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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 criticized 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

has been proven time and time again. They have been observed feeding upon the chrysalises of butterflies and puncturing the heads of young fishes.

How far do mosquitoes fly? The question is of no little importance, for if mosquitoes fly great distances, exterminative work on the breeding places near a house or community is of slight avail. Most writers agree that mosquitoes will not rise or take flight when a brisk breeze is blowing, and that even in light winds they keep close to the ground. That mosquitoes do cling to the branches of trees during a wind has often been observed. They are so frail in structure that it seems impossible that they should be carried great distances by land breezes; for a long flight presupposes an ability to battle against wind which so feeble a creature cannot possess. But, although mosquitoes may not be carried along by winds, they are sometimes transported by railway trains to the despair of many country resorts. Mosquitoes are carried in cars for great distances and will start to breed in localities where mosquitoes are rare.

It is a much-mooted question among entomologists whether or no mosquitoes can breed in mud. Dr. Howard's experiments and investigations tend to show that the larvæ will live in wet mud for some little time and that they will even transform after water has been added. In no case were larvæ revived after the water had been drawn off for more than forty-eight hours.

#### ANOTHER ELECTRIC RAILWAY FOR LONDON.

Since the advent of the Central Electric Railway in London, innumerable schemes have been formulated for a further means of rapid intercommunication with all parts of the metropolis. Some have been practicable and useful, while others have been simply due to the imagination of fertile brains. But now a scheme has been formulated, which, if reduced to practice, would prove of inestimable benefit to everyone, both Englishmen and foreigners. It is proposed to link all the termini of the various trunk lines in London together by means of an electric railway. Unfortunately, London does not possess one huge depot in which all the railways converge, and thus obviate much inconvenience to those passengers who desire to change from one system to another, but they are distributed throughout the metropolis, and in some cases are as much as four or six miles apart.

With a view to surmounting this difficulty, and to bring the termini into close communication, two leading London engineers have drawn up the scheme in a terse and practicable manner. Their idea is to establish a central station in Piccadilly Circus, and from there to radiate tracks direct to the terminus of each trunk line, at a depth of 100 feet, or more, below the surface. When a train arrives at a southern terminus with passengers desiring to cross London to a terminus in the north, the steam locomotive will be simply detached at the southern terminus, the train lowered bodily by a huge electric lift to the underground system, an electric locomotive attached, the train hauled to the northern terminus, raised to the higher level again by lifts, another steam locomotive attached, and the passengers conveyed to their destination without experiencing all the inconvenience and trouble of changing their carriages.

It is estimated that a total length of 11 miles of railway will be necessary to connect all the termini together, while about 40 tunnels would ramify from Piccadilly. In addition to the central station there will be 17 local stations. One of the objects of the railway will be the rapid transit of fruit and fish to the markets of Covent Garden and Billingsgate respectively, the produce for which is at present conveyed through the streets. The Covent Garden station will be a great boon. About 1,600,000 tons of fruit and vegetables are carried to this market every year, and yet there is no railway facility to Covent Garden. Another station will be established at the General Post Office for the rapid conveyance of the mails to the trunk lines-termini. The greatest beneficial effect of the railway will be that it will relieve the existent too densely crowded streets of the greater part of the slow vehicular traffic. A company is being formed for the purpose of obtaining the necessary Parliamentary powers, and also to construct the railway. It is estimated that it will cost about \$150,000,000 to realize the scheme, but already the idea has found wide financial support.

#### MALARIAL INFECTION ON THE EAST COAST OF AFRICA.

The Malaria Committee of the Royal Society of London have received some startling information from Drs. Christophers and Stephens anent malarial infection on the east coast of Africa. According to their reports, the native races, and particularly the children, are extensively responsible for the infection, assisted by the mosquito. These two doctors state that they have found no native house the children in which were free from infection. The blood of the infants contains just what is essential for the transmission of human malarial poison by the intervention of the mosquito.

