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.
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, APRIL 13, 1901.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE BROOKLYN RAPID TRANSIT EXTENSION.

The citizens of New York will approve the stand taken by President Orr, of the Rapid Transit Commission, in regard to the proposal, more ambitious than tangible, of Mr. Johnson to build an extension of the subway system through South Brooklyn to Fort Hamilton, and across Staten Island to a junction with his proposed Philadelphia and New York trolley line. Mr. Johnson may be perfectly sincere in his intentions, and, for all we know, may have the necessary ability and capital to do everything that he promises; but he has certainly failed, thus far, to place his proposal before the Rapid Transit Commission in such a practical form as would justify that body in taking it into serious consideration.

In a communication to the Railroad Committee of the Municipal Council, and the Chairman of the Committee on Streets and Highways of the Board of Aldermen, President Orr says that the difficulties in the way of laying out and offering at public letting any such road as Mr. Johnson describes, are two: First, that at the present time the city cannot afford to borrow for rapid transit purposes more than $8,000,000, which sum the Rapid Transit Board is advised by its engineers will probably suffice to extend the railway beneath the East River to the Borough Hall and Flatbush Avenue. Such a road as Mr. Johnson describes would probably cost in the neighborhood of $24,000,000, and in view of the possible difficulties in tunneling beneath the Narrows, might cost a great deal more. President Orr points out, secondly, the uncertainty as to securing a bidder, since Mr. Johnson does not positively say that he will bid for or build a road on the lines he suggests. With regard to Mr. Johnson's statement that he is able and willing to carry passengers for three-cent fares within the city limits, Mr. Orr's letter pertinently suggests that if the Municipal Assembly will approve the plans of the Rapid Transit Commission, and the contract is put up for public letting, Mr. Johnson may bid, and include in his proposal the offer for a three-cent fare, that being the proper time and the proper way to have such an offer considered.

In its treatment of this latest proposition, the Rapid Transit Commission has shown the discretion which has been a marked feature in its very successful handling of the great problem before it. With over twenty miles of tunnel road under contract, and a proposed extension to cost $8,000,000, we think that the only possible course for the Commission is the rejection of a scheme so extravagant and immature as this Staten Island proposal. Some day in the future, the Rapid Transit system will be extended through South Brooklyn and beneath the Narrows to reach the large suburban population on Staten Island; but the time is not yet come.

A STEP BACKWARD.

When the last Congress adjourned without making any provision for new battleships and cruisers—the first time such an omission has been made in ten years—the United States Navy was set back among the growing navies of the world by just twelve months in time, and by exactly the number of battleships and cruisers which represents the average annual addition, that should be made at this time to our navy, if we are to maintain even our present relative standing among the world's powers.

It is at all times the risk and, as the last Congress has proved, may be at any time the misfortune, of a country the question of whose naval increase is absolutely in the control of laymen, that the additions to the navy, both as regards the numbers and the types of new ships, may be made with very little, if any, reference to the pressing needs of the hour, or to a carefully-thought-out programme, whose provisions are based upon a farsighted and statesmanlike view both of the present trend of events and of the probable developments of the future. Whether we like the thought or not, we are boldly launched upon the tempestuous sea of international politics; for the possession of the far-distant Philippines has rendered us ten-fold more open to attack by a naval power than we were before the first gun of the Spanish-American war was fired. With other naval powers bending every effort to increase their fleets, to reorganize their personnel, and maintain their standing as to number and efficiency, the failure of Congress to authorize a single battleship or cruiser becomes doubly deplorable. Are the country's representatives perhaps without the necessary technical advice as to the requirements of the navy? We think not; for there is in Washington a board composed of leading officers of the line and staff whose special duty it is to keep Congress informed as to the naval situation, and our particular requirements as a naval power, and these requirements are regularly placed before Congress in an annual report of the Board. The plea of ignorance, therefore, cannot be urged; and one is driven to the conclusion either that Congressmen are guilty of amazing indifference, or that they are willing to make the interests of the navy, which are just now, or may soon become, the most vital interests of the country, the sport of contending political factions.

Two years ago the Scientific American showed in a careful analysis of the seven leading naval powers of the world that the United States came fourth, with Germany as a very close competitor. It was pointed out at the time that, whereas the increase of our navy depended upon the caprice of Congress and might be great or little according to the temper of that body in each particular year, the Germans, with characteristic method and thoroughness, had conceived and were carrying out a programme of construction, which was to extend over a couple of decades and insure that a certain number of ships would be commenced and a certain number completed each year. Since then Germany has not only been steadily at work upon this programme, but she has drawn up and committed herself to a second or even more ambitious programme. The two schemes together have already placed that power on a par with ourselves; and by next year, thanks to Congress, we shall have taken the fifth position with the prospect of being steadily outdistanced by a power whose trade and spheres of influence in the South American Continent are growing by leaps and bounds.

