and superior naval intelligence. But the key to Allied success, in the end, was the astonishing productive power of American shipyards. By the end of the war the US Navy had not only crushed its enemies, but established an overwhelming superiority over its Allies.

COLD WAR AND AFTER

The context for the development of navies in the 40 years after World War II was the Cold War confrontation between the United States and the Soviet Union. The US Navy had to prepare for a possible nuclear war with the Soviets and to counter what America regarded as communist expansionism around the globe. The navy enjoyed the resources made available by American economic dominance, always the ultimate basis for naval power. But the USSR was prepared to devote a large percentage of its lesser national wealth to military development and thus over time created the world’s second largest navy, a massive force especially strong in nuclear submarines. However, as a war between the two superpowers was ruled out by nuclear weapons, which made an all-out armed struggle between them in practice unwinnable, the Soviet Navy never fired a shot in anger. The US Navy by contrast saw plenty of action during the Cold War, notably in support of land operations in “limited” wars in Korea and Vietnam. Britain became America’s subordinate ally, the Royal Navy still the third-largest naval force in the

Hunter-killer submarine

The Los Angeles-class nuclear-powered submarine Salt Lake City on exercises in 2005. The class was introduced during the Cold War as hunter-killers to track, and if necessary destroy, Soviet ballistic missile submarines.
Genuine submarines, in the sense of a vessel capable of sustained operations underwater, were brought into service by Germany at the end of World War II, but it was nuclear power that really made submarines come into their own. Nuclear submarines, much bigger than their predecessors, could travel under the sea almost indefinitely. They diverged into two types: those armed with ballistic missiles that formed part of the “nuclear deterrent” and hunter-killer submarines, chiefly to be used to hunt an enemy’s submarine forces.

The demise of the big guns did not mean that the only valid surface warships were carriers. Frigates, reintroduced during World War II, and destroyers continued to fulfill a vital role as platforms for anti-submarine, anti-ship, and anti-aircraft missiles, as well as mounting nuclear and non-nuclear land attack missiles. The predominance of missiles was such that by the 1970s some warships were being built with no guns at all—but this proved a momentary aberration. The use of missiles, with their guidance systems and the countermeasures they required, was necessarily linked to massively sophisticated systems of communications and control. Combat was in the hands of men or women sitting in front of computer screens in control rooms who would never see the enemy they fought. By the 1991 Gulf War, shore bombardment was being conducted at ranges of hundreds of miles not only by naval aircraft but also by Tomahawk cruise missiles.

**THE 21ST-CENTURY NAVY**

By the 21st century it was fair to say that, in terms of world power, the US Navy was the only force that really counted. The navy that took part in attacks on Afghanistan and Iraq was a refined instrument of global power-projection. Its crews, ratings as well as officers, consisted mostly of educated people—women as well as men from 1993—exercising some special skill. Many were operating electronic gadgetry related to sensors and guidance systems, control and communications. Manual labor formed only a relatively small part of life on board any warship. Even on submarines, crew experienced conditions—in terms of food, comfort, and medical care—far more civilized than any of their historical predecessors. What role this superbly trained and equipped navy would find to play in the context of the “War on Terror” remained open to question.
EUROPE BETWEEN THE WARS

AFTER THE END of hostilities with Germany in 1918, the British and French toyed with intervention in Russia against the Bolshevik regime, when engaged in conflicts on its western borders. The commitment of naval forces in the Baltic and the Black Sea brought little positive result besides a demonstration of British fighting spirit in a raid on Kronstadt. A mutiny aboard the French battleships Jean Bart and France in the Black Sea in April 1919 hastened disillusionment with interventionism and pressure to demobilize. No further naval conflict occurred in Europe until 1936, when right-wing Nationalist officers in Spain rebelled against the left-wing government of the Republic. Nazi Germany and Fascist Italy gave the Nationalists military support while the Soviet Union backed the Republic, and Britain and France operated a “non-intervention” policy. The Spanish navy split like the rest of the country and elements of it fought one another. Aided by Germany and Italy, which deployed submarines to attack Republican convoys, the Nationalists had the better of the naval war, although this was marginal to their eventual victory in 1939.

RUSSIAN CIVIL WAR
RAID ON KRONSTADT
Date: August 18, 1919
Location: Kronstadt, Baltic
The British navy developed Coastal Motor Boats (CMBs) during World War I, small torpedo craft designed to attack warships in harbor. After the war Lieutenant Augustus Agar was sent to the Baltic with two CMBs to help the British secret service destabilize the revolutionary Bolshevik government in Russia. Agar made a night raid on the Russian naval base at Kronstadt on June 17, 1919, sinking the cruiser Oleg.
Rear Admiral Sir Walter Cowan was commanding a Royal Navy force in the Baltic blocading the Russian navy in Kronstadt. Inspired by Agar’s example, he had a flotilla of CMBs brought from Britain. Led by Commander Claude Dobson, they attacked Kronstadt on the night of August 18-19, supported by aircraft from the carrier Vindictive. Dobson led the first wave of four boats into the harbor. His CMB 31 torpedoed the pre-dreadnought Andrei Pervozvanny. CMB 88 had her captain killed but Sub-Lieutenant Gordon Steele, taking control under heavy fire, torpedoed the dreadnought battleship Petropavlovsk. A second wave of CMBs faced intensifying Russian resistance. Two boats collided in the dark and another was cut in two by a shell. Both Steele and Dobson were awarded Victoria Crosses for their part in the raid.

SPANISH CIVIL WAR
CAPE ESPARTEL
Date: September 29, 1936
Location: Straits of Gibraltar
At the start of the Spanish Civil War Republican sailors took control of many naval vessels and blocked the movement of Nationalist troops by sea from Spanish Morocco to southern Spain. At the Atlantic port of El Ferrol Nationalists won control of warships including the light cruiser Almirante Cervera and heavy cruiser Canarias. Under Captain Francisco Moreno, the two ships sailed to the Straits of Gibraltar and attacked a Republican flotilla. Almirante Fernandez was sunk and another destroyer, Gravina, severely damaged. The rest fled for safety, leaving the sea route between North Africa and Spain open for Nationalist forces.

SPANISH CIVIL WAR
CAPE PALOS
Date: March 5-6, 1938
Location: Off Cartagena, Spain
On the night of March 5-6, 1938, the cruisers Baleares, Canarias, and Almirante Cervera, under the command of Rear Admiral Manuel de Vierna, were escorting two Italian freighters to Nationalist Spain. At the same time a Republican force of cruisers and destroyers under Vice Admiral Luis de Ubieta left the port of Cartagena, intending to raid the Nationalist harbor at Palma on Mallorca.

Just after midnight the two naval forces ran into one another. The Republicans frusteelessly fired a number of torpedoes before the Nationalist cruisers disappeared into the darkness. Around 2:15 a.m. the two forces met and Almirante Cervera to return at dawn to collect the survivors, transferring them to the Nationalist cruisers under Republican air attack. The battle of Cape Palos was a Republican success but had no strategic consequences.
EARLY NAVAL AVIATION

AMERICAN FLIER EUGENE ELY demonstrated in 1910–11 that it was possible to take off from and land on the deck of a ship. Navies were quick to see the usefulness of aircraft, especially for reconnaissance, and adopted both airships and heavier-than-air machines. In 1911 the French navy introduced the first ship to carry float planes and in 1914 Britain’s Royal Naval Air Service was founded.

EARLY NAVAL AIRCRAFT
Float planes were used from the start of World War I. Lowered over the side of a seaplane tender to take off from the water, they were lifted back on board after their mission. Unfortunately, the float planes could only operate in optimum weather conditions. A heavy swell made landing and take-off impossible. The lightweight wood-and-canvas aircraft of the period were relatively easy to launch from an improvised platform on a ship, but safe landing was only just being mastered as the war ended. Thus even ship-launched machines had to be retrieved from the sea after a mission.

CARRIER CONVERSIONS
The first carriers evolved from experiments by the Royal Navy Air Service in 1916. The decks of the battlecruiser Furious were cleared to make a platform for take-off and landing, but it was found that the funnel and central superstructure created insuperable problems for pilots. In 1918 the British converted an Italian liner into the carrier Argus, with a funnel tucked away at the end of a long unobstructed deck. The US Navy followed this example with the converted collier Langley—dubbed the “covered wagon”—in 1922. A superstructure offset to starboard was generally adopted in the 1920s, but most carriers continued to be conversions—the US Navy’s Lexington and Saratoga, for example, started life as battlecruisers.

HMS Argus
Built in 1916, the British aircraft carrier Argus was the first carrier to have a flush deck that let wheeled planes take off and land safely.

HMS Hermes
The world’s first purpose-built aircraft carrier, the Royal Navy’s Hermes, was commissioned in 1923. She was sunk in 1942.
THE OUTBREAK OF World War II in 1939 came too early for the German navy, which was looking forward to completing a large-scale expansion program by the mid-1940s. Yet Britain’s Royal Navy found itself fighting a defensive war on increasingly difficult terms. Germany’s military successes in 1940 gave it control of the Norwegian side of the North Sea, France’s Atlantic ports, and the southern Channel coast, and deprived the Royal Navy of the support of the French fleet. With Italy also entering the war, British naval forces were desperately stretched. German U-boats came close to severing Britain’s lifeline across the Atlantic through the savaging of merchant convoys. Yet while in World War I the Royal Navy had performed disappointingly, despite its superiority, in World War II it showed endurance and aggression under the most demanding circumstances.

WEAKNESSES AT SEA
The Royal Navy entered the war with some serious drawbacks. Failing to learn from the experience of World War I, the British had inadequate numbers of smaller ships for convoy escort duties to combat U-boats. Too much faith had been put in sonar underwater detection equipment and depth charges as a miracle cure for submarine attack. Corvettes and then frigates were rushed into service to fill this gap, while Canada made an invaluable contribution to convoy defense, followed by the United States from 1941. British inter-war neglect of carrier aircraft—a result of putting them under RAF rather than navy control up to 1937—resulted in the Fleet Air Arm entering the war with some excellent carriers but obsolescent aircraft. On the other side, Germany was slow to put sufficient resources into U-boats, and the Italian navy suffered from technical deficiencies including absence of radar and inadequate intelligence as well as poor command at the highest levels.

COURAGE AND AGGRESSION
Germany’s surface fleet was never powerful enough to challenge the Royal Navy in the way its World War I predecessor had at Jutland. After heavy losses of destroyers in the 1940 Norwegian campaign the German navy was in no position to engage in fleet actions or cover a seaborne invasion of Britain. Its fast modern warships, used as surface raiders, were a serious threat to vital shipping lanes early in the war but they...
were gradually hunted down and destroyed, if at considerable cost. The Royal Navy also inflicted heavy losses on Italian warships in a number of bold actions. But the use of submarines and air power denied the British command of the sea. Although the Germans had no carriers, land-based Luftwaffe aircraft proved their deadly effectiveness against the Royal Navy in the Norwegian campaign, at Dunkirk, and in the Mediterranean, especially during the evacuation of Crete in 1941 in which 24 British warships were sunk or badly damaged by air attack. Mines were rendered less effective than in World War I through the adoption of effective countermeasures by 1940, but Axis submarines took their toll of warships as well as merchant shipping—Royal Navy ships lost to U-boat attack included the battleships \textit{Royal Oak} and \textit{Barham} and the carriers \textit{Courageous} and \textit{Ark Royal}. Convoys had to be escorted through the Mediterranean, across the Atlantic, and into the Arctic under both submarine and air attack, grueling and costly operations to keep lifelines open. It was not until 1943, more than a year after America’s entry into the war, that the Allies established effective command of the Atlantic and Mediterranean. Even then much was owed to air power—the battle of the Atlantic was not won until escort carriers and long-range aircraft brought the whole ocean under cover of air patrol. The landings at Normandy in June 1944 were a staggering demonstration of naval power, but the operation depended on command of the air. The impressive productivity of Allied shipyards, especially those of the United States, meant that the odds mounted overwhelmingly against Germany as time passed. The U-boats never ceased to operate, with superior design even giving them a fresh lease of life in 1945, but it was far too little and too late.
In the early months of World War II, the Deutschland-class pocket battleship Admiral Graf Spee was engaged in commerce raiding in the Indian Ocean and the South Atlantic. Under the command of Captain Hans Langsdorff, the German warship sank nine merchant ships, while chivalrously ensuring that there was no loss of life.

At around 6:15 a.m. on the morning of December 13, 1939, a lookout on Graf Spee sighted a cruiser and, it was initially believed, two destroyers. The ships were in fact the Royal Navy’s Force G, consisting of the heavy cruiser Exeter and the light cruisers Ajax and Achilles, the latter belonging to the New Zealand Division. Led by Commodore Henry Harwood on board Ajax, the cruiser squadron had been hunting for the German commerce raider and correctly guessed it might be lurking off the estuary of the River Plate between Argentina and Uruguay. The Royal Navy ships were outgunned by Graf Spee: the pocket battleship had 11-in main guns, compared with Exeter’s 8-in and the 6-in armament of the two light cruisers.

In the true tradition of the Royal Navy, however, Harwood unhesitatingly attacked. He split his force, with Exeter steering to the south of Graf Spee and the cruisers Ajax and Achilles manoeuvring to the north. Fire opened within minutes as the range closed, Graf Spee initially focusing upon Exeter as the greater threat. The heavy cruiser was soon in trouble. Its bridge was swept by shrapnel, leaving the ship’s captain, E.S. Bell, as one of the few survivors. Guns were put out of action, communications destroyed, and fires started. Ajax and Achilles forced Langsdorff to divide his fire, depending on their speed to survive as salvos fell around them. By around 7:40 a.m. Exeter could no longer fight and limped away from the battle. But without knowing it, Exeter’s gunners had succeeded in scoring a crucial hit on Graf Spee, destroying her fuel processing system. Langsdorff knew he could not long remain at sea without repairs and headed west for the River Plate. Damaged and short of

Glory of the Navy
The sinking of the Graf Spee was a huge boost for British morale. This commemorative magazine celebrates “How we beat the Graf Spee.”
The German battlecruisers *Scharnhorst* and *Gneisenau* and the heavy cruiser *Prinz Eugen* were ordered to return to Germany from Brest through the Channel. Under Vice Admiral Otto Ciliax, they left port late on the night of February 11–12 and sailed 300 miles (480 km) down the Channel before they were detected, even though the British had been expecting their move. They dodged fire from shore guns and brushed off destroyers and torpedo boats. A gallant attack by six Fairey Swordfish biplanes led by Lieutenant Commander Eugene Esmond also failed and the aircraft were shot down. Despite hitting a number of mines, the ships successfully reached home, to the great embarrassment of the Royal Navy.

The British cruisers *Achilles* and *Ajax* settled for shadowing *Graf Spee* through the day, largely succeeding in keeping out of range of the battleship’s guns. That night, *Graf Spee* entered the port of Montevideo, the capital of neutral Uruguay. According to the rules of war, the Uruguayans had to order the German warship to leave after repairs or intern both the ship and its crew. British misinformation convinced Langsdorff that a powerful Royal Navy force awaited him—while in fact only the heavy cruiser *Cumberland* had joined *Ajax* and *Achilles*. Langsdorff rejected the options of internment or a showdown. On December 17 *Graf Spee* steamed out into the River Plate estuary, the crew were taken off, and the ship was scuttled. Two days later, Langsdorff shot himself.

**Ajax and Achilles**
The light cruiser *Achilles* seen from underneath the guns of her sister ship *Ajax* after battle with *Graf Spee*. The guns are loaded and trained in the direction of the River Plate estuary to prevent *Graf Spee*’s escape.

Ammunition, *Achilles* and *Ajax* settled for shadowing *Graf Spee* through the day, largely succeeding in keeping out of range of the battleship’s guns. That night, *Graf Spee* entered the port of Montevideo, the capital of neutral Uruguay. According to the rules of war, the Uruguayans had to order the German warship to leave after repairs or intern both the ship and its crew. British misinformation convinced Langsdorff that a powerful Royal Navy force awaited him—while in fact only the heavy cruiser *Cumberland* had joined *Ajax* and *Achilles*. Langsdorff rejected the options of internment or a showdown. On December 17 *Graf Spee* steamed out into the River Plate estuary, the crew were taken off, and the ship was scuttled. Two days later, Langsdorff shot himself.

**ATTACKS ON TIRPITZ**

From early 1942 the German pocket battleship *Tirpitz* was stationed in northern Norway, posing a threat to British Arctic convoys. The Royal Navy tried to sink *Tirpitz* in the fjords, twice inflicting serious damage. In September 1943 six X-rafts—midget submarines with a three-man crew—were towed across the North Sea by conventional submarines. Two X-rafts were lost en route but the rest made their run into Kafjord, steering a hazardous course through a minefield and past listening posts. One of the X-rafts was sunk by gunfire and another failed to locate a target, but X-6 and X-7, commanded by Lieutenant Donald Cameron and Lieutenant Basil Place, succeeded in laying their explosive charges beneath *Tirpitz*’s hull. These exploded, causing substantial damage that put the ship out of action for six months. The crews of the X-raft survived but were captured. Cameron and Place received the Victoria Cross.

**OPERATION TUNGSTEN**

Another attack on *Tirpitz* was carried out by the Fleet Air Arm in April 1944. The fleet carriers *Victorious* and *Furious*, supported by a powerful force including two battleships, launched 40 Fairey Barracuda dive-bombers with fighter escorts in two waves. The fighters strafed *Tirpitz* and the Barracudas dropped both general-purpose and armor-piercing bombs, the latter disappointingly failing to penetrate the battlecruiser’s deck. *Tirpitz* suffered more than 400 casualties and was put out of action for a further month. She was finally sunk by the Royal Air Force on November 12, 1944.
On May 18, 1941, the battleship *Bismarck*, accompanied by the cruiser *Prinz Eugen*, sailed from the Baltic port of Gdynia. Admiral Lütjens’ mission was to break out into the Atlantic and raid Allied merchant convoys. The Royal Navy tracked the ships as far as the Norwegian coast, after which they disappeared. On the evening of May 23, however, the pair were detected by the radar-equipped cruisers *Norfolk* and *Suffolk*, on patrol in the Denmark Strait.

**SINKING OF THE HOOD**

The new battleship *Prince of Wales* and the large but aging battlecruiser *Hood* arrived in visual range at 5:35 a.m. the next morning. On paper the two sides looked well matched, but *Prince of Wales* had been rushed into action without proper preparation, while *Hood* lacked adequate armor. *Bismarck*, while not without flaw, was the largest warship commissioned at the time. The firing began at range, with the Royal Navy ships closing rapidly. At 6:00 a.m. a shell penetrated one of *Hood’s* magazines and the battlecruiser was split in two by a huge explosion. It sank in three minutes. Only three men from a crew of over 1,400 survived. The *Prince of Wales* prudently broke off the fight. The sinking of *Hood* was a severe shock to the Royal Navy, but *Bismarck* had not emerged unscathed. A shell had damaged its fuel tanks, forcing Lütjens to alter his plans. *Prinz Eugen* was despatched to fulfil the commerce raiding mission, while *Bismarck* made a dash for Brittany.

The Royal Navy devoted every available resource to hunting down the German battleship, but Admiral John Tovey, leading the pursuit on board *King George V*, found the enemy elusive. A torpedo attack by Swordfish aircraft from the carrier *Victorious* on the night of May 24 was ineffectual, and the following day Lütjens gave his pursuers the slip. Tovey mistakenly suspected he was heading back to the Denmark Strait and sailed too far north.

**THE END OF THE BISMARCK**

On the morning of May 26 *Bismarck*’s luck changed, when she was spotted by a Catalina flying boat of RAF Coastal Command. Tovey was too far off to catch *Bismarck* before she came within the protective shelter of land-based Luftwaffe aircraft. But Force H, including the carrier *Ark Royal*, sailing north from Gibraltar, was well placed to intercept. The Force’s commander, Admiral James Sommerville, sent the cruiser *Sheffield* to shadow *Bismarck* and Swordfish from *Ark Royal* to attack with torpedoes. The first Swordfish sortie was a fiasco—they attacked *Sheffield* by mistake. But a second sortie late in the day proved decisive. Flying unscathed through a barrage of anti-aircraft fire in the murky dusk, the flimsy biplanes managed two hits on *Bismarck*, one of which jammed the rudders. The ship was stuck in a circle to port. Realizing that he was now doomed, Lütjens sent a last message to headquarters: "We will fight to the last shell. Long live the Führer!"

British destroyers kept up the pressure on *Bismarck* through the night with torpedo attacks. The following morning the battleships *King George V* and *Rodney* arrived to batter Lütjens’ crippled ship. *Bismarck* was a burning hulk by the time the cruiser *Dorsetshire* closed to finish her off with torpedoes. Only 110 of the crew were saved.

---

**THE HUNT FOR THE BISMARCK**

The hunt for the *Bismarck* was a burn for the Royal Navy, the British commit every available unit to hunting down the now limping *Bismarck*, one of which jammed the rudders. The ship was stuck in a circle to port. Realizing that he was now doomed, Lütjens sent a last message to headquarters: "We will fight to the last shell. Long live the Führer!"
Bismarck’s last battle
Raked by gunfire from the British battleships, the crippled Bismarck puts up a desperate last fight.

A reconnaissance plane from Northern Ireland spots the Bismarck, letting the British units renew their pursuit.

A second bombing raid by Ark Royal’s Swordfish torpedo bombers damages the Bismarck’s steering.

Force H, including aircraft carrier Ark Royal, heads north from Gibraltar to block the Bismarck’s escape.

The end of the Bismarck
Her rudders jammed, the Bismarck steams in large circles into the path of the approaching British battleships. Mortally damaged by torpedo attacks from the cruisers and destroyers and heavy fire from the battleships, the Bismarck finally succumbs.

Heavy cruiser Dorsetshire arrives from the south to join the attack. With Bismarck’s crew already scuttling the battleship, Dorsetshire’s torpedoes finally finish her off.

ATLANTIC OCEAN
**USS TEXAS**

**THE NEW YORK-CLASS** battleship Texas, commissioned in March 1914, was a “super-dreadnought,” a product of the naval arms race that preceded World War I. She was especially prominent in World War II in a shore bombardment role, her big guns providing fire support for landings in North Africa, Normandy, Iwo Jima, and Okinawa.

**THE USS Texas** was built at Newport News, Virginia, for a cost of around $6 million. Her main armament of ten 14-in guns made her the most powerful warship in the world in 1914, but in some respects she was behind the times, especially in depending upon coal-fired reciprocating engines instead of oil-fired steam turbines. An extensive modernization in 1927 replaced coal-fired boilers with oil-firing, improved the ship’s armor, and upgraded her fire-control systems. Subsequent modifications included the addition of anti-aircraft guns and the installation of radar on board in 1939.

