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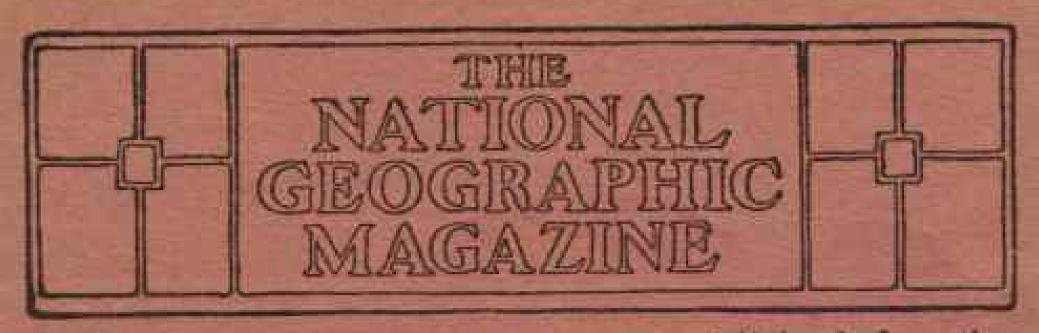
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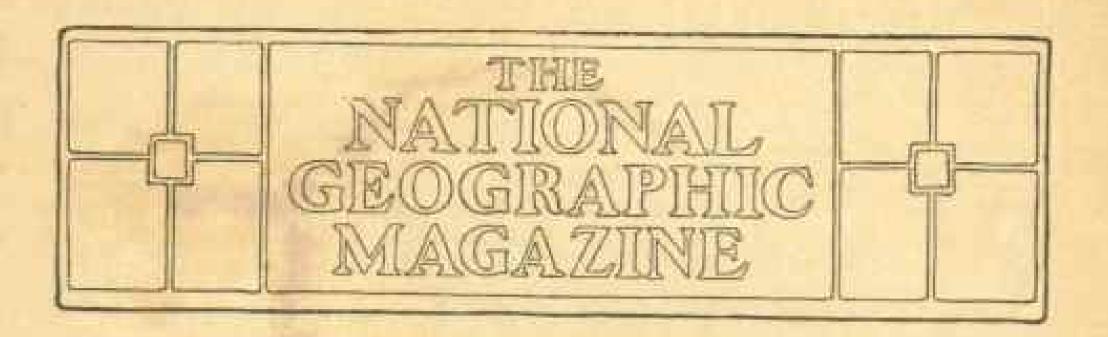
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# THE U.S. COAST AND GEODETIC SURVEY

BY O. H. TITTMANN, SUPERINTENDENT

MVE years from now the Coast and Geodetic Survey may celebrate the centenary of the act creating it, for it was in 1807 that Congress passed "An act for surveying the coasts of the United States." The President was authorized and requested to cause a survey to be taken of the coasts of the United States, in which shall be designated the islands, shouls, with the roads and places of anchorage within 20 leagues of any part of the shores of the United States, and also the respective courses and distances between the principal headlands, together with such other matters as he may deem proper for completing an accurate thart of every part of the coasts within the extent aforesaid. He was also to cause such examinations and observations to be made with respect to Saint Georges Bank and any other bank or shoal and the soundings and currents beyond the distance aforesaid to the Gulf Stream as in his opinion may be especially subservient to the commercial interests of the United States.

To Professor Patterson, of Philadelphia, is due the credit of having urged the undertaking, and to President Jefferson and Secretary Gallatin of having interested themselves and given their support to the suggestion of Professor Patterson.

In 1807 the coasts of the United States extended from the eastern boundary of Maine to the northern boundary of Florida, for the latter still belonged to Spain. The coast of Louisiana between the Sabine and the Mississippi had recently been acquired, and gave to the United States a small, if important, strip of coast on the Gulf. These. then, were the coasts which at that time were deemed needful to be surveyed in the interests of commerce. Not that no charts existed of the regions in question; Des Barres, His British Majesty's Surveyor General for the Colonies, had begun the good work, which was interrupted by the War of the Revolution. but at best the results of his surveys were meager, insufficient, and inaccurate.

#### ITS INCEPTION

It may be worth while to call attention to and to dwell for a moment on the unusual but eminently practical and sensible measures that were taken to

<sup>&</sup>quot;An address before the National Geographic Society, November 21, 1902.

bring the Survey into existence after it had been authorized by Congress.

