

THE NAVAL BATTLE OF THE FUTURE.

IN former times, the armed galleys of the Mediterranean, rowed by slaves chained to their seats, were manned by soldiers as a fighting force. Sir Francis Drake was both an admiral and a general. As the seaman's art developed—as ships became heavier, and masts loftier, and sails larger, and rigging more complex—the sailor, as a man apart, came into being. The war ship was a ship like other ships, with the addition of guns, nothing more; and the man-of-war's man was a sailor like other sailors, save that he was taught to wield the broadsword and serve the guns.

The genius of Nelson brought the sailing ship-of-war to its perfection; and his stately squadrons, covered with thousands of yards of canvas, filled with tier on tier of guns, high of mast and strong of timber, some ships holding a thousand men, carried England's victorious standard in many a hotly-contested fight. A battle was preceded by more or less of preliminary maneuvering, to get the weather gage, or to secure some other advantage depending on the direction of the wind. When once the battle had begun, ships got close alongside of each other, and a *mêlée* ensued. The yard arms became locked, guns frequently protruded into the adversary's ports, men went aloft and dropped bombs and grenades on the enemy's deck or down his hatches, and hand-to-hand duels went on in the rigging. The crew of one ship boarded their antagonist, and drove the other crew below hatches, or were themselves driven back to their own vessel. The ships were usually not injured very much, and were frequently towed or sailed into port as prizes by the victorious contestant; but the slaughter on board was dreadful. A sea fight was a wholesale killing; the endeavor was, not to destroy war material, but to destroy men.

In the war of 1812 we see a new element coming into prominence, that of accurate gunnery; and shortly after followed the

first suggestion of modern naval warfare, in the launching at New York, in 1815, of the "Fulton the First," the most complete and most powerful engine of war that had, up to that time, ever been conceived. Propelled by steam, protected on her upper deck with oak redoubts four feet thick, provided with apparatus for deluging a boarding party with prodigious quantities of scalding water, armed with the largest guns yet constructed, equipped with contrivances for firing red-hot shot, carrying submarine guns for attacking the enemy below the water line, and formed of twin hulls with the propeller between, she was beyond comparison the most wonderful craft that had ever been constructed. She made a number of successful trial trips, but the war ended just before she was completed; Fulton died, and men were unable to follow the path he had so plainly pointed out. So the navies of the world went along as before; and though Samuel Colt invented and perfected the torpedo in 1841, his invention was promptly frowned out of existence by the authorities. From Fulton's time till our war of the rebellion, little change took place in naval warfare or in war ships. Ships were made larger, as a rule, and some ships had steam; but there was no endeavor on the part of the powers that were to take Fulton's hint and make the war ship a special contrivance, though Ericsson and Stevens labored through many years to induce them so to do. At last the war broke out; Ericsson seized the long-awaited opportunity, and the "Monitor" met the "Merrimac" at Hampton Roads.

The "Merrimac" had been one of the finest frigates in the world. She was 300 feet long, and was specially strengthened for fighting by an armor of railroad iron. The "Monitor" was a half-worked-out theory. She was about 120 feet long, and was designed, put together, and sent to sea with incredible haste. She was faulty in a thousand ways, as are all first attempts in new inventions. But she drove the "Merrimac," disabled and bewildered, back to Norfolk, and became at once the type of the battle ship of the future. Never in history had there been so sudden, so complete, and so dramatic a victory of science over mere strength. Worden and Greene were men of the highest order of courage; but the whole reason why the "Monitor"

worsted the "Merrimac," was simply that she was a better fighting machine. This plain fact was recognized at once here and the world over, and Ericsson became one of the men of history.

Following the "Monitor," came at last the torpedo, and by the tremendous effectiveness of these two inventions the world was made to see that other things besides bravery and skill can assist a nation in war. Since then, the inventive and constructive resources of mankind have been ransacked to provide engines of offense and defense. The pale-faced scientist in his laboratory has put into the hands of our naval commanders weapons that surpass in power and in length of reach the fabled weapons of mythology. The chemist has contributed high explosives and smokeless powder; the metallurgist, steel and bronze for armor and for guns; the electrician, telegraphs, signals, range-finders, motors, and torpedoes; the highest engineering talent has been straining itself to improve the engines; and the constructors' corps of all nations number men of the highest order of scholarly attainment. What is the result? A modern battle ship has become the most intricate machine existing. It takes five years to build her, and one submarine mine or dynamite projectile may sink her in a moment. Why, then, do nations build such ships? Because they must. A nation's existence depends on her ability to assert herself at junctures; and while a powerful and expensive battle ship may be sunk as stated, yet she is less likely to be sunk than a cheaper and weaker one.

