

# Scientific American.

ESTABLISHED 1845

MUNN &amp; CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

## TERMS TO SUBSCRIBERS

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Scientific American (Established 1845) ..... \$3.00 a year.  
 Scientific American Supplement (Established 1876) ..... 3.00  
 Scientific American Building Edition (Established 1885) ..... 2.50  
 Scientific American Export Edition (Established 1876) ..... 3.00

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MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 15, 1900.

## THE ARMAMENT OF OUR NEW BATTLESHIPS AND CRUISERS.

We are asked by a correspondent, whose letter is published on another page, to express an opinion as to the efficiency of the armament of our latest battleships and armored cruisers. In the first place, with regard to the armored cruisers, of 13,500 tons displacement, it is sufficient to say that the latest decision of the government is to arm these vessels with four 8-inch breech-loading rifles, and fourteen 6-inch rapid-fire guns, and that all of these weapons will be of the new long caliber, high-velocity type, which is now being manufactured at the Washington gun shops. We question very much whether the proposal to use the 5-inch gun in the secondary battery of these ships was very seriously entertained, and it is probable that an error was made as to the caliber when the figures were given out by the government. At any rate, it is certain that the day of the 5-inch rapid-fire gun in the secondary battery of our large battleships and cruisers is over. In estimating the power of the armament of our latest ships, it is necessary to bear in mind what an enormous advance has been made in the ballistics of our naval guns. If our correspondent will turn to the SCIENTIFIC AMERICAN of January 20, he will find a diagram showing the increase in length and weight of the naval 6-inch gun during the past few years. If the 6-inch gun carried by the "Baltimore" be compared with one of the new, rapid-fire, 6-inch guns of the secondary battery of our armored cruisers, it will be found that the weight has increased from 48 tons to 82 tons, while the length has increased from 30 calibers to 50; the velocity has risen from 2,000 to 2,900 foot-seconds, and the muzzle energy from 2,773 to 5,838 foot-tons, or more than a hundred per cent. The gun crew of the "Baltimore" is doing good work if it fires one shot per minute; whereas, if called upon to do so, each of the fourteen 6-inch guns on the new armored cruisers could deliver five aimed shots per minute.

The new 8-inch gun, four of which are to form the main armament of the new cruisers, because of its great velocity, will strike a blow whose muzzle energy is equal to that of the 10-inch guns of the late battleship "Maine." It will be capable of delivering at least two aimed shots per minute, capable of penetrating 13½ inches of Harveyized armor at the muzzle, and 9 inches at a distance of 2 miles; at which distance, by the way, the new 6-inch gun would be able to penetrate the 5½-inch side armor of the "Kentucky" and "Kearsarge." It is true that 4,000 tons is a big increase over a ship like the "Brooklyn," but it must be remembered that these ships will have a guaranteed speed of 22 knots an hour, and that they will carry an enormous coal supply, besides being completely covered with side armor at the water-line from stem to stern.

Undoubtedly the new 20-knot battleships of the Italian Navy to which our correspondent refers would be formidable opponents to our armored cruisers; but the latter, because of their extra speed of 2 knots, would be in a position to accept or decline battle at will. Ever since the plans were made public, we have greatly admired these small but swift and powerful ships, and it is quite possible that in this matter, as in some others, the Italian designers have originated a type which will ultimately become general among the navies of the world. The Italians evidently consider that the result of a sea fight will depend more upon the number of blows struck than upon their individual weight; and hence they have sacrificed the heavy 12-inch guns in favor of engines and boiler power, the idea being to provide a ship that could rush in and quickly smother, as it were, an opponent with a number of 8-inch armor-piercing shells, before he could have an opportunity to get in the one theoretically annihilating 12-inch shot.