Mr Gallatin's first step was to invite the opinion of scientific men as to the plans to be adopted, in a circular setting forth the objects to be attained. Thirteen replies were received, and these were referred to a committee of the American Philosophical Society, which recommended the adoption of the plan submitted by Mr Hassler. We shall presently see that 36 years later another committee of learned men, called together to reorganize the Survey, affirmed and adopted the scientific methods of Hassler and adapted them to the larger work devolved on the Survey by the extension of our domain. It thus happens that in the case of the Coast Survey the most competent authorities of the times were consulted to prescribe the principles on which the work was to be carried out. This later generation of men may well be thankful for the prevision of the two statesmen who gave direction to the work, and for the wisdom of those who conceived in those early days the broad lines on which the work was to be conducted; for though the methods have been modified, changed, and perfected, the principles then prescribed have guided the Survey ever since.

#### THE NEED FOR A COAST SURVEY

The problem before the Survey was to perform a national as well as an international duty. It behooves every country, in the interests of humanity, to safeguard the lives and property which are continually at stake on the great highways of commerce along the shores of the oceans; and the first step toward the fulfillment of this obligation is to map the coasts and chart the waters, in order that the mariner may have before him a graphic guide of the routes he must follow to insure the safety of the lives and property committed to his

charge. The high seas claim their victims through fogs and storms and collisions, but to the experienced navigator the open ocean is a place of safety, while a proximity to the coasts, even where surveys and light-houses have minimized the risks, inspires feelings of grave responsibility and even of dread of hidden dangers, of unknown currents, and of collisions where busy commerce concentrates in narrowing lines the coming and departing ships.

Mr Hassler, whose plan was adopted, was a Swiss by birth, a man of great learning and well qualified by experience to outline the scientific principles on which an extended survey was to be conducted. Histask was a diment one, for neither men trained in the profession nor instruments were to be had in our country, nor was there a common appreciation of the importance of the work at that time. He went to England in 1811 to procure instruments, but the war with that country deferred the accomplishment of his purpose. It was not until 1816 that he was appointed Superintendent, and though he immediately began his operations with vigor they were cut short by the practical abolition of the Survey two years later through the revocation of the authority to employ civilians on the work. Its connection with the Treasury Department ceased, and the country became dependent for its charts on the private enterprise of the Messrs Blunt, of New York, and on fitful and unsystematic surveys made under the Navy Department. On the recommendation of the Secretary of the Navy the original act of 1807 was revived and the Survey was resumed in 1832 under Mr Hassler's direction, and it was again placed under the Secretary of the Treasury, only, however, to be retransferred to the Navy in 1834. This arrangement again proved to be unsatisfactory, and in 1836 the Survey was finally placed under the Treasury Department.

Suggestions for changing its status were again made, and its condition of apparent unstable equilibrium prompted Congress to take the matter in hand. Reference has already been made to a committee which was appointed by act of Congress in 1843 to reorganize the Survey. It consisted of six commissioned officers—that is, two officers of the Navy, four of the U.S. Topographical Engineers, all experienced in the work of the Survey, and three civilians. The act of Congress provided that the work should be conducted in accordance with the plan of reorganization of this committee, but prescribed that as many army and navy officers should be employed upon the work as would be compatible with the successful prosecution of the work.

At the same time the committee made

the following recommendation:

in Resolved. That inasmuch as the object and purpose of the survey of the coast refers principally to the commercial interests of the country, and as all the laws of Congress in relation to the same contemplate the employment of civilians and officers of the army and navy upon said work, it is the opinion of this board, and they do hereby respectfully recommend, that it should be under the control and considered a part of the Treasury Department."

The President's formal approval of the plan of reorganization and of the recommendation just recited placed the Survey under the Treasury Department, where it has remained ever since.

Before describing its present organization; it must be explained why the original one was gradually modified by the withdrawal of army and navy officers

from participation in its work.

During the Mexican war the withdrawal of all the navy officers was threatened, and nearly all the army officers were withdrawn. At the outbreak of the civil war in 1861 all army and navy officers were withdrawn and the connection of the Army with the Survey ceased altogether. The navy officers did not return until about 1870, but as the needs of the country required the continuation of the Survey, its execution was entrusted entirely to civilians during these years.

At the outbreak of the Spanish war the progress of the Survey was again endangered by the sudden withdrawal of all the navy officers and enlisted men of the navy. With the concurrence of the Secretary of the Navy, Congress made provision to put the Survey on an entirely civil basis. Its present organization may be described as follows:

#### PRESENT ORGANIZATION

The head of the Survey, called the Superintendent, reports to the Secretary of the Treasury. The Superintendent is charged with full responsibility in every respect for all the work of the Bureau. He is aided in such of his duties as cannot be delegated to officers of lower rank in the organization, by an Assistant Superintendent, who acts as Superintendent in his absence.

Eight officers or groups of officers report directly to the Superintendent and

Assistant Superintendent, viz:

The assistant in charge of the office.

The inspector of hydrography and topography.

Inspector of geodetic work.
Inspector of magnetic work.

The disbursing officer.

Editor.

Chiefs of field parties. Heads of suboffices.

