Scientific American.

ESTABLISHED 1845.

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

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS TO SUBSCRIBERS.

One copy, one year, for the United States. Canada. or Mexico $3.00
One copy, one year, to any foreign country. postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....$3.00 a year.
Scientific American Supplement (Established 1876) ..... 5.00 "
Scientific American Building Edition (Established 1885). ..... 2.50 "
Scientific American Export Edition (Established 1878)..... 3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.
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MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, FEBRUARY 25, 1899.

CONGRESS AND THE TECHNICAL BUREAUS.

The fact that in this advanced age of warship construction we should be committed to the building of four vessels of the ancient monitor type simply proves that there are some subjects with regard to which the two Houses of Congress ought to rely entirely upon the judgment of the technical bureaus.

The question as to what types of ships are best suited to the needs of the navy is a purely technical and professional question which can only be decided by the men who design the ships and the men who handle them. Naval architecture is, perhaps, the most complex and difficult of all the exact sciences. Its problems are complicated by the fact that because of the long periods of peace and the comparative absence of the practical test of war, much of the designing is done on theoretical lines. Hence the experience of the late war was of inestimable value. One of the earliest lessons we learned was that for most naval operations the monitor is worse than useless. The fact had long been suspected and Admiral Sampson proved it when he took the monitors with him on his cruise to the eastward in search of Cervera. They kept down the speed of his fleet to five knots an hour on the way to San Juan, and when he reached his objective point and commenced to bombard they made such poor gun-platforms that the gunners were unable to hit anything. In his report of these operations Admiral Sampson condemned the monitors, and in doing so was indorsed by every officer of the new school who witnessed the misbehavior of these embryo craft during the war.

When the time came for the Naval Board (which is an expert board) to make recommendations for new vessels, it very naturally called for ships of a modern type—battleships. cruisers, and torpedo boats. The bill authorizing the construction of these ships passed the House; but when it reached the Senate, instead of confining itself to its proper function of authorizing or refusing the expenditure necessary for the construction of the ships, it undertook to ignore the opinion of its naval experts by inserting in the bill a provision for constructing four of the very type of ship that the navy was practically unanimous in condemning.

Now, we think that the Senate could not more effectually have stultified itself than by assuming to know more about a purely professional matter than professional men themselves. It is certain that such an assumption will always result, as in the present case, in foolish expenditure of the public moneys. The truth of the matter is that these gentlemen, in their admiration of the monitor, are guilty of a kind of fetish worship, for they will not bring themselves to believe that a craft which did such sensational work in the sheltered bays and rivers of the South cannot contend successfully with modern battleships in the vastly altered conditions of modern warfare.

The tendency of Congress to go beyond its proper sphere by setting up its own judgment against that of the technical bureaus or boards by which it is advised is greatly to be regretted. Any attempt to do more or less than control the expenditure of the sums necessary for construction will almost inevitably, as in the case of the monitors, reflect unfavorably upon the good sense of Congress and be prejudicial to the best interests of the country at large.

THE NAVAL BILL FOR 1899.

It is sincerely to be hoped that in dealing with the new Naval Bill, Congress will not make the mistake of interfering with the technical features of the bill. If it considers that the appropriations are too great or too small, it will be perfectly within its province in reducing or increasing the number of ships of the various types suggested by the Board; but it will repeat the error of last year if it calls for changes in the character and make-up of the ships themselves, or deliberately authorizes the construction of ships which are viewed with disfavor by naval authorities.

The bill calls for the construction of the following vessels: Three sea-going battleships, to carry the heaviest armor and most powerful ordnance for vessels of their class upon a trial displacement of 13,500 tons. They are to be sheathed and coppered and have the highest practicable speed and great radius of action.

Three armored cruisers of about 12,000 tons trial displacement, carrying the heaviest armor and most powerful ordnance for vessels of their class, to be sheathed and coppered and have the highest speed and steaming radius.