By the outbreak of World War II Texas was too slow to hold her own as a warship in battle with more modern capital ships, but her guns still packed a powerful punch and the battleship earned five battle stars during the war. The only combat fatality ever suffered by Texas occurred in a duel between the ship and German shore batteries at Cherbourg in June 1944, when a shell struck her armored conning tower. Texas was decommissioned in 1946. Now a museum ship at San Jacinto, Texas, she is the last surviving dreadnought-era battleship.
When not in use, the ship's huge 14-in guns were covered by metal caps designed to prevent water from entering the barrels.

The bakery was located near to the galley on the port side of the main deck where the ovens could be cooled by fresh air.

The ship was fitted with ten sets of four Bofors 40-mm guns to provide defense against enemy aircraft. Each of the four quad mounts was powered and controlled remotely using a Mk51 gun director located close to the mount.

44 Oerlikon automatic cannon were fitted as a secondary anti-aircraft defense. The gunner was strapped against the shoulder rests and aimed using the sight.

Texas was the first US battleship to use electric ovens, though these were later replaced with oil-fired ovens to reduce electricity consumption.

Shells would be brought from the magazine up into the gunhouse through the upper shell hoist and rolled onto the loading tray. The shell and charge bags were then rammed into the open breech and the breech door shut. A trained gun crew could load and fire a round every 45 seconds.

The ship's galley handled three meals a day for a crew of almost 1,800 men. A dumbwaiter carried food down to a second serving area below deck.

Underneath the large guns at the bows of the ship, two large electric anchor capstans could rotate to raise or lower the ship's anchors. Capstans at the stern were used for towing.

Most of the 20-mm, 40-mm, and 3-in anti-aircraft guns down side of the battleship are protected by circular, armored barbettes. The boxes on top of this 40-mm mount are covers for the ammunition loading slots.
WITH A COMPLEMENT of around 1800 officers and men by 1945, the battleship Texas was in some ways like a small town, with its own post office, barber shop, and dentist—although no liquor store, alcohol consumption being officially banned on all US Navy ships, in sharp contrast to the practice of Britain’s Royal Navy. This was certainly a large ship, 573 ft (175 m) long and 106 ft (32 m) across the beam, yet there was little room for privacy and precious few frills. Toilet and bathing facilities in particular were quite primitive and most men ate where they slept. It was, however, a well-organized world in which each individual knew his place and his function, and in which the basic needs of health and nutrition were properly addressed.

Chart House
Located close to the pilothouse and the Captain’s sea cabin, this room was used for chart navigation. The devices attached to the wall above the chart table are depth and speed indicators. The bulkheads surrounding the room are made of brass to avoid magnetic interference with compass readings.

Navigation dials
The equipment in the auxiliary CIC includes this speed indicator dial and chronometer—a precise timekeeper used to assist in navigation.

Combat information center
The CIC provided the electronic eyes and ears of the ship, collecting and evaluating information from a variety of sources such as the ship’s radar, and coordinating the fire control systems.

Pilothouse
The ship was steered from the helmsman’s station where the ship’s wheel, tiller, rudder angle indicator, compass, and engine order telegraph were all located.

Executive Officer’s Office
The Executive Officer was the second-in-command of the ship. The staff in his office handled much of the ship’s day-to-day administration, approved work assignments, and created the daily routine sheet—the orders and schedule for the ship’s daily activities.

Adding machine
The Burroughs machine was an early calculator used to help the officers with their bookkeeping.

Auxiliary Combat Information Center (CIC)
Located in the heart of the ship to provide backup in case the main CIC was damaged, the auxiliary CIC contained a range of crucial information-gathering equipment such as the surface SG radar unit seen against the wall on the right. The large circular device in the foreground is an illuminated plotting table.
Barber shop
Regulations specified that a sailor's hair should be no longer than 1.5 in (38 mm) on top and clipped short on the sides. This barber looked after the enlisted men—officers had their own barber shop further forward.

Post office
Letters and news from loved ones back home reached the sailors through the ship's post office, providing an important boost to crew morale.

Cafeteria
Food came down from the galley on the deck above in a dumbwaiter and was put into heated containers for serving. Most enlisted men took their food back to their berthing areas to eat off stowaway wooden tables.

Operating room
The ship's medical facilities included a surgery to deal with injuries sustained in battle and other emergencies. Instruments were sterilized using a pressurized device known as an autoclave, in the next room.

Tailor's shop
Alongside the ship's post office in the general service area was a busy tailor's shop where crew members could pay to have their uniforms mended or altered, and pressed.

Sick bay
Texas had a large sick bay and extensive medical facilities, and the battleship often provided medical services to smaller ships in the fleet. The ship also contained an isolation ward next to the main sick bay to prevent the spread of infectious diseases.

Prophylactic room
Condoms were made readily available to US sailors during World War II to prevent sexually transmitted diseases—one government educational film urged the sailors to “put it on before you put it in”.

Dispensary drawers
The ship's doctor treated minor injuries and ailments in the dispensary, next door to the surgery and sick bay.

Dentist's room
Texas had her own dentist on board, as well as a well-equipped dental surgery. The dentist was also able to perform other types of surgery when required, something which could prove essential if the ship had to deal with large numbers of wounded.

Ship's laundry
The large laundry was equipped with a washer, wringers, and clothes pressing machines. Laundry workers received additional pay because of the unpleasantly hot and humid working conditions.
Junior officer's racks

Accommodation for junior officers was in shared staterooms often only slightly less cramped than the areas for the enlisted men. Bunks in the passageway of the officers' quarters provided an overflow berthing space.

Officer's washroom

Junior officers shared their own washing facilities and toilets in a small area on the second deck in the bows of the ship.

Crew locker

Privacy and personal space were at a premium on board a crowded battleship, but each crewman had a locker for his clothes and possessions, including a small lockable compartment for his valuables.

Marine berths

The ship's complement of marines, like the enlisted sailors, slept in bunks hung three or four levels high. Berthing areas were dotted around the ship where there was space, mostly on the second deck.

Crew heads

Crew toilets consisted of nothing more than boards over a trough with seawater pumped down to carry waste matter into the sea.

Lieutenant's cabin

Only relatively senior officers would have enjoyed the luxury of a private room. This cabin belonged to Lieutenant Fred Winter, the officer in command of Turret No.2's gun crew.

Ventilation holes

Small vents in the partition walls helped air circulate between the berthing areas. Nonetheless the crowded bunkrooms must have felt oppressive during hot summer weather.
Battle lantern

Although Texas was fitted with a regular electric lighting system, there were also a number of portable relay-operated lamps known as battle lanterns located around the ship for use in an emergency.

Bureau Express oil-fired boiler

The propellers and electrical generators were powered by steam engines driven by six oil-fired boilers. This boiler’s triangular firebox has nine burners mounted on the front (three are removed to show the openings) and two large cylinders for water on either side. The steam drum above the firebox which fed the engine is out of shot.

Nozzle detail

The nine burners forced oil through atomizers to create a spray mist that was burned to heat the water. The red T-bar handles held the adjustable atomizer rods in place to control the volume and fineness of the spray.

Steering room

The rudder was normally turned using an electric motor, but if the battleship's steam and electric power systems were knocked out, it was possible to steer the ship manually using four large wheels along the main rudder shaft. It took 16 men to turn the rudder very slowly.

Powder scuttles

Propellant powder was stored in the powder magazines, well away from the shells. The powder bags were passed from the powder magazine to the turret handling room through flash-proof scuttles to prevent explosive flash travelling down from the gun and igniting the powder.

Power shop test unit

The workshop used for the repair of electrical items and the maintenance of the ship’s electrical power systems was known as the power shop. This test unit allowed the engineers to check different parts of the ship’s electrics.

14in shell magazine and hoist

Several decks below each of the five main gun turrets lay magazines for storing the 14in shells. The shells were lifted using a block and tackle and carried on ceiling mounted pulleys to the lower handling room, where they were hoisted to the gun turret for loading.

20mm ammo box

A wooden box from one of the ammo magazines containing two 60-round clips of ammunition for the 20mm anti-aircraft guns.
The U-boat War 1939–45

British convoy escorts were inadequate in numbers, equipment, and training, and the U-boats sank many ships. Successful U-boat captains became celebrated in Germany as “aces.” A second surge of U-boat success followed the entry of the United States into the war in December 1941, which allowed them to prey on ships on convoy routes up and down the US east coast. The climax of the U-boat war came in spring 1943. Just as Dönitz looked like winning the war, a combination of superior industrial production, improved technology and tactics, air cover, and intelligence allowed the Allies to turn the tide decisively against the U-boats. Overall, the U-boat war was exceptionally tough for Allied merchant and naval seamen, whether crossing the Atlantic or on the harsh Arctic route to Russia. However, it was the U-boat crews that suffered the heaviest losses, with 60 percent of all crew dying during the war.

The main areas of engagement between German and Allied forces during the U-boat war were in the North Atlantic along the major convoy routes connecting the US east coast with the UK, and along the convoys routes running around the US east coast. German U-boat wolf packs also targeted Allied merchant shipping on routes running through the Arctic between the UK and northern Russia, and on convoys running between West Africa and the UK and from the Americas through the Straits of Gibraltar into the Mediterranean.

The U-boat War 1940-1943

The main areas of engagement between German and Allied forces during the U-boat war were in the North Atlantic along the major convoy routes connecting the US east coast with the UK, and along the convoys routes running around the US east coast. German U-boat wolf packs also targeted Allied merchant shipping on routes running through the Arctic between the UK and northern Russia, and on convoys running between West Africa and the UK and from the Americas through the Straits of Gibraltar into the Mediterranean.
At the start of World War II German U-boat chief Admiral Dönitz was looking for a prestige operation that would win Hitler’s support for the submarine arm. He decided to attempt to penetrate the Atlantic approaches, Western Approaches, Atlantic and to attack Royal Oak so early in the war, came as a severe blow to the Royal Navy.

The Royal Oak was a merchant ship of 24,638 tons. It had been left behind, moored next to a seaplane carrier. Dönitz believed Scapa Flow, the Royal Oak had been impregnable to U-boats, so it was assumed the explosion had occurred in a storeroom. Most of the crew were still sleeping below decks when three more torpedoes ripped into the ship, causing a further huge explosion. Royal Oak swiftly sank. Of 1,200 crew, 833 sailors were killed. Prien slipped away before dawn, to receive a hero’s welcome on his return to Germany.

SINKING OF ROYAL OAK

Date: October 14, 1939
Forces: British: 5 escort ships, 35 merchant ships; Germans: 7 U-boats
Losses: British: 20 merchant ships; Germans: none

SC-7 was a convoy of slow merchant ships that set out from Nova Scotia on October 5, 1940, with a single sloop as escort. Although another two sloops and two corvettes met the convoy as it entered the Western Approaches, none of them had any idea how to cope with multiple attacks by submarines operating on the surface at night. The convoy itself was undisciplined, with too many ships out of formation. Four merchant ships were sunk by U-boats on October 16 and 17, before the main attack commenced on the night of October 18-19. This involved five U-boats, including Otto Kretschmer’s U-99, Joachim Schepke’s U-100, and Engelbert Endrass’s U-46. They sank 16 ships in six hours, while the escorts were reduced to picking up survivors.

CONVOY SC-7

Date: October 16–19, 1940
Forces: British: 5 escort ships, 35 merchant ships; Germans: 7 U-boats
Losses: British: 20 merchant ships; Germans: none

CONVOY HX-79

Date: October 19–20, 1940
Forces: British: 11 escort ships, 49 merchant ships; Germans: 5 U-boats
Losses: British: 12 merchant ships; Germans: none

How Submarines Work

Depending on its density, an object will either float or sink in water. When a submarine is about to dive, vents at the top of the hull are opened, air escapes, and the reduced pressure allows water in through vents in the bottom. The density of the submarine increases and it sinks. With the aid of hydroplanes, the engine powers the submarine forward and down until the ballast tanks are completely full and a state of neutral buoyancy has been achieved. At this point the upper vents are closed. To reverse the process, compressed air is forced into the ballast tanks, forcing water out of the lower vents and increasing buoyancy, while the engine propels the submarine back to the surface.

Partially submerged
Ballast tanks filled with compressed air allow the submarine to float just below the surface of the water.

Submerging
As air is released the ballast tanks fill with water and the submarine starts to submerge.

Fully submerged
The submarine continues to sink until the ballast tanks are completely filled with water.

Surfacing
Compressed air released into the ballast tanks forces water out and the submarine surfaces.
ARCTIC CONVOY PQ-17

Following the entry of the Soviet Union into the war in summer 1941, Britain and the United States began supplying Soviet forces with military equipment to fight the Germans. Some of these supplies were carried by convoys to the northern Russian ports of Arkhangelsk and Murmansk. Even without enemy action, Arctic convoys were a grueling struggle against freezing cold, gales, fog, and ice. The convoys were exposed to attack by land-based Luftwaffe aircraft in occupied Norway as well as from U-boats, and they were constantly threatened by the presence of German warships in the Norwegian fjords.

PQ-17 SETS SAIL

In June 1942 the largest Arctic convoy yet to sail, consisting of 35 merchant ships, assembled at Iceland. It was given three levels of naval defense: a close escort force of destroyers, corvettes, minesweepers, armed trawlers, and anti-aircraft auxiliaries. In support was a covering squadron of heavy cruisers and destroyers. Yet further off lurked a powerful force centered around the carrier Victorious and two battleships, Duke of York and Washington, hoping that the German big-gun ships Tirpitz, Admiral Hipper, and Admiral Scheer might come out. The Germans had in fact decided to launch a major operation against the convoy, which therefore became the unfortunate focus of a trial of strength between the two sides. Leaving Iceland on June 27, the convoy started to run into air attacks from July 2. The swarms of Luftwaffe aircraft met fierce resistance from the ships of the close escort and from guns on the merchant ships. Although two American merchantmen were lost on July 4, the situation seemed broadly under control. At this point, however, the British Admiralty made an
assessment—not supported by any intelligence—that Tirpitz, Hipper, and Scheer were moving to intercept the convoy. The First Sea Lord Sir Dudley Pound ordered the convoy to scatter, concentrating all the escort and covering warships to meet the German sortie. It was an appalling error. The German warships were moving to intercept the convoy, but were not present at the time.

Many merchant vessels were sunk, among the worst losses of any convoy in the war. In March 1943, two convoys left New York bound for Liverpool: HX-229 with 40 merchant ships and the slower vessels of SC-122. Admiral Karl Dönitz knew of these convoys because B-Dienst intelligence department had cracked British naval codes. Three U-boat wolf packs, codenamed Raubgraf, Stürmer, and Dränger, were positioned in the mid-Atlantic across the convoys’ route. Raubgraf made contact with HX-229 on March 16. The merchant ships had a weak escort of three destroyers and two corvettes, insufficient to prevent the eight-boat wolf pack from harrying the convoy mercilessly. Meanwhile, on their way to join the attack on HX-229, the other wolf packs stumbled upon SC-122. This had a stronger escort, but the wolf packs totaled 30 U-boats and simply swamped its defenses. By 19 March, when the arrival of more escort ships halted the attacks, HX-229 had lost 13 ships and SC-122 had lost nine. Some 300 merchant seamen were killed.

Some 300 merchant seamen were killed. The Germans lost a single U-boat to an air patrol. A Royal Navy report later stated that “there seemed real danger the enemy would achieve his aim of severing the route which united Great Britain with the North American continent.”

The icebound deck of a British cruiser sailing the convoy route between Britain and Russia in 1943 gives an idea of the risks and hardships facing sailors on the Arctic convoys.

**U-BOAT CREW**

**A TYPE VII,** the standard U-boat of World War II, typically had a crew of four officers—the captain, his two lieutenants or “watch officers”, and an engineering officer—and some 40 petty officers and seamen. The petty officers were responsible for various specialized areas such as crew discipline, the torpedoes, the diesel and electric engines, the radio, navigation, and steering. At least in the early period of the war, U-boat crews were a self-conscious elite, with five years’ intensive training before going operational. They needed to be exceptionally fit and well balanced to endure the rigors of a submariner’s life. Most of the men were in their early 20s, and their captains were usually not much older.

**U-BOAT SEAMAN**

The seamen were housed in the bows of the boat, a space they shared with the forward torpedoes. There was usually one bunk for every two men, occupied on a shift system as one was on duty while the other rested. There was no privacy and little opportunity to wash or get a change of clothes while on patrol. The seamen performed the whole range of tasks required on board, from preparing food to manning the guns and loading the torpedoes in their tubes. Their most onerous task was keeping watch. When the U-boat was on the surface there had to be four seamen on watch 24 hours a day, searching the horizon for a convoy to attack or a hostile warship or aircraft.

**UNITY IN ADVERSITY**

Each sailor stood at each corner of the conning tower and was responsible for observing a 90-degree sector of the sea. A four-hour watch, often in freezing cold and with waves sweeping over the bridge, could be a feat of endurance. To avoid being swept overboard in rough weather seamen on watch wore safety belts that tied them to the column in the middle of the conning tower, as well as special waterproof suits. In the claustrophobic, cramped conditions on a U-boat, most crews became like a family for the seamen one U-boat man wrote that “you felt engulfed by comradeship.”

**Torpedo ratings**

Crew members load a torpedo into one of the tubes on board a German U-boat. Seamen usually had to share their sleeping quarters with spare torpedoes.
CONVOY ONS-5

In spring 1943 a convoy of 43 merchant ships left Liverpool bound for Halifax, Nova Scotia. It was escorted by Group B-7, consisting of two destroyers, a frigate, and four corvettes under the command of Commander Peter Gretton. Convoy ONS-5 was always a sitting target for Admiral Dönitz’s U-boat “wolf packs” swarming in the North Atlantic, the more so because the Allied codebreakers were temporarily unable to decipher German messages.

On April 28, ONS-5 was spotted by U-650, one of 16 boats strung out in a line between Greenland and Iceland. Tracking the convoy, U-650 called in the other U-boats for a group attack. Aware of the U-boats’ presence through “huff-duff” (HF/DF) radio direction finders, Gretton organized his defense well—the convoy suffered small losses, while two U-boats were severely damaged. Bad weather then led to an intermission. Reinforcements arrived for the convoy escort, but Gretton’s destroyer Duncan was forced to leave, unable to refuel in the heavy seas.

THE SECOND ENGAGEMENT

Command passed to Lieutenant Commander Robert Sherwood on the frigate Tay. By the time the storm abated on May 4, the main convoy had been reduced to 30 merchant ships with the rest detached stragglers. The U-boats reformed a line of 29 vessels into which the convoy now blundered. Behind this lay a further line of 24 U-boats. Taken together it was the largest concentration of force Dönitz had ever achieved. He told his U-boat commanders to “fight with everything you’ve got.” On the night of May 4–5 the onslaught on ONS-5 began. It lasted more than 30 hours. U-boats preyed upon the stragglers and worked their way into the middle of the main convoy, sending a number of ships to the bottom with torpedoes. The escorts fought back uselessly with a well-rehearsed sweep, using radar and ASDIC (sonar) to locate targets and depth-charges or ramming to attack them. On the night of May 5–6 fog set in. The convoy escorts could see the U-boats on their radar screens, while the U-boat commanders could see neither their targets nor their pursuers.

By daybreak on May 6, ONS-5 had lost 13 merchant ships, but the cost to the U-boats had been high—six boats sunk and at least four severely damaged.

U-BOAT TACTICS

WOLF PACKS

The “wolf pack” was a group of U-boats hunting together to locate and attack convoys. Typically the U-boats formed a line spread out across an Atlantic convoy route. When one of them spotted a convoy it tracked it, radioing the location to headquarters, which directed other U-boats to join in the hunt. When the pack had assembled around a convoy, the U-boats waited for nightfall and then surfaced to attack. The boldest of them would penetrate the escort screen into the heart of the convoy, picking targets to torpedo at will.

The rest fired their torpedoes from outside the convoy. Escort ships were frequently overwhelmed by the number of attackers and, at first, had little chance of spotting low-lying U-boats on the water’s surface at night. However, wolf-pack tactics required much use of radio, which allowed the U-boats to be located by escort ships “huff-duff” (HF/DF) radio direction finders. The subsequent introduction of shipborne radar transformed the ability of escort ships to cope with night surface attacks.
WE WERE ALMOST RAMMED BY A DESTROYER THAT SUDDENLY Appeared behind us, lighting up the Stern of our U-boat with a big searchlight ... I Dived immediately.

CAPTAIN-LIEUTENANT HARTWIG LOOKS, COMMANDER OF U-264
ANTI-SUBMARINE WARFARE

During the Battle of the Atlantic from 1939 to 1945, German U-boats sent around 2,000 Allied merchant vessels to the bottom of the ocean. The U-boat war was the critical threat against Britain once the immediate danger of a German invasion had passed in 1940—Winston Churchill once commented that “the only thing that ever really frightened me during the war was the U-boat peril.” Yet over the next six years, the Allies steadily gained the tactical and technological advantage, and by war’s end nearly 80 percent of operational U-boats were destroyed, giving the U-boat crews the highest percentage of fatalities of any German armed service.

Avoiding U-boats

The primary measure adopted to avoid U-boats was the convoy system. Sending supplies in large convoys rather than single, independent vessels worked on probability. If a U-boat failed to detect a single ship, or failed in an attack, then probability assured that another target would be along soon. However, if the U-boat failed to detect or attack a convoy, then it would lose a mass of opportunities in one instance. Convoying certainly reduced causalities, but the convoys themselves took further evasive measures to throw off the U-boats. They adopted zigzag movements across the Atlantic, with slow convoys making shifts at angles of 20–40 degrees every few minutes. Convoy evasion did not always work, but on many occasions convoys of almost 200 vessels crossed the Atlantic perfectly safely without being spotted by U-boats.

Huff-Duff

High-Frequency Direction-Finding (HF/DF), abbreviated to “huff-duff,” became one of the crucial technological resources in the battle against the U-boats. It consisted of either shore-based or ship-mounted antennas that picked up German U-boat radio transmissions, from which it was possible to triangulate the enemy’s rough position, and then make evasion or attack.

Locating U-boats

Even more than “huff-duff” (see above), radar systems were the critical U-boat locating tool. The first ship-mounted sets were crude and often ineffective, but by 1942 the British Type 271 centimetric radar was in operation, with enough sensitivity to detect a surfaced submarine at a distance of several miles. Once similar radar was fitted to long-range patrol aircraft, U-boats found it more difficult to hide. When the submarine was submerged, ASDIC (sonar) came into play. ASDIC used a sonar pulse that, if it hit and rebounded off a submarine’s hull, would give depth and direction data. The Allies also used hydrophone sets, powerful underwater microphones that “listened” for propeller or other noises. The Americans had the Magnetic Anomaly Device (MAD) fitted to patrol aircraft, which searched for magnetic disturbances in the water.
DESTROYING U-BOATS

Once a convoy escort group had located a U-boat they had several means of engaging it. If the U-boat was on the surface, it was attacked with gunfire or torpedoes, or sometimes even rammed (maritime patrol aircraft would make strafing or depth-charge runs). In most cases, however, the U-boat would submerge. In this case, the primary weapon was the depth charge, a cylinder of explosive with a hydrostatic fuze that was set to detonate the weapon at a particular depth. Escort vessels would circle the known or predicted U-boat position and “bracket” the area with depth charges. Typically, an escort would drop three depth charges from the stern and fire one from each side in every attack, varying the depth settings of each depth charge to maximize the possibilities of a kill. Several ships working in tandem would be able to blanket a wide area with explosive. In response, the U-boat commander would make constant evasive maneuvers and depth changes in order to throw the enemy ships off his scent.

