

ram were the chief tactical features, fewer marines were employed. Xerxes' great fleet carried 30 men to each trireme. We hear of 40 picked men on board each Chian vessel at Lado. The Corinthians and Coreyrens had their decks crowded at the battle of Sybota; and the unfortunate Athenians in the great harbour of Syracuse, where there was no space for their usual methods of manoeuvring, found themselves obliged to imitate their enemy's tactics in this respect, with disastrous results. Of the officers the chief was the Triaroh or captain, and next to him the kubernetes or master, who was responsible for the steering and sailing of the vessel. Each tier of rowers on either side had its captain (stoicnarchos). There was also the proreus, or boatswain, the keleustes, who gave the time to the rowers, a steward, a purser, and their subordinates, and last, not least, the ship's piper (trieraulos), who might not be omitted. We have thus completed our sketch of the trireme, as from it we may also form, without any difficulty, an idea of the larger vessels, quadriremes, quinqueremes, &c. The principles of construction in these were exactly the same, the additional tiers of rowers being added by carrying on the diaphragmata upwards, and at the same regular intervals inserting the thwarts on which the rowers' seats rested. The increase in the size of the whole vessel was not as large as one might at first expect. The increase in the size of Greek vessels began after the Peloponnesian war, and seems to have culminated in the time of Demetrius Poliorketes, who manœuvred with vessels of sixteen banks of oars, and we hear of nearly every number of banks of oars up to that figure. The Romans, who copied a quinquereme which fell into their hands in the first Punic war, appears to have used vessels chiefly of that description. They did, however, build much larger vessels up to time of Actium, when the defeat of Antony and Cleopatra's great ships by the light Liburnians, altered the whole fashion and prepared the way for the disappearance of the great banked galleys, and the almost complete loss of the knowledge of the principle on which they were constructed. An interesting question arises at this point, and one not easily solved, as to the pace at which these galleys could be moved. Taking, however, one horse power to be equivalent to between 7 and 8 man power, we may say that the trireme was propelled by a force equal in amount to about 24 horse power, the quadrireme by about 32 horse power, the quinquereme about 42, and so on, increasing a little more than 10 horse power for each tier of oars added. There is a passage in Xenophon (Ælab. vi. 42,) in which it is stated that from Byzantium to Heraclea, in Bithynia, a distance of about 150 nautical miles, could be rowed in a day by a trireme, and was a very long day's work. Now, allowing sixteen hours' daylight for the work, which is probably above the mark, a speed would have to be maintained of over nine knots. This, considering the shape of the vessel and the man power employed, does not seem excessive, and if such a speed could be maintained on an average for a whole day's voyage, it is obvious that in action or when any special effort was required, a much greater pace, probably equal to 13 or 14 knots, could be attained. Such speed we may believe was attained, if at any time in those famous encounters, in which the vessel itself was the missile hurled at the enemy, when, as in the prime of her Thalassocracy, the rapidity and agility of the trireme of Athens was the terror alike of her Greek and her Phœnician foes. Long and careful training had perfected the system of rowing and

steering. The vessel itself was shaped for speed by the cunning master builders of a people whose eye for form has never been surpassed. To the attainment of the highest possible speed everything was sacrificed, till at last the thin sharp bows were incapable of standing a concussion with the heavy mass presented to them by Corinthian and Syracusan constructors, and suffered themselves the damage they were intended to inflict upon others. Time will not allow me here to follow out in detail the second part of my subject, the development of the ram in its successive types, from the sharp Assyrian spur, the old Phœnician fish like snout, the early Greek boat's head, which we can trace down to the third century on coins, to the three toothed rostrum of the early Macedonian and later Roman epoch. I should have liked to have touched upon some of the instances of single encounters, such as those at Salamis, of Artemisia, and of the Samothracian vessel, and of Phormion's Captain off Naupaktus, and further, to have pointed out the causes why the (probole) direct attack stem on, that which in the eyes of the Athenian was the unskillful and unseamanlike manœuvre, prevailed over the skilful attack on the enemy's quarter or side (eubole), success in which was the glory of the Attic sailor; to have shown how, as Thucydides aptly calls it, 'land fighting at sea,' became the rule, how grappling irons and boarding bridges and ponderous missiles ultimately superseded ramming tactics to such an extent that Brutus, off Marseilles, exposed the sides of his great vessel on purpose to the enemy, trusting to the thickness of his timbers, and making sure of destroying his smaller antagonists with the ponderous weight swinging from his yardarm."