Six protected cruisers of about 2,500 tons trial displacement, sheathed and coppered, to have the highest speed compatible with good cruising qualities and great radius of action. The armor for these vessels is to cost not more than $545 per ton.

The provisions of the bill, as far as the new ships are concerned, show the effect of the new foreign policy upon which we have entered. We can no longer be content to design vessels of a purely coast defense type. The acquisition of the far distant Philippines has necessitated the construction of vessels that are capable of steaming for long distances and arriving at our new possessions in a serviceable condition, with clean bottoms, an ample supply of stores and ammunition on board, and enough coal to enable them, if need be, to go into immediate action. Hence it is that all the new vessels are to be sheathed and coppered, and are to carry specially large supplies of coal, and consequently there is an increase in displacement. The battleships are to be 1,000 tons larger than the new "Maine," and over 3,200 tons larger than the "Oregon." Their speed will probably be 18½ knots and their coal supply from 2,000 to 2,500 tons with close stowage. It is not likely that the armament will be increased over that of the new "Maine," which is already equal to, if not slightly superior to, that of any ship now built or building.

The armored cruisers will be magnificent vessels of 12,000 tons and 21½ to 22 knots speed. We are in a position to state that in the disposition of their armor they will probably be enlarged vessels of the "Christobal Colon" type, which we consider to be to-day the best type of vessel for her size in the world. They will have a complete water-line belt, above which will be a central citadel extending from the belt to the main deck with complete athwartship bulkheads, in which will be carried a powerful battery of the new 6-inch smokeless powder rapid-firers. The bulkheads will inclose the turrets for the main battery of armor-piercing rifles. which will probably be of an improved rapid-firing 8-inch type of great power.

The protected cruisers will be enlarged "Cincinnatis," with a larger coal supply and carrying the new smokeless powder rapid-firers. The greater power of the new weapons will render these six cruisers far more formidable than the "Cincinnati" or her sister the "Raleigh."

The total amount carried by the bill is $44,158,605, a large sum on the face of it; but not so large if we bear in mind that it represents the insurance upon our new possessions and the merchant fleets which we expect to place upon the seas in the coming years.

THE MINERAL RESOURCES OF THE PHILIPPINE ISLANDS.

At a time when information regarding our new possessions is so much in demand, the memorandum by George F. Becker, of the United States Geological Survey, on the mineral resources of the Philippine Islands, will prove of great interest and value. The pamphlet, which will be given at full length in the next issue of the SCIENTIFIC AMERICAN SUPPLEMENT, covers all the main discoveries in the geology of the Philippines which are of economic interest. The data was obtained from various sources, including unpublished records in the Spanish Mining Bureau, mine reports by the late William Ashburner, verbal information obtained in Manila, and from various technical publications.

The valuable minerals, as far as present knowledge goes, are confined to about a score of the islands. Luzon heads the list with deposits of coal, gold, copper, lead, iron, sulphur, marble, and kaolin, while coal and gold are the two minerals most commonly found in the other islands. The Philippine Islands coal is a highly carbonized lignite, analogous to the Japanese coal and that of the State of Washington, but not to the Welsh or Pennsylvania coals. It is thought that the native coal might be made to supplant the English or Australian coal for most purposes. Petroleum is found in Cebú, where a concession has been granted, and there are evidences of natural gas, while oil and gas are reported on Panay.

Gold is found in a vast number of localities in the archipelago. It is generally detrital and found in watercourses or stream deposits now deserted by the currents. There are placer deposits, some of which are worked in a crude way by the natives, and some of the gravels are adapted to hydraulic mining. In one of the islands a gold quartz vein has been worked which is six feet in thickness and has yielded from $6 to $7 to the ton.

Copper ores are reported from a great number of localities, northern Luzon containing a copper region of unquestionable value, where the ore has been smelted by the natives from time immemorial. Other of the deposits are described as veins of rich ore 23 feet in thickness.

A lead mine has been partially developed near the town of Cebú on the island of that name, while at Torrijos, on Marnidugue, a metric ton of argentiferous galena is said to contain 96 grammes of silver, 6 grammes of gold, and 565·5 kilogrammes of lead.