DEPTH-CHARGE LAUNCH PATTERNS

As the war progressed, two main forward-firing variations on the depth charge emerged. The Squid three-barreled mortar fired three fast-sinking depth charges that produced triangular explosive patterns beneath the water, increasing the chances of a successful kill. The Hedgehog, by contrast, fired 24 small contact-detonated bomblets over a wide circular area.

READY FOR LAUNCH

A British naval crew prepare a depth charge for launch from a thrower. Depth charges may have been the crudest anti-submarine weapon in the Allied arsenal, but they were also extremely effective, accounting for 43 percent of all U-boats sunk.

ANTI-SUBMARINE DEPTH CHARGES AND MORTARS

The limitations of British sonar (ASDIC) were critical in the development of new anti-submarine weaponry during World War II. ASDIC was forward pointing, and therefore lost contact with a U-boat if it was within 600 ft (180 m) of the front of the ship. New types of anti-submarine weapon such as the Hedgehog and Squid mortars, introduced in 1942–43, fired forward and far enough ahead to engage the U-boat while still within ASDIC contact. The shape of their bombs also meant that they sank faster than depth charges, so escort vessels could put their explosives on target more quickly if a contact was made.
FORMIDABLE FIREPOWER
Huge shockwaves spread across the water as the battleship USS Iowa fires a full broadside from her nine 16-in guns. One of the most heavily armed warships ever built, the Iowa entered US service in 1943 and participated in many of the key Pacific battles of World War II. Iowa-class battleships have since served in every major US conflict of the second half of the 20th century.
EVACUATIONS AND LANDINGS

OPERATIONS IN SUPPORT of land forces constituted a major part of the naval war in the European theater. In April 1940 the Germans landed troops in Norway, primarily by sea, precipitating an intensive air-sea battle as Britain and France attempted first to interrupt the landings and then to put their own soldiers ashore. Both sides suffered naval losses in the Norwegian campaign, which ended in victory for Germany in June. By then the Germans had invaded France and the Low Countries, forcing a mass evacuation of Allied troops from Dunkirk, carried off by Royal Navy warships with the assistance of a flotilla of small craft under intensive air attack. From 1942, however, with the United States in the war and the tide of victory flowing in the opposite direction, Allied naval forces developed expertise in troop landings rather than evacuations. After British and American warships had successfully escorted troops to North Africa in late 1942, they went on to cover the landings in Sicily and southern Italy in the following year, and finally played a crucial role in achieving the vast-scale invasion of Normandy in June 1944.

DUNKIRK

The evacuation of Allied troops trapped by German forces at Dunkirk was codenamed Operation Dynamo. Vice-Admiral Sir Bertram Ramsay was initially ordered to take off 45,000 men over two days, but once it became apparent more time was available, the operation was greatly expanded. The troops were mostly carried across the Channel on destroyers and minesweepers, but Ramsay also called for the aid of hundreds of small civilian vessels including paddle steamers, trawlers, tugboats, and lifeboats. This was not a pure improvisation—most of the boats belonged to the Royal Navy’s “small vessels pool.” The function of the little boats was to ferry soldiers from the Dunkirk beaches through the shallows to naval ships waiting off shore, since Dunkirk port had become unusable. The evacuation was carried out under repeated attacks from the Luftwaffe, especially from Stuka dive-bombers. Ships were also lost to U-boats and German Fast Attack Boats (E-boats) as they crossed to England.

The evacuation peaked on May 31 when 68,000 men were rescued. The following day four destroyers were lost to enemy attack, after which the operation was restricted to night-time. In all 338,226 troops were brought safely across the Channel, the majority British but some 120,000 of them French.

Dunkerque little ship
At only 15 ft (4.5 m) long, Tamzin was the smallest vessel to take part in the evacuation of Dunkirk.
The invasion of Normandy by Allied forces on June 6, 1944, was the largest amphibious operation in military history. The naval aspect of the landings was known as Operation Neptune. The naval forces had three major functions: to transport troops and equipment across the English Channel; to protect the invasion force against attack by German surface warships or submarines; and to bombard the German land defenses. That the operation succeeded should not hide the fact that it involved considerable risks.

From a naval point of view, bad weather was probably the most serious hazard, for heavy seas would have prevented the landings entirely. Weather did in fact force a postponement from the original planned D-Day of June 5, and conditions on June 6 were far from perfect. This resulted in most troops arriving at the beaches seasick, but put the German defenders on their guard, since they considered an invasion in such weather unlikely.

Intervention by German naval forces also had to be taken seriously. During a rehearsal for D-Day at Slapton Sands in southern England in April 1944, a group of German Fast Attack Boats (E-boats) struck a convoy of landing craft and killed more than 60 American servicemen. If E-boats, U-boats, or even large surface warships had got among the landing craft during the actual landings the death toll could have been serious. In the event, the threat of the German navy was nullified. Kirks force consisted of three battleships—Nevada, Texas, and Arkansas—nine cruisers, and 20 destroyers. Vian had the battleships Hrmps and Ramillies, along with 12 cruisers and 37 destroyers.

The operation did not end with the landings. Naval forces had to maintain the supply lifeline across the English Channel, using the famous Mulberry artificial harbors towed across to Normandy. Naval guns continued to bombard German land forces as the fighting moved inland. There were losses to mines and air attacks, duels with coastal artillery, and occasional fights with German destroyers. But taken as a whole the Normandy invasion was a remarkable demonstration of the command of the sea and the importance of logistics.

D-Day landing craft
A British Landing Craft Assault (LCA) ferries US troops to shore during the rehearsals for the Normandy landings.
WAR IN THE MEDITERRANEAN

ITALY'S ENTRY INTO THE WAR in June 1940 initiated a three-year naval struggle for control of the Mediterranean. The Italian navy, the Regia Marina, fought bravely, although its effectiveness was limited by lack of radar. When the Italians were joined by the land-based aircraft of the German Luftwaffe, Britain's Royal Navy came under severe pressure. Running convoys from Alexandria and Gibraltar to Malta, a key British base less than 62 miles (100 km) from Sicily, was always difficult and sometimes impossible. Although British victories at Taranto and Cape Matapan weakened the Italian fleet, the Royal Navy's losses were grievous, mostly to air attack but also to German and Italian submarines. By the start of 1942 the Axis was winning control of the Mediterranean. The progress of Allied ground forces in North Africa, facilitated by naval attacks on Axis supply ships, eventually relieved the pressure on sea communications. Italy was defeated in September 1943.

### MERS-EL-KEBIR

Date July 3, 1940

**Forces**
- British: 1 carrier, 2 battleships, 1 battlecruiser, 2 light cruisers, 11 destroyers; French: 4 battleships, 6 destroyers, 5 submarines

**Losses**
- British: none; French: 3 battleships sunk or disabled

As German forces overran France in June 1940, the French Navy made vigorous efforts to keep its warships out of Nazi hands. Ships dispersed to British ports and the French overseas empire, including Mers-el-Kebir in French Algeria. The armistice terms agreed on June 24 specified that the French Navy would not be handed over to the Germans. The British, however, did not trust Germany or France to stick to the agreement. The addition of the French fleet to the Axis naval forces would have dangerously altered the balance of power at sea. Britain decided to ensure this could never happen. A force consisting of the battlecruiser *Hood*, the battleships *Tirpitz* and *Resolution*, and the carrier *Ark Royal* was sent to Mers-el-Kebir. Its commander, Admiral Sir James Somerville, had orders to demand that the French either join the British war effort, surrender their ships into British hands, or sail to internment in the Americas. If they refused these options they had to scuttle their ships or be fired upon. The French commander in Mers-el-Kebir, Admiral Marcel Gensoul, preferred to fight. He cleared his four battlecruisers—*Dunkerque*, *St Nazaire*, *Bretagne*, and * Provence*—for action and attempted to get under way. The British narrowly escaped being destroyed. *Bretagne* was hit by 15-inch salvos, exploded and capsized, *Dunkerque* was immobilized, and *Provence* set on fire and forced to beach. Only *St Nazaire* escaped to Toulon, but she was scuttled along with the rest of the Vichy fleet in 1942 to prevent her falling into Germans hands. Almost 1,300 French sailors died at Mers-el-Kebir, an action regretted by the Royal Navy and bitterly resented in France.

French fleet at Mers-el-Kebir

A French soldier stands guard next to the battleships *Dunkerque* and *St Nazaire*. The sister ships were of an unusual design with all their main guns mounted forward.

**The Mediterranean Theater 1940-1943**

By 1942 the Mediterranean was in danger of becoming an Axis lake. The Germans had invaded Greece in 1941, and by October 1942 British land forces had been driven back almost to Alexandria. Yet the Royal Navy continued to operate, escorting convoys to isolated Malta. The situation changed in November 1942 with the Allied victory in Egypt and US landings in Algeria.

One month after Italy had entered the war, a British naval force under Admiral Sir Andrew Cunningham escorting convoys from Alexandria to Malta was intercepted by Italian warships under Admiral Inigo Campioni. The British had suffered damage in attacks by Italian land-based aircraft, leading the Italians to believe they were in worse shape than was actually the case. After a clash between opposing cruisers, Cunningham's flagship *Warspite* dueled at maximum range with the Italian battleships *Gioia Cesaré* and *Conte di Cavour*. *Warspite* hit *Gioia Cesaré* with a 15-in shell from a distance of 15 miles (24 km), causing considerable damage. At the other British battleships, *Malaya* and *Royal Sovereign*, came up the Italians turned for home. The Italian air force concluded the engagement by bombing both fleets indiscriminately.
The Battle of Taranto

Admiral Sir Andrew Cunningham approved a bold plan for a night attack by the Fleet Air Arm upon the Italian naval base at Taranto. For the first time in history a naval attack would use only planes, launching them from offshore aircraft carriers. The raid was originally scheduled for Trafalgar Day, October 21, and was to involve the carriers Eagle and Illustrious. However, fire damage to one ship and structural damage to the other delayed the action. Eventually it was decided to go ahead with Illustrious only, bolstered by the transfer of five aircraft from Eagle.

The Aircraft

It was a peculiarity of the Fleet Air Arm that its carriers were superb but its aircraft were obsolescent. The raid was carried out by slow-moving Fairey Swordfish, two-seater biplanes that had first entered service in 1936 and were affectionately known as “Stringbags.” Escorted by cruisers and destroyers, Illustrious approached within striking range of Taranto on the evening of November 11, flying off two waves of 12 and nine Swordfish an hour apart. Half the aircraft were armed with torpedoes and the rest with bombs. The torpedoes were used against the six battleships and three cruisers moored in Taranto’s outer harbor, while the bombs were dropped on the smaller ships in the inner harbor.

The Outcome

The Italians were well prepared for an aerial attack. The Swordfish flew into an inferno of anti-aircraft fire, some keeping so low their wheels touched the sea. Their torpedoes had been skillfully adapted to run in the shallow harbor waters and explode beneath the torpedo nets protecting the capital ships. Five struck home, hitting the battleships Vittorio Veneto, Caio Duilio, and Conte di Cavour. A cruiser in the inner harbor was badly damaged by bombs. Remarkably only two Swordfish were shot down during the conflict. For this trivial cost, the Fleet Air Arm succeeded in halving the Italian battleship strength in a single night. Vittorio Veneto and Caio Duilio were recommissioned the following year, but Cavour was never salvaged.

The victory tilted the balance of power in the Mediterranean in favor of the Allies. Any Italian ships that survived the attack were moved further north to Naples and La Spezia.

Fairey Swordfish
British Fairey Swordfish torpedo-bombers used modified torpedoes dropped from a low height to attack the Italian fleet at Taranto.

Admiral Andrew B Cunningham, known as “ABC,” was commander-in-chief of the Royal Navy’s Mediterranean Fleet from the outbreak of World War II to the Italian surrender in September 1943. A forthright man of action, Cunningham best showed his nerve and aggression in the night-time pursuit and destruction of the Italian fleet at Cape Matapan. His iron will helped keep his fleet going through the savage losses of the Malta convoy battles and the Crete campaign. In October 1943 he was appointed First Sea Lord and was responsible for British naval strategy through the rest of the war.

World War II

Date: November 11–12, 1940
Location: Taranto, southern Italy
Result: British victory

BRITAIN
Sir Andrew Cunningham

ITALY
Inigo Campioni

Ships: 1 carrier, 4 cruisers, 4 destroyers
Ships: 6 battleships, 9 cruisers, 17 destroyers

Men: 2
Men: 59

Aircraft: 2
Ships: 1 battleship sunk, 2 battleships and 1 cruiser disabled

1883–1963
Andrew B. Cunningham
British Admiral of the Fleet

Italian firepower
Italian battleship Vittorio Veneto fires a salvo from her nine 15-inch guns. The Vittorio Veneto was the most powerful warship to survive the attack on Taranto.
The Luftwaffe’s Fliegerkorps X moved to bases in Sicily in January 1941. The British mounted a complex convoy operation, Operation Excess, in which merchant ships from Gibraltar were escorted to the south of Sicily by a force, including the carrier *Illustrious*, and passed to cruiser escorts from Alexandria to continue eastward. *Illustrious* was attacked by Stuka dive-bombers on January 10. Hit by eight bombs and partially disabled, she limped to Malta, where air attacks continued. The next day the cruiser *Southampton*, heading for Alexandria, was so damaged by dive-bombing that she had to be scuttled.

On March 27, 1941, a substantial force of Italian warships assembled off southern Italy, commanded by Admiral Angelo Iachino on the Littorio-class battleship *Vittorio Veneto*. Iachino had been misled by intelligence reports suggesting the Royal Navy had only one battleship and no aircraft carriers in the sea around Crete. In reality, Admiral Sir Andrew Cunningham had the battleships *Warspite*, *Barham*, and *Valiant*, and the carrier *Formidable*. Once the Italian fleet was at sea, Cunningham set out from Alexandria to intercept, calling on Vice Admiral Henry Pridham-Wippell to join him with a destroyer flotilla and light cruiser squadron from Pireaus.

On March 28 an Italian aircraft spotted Pridham-Wippell’s light cruisers and destroyers and Iachino headed to intercept. Shortly after 8:00 a.m. Pridham-Wippell came under fire from Italian heavy cruisers. Iachino executed a pincer movement that threatened to trap Pridham-Wippell’s force between the heavy cruisers and *Vittorio Veneto*, but at around 11:00 a.m. torpedo bombers from Andrew Cunningham’s carrier *Formidable* arrived on the scene. While the Italian warships were preoccupied with evading air attack, Pridham-Wippell slipped away.

### The Italian Retreat

Without air cover, Iachino wisely decided to withdraw. Meanwhile Cunningham ordered further air attacks during which *Formidable’s* airmen succeeded in scoring hits on *Vittorio Veneto* and the heavy cruiser *Pola*, slowing down the former and immobilizing the latter. Still unaware that heavier Royal Navy forces were in the vicinity, Iachino ordered Admiral Carlo Cattaneo’s heavy cruisers *Fiume* and *Zara* plus three destroyers, to stay behind to rescue *Pola*.

By this time night had fallen. The Italians had no radar and no training in night fighting. Totally undetected by the Italians in the pitch darkness, Cunningham’s battleships, which had radar, advanced to around 3,800 yards (3,500 m) of the ships clustered around *Pola* before opening fire. Struck repeatedly by heavy armor-piercing shells from *Valiant* and *Barham’s* 15-in guns, *Fiume* and *Zara* were disabled in minutes, on fire, and listing heavily. British destroyers sank two Italian destroyers; only the destroyer *Gioberti* escaped. *Fiume* sank around 11:00 p.m. *Zara* and *Pola* were finished off by torpedoes in the early hours of the following morning.

The battle ended Italian hopes to control the Mediterranean. Mussolini’s once proud fleet would not emerge in force again until it surrendered in 1943.
**Ambush at Cape Matapan**

HMS Valiant, together with her fellow Queen Elizabeth-class battleships, Barham and Warspite, fires her 15-inch guns. The three British battleships destroyed two Italian cruisers and two destroyers at Cape Matapan.

**CRETE**

Date: May 21–June 1, 1941  
**FORCES**  
British: 1 carrier, 4 battleships, 12 cruisers, 32 destroyers; Axis: unknown  
**LOSSES**  
British: 3 cruisers and 6 destroyers sunk; Axis: unknown

On May 20, 1941, German paratroops launched an assault upon Crete, held by British Commonwealth troops. British naval commander Admiral Cunningham was determined to prevent German troop reinforcements arriving by sea from Greece. His principle throughout was that “the Navy must not let the Army down.” Since his ships were operating without air cover within range of German land-based aircraft, losses were inevitably heavy. On May 21 a first flotilla of German troop transports was forced to turn back. The next day a larger invasion force was attacked and scattered, but this time Luftwaffe air attacks took their toll—the cruiser Glorious sunk and 723 lives were lost.

**RAID ON ALEXANDRIA**

Date: December 17–18, 1941  
**FORCES**  
British: 5 cruisers, 18 destroyers, 1 submarine; Italians: 1 battleship, 3 midget submarines  
**LOSSES**  
British: none; Italians: 1 submarine

The Italian Regia Marina developed midget submarines known as Maiali, for underwater raids on British harbors. On the night of December 17–18, 1941, three Maiali were carried to the entrance of Alexandria harbor, home of the British Mediterranean Fleet, by the submarine Scire. Released under water, they penetrated the harbor’s defenses undetected by following behind a British cruiser, the entry of which required the anti-submarine barrier to be opened. Two of the crews attached their charges to the hulls of the battleships Valiant and Queen Elizabeth—Admiral Andrew Cunningham’s flagship. The third was destined for the absent aircraft carrier Eagle, so a large tanker, Saona was drawn the British toward their battleships, which loomed into sight around 4 p.m. Heavily outgunned, the British laid down a thick smoke screen, from behind which they dodged out intermittently to engage the Italians with their guns and torpedoes. The destroyer Kingston was almost torn apart by a hit from Littorio’s 15-inch armament and Hawek was so badly damaged she was for a time dead in the water. Most of the British cruisers also took hits. Toward nightfall Admiral Iachino withdrew, and all the British ships were able to escape. The aftermath of the battle was painful for both sides. Two Italian destroyers foundered in a storm returning home; all the British supply ships were sunk by air attack on arrival at Malta.

**SECOND SIRTE**

Date: March 22, 1942  
**FORCES**  
British: 5 cruisers, 18 destroyers, 1 submarine; Italians: 1 battleship, 3 cruisers, 8 destroyers, 1 submarine  
**LOSSES**  
British: none; Italians: none

The First Battle of Sirte, on December 17, 1941, was an inconclusive fight between Italian and British convoy escort forces under Admiral Anglo Iachino and Rear-Admiral Philip Vian. The same commanders clashed at the same location three months later. Vian was escorting four supply ships from Sphakia in southern Crete to Malta, with four light cruisers, an anti-aircraft cruiser, and a bevy of destroyers. The Italian Regia Marina intercepted with a squadron that included the heavy cruisers Gorizia and Trento, and the battleship Littorio. The weather was stormy, with heavy seas. Vian sighted the heavy cruisers and, leaving five destroyers to escort the supply ships, turned the rest of his escort force to confront the enemy. The Italians maneuvered to draw the British toward their battleship, which loomed into sight around 4 p.m. Heavily outgunned, the British laid down a thick smoke screen, from behind which they dodged out intermittently to engage the Italians with their guns and torpedoes. The destroyer Kingston was almost torn apart by a hit from Littorio’s 15-inch armament and Hawek was so badly damaged she was for a time dead in the water. Most of the British cruisers also took hits. Toward nightfall Admiral Iachino withdrew, and all the British ships were able to escape. The aftermath of the battle was painful for both sides. Two Italian destroyers foundered in a storm returning home; all the British supply ships were sunk by air attack on arrival at Malta.

**ENIGMA INTERCEPTS**

The Enigma machines used by the German Navy for encoding communications used three (later four) rotors to scramble the messages. They were considered utterly secure because the receiver needed to know the exact settings of the rotors, which changed daily. British codebreakers, however, intermittently managed to decipher these messages, providing advance warning of the movements of Axis warships, supply convoys, and submarines. The Enigma intelligence is credited, among other things, with contributing to the victory at Cape Matapan and the defeat of German U-boats in the Atlantic.

**WEAPONS AND TECHNOLOGY**

**ENIGMA MACHINES**

By rotating the cylinders at the rear of the machine, code settings could be changed daily. Viewing windows on the lid showed the encoded letters.
FOOD AND DRINK

AN AGE-OLD PROBLEM of naval warfare is how to keep ships supplied with food and drink at sea. In the ancient world galleys carried only enough supplies for a few days of sailing. Hugging the coastlines, they beached to buy food and usually ate on shore, although when the galley was in a hurry the oarsmen might snack while they rowed. As sailing ships ventured far from land, however, they had to carry their own supplies with them for long periods of time. This led to health problems because of the lack of fresh food available and inadequate methods of food preservation.

A SAILOR’S DIET

Sailors basically consumed the food and drink typical of their society. In the 16th century Spanish sailors ate squid, tuna, sardines, oil, rice, and wine, while the English ships carried beef, butter, and beer. The distinguishing feature of shipboard food was that it needed to last. So freshly baked bread was replaced by biscuit, provided for Venetian galley crews as “biscotti” and the Royal Navy as “hard tack.” Although liable to infestation by weevils and other pests, it provided a good basic foodstuff. Salted meat and fish (“stockfish”) were also near universal staples, along with cheese and peas or lentils. That these lacked essential vitamins found in fresh food was recognized long before any scientific explanation was available. Navies in the 18th century tried to provide fresh fruit and vegetables when possible and carried live animals for slaughter. Sailors were on the whole not badly fed by the standards of their day. Scurvy, a disease formed by a deficiency of vitamin C, was found on land as well as at sea.

COOKING AND MESSING

Arrangements for messing (eating) and cooking on a packed wooden sailing ship were always unsatisfactory. Men messed on the gun deck where they slept, letting down tables that hung from the deckhead. There were typically eight men to a mess. One man from each mess prepared the rations and brought them to the ship’s cook—a petty officer, often a disabled man unfit for other service. For safety reasons the cooking fire was small and in the safest place that could be found. All food was typically cooked in a single large pot. Until the mid-19th century men provided their own table utensils. Naturally, life for officers was very different and quite luxurious by comparison.