The first four of these officers have a general supervision over all the operations of the Survey indicated by their designation, each acting as an advisory officer to the Superintendent in regard to the specified portions of the work. The chiefs of field parties and the heads of suboffices have direct charge of all operations in the field.

Each field party is a temporary organization which is created for a specific operation by an order of the Superintendent, which makes one of the officers of the field force the chief of party, and if necessary assigns to him as subordinates one or more other officers from the same force. The party is disbanded when the work assigned to it has been completed. If the party is for duty on land, the remainder of the organization of the party, the hiring of recorders, laborers, drivers, etc., is left entirely to the chief of party. If the party is for duty on a vessel, the assignment of an officer of the field force to command the vessel carries with it necessarily the command of the whole force on board the vessel, including watch and deck officers as well as crew.

Congress has provided for over 100 field officers, of which number about 77 are subject to ship or shore duty, and are also subject to office duty between field seasons, while about 30 are mainly engaged in hydrographic surveying and ship duty.

The Survey has its own fleet of twelve steamers and six sailing vessels, aside from launches and other small craft.

There are at present two suboffices, each in charge of a field officer reporting directly to the Superintendent, viz., at San Francisco, California, and Manila, Philippine Islands. The purpose of these suboffices is to aid in the prompt dissemination of information, to serve as storage depots, and to save traveling expenses by providing points at which the field officers may be temporarily assigned to office duty between the seasons. At the Manila suboffice the publication of preliminary charts is authorized.

#### DUTIES OF THE OFFICE FORCE

The inspector of hydrography and topography, reporting directly to the Superintendent, has general supervision over the classes of field work indicated by his title, places before the Superintendent plans for such work, makes the necessary inspection in the field to insure that the Superintendent's orders are carried out economically and effectively, and is especially charged with the supervision of all matters relating to the ships and their personnel. The Ciast Pilot, a publication in several volumes, giving full description of the coast from the mariner's point of view, sailing directions, warnings as to dangers to navigation, and other information of special value to navigators, is prepared under his direction.

The inspector of geodetic work, reporting to the Superintendent, is charged with the duty of preparing plans for the field operations of triangulation, astronomical determinations and precise leveling, and of making inspections of parties in the field, and of records and correspondence received at the office from field parties, with a view of insuring that the field operations are in accordance with the Superintendent's orders, are of the desired degree of accuracy, and are efficient and economical.

The inspector of magnetic work, reporting to the Superintendent, is charged with similar duties in regard to the magnetic work of the Survey.

The assistant in charge of the office, reporting to the Superintendent, supervises the work of the office at Washington, is charged with the disbursement of all moneys allotted for that office, is responsible for the safety and arrangement of archives and property, and receives all money paid to the Survey for charts and other publications. As the official head of the office, the chiefs of the following divisions of the office force report to him: Computing Division, Magnetic Division, Tidal Division, Drawing and Engraving Division, Chart Division, Library and Archives Division, Instrument Division, and Miscellaneous Division. Each of these divisions, under the direction of the assistaut in charge of the office, prepares replies for the Superintendent's signature to such parts of the correspondence as falls within its particular field, and also furnishes such information and equipment to field parties as it is within their power to furnish.

In the computing division all computations in connection with triangulation, astronomical determinations, and precise leveling are made, appropriate registers of results are kept, and the results prepared for publication as rap-

idly as possible. The magnetic division and the tidal division deal similarly with the computations and publications of magnetic and tidal results respectively.

The drawing and engraving division is divided into five sections:

The photographing section, engaged in reducing, enlarging, and reproducing drawings for various purposes.

The drawing section, engaged in making from the original topographical and hydrographical field sheets the office drawings, which are the original from which charts are produced, either by engraving on copper or by photolithography.

The engraving section, engaged in

copper-plate engraving.

The electrotype section, engaged in producing from the original engraved copper plates by electrotype process the copper plates actually used in printing the charts.

The printing section, engaged in printing charts from the copper plates (the lithograph printing is done by contract outside of the organization).

The chart division is divided into two sections. The hydrographic section is engaged in completing unfinished bydrographic sheets sent in from the field, in the correction of charts, especially with reference to aids to navigation (lights, buoys, etc.), preparation of monthly Notices to Mariners in regard to this matter, and the inspection of

charts in their various stages of preparation. The chart section is engaged in applying such hand corrections to charts at the last opportunity before issuing as has become necessary on account of such changes, principally in aids to navigation, as have taken place after the chart was printed, and with the clerical work connected with the issue and sale of charts.

The library and archives division has charge of the library of the Survey and the archives in which all hydrographic and topographic sheets and all the original records and computations are stored.

The instrument division has charge of all the instruments and general propcity. Many of the best of the new instruments for the Survey are designed and made in this division, and it is continually engaged in repairing and remodeling necessary to keep the instrument outfit at a high standard of efficiency.

