The period of the Crusades was one of great activity in ship- building, in which the Venetians and the Genoese were the leaders in the Mediterranean, but the enterprise of England under Richard Cœur de Lion (1189-1199) shows that in the northern seas great efforts were being made in the same direction, with the undoubted result that the English nation became more familiarized with the sea, and more eager for maritime adventure. Richard’s fleet which sailed from Dartmouth consisted of 110 vessels, and its total in the Mediterranean after reinforcement amounted to 230 vessels. Among these were Busses, or Dromons of large size, with masts and sails, ships of burden and triremes. Nor were the Saracens without great vessels, if the story of Richard’s destruction of a three-masted vessel, carrying rein­forcements to Acre, on board of which there were no less than 1500 men, be true. The attack of a swarm of galleys upon the great ship as she lay becalmed reads almost like the attack of a swarm of torpedo boats upon a disabled battleship to-day.

The whole period of the Crusades was, as regards naval matters, one of mixed fleets, in which the sailing vessels were mostly merchant vessels armed for fighting purposes. The effect of the Crusades upon the seafaring races of northern Europe was that the revelation of the East and its traffic quickened their desire for adventure in that and other directions. Hence rivalries between them and the Mediterranean sea powers, and consequent improvement in sea-going vessels and in seaman­ship. The steering side-paddle gradually disappears, and the rudder slung at the stern becomes the usual means of directing the vessel’s course. The merchant vessels when prepared for war have fore-castles and stern-castles (compare the Roman *turres)* erected on them, of which the one survives in name, and the other in the quarter-deck of modern times. But a change was at hand which was destined to affect all classes, from the galley with its low freeboard to the *alta propugnacula* of the great sailing vessels.

The invention of gunpowder, and the consequent use of cannon on board ship, was the cause of many new departures in building and armaments. In the galleys we find guns mounted in the bows, and broadside on the upper deck, *en barbette,* firing over the bulwarks. Soon, however, the need of cover suggested portholes cut for the guns, just as in the ancient galleys they had been cut for the oars. The desire to carry many guns led to many alterations in build, such as the tumble-home of the sides, and the desire for speed to many improvements in rig, as well as to an increase in the number of masts and consequently larger spread of sail. About 1370-1380 French, Venetians and Spaniards are using the new artillery in action, and the policy of maintaining a navy composed of sailing vessels built for the purposes of war, and not merely of armed merchant ships impressed for the emergency, soon began to take effect.

In England Henry V. (1413) built large vessels for his fleet, “ great ships, cogs, carracks, ships, barges and ballingers,” some of which were of nearly 1000 tons, but the generality from 420 to 520 tons. In the list of his fleet no galleys seem to be included. Meanwhile in the south the type of vessel called “ caravel ’’ was being developed, in which Portuguese and Spaniards dared the Atlantic and made their great discoveries. It was in a vessel of this kind that Columbus (1492) sought to reach the Indies by a western route.@@1 She was but little over 230 tons when fully laden. Her forecastle overhung the stem by nearly 12 ft. Aft she had a half deck and a quarter deck. Her total length was 128 ft., her beam nearly 26 ft. She had three masts and a bowsprit. Her fore and main masts were square-rigged, but the mizzen had a lateen sail. The vessels in which Vasco da Gama first doubled the Cape of Good Hope (1497) were of the same type but larger. The ship of John Cabot (1497) in which he discovered Newfoundland must have been much smaller, as he had a crew of only eighteen men.

Among the results of these world-famous voyages and dis- coveries was naturally a great increase in maritime adventure.

In England during the Tudor times a great advance in ship- building is observable. Henry VII. with his new ships, the “ Regent ” and the “ Sovereign,” and Henry VIII. with his “ Henry Grace à Dieu,” or “ Great Harry,” both came abreast of their times, but it is worthy of notice that the French then, as well as at a later period, were providing the best models for naval architecture. These big ships were armed at first with “ serpentines,” and later with cannon and culverins. The representations of them show several tiers of guns, four or even five masts, and enormous structures by way of forecastles and deck-houses aft. As regards merchant vessels, the Genoese and the Venetians during the 15th and 16th centuries carried out great improvements. The “ carracks ” of the 16th century often reached as much as 1600 tons burden. There is a record of a Portuguese carrack captured by the English, of which the dimensions reached 165 ft. in length and 47 ft. in beam. She carried 32 pieces of brass ordnance and between 600 and 700 passengers. The Spanish Armada (1588) was composed of 132 vessels, of which the largest was about 1300 tons and 30 under 100 tons. Four galleys and four galleasses accompanied the fleet. The opposing fleet consisted of 197 vessels of which only 34 belonged to the royal navy. Of these the largest was the “ Triumph ” of about 1000 tons. The “ Ark,” the flagship of the English admiral, was of 800 tons, carrying 55 guns. Among the armed merchant vessels employed with the fleet was the “ Buonaventure,” the first English vessel that made a successful voyage to the Cape and India. The result to England of the defeat of the Spaniards was a great increase of mercantile activity. Merchants, instead of hiring Genoese or Venetian carracks, began to prefer building and owning home-built ships, and though the foreign merchant vessels appear to have been on a larger scale, yet, as sea-going craft, the English-built ships certainly held their own. We hear also during this period of many improvements in details, such as striking topmasts, the use of chain pumps, the introduction of studding, topgallant, sprit and top sails, also of the weighing of anchors by means of the capstan, and the use of long cables. In the men-of-war the lower tier of guns, which, as in the galleys, had been carried dangerously near the water-line, began to be raised. This im- provement, however, does not seem to have been adopted in the English ships till after the Restoration. Meanwhile, in the Mediterranean the galley was still in vogue, being only partially superseded by the great galleasses, six of which are recorded to have taken part in the battle of Lepanto (1571), in which the Venetians and their allies employed no less than 208 galleys with single banks and long sweeping oars. The contrast between the conditions and the character of the vessels used in this battle and those engaged in the case of the Spanish Armada is interesting and instructive as typical of the different development of naval power in the inland and the open seas.

During the 17th century the expansion of trade and the increase of mercantile enterprise were incessant. The East India Company organized its fleet of armed vessels of about 600 tons, and fought its way through Portuguese obstruction to the Indian coast. The Dutch were also competing for the trade of the East and the West, and formed similar companies with this object in view. Conflicts owing to commercial rivalry and international jealousies were inevitable. Hence in the British navy the construction of large vessels such as the “ Prince Royal ” and the “ Sovereign of the Seas ” (see Rigging), which may be con- sidered as among the earliest types of the modern wooden man- of-war. English oak afforded the best timber for shipbuilding, and skilful naval architects, such as Phineas Pett, succeeded in constructing the kind of sea-going war vessel which eventually gave England the superiority in its struggle with other naval powers in this and the following century. This, however, was by no means easily gained. The Dutch and the French were not slack in the building of merchant vessels and men-of-war. The capture of vessels from time to time on either side served to enlarge the area of improvement and to assist in the progress of the art of construction. The French navy especially, under the fostering care of Colbert, was greatly strengthened. During

@@@1 See Sir G. V Holmes, *Ancient and Modern Ships,* i. 87, to which the writer is indebted for many of the details concerning modern vessels.