THE CREW MADE HASTE THAT THEY (DID NOT STOP FOR MEALS BUT) PULLED AND ATE AT THE SAME TIME, BARLEY BREAD MIXED WITH WINE AND OLIVE OIL.

THUCYDIDES (c.400 BCE), on the exceptional circumstances when a trireme crew did not go ashore to take their meal.
WATER AND ALCOHOL

Keeping water fresh at sea was beyond the technological capacity of the age of sail. It corrupted in the barrels, a problem only solved by the use of iron storage tanks in the 19th century. Instead, sailors mostly drank beer or wine. A sailor in Nelson’s Royal Navy was allowed a gallon (4.5 liters) of beer a day. There was also a daily rum ration of half a pint (280 ml) per man, drunk mixed with water as “grog.” However, punishments for men drunk on duty were severe. Concern about alcohol led to the reduction of the Royal Navy rum ration to an eighth of a pint (70 ml) by the 1850s. The US Navy stopped alcohol rations in 1862 and banned all alcohol on board warships in 1914.

The stench of 51 sweating seamen, diesel oil, rotting food, and moldy bread mingled with the noisome odors that emanated from the galley and the two tiny washrooms.

HERBERT A. WERNER Iron Coffins, describing the unappetizing conditions in a U-Boat in World War II.

MODERN INNOVATIONS

The introduction of canned foods, followed later by refrigeration, improved nutrition on board through the 19th century. Also the increase in the speed of steamships shortened times at sea, making use of fresh ingredients more feasible. In Britain’s Royal Navy in 1914, potatoes, powdered soup, smoked salmon, and milky tea were on the menu, although men still ate in messes eight to a bench with a table that probably doubled as a bed. During World War II self-service cafeterias became common on larger ships, though this brought no end to seamen’s grumbling about food.

HERBERT A. WERNER Iron Coffins, describing the unappetizing conditions in a U-Boat in World War II.
LAUNCHING A WAR in the Pacific was a desperate gamble by the Japanese. The temporary weakness of Britain, France, and the Netherlands—the colonial powers in southeast Asia—created an irresistible opportunity for Japan to seize control of the oil and other natural resources of British-ruled Malaya and the Dutch East Indies. But Japanese military leaders knew they would also have to fight the United States, with its vastly superior long-term warmaking potential. Admiral Isoroku Yamamoto, commander-in-chief of the Imperial Navy, proposed a surprise attack on the US naval base at Pearl Harbor, Hawaii. By crippling the US Pacific fleet, the Japanese would buy enough time to establish a defensive perimeter across the Pacific, ready to resist an eventual US counterattack. The raid on Pearl Harbor on December 7, 1941, initiated the most intensive large-scale naval conflict ever seen.

EARLY SUCCESSES
At the start of the Pacific War the Japanese and US fleets were quite evenly balanced, except in terms of carriers. Japan had more, and its carrier aircraft were the best in the world. For the first six months of the war Japanese forces ran amok. The Pearl Harbor raid subdued the US Navy briefly, and Britain’s Royal Navy, committed to the war against Hitler’s Germany, could offer little resistance. In early 1942 the formidable British base at Singapore fell to an attack from the land. Part of the Japanese fleet entered the Indian Ocean and there was nothing to stop it sailing up the Red Sea to the Suez Canal or attacking Iraq, a vital source of British oil supplies. But the Japanese never went further west than Sri Lanka. By May 1942 they were thoroughly occupied in the South Pacific, as the Americans fought back sooner than expected. US carrier aircraft checked Japanese carriers at the Coral Sea and then dealt them a severe blow at Midway—one from which the Imperial Japanese Navy never fully recovered.

Neither the Americans nor the Japanese shied away from a fight. Particularly fierce sea battles were fought around the island of Guadalcanal in the Solomon Islands, with heavy losses on both sides. The Americans benefited from superior naval intelligence—having broken the Japanese naval codes—but the Japanese proved
The Japanese Advance

The Pacific War began with Japan’s invasion of China and Manchuria in 1937–39 before moving into a second more intensive phase after Japan’s attack on Pearl Harbor in December 1941. This was followed by the invasion of the Philippines, Burma, Malaya, and the Dutch East Indies (Indonesia) and the seizure of their economic resources.

KEY

- Under Japanese control Dec 1941
- Under Japanese control Jun 1942
- Japanese invasion/landing
- Route of Pearl Harbor carrier fleet
- Doolittle Raid on Tokyo Apr 18, 1942
- Japanese victory
- US/Allied victory
- Inconclusive battle
- US/Allied bombing raid
- US/Allied bombing raids

Better at night-fighting and had more effective torpedoes. At the end of 1942, the Imperial Japanese Navy was still holding its own, but against the huge industrial potential of the United States Japan’s long-term prospects looked more grim.

Industrial Might

The United States embarked on the largest shipbuilding program in history. From 1943 onward the US Navy expanded its resources in the Pacific until it had achieved an overwhelming superiority over the Japanese. New heavy carriers, plus carrier aircraft, provided fire support. Pacific islands, for which the big guns of their ships, plus carrier aircraft, provided fire support. Meanwhile US submarines overcame problems with non-functioning torpedoes to take a mounting toll on Japanese merchant shipping and warships. The US Navy handled its rapid expansion remarkably well, achieving a high level of training for fresh pilots and sailors and the provision of an efficient supply line to keep the massive new fleets at sea. New tactics were developed, turning amphibious landings into precisely coordinated operations, and evolving robust systems of fleet defense against air attack such as the use of destroyer “pickets” to identify incoming enemy aircraft and the coordination of ship anti-aircraft fire with air combat patrols.

Acutely aware of their growing material inferiority, the Japanese fell back on their fighting spirit. Naval commanders remained committed to seeking a decisive fleet encounter in which they would destroy the enemy against all the odds. The result in 1944 was a series of epic battles as the Japanese Imperial Navy attacked US ships supporting landings on the Marianas and the Philippines. The absolute superiority of US naval aviation, with improved aircraft and better-trained pilots, achieved the destruction of Japanese carrier-borne air power at the battle of the Philippine Sea. At Leyte Gulf the Japanese fleet made its last serious bid for a decisive victory and lost.

Desperate Offensives

Japan’s adoption of kamikaze suicide tactics in the final phase of the war was in part a practical response to the problem of how to inflict damage on the well-defended US fleet. What the Japanese really needed was guided missiles, but a suicide pilot could perform a similar function. For the final battles, as the war approached Japan itself, the Japanese had no usable warships and no time or fuel to train naval pilots operating from land bases. A vast fleet of US, British, and Australian ships was the object of mass suicide attacks by pilots who could barely fly.

The kamikazes inflicted much damage, but by this stage the Allies could replace ships faster than they lost them. By the end of the war Japan was under total naval blockade. In September 1945 Japan’s formal surrender took place on board USS Missouri in Tokyo Bay.

1884–1943

Isoroku Yamamoto

COMMANDER-IN-CHIEF OF JAPANESE COMBINED FLEET

Born Isoroku Takana, the future admiral entered the Etajima Naval Academy aged 16 and fought as an ensign at the battle of Tsurushima in 1904, losing two fingers on his left hand. He became part of the Yamamoto samurai family by adoption in 1914. As an admiral in the 1930s he was an advocate of naval air power, deploring Japan’s obsession with outsize battleships. He was deeply pessimistic about Japanese chances of success in a war against the US, and he opposed Japan’s alignment with Nazi Germany. On being appointed commander-in-chief of the Japanese Combined Fleet in 1939, he pushed through the plan for a preemptive attack on Pearl Harbor. On April 18, 1943, pinpointed by American intelligence, the aircraft in which he was traveling was shot down over Bougainville.
THE SURPRISE ATTACK by Japanese naval aircraft on the American naval base at Pearl Harbor on December 7, 1941, was the first of a series of bold aggressive moves that within six months gave Japan control of all of southeast Asia and much of the Pacific. The navies of Britain and the Netherlands were able to put up little more than token resistance to an enemy overwhelmingly superior both in heavy-gun warships and in land- and carrier-based aviation. It fell to the US Navy to contest the dominance of the Japanese at sea. The Americans faced an opponent not only superior in numbers but also highly motivated, well trained, and in some departments, better equipped. Yet at the decisive battle of Midway in June 1942 the Japanese carrier force that had humiliated the United States at Pearl Harbor was itself crushingly defeated. The fierce battles fought around the island of Guadalcanal during the second half of 1942 showed that the Japanese Imperial Navy was still confident and aggressive, but Japan had ultimately failed to achieve a decisive naval victory while the balance of power at sea was most in its favor.

On November 26, 1941, a Japanese naval task force commanded by Vice Admiral Chuichi Nagumo slipped out of Hitokapu Bay in the Kurile Islands bound for Hawaii. The force included six aircraft carriers: Akagi, Kaga, Soryu, Shokaku, Hiryu, and Zuiho. Its goal was to attack and destroy the US Pacific Fleet in its base at Pearl Harbor. The key figure behind the Pearl Harbor raid was Admiral Isoroku Yamamoto; Japan had decided to seize Malaya and the Dutch East Indies, and, convinced this must mean war with the United States, Yamamoto planned a preemptive strike against the US fleet, to coincide with, rather than follow, a declaration of war. The operation depended on total surprise. Observing strict radio silence, Nagumo's force would cross thousands of miles of ocean undetected, refueling from tankers en route. A separate force of Japanese submarines also proceeded to Pearl Harbor, full-size boats carrying midget submarines to penetrate the American defenses. At dawn on December 7, 250 miles (400 km) north of Hawaii, the first wave of 183 Japanese aircraft took off from their carriers—Nakajima “Kate” torpedo-bombers, Mitsubishi “Zero” fighters, and Aichi “Val” dive-bombers. Although Japan and the US were not at war, diplomatic relations had reached a breaking point and American forces should have been on full alert. But Pearl Harbor was enjoying a sleepy peacetime Sunday morning. The incoming aircraft were picked up on radar and one midget submarine was spotted, but none of this disturbed the Americans. The ship's band was playing on the deck of the battleship Nevada as the bombs began to fall. The aircraft that should have defended the base were destroyed as they sat on the ground. Japan's naval pilots were a highly trained elite flying the world's best carrier aircraft. It is believed that 90 percent of the torpedoes at Pearl Harbor found their target, as did around 60 percent of the bombs dropped by dive-bombers. Within 20 minutes of the start of the attack the battleship Oklahoma had capsized after hits by five torpedoes, while Arizona had suffered

YESTERDAY, DECEMBER 7, 1941—A DATE WHICH WILL LIVE IN INFAMY—THE UNITED STATES OF AMERICA WAS SUDDENLY AND DELIBERATELY ATTACKED.

PRESIDENT FRANKLIN D. ROOSEVELT, SPEECH TO CONGRESS ON DECEMBER 8, 1941
an even worse fate: an armor-piercing bomb penetrated its forward magazine, setting off an explosion that ripped the battleship in two, killing more than a thousand of its crew. A second wave of 170 aircraft arrived later in the morning to add to the mayhem. By the time it was all over, 18 American ships were sunk or disabled, including all the battleships.

There were a few glimmers of light in an otherwise grim scene. The attempted attack by Japanese midget submarines was a total failure. The Japanese also failed to destroy the oil tanks at the base. And most important of all, the US Navy’s four aircraft carriers were absent when the raid took place. But for the time being, the Japanese navy had established dominance in the Pacific.

USS Nevada on fire
Despite being damaged in the first wave of attacks, Nevada was the only battleship to get underway during the raid. The battleship was struck again and beached during the second wave of attacks.

With Americans in desperate need of a morale boost, a plan was devised for a carrier raid on the Japanese homeland. The US Navy believed it could advance a carrier task force to within 400 miles (650 km) of Tokyo. As no naval airplane had sufficient range, the US Army Air Force agreed to supply B-25 Mitchell bombers, although no B-25 had ever flown from a flight deck. Lieutenant Colonel James Doolittle led the air side of the mission.

The carrier Hornet set to sea on April 2, 1942 with 16 B-25s tethered on the flight deck—they were too large to be stowed below. North of Hawaii Hornet rendezvoused with the carrier Enterprise and its escort of cruisers and destroyers. Maintaining strict radio silence, they had advanced to 650 miles (1,000 km) from Tokyo when, on the morning of April 18, they were spotted by a Japanese patrol boat. The decision was taken to launch the planes immediately, though the extra distance meant they would be unlikely to reach the airfield in a friendly area of China where they planned to land.

Doolittle had exhaustively practised short take-offs with his volunteer crews, but no one actually knew if the aircraft, laden with fuel and bombs, would launch from a pitching deck in a heavy sea. Remarkably, they took off without mishap and, four hours later, bombed Tokyo and other cities. All the aircraft were subsequently lost but most of the crews found their way back to the US. The raid was a severe embarrassment to Japanese military leaders and partly motivated their fateful decision to attack Midway the following June.
Heavy cruiser Naka
The Japanese cruiser Naka and her sister ship Haguro outclassed their opponents at the battle of the Java Sea. Naka’s long-range torpedoes, more reliable than the Allied torpedoes, sank the Dutch light cruiser Java.

Heavy cruiser Naka
The Japanese cruiser Naka and her sister ship Haguro outclassed their opponents at the battle of the Java Sea. Naka’s long-range torpedoes, more reliable than the Allied torpedoes, sank the Dutch light cruiser Java.

Coral Sea
Date: May 4–8, 1942
Forces: US and Australians: 2 carriers, 8 cruisers, 13 destroyers; Japanese: 2 carriers, 1 light carrier, 6 cruisers, 6 destroyers
Losses: US and Australians: 1 carrier, 1 destroyer, 74 aircraft; Japanese: 1 light carrier, 1 destroyer, 70 aircraft

In April 1942 the Japanese, pushing south toward Australia, sent a force to occupy Tulagi in the Solomon Islands and Port Moresby in New Guinea, supported by the carriers Shokaku and Zuikaku. The US Navy was well informed of Japanese plans through radio intercepts and Rear Admiral Frank Fletcher was ordered to seek out and attack the Japanese forces. He assembled the carriers Lexington and Yorktown and a number of cruisers and destroyers in the Coral Sea, including a contingent from the Royal Australian Navy under Rear Admiral John Crace.

The Americans struck the first blow on May 4 when aircraft from Yorktown attacked the Japanese at Tulagi, sinking a destroyer and several merchant vessels. For the next two days the rival carrier forces, concealed by cloud cover, failed to find one another. Fletcher was, however, informed of the course of the invasion force bound for Port Moresby, which was located by the US Army Air Force. On May 7 carrier aircraft attacked the Japanese troop convoy escorts. US fliers piled in to sink the light carrier Shoho with a plethora of torpedoes and bombs. But the overkill on a single ship meant other available targets were neglected. Meanwhile, Japanese carrier aircraft attacked and sank an American destroyer and oil tanker that had been mistakenly identified as a carrier and a cruiser. As night fell six Japanese planes tried to land on Yorktown, believing it was one of their own ships.

The following morning both sides flew off their aircraft to attack. Many of the American pilots had trouble finding the Japanese carriers, which were sailing through a tropical rainstorm. Zuikaku escaped in the poor visibility but Shokaku was left ablaze and incapable of operating aircraft. Meanwhile, Japanese bombers, enjoying better conditions, attacked with excellent coordination. Yorktown was hit by a bomb that exploded below decks, killing or seriously injuring 66.

Java Sea
Date: February 27–March 1, 1942
Forces: Allies: 5 cruisers, 9 destroyers; Japanese: 4 cruisers, 14 destroyers
Losses: Allies: 5 cruisers, 5 destroyers; Japanese: 4 troop transports

An American-British-Dutch-Australian (ABDA) force under Dutch admiral Karel Doorman was created to prevent the Japanese landing troops on Java. On February 27, 1942, an invasion force was spotted and Doorman sailed from Surabaya to intercept it. His force consisted of two heavy cruisers—the Royal Navy’s Exeter and the US Navy’s Houston—one Australian and two Dutch light cruisers, and nine destroyers, four of them American. They found the Japanese troop transports defended by Admiral Shoji Nishimura with the heavy cruisers Naka and Haguro supported by light cruisers and destroyers.

Although on paper the two forces were comparable, the Japanese were superior in guns, torpedoes, organization, and morale. After two hours’ gunfire Exeter withdrew from battle after a hit on her boiler room and two ABDA destroyers were sunk. At around 6:00 p.m.

Dutch medallion
Admiral Doorman’s flagship De Ruyter appears below his reputed last words at the battle of the Java Sea: “I’m attacking, follow me.”
the US destroyers covered a tactical withdrawal by laying a smokescreen, Doorman intending to maneuver around the Japanese escorts and get among the troop ships at night. However, the destroyers then left for Surabaya and by the time Doorman encountered the Japanese again he had only his four remaining cruisers. In the darkness, a devastating Japanese torpedo attack sank two light cruisers including Doorman's flagship. The admiral was not among the few survivors.

Two days later the Exeter, with two destroyers, encountered Nachi and Haguro as she headed for Sri Lanka. All three ships were sunk. Also on March 1, Houston and the Australian light cruiser Perth were sunk in night action in the Sunda Strait. This completed a naval disaster for the Allies, who had lost more than 2,000 men and 10 warships.

Lexington took the worst of the damage, struck by at least two torpedoes and two bombs, and had to be scuttled.

Overall the US Navy came off the worse in the world’s first battle fought exclusively between carriers. But the Japanese were forced to abandon their intended invasion of Port Moresby, an important strategic setback.

Preparing for launch
SBS Dauntless dive-bombers stand on the flight deck of the US carrier Yorktown. Coral Sea was the first battle fought as a duel between carrier aircraft, without opposing ships sighting one another.

**NAVAL AVIATOR**
American naval pilots were a gung-ho body of men, eager to fight and justly proud of their skills. Between 1942 and 1944 more than 50,000 were trained, most passing through Naval Air Station Pensacola in Florida. Officers became Naval Aviators while enlisted men were designated Naval Aviation Pilots (NAPs). On flying operations rank was disregarded, the most experienced fliers taking command even if this meant non-commissioned men giving orders to officers. As in all aerial warfare, a few pilots proved exceptionally gifted and these men led from the front. In fighter squadrons pilots flew in divisions of four aircraft. The leader of the division was the man expected to shoot down enemy aircraft, the other three were there primarily to cover his back. A carrier pilot’s task was exceptionally demanding because of the need to launch from and land on a small pitching flight deck crowded with aircraft. Taking off even with the aid of a catapult was only possible if the carrier was making speed into the wind. Landing posed even more complex problems. Once the pilot got “into the groove” to land, he was in the hands of the landing officer who would give him “the cut” to authorize landing or the “wave off” if all was not well. Pilots tended to be competitive individualists by nature, but they acknowledged that they needed the help and support of many other crew members to stay operational.

**CREW PROFILE**
**US AIRCRAFT CARRIER**
**WORLD WAR II**

With a crew numbering over 2,000 men, a World War II American fleet aircraft carrier was a complex social world, in which divisions of function were often as important as differences of rank. Some officers and men executed tasks required on all warships, while others did jobs specific to the business of operating warplanes from carriers. These included the aviation machinists and electricians who serviced the aircraft in the hangars, the aviation ordnance teams responsible for arming the planes, the aviation boatswain’s mates whose tasks included supervising the catapults and arresting gear on the flight deck, and the landing signal officer—usually a trained aviator—who stood prominently on deck using colored paddles to guide pilots attempting to land. Until 1943 the navy accepted no draftees, so all crew members were volunteers, many going to sea to avoid being drafted into the army.
In June 1942 Japan embarked upon an invasion of the American-held Midway atoll. One of the objectives was to draw the US Pacific Fleet into a decisive battle that Japanese commanders were confident they would win. Admiral Yamamoto dispersed his forces in a complex plan to distract and envelop his adversaries. Since the Americans had broken Japanese naval codes they were aware of Yamamoto’s intentions and, ignoring a diversionary attack on the Aleutians, concentrated their efforts against Vice-Admiral Nagumo’s force of four carriers. US Admiral Chester Nimitz sent two carrier task forces to defend Midway. Rear Admiral Fletcher commanded Task Force 16 with the carriers Enterprise and Hornet, while Rear Admiral Raymond Spruance led Task Force 17 with Yorktown, repaired at Pearl Harbor in a mere three days after its battering at the Coral Sea.

DECISIVE AIR STRIKES

Battle was joined on June 4. Unaware of the proximity of the US carriers, Nagumo launched an early morning air strike on Midway. He was planning a follow-up when a reconnaissance aircraft reported sighting enemy ships, tardily identified as including carriers. By then the Americans had already flown off their aircraft. Launched in haste and some confusion, the Wildcat fighters, Dauntless dive-bombers, and Devastator torpedo-bombers from Hornet and Enterprise searched for the enemy in uncoordinated groups. Unfortunately the slow-moving torpedo-bombers were first to locate Nagumo’s carriers. Without fighter cover, they were pounced upon by Zero fighters. Not one of Hornet’s 15 Devastators survived.

Aircraft from Yorktown, launched later than those from the other two carriers, arrived together at around 10:20 a.m. By chance, two squadrons of dive-bombers from Enterprise found Nagumo’s force at the same moment. While Yorktown’s Wildcats took on the Zeros, dive-bombers from Yorktown and Enterprise were left free to attack the carriers. Bomb after bomb struck the decks of Japanese carriers packed with aircraft, munitions, and fuel lines. In five minutes Akagi, Kaga, and Soryu were all burning wrecks.

The Japanese still had one carrier intact. Hiryu flew waves of bombers to deliver a counter-strike against Yorktown. Showing great determination in the face of American fighters and anti-aircraft fire, the Japanese pilots inflicted crippling damage upon the carrier. It was small compensation for a day of disaster for the Imperial Japanese Navy, capped late on when Hiryu was destroyed by dive-bombers from Enterprise.

Over the following days American aircraft and submarines harassed the withdrawing Japanese fleet, sinking the cruiser Ashiya. Meanwhile, efforts were made to salvage Yorktown, until a Japanese submarine hit the carrier with two torpedoes, also sinking a destroyer alongside. But nothing could detract from the scale of the American victory. That the invasion of Midway had been defeated was a minor point compared with the blow inflicted upon Japan’s naval aviation. The loss of four carriers and many of their best naval pilots was a setback from which the Imperial Navy never recovered.
Crippled carrier at Midway
USS Yorktown lists heavily after being attacked by bombers from the Japanese carrier Hiryu. Yorktown was sunk the following day by a Japanese submarine.

I saw this glint in the sun and it looked just like a beautiful, silver waterfall. These dive-bombers coming down. I'd never seen such superb dive-bombing.

US PILOT JIMMY THATCH, RECALLING THE BATTLE OF MIDWAY, 1942

Hiryu, the only surviving Japanese carrier, counterattacks with further air strikes that knock Yorktown out of action. However, bombers launched from Enterprise, Hornet, and airfields on Midway Island heavily damage and finally sink Hiryu.