But there is one great drawback to the modern war ship, and that is the time required to get her ready. No one without personal acquaintance with the subject can form any conception of the number of things that are put into a man-of-war at a navy yard, even after all the stationary fittings, such as engines, torpedo tubes, guns, gun carriages, electric lights, etc., have been put in place. The time required to get ready is an obvious source of danger; for in a modern war nothing is more essential than dispatch, and in any naval war that country which has its fleets ready first, will, *ceteris paribus*, win the day. The destruction which a modern fleet can work, if unopposed, is far beyond anything popularly supposed to be possible. When the Achill fleet broke the blockade at Bantry Bay during the naval maneu-

vers in 1888, Admiral Fitzroy, with the "Rodney," "Warspite," "Iris," and "Severn," made a sham raid on the enemy's coast, and the supposititious damage for two days amounted to £5,400,000. It is the consequent necessity for being always ready that causes the large naval establishments of Europe; and in all modern navies—which means all European navies—no expense is deemed too great and no detail is deemed too small which bear in any way upon it. In those countries where annual maneuvers are held, the beginning of the maneuvers is the mobilization, and the time required for each vessel to go into commission, get out into the stream, and report herself ready for duty, is taken as carefully as the time of a trotting horse. In all modern navies, moreover, it is the practice to keep as many ships in commission as possible, and to keep those not in commission as nearly ready as may be. Perhaps it is in Germany that the most complete preparations for mobilization exist; and so perfect are they, that in from six to eight days the entire imperial fleet in the first class of the reserve can put to sea ready for battle.

On the outbreak of a naval war, the first duty of a nation is the defense of its own coasts. This being provided for, offensive operations are in order. But to provide for the coast defense is no simple matter, as was shown by Admiral Fitzroy, who demonstrated the possibility of devastating sea-board cities almost in the presence of the hostile fleet from which he had just escaped. The amount of attention to be required from the fleet depends on what is to be expected from the enemy, and even more on the condition of the land defenses. If the principal ports are well commanded by modern forts, having thick iron casemates, heavy guns, sunken batteries, position-finders, and search lights; if the harbors themselves are well sown with submarine mines, connected with protected operating rooms by an efficient system of cables; if the land works, as a whole, are manned by large and competent garrisons, thoroughly drilled in the use of the guns and apparatus; if there is an efficient system of coast signals and of telegraph communication with the interior, then we can use the fleets for their proper work of offensive operations on the high seas, and in assisting the land defenses of any port actually attacked.

In the event of a war between this country and any great commercial power, a prominent feature would be the dispatch of swift, unarmored, but well-armed, cruisers, to prey on the commerce upon which the enemy's greatness rests. Many of the merchant steamers of the enemy would be armed with a few rapid-fire guns, but their engines and boilers being above the water line, they could defend themselves against similar merchant steamers only. A cruiser meeting one of these craft would have an easy victory, if she could catch her, or hit her with a shot from one of the six-inch or eight-inch rifles. But suppose she meets a similar cruiser of the enemy bound on a similar errand; a struggle to the death is the only possible result. Each will clear for action as soon as the other is discerned—perhaps five miles away. Each will probably slow down at first, in order to gain time for preparation, and especially for getting the steam pressure up to the highest point. Forced draught will at once be started, and the subdued roar of the air driven through the furnaces, to accelerate combustion, and the whirr of the dynamos, will be added to the clang of the gun breech blocks, as they are swung open to admit the projectile to the breech, the hum of the ammunition hoists raising powder and shell to the decks, and the quiet, firm orders of authority. On deck, the Gatling guns and revolving cannon, and the rapid-fire guns in the tops, are got noiselessly into readiness; the captain takes his place in the armored conning tower, with the chief quartermaster and his aid; the executive officer assumes charge of the battery, and remains near at hand to take the captain's place in case of his death or disability; the range-finders are got into position, and the officer in charge begins to report from time to time the distance of the enemy, now drawing closer.

Probably not a shot will be fired until this distance is reduced to 2,000 yards, and probably both ships will keep pointed toward each other until that time. But now what will the contestants do? It has been held that both will advance steadily toward each other—each commander hoping that some false move on the part of his adversary will enable him to rush forward, discharge his bow torpedo at 500 yards, and perhaps follow it up with his ram and end the fight at once—until they have