By some occult means the children experience an in-

teresting and perfect immunity from the effects of malaria. Young babies have been proved to be the most infectious, the inherent presence of the malaria gradually decreasing as the child grows older, and in children over twelve years of age, cases of infection were rare—the majority, on the other hand, appearing rather healthy. The huts of the native villages are infested with the mosquitoes, which during the daytime secrete themselves in all the nooks and crannies. A white man would enter a native hut, and, from a cursory inspection, would conclude that it was safe. But when the night came on, and the mosquitoes issued from their hiding places, the stranger would be attacked by the insects and would almost invariably contract the disease. Dr. Christophers contends that it is absolutely unsafe to sleep within one hundred yards of a native village. One of the observers made the experiment of sleeping close to a village without a net, and soon experienced the discomforts resulting from the attacks of the mosquitoes. By displaying every precaution, however, a white man may sleep night after night without experiencing any ill effects.

#### THE "DEUTSCHLAND" BREAKS TWO RECORDS.

The "Deutschland," of the Hamburg-American Line, made two records on her last westward trip, which ended on September 1. She made the voyage from Cherbourg, a distance of 3,050 knots, in five days twelve hours and twenty-nine minutes. This beats the "Kaiser Wilhelm der Grosse's" best record made November 15, 1899, by four hours and fifty-eight minutes. An average speed of 23.2 knots per hour was maintained by the "Deutschland" during the entire trip, which was a fraction better than the promise of her builders. The record of the daily runs was 337, 566, 570, 570, and 584 and 423 knots. The "Deutschland" exceeded by 4 knots the greatest distance ever sailed in twenty-four hours. The "Kaiser Wilhelm der Grosse" made 580 knots on one occasion. The "Deutschland" now holds six records. First, the voyage from New York to Plymouth on August 14, the time being five days eleven hours and forty-five minutes, which was better by two hours and twenty-one minutes than her previous record of July 24. Second, her voyage from Plymouth to New York, completed on July 12, in five days sixteen hours and forty-six minutes, being her maiden trip. Third, her voyage from Cherbourg to New York made in five days twelve hours and twenty-nine minutes. Fourth, her best hourly average 23.32 knots recorded for the voyage ended at Plymouth August 14. Fifth, best day's run 584 knots on August 30. Sixth, the best time for a maiden trip made between July 6 and 12. On the last voyage, the engines exerted 36,000 horse power and 600 tons of coal were burned per day. The engineers of the "Deutschland" believe that the ship has "found herself" and that in a short time she will break more records.

#### THE GREAT ARARAT ASCENDED.

The Ararat Mountains in Armenia comprise two peaks situated seven miles apart. They are known as Great and Little Ararat, and are respectively 17,260 and 14,320 feet above the plain. They partially belong to three countries, Russia, Turkey and Persia. The mountains are covered on the tops with perpetual snow, ice and glaciers. The summit of Great Ararat was reached in 1829 by Prof. Parrot, and on September 2, 1900, a member of the Russian Geographical Society named Peoggenpohl ascended the peak with a considerable party. The difficulties of the ascent are very great, and his successful expedition will be welcome news in geographical circles. Ascents are rare, having been made in 1834, 1843, 1845, 1850 and 1856. Little Ararat is even more difficult to climb, as its declivities are greater and steeper, its form being almost conical. It is believed to be the spot where the ark rested, but there is a tradition that Mount Judi in southern Armenia was the spot. The mountain is of volcanic origin and was in eruption in 1785, and in 1840 there was a vast discharge of sulphurous vapors from its sides, and a tremendous earthquake shook the surrounding country. There is considerable literature devoted to the mountain.

#### THE DUKE OF ABRUZZI'S EXPEDITION REACHES THE HIGHEST ALTITUDE.

All those who are interested in Arctic exploration will be glad to learn of the return of the "Stella Polaris" with the Duke of Abruzzi's Arctic exploration party. The sledge party reached a point farther north than Nansen, 86° 33' and was gone 104 days. The "Polaris" was caught fast in the ice and held for eleven months, stoving in her sides and inflicting other damage. The members of the principal sledge party suffered the usual hardships which fall to the lot of the Arctic explorer, being forced to eat their sledge dogs for food; three of the party perished. Reports, meager in their details, have been received from Tromsø. The Duke's equipment was admirable and he did not attempt to reach the pole by the Nansen plan of approaching by the open sea or by drifting, but relied upon sledge trips. The scientific value of the Duke's expedition will probably be considerable, as the

members of the party were provided with the best instruments obtainable.