LAKE VESSELS FOR THE ATLANTIC TRADE.

Some years ago it was confidently expected that the whaleback type of vessels which has done so much for navigation on the Lakes, would eventually become a factor in the Atlantic trade, and although a number of vessels of this type entered into the ocean trade some years ago, and have met with no little success, they have not made the advancement in the ocean trade that had been hoped for this type of vessels. Whaleback barges owned by Rockefeller are now, however, en route to Europe, having refitted at New York for the sea service.

Of the ten vessels under construction in Lake shipyards for the Atlantic service four are practically completed. These are owned by the International Steamship Company, a concern organized early in the year. These four vessels will serve as freight carriers between New York, Cuba, Porto Rico, and South America. Four steamers are under construction at South Chicago for a syndicate composed of New York and Chicago capitalists, and they will form the nucleus of a big fleet of carriers which will engage in the packet freight and grain trade between Chicago and Liverpool. Owing to the limitations of the Canadian canals connecting the Lakes with tide water all the vessels being built at Lake shipyards for ocean service are about 250 feet in length, but all interested in Lake shipping are hoping for the time when American canals of a greater capacity will be opened.

The new vessels of the International Steamship Company afford good examples of the Lake craft now being constructed for the Atlantic trade. These vessels have a length of 256 feet over all and a length on keel of 252 feet. The molded breadth of the steel hull is 42 feet, and the molded depth is 26 feet 5 inches. These vessels are fitted with quadruple expansion engines, with cylinders 15, 23, 35 and 54 inches in diameter, which will be supplied with steam by two Babcock & Wilcox water tube boilers, with a steam pressure of 250 pounds. The argument of builders of regular ocean craft that a vessel's machinery must be located amidships is disputed by the builders of Lake vessels, and the boilers and engines of all these Lake craft for the Atlantic trade will be located aft, and thus, by the special hull construction, they will be able to carry larger cargoes than the regular ocean vessels of like draught. By thus carrying the same cargo as is now carried by regular ocean craft of greater draught these ocean-going vessels will be able to discharge cargoes at those ports, where lightering systems are now in vogue, without the use of lighters, and thus they hope to outbid the regular sea-going craft for such trade.

The "Tampico" and the "Eureka," two first-class steel ships which traded on the Lakes during the season just closed, are on the coast. They are sister ships and models of their type. As they possess a very large carrying capacity they can be operated at a comparatively small expense. The "Simon J. Murphy" is another type of Lake ocean-going vessel which was built last summer. The Rockefeller interests, among other large Lake shipping concerns, will now give the Atlantic shipping business a thorough test, and in case there is a reasonable chance of profit a large fleet of these boats, many of them of the whaleback type, will be sent to the coast next fall. The Carnegie Steel Company, Limited, last year dispatched the steamer "Monkshaven" from Conneaut, Ohio, to England, laden with a cargo of 1,001 tons of steel billets, this being the first Lake vessel to carry the product of this great iron and steel firm abroad. After passing the Canadian locks she took on a shipment of pulp wood. Were it not for the locks she could carry direct from the Lakes 2,000 tons of steel The Carnegie Company have under construction a number of vessels which are being built with a view to engaging in the ocean carrying trade, and it is now proposed to ship much of the product of this great manufacturing concern to Europe via the Lakes. The vessels being constructed by the Carnegie Company will engage in the ore-carrying trade during the open season on the Lakes, and in the winter will be dispatched with cargoes of finished product to Europe, and, during the season, will ply regularly between the Atlantic coast and European ports, and thus carry much of the trade of the Carnegie Company now shipped by the regular ocean lines.

GOVERNMENT ECLIPSE EXPEDITION.

BY MARY PROCTOR.

The Government Eclipse Expedition sailed from San Francisco for Sumatra on February 16, on the transport "Sheridan," which will take the members as far as Manila. There a man-of-war from the Asiatic station will be set apart for their use during the remainder of the trip as far as Padang, in the island of Sumatra. The expedition is sent for the purpose of observing the total eclipse of the sun which occurs May 17, 1901.