Kaga, Akagi, and Soryu are all knocked out of action and later scuttled. Only Hiryu escapes.

First strikes by Torpedo bombers from Hornet and Enterprise repulsed with heavy US losses.

Dive-bombers from Enterprise attack Kaga and Akagi leaving both carriers heavily ablaze.

Dive-bombers from Yorktown attack Soryu, hitting the carrier with three bombs.

Dive-bombers from Yorktown attack Hiryu, sinking the carrier with three bombs.

Hiryu's aircraft knock Yorktown out of action.

9pm, Hiryu finally sinks.

Yamamoto's bombardment group, approaching Midway from the west, ordered to retire.

8-17 bombers from Midway cause further damage to Hiryu.

Kamamoto's bombardment group, approaching Midway from the west, ordered to retire.

Several hits by dive-bombers from Enterprise sets Hiryu ablaze.

Midway Island

Enterprise and Hornet move down toward Midway air cover.

Kure Island

Enterprise

Hornet

PACIFIC OCEAN

3 SINKING OF HIRYU

Hiryu, the only surviving Japanese carrier, counterattacks with further air strikes that knock Yorktown out of action. However, bombers launched from Enterprise, Hornet, and airfields on Midway Island heavily damage and finally sink Hiryu.

2 CARRIERS ABLAZE

Initial air strikes by American torpedo-bombers and dive-bombers are repulsed with heavy losses. Subsequent waves of dive-bombers from Enterprise and Yorktown leave three of Nagumo's four aircraft carriers as blazing wrecks. Only Hiryu escapes.
THE BATTLE FOR GUADALCANAL

AMERICAN FORCES LANDED on Guadalcanal and other islands in the Eastern Solomons on August 7, 1942. As the Japanese were determined to retake Guadalcanal and the Americans equally determined to hold it, the island became the focus for intense naval warfare. The Japanese Navy was at first supremely confident, viewing the fighting as a chance to draw American forces into battle and destroy them. After a stunning initial victory at Savo Island, however, the Japanese failed to crush the Americans in fleet encounters at the Eastern Solomons and the Santa Cruz Islands. The US Navy equally failed to prevent the Japanese running the convoy ships of the “Tokyo Express” down New Georgia Sound at night to land reinforcements on Guadalcanal and shell the airbase at Henderson Field. The climax of the campaign came in two major night encounters in mid-November, known as the naval battle of Guadalcanal, during which the Japanese lost two battleships. Their attempt to retake the island was eventually abandoned. The Japanese Navy successfully evacuated troops from Guadalcanal in February 1943, but it had been unable to achieve decisive naval superiority.

THE BATTLE OF SAVO ISLAND

Japanese vice admiral Gunichi Mikawa, based at Rabaul, organized a rapid naval response to the initial American landings on Guadalcanal. With no air cover, Mikawa planned to attack under cover of darkness, as his cruisers were well trained in night-fighting. On the evening of August 8, the Allied naval forces covering the landings were far from alert. Admiral Frank Fletcher had withdrawn his carriers and British admiral Victor Crutchley, commanding the warships screening the landings, had departed from his station with his flagship Australia to discuss this move with the overall commander, Admiral Turner.

On the ships of the screening force it was hot and crews were tired. Captain Howard Bode, left in command on Crutchley’s departure, slept soundly on board his cruiser Chicago. The approach of Mikawa’s force was undetected until far too late. The destroyer Patterson raised the alarm at almost the same moment that Japanese floatplanes dropped flares to illuminate Chicago and the Australian cruiser Canberra. Hit by gunfire and torpedoes from four Japanese cruisers, Canberra was wrecked in minutes. Bode, rudely torn from his sleep, succeeded in extracting Chicago from the action with relatively little damage, but his flight left the rest of the ships exposed. Other Allied warships fatally hesitated to open fire on Japanese searchlights, unsure whether they would be hitting friendly vessels. The cruisers Astoria, Quincy, and Vincennes were all sunk after multiple hits from shells and torpedoes.

Mikawa could have gone on to destroy the Allied transport ships, but he was unaware that the US carrier aircraft were no longer there and wanted to get away before daylight. The Japanese cruiser Kako was sunk by a submarine on its way back from the action, a small consolation for the battered Allies.

Torpedo damage
Crewmen on the heavy cruiser USS Chicago cut away torpedo-damaged plating on the day after the battle of Savo Island.
BEFORE GUADALCANAL THE ENEMY ADVANCED AT HIS PLEASURE—AFTER GUADALCANAL HE RETREATED AT OURS.

Admiral William Halsey, Describing the Significance of the Campaign for Guadalcanal

Encouraged by their victory at Savo Island, the Japanese devised Operation Ka, a counteroffensive whose twin objectives were to retake Guadalcanal from the US Marines and to establish naval dominance in the South Pacific by the destruction of American fleet carriers. On August 20, 1942, 3,000 soldiers embarked on transport ships at the Japanese base of Rabaul and headed for Guadalcanal to reinforce a first wave of troops already ashore. Admiral Yamamoto, commander-in-chief of the Japanese Combined Fleet, hoped this troop convoy would lure the American carriers into a trap. His fleet carriers Shokaku and Zuikaku, under Admiral Chuichi Nagumo, would surprise and destroy them, allowing a powerful force of battleships and cruisers to mop up the remaining American ships and support the retaking of Guadalcanal.

In the event, the American carriers Enterprise, Saratoga, and Wasp, under Admiral Frank Fletcher, were already heading toward Guadalcanal in response to the original Japanese landings. Because of confused intelligence reports, Fletcher was unsure whether the Japanese Combined Fleet was in the area. On August 23, an American reconnaissance aircraft spotted the troop transports, but in the absence of any sighting of carriers Admiral Fletcher sent Wasp away to refuel. The following morning there were more sightings of Japanese ships, including the light carrier Ryujo.

BOMBER ATTACKS

In the early afternoon, still unaware of the approaching Japanese fleet carriers, Fletcher ordered a strike by aircraft from Saratoga against Ryujo, which was duly sunk. Meanwhile, Admiral Nagumo, having located the American carriers, launched waves of torpedo-bombers and dive-bombers to attack them. The incoming Japanese aircraft were picked up on US radar and carrier-based F4F Wildcat fighters flown off to engage them, but despite their best efforts and those of anti-aircraft gunners on the ships, some of the Japanese bombers got through. Enterprise received the brunt of the aerial onslaught. Hit by three bombs in rapid succession, the carrier was on fire, listing, and for a time without steering control, yet she survived.

After this the battle petered out, the Japanese battleships and cruisers giving up efforts to locate the US carriers soon after nightfall. The attempt to land reinforcements was abandoned the following day.

Both sides reinforced their troops on Guadalcanal as the ground fighting intensified. On the night of October 11–12 a group of Japanese destroyers was ferrying in soldiers and equipment while another force under Rear Admiral Goto was sent to bombard the airbase at Henderson Field. A US Navy task force of cruisers and destroyers, commanded by Rear Admiral Norman Scott aboard San Francisco, had orders to stop Japanese ships entering Ironbottom Sound. Goto’s force of three cruisers and a destroyer, detected by radar, was surprised off Savo Island around midnight. Goto’s flagship Aoba was immediately hit and the admiral fatally wounded. Two other Japanese ships were sunk by gunfire and torpedoes, but the Americans also suffered losses. The light cruiser Boise’s magazine exploded killing almost 100 men, and the destroyer Duncan was sunk, shelled by both sides in the confusion. Although on balance an American victory, the battle failed to stop the Japanese continuing to land troops.

ANTI-AIRCRAFT DEFENSE

American naval defense against air attack improved steadily in the course of the Pacific War. Carrier task forces adopted a circular formation, with carriers in the center surrounded first by a circle of battleships and cruisers and then by an outer ring of destroyers. These ships between them threw up an impressive weight of anti-aircraft fire. The carriers also provided aerial defense, their fighter aircraft guided onto incoming aircraft by radar controllers on the ships. Naval anti-aircraft guns ranged from 3-in guns for long-range fire to 40-mm Bofors for medium-range and 50-caliber machine guns or 20-mm Oerlikons for close-range fire. Improving fire-control systems increased the chances of hitting a rapidly moving target, but probably the most important development in the war was the adoption of radar proximity fuses. These made shells explode when close to an enemy aircraft, rather than at a pre-set time after firing. The sheer number of guns on ships vastly increased as well as their quality. By 1945 the American battleship South Dakota, for example, mounted 16 5-in, 68 40-mm and 76 20-mm guns.

Japanese navy sextant

 Sextants were used to calculate latitude so Japanese officers could navigate around the Pacific Ocean.

Anti-aircraft gun

The Swiss-designed 20-mm Oerlikon was one of the most widely used anti-aircraft guns of World War II.

Sailors man an Oerlikon 20-mm anti-aircraft gun during training on board the USN Iowa in 1943.
In October 1942 the United States had only two carriers, Hornet and Enterprise, operational in the Pacific. Rear Admiral Thomas Kinkaid, on board Enterprise, led them on a sweep north of the Santa Cruz Islands, searching for a Japanese naval force bound for Guadalcanal. The Japanese, under Vice Admiral Kondo, had the carriers Shokaku, Zuiho, and Junyo, as well as a powerful force of battleships and cruisers.

On the morning of October 26, the opposing carriers located one another and launched air strikes. The first American and Japanese attack waves crossed in flight. The American attack put the carriers Zuiho and Shokaku out of action, along with the cruiser Chokorsu. But the Japanese strike was more deadly. Combat air patrols failed to stop the Japanese dive-bombers and torpedo-bombers and the US carriers took a pounding. Hornet was hit first and worst. The Japanese struck her with bombs and torpedoes, and with two aircraft that, deliberately or not, crashed into the ship. Hornet was left dead in the water and on fire. Enterprise, initially hidden by a rain shower, soon came in for her own share of attention and suffered serious bomb damage. Many US aircraft were forced to ditch in the sea for lack of a deck to land on. Japanese losses of aircraft were, however, far heavier, for they pursued their attacks with relentless courage through a storm of anti-aircraft fire.

An attempt to take Hornet under tow failed as further waves of Japanese aircraft attacked. The carrier was eventually abandoned and finally sunk by a torpedo. For a short period after the battle, until Enterprise had been repaired, the United States had no aircraft carriers in the Pacific. Yet the Japanese had suffered such heavy losses of experienced pilots—148 aircrew killed—that they were in no position to exploit this temporary advantage.

**Dive-bomber attack**

A Japanese "Val" bomber dives on the USS Hornet during the battle of Santa Cruz. Seconds later the plane crashed into the Hornet’s signal bridge.

---

**THE NAVAL BATTLE OF GUADALCANAL**

In November 1942 the Japanese planned to turn the battle for Guadalcanal decisively in their favor by mounting a naval bombardment on the US airstrip at Henderson Field and landing thousands of reinforcements on the island. The operation would take place by night to avoid attack by aircraft from the airfield and the carrier Enterprise.

On the night of November 12–13 Vice Admiral Hiroaki Abe led a force of two Japanese battleships and 12 smaller warships into "Ironbottom Sound" off northern Guadalcanal—so named for the number of ships sunk there. As usual, the Americans had forewarning of the Japanese movements and sent a force of five cruisers and eight destroyers to meet them. The Japanese and American ships blundered into one another in the dark and a brutal, disorganized fight broke out at close quarters—memorably described by one US officer as like “a bar-room brawl after the lights had been shot out.” In the confused mêlée both Admiral Callaghan and his second-in-command were killed—the latter probably by “friendly fire.” The Japanese battleship Hiei took significant damage, but the Americans suffered worse. By the time the Japanese disengaged only two US ships were still in a condition to fight. The next day the limping Hiei was attacked by American land-based and carrier aircraft and eventually scuttled.

**ROUND TWO**

Nothing could be done to stop the Japanese bombarding Henderson Field the following night, but by November 14–15 the Americans had brought in a new force into play, consisting of the battleships Washington and South Dakota and four destroyers. This force encountered the advancing Japanese

**Japanese Naval Landing Forces helmet**

Japanese attempts to land troop reinforcements on Guadalcanal were repulsed after two nights of naval fighting.

**battleship Kirishima** and 13 other ships shortly before midnight. The destroyers screening the American battleships performed their role courageously, but two were quickly sunk, a third so badly damaged it sank the following day, and the fourth disabled. Meanwhile South Dakota suffered electrical failures that left her exposed to a pounding from the Japanese guns. Washington, however, succeeded in stealing up on the Japanese unnoticed and hit Kirishima with a sudden devastating salvo that set the Japanese battleship ablaze.

The night ended with the Japanese scuttling Kirishima. The battle doomed the Japanese plans to reinforce Guadalcanal. By November 15, seven transport ships had been sunk by air attack. The four remaining transports beached that morning and were quickly destroyed by American bombardment from air, land, and sea. The ultimate outcome was that the Americans could strengthen and supply their forces on Guadalcanal while the Japanese could not.

---

**WITNESS TO WAR**

**COMMANDER CHIHAYA MASATAKA**

OFFICER ON BOARD JAPANESE BATTLESHIP HIEI, NIGHT OF NOVEMBER 12–13, 1942

“I think it was about a minute before I was due to give the order to start bombing [Henderson Field] when, all of a sudden, the look-out on the bridge shouted out: “Enemy ships starboard ahead” . . . I can still remember it. There was no time to get permission from my commanding officer. I shouted: “Change target! New target! Enemy ships starboard ahead! Start bombardment with searchlights on!” . . . The ships fought at close quarters, almost falling aboard each other.

We missed our antiquated rams very badly.”
Raymond A Spruance

A career naval officer, Raymond Spruance commanded a cruiser division in the early stages of the Pacific War. Despite having no previous experience of carriers, he was given command of Task Force 16 in time to play a vital part in the crucial battle of Midway in June 1942. As commander of the US 5th Fleet from 1943 he spearheaded the drive through the central Pacific, presiding over the destruction of Japanese naval aviation at the battle of the Philippine Sea. Sometimes criticized as over-cautious, Spruance enjoyed an exceptional record of success in major naval engagements.

1918–PRESENT

THE BATTLE FOR GUADALCANAL

Date
November 30, 1942

Forces
Americans: 5 cruisers, 4 destroyers; Japanese: 8 destroyers

Losses
Americans: 5 cruisers, 4 destroyers; Japanese: 8 destroyers

In response to a shortage of supplies, Japanese destroyers under Rear Admiral Raizo were delivering drums of food by night to troops based on Guadalcanal when they were intercepted by Task Force 67 commanded by Rear Admiral Wright. The five cruisers in Wright’s force had an overwhelming superiority in firepower and possessed radar, which the Japanese did not. On detecting the Japanese ships there was a brief delay before permission to commence firing was granted. However, once the word was given, the Americans concentrated their fire on a single ship, Takanami. She was quickly incapacitated, but in the interim the other Japanese destroyers had converged. None of the torpedoes fired by the American force found their target. Guided onto target by the flashes of the American guns, the Japanese destroyers delivered a series of devastating torpedo attacks that left Minneapolis, New Orleans, and Pensacola holed and on fire. Northampton was the last cruiser hit; struck by two torpedoes, she sank in the course of the night.

All of the Japanese destroyers except Takanami escaped unscathed, but did not succeed in delivering the supplies.

The increasing range of naval guns and speed of warships from the late 19th century onward led to the introduction of fire control systems to replace gunners sighting by eye. Personnel aloft in the director tower were equipped with optical instruments to gauge the bearing and range of a target to a fine degree of accuracy. They also “spotted” the splash of shells to provide feedback to correct the aim. This information was transmitted to a plotting room below the decks, where gunnery officers combined this data with other input (the movement of the ship, wind speed and direction, and so on) to produce a “firing solution.” Various forms of analog computers were developed to permit fast and accurate update of the calculation in a rapidly changing situation. The firing solution was transmitted electronically to the gun turrets, appearing as a visual pointer indicating the correct elevation and bearing. The gunner matched the pointer on his gun to the desired position and the guns were ready to fire. The use of radar and increasingly complex computers allowed large strides to be made in speed and accuracy of fire during World War II.

Director firing
Most of the guns on a large warship were directed—the person firing the gun relied on a series of readings and calculations taken elsewhere on the ship.

Wrecked Japanese transport

Japanese cargo ship Kinugawa Maru lies beached and gutted on the Guadalcanal coast, destroyed by US aircraft after the naval battle of Guadalcanal.
DRIVE TO VICTORY

THE AMERICAN WAR EFFORT in the Pacific began inexorably to gather momentum after 1943. At first naval action was confined to relatively small-scale engagements around the Solomons and in the North Pacific, but from November 1943 the United States began a drive through the Central Pacific to the Marshall and Mariana Islands, and from New Guinea to the Philippines. Attempting to resist this advance, the Japanese navy committed its forces to major battles at the Philippine Sea and Leyte Gulf. These epic engagements revealed the overwhelming naval superiority the Americans had achieved by this stage in the war. After Leyte Gulf the Japanese navy could only put up meaningful resistance by operating naval aircraft from land bases. Using kamikaze tactics they inflicted heavy losses on the Allied fleet at Okinawa in 1945, but by then Japan had already lost the naval war.

THE WAR IN THE PACIFIC 1943–1945

By late 1943 the tide of the Pacific War had turned and the US Navy began its long, inexorable advance through the Pacific toward Japan, one island to the next. The destruction of the Japanese Navy and naval aviation at Leyte Gulf and the Philippine Sea opened the way to the Japanese home islands.

KOMANDORSKI ISLANDS

Date March 27, 1943
Forces Americans: 2 cruisers, 4 destroyers; Japanese: 4 cruisers, 4 destroyers
Losses Americans: none; Japanese: none

Location South of Komandorski Islands, North Pacific

In 1943 the Allies installed elements of the US 5th Army Air Force and the Royal Australian Air Force at bases on New Guinea to intercept Japanese convoys ferrying troops from their base at Rabaul across the Bismarck Sea. On March 1, 1943, a convoy of eight Japanese troop transports with destroyer escorts, under Rear Admiral Masatomi Kinura, was spotted heading for Lae in New Guinea. One transport was sunk by B-17 bombers on March 2, but the main air strike was delivered on the morning of March 3. American B-25 Mitchell bombers and Australian Bristol Beaufighters attacked at low altitude with torpedoes, “skip” bombs—released onto the water to bounce into their target—and strafing guns.

The destroyers Shinyuki, Anashio, Tokitsukaze, and Asashio were sunk, along with all the troop transports. On the day after the battle Allied aircraft and torpedo boats systematically machine-gunned Japanese survivors in the water. Almost 2,900 Japanese soldiers and sailors were killed in what General Douglas MacArthur described as “one of the most complete and annihilating combats of all time.”

BISMARCK SEA

Date March 2–3, 1943
Forces Americans: 168 aircraft; Japanese: 8 destroyers, 8 transports
Losses Americans: 5 aircraft; Japanese: 4 destroyers, 4 transports

Location Off Papua New Guinea, Bismarck Sea

In April 1943 the Allies learnt that the Japanese were to embark a strong force of warships at Rabaul for an attack on Port Moresby. The Americans first steamed toward the island on March 2, but were turned back by the cruiser Sendai, which fired on the American fleet. Vice Admiral Hosogaya broke off the engagement and sent the cruisers Myoko, Nachi, and Maya south. The cruiser Sendai was disabled by multiple hits from American guns, but the Japanese turned away, short of ammunition and fuel. This inconclusive encounter was one of the last in naval history in which large ships battled almost exclusively with gunfire.
By the summer of 1944 the Americans held the strategic initiative in the Pacific War. Without any source of intelligence on US planning, the Japanese were reduced to guessing where the next blow might fall. The target chosen by the Americans in June 1944 was the Mariana Islands, which would provide bases for bomber aircraft within range of Japan. Admiral Raymond Spruance sent Task Force 58 under Vice Admiral Marc Mitscher to support landings on Saipan with bombardment by carrier aircraft and naval guns. Japanese Vice Admiral Osawa Jisaburo, with a force of carriers and battleships, was 2,000 miles (3,000 km) to the south when the Japanese realized the Marianas would be the next battleground. He steamed north at speed, hoping to catch the Americans between his carriers and airbases on the islands.

The battle began on the morning of June 19. For the Japanese it was an unmitigated disaster. The waves of aircraft sent to attack the American fleet met a sophisticated defense system. Incoming aircraft were detected by radar, allowing the carrier Combat Information Centers to scramble fighters and vector them onto the intruders. The Japanese pilots were less experienced than the Americans and had no aircraft to match the Grumman Hellcats. The few who survived being pounced on by the fighters were shot down by anti-aircraft fire. In total the Japanese lost over 300 aircraft in what became known as the “Marianas Turkey Shoot.” Meanwhile, American submarines preyed on the Japanese carrier force with first Taiho and then Shokaku struck by torpedoes.

The following day Mitscher sought to complete the victory with an air strike on the Japanese fleet. The Americans did not locate the enemy naval force until late in the afternoon. Mitscher decided to launch his aircraft although they would be operating at extreme range and would have to return after nightfall. The attack was largely successful, sinking the carrier Hiyo for the loss of a handful of aircraft, but the return journey proved to be a nightmare for the naval aircrews. Some 80 aircraft ran out of fuel before reaching the US carriers and were forced to ditch in the ocean, although the majority of the aircrews were rescued.

The battle of the Philippine Sea destroyed the Japanese carriers as a fighting force. The losses of aircraft and pilots were even more crippling than the losses of ships. Another step had been taken toward the total dominance of the US Navy in the Pacific.

**Turkey Shoot**

Part of the propeller from a Japanese plane that crashed into the carrier Essex during the one-sided air battle American aviators and sailors nicknamed the “Marianas Turkey Shoot.”
On October 20, 1944, US forces began landing on Leyte island as the first stage in the invasion of the Philippines. Admiral Thomas Kinkaid’s 7th Fleet was responsible for the amphibious operation, while Admiral William Halsey’s 3rd Fleet was on hand to help resist any effort by the Japanese navy to disrupt the invasion. Japan had in fact drawn up plans to meet this contingency and these were swiftly implemented. Virtually all available Japanese naval forces were to be thrown into a death-or-glory battle on an awesome scale.

By this stage in the war, after the disaster of the battle of the Philippine Sea, Japan had few carriers and barely any carrier aircraft, but still possessed a formidable tonnage of large battleships and cruisers. These would have to rely on land-based aircraft from the Philippines for air cover. The Japanese plan, Operation Sho-Go, envisaged simultaneous thrusts by Admiral Takeo Kurita’s Center Force through the Sibuyan Sea and Admiral Shoji Nishimura’s Southern Force through the Sula Sea, emerging to the east of the Philippines to catch Kinkaid’s ships in a pincer from north and south. Admiral Ozawa’s force of four impotent aircraft-less carriers was to provide a suicidal decoy for the Americans, drawing some of their fleet away to the north. The plan was ambitious, complex, and very unlikely to succeed.