Iron ore exists in abundance in Luzon, Caraballo, Cebú, Panay and probably in other islands. The finest deposits in Luzon are near Camachin, where wrought iron is produced and manufactured into plowshares. Charcoal pig might be produced to some advantage in this region, but the lignites of the archipelago are probably unsuitable for iron blast furnaces.

Of non-metallic substances, sulphur deposits abound in Luzon and other islands, while marble of fine quality occurs in the island of Romblon and in the provinces of Manila and Marong. There are concessions for mining kaolin in Laguna province, and the pearl fisheries in the Sulú archipelago are said to form an important source of wealth.

Taken altogether, the above statement, coming from an official source, establishes the fact that the Philippine Islands have a solid mineral as well as agricultural value. When the pacification of the islands is effected, a promising field will be open in the exploitation of the actual extent and value of these resources.

TRANSPORTATION IN THE RECENT SNOWSTORM.

When we consider what a splendid series of weather prognostications is sent out to the railroad companies by the United States Weather Bureau, we think that the immediate blockade which follows a snowstorm of more than usual severity is, in many cases, quite inexcusable. The receipt of the warning of a snowstorm should be followed by the placing of "snow-fighting" trains, with plows and properly trained and equipped crews, at stated intervals along the main lines, whose duty it should be to pass to and fro over their own sections of the line. Had this been done on the great trunk lines which enter New York city, they would have been able to keep at least the suburban tracks clear and prevent the drifts from accumulating. Instead of this the storm was in many cases allowed to run its course before the plows were sent out. To any railroad man who is acquainted with the elaborate snow-fighting preparations of some of our Western roads, it was evident that the New York, New Haven and Hartford Railroad, for instance, could have readily kept open its suburban lines, had the company sandwiched in an occasional snowplow between its regular and frequent passenger trains. Instead of this the company appeared to be content to let its suburban service come gradually and inevitably to a standstill.

In the city the most significant fact was the contrast presented between the two systems of traction in use on the lines of the Metropolitan Street Railway Company. The cable cars, thanks to their positive connections by cable to the full available horse power at the power stations, were able to grind their way steadily through the heavy snowdrifts without a single blockade; but the underground trolley, after a desperate struggle with its old enemy, had to give up the unequal contest. It is only fair to state that the breakdown was not due to failure of the electrical features of the system so much as to the fact that the adhesion of the driving wheels was destroyed by the accumulation of snow on the rails. Generally speaking, there was ample power at the motors, at least in the earlier stages of the storm, and it was not until most of the snow had fallen that the old trouble of short-circuiting and clogging of the conductors was experienced.

While the underground trolley is inferior to the cable in a snowstorm, it surpasses it under every other condition of service, and the delays in winter storms do not equal the ever-recurring breakdowns to which the cable is liable at any time of the year.

Every snowstorm of any severity that strikes New York city suggests the immense advantages that would be afforded by an underground system of rapid transit, which would of course be entirely unaffected. A suggestion of this is afforded by the fact that it was the underground mail tubes that saved the local postal service from a blockade. According to the Assistant Postmaster, the tubes made possible the delivery of large quantities of mail which under the old mail wagon service would have been delayed in the main office. An underground railway running the length of Manhattan Island would have been an inestimable boon during the many storms of this winter—it would prove an inestimable boon indeed at any time of the year.

THE SINKING OF THE WHITE STAR STEAMER "GERMANIC."