With regard to the armament of the new battleships, we point out that while the "Rhode Island" and "Virginia" will carry eight 8-inch guns as against four 8-inch carried by the "Georgia" class, the position of the guns of the "Georgia" on the center line of the vessel will enable these ships to deliver, both on the broadside and parallel with the keel, a weight of 8-inch

fire equal to that of the more heavily armed vessels. We must remember that in the case of the "Oregon" class it was found that the blast of the 8-inch guns prevented them from being fired dead-ahead or dead-astern, for fear of injuring the officers in the sighting hoods of the 13-inch guns. At the same time, for broadside firing, only two turrets will be available in the "Rhode Island" and "Virginia," the guns on the off side of the ship being masked by the superstructure. The absence of four 8-inch guns, moreover, enables the secondary battery of the "Georgia" class to be increased by at least four 6-inch guns.

In general it may be said that if there has been any error in the designs of our earliest battleships, it has lain in the tendency to overload them with guns; and if this be true, we must naturally look for a somewhat lighter armament relative to the displacement than is found in the ships, say of the "Oregon" type. Our naval constructors are giving more berthing space to crew than formerly, and it is easily conceivable that it might be well worth while to sacrifice a gun or two for the sake of increasing the comfort, health and general good spirits of the crew, upon whom, after all, the fighting efficiency of the ship is dependent.

## PROPOSED ABANDONMENT OF PORT ROYAL NAVAL STATION.

The question of the best site for a naval station on the Atlantic coast between Norfolk and Pensacola is now being made the subject of investigation by a special commission, whose report to the Secretary of the Navy will probably be made public within the next few weeks. There is already in existence at Port Royal a naval station which was selected and approved by various commissions which, after an examination of the locality, pronounced emphatically in favor of this site as being the best adapted to meet the requirements of the case. One of these commissions was presided over by Admiral Porter, who was strongly in favor of the site, and a later commission authorized by Congress in 1888, and presided over by Commodore McCann, recommended the establishment at Port Royal of a dry dock, a depot of naval supplies, and a coaling station. In the spring of the present year, the Naval Appropriation Bill, as passed by the House of Representatives, contained an appropriation of \$100,000 toward the rebuilding of the dry dock at this station in concrete or stone. The bill went to the Senate and was referred to the Committee on Naval Affairs. While under consideration by this committee, the Secretary of the Navy submitted a letter from Admiral Endicott, Chief of the Bureau of Yards and Docks, in which he strongly deprecated the carrying out of any further work of improvement or extension of facilities at Port Royal, and criticised the site of the dock as being unsuited, for various specified reasons, to the purposes of a naval station, the specified grounds of objection, strange to say, being the very grounds which had been quoted in all previous investigations as being favorable for a station. In the course of his letter he said: "During the year the Mayor of the city of Charleston suggested the propriety of transferring the naval station to that city from Port Royal, stating among other things the facilities for transportation to the interior, the proximity of a large commercial city, the convenience of obtaining at all times skilled labor of all classes, an abundance of fresh water, etc., advantages which are lacking at Port Royal." While the transfer would undoubtedly result in the loss of a great deal of money which has been expended at Port Royal, Admiral Endicott considers the present is the proper time to consider the suggestion of the Mayor.

The Admiral was so much impressed with the wisdom of the Mayor's suggestion, that he gave it hearty endorsement and able advocacy throughout his whole letter. He recommended that the matter be brought to the attention of the Senate Committee on Naval Affairs, and that a board of officers be appointed to "examine into the conditions existing at Port Royal, and the various questions involved in the proposition to remove this station to Charleston Harbor."

Acting upon this letter, the Naval Committee amended the bill by authorizing the Secretary of the Navy to inquire into the advisability of moving the naval station from Port Royal to Charleston, and if he deemed it advisable to do so, empowering him to use \$100,000 of the money appropriated in the bill for the Port Royal naval station for the purchase of land for a site at or near the city of Charleston, and to proceed with the building of a dry dock there.

Pending the publication of the report of this commission, it is not for us to say anything one way or the other with regard to the proposed transfer which, of course, has very naturally aroused bitter opposition on the part of the citizens in the immediate neighborhood of the present station. The proposition to "remove" the yard involves the abandonment of the dry dock, machine shops and other buildings at Port Royal, which would represent a dead loss of between one and two million dollars. Moreover, the modern forts at the entrance to the station, which were erected during the Spanish war, will, to a large extent, lose their military value when there is no longer any station for them to

defend. The Port Royal site was chosen, presumably, after careful and exhaustive examination, by various expert commissions, in the course of which the advantages of Charleston must surely have received due consideration. At the same time it is possible that the relative strategical advantages of Port Royal and Charleston are not the same under the changed condition of modern naval warfare as they were in the days of Admiral Porter, Admiral Jewett and Commodore McCann.