The lecturer concluded with an eloquent spirited description of the sight presented in the Piræus when the Athenians were preparing for their fatal expedition to Sicily, B.C. 415. A vote of thanks concluded the proceedings.

The Inflexible.

That the launch of such a skilfully designed and powerful ship as the *Inflexible* is looked upon as an event of the highest importance to the Royal Navy by the authorities at the Admiralty, is shown by the extensive preparations which are being made in order that the ceremony shall be performed with the desirable éclat. Her Royal Highness the Princess Louise of Lorne has consented to name the vessel, and every effort is put forth at Portsmouth Dockyard to provide the requisite accommodation for the members of both Houses of the Legislature and the other distinguished visitors who have been invited to witness the ceremony.

A description of this remarkable vessel will doubtless prove of interest to our readers. The *Inflexible* was laid down late in the year 1873, so that up to the present time she has been rather more than two years in building. She is a development of the idea first put into shape in the case of the *Devastation*, and since improved upon to a slight extent in the *Thunderer*, and to a greater extent in the *Dreadnought*. In designing the *Inflexible*, the Construction Department departed from the "all round belt" system and resorted to the "central citadel with unprotected ends," mode of construction. In so far as they did that, they returned to original idea of armour protection, as exemplified in the case of the *Warrior*. But instead of sacrificing the buoyancy of the extremities, should they be damaged, as in the *Warrior* design, a deck formed of 3 in. iron plating is laid at a depth of 6 ft. below

the water line, extending from the ends of the citadel to right forward and aft. This iron deck is at the level of the under side of the armour plated sides and ends of the citadel; thus prolonging, by means of horizontal armour, the protection which in the citadel is afforded by vertical armour plating. In addition to this, the whole of the citadel is protected by iron deck plating 3 in. thick, so that it will be seen that a shot or shell cannot enter any part of the ship without penetrating vertical or horizontal armour; it being manifestly impossible for a projectile to pass through the six feet of water above the armoured decks and pierce the thin bottom plating beneath it. It is, perhaps, unnecessary to say that the *Warrior* is not provided with these armoured decks, and is therefore entirely dependent upon the transverse watertight bulkheads for whatever buoyancy she may possess after her ends are riddled with shot.

This system of horizontal armour protection has been rapidly getting into favour during late years, as will be seen by the following tabular statement:—

Ships.	Displacement.	Weight of Vertical Armour and Backing.	Weight of Horizontal Armour.	Total Weight of Armour.
	Tons.	Tons.	Tons.	Tons.
<i>Minotaur</i>	10,627	2100	Nil.	2100
<i>Hercules</i>	8,677	1819	100	1919
<i>Ajax</i>	8,493	2000	720	2720
<i>Inflexible</i>	11,105	2555	967	3522

A scientific contemporary recently stated that horizontal armour is a compromise between vertical and inclined armour; but seeing that inclined armour has not yet been fitted in Her Majesty's ships, and that an inclined plane is one between the vertical and the horizontal, it seems to us that the compromise would be found in the inclined mode of protection. At all events, the highest naval authorities have given in their adherence to the horizontal system, and, in our opinion, the war ship of the future will be one in which that system and cellular sub division are consistently and intelligently applied.

But to return to the *Inflexible*. The principal dimensions of the ship are 320 feet long by 75 feet wide; and she will have a draught of water of 23½ feet forward and 24½ feet aft; thus giving a mean draught of 24 feet. She will then displace about 11,200 tons. Engines of 8000 indicated horse power are being manufactured for the ship by Messrs. John Elder and Company, of Glasgow; and if this power is developed on the trial trip, a speed of 14 knots is expected to be attained. The complement of coal is 1200 tons, which will allow of a continuous steaming at full speed for six days; but stowage space is provided for 2000 tons of coal, which may be carried at an increased draught of rather more than 18 inches. This coal stowage is probably sufficient to allow the vessel to steam across the Atlantic.

The armour protection of the *Inflexible* is the most invulnerable that has yet been attained in a ship of war. At the water line the armour plating is 2 feet thick, in 2 plates, each a foot thick; but above the water line belt the