Everyone who takes any interest in Atlantic navigation will feel a pang of regret that such a splendid veteran of the transatlantic service as the "Germanic," after successfully buffeting the storms of twenty-five winters, should be condemned to sink ingloriously while at her moorings in the port of New York. The accident is attributable indirectly to the bitter cold and the storms of the last few days. When

the ship made fast at her pier, her deck, sides, masts, and rigging were coated with many tons of ice, the weight of which, being placed so high above the waterline, materially affected though not endangering the stability of the ship, especially as the unloading progressed. On Monday, while she was coaling from barges alongside, she had a heavy list to starboard, which increased ultimately to 8 degrees, when coaling was discontinued on the starboard side and carried on through the port side, the starboard ports being left open. At 9:30 P. M. a heavy gust of wind careened the ship to port, and assisted by the weight of the ice aloft, heeled the vessel sufficiently to let the water in by the coal ports. After an unsuccessful effort had been made to close the ports the ship righted herself and took water in by the starboard ports also. Before anything could be done to save her, the vessel was down on the mud.

Cofferdams are being built around ports and hatchways, and an effort will be made to pump the ship dry. The wrecking company are fully confident of their ability to float her within in a few days.

The "Germanic" was the pioneer vessel of the modern type, and since her maiden trip in 1875 she has crossed the Atlantic 600 times, covering a total distance of about 1,800,000 miles, or sufficient to carry her around the world on a great circle 75 times. She has carried some 60,000 saloon and 200,000 steerage passengers, and to the credit of her builders and officers it can be said that she has never, in all the twenty-five years of her service, met with a serious mishap. In 1894 she was re-engined and refitted at a cost of $250,000, and to-day she is faster by a knot per hour than she was a quarter of a century ago.

THE HEAVENS IN MARCH.

BY GARRETT P. SERVISS.

The first month of spring witnesses the retreat of the constellations which formed the glory of the mid winter nights. The early evenings of March are not entirely deprived of the presence of Sirius, Orion, and their splendid attendants, but these stars are on their downward way, and, as they approach their setting place, they do not sparkle with the dazzling beauty that characterizes them when they are mounting from the east or crossing from the meridian in the crisp air of January or December. At 9 o'clock P. M., in the middle of March, they are all in the western half of the sky, while far less brilliant star groups occupy the zenith and the east. Leo is near the meridian, with Hydra stretched across the south, and the quadrilateral of Corvus rising well above the eastern hills. Behind Corvus come the leading stars of Virgo, while Arcturus glows redly in the northeast, and the Great Dipper is conspicuous between Arcturus and the pole.

THE PLANETS.

Mercury is an evening star, reaching its greatest elongation east of the sun on the 24th, when it will set nearly two hours after sundown. It should be easily seen in the western twilight for several days before and after that date. It may interest those who wish to test their powers of vision by trying to see the markings on Mercury to learn that at the Flagstaff Observatory the magnifying power usually employed in studying that planet and Venus is only 150 diameters on a 24-inch telescope. But diaphragms are employed to cut down the aperture to three or four inches, with great gain to clearness of seeing when such bright objects are to be viewed.

Venus is a morning star, and still brilliant, although gradually losing magnitude as she retreats from the earth. She rises between 4 and 5 o'clock in the morning, and moves in the course of the month from Sagittarius into Aquarius.

Mars, which distinctly outshone its neighbors Castor and Pollux, in Gemini, during the winter, is yet conspicuous and well worth studying with a telescope, although not much detail can now be seen on its disk. It will be interesting during the month to watch the motion of the planet with reference to the two stars. Mars rises about noon and sets in the small hours of the morning, so that it can be seen all night long. It is on the meridian, at the opening of the month, about a quarter before 9 o'clock.

Jupiter, the king of the planets, now in the western edge of the constellation Libra, rises at the beginning of February about 11 o'clock P. M., and, at the end of the month, about 9 o'clock. It is accordingly coming into fairly good position for observation. Prof. Hough has recently pointed out that there is a prevailing misconception as to the rotation of Jupiter. He himself thought in 1882 that the rapidity of rotation varied with the latitude, as on the sun. Now he concludes (and he has studied the planet assiduously for twenty years) that the different rates of rotation observed on Jupiter depend rather on the level of the markings than on their latitude. There are two principal rotation periods—9 hours 50 to 51 minutes and 9 hours 55 to 56 minutes—and spots are occasionally seen moving at these two different rates in nearly the same latitude. Usually, however, the shortest period is found only within a distance of about 9° north or south of the equator, although it is not confined to that region. The swifter moving spots, Prof. Hough thinks, are the more elevated. Fortunately for those who desire to satisfy their curiosity about this grand and puzzling planet, many of the markings on Jupiter can easily be seen with good three and four inch telescopes, and with a five or six inch glass observations of decided scientific value may be made.