The miscellaneous division is charged with the purchase and distribution of all supplies required for use in the office and of such supplies as are furnished to field parties on requisition; also with the making of requisitions for printing and binding, the custody of blank forms, stationery, etc., and the distribution of the reports of the Superintendent and of all other publications of this Bureau,

with the exception of charts.

As already noted, the accounting division, at the head of which is the disbursing officer, is not a division of the office in the sense of reporting to the assistant in charge of the office. The disbursing officer makes all disbursements on account of the Survey, with the approval of the Superintendent; renders a monthly account of all disbursements to the Auditor for the Treasury Department for audit by him, renders a statement of expenditures and balances to the Superintendent whenever required to do so, suspends returns

for correction, or disallows, under the Superintendent's direction, all items of expenditures irregular in form or in contravention of law or regulations, and refers to the Comptroller of the Treasury for decision all questions of law involving a payment to be made by him.

The editor, reporting to the Superintendent, compiles the administrative part of the annual report and acts as editor in connection with all other publications of the Survey except the charts.

#### THE EXTENSION OF FIELD WORK

The acquisition of Florida and Oregon in 1819 and of Texas and California soon after the reorganization of the Survey before described vastly extended the operations, and in view of the desirability of connecting the surveys of the Pacific and Atlantic coasts, a transcontinental triangulation was authorized in 1871. Eight years later, in recognition of one of its functions, the name of the organization was changed to that of Coast and Geodetic Survey.

When Alaska was purchased in 1867 the charting of its vast and intricate shore line was added to the duties of the Survey, and still more recently, in conformity with and in pursuance of the established policy, its labors were extended, to use the phraseology of the law, to all "the coasts under the jurisdiction of the United States," in order to include Porto Rico, Hawaii, Guam, the Samoan Islands, and the Philippines.

The plan of reorganization contemplated a chain of triangles along the coasts which should unite and coordinate all the local surveys. Astronomical observations were to fix the geographical position of the triangulation, and the differences of longitude between some of principal stations and Europe were to be determined.

The topography was to be carried inland as far as would subserve the purposes of commerce and defense, and, resting upon the data thus obtained. soundings were to be made along the shores and seaward to insure the safety of commerce. Such was the simple scheme, but there were inherent in it certain requirements for the accomplishment of which extended researches in many branches of science were needed, and there were inherent in it also possibilities for greater usefulness to the nation and the world than the mere attainment of the immediate objects sought. It was foreseen that the triangulation if carried out with sufficient care would ultimately form the basis of a national trigonometric survey. The great extent of territory to be covered indicated that the triangulation would be used to determine the size and figure of the earth, which is the ultimate base of dimensional astronomy. The need of compasses on the charts compelled the determination of at least one of the elements of the earth's magnetism and a study of the law of its variation. The rise and fall of tides required observations along the coasts which would disclose the law of their periodicity in order that predictions could be made long in advance; a needful regard to benchmarks to which the tides were referred would betray the subsidence or rise of the land. Observations on tidal and ocean currents were needful to supplement the other information on the charts. The determination of astronomical positions required the perfection of existing star places, and thus practical astronomy was stimulated, and when the importance of the geodetic function of the Survey was recognized by law, the pendulum, by means of which the figure of the earth can be determined, was employed in gravity research.

Deep-sea soundings and incidental physical observations and dredgings contributed no little to our knowledge of marine life.

#### WORK DONE BY THE SURVEY

What the Survey has accomplished in the 70 years of its active existence may be broadly stated as follows:

It has carefully mapped about 30,000 miles of topography and sounded out minutely nearly 300,000 square miles of water, while its deep-sea soundings cover a little less than a million square miles. The results of this work are shown on about 500 charts of unrivaled accuracy and beauty. But it must not be forgotten that its energies have been largely devoted to resurveys required by the constantly shifting bottoms of our southern shores. Bearing this fact in mind, it may be stated that is has completed a first survey of the Atlantic, Gulf, and Pacific coasts of the United States. It has observed tides at thousands of stations, and publishes annually in advance predictions not only for our own coasts, but for all the ports of the world to which our shipping is likely to go. It has covered an area of between three hundred thousand and four hundred thousand square miles with its network of triangulation, and has incidentally completed the measurement of an are of the parallel traversing our country from ocean to ocean, and has measured an oblique arc extending from Maine to Louisiana.

It has run many thousand miles of precise levels.

It has determined transatlantic longitudes and covered the country with a homogeneous system of astronomically determined points. It has taken an active part in the delimitation of national and state boundaries.

It has undertaken the study of the law of the earth's magnetism, and made observations for determining the declination, dip, and intensity at many stations throughout our domain.

It has published and maintains Coast Pilot volumes of the Atlantic and Pacific coasts and parts of Alaska.