#### SCIENCE NOTES.

The small planet No. 444, which was discovered by M. Coggia at Marseilles on March 31, 1899, has been named Gyptis.

The presentation of the awards of the Paris Exposition was an elaborate ceremony. A number of decorations of the Legion of Honor have been distributed.

The sewers of Munich discharge their contents directly into the river Iser. This river flows so rapidly and its volume is so considerable, that there has been no sensible deterioration in the river water. As a precaution, however, the building of a catchpit to remove heavier matter is contemplated.

Dr. R. Uhlenbuth describes a simple method of preparing free hydroxylamine, which consists in heating hydroxylamine phosphate gently under reduced pressure. It is stated that the hydroxylamine distills over in a state of extreme purity, the distillate solidifying if the receiver be surrounded by melting ice.—Annalen.

The panorama of the Battle of Champigny, by the great French military painters De Neuville and Detaille, has had a checkered career. When the panorama ceased to pay, it was cut into pieces and the groups were sold separately. The central scene was exhibited in several French towns and was finally pawned. It is at present in the section known as "Old Paris," at the Exposition.

MM. Desgrez and Balthazard state that they have discovered a method of regenerating air in confined spaces. They have submitted to the Academy of Sciences aluminium diving dresses weighing 25 pounds. They state that the diver can move in this suit for hours under water without drawing air from the surface. The principal regenerating agent seems to be sodium dioxide. It is said that the invention is applicable to submarine work, poisonous atmospheres in mines, submarine warfare, and certain chemical industries.

E. Gain has examined the structure of the embryo of grains of wheat and barley obtained from Egyptian mummy cases, and finds that although the grains have undergone but little change in external appearance, and the reserve substances have retained their chemical composition, the chemical composition of the embryo has been completely altered, and it is no longer capable of development. The dormant life of the seed must long ago have expired; and M. Gain regards this observation as entirely disposing of the apocryphal statements that these seeds can germinate after thousands of years.—Comptes Rendus.

After the dispersion of a French exploring expedition under M. Blanchet in the Western Sahara, and the imprisonment of its leaders by the Chief of Adrar, the French public must have learnt with satisfaction that the three military expeditions dispatched to Lake Tsad effected their junction on April 21 at Kusuri on the Shari. Lieut. Joalland, of the disastrous expedition originally sent out under Capt. Voulat, was the first to arrive. M. Foureau and Major Lamy followed; and when M. Gentil, coming from the south, joined their forces, the French were in a position to bid defiance to the usurper Rabah of Bornu, whom they defeated in a pitched battle. Rabah himself was wounded, and, after the fashion of Duncan of Knockdunder, a French tirailleur cut off his head. Major Lamy, the leader of the united forces, was mortally wounded.

The uses of monochromatic light in optical experiments are so numerous that considerable interest attaches to the paper, on the means of producing such light, by MM. Charles Fabry and A. Pérot in the Journal de Physique for July. After pointing out the disadvantages of sodium light on account of the proximity of the D lines, the authors divide the methods of producing a beam of monochromatic light into two, viz.: (1) Simplification of a beam of white light, and (2) use of light emitted by a gas. Under the later method are included (a) flames; (b) gases or vapors rendered luminous by electricity; (c) induction sparks; and (d) the electric arc. In connection with (b) it is found that the quality of the rays depends on the nature of the current exciting them, and the authors consider the use of (1) a coil with secondary condensers; (2) alternating currents; (3) continuous currents. Of these methods the last is the best, though the second is better than the first. While the results of these investigations cannot be briefly summarized, we notice that the authors have shown the possibility of improving the action of Michelson's tubes, of using a modification of the mercury arc of Arons as a source of monochromatic light of great intensity, of using the rays of a certain number of metals for interference observations where the difference of path is considerable, and, by measuring the wave-lengths, of adding a number of new fixed points on the spectrum. The paper concludes with a table of wave-lengths determined by MM. Pérot and Fabry, and comparison with the determinations of Michelson.