Saturn is in the lower part of Ophiuchus, between Scorpio and Sagittarius. It is a morning star, rising, in the middle of the month, about 2 A. M.

Uranus in Ophiuchus, about 5° north of the red star Antares, rises one hour before Saturn.

Neptune in Taurus is too faint for recognition by the naked eye.

It is interesting to note that the new asteroid discovered by Dr. Witt last year, which at times approaches the earth many million miles nearer than Venus is at inferior conjunction, has at last received a name from its discoverer. He has chosen to call it Eros. Eros, though a very small planet, is likely to play a very important part in the future history of astronomy.

THE MOON.

March opens with the moon approaching last quarter. New moon occurs on the 11th; first quarter on the 18th; and full moon on the 27th.

THE SUN.

The sun enters Aries, and the astronomical spring begins, on the afternoon of March 20. We appear to be, at present, close to the minimum sunspot period, and those who accept the view that at such times extreme contrasts in weather conditions are likely to prevail will be encouraged by a review of the meteorological records of the past winter, especially when taken in connection with those of the summer of 1898.

WORK OF THE WEATHER BUREAU.

Each year a concise report of the Chief of the Weather Bureau gives an idea of the splendid work which this bureau is doing. During the latter part of the fiscal year which ended June 30, 1898, it became apparent that the methods of gathering information of the approach of the West Indian hurricanes, which serve so admirably as warnings for the Gulf and Atlantic coasts, were wholly inadequate for a service which should cover the waters of the West Indies in which upward of two hundred naval and transport vessels of the United States were operated. The presence of this large fleet in the hurricane region made it imperative that precautionary measures should be taken. Accordingly a bill was submitted to Congress on January 16, 1898, authorizing the bureau to establish and operate observation stations throughout the West Indies and along the shores of the Caribbean Sea, and this bill became a law, and arrangements were made for making meteorological observations and displaying hurricane signals at Kingston, Santiago de Cuba, Santo Domingo, Barbados, Port of Spain, St. Thomas, Curaçoa, and Barranquilla. At the above named places observations will be made twice daily and cabled to Kingston and the central office in Washington. Even during hostilities Prof. Carbonell forwarded daily reports from Havana, which were especially gratifying to officials of the bureau as well as to scientists all over the world. Although the protection of our naval forces was a primary object in the extension of the storm warning system to the West Indies, other considerations scarcely less important made the step a wise and beneficent one. Now that the exigencies of war permit the removal of a greater part of the fleet from West Indian waters, the meteorological service will still serve a useful purpose in the protection it will afford to the commerce of that very extensive region.

Steps have been taken to equip about thirty stations in the Mexican republic by that government with the most modern type of meteorological instruments and to establish a service similar to our own. Additional observation stations have been established in arid and subarid regions of the West. It is believed that the additional stations will not only assist in the development of agricultural and industrial interests in the respective States in which they are located, but will also be of material benefit in improving warnings and forecasts, specially for the regions west of the Rocky Mountains.