In regard to the present activity of the Survey, a few words will prove of interest. The completion of the transcontinental triangulation and that of the oblique arc has rendered it possible to adopt a single system of geographic coordinates for all points in this country which have been trigonometrically determined, and the office is engaged in the great and useful task of making the computations and preparing them for publication. Cooperation between the Lake Survey and the Coast Survey has resulted in the adoption by the former of the same system, and the necessary computations to bring about this unification have been made. At the same time, a comprehensive investigation of the deflections of the plumb-line throughout the area covered by the triangulation is in progress, and one of its immediate results will be to guide the Survey in making future gravity researches.

A few years ago Congress authorized. by increased appropriation and legislation, the extension of the magnetic survey of the country. Magnetic observatories, equipped with the most modern and economical appliances, are being maintained—one in Maryland, one in Kansas, one at Sitka, Alaska, and one in Hawaii. These observatories, at the formal request of the German government, are cooperating, in common with others under foreign governments, with the German and British South Polar Expeditions by making simultaneous observations. At the American observatories the magnetic instruments record photographically day and night the changes of the magnetic forces. Rapid progress has been made in the accumulation of magnetic data, their discussion, and publication. Meridian lines to aid surveyors are being established at or near county seats of the several states. There has just been issued a comprehensive volume of declination tables and isogonic charts.

As a member of the International

Geodetic Association, the Coast and Geodetic Survey supervises the maintenance of two astronomical observatories established exclusively for the purpose of observing the variation of latitude.

The Tidal Division has made good progress not alone in the reduction of tidal observations and in the publication of predictions, but has devoted attention to the theoretical investigations needful in this important and difficult

branch of applied science.

The Coast Pilot Division issued last year a new Coast Pilot of Southeastern Alaska. It has in preparation another volume of the Pacific coast from San Diego to Puget Sound, and has just completed, in the field, an examination of the coast from Eastport to Point Judith.

The triangulation along the 98th meridian is progressing with remarkable rapidity in consequence of carefully devised plans, which prescribed the method to be followed along efficient and economical lines without any sacrifice of accuracy. During the last season an axial distance of about 400 miles was measured, which in itself constitutes an arc of no mean extent.

Speed trial courses based on the triangulation of the Survey have been laid out in various localities at the request of the Navy Department.

At the request of the states of Pennsylvania and Maryland, a remarking of Mason and Dixon's line has been undertaken by the Survey in cooperation with commissioners from those states,

and the work is nearly finished.

Two officers of the Survey were appointed by the United States Supreme Court to take part in the remarking of the disputed boundary between Virginia and Tennessee, and this work has reached a conclusion.

The work of determining trigonometrically light-houses and beacons along the coasts of Maine and Massachusetts erected or rebuilt since the original triangulation was made, and elsewhere, was taken up and a junction was made between the secondary coast triangulation near Beaufort, South Carolina, and the oblique are near the northeastern corner of Georgia.

Revisionary hydrographic surveys were made in Nantucket Sound, in New York Bay and in the Chesapeake Bay and its tributaries, as well as on the Gulf coast, and new hydrographic developments were made on the coasts of Porto Rico.

#### PORTO RICO

In the survey of that island great progress has been made. The entire shoreline of Porto Rico, Vieques, and Culebra Islands has been mapped. A triangulation extending from Mona Island on the west to St Thomas on the east has been made. It encircles the island of Porto Rico and traverses it in the direction from San Juan to Ponce. Surveys of all the ports have been made and are either published or in process of publication. A corrected general chart of Porto Rico and adjacent waters embodying all the work done has been engraved on copper and is in the printer's hands, and a series of 4 charts on a scale of 1: 100,000 is rapidly being prepared and two of these will soon be issued. Tidal and magnetic observations have been made at numerous points. The harbor charts which have been published or which are about to appear are those of San Juan, Fajardo, Culebra, Port Mulas, Bahia Honda, Ponce, Guyanilla, Guanica, and Mayaguez.

The hydrography of by far the greater part of the south coast has been finished, and great progress has been made on the west coast, but more especially on the east coast, which is the scene of the coming naval maneuvers. There an area of no less than 400 square miles has to be sounded out with minute accuracy, owing to the importance of the locality and the irregularities of the

bottom which accompany coral formations.

#### ALASKA

In Alaska, Cross Sound and Icy Straits have been surveyed and much work has been accomplished in Prince William Sound, which promises to become one of the most important regions commercially in Alaska. During the last season two survey vessels were at work in that Sound. A chart of Fox Island Passes and the dangerous region of the Sannak Islands has been published. One of the surveying vessels was employed in a chronometric longitude expedition to determine respectively the geographical positions of the eastern end of St Lawrence and the western end of Nunivak Islands, and a successful termination of the expedition has been announced.