approached so close, say 500 yards, that neither dares to swerve lest he himself be rammed, and that the ships will at length collide end on, and possibly both sink! This seems absurd, yet is it impossible? But if one commander feels great confidence in his gunners, and especially if the sea is smooth, he may turn his broadside toward the enemy, so as to bring his guns to bear in the most effective way, and begin a careful cannonade, knowing that one well-placed shot may rake the enemy fore and aft and disable his best gun. In case the enemy adopt similar tactics, fearing the effect of a fore-and-aft raking fire, a long-range duel may be kept up, until one or the other scores a sufficiently effective shot to warrant closing and trying the torpedo and then the ram, each hoping meanwhile to get in a heavy shot near the water line, as the adversary rolls the other way. But in case both elect a closer range, we may see the "Kearsarge" and "Alabama" duel re-enacted, each vessel steering toward the other until so close as to fear a raking shot, then sheering off toward the other's stern—not her bow, for fear of being rammed—and then each going ahead with the helm over, describing a circle with a common center. If the contestants, while possessing about equal strength, differ in one being stronger in fore-and-aft and the other in broadside fire, the former may keep pointed toward his adversary, using his bow guns, while the latter will reply with the full strength of his broadside. But should this broadside fire fail to stop the other's advance, it must soon be discontinued, and the bow turned, to avoid being rammed in the side. Here the judgment of the commander will have its fullest test, for if he delays too long—if he delays, for instance, until the distance is down to, say, 500 yards—he will not have time to turn his bow, and will certainly be rammed and sunk. He must know to a nicety the exact turning power of his ship, and must keep careful count of the distance, so that while using to the utmost the power of his formidable broadside, he will always reserve ability to turn his ram to the enemy. He must allow a margin, too, lest a sudden, even a temporary, accident or disablement to the engines or the steering gear should leave him helpless at the critical instant. The weakness of the side of the ship, and the time required to turn, which, is, on the average,

almost two minutes for 90° , show the advantage of bow fire, and of protection on the bow against a raking fire.

But the diversities of sizes and types of ships and of the circumstances under which they may meet, are so great that a thorough discussion of the naval duel cannot be made within any available limits. And what can be said of a fight between two fleets of, say, twenty-four vessels each, of which scarcely two in the whole forty-eight are exactly alike in size, speed, armament, armor, time required to turn, or size of circle for turning in?

A modern fleet is an engine of vast complexity, composed of parts dissimilar one from another. It comprises battle ships of various types, armaments, size, and speed; armed cruisers, protected cruisers, unarmored cruisers of many kinds, torpedo-catchers, torpedo boats, gun boats, dispatch vessels, and probably in the near future dynamite or gun-cotton throwers. So numerous are the requirements which war ships must fulfill, that it is impossible to combine all in one hull; hence this great dissimilarity, each vessel being built to carry out some one idea, subordinating others.

Let us imagine two fleets at sea in war time, each conscious that the other may appear at any instant upon the horizon. In the center of each fleet are the heavy battle ships of the first and second class and the armored cruisers, steaming ponderously along in columns of division, the flag ship of each division leading, and the center flag ship bearing the flag of the commander-in-chief. Close in the rear of each of the heaviest battle ships, are one or more torpedo boats, looking to her as their parent ship. On the right and left wings, and ahead and astern, as far away as clear signaling will admit, are the light, swift cruisers—the eyes of the fleet, the scouts; these scan the horizon incessantly. All the ships have distinguishing pennants unmistakably displayed, and frequent signals convey to the various captains the instructions of their admiral. Suddenly the advance scouts of the opposing fleets discern each other as specks on the horizon. The announcing signal is already bent on, and up it goes. It is read at once, and now follow the rapid signals of the admirals to their ships. All clear for action; forced draught is started, if not already up. The admirals reform their fleets, the

scout ships exchanging perhaps a few shots as they fall back to take up their allotted positions. Undoubtedly the simplest formation for each force is the line, in which each ship heads toward the enemy, the line being at right angles to this direction; and probably each admiral will at first so arrange his fleet, and slowly advance until he has made an estimate of the number of the opposing ships, their size and character, and has formed the plan on which he purposes to open the engagement. Perhaps one admiral will at once precipitate the action by signaling "engage the enemy," especially if, from any evidences he may see of hurry, confusion, or misunderstanding, he judges that the other is not quite prepared; then the fleets will rush at each other and a *mêlée* will at once ensue. Battles have been thus fought ere this both on sea and land, one side or the other eventually coming out victorious, nobody ever knew how or why; and the lucky commander has been crowned with imperishable laurel. Possibly the next great naval battle will be fought in this way; but it is the opinion of the writer that at present the whole tendency is in the other direction. The increased use on shipboard of fine guns requiring great care, the employment of so much delicate electrical apparatus, the necessary precautions attending the storage and firing of high explosives, the nicely-compensated compasses, the precise method essential to effective gunnery at sea—all are breeding an exact habit of thought and action. This exact habit is not incompatible with bravery and dash, but it predisposes an officer to plan deliberately, not to throw away good ammunition by reckless firing, coolly to take advantage of every mistake and every mishap of the enemy, and at the proper moment (but not till then) to overwhelm him by a decisive charge. Perhaps the one of the new inventions that will make the most radical change and that will contribute more than anything else to bring this about, is smokeless powder, or powder so nearly smokeless that a battle can be seen as well as heard. In the battles of the past, an admiral had little control over his fleet after the action had once begun; he had to depend on his captains to carry out the general instructions with which the battle had been opened, for the smoke of the guns obscured the field of action. Farragut's fa-