The entire expedition has been planned and the preparations carried out under the personal direction of Prof. S. J. Brown, Director of the United States Naval Observatory, Washington, D. C. However, he was unable to accompany the expedition, which is consequently placed in charge of Prof. A. N. Skinner, of the Naval Observatory.

The names of the astronomers who are to accompany the expedition are as follows: Prof. A. N. Skinner; Prof. W. S. Eichelberger, assistant astronomer; Prof. F. B. Littell, G. W. Peters, L. E. Jewell, and W. W. Dinwiddie, of the United States Naval Observatory staff.

From the other observatories are Prof. E. C. Barnard, of the Yerkes Observatory; Dr. W. J. Humphreys, of the University of Virginia; Dr. S. A. Mitchell, of Columbia University, N. Y.; Dr. N. E. Gilbert, of Johns Hopkins University; Dr. H. H. Curtis, formerly of the Lick Observatory, now assistant in the Leander McCormick Observatory.

The "Sheridan" was expected to reach Manila by the middle of March, and Padang by the first of April, leaving nearly two months for preliminary operations in Sumatra. This is of special value, since there may be many difficulties to overcome with regard to the transportation of instruments and in making a careful search for desirable locations for the observing-stations, which are to be distributed along the shadow-path. As soon as these important facts are determined, the instruments will be assigned to the different observers and set up in place.

According to the programme arranged by Prof. S. J. Brown, the work will consist of photographic, spectroscopic, and polariscopic observations, in addition to the usual visual work. Prof. Bernard will be stationed at Solok, near the central line, and expects to photograph the corona on a large scale. He will use the cœlostat which he employed so successfully at the last eclipse, besides using smaller apparatus.

At Fort de Kock, near the northern border of the shadow-path, Mr. Peters will occupy a position, using the 40-foot photoheliograph lenses of the Naval Observatory, two of which gave very fine results at the last eclipse when used at Barnesville and Winnsboro. Two other photographic instruments will be used to test the value of photographing with visual lenses, using some form of screen to cut out the violet light. The results at Barnesville in this direction were so successful at the last eclipse that they show that this method

for the study of the greatest extension of the coronal streamers is of much value.

As in the last eclipse, the spectroscopic investigations will be carried on entirely by grating, concave and flat. Dr. S. A. Mitchell will occupy a position at the central station, and will use the objective grating with which such successful results were obtained at the last eclipse. Mr. Littell will take charge of another objective grating, using a very long slit, with which it is expected to obtain some light on the rotation of the corona, as the length of the slit is sufficient to take in the disk of the moon and the brighter portions of the corona.

Mr. Jewell and Dr. Humphreys will use a concave grating of 30 feet focal length and a ruled space of 3½ x 3 inches, which has just been constructed by the Johns Hopkins University. It will be used without a slit, and as Dr. Humphreys and Mr. Jewell expect to occupy a position near the northern border of the shadow-path, where the duration of the reversing layer will be several seconds, the concave grating used by these observers is expected to yield results of unusual value. Mr. Jewell will also take charge of a concave grating of 10 feet focal length, and a photographic instrument in which a visual lens will be utilized.

The character of this particular eclipse is well shown by the fact that although this station will be located within seven miles of the northern border, the duration of totality is over three minutes, more than twice as long as the duration of totality at the central line of the eclipse in 1900.

Dr. N. E. Gilbert has the important task of looking after an instrument loaned to the expedition by the University of Wisconsin. It consists of a combination of a spectrum and Nicol prism, by means of which only the reflected light of the corona will be admitted on to the photographic plate. This will be used at the suggestion of Prof. R. W. Wood, of the University of Wisconsin, who has made certain interesting investigations with regard to the possibility of securing reliable records of the Fraunhofer lines in the spectrum of the corona. According to his theory, they ought to be found there, but for some reason it has been impossible to secure reliable records of their presence there.

Dr. Wood believes it is possible to detect the presence of these lines in the spectrum of the corona, basing his supposition on the fact that the light emitted by the particles in virtue of their incandescence so overpowers the reflected sunlight that the lines are invisible. That the coronal light is strongly polarized is well known, and there is scarcely any doubt that the polarized light is reflected sunlight. To quote Dr. Wood's remarks, in Science for February 1, 1901:

"If now a Nicol prism be placed before a slit of the spectroscope in such a position as to transmit the polarized radiations, these will be allowed to pass with almost undiminished intensity, while the emitted or unpolarized light will be reduced in intensity by one-half. The great change in the ratio resulting might easily be sufficient to bring out the dark lines distinctly. I feel firmly convinced that the experiment should be tried at the Sumatra eclipse of next May, for I have successfully accomplished it in the laboratory with an artificial corona."