#### IN THE PHILIPPINES

In the Philippines most gratifying pro-

gress has been made under the direction of Mr. George R. Putnam, a gifted and energetic officer of the Survey. An office was established at Manila, and it was organized to publish the preliminary results of the work accomplished

with the least possible delay.

The sub-office at Manila has published over thirty charts, many of them original surveys. It has availed itself of the facilities afforded by the cable and telegraph lines recently established and has determined the telegraphic longitude of the principal ports of the archipelago. Tidal and magnetic observations have been made and sailing directions have been printed in pamphlet form in addition to the continued issue of Notices to Mariners which were given to the public with great expedition. A small ship called the Research was provided by the island authorities for the use of the survey, and a larger vessel has been actively engaged there for over a year.

## JADE

### BY S. E. EASTER

ADE, which has been found in every part of the world-China, Burma, New Zealand, Alaska, Mexico, and central Europe-is the best illustration of the universal passion of all primitive peoples for the possession of green stones. From prehistoric times to the last looting of Peking, jade has been a treasure most highly prized and eagerly sought. The most famous quarries of jade are those of the Karakash Valley, in Chinese Turkestan, from which the chief supplies of the Chinese Emperors were drawn.

Much confusion has arisen from the too general application of the term

" jade " to kindred mineral substances, such as saussurite, chloromelanite, pectolite, serpentine, and fibrolite or sillimanite, and Dr Fischer has collected one hundred and fifty specimens of stones carelessly called jade. Properly speaking, jade only includes nephrite, a variety of amphibole, and jadeile, one of the pyroxene group.

Nephrite, which occurs more frequently than jadeite, and the best-known quarries of which are those of Chinese Turkestan, is, according to Dana, a tough, compact, fine-grained tremolite (or, in green specimens, actinolite),

breaking with a splintery fracture and glistening luster. Its specific gravity is 2.96-3.1, and it varies in color from wax white, cream white, green white, greenish gray to pale green, passing through many gradations to the very darkest green, in which variety iron protoxide

is present up to 6 or 7 per cent.

Jadeite, which occurs in the Mogoung District, in Upper Burma, and in the Province of Yun-nan, China, is essentially a metasilicate of sodium and aluminium and has a specific gravity of 3-33-3-35 and a hardness of 6.5-7. Its luster is subvitreous and its fracture splintery, while in color it varies even more than nephrite. It may be gray green, bluish green, bluish gray, clear gray, orange yellow, smoky green, passing to black (the latter resembling the nephrite of Siberia), smoky white, white with green tints and splotches, and apple green; also, but rarely, violet and manye. All the green tints are, as a rule, much brighter than those of nephrite. The so-called 'jewel jade," the Chinese fee Isia (kingfisher-feather color), is jadeite of an intense emerald line. It is seldom found, and then generally in thin veins and often much flawed. It is said to be harder than ordinary jadeite. Much of it is taken to Canton, where it is converted into jewelry. In carlier times, this apple-green jade was not so highly valued as the darker olive shades, while the Emperors of the Ming Dynasty (1368-1664) esteemed pale bluish-green specimens above all others, and white next held imperial and Manchu fancy.

Both nephrite and jadeite have a waxy, oily surface and take a high polish in the hands of oriental artisans. When modern European machinery is used, a dazzling, mirror-like surface is obtained. Though generally opaque or translucent, there is a very rare variety known as "camphor jade," from its appearance, which resembles a much-flawed crystal, and is actually transparent in spots. Under the name of "oceanic jade," Damour describes a

variety found in New Caledonia and the Marquesas Islands, "which possesses a somewhat silky luster, due to exceedingly delicate fibers which traverse the mass, and which has a specific

gravity of 3.18."

Collectors of jade objects of the present day have given much attention to distinguishing, by means of the scientific tests of specific gravity, analysis, and microscopical examination, between true nephrite and jadeite and the numerous substances which, so far as outward appearances go, resemble them. The common and predominant characteristic of all the stones to which the name jade from time to time has been applied is their tenacity. Their compactness of texture and extreme toughness recommended them in prehistoric times as the best materials from which to manufacture tools with sharp cutting edges. Since jade in its natural state was for a long time vainly sought in Europe, many scholars concluded that the jade implements found in the Swiss lake dwellings, or the materials from which they were made, must have been brought from the quarries in Turkestan. If, it was argued, jade were a product of the countries in which these implements were found, how did it happen that it was never discovered by the races who succeeded the men of the Palicolithic Age? There is no evidence of jade having been employed by the Greeks and Romans for any purpose, nor was it known in mediaval times. As it was only through its introduction from Mexico by the Spaniards that modern Europe was made aware of its existence, it was questioned whether Aryan wanderers could have brought these jade objects with them from the Kuenlun Mountains, Professor Max Muller asks: If the Aryan settlers could carry with them so ponderous a tool as their language, what is surprising in their having carried along, preserved from generation to generation, such

handy and valuable instruments as these jade celts?