mous ascent of the rigging of the "Hartford," made in order that he might see above the smoke, will occur to everybody. With smokeless powder, an admiral need no longer be a simple spectator of a conflict, as Sieglinde was of the duel between the mist-enshrouded heroes of the Teutonic legend, but from the armored conning tower of his flagship may exercise as active a control over his ships as does a chess-player over his pieces. With a well-trained signal corps, and with swift dispatch vessels to act as messengers, an admiral can mass his whole force upon a given point, or give re-enforcement where his own line seems to waver.

While the battle ships bear the brunt of the engagement, the lighter and swifter cruisers seek out each other, or assist the battle ships at some designated point. In obedience to signal, the stealthy torpedo boat darts out at intervals from her hiding place behind her parent vessel, delivers a torpedo at some ship that has approached too close, and runs back for shelter, or perhaps is sunk by a single shot. Meanwhile some "Vesuvius," also hidden behind the parent ship, throws long, arrow-like projectiles, each holding 200 pounds or more of dynamite, perhaps a mile. Her target is the whole surface, deck and sides of an enemy's ship, while that of the powder guns is only the area presented by the vertical side; and one hit from her means wreck.

In view of the destructiveness of the new weapons of offense, there has been no lack of predictions that the naval duel of the future may simply reproduce the conditions of the famous conflict of the Kilkenny cats. While it is hardly wise to go to such an extreme as this, it is none the less true that the modern naval conflict may be affected by causes far less overwhelming in appearance, but none the less potent in reality, than those which gave victory or disaster in the battles of the past. The vast multiplication of delicate apparatus increases the chances of accident, and therefore the difficulty of predicting the result of any given engagement; but it must always remain true that the chances will still be in favor of the ship that is the best equipped and the best managed. The various inventions of the past few years—rapid-fire guns, high explosives, torpedoes, submarine boats, dynamite guns, and range-finders; the increased power and perfection of steam and electric machinery; the improvements

in powder and in steel for projectiles and for armor—have not revolutionized naval science so much as they have broadened it. The principles of strategy remain the same, and so does the necessity for the seaman's skill. New tools have been placed in the hands of naval commanders, and with them comes the necessity for learning how to use them. Torpedoes have not abolished iron-clads, but they have made constructors build iron-clads with an eye to resisting them, and they have made commanders study how to avoid torpedoes and how to use them in return. Rapid-fire guns came into use just when ordnance men were declaring that the future held only very large guns, and that ships would carry but few; and now we see a suggestion of the olden days in the numerous small rapid-fire guns carried in every war vessel on the seas. There is a perpetual readjustment of the powers of offense and defense; new weapons of destruction call forth new methods of protection. Engineers construct, inventors invent, experiments are tried, sham battles are fought, and heated discussions agitate the naval mind; but the only thing that can determine the real conditions of modern naval warfare is a modern naval war.

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WOMAN'S INTUITION.

How very odd that those who love and reverence womanhood most, should often be regarded by the self-constituted champions of the "women's cause" as its avowed enemies. And yet perhaps not so odd after all, if one remembers that the object of the women's advocates is, not to defend and uphold womanhood as such, but on the contrary to turn women, if possible, into feeble, second-rate copies of men. Between those who admire woman, as woman, and those who think so ill of their own sex that they want to abolish all its distinctive and essential features, there can in the nature of things be no possible sympathy, and no room for compromise, now or ever.

Happily, however, women have still a vast body of friends left—friends who will succeed in saving womanhood from the "advanced" women who would fain abolish it; and those friends are, as might naturally have been expected, the men. In spite of all that lady lecturers and anti-feminine old maids can do to unsex their sisters, men will for the most part continue to choose their wives—the mothers of future women—from the most womanly of their kind; and so will aid and abet in handing down to coming generations those fine and beautiful feminine qualities that the recalcitrant mannish women of our age are so anxious to disown in favor of male peculiarities. Men will protect women against the enemies of womanliness in their own sex. The celibate lady lecturer will die unrepresented; the woman with grace, tact, high emotional endowments, pure womanly gifts, will hand down her exquisite and charming qualities to other women, her likes, after her.

And these qualities, the finest flower and most ethereal outcome of our race, manly men are certainly the last persons to underestimate. What a vulgar, material view of humanity it is that treats the power to teach school or to earn a livelihood as the sole measure of efficiency in the race. What a vulgar, ma-