Among other reasons which are given for the removal of the station it is urged that the absence of social attractions and conveniences in such an out-of-the-way place as Port Royal will render it unpopular with naval officers, both of the line and staff, conveniences which Charleston would readily afford. It seems to us that arguments of this kind are not warranted either by the traditions of the navy or the invariable self-effacement which characterizes our naval officers, when it is a question between personal comfort and the highest interests of the country they serve. The question for the best site for a dry dock and naval repair yard is purely a technical one, and will be decided entirely by questions of accessibility by sea and by land, capabilities for defense, suitability of location with regard to the exigencies of a naval campaign, and possibilities of obtaining at all times the necessary skilled labor.

It is at any rate certain that so complicated and eminently technical a question as this is not to be decided by the preferences of the Mayor of any particular city concerned, although it must be admitted that by quoting the Mayor of Charleston as his leading authority on the advantages of the proposed change, Admiral Endicott has shown a flattering opinion of the judgment of the lay gentleman who holds that distinguished municipal position.

In view of the high authority upon which Port Royal station was originally selected, we think the subject is of sufficient importance to place it before our readers at considerable length, and in the current issue of the SUPPLEMENT we give several views of the yard, together with a history of the selection of the site, and the legislation which has led to the appointment of the present Commission.

## CURIOUS FACTS REGARDING MOSQUITOES.

In the SCIENTIFIC AMERICAN for July 7, 1900, appeared an article by Dr. L. O. Howard, in which the distinguishing features of malarial and non-malarial mosquitoes were clearly pointed out. The Department of Agriculture has now issued a monograph by Dr. Howard on the "Mosquitoes of the United States," which, in addition to the critical analysis already published in the SCIENTIFIC AMERICAN, contains matter which is interesting, and little known.

Of the abundance of mosquitoes in all parts of the world, travelers and explorers have given ample testimony. In Lapland and Crimea, according to Kirby and Spence, the number of mosquitoes is enormous. Humboldt has given similar accounts of the conditions at the mouth of the Rio Unare. In the United States mosquitoes are found almost everywhere, from Alaska to Texas, from Maine to California.

A curious and as yet unexplained point, in regard to mosquito existence, is the extraordinary abundance of the insect at certain times upon dry prairies, miles away from water. Although this fact has led Westerners to believe that pools of stagnant water are not necessary for the breeding of mosquitoes, Dr. Howard is more inclined to attribute their presence in dry regions to a greater longevity on the part of the adults of certain species, thus enabling them to live from one rainy period to another. Although adults hibernate and live from November until April or May in the latitude of Washington, they die rather quickly in confinement in the summer. They have been kept in glass jars under various conditions and have thus lived for about eight days. When they have been provided with a piece of ripe banana, renewed every three or four days, they have lived in confinement for two months.

The adult male mosquito does not necessarily take nourishment; and the adult female does not necessarily rely on the blood of warm-blooded animals for food. The mouth parts of the male are so different from those of the female that it is probable that if it feeds at all it obtains its nourishment in a manner quite different from the female. Male mosquitoes are often observed sipping at drops of water; and in one instance a fondness for molasses has been recorded. They have also been known to sip beer and wine. The female mosquitoes are without much doubt plant feeders. It is generally supposed that a highly nutritive fluid is necessary for the formation of the eggs; but the supposition is emphatically denied by Dr. Howard. There are in this country enormous tracts of marshy land into which warm-blooded animals never find their way, and in which mosquitoes are breeding in countless numbers. Instances have been recorded in which mosquitoes have been observed feeding on boiled potatoes and watermelon rinds. That they do occasionally feed upon other than warm-blooded animals