Lengthy discussions were waged as to how this "venerable witness to the brotherhood and intercommunication of the human race" first found its way into Europe, and the famous " nephrite question" long divided European scientists. By many it was insisted that jade implements were brought by migratory tribes from the cradle of their race in Asia, the perfect fitness of the material to the uses to which it was put, as well as the inherent preciousness of the stone, rendering such instruments of sufficient value to be prized and preserved throughout the many generations who lived and died ere the long march ended.

Other investigators held that jade celts, or the material for making them, were objects of actual commerce between Europe and the Orient; but Sir John Lubbock considers it more probable that they were passed from hand to hand and tribe to tribe by a system of primeval barter. As a parallel case, he cites the tumuli of the Mississippi Valley, where the same mound often contains copper from Lake Superior, mica from the Alleghanies, shells from the Gulf, and obsidian from Mexico.

The discovery of jade implements in Swiss lake villages followed long after their occurrence in a stone tomb in Normandy, in caves in Brittany and at Mentone, in the tumulus of Mont St Michel, and in southern Italy. Schliemann found thirteen jade celts in the ruins of ancient Troy. One of these celts and one other found in Crete are the only white celts so far found in Europe. The British Museum possesses one Babylonian cylinder of jade, and also a gold necklace with a small jade celt as a pendant. Both faces of the pendant are occupied by Gnostic formulæ engraved in Greek characters. The formulae are cut in the outline of a wreath of fourteen leaves, the ends on which are engraved different combinations of the Greek vowels, while each leaf is emblazoned with a holy name. The other face of the celt is covered with an inscription in eight lines. This celt, which is supposed to have come from Alexandria and, judging from the character of the lettering, to date from the third or fourth century, is the only known specimen of jade bearing indisputable marks of either Greek or Roman workmanship. It was a celt originally, however, and not an object of Greek manufacture.

There is no ancient name for jade in any European language. Its name is derived from the Spanish pictra de hijada, "stone of the loins," a reference, doubtless, to the Aztec superstition that jade was the surest protection against diseases of the loins.

Jade has been known to the Chinese since the earliest times as I'm, or "the gem." They class the different kinds of jade under seventy-seven heads, but for the mineral itself they have no distinct, generic name. It is the typical precious stone, the gem. Throughout every age they have attached an extraordinary value to it, comparing it to "the subtle matter of the rainbow concreted and fixed under the form of a stone," and regarding it as the most beautiful substance in which human thought can embody itself. Confucius explained this by telling one of his disciples that "in the eyes of wise men its polish and its brilliancy represent virtue and humanity, and its perfect compactness and extreme hardness the safeguards of intelligence; the angles of jade, which, seeming sharp yet do not cut, represent justice; the little buttons which hang from the hat or belt, as if about to fall, represent ceremony and politeness; the sound-pure, sustained. and prolonged-which it gives forth when struck and which ceases suddenly. represents music; the impossibility for the bad shades to hide the beautiful, or the beautiful the bad, represents loyalty; the defects under the surface, yet apparent, represent sincerity; its luster, like that of the rainbow, represents the firmament; its wonderful material, extracted from the mountains and waters, represents the earth; cut into Kuei or Chu, without other embellishment, it symbolizes virtue, and the price at which all the world values it symbolizes truth."

This passion for jade, the classic or poetic color of which is white in China, causes Chinese writers to use the word figuratively whenever they wish to indicate anything very white, very pure, or very perfect. In the language of compliment no word of praise rises above that which likens beauty to jade, and the loftiest thought, as well as the highest morality, are compared to it. References are constantly made to it in poetry, as in the Emperor Kien-lung's verse—

"While the waning moon in the westward hungs like an orb of jude."

The most ancient of the Chinese classical books, the Shu King, or Book of Historical Documents, relating to the period B. C. 2357 to 627, mentions jude



Preliminary Survey Map of the Khotan Valley, Site of the Chinese Jade Mines. B Dr M. A. Stein, H. M. Indian Educational Service. Printed by Courtesy of Dr. M. A. Stein and Royal Geographical Society, London.

as one of the articles of tribute of the Province of Yung Kau, which embraced nearly all the present provinces of Shenhsi and Kan-su, and extended indefinitely northward to the desert.