Thus we see that eclipse work of the present day includes in its programme a study of the coronal light, the record and measurement of the bright coronal lines, and their identification, if possible, with terrestrial elements. and the distribution in the corona and round the sun of the various bright lines of the coronal spectrum, and especially of the bright line "coronium."

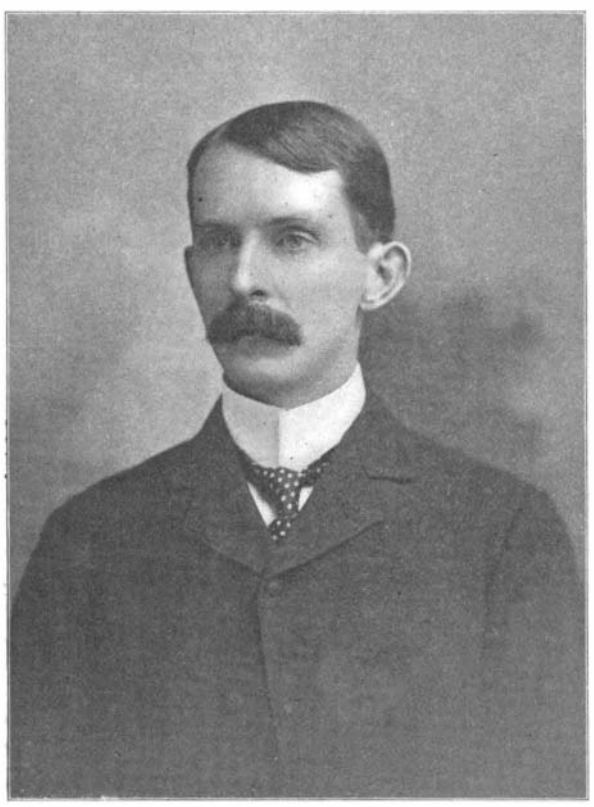
This May is the first time the United States Naval Observatory has sent an expedition to observe a total eclipse of the sun since 1878. Let us hope success may attend the present Government Eclipse Expedition, and that an important advance may be made in connection with the study of the corona, and especially as to the best methods and instrumental means for future research.

ELECTRICAL PROTECTION OF THE MAILS.

The Post Office Department is utilizing all means to insure the security of mail matter, and it may not be generally known that the government conducts from time to time tests of inventions designed with this end in view. The Post Office has suffered considerable losses by organized thieves who were dressed in uniform like government mail collectors and provided with duplicate keys. An electrical device for protecting the letter boxes is now being tested. A number of mail boxes with locks electrically controlled have been installed on one of the mail routes in the business section of the capital, says The Western Electrician. The electrical locking devices are under the control of an operator at the central station in the Post Office where there is a clock, similar in appearance to the ordinary watchman's clock, provided with a mechanism which prints the numbers of the mail boxes when they are opened and when they are closed. The first box must invariably be visited first by the collector, as this box controls the operation of the lock of box number 2, box number 2 of number 3 and so on. After allowing the mail collector time to reach the first box, the operator at the central station presses a button which releases a secondary locking device, and allows the carrier's key to throw the lock bolt. The opening of this box performs the same service for box number 2 as that performed by the operator at the central station; that is, sets automatically the lock for the collector's key to open. Since succeeding boxes are set by the one last opened, it is obvious that the predetermined order of visitation by the collector must be strictly adhered to. The act of opening and closing each mail box is instantly recorded on a time dial at "Central," and in case of unlawful attempts being made to open them Central is instantly notified of "trouble on route" by the ringing of an electric bell. Should the occasion arise when the collector desires to communicate with the operator at Central, he can do so by pressing a button at any mail box, a prearranged code of signals permitting the sending of a few important messages.

THE NEW COMMISSIONER OF PATENTS.

Frederick Innes Allen, the new Commissioner of Patents, was born in Auburn, N. Y., January 19, 1859. He comes from New England stock, being a direct descendant of George Allen, who landed with the Weymouth party from England in 1636, and settled at Weymouth, Mass. The head of the branch of the family from which the Commissioner is descended was one of the founders of the town of Sandwich,



F. I. Allen

Commissioner of Patents.

Mass., the first town of the Plymouth colony upon Cape Cod.

Mr. Allen's father was William Allen, who for many years was prominently and actively engaged in the practice of patent law. He was a contemporary of, and associated with, such great patent practitioners as Blatchford, Gifford, Harding, and other authorities upon patent law of a generation ago. He was the managing attorney of the combination of reaper patent owners who controlled the manufacture of harvesters in the United States forty years ago, and which was the largest combination of the time.