The work of producing a thoroughly satisfactory kite was begun in the latter part of 1895. Various forms of kites were devised and thoroughly tested and many valuable laws relating to the strength and efficiency of the kites were developed. The kite finally adopted for practical work was an improved form of the Hargrave cellular type. A popular idea prevails that any one possessed of a few materials and a little ingenuity can construct a thorough-going kite. This is not true as regards the present Weather Bureau kite. The size and construction of every detail have to be worked out with reference to the several strains at the different points, securing thereby the maximum strength with the minimum weight. Suitable forms of automatic registration apparatus have also been devised. Sixteen stations have been equipped with kites and other necessary instruments, and the observers chosen for the work were, with three exceptions, drawn from the list of eligibles from the Civil Service Commission. These men were called to Washington and given a practical course of instruction in the art of flying and managing kites. The period of construction extended from the 17th of March to the 18th of April. If each station had made an ascension daily during June, five hundred and ten ascensions could have been made, whereas two hundred and seventy-eight actual ascensions were made, in each of which the elevation attained exceeded 1,000 feet. The Weather Bureau kite stations are now in a position, as far as means and appliances are concerned, to obtain a complete series of observations. It is expected that the kite observations will add largely to our knowledge of temperature of the gradients aloft, and thus contribute to the solution of the problem of reducing barometer readings on the plateau to sea level.

As is usual, all forecasts and warnings issued by the department are of the greatest possible value to the community at large. The true measure of efficiency of the Weather Bureau is found in the promptness and accuracy with which notice of the approach and force of severe atmospheric disturbances is given. The efficiency of the bureau during the year 1897-98 was fully up to the high standard of the previous year. Hurricanes, wind and snow storms, freezing weather, and floods were heralded by timely and accurate warnings, and undoubtedly saved many lives and a vast amount of property. The distribution of the forecasts was in accordance with methods tried and proved by the experience of previous years. The daily press, the mail, telegraph, telephone, railroad bulletins, etc., were utilized to the greatest possible extent; and forecasts, warnings, maps, and bulletins were issued and distributed to the extent of 23,531,500, which is a most remarkable showing; 5,239,800 weather maps of all classes were issued, and 108,600 bulletins were distributed during the year. Each map or bulletin contains daily forecasts and statistics showing the weather conditions over some part of the United States. In the large cities the map contains a large number of reports. These are exposed on bulletin boards, etc., by boards of trade, business houses, and public offices. There is also a very considerable number issued to the schools and colleges for purely educational work. Climatic work was carried on in the cotton, corn, and wheat regions, consisting in reporting the daily temperature and rainfall at 129 stations in the cotton region and 131 in the corn and wheat region. The establishment of an agricultural experiment station in Alaska in April, 1898, led to the detail of an official of the Weather Bureau for duty in organizing a climate and crop service in that territory. The central station of the new service is situated at Sitka, at which point continuous observations are registered. Various publications and The Monthly Weather Review were continued.

Among the interesting features of the scientific work carried out by the bureau were observations on the rainfall and outflow of the great lakes, minute oscillations by the great lakes, and meteorological chart of the great lakes. In 1891, 633 miles of telegraph lines on the sea coast and frontier were turned over to the Weather Bureau as appropriate to a purely meteorological service. These lines traverse thinly settled regions or connect islands with the mainland by submarine cable at points where there is not enough commercial business to warrant the construction of a private line. These lines serve a double purpose. First they enable the bureau to receive early information of changes in the weather of exposed points on our coast, and they permit of display of storm warnings near several of the great highways of vessels leaving or entering our ports.

Instruction given in meteorology in the United States varies in its character as the subject is considered as a part of a course in climatology and geology, or a course in mathematics and physics. The former method of treatment is appropriate to high schools and to those who contemplate becoming observers in the Weather Bureau. The latter method of treatment is appropriate to those in universities, and should fit one for the prosecution of important work in dynamic meteorology. The importance of the subject has been kept in mind specially in the assignment of observers to duty at points where there are colleges and universities not already provided with instructors in meteorology. Prof. Cleveland Abbe, editor of The Monthly Weather Review, has been requested to prepare a report of the general conditions of the subject in the United States. A meteorological observatory has been erected at Columbia University, and a complete course of instruction in this subject will undoubtedly follow. Important improvements in experimental equipment were also introduced during the year, and classes of students visit Weather Bureau stations regularly, and advantage is taken of this opportunity to instruct large numbers of pupils in the use of meteorological instruments, as well as the methods of observations and general work of the bureau.