**The Battles Begin**
Admiral Kurita’s Center Force, with five battleships including the giants Yamato and Musashi, set out for the Philippines on October 22. It suffered its first losses within 24 hours when two of its heavy cruisers, including Kurita’s flagship Atago, were sunk by American submarines. When he had been picked up out of the sea, the admiral shifted his flag to Yamato and pressed on, entering the Sibuyan Sea on October 24. There his ships were spotted by Halsey’s carrier aircraft and an air-sea battle commenced. Japanese aircraft based on Luzon succeeded in destroying the light carrier Princeton at great cost to themselves in aircraft and pilots lost, but they could not prevent waves of American carrier aircraft striking the Japanese fleet, putting 19 bombs and 17 torpedoes into Musashi before the leviathan finally sunk.

At this point the Americans made an error that could have cost them dearly. Believing that Kurita had turned back to escape air attack, Halsey departed
WOULD IT NOT BE A SHAME TO HAVE THE FLEET REMAIN INTACT WHILE OUR NATION PERISHES? ... YOU MUST ALL OF YOU REMEMBER THAT THERE ARE SUCH THINGS AS MIRACLES.

ADMIRAL TAKEO KURITA  BRIEFING HIS OFFICERS BEFORE THE BATTLE OF LEYTE GULF

northward, accepting the bait offered by Ozawa’s carrier force. Communication between the two American commanders was poor and Kinkaid mistakenly thought Halsey had left part of his fleet covering the northern flank of the invasion force. He had not. Meanwhile, Kinkaid sent most of his warships south to meet Admiral Shoji Nishimura’s two battleships, cruiser, and four destroyers coming through the Surigao Strait.

Emerging from the strait in the early hours of October 25, the Japanese ships were ambushed by US destroyers firing a total of 27 torpedoes and sinking the battleship Fuso and three destroyers.

Landings at Leyte Gulf
Two Coast Guard-manned LSTs (Landing Ships Tank) open their jaws onto Leyte Beach. While the landings themselves were not strongly opposed, the Japanese Navy later threw all the forces they had left against the invading forces.

1885–1966
CHESTER NIMITZ
COMMANDER-IN-CHIEF OF PACIFIC NAVAL FORCES

Born in Texas into a family of German origin, Chester Nimitz graduated from the US Naval Academy in 1905. After earning a reprimand as a young ensign for running a destroyer aground, he transferred to submarines and during World War I acted as chief of staff of the US Atlantic Submarine Force. Promoted to rear admiral in 1938, he was chief of the Bureau of Navigation when the Japanese attacked Pearl Harbor. Ten days later he was appointed commander-in-chief of the Pacific Fleet. During a period of Japanese naval superiority, Nimitz followed an aggressive strategy based on calculated risk. This bore fruit in the crucial victory at Midway in 1942. He masterminded the subsequent “island-hopping” drive through the Central Pacific toward Japan. Nimitz was appointed a fleet admiral in 1944 and was a signatory at the Japanese surrender ceremony in Tokyo Bay in October 1945.
Nishimura’s flagship Yamashiro was hit but pressed on. At 3:52 a.m. the darkness ahead suddenly erupted as a semicircle of waiting American warships opened fire. The most modern of them had radar fire control that left the Japanese no chance. Nishimura was already dead by the time Yamashiro sank.

Approaching this scene of carnage, some way behind Nishimura, a second group of warships under Admiral Shima added an element of farce to the tragedy by colliding with the crippled cruiser Mogami and then torpedoing an island misidentified as an enemy ship, before fleeing back down the strait.

To the north, meanwhile, Kurita led his ships undetected through the San Bernadino Strait and on the morning of October 25 sailed south down the coast of Samar island toward Leyte. First light revealed a force of 16 American escort carriers and seven destroyers and destroyer escorts lying in his path. As the Japanese ships opened fire, Rear Admiral Sprague radioed desperately for help, believing his carriers would be destroyed in minutes. With outstanding bravery the destroyers attacked the Japanese capital ships, winning the carriers a breathing space. All but one were eventually sunk by Japanese guns and many of the carriers took hits. But the destroyers and carrier aircraft between them sank three of Kurita’s heavy cruisers and badly damaged three more. Although Sprague’s carriers were still theoretically at his mercy, Kurita had had enough and turned back, safely withdrawing the remainder of his ships from the battle.

DESPERATE LAST GAMBLE

Admiral Ozawa’s carriers and cruisers had performed their function bravely by drawing Halsey’s 3rd Fleet away from Leyte, though all to no avail. Their destruction, which took place off Cape Engano, at the northern tip of Luzon, was inevitable—indeed, it formed part of the Japanese plan. The only use that remained for the once proud Japanese carrier force was as sacrificial victims.

It was as a response to his pilots’ inability to damage enemy ships with conventional tactics that Admiral Ohnishi, commander of the 1st Air Fleet on the Philippines, called for volunteers to carry out suicide attacks. On October 21, off Leyte, a pilot flew his aircraft into the cruiser Australia. Four days later Ohnishi’s Special Attack Unit, formally dedicated to kamikaze tactics, began systematic suicide attacks. On October 25–26 they crashed onto 47 US ships, including seven carriers. The first to be sunk by a kamikaze attack was the escort carrier St Lô.

The suicide attacks were a disturbing conclusion to an important American victory. By any measure it had been one of the largest sea battles in history, and the Japanese had lost. Their surface warships would take no further active part in the war, beyond a suicidal gesture at the very end.
I heard one of the signalmen yell: “Goddamit, boys, they’re getting away!” I could not believe my eyes, but it looked as if the whole Japanese fleet was indeed retiring... at best I had expected to be swimming by this time.

Vice Admiral Clifton Sprague describing the Battle off Samar
CARRIERS, SUBMARINES, AND MISSILES

WORLD WAR II: THE PACIFIC

Date
February 19–March 26, 1945

Forces
Americans: Over 800 ships, 74,000 Marines; Japanese: 23,000 soldiers

Losses
Americans: 1 escort carrier, 1 tank landing craft, 1 infantry landing craft

WORLD WAR II

IWO JIMA

Location
Iwo Jima, Ogasawara Islands

Lying halfway between the Marianas and the Japanese mainland, the small volcanic island of Iwo Jima was of limited military value. But the Americans decided to take the island as a stepping stone across the Pacific, and the Japanese defended it to the death.

The Iwo Jima landings were an amphibious operation on an awesome scale. Almost 500 ships were dedicated to transporting and landing more than 70,000 men of the 3rd, 4th, and 5th Marine Divisions. Hundreds of other ships were deployed in support, including battleships, cruisers, and escort carriers. The US Navy was not expecting interference from the Imperial Japanese Navy, which was no longer a viable fighting force, and Iwo Jima was far distant from Japanese air bases. The function of the US armada was to bombard the island and land Marines. The naval bombardment of Iwo Jima began three days before the landings—a much shorter softening-up than the Marines would have liked. Battleships and cruisers fired a total of 22,000 shells into the island. The effect of this onslaught and the accompanying aerial bombardment was slight.

Under Lieutenant General Tadamichi Kuribayashi, the 22,000 soldiers on the island had created a network of strongpoints and bunkers linked by tunnels deep inside the cave-riddled volcanic rock. When the first wave of Marines came ashore at 8:59 a.m. on the morning of February 19, the Japanese were ready to receive them.

The initial landing was not contested. The Japanese only opened fire when a log-jam of Marines and equipment had built up on the beaches, trapped by the volcanic terrain. Sailors bringing landing craft into shore had to contend not only with enemy fire but also with waves that dashed boats onto the beach. Close support for the Marines from naval guns and carrier aircraft was inhibited by worsening weather. On February 21 the attack carrier Saratoga and escort carrier Bismarck Sea were hit by attacks from Japanese kamikaze aircraft. Saratoga limped away for repairs after fires and explosions caused over 300 casualties on board; Bismarck Sea was blown apart and sank with the loss of 318 men.

The beaches of Iwo Jima
US Marines make their way up the volcanic beaches on Iwo Jima. The Japanese waited until the beaches were full of men and equipment before opening fire.

WEAPONS AND TECHNOLOGY

AMPHIBIOUS WARFARE

The Americans deployed an impressive range of amphibious vehicles during the Pacific War. The most basic was the LCVP (Landing Craft Vehicle Personnel) or Higgins Boat. Men climbed down netting from transports into these shallow-draft wooden boats to be ferried ashore. More than 23,000 LCVPs were built in World War II, along with 11,000 LCMs (Landing Craft Mechanized) designed to carry tanks and other vehicles. The larger LCI (Landing Craft Infantry) was an oceangoing vessel capable of carrying 200 soldiers. Alongside these landing craft a number of inventive types of amphibious vehicle were used. These included the DUKW, an amphibious wheeled truck, and various forms of LVT (Landing Vehicle Tracked). LVTs were basically designed to carry men ashore, but they developed in the course of the war into armored vehicles, some equipped with turret guns so that they could function as amphibious tanks.

DUKW amphibious truck
This US Navy six-wheel drive truck carried 25 soldiers and could maintain a speed of 5 knots in the water.
The assault on Okinawa was the largest amphibious operation of the Pacific war. More than half a million Allied personnel were involved in the battle for control of an island regarded by the Japanese as part of their homeland. In many ways the operation resembled the struggle for Iwo Jima, only on a larger scale. The preliminary naval bombardment to soften up the defenses, begun on March 21, was so intensive that Okinawans called it the “Typhoon of Steel.” As at Iwo Jima, the initial landings on April 1 were unopposed. The Japanese soldiers on Okinawa, numbering over 100,000, were hidden in well-prepared defensive positions from which they could only be removed by months of hard infantry fighting.

**OPERATION TEN-GO**

The Allied naval forces at Okinawa consisted of the American Fifth Fleet—which included an astonishing 40 carriers and 18 battleships—and Vice Admiral Sir Bernard Rawlings’s Royal Navy Task Force, under American operational control. The fleet was in an exposed position, within range of Japanese air bases on Kyushu island in southern Japan. It was also close enough to tempt the remnants of the Japanese navy into a final sortie, Operation Ten-go. On April 6, Admiral Seiichi Ito sailed out of the Inland Sea on board Yamato, the largest battleship in the world, accompanied by the cruiser Yahagi and a handful of destroyers—at that point the entire naval force that Japan could muster. His mission was to attack the Allied fleet off Okinawa. None of the ships was expected to return; they had only been supplied with fuel for a one-way trip.

On April 7 the 11 carriers of Vice Admiral Marc Mitscher’s Task Force 58 launched three waves of aircraft. Swarming around the Yamato, they struck it time and again with bombs and torpedoes until the battleship turned turtle and exploded, sending up a plume of smoke that could be seen 125 miles (200 km) away. The cruiser and four destroyers were also sunk and the operation abandoned.

**FINAL SACRIFICE**

The Allied fleet did not find it so easy to cope with air attack. On April 6, Japanese aircraft under launched the first mass kamikaze attack with over 300 aircraft. By crashing their aircraft onto warships, young half-trained pilots caused fearsome damage, even though few of them penetrated the combat air patrols and massed fire of the Allied fleet. In raids that continued through to the third week of June, the kamikazes sank more than 40 Allied ships, damaged some 200 others, and killed over 5,000 sailors. The fall of Okinawa came as a relief to battered and exhausted naval personnel.

---

**WE WATCHED EACH PLUNGING KAMIKAZE WITH THE DETACHED HORROR OF ONE WITNESSING A TERRIBLE SPECTACLE RATHER THAN AS THE INTENDED VICTIM.**

VICE ADMIRAL C. R. BROWN, DESCRIBING JAPANESE KAMIKAZE ATTACKS
POSTWAR CONFLICTS

IN THE SECOND HALF of the 20th century, the developments in naval tactics and technology evident during World War II continued apace. Big-gun naval vessels were reduced to a shore bombardment role, before virtually disappearing as ever larger aircraft carriers and submarines took center stage. By the 1960s carriers were operating missile-armed jet aircraft from their decks and nuclear-powered, nuclear-armed submarines had become a central part of the Cold War “nuclear deterrent.” Surface warships gained a new lease of life through the introduction of shipborne missiles, which not only equipped escort ships for fleet defense but also provided powerful offensive weapons. The days of pitched battles between fleets seemed over, but the relevance of maritime strength to military power projection remained essential, in particular to the global role of the United States, from the Korean War through to modern Middle East conflicts.

NO BIG BATTLES
Since the end of World War II there have been no major battles at sea. The end of the war found the United States in possession of what was in practice an unchallenged worldwide naval supremacy. Defeated Germany and Japan were denied any significant naval forces. Britain and France still maintained navies of significant size, but were not potential opponents of the United States. The Soviet Union emerged as a global superpower rival for the United States in the Cold War, but the Soviet navy was not a major force in the first decades after the war. When the Soviet Union did develop a major fleet, by the 1970s, both sides planned for a sea conflict that never happened. Indeed, the Soviets and Americans observed rules to prevent hostile encounters between their navies. Thus the Soviet Union did not intervene with its navy during the Korean War in the 1950s, although the United States and its Allies operated large fleets close to the Soviet Pacific coast, and during the Vietnam War the Americans mostly did not interfere with Soviet seaborne supplies of war material to North Vietnam. With the demise of the Soviet Union in 1991, the United States was left with no credible enemy for a
major war. But the Middle East offered plenty of scope for US power-projection in which naval forces could play a central role.

**SUPPORTING LAND FORCES**

The largest naval operations since 1945 have been conducted in support of land forces, with firepower deployed for the bombardment of targets on land. During the Korean War and the Vietnam War, big naval guns and carrier aircraft were used by the Americans and their allies on a massive scale to provide fire support and to devastate targets in enemy territory. This pattern was repeated in Iraq and Afghanistan in the 1990s and more recently—although with ship-launched missiles replacing the big warships’ heavy guns.

These large-scale operations were largely uncontested at sea, but during the same period several of the world’s smaller navies engaged in some sharp, if mostly limited, naval combat that provided the opportunity for real-life use of developing new technologies and tactics. The Middle East and the Indian subcontinent were the scenes of interesting encounters, including the successful use of a ship-to-ship missile in the sinking of the Israeli destroyer *Eilat* by Egyptian missile boats in 1967. The Falklands War of 1982 was an unequal contest between the Royal Navy and Argentina’s small and ageing fleet, but a more balanced contest between the British ships and shore-based Argentinian aircraft armed with advanced missiles as well as bombs.

**AWESOME POWER**

By the early 21st century the firepower of navies was far beyond anything that had previously existed, even if nuclear warheads were left out of account. The aircraft and missiles of the fleets assembled by the United States and its allies for operations in Afghanistan and Iraq constituted an awesome concentration of force and sophisticated technology. Nuclear submarines were among the technological wonders of the modern world. Whether such supremely impressive naval forces were a weapon that would continue to suit 21st-century strategic needs in the age of the “War on Terror” remained to be demonstrated.

**BALLISTIC MISSILES**

Unlike cruise missiles, which take a guided flight path to their targets, ballistic missiles are guided only during the relatively brief powered multi-stage lift-off and initial flight, which takes the missile to sub-orbital altitudes. Thereafter the missile flies on using its own ballistic, free-flight energy, eventually deploying nuclear or conventional warheads at supersonic speeds to the target area.

Ranges of these missiles vary from a few hundred miles to more than 3,418 miles (5,500 km) in inter-continental models. Naval ballistic missiles are primarily submarine-launched weapons. The first operational naval model was the Polaris, which entered service with the US Navy in 1961 after a five-year development program. The latest Trident ballistic missiles have a range of 7,000 miles (11,300 km), reach speeds of 18,000 mph (29,000 kph) in sub-orbit, and use star-sighting and inertial guidance systems.

**Polaris nuclear missile**

The Polaris missile was a submarine-launched, solid-fuel, nuclear-armed, ballistic missile (SLBM), which was carried by British submarines from 1968. It was later replaced by Trident I.
COLD WAR CONFLICTS

AFTER THE END OF World War II the United States and it allies became involved in global resistance to the spread of Communism. Communist triumph in the Chinese Civil War in 1950 was followed by a major war in Korea, where Communist North Korean and Chinese forces fought South Korean and US-led United Nations forces. The navies of the United States and its allies were deployed on a large scale through the three years of the war, operating unchallenged around the whole Korean peninsula. As well as the amphibious operations such as that at Inchon in September 1950, they provided close air support for UN ground forces with carrier aircraft, and flattened North Korean coastal towns with naval gunfire. The fact that both the Communist Soviet Union and the United States possessed nuclear weapons deterred them from fighting one another directly, but a dangerous confrontation developed when Fidel Castro came to power in Cuba in 1959 and allied his country with the Soviets. The possibility that the Soviets might defy a naval blockade imposed on Cuba by the United States during the missile crisis of 1962 brought the world close to nuclear disaster.

THE INCHON LANDINGS

In August 1950 United Nations and South Korean forces were pinned in the Pusan area of southern Korea. UN Supreme Commander General Douglas MacArthur planned a bold amphibious operation to land troops behind North Korean lines at Inchon. The conditions for landings were difficult. Inchon had one of the most extreme tidal ranges in the world—around 36 ft (11 m) maximum variation between low and high tide—and was surrounded by treacherous mudflats. The two sea approaches, the Flying Fish Channel and the Eastern Channel, were narrow and difficult to negotiate. The approaches were dominated by the fortified island of Wolmi-do, which would have to be captured first. On the other hand, the UN forces had total command of the sea and air. The operation, codenamed Chromite, was set for September 15, when the tide would be high enough to allow large tank landing craft to reach the shore.

In the course of operations around the port of Inchon, UN forces landed some 50,000 US troops. The Inchon landings led to the recapture of Seoul and turned around UN fortunes in the Korean War.

A Force of 261 ships, including British and Canadian vessels as well as American, assembled under Vice Admiral Arthur D. Struble, although preparations were disrupted by a typhoon in early September. Diversionary attacks were mounted to disperse the North Korean defenses, but Inchon itself was thoroughly softened up with strikes by carrier aircraft. Seven destroyers made

THE INCHON LANDINGS

| Date       | September 15, 1950 |
| Location   | South Korea        |
| Result     | UN victory         |

**COMBATANTS**

<table>
<thead>
<tr>
<th>UNITED STATES</th>
<th>NORTH KOREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas MacArthur</td>
<td>Choi Yong-kun</td>
</tr>
</tbody>
</table>

**FORCES**

| Ships: 261 ships, 46,000 troops | Ships: 1,000 troops |

**LOSSES**

| Men: 196 | Men: unknown |
| Ships: none | Ships: none |
In the early 1960s, with Communist dictator Fidel Castro firmly in power in Cuba, relations between the United States and its Caribbean neighbor were deteriorating fast. In 1961 the US government decided to pursue a military solution. The Central Intelligence Agency (CIA) trained a group of 1,500 Cuban exiles for an invasion of Cuba, with the aim of removing Castro from power. The exiles were to land at the Bay of Pigs in four freighters, alongside two CIA landing craft, with heavy air and fire support from the US carrier Essex and six US Navy destroyers.

The landing force went in on April 17, 1961. Air strikes destroyed initial Cuban resistance and the landing was successful. However, the invasion force was subsequently destroyed over three days of fighting, to the embarrassment of the US government. Four US pilots also died during engagements over Cuba and Cuban strike jets managed to sink one enemy freighter.

From the summer of 1962, Soviet engineers and scientists began work on the Communist-controlled island of Cuba, establishing medium-range ballistic missile launch facilities. By using Cuba as a nuclear missile launch-pad, the USSR could target almost the whole of the southern United States. When the facilities were revealed by U-2 reconnaissance flights over the island in October 1962, the deployments terrified the US authorities.

The US government of John F. Kennedy opted to take a tough stance against the Soviets, issuing a demand that the missiles and their facilities be withdrawn from Cuban soil immediately, and threatening a nuclear response against the Soviet Union should it attempt any open aggression. The stakes were raised when the United States, with maritime support from Venezuela, Argentina, and Dominica, imposed a naval blockade.

Submarine Geiger counter
The US deployed nuclear submarines during the Cuban blockade. Geiger counters such as this one were used to check levels of radiation in the vessels and monitor how much radiation had been absorbed by crews.
COLD WAR WARRIOR
The crew of the USS Nautilus, the world’s first nuclear-powered submarine, takes to her deck as she enters New York Harbor in 1957. The next year Nautilus made the first submerged transit of the North Pole. Nuclear submarines, able to stay submerged for weeks or even months at a time and carrying a payload of ballistic missiles, soon became a key part of the Cold War stalemate.
POSTWAR CONFLICTS

THE VIETNAM WAR

The popular image of the Vietnam War is of foot-slogging search-and-destroy operations. The impression does little justice to the key US and South Vietnamese naval operations during the decade-long conflict. US involvement in the Vietnam War began in earnest at sea with the Gulf of Tonkin engagement in 1964, and ended with major evacuations from the South Vietnamese coastline in 1975. In between were a huge range of maritime operations. Aircraft carrier groups sat at two locations off the Vietnamese coast (“Yankee Station” and “Dixie Station”) to launch naval air strikes against North Vietnam and Viet Cong targets in South Vietnam. Navy and Coast Guard units cut Communist supply lines during Operation Market Time, while a composite US Navy and US Army “Brown Water Navy” fought the Communists along the waterways of the Mekong Delta. Vietnam also saw more traditional forms of naval warfare, with the battleship New Jersey deployed to provide fire support to ground troops with her huge 16-in guns. Although the Vietnam War ultimately ended in defeat for the West, the efforts of the US maritime forces were arguably the most successful component of the war.

RIVERINE OPERATIONS

The Mekong River Delta in South Vietnam was home to over 50 percent of the country’s population during the Vietnam war and contained the most fertile rice-producing land. It was also laced with 3,000 miles (4,800 km) of tangled, jungle-shrouded waterways that provided superb covert transportation lanes for Communist insurgents, the Viet Cong, to traffic people, supplies, and weapons. Taking the war to the Viet Cong along the Mekong was the task of the “Brown Water Navy,” a collection of US Army, Navy, and South Vietnamese riverine patrol units.

The first unit tasked with patrolling the Mekong was the River Patrol Force (RPF), established in 1965. In terms of vessels, US forces made use of almost anything that could float and be armed, including World War II-era landing craft and French colonial monitor gunboats. Yet the arsenal also included purpose-built vessels such as the Patrol Boat, River (PBR) whose shallow draft, a high-speed of 25 knots, and armament of machine guns and grenade launchers made it an ideal river assault craft.

The US launched Operation Game Warden in 1966, aimed at stopping and searching vessels along the Mekong waterways. These patrols could be violent affairs—in 1967 alone Game Warden operations destroyed 2,000 enemy vessels, and boarded around 400,000. Yet US forces soon sought more aggressive solutions. The result was the creation of the Mobile Riverine Force, a joint army-navy unit dedicated to search-and-destroy operations. Soldiers (principally the 9th Infantry Division) were carried into battle in Armored Troop Carriers (ATCs), with fire support from gun-bristling monitor gunboats. Headquarters were created from floating base ships—often converted LSTs (Landing Ships, Tank) left over from World War II. Pontoons provided platforms for floating artillery firebases.