Commissioner Allen was educated at the Auburn High School and Phillips Academy, Andover, and graduated from the Sheffield Scientific School of Yale with the class of '79.

He then took up the study of law, and was admitted to practice in 1882. His natural inclination was to patent law, and he at once began the study of this special branch of his profession. He has been eminently successful in his practice.

While he has always been a diligent student of the law, Mr. Allen has found time to acquaint himself with a wide range of topics, and few men have more general information upon a greater variety of subjects. He has been a special student upon naval and ordnance construction, and he has given a number of entertaining and instructive addresses upon these subjects. Mr. Allen also excels as a mineralogist. While at Yale he took the class prize for geological and mineralogical study. He has never lost interest in the subjects and his collection of specimens is large and complete.

Mr. Allen is a man of dignified appearance and pleasant manners. He gives one the impression of being a man of strength and firmness coupled with that breadth of view which is so absolutely essential in any one holding a position requiring as diversified talents as a Commissioner of Patents. He has, by education and experience, a thorough knowledge of the patent practice, and there is no reason why he should not soon acquire a thorough understanding of the inner workings and special needs of the Patent Office. We are happy to extend to him our congratulations upon his appointment to this most important trust.

THE NEW YORK BOTANICAL GARDEN MUSEUM.

The museum stands on a commanding site near the Bedford Park entrance to the garden. Looked at from the south, it is an imposing building. The walls are a gray white; they rise in four high stories, and the center has a dome. The Corinthian columns at the portico, and the stone balustrade at the outer side approach contribute to the substantial elegance of the structure.

The practical information now to be gained in the garden is mainly to be obtained in the museum, and at the same time, no small measure of pleasure. In the work rooms in the basement, quantities of unmounted specimens of plants are being put into order. The young men at work upon them spread upon a large thick sheet of glass, a coating of Dennison's glue diluted with vinegar. Upon this, the dried specimen is laid for an instant; then it is touched upon a sheet of porous paper that the unneeded glue may be absorbed; from this, it is laid upon the permanent cardboard, which already bears a printed label. After being kept under pressure for two or three days, the specimens are strapped in two or three places, and thus are perfectly secure.

One of the students at work gave a hint in regard to the preservation of the color of flowers, worth noting here. It has been found that if the specimens, after being under pressure for a day or two, are laid in papers heated in the sun, until their drying is complete, the color is preserved as by no other process.

The first floor contains the collections illustrating economic botany. They are beautifully arranged and are deeply interesting. Each case tells a volume. For example, one showing pine products contains a section of the trunk of a Georgia pine, cut as such trees are when the turpentine is collected. Beside it are jars of turpentine and tar in various degrees of density, with lumps of resin. Close at hand are specimens of soaps in which tar or resin has been used.

The cocoa bean, cotton, cork, tea, the grains, hemp and the rest of the vegetable products upon which we depend, are represented with equal detail in the collection. One case of special interest is that devoted to sedge-fiber products made by the Northwestern Grass Twine Company, of St. Paul. The fabric is called *iyotan*. The samples of carpets, rugs and cushions of soft greens and grays into which the grasses are woven are very agreeable in color, and look durable.

The next floor is devoted to the illustration of systematic botany in a manner at once interesting and instructive. Each of the large cases is devoted to one family of plants, or to closely allied groups. For example, the *Polypodiaceae* may be named. Its 3,000 species are represented by specimens of fossil ferns from coal measures, a section of a large tropical tree fern, roots in jars of alcohol, as well as dried ferns mounted, and cuts of microscopic preparations of sections of ferns.

Between the upright cases, swinging cases on standards are arranged. These contain dried specimens of a great variety of plants, arranged, apparently, rather with reference to making the room attractive than to their classification.

This collection and the one below are of deep interest and calculated to inspire children who see them with an enthusiastic love of botany as it may now be studied. A day in this museum with most people would do more in this direction than years of study according to the old methods when the science consisted mainly in the identification and classification of flowering plants.

The top floor of the building is not open to the general public. The beautiful laboratories there, physiological, taxonomic, chemical, and embryological, are used both by graduate students of Columbia and the garden students, and here they carry on original work in all these departments of botany. They have access to the botanical library of about 8,000 volumes, and to the immense herbaria belonging to both institutions. The plants are arranged in cases, and classified according to Engler and Prautl's system. In such a working-place as this many of Nature's remaining secrets ought surely to be discovered.