The Mobile Riverine Force was critical in curtailing Viet Cong influence in the Mekong, particularly during the Communist Tet offensive of 1968, when the riverine craft were used to deploy troops around South Vietnam to douse the fires of Viet Cong uprisings. In 1969 the MRF was reorganized under the SEALORDS program (the Southeast Asia Lake, Ocean, River, and Delta Strategy). The 9th Infantry were detached for other land warfare duties, but the boat force grew in scale and included the now 258-boat strong RPF.

1943–PRESENT

JOHN KERRY

Swift Boat Commander and Anti-War Activist

Future US Senator and presidential candidate John Kerry served in Vietnam from 1968–1970, his first tour of duty being aboard the frigate USS Gridley. Kerry voluntarily transferred to be the commander of a Patrol Craft, Fast (PCF) Swift boat, performing coastal and river interdiction. In this role he saw much action, receiving three Purple Hearts for wounds sustained in action. After leaving Vietnam, Kerry became an antiwar activist and was the first Vietnam veteran to testify before Congress.

Slow but sure

The turtle emblem on this uniform patch is an affectionate nod to the armored monitor gunboats used by riverine units in Vietnam.
THE GULF OF TONKIN INCIDENT

Date August 2–4, 1964
Forces Americans: 2 destroyers; North Vietnamese: 5–8 torpedo boats
Losses Americans: none; North Vietnamese: c. 3 boats destroyed

The Gulf of Tonkin incident provided a pretext for escalating US involvement in the Vietnam War. On August 2, 1964, the destroyer USS Maddox was engaged in intelligence-gathering off the Gulf of Tonkin when she was approached by three North Vietnamese torpedo boats. Warning shots failed to deter the attackers, and US gunfire subsequently destroyed one boat and damaged another. Two days later Maddox was on patrol with another destroyer, Turner Joy. Radio operators on board suddenly reported five enemy torpedo boats approaching, resulting in a blaze of US gunfire and reports that two enemy craft had been sunk. Later analysis contended that the reports were false and no enemy craft were present. Nonetheless, the incidents led to retaliatory air attacks on North Vietnam and persuaded US Congress to effectively commit to war.

Jet warfare
Deck crew on board the carrier Bon Homme Richard prepare F-8 Crusader fighter jets for action against North Vietnamese aircraft in 1965.

OPERATION ROLLING THUNDER

Date March 2, 1965–November 1, 1968
Forces Americans: 600 ships; North Vietnamese: extensive Soviet-supplied air defenses
Losses Americans: 922 aircraft; North Vietnamese: unknown

Rolling Thunder was the name of the aerial bombing campaign over North Vietnam, initiated in March 1965 with the intention of pounding the North Vietnamese government into submission. A sustained bombing campaign, carried out over several years, inflicted huge damage—air force, navy, and Marine Corps aircraft dropped 864,000 tons of bombs—but ultimately failed to break North Vietnamese resistance or convince the government not to aid Communist insurgency in the South. The US Navy and Marine Corps component of Rolling Thunder was primarily delivered by the carrier aircraft of “Yankee Station” based 75 miles (140 km) off the Gulf of Tonkin. Yankee Station consisted of multiple US aircraft carriers during the Rolling Thunder operations, including Coral Sea, Hancock, Constellation, and Midway. By operating in a multi-carrier unit, Yankee Station was able to keep up the round-the-clock commitments of the air war. Its aviators ran terrible risks from Soviet-supplied SA-2 Guideline missiles and vast barrages of conventional anti-aircraft fire. There were also some horrific offshore accidents, the most famous of which resulted from the accidental firing of a Zuni rocket aboard USS Forrestal on July 29, 1967. The missile ignited fuel and ordnance, and subsequent fires and detonations killed 134 and destroyed or damaged 64 aircraft. In total, 454 naval aviators and many more air force pilots died during Operation Rolling Thunder.

OPERATION MARKET TIME

Date March 11, 1965–December 1972
Forces Americans: unknown; North Vietnamese: unknown
Losses Unknown

On February 16, 1965, a US helicopter flying along the coast of central South Vietnam spotted a North Vietnamese trawler unloading arms and ammunition at Vung Ro Bay—the first tangible evidence that North Vietnam was using open sea routes to supply Communist insurgents in South Vietnam. The US Navy responded to the incident by launching Market Time, a major coastal patrol operation designed to cut the open-water supply lines between North and South Vietnam.

Operation Market Time ran for seven years along a 1,200 mile (2,000 km) stretch of the South Vietnamese coast. It was delivered by Task Force 115, the Coastal Patrol Force. By 1966 hundreds of US Navy, Coast Guard, and South Vietnamese Navy craft were involved. The screening operation was organized around nine patrol sectors stretching 40 miles (65 km) out to sea. Close to the shore, US Navy Patrol Gunboats, armed junks, and Coast Guard Cutters performed stop-and-search operations. Further from the coast, larger navy minesweepers and destroyers intercepted deep-water traffic. US Navy surveillance aircraft patrolled the waters beyond.

The effect of Market Time on the Communist supply lines was profound. Out of 50 North Vietnamese trawlers that attempted the run south between 1965 and 1972, US forces captured or destroyed 49. Communist forces almost entirely abandoned the coastal route in favor of the inland Ho Chi Minh Trail.
USS LEXINGTON

THE FIRST AIRCRAFT CARRIER to bear the name Lexington was sunk at the Coral Sea in 1942. The name was transferred to a new fleet carrier commissioned in 1943, which played a prominent part in the battles of the Philippine Sea and Leyte Gulf. Lexington remained in service until 1991, making her the longest serving carrier in the US Navy.

KNOWN AS THE “BLUE GHOST” because of her dark blue paint scheme, Lexington operated some 80 aircraft during World War II. The ship had the standard layout for a World War II carrier, with an island superstructure offset to starboard and aircraft taking off and landing along a straight flight deck stretching from the stern to the bow. With the aid of a steam-operated catapult and an arrestor cable, aircraft could take off and land using half the length of the flight deck, leaving the rest free for shifting planes up from and down to the hangars on lifts. If a landing went wrong, only a crash barrier prevented an aircraft piling into planes being marshalled on the deck. After the war, carriers were designed with a landing deck angled to port, so that if anything went wrong the landing pilot could accelerate off and come round for a second try. Lexington was given an angled flight deck during extensive modernization in the 1950s. By the time she was decommissioned in 1991, Lexington was the oldest working aircraft carrier in the US Navy. She is now a museum ship at Corpus Christi, Texas.

**Known as the “Blue Ghost”** because of her dark blue paint scheme, Lexington operated some 80 aircraft during World War II. The ship had the standard layout for a World War II carrier, with an island superstructure offset to starboard and aircraft taking off and landing along a straight flight deck stretching from the stern to the bow. With the aid of a steam-operated catapult and an arrestor cable, aircraft could take off and land using half the length of the flight deck, leaving the rest free for shifting planes up from and down to the hangars on lifts. If a landing went wrong, only a crash barrier prevented an aircraft piling into planes being marshalled on the deck. After the war, carriers were designed with a landing deck angled to port, so that if anything went wrong the landing pilot could accelerate off and come round for a second try. Lexington was given an angled flight deck during extensive modernization in the 1950s. By the time she was decommissioned in 1991, Lexington was the oldest working aircraft carrier in the US Navy. She is now a museum ship at Corpus Christi, Texas.

**Superstructure**
The island superstructure is the ship’s command-and-control center. The radar mast carries six different radar systems as well as radio antennas and other equipment. Below this, the island houses the bridge, pilot house, radar room, flight control center, and other key command areas.

**Whaler MK11**
Suspended from the starboard aft edge of the flight deck, the lightweight 26 ft (8 m) long MK11 Whaler motorboat was used to ferry personnel to shore. It could carry up to 22 passengers.

**Life rafts**
Two rigid, puncture-proof rafts known as Carley floats are fixed to the starboard side of the island. In case of emergency, the lightweight rafts could be launched simply by casting them into the water.

**Pilots are the weapon of this force. Pilots are the things you have to nurture. Pilots are the people you have to train … you have to train other people to support the pilots.**

ADMIRAL MARC MITSCHER, COMMANDER OF FAST CARRIER TASK FORCE 58 ON LEXINGTON, 1941
Life-raft pods
Each of the barrel-shaped pods suspended off the starboard side of the flight deck contains a 15-man life raft. In the event of the ship sinking, hydrostatic devices inside would release the pods from their mountings and carry them to the surface, inflating the rafts.

40-mm Bofors anti-aircraft gun
The Bofors 40-mm gun was the US Navy’s standard anti-aircraft weapon during World War II. Lexington carried 15 Bofors 40-mm quad mounts, each with four guns. Each quad mount required a crew of 10 men to load and operate it.

Air defense
The Mk37 Fire-Control Director, one of several air defense radar on board the carrier, could track and respond to incoming air threats.

Skyhawk
An A-4 Skyhawk Marine aircraft on Lexington's flight deck. The Skyhawk entered service in 1956 and was the US Navy’s primary light bomber during the early years of the Vietnam War.

Catwalks
Suspended walkways known as catwalks run down the sides of the deck, giving the crew a way to move around the carrier without crossing the busy and dangerous flight decks.

Flight deck status lights
The carrier flight deck was an extremely busy and hazardous place to work. The flight deck status lights were used to show a clear, caution, or warning status to the flight deck personnel.

3-in anti-aircraft gun
Lexington was fitted with a range of light 20-mm and 40-mm anti-aircraft guns (and several 5-in dual-purpose guns). Most of the light anti-aircraft guns were removed during Lexington's extensive 1955 refit and replaced with heavier 3-in guns such as this one.

Navigation and flag bridges
The windows of the navigation bridge (where the captain commands the ship) and the flag bridge (where the admiral commands the fleet) enjoy a panoramic view over the surrounding area. Above the navigation bridge the mast bristles with radar.

Warning notice
A notice on the side of the island reminds deck crews about some of the dangers of working on a busy flight deck.
LEXINGTON HAD A complement of 2,600 officers and men, berthed in generally spartan conditions. Lexington represented a step forward from earlier carriers in some respects, however, notably the comfort of its pilot’s briefing room. Much space below deck was devoted to the stowage of aircraft. The operation of aircraft in the confined space of a ship inevitably led to accidents, such as gruesome encounters between men and propellers.

Navigation bridge
High in the island superstructure, with slanted windows to reduce the glare, the navigation bridge was the main command center of the ship. The large device in the center of the bridge is the navigational radar monitor.

Port engine control panel
Eight steam boilers powered the ship’s four Westinghouse steam turbine engines. Control panels in each of the two engine rooms were used to control the turbine pressures and operate the engines.

Pilot’s ready room
The air-conditioned ready rooms were where pilots and air crew were briefed prior to their missions. Foldaway desks allowed the airmen to make notes during briefings.

Bridge indicators
The bridge is fitted with a range of instruments, including this wind speed and direction indicator and the equipment for the bridge officers to talk to other areas of the ship.

Engine control panel
Numerous dials, switches, and gauges were used to indicate the turbine pressures and operate the ship’s engines.

Hangar division doors
Heavy hangar doors divided the main hangar into bays, helping to limit the damage from fired or explosions within individual bays. Each door section weighs over eight tons.

Air Operations room
Planning and coordination for flight operations took place in the Air Ops room. The plot board listed all the day’s flying schedules.

Tow truck
With so many planes to move around the hangars, tow trucks were an indispensable piece of the ship’s equipment.
Soup kettles
With more than 2,000 enlisted men on board, feeding the crew was a 24-hour operation. These gigantic soup kettles, like much of the kitchen equipment, were made out of stainless steel for ease of cleaning and maintenance.

Bed pans
This set of bed pans and "piss pots" in the ship's sick bay was designed with utility in mind.

Sick bay
The sick bay was located below the hangar deck, a common site for accidents. Beds could be raised to make room for stretchers.

Surgery room
Lexington was equipped with extensive medical facilities. As well as this operating room, the ship also had a triage emergency room, a dentist's office, a diagnostics laboratory, an X-ray room, and a prosthetics lab.

Captain's quarters
There were separate galleys and messes for the enlisted men and officers. The captain had his own galley which was used to make meals for the captain and his guests.

Admiral's quarters
The rooms reserved for the admiral, when he was on board, were comfortable but by no means lavish.

Galley ovens
The ship’s ovens are much larger than normal, and there are lots of them. The size of the ship meant that feeding the crew was more like feeding a small city than a regular ship. The ovens, like the rest of the galley, were in constant use.

Sick bay
The sick bay was located below the hangar deck, a common site for accidents. Beds could be raised to make room for stretchers.

Female berthing
Lexington was the first US Navy ship to have women serving on board. A sign at the entrance of the female berthing area indicates the protocol expected from male crewmen entering the women's living quarters.

Crew shelter and food service area
Small shelters around the ship provided areas for the gun crews to relax while remaining close to their guns in case of emergencies. Though sparsely furnished, the rooms provided a refuge from bad weather and a place to unwind and eat in comparative safety.
ARGENTINA LAUNCHED A MILITARY campaign to invade and occupy South Georgia and the Falkland Islands, disputed British possessions in the South Atlantic, on March 19, 1982. The British opted to retake the islands by military force, which it achieved by mid-June. The British victory was made possible by the rapid deployment of a naval task force across 8,000 miles (12,900 km) of Atlantic Ocean. The task force consisted of two small carriers, Hermes and Invincible, operating Harrier jump-jets, and ships carrying troops and equipment, screened by destroyers and frigates. A submarine force was sent to keep the Argentinian navy away from an “exclusion zone” around the islands. As the task force drew closer to the Falklands in early May, both sides suffered naval losses. The aging Argentinian cruiser General Belgrano was sunk by a submarine while the Royal Navy lost a destroyer to air attack from land-based aircraft. On May 21 British troops landed at San Carlos, but air attacks intensified. Argentinian forces on the Falklands surrendered on June 14, but it proved a close-run conflict. British losses were high, with 15 ships either sunk or badly damaged.

THE FALKLANDS WAR

LANDINGS AT SAN CARLOS WATER

The landing of British troops on the Falklands began on May 21, initiating the most intensive phase of the air-sea conflict. The Royal Navy positioned its destroyers and frigates in Falkland Sound to intercept air attacks with their missile defenses, while the carriers Hermes and Invincible, operating far to the east for fear of Exocet missile attack, flew off Sea Harriers to provide a combat air patrol. The amphibious assault began at dawn with 4,000 men being landed by a variety of amphibious ships around San Carlos bay. Within 24 hours the beachhead had been secured and the land campaign had begun.

The naval forces, however, were still fighting for their lives. Argentinian air attacks began two hours after first light on May 21, the principal attackers being Skyhawk and Mirage fighters flying low-level bombing and strafing runs from bases on the Argentine mainland. The British ships replied with machine gun and cannon fire, as well as numerous Sea Slug, Sea Cat, and Sea Wolf missiles—although many of the missiles suffered technical failures. The County-Class destroyer Antirio was hit by a dud bomb that knocked out her surface-to-air missile systems; the Type 22 frigate Brilliant was strafed; and the Leander Class frigate Argonaut was crippled in the water by multiple bomb strikes. Worse still, the Type 21 frigate Airdale was hit by two 1,000 lb (454 kg) bombs and sank. The only compensation was that the Argentine air force had lost 16 aircraft during the first day’s fighting, an unsustainable daily loss.

It was the beginning of a difficult week for the British naval forces around San Carlos Water. The frigate Antelope was sunk on May 24 and on May 25 the destroyer Coventry and frigate Broadsword were attacked by waves of A-4 Skyhawks in Falkland

I WAS TWO DECKS DOWN AND COULD SEE NO WAY OUT. THE SMOKE WAS SUFFOCATING AND THE DOORS WERE BLOCKED BY FIRE. I WAS CALM AND PREPARED TO DIE.

CAPTAIN DAVID HART DYKE, DESCRIBING THE SINKING OF THE HMS COVENTRY ON MAY 25, 1982
After joining the Royal Navy at the age of just 13, John “Sandy” Woodward spent most of his early career on submarines, where he gained his first command, the submarine Wasp, in 1969. Promoted to rear admiral in 1981, the following year he was given command of the British Task Force sent to the Falklands. Woodward received a knighthood for his service during the war, finishing his career as a full admiral.

### SINKING OF THE BELGRANO

**Date:** May 2, 1982  
**Forces:** British: 1 submarine; Argentine: 1 cruiser  
**Losses:** British: none; Argentine: 1 cruiser  

**Location:** South of Falkland Islands, South Atlantic

The sinking of the Argentine cruiser General Belgrano remains one of the most controversial incidents of the Falklands War. By April 30, when the Belgrano’s presence was first registered by British surveillance, the Royal Navy had established a circular exclusion zone around the Falkland Islands with a radius of 230 miles (370 km). The Belgrano, accompanied by two Argentine destroyers, was actually 40 miles (64 km) outside this exclusion zone and might therefore have been considered safe from attack. The British authorities, however, decided that the Belgrano did pose a serious threat to the British Task Force. It was directing aircraft attack missions and carried a powerful array of long-range and anti-aircraft guns. On May 2 the order came from London that the Belgrano was to be sunk. The tool for this job was the nuclear-powered submarine Conqueror, which had been shadowing the enemy cruiser since April 30. When she received the order to attack, Conqueror closed to firing range at 3:57 p.m. on May 2, firing three Mark 8 mod 4 torpedoes. These were old, unguided weapons compared to the modern Tigerfish homing torpedoes; the Conqueror also had on board at the time, but there were some concerns about the Tigerfish’s reliability. Two of the torpedoes, each carrying 800 lb (364 kg) of Torpex explosive, hit the cruiser and detonated, ripping open her hull and killing around 275 men. Within 20 minutes the Belgrano’s crew were abandoning ship; many men would float in the South Atlantic for several days, some surviving, some not. In total 321 men out of the Belgrano’s crew of 1,000 died in the attack.

**Mark 8 torpedo**  
Despite carrying modern Mark 24 Tigerfish torpedoes, HMS Conqueror opted to use the much older but more reliable Mark 8 torpedo to attack the ARA Belgrano.

### MODERN AIR DEFENSE SYSTEMS

Hostile aircraft armed with anti-ship missiles are one of the most potent threats to modern warships. As a response, navies tend to use three levels of onboard air defense technology. First are the electronic countermeasures (ECM) suites dedicated to jamming missile homing systems, or the radar systems of the attack aircraft themselves. ECM might include chaff and radar-jamming equipment, but these pose no real danger to the aircraft itself. The second level is more aggressive, and consists of automated missile defense systems. These are linked to fire-control systems that can automatically acquire the targets and fire either a guided missile or, in the case of gun systems like the US Phalanx, deliver hails of radar-guided cannon or machine-gun fire. The final, and most basic, level of air defense is provided by optically aimed machine guns and cannon. Even the most modern vessels often have pintle mounts for machine-guns dotted around the ship’s rails, and these can provide a last-ditch method of air defense.

**Phalanx anti-missile system**  
The US Navy’s Phalanx close-in weapon system (CIWS) uses an automated radar and fire-control system to track incoming anti-ship missiles and destroy them with its M61 Vulcan cannon.
REGIONAL CONFLICTS

ALTHOUGH MOST CONFLICTS since 1945 have been largely restricted to land warfare, the “war in peace” has nonetheless featured some major regional naval engagements. Significant naval actions occurred, for example, around the troubled Middle Eastern region during the Arab–Israeli wars of the 1960s and 70s, and in the waters around the Indian subcontinent during the later decade. The navies involved in these engagements have not been the world’s largest by any means, but in many cases they were pioneers in testing out modern ship-versus-ship weapon systems and electronic countermeasures in actual combat situations. In this capacity they often had a formative role in the development of naval weaponry by the major Western and Soviet bloc powers. The diversity of postwar regional naval engagements has also been impressive, and has ranged from gunboat missile actions through to well-organized suicide bombings and carrier aircraft attacks. Sheer cost has limited the capacity of many regional powers to maintain navies in recent years, but investment in modern weapons technology has enabled them to remain a potent threat to far larger forces.

On October 21, 1967, the Eilat was on a routine patrol of the Sinai coastline, which took her some 15 miles (25 km) from the Egyptian city of Port Said, when she suddenly came under attack from an Egyptian Komar-class missile boat. The boat fired a Russian-built SS-N-2 Styx anti-ship missile that struck the Eilat, destroying her communications and powerplant. The Eilat was attacked again 90 minutes later, receiving another missile strike that caused her magazine to detonate. The crew abandoned ship, but many were wounded in the water when one of the ship’s depth charges exploded. A total of 47 Israeli sailors were killed.

The Eilat was the first ship to be sunk in battle by a ship-launched anti-ship missile. It was a huge blow to the Israeli navy and led to a major review of Israeli naval strategy. The resulting focus on fast, missile-armed boats and missile countermeasures would reap major benefits for the Israeli navy six years later at Latakia.

**SINKING OF THE EILAT**

<table>
<thead>
<tr>
<th>Date</th>
<th>October 21, 1967</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forces</strong></td>
<td>Israel: 1 destroyer; Egyptians: 2 missile boats</td>
</tr>
<tr>
<td><strong>Losses</strong></td>
<td>Israelis: 1 destroyer; Egyptians: none</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Off Egyptian coastline, near Port Said</td>
</tr>
</tbody>
</table>

Prior to her sale to Israel in 1955, the Eilat had seen service in World War II as the British Z-Class destroyer HMS Zealous. Renamed Eilat, she enjoyed a long operational record, including the sinking of two Egyptian vessels.

**MISSILE DUEL**

On October 6, Egyptian forces launched a surprise eastward thrust across the Suez Canal against Israeli forces in the Sinai. Syria made a simultaneous attack from the north across the Golan Heights. In an attempt to check the potential threat to Israeli shipping, they were armed with the same SS-N-2 Styx anti-ship missiles that had sunk the Israeli destroyer Eilat in 1967. The Israeli warships were also armed with anti-missile systems and electronic countermeasures (ECM). These consisted of two principal elements: chaff dispensers to fill the air with metallic strips, clouding the incoming missile’s target picture; and jamming systems designed to confuse the missile’s tracking system.

At Latakia both systems would be tested for the first time against real threats.

**THE BATTLE OF LATAKIA**

The battle of Latakia was a milestone in postwar naval engagements—never before had anti-ship missiles and missile-jamming technology been pitted against one another in open combat. The context of the battle was the opening actions of the 1973 Yom Kippur War.

**ARAB-ISRAELI WARS**

**THE BATTLE OF LATAKIA**

The battle of Latakia was a milestone in postwar naval engagements—never before had anti-ship missiles and missile-jamming technology been pitted against one another in open combat. The context of the battle was the opening actions of the 1973 Yom Kippur War.
Although anti-ship missiles were trialed to some degree during World War II, it was only during the late 1950s and 1960s that they began to challenge gunfire as the primary weapon of combat vessels. Pioneering missiles such as the SS-N-2 Styx proved their worth in action, most notably sinking the Israeli destroyer Eilat in 1967, and inspired the US Navy to develop its own Harpoon missile during the 1970s. By the 1980s all major world navies had equipped themselves with ship-launched missile systems plus, in many cases, electronic countermeasures (ECM) to combat enemy missile threats. Among the more effective anti-ship missiles developed in the 1980s, the Exocet gained particular notoriety in its air-launched form during the Falklands War. Most such missiles use active radar or infrared homing systems, and some of the longer-range examples can hit targets well over 62 miles (100 km) away. Even terrorist units have used missiles against ships—in 2006 a Hezbollah unit hit and damaged an Israeli corvette with a Chinese-made C-802 missile.

**Sea Sparrow**
Fitted on board many US and NATO warships, the RIM-7 Sea Sparrow is a lightweight, radar-guided missile system used to provide point defense against air attack, incoming missiles, or small surface craft.

---

**EXOCET MM38 SHIP-LAUNCHED MISSILE**
The French-built Exocet missile is designed to target large warships—the Type-42 destroyer HMS Sheffield was sunk by an Exocet during the Falklands War.

---

**The Sea Tigers**

The Sea Tigers are the naval element of the Liberation Tigers of Tamil Eelam, or Tamil Tigers, an insurgency force conducting a long-standing war aimed at creating a separatist Tamil state in northern Sri Lanka. The naval force was founded in the mid-1980s, and is likely to be a thorn in the side of the Sri Lankan navy for years to come.

---

**Sea Tiger suicide vessel**

Sea Tiger suicide soldiers—known as Black Tigers—ride a patrol boat through shallow waters near the rebel-controlled town of Mullaitivu in 2005.
CARRIERS, SUBMARINES, AND MISSILES

MIDDLE EAST AND TERRORISM

SINCE THE END of World War II the Middle East has been both a flashpoint for conventional conflicts and a breeding ground for terrorism. Much of the impulse for this has derived from the particular political and historical conditions in the region—questions of land, oil, nationhood, and religion. The other great catalyst for war has been the relations between Iraq and the wider world. The Iran–Iraq War led to around one million deaths in the 1980s, and generated many of the political conditions that led to the Gulf War of 1990–91. Following the terrorist attacks on New York in September 2001 and the subsequent US-led “War on Terror,” tensions in the Middle East remained high. The invasion of Taliban-controlled Afghanistan and the ongoing conflict in Iraq mean that foreign troops continue to be deployed throughout the region. In all these conflicts, the waters of the Gulf have been a critical battle zone, controlling the shipping lanes through this vital oil-producing region remains essential, hence the United States Navy still maintains a forceful presence in the region, guarding against terrorist and conventional foe alike.

OPERATION PRAYING MANTIS

PRAYING MANTIS

Date April 18, 1988
Forces Americans: 10 ships; Iranians: 13 ships
Losses Americans: 1 helicopter; Iranians: 3 speedboats, 1 frigate, 2 oil platforms damaged

Location Persian Gulf

On April 14, 1988, the US Perry class frigate Samuel B. Roberts was patrolling the Gulf waters off Qatar when it spotted three naval mines in the water. In its attempt to evade the devices the ship hit a fourth mine that detonated, injuring 10 and blowing open the side of the hull. The mines were identified from their serial numbers as Iranian. With the United States committed to keeping the Gulf navigable for Kuwaiti oil tankers, a strong US reaction was inevitable.

US RETALIATION

The American response was codenamed Operation Praying Mantis. Commanded by Rear-Admiral Anthony A. Less, Praying Mantis had as its main objective the destruction of Iranian oil platforms in the Gulf by amphibiously deployed US Marine and SEAL units. As a by-product, it was hoped that this would draw Iranian warships into the Gulf waters, where they could be destroyed by the US surface vessels plus carrier aircraft flying from the Enterprise.

The attack was launched on April 18 when two units of destroyers, frigates, and amphibious ships assaulted the Sassan oil platforms. Resistance was first crushed by naval gunfire, then Marines were dropped by helicopter onto the platforms, where they placed demolition charges and left.

The Iranian navy responded in force. It sent out a group of armed Boghammar speedboats, though three of these were quickly sunk by bombing runs from US A-6E Intruder aircraft. A Kaman-class fast attack craft was similarly despatched by Harpoon missiles and naval gunfire. Two Iranian F-4 fighters made a run at the guided-missile cruiser Wainwright, but were scared off when Wainwright replied with Standard surface-to-air missiles. The Iranians now committed their most significant naval vessels—the frigates Sahand and Sabalan, Sahand went first, but was intercepted by aircraft and destroyed by three Harpoon missiles and four laser-guided bombs. The Sabalan was crippled by a single bomb dropped down its funnel; the US aircraft and ships then left it dead in the water.

Operation Praying Mantis, the largest US military engagement since the end of World War II, dealt a major blow to the Iranian navy and to Iranian pride. US losses amounted to two men killed in a helicopter crash, an unusually light toll for such a high-risk mission.

WITNESS TO WAR

COMMANDER BUD LANGSTON

A-6 INTRUDER PILOT DURING THE ATTACK ON IRANIAN FRIGATE SABALAN

“My bombardier-navigator was looking at this (Iranian ship) on our forward looking infrared and it certainly matched the silhouette that we’re looking for. So we made a high speed dive right down to the bottom, and rounded the ship opened fire on us and that gave a pretty good idea it wasn’t a friendly... she clearly had the number of the Sabalan and traces were going over the canopy from its anti-aircraft guns and shoulder fired weapons and rounds were going off all around the canopy.”

WEAPONS AND TECHNOLOGY

MARK 45 GUN

Although naval cannon have been largely superceded by guided missiles as the primary anti-ship and anti-aircraft defense on modern warships, the fully-automated Mark 45 proves that there is still a role for a fast and accurate lightweight naval gun. First developed in the 1960s by BAE Systems, the 5-in Mark 45 has gone on to become the principal lightweight naval gun of the US Navy and several other navies worldwide. Aboard US ships the Mark 45 is controlled by the Mark 86 Gun Fire Control System or the Mark 160 Gun Computing System, both of which give rapid automated target acquisition and fire control. The gun is fed by an automatic loading system that can fuel automatic rates of fire of up to 20 rounds per minute, and the gun can engage naval, land, or even (with air burst shells) aerial targets.

Although most Mark 45s have a range of about 15 miles (24 km), the latest Mod 4 version has a greater velocity and, with advanced rocket-assisted, satellite-guided ammunition, a range of up to 71 miles (115 km). The qualities of the Mark 45 will doubtless keep it in service for many more years to come.
**THE FIRST GULF WAR**

The Gulf War of 1990–91 was a massive naval operation as well as a major air and land campaign. At the time of Saddam Hussein’s invasion of Kuwait on August 2, 1990, the US Navy, Royal Navy, Saudi Arabia, and others already had significant naval assets on station. Once Operation Desert Shield—the Coalition operation for the protection of Saudi Arabia—was implemented, the naval presence expanded enormously.

The US had to provide naval logistics for a swelling land army—during the first six months of Desert Shield sealift accounted for over 2 million tons of supplies shipped ashore. Two carrier battlegroups (centered on Eisenhower and Independence) were on station by August 8, providing huge offshore air capability. Four more carrier battlegroups and several surface warfare battlegroups would soon join them, including two battleships (Wisconsin and Missouri). The Coalition also enforced a naval embargo, resulting in hundreds of stop-and-search operations in Gulf waters: by January 1991 the US Navy had conducted 6,221 challenges and 749 boardings.

On January 17, 1991, Desert Shield turned into Operation Desert Storm, and the shooting war began with a heavy, prolonged air attack on Iraq’s forces and infrastructure. Desert Storm opened with naval vessels launching Tomahawk cruise missiles at key targets throughout Iraq, destroying much of Saddam’s command-and-control structure. The carrier groups in the Gulf and Red Sea then contributed naval and Marine air assets to the Coalition air campaign, destroying vast amounts of Iraqi military material and killing many thousands of Iraqi troops. Navy E6-AB Prowler ECM aircraft also played a critical role in jamming Iraqi air defenses to open a door for strike aircraft attacks. In total, US Navy and Marine Corps pilots flew some 30,000 sorties from the US carriers during the war.

**DENOUEMENT**

Out at sea there were skirmishes with Iraqi craft. Lynx helicopters from Royal Navy vessels destroyed 15 Iraqi vessels, including minesweepers and patrol boats, using anti-ship missiles. US vessels wrecked Iraqi positions atop several oil platforms, while naval aircraft took out Iraqi minelayers. When the land offensive opened, not only did Coalition marine forces take leading roles, but US naval units conducted simulated amphibious landings off the Kuwaiti coast to hold the attention of Iraqi coastal troops, who were actually being outflanked from behind. The US battleships delivered huge offshore bombardments. By February 27, offensive operations had effectively ceased and Kuwait was back in Kuwaiti hands.

---

**Shore bombardment**

The USS Wisconsin fires one of her nine 16-in guns at an Iraqi shore target during Operation Desert Storm.

**Sea Skua anti-ship missile**

The British Sea Skua radar-guided anti-ship missile was first used in the Falklands War. A total of 26 missiles were fired during the First Gulf War, sinking 11 Iraqi vessels.

---

**THE FIRST GULF WAR**

**COMBATANTS**

**US-LED COALITION**

Stanley R. Arthur

Norman Schwarzkopf

**IRAQ**

Saddam Hussein

**FORCES**

Ships: ≤150 combat and logistical ships, including 6 US carrier battlegroups

Ships: ≤80 military vessels, mostly gunboats and missile boats

**LOSSES**

Men: 64 US Marines and US Navy personnel

Men: unknown

**DATE**

August 2, 1990–April 11, 1991

**LOCATION**

The Gulf, Red Sea, Kuwait, and Iraq

**RESULT**

Coalition victory
CARRIERS, SUBMARINES, AND MISSILES

POSTWAR CONFLICTS

ATTACK ON THE USS COLE

Date: October 12, 2000
Forces:
- Americans: 1 destroyer
- Terrorists: 1 suicide boat
Losses:
- Americans: 1 destroyer damaged
- Terrorists: 1 suicide boat sunk

Location: Port of Aden, Yemen

On October 12, 2000, the Arleigh Burke-class guided-missile destroyer USS Cole made a routine refueling stop in Aden Harbor, Yemen. The Cole was a very new addition to the US Navy arsenal. She had been launched in 1996 and was equipped with the latest Aegis integrated guided weapon system. The Middle East was a potentially dangerous part of the world for the ship and its crew, but Aden was classed as a relatively safe harbor. The ship had been refueling for some 50 minutes when, at 11:18 a.m., a speedboat made an approach to the port side of the destroyer, piloted by two men. The vessel seemed to present no threat; indeed, many of the US sailors thought that it was the local garbage collection boat. Yet on board the speedboat was a large quantity of explosives, which the suicide bombers then detonated against the side of the ship.

**USS Cole limps home**

The damaged destroyer is towed out of Aden by a Military Sealift Command tug before returning to the United States for repairs lasting 14 months.

Waterline blast

A gaping 35 ft (10.6 m) hole mars the side of USS Cole. The ship was carried back to the US for repairs aboard a heavy transport ship. The explosion ripped open the port side of the Cole; its force was directed into the galley area, where many men were lining up to eat, killing 17 and injuring another 39.

**AFTERMATH**

Although the keel of the vessel was not significantly damaged, water poured into the ship through the open hull, and it took the whole day to bring the flooding under control. The first naval assistance to the Cole came from the Royal Navy Type-23 frigate HMS Marlborough, which was sailing through the Gulf and diverted to provide medical and engineering aid.

The bombing was planned by the Al-Qaeda terrorist group and carried out by operatives most likely acting with the support of Sudanese officials. The US Navy subsequently changed its rules of engagement—which had prevented the ship’s guards firing on the approaching boat—to protect US vessels from similar attacks. Nonetheless, the bombing was a grim reminder of the vulnerability of modern warships, however well defended against conventional attack, to small vessels posing as non-combatants.

The invasion of Afghanistan by US, UK, and Coalition forces in 2001—named Operation Enduring Freedom—presented significant problems in terms of air support. Afghanistan is a landlocked country with no substantial infrastructure, hence there was little in the way of Forward Operating Bases (FOBs) for Allied aircraft. For much of the early part of the campaign, therefore, air support was almost exclusively provided by US Navy and Marine Corps aviation operating from carrier battle groups in the Gulf. The attack sorties ran in over Pakistan (Iran was, and remains, prohibited airspace) to bomb enemy bunkers and positions, the great distance to the inland target leaving scant time for loitering over the target. Only once the US Air Force began deploying heavy bombers to Diego Garcia, a British overseas territory in the Indian Ocean, did responsibility for the attacks become shared. Today the US Marine Corps (USMC) deploys aviation combat elements to support its ground forces on operations, deploying from FOBs established since the invasion.

US Marine and Navy aircraft were also integral to the invasion itself. The Marine Corps force that established the first strategic base in Afghanistan, for example, deployed Marine helicopters from the amphibious assault ships Peleliu and Boxer. The US Navy and USMC continue to provide support operations to ground troops, particularly as the US Marine Corps has been so heavily in demand for the ground fighting.

**9-11 Let’s Roll**

Crew members assemble on the deck of amphibious assault ship USS Belleau Wood to remember the September 2001 terrorist attacks on New York, the catalyst for the invasion of Afghanistan.
In many ways the invasion of Iraq in 2003 was very different than the war conducted against Saddam Hussein’s forces in 1991. Instead of repeating the first Gulf War’s prolonged air campaign as preparation for the ground assault, the second war against Iraq saw a near simultaneous launch of air and ground assets, with land forces making a direct, fast strike toward the Iraqi capital Baghdad. Nonetheless, as with the 1991 conflict, it was the US Navy that fired the opening shots.

At 5:15 a.m. on March 20, 2003, the Ticonderoga-class destroyer USS Bunker Hill fired the first of many US Navy Tomahawk missiles targeted at command-and-control centers and political targets deep in Iraq. Shortly afterward, US and UK ground forces attacked Iraq from across the Kuwaiti border. The US forces, with a large Marine Corps spearhead, would strike up to Baghdad, while British troops took responsibility for securing Basra, Iraq’s second city.

SHOCK AND AWE
The order of battle of the coalition’s naval contingent was formidable. The US Navy element alone (by far the biggest portion) ran to 115 ships, including five carrier battle groups centered around the carriers Kitty Hawk, Constellation, Theodore Roosevelt, Abraham Lincoln, and Harry S. Truman. The aviation striking power of these carrier groups was truly enormous, and F-18 Hornets, F-14 Tomcats, and US Marine Corps AV-8B Harriers provided close-air support for the advancing troops. The Constellation carrier group alone flew more than 1,500 sorties during Operation Iraqi Freedom – as the US operations were codenamed – during which it dropped more than 1 million lb (450,000 kg) of ordnance.

SUPPORT MISSIONS
Allied warships also provided offshore gunnery platforms for missions on land. For example, the Royal Navy warships HMS Richmond, Marlborough, and Chatham, and HMAS Anzac delivered bombardments in support of British Royal Marine and USMC assaults on the Al-Faw peninsula, a critical southern action that included the capture of Umm Qasr, the only deep-water port in Iraq. Baghdad was finally secured in the first week of April 2003, after what appeared to be a vigorously successful operation. The post-invasion conflict, however, far exceeded the worst expectations in terms of fighting, and US Marine and Navy air assets remain on call to deliver strikes in support of counter-insurgency operations.

WEAPONS AND TECHNOLOGY

SHIP-LAUNCHED CRUISE MISSILES
The development of cruise missiles that track to a target in a sustained, guided flight pattern began during World War II on both sides of the Allied-Axis divide, but was refined to operational level during the postwar period. The Regulus was the first US ship-launched version. It had a range of 575 miles (926 km) and could be launched from both submarines and surface vessels. Regulus was deployed between 1955 and 1964. In the 1970s and 80s the world caught up with US advances and a wide range of ship-launched cruise missiles emerged in other world navies, such as the SS-N-12 (USSR) and the HY-2 Haiyang (China). The most famous of all the cruise missiles, however, remains the Tomahawk, used to powerful effect during both the 1991 and 2003 Persian Gulf Wars. Based on this success, new generations of long-range cruise missiles have recently entered service with many navies, including Pakistan, India, France, and Russia.
THE ARLEIGH BURKE-CLASS destroyer was commissioned in 1991. Donald Cook belongs to Flight II, incorporating significant advances in armament and electronics. The ship is packed with diverse weaponry, giving her what the US Navy calls “multi-mission offensive and defensive capabilities.” The Mk41 vertical launch system fires anti-aircraft missiles, anti-submarine missiles, missiles for destroying other surface ships, and cruise missiles for strike operations against land targets. The destroyer does not have the covered helicopter hangar fitted to later ships in the class, but a launch-pad allows an attack helicopter to be embarked. Survivability is a key concept in the destroyer’s design and equipment. The Arleigh Burke-class were among the first ships to incorporate elements of “stealth” technology, with buried funnels and rounded shapes to reduce the ship’s radar profile, as well as features to suppress infrared emissions. They were also the first American all-steel warships. Replacing the aluminum superstructure with steel was meant to reduce damage in case of a missile hit. The destroyer has a crew of 30 officers and more than 300 enlisted personnel.

These destroyers ... are a special class of ships, the class of Arleigh Burke. Admiral Burke was the inspiration for these ships. They were meant to be feared and fast, the very attributes that earned their namesake the nickname “31-Knot Burke.”

**President Bill Clinton**, Speech at the Funeral Service of Admiral Arleigh Burke, 1996
Two Mk38 chain guns provide close-range defense against small surface threats such as hostile patrol boats or floating mines. The guns are manually aimed and operated and can fire up to 200 rounds per minute.

The ship’s two Vertical Launch Systems (VLS) can store and fire up to 90 Standard medium-range surface-to-air missiles, Tomahawk long-range cruise missiles, or ASROC anti-submarine missiles. In 2003 these launchers fired some of the first Tomahawk strikes of Operation Iraqi Freedom.

The Mk36 Super Rapid Bloom Offboard Chaff (SRBOC) system can fire a range of chaff and infrared decoys to confuse hostile missiles and fire-control systems.

USS Donald Cook is fitted with two Phalanx Close-In Weapon Systems (CIWS) using automated radar-controlled 20-mm rotary cannon that can identify, track, and destroy incoming threats such as missiles.

The ship also has an automated digital steering system, allowing a course to be entered and automatically maintained.

This lightweight 4,000 lb (1,800 kg) anchor and the heavier 9,000 lb (4,000 kg) main anchor are both carefully positioned to stop them striking the large sonar dome on the hull as they are lowered.

The 5-in-gun on Donald Cook’s forward deck is the guided-missile destroyer’s only large artillery weapon, designed for use against surface warships or aircraft, or for shore bombardment. The mast and deckhouse behind the gun bristle with radomes, antennas, jamming devices, and other types of navigational and electronic warfare equipment.

The helmsman steers the ship from the helm station in the center of the bridge. The ship also has an automated digital steering system, allowing a course to be entered and automatically maintained.
THE AEGIS COMBAT SYSTEM at the heart of the ship's operations detects incoming missile and aircraft threats and deploys countermeasures, missiles, and gunfire. The ship's AN/SPY 1-D phased array radar can track hundreds of targets simultaneously. There are steel bulkheads throughout the ship in case a hit is suffered, and especially vital equipment is given extra armor by Kevlar shields. An air filtration system forms part of the comprehensive protection against nuclear, biological, and chemical attack. The gas turbine engines are derived from the engines used on jet airliners such as the Boeing 747.

BELOW DECKS

The AEGIS Combat System at the heart of the ship's operations detects incoming missile and aircraft threats and deploys countermeasures, missiles, and gunfire. The ship's AN/SPY 1-D phased array radar can track hundreds of targets simultaneously. There are steel bulkheads throughout the ship in case a hit is suffered, and especially vital equipment is given extra armor by Kevlar shields. An air filtration system forms part of the comprehensive protection against nuclear, biological, and chemical attack. The gas turbine engines are derived from the engines used on jet airliners such as the Boeing 747.

Main passageway
Double-plated bulkheads and interior air-lock doors provide protection and allow vital areas—such as the Central Control Station at the end of this corridor—to be isolated.

Tactical Coordinator
The CIC is manned by a team of highly trained specialists, each with a specific role to play. The Tactical Information Coordinator, for example, handles tactical data coming in from allied ships.

Airtight hatch
To protect the ship and crew against contamination from chemical or biological agents, the Collective Protection System (CPS) divides the ship into zones, separated by airtight hatches, enabling the crew to maintain a pressurized, filtered environment.

Ship's galley
The spacious and well-equipped kitchens on board Donald Cook allow the galley staff to prepare three hot meals a day, with a choice of dishes, for a crew of over 300 officers and enlisted men.

Enlisted mess
Enlisted men on Donald Cook eat most of their meals in an informal self-service cafeteria next to the ship's galley. Officers have a separate mess.

Combination Information Center
The Combat Information Center (CIC), the tactical heart of the ship, is dominated by the AEGIS combat system, an advanced computer-based control and information system that integrates the data coming in from the radar and satellite systems and controls the ship's weapons and electronic countermeasures.

Double-plate bulkheads and interior air-lock doors protect on vital areas—such as the Central Control Station at the end of this corridor—to be isolated.
Located underneath the Mk45 gun mounting, the 5-in shell magazine on Donald Cook stores 680 rounds of ammunition. The yellow markings on the shells indicate high explosive. Propellant powder is stored nearby.

A small team inside the magazine operates a computerized loading system that ensures an uninterrupted supply of ammunition to the Mk45 gun on the deck above. It can select and load different types of ammunition, from high-explosive to illumination, at the touch of a button.

The four LM2500 gas turbine engines are key to Donald Cook’s speed and maneuverability, powering her to over 30 knots (56 kph).

The ship’s two fuel oil transfer and purification systems, one in each of the two main engine rooms, remove water and solid contaminants from the engine fuel supply.

The halon system forms a key part of the Donald Cook’s damage control systems. Fire-suppressant halon gas can be directed from canisters in the halon room throughout the ship to fight internal fires.

As part of the ship’s extensive fire-control systems, several fire stations containing protective overalls, fire hoses, and closed breathing apparatus are located around the decks.
CARRIER STRIKE FIGHTER JET

Deck crew direct an F/A-18 Hornet strike fighter and ground attack aircraft as it prepares to launch from the US supercarrier Kitty Hawk during its operations in the Persian Gulf. Around 85 aircraft are deployed on the carrier, which ranks among the largest warships ever built, with a crew of over 5,000 men. The F/A-18 has been the mainstay of American naval aviation since the 1980s.
INDEX