It is an old saying with the Chinese that "jadestone comes from the Kuenium Mountains, in the Province of Khotan," and in the history of the T'ang Dynasty (618-906) reference is made to a yearly tribute of 500 pieces of jade sent to the

Emperor by the king of that region. Travelers describe the jade quarries as situated on the south face of the Kuenlun Mountains, in the main valley of the upper part of the Karakash River, south of the city of Khotan. They extend for a mile or more in length, and in this space are the entrances of at least a hundred tunnels which riddle the mountain side in every direction, and in some cases pierce through the mountain to the further side. The mineral is found in veins of varying thickness, in width from a few inches to ten feet, but so seamed and cracked as to make it difficult to find a piece even a few inches thick which is not badly flawed. Until the middle of the last century China maintained her authority over eastern Turkestan, including Yarkand and

Khotan. The people, however, were Mohammedan, and in 1852 they succeeded in throwing off the Chinese yoke by a general uprising, in which all the officials were massacred. The jade workers, who were Chinese, probably fled from the quarries at this time and shared the fate of their countrymen. Their clothing, implements, and remnants of food were left in their haste and were seen by Cayley when he visited the quarries in 1871. Work has since been resumed, but too many of the expert carvers and workmen were killed during the rebellion for the industry to recover its former preeminence.

Loose boulders of jade are often carried down by the force of the current in the Karakash and tributary streams, and they eventually become embedded in the soft clay banks or are deposited in the bed of the river. This "water jade" is highly valued by the Chinese carvers, as its rough journey is a severe test of hidden flaws, which might otherwise cause the block to fall to pieces after much labor has already been ex.



Hastern Turkestan. After the Map of Dr M. A. Stein, Indian Educational Department. Reprinted by courtesy of the Royal Geographical Society and Dr M. A. Stein.

pended on it. It is obtained either by digging the boulders out of the banks or by divers specially trained for the work. An inspector always accompanies these diving parties, whose duty it is to mark each lump as it is brought up, estimate its value, and finally ship the jade to Peking. Such pieces bring three times the price of quarried specimens of similar size and color.

In many rivers of eastern Turkestan jade pebbles are found in abundance. The word "kash," so often found in the names of rivers and places in this region, means "jade" in Toorkee, and there seems little reason to doubt the

existence of the mineral along the whole of the Kuenlun range. Much difficulty is experienced in tracing the veins, owing

to the shifting sands.

A huge dike of nephrite embedded in the rocky banks of the Raskemdaria, on the eastern slope of the Pamir, was another source from which the Chinese formerly drew large supplies of jade. They extracted it by lighting large fires on the rock and then throwing water on it when it became thoroughly heated. The rock was abandoned some years ago in consequence, it is said, of the illness of a member of the Imperial family, who was taken sick after having slept on a bed made of Raskem nephrite. A large block of the stone which was then on its way to Peking was put in chains and thrown on the roadside at Kutcha, where it still remains. It was from this ridge on the Raskemdaria that the monolithic tombstone of Tamerlane was cut. This famous tomb of darkest-green jade stands in a half-ruined mosque at Samarkand, and is 7 feet 8 inches long, 17 inches wide, 14 inches high, and weighs about 1,800 pounds. It is broken through the middle, but is well polished, completely covered with inscriptions, and rests on a white marble base. In addition to this and the Karakash quarries, the Chinese also obtained jade from deposits in Yun-nan, Kan-su, Shen-se and Quang-se, and other provinces of China. Many mines throughout China are owned by private individuals, who keep the existence of their quarries secret, fearing the extortions of the government.

Jade has also been found in fair abundance on the shores of Lake Baikal, Siberia. The South Kensington Museum possesses a large, water-worn, well polished boulder from this region, weigh-

ing more than half a ton.

The Chinese use the utmost care in carving jade. The workman having determined from the natural form of the block, and its visible and probable

flaws, into what object he will carve it. fixes it on a lathe and gives it the general outline. The interior is then hollowed out by first drilling, with diamond-pointed needles, innumerable little holes all over the surface which is to be broken away. When this is completely honeycombed the partitions are broken down by being sharply tapped with a hammer. Too hard a tap might develop some hidden flaw and shatter the half-finished object. The piece is finally polished with corundum. The harder the stone and the more difficult the cutting, the more brilliant the polish it is capable of acquiring. It is claimed the jade is softer when freshly taken from the quarries. So great is the difficulty of carving jude that an elaborate piece may represent a lifetime's labor. In Kienlung's ateliers, in the Summer Palace at Peking, the workmen succeeded each other without interruption night and day. Even then many years were occupied in completing a single piece.

Jade is becoming more and more appreciated as a material for interior decorative construction by the splendor-loving Russians. By cutting the stone into sections an eighth of an inch thick it is employed for the panelling of walls and chimney pieces, and even window panes—the translucent pieces showing the most exquisite shading and cloud-

ing.

European and American collections owe many of their finest specimens to the plunder taken from the Summer Palace in Peking in 1860, when the enormous collections of the Emperor of China were at the mercy of the French and British forces, who were ordered to burn and destroy all the buildings. The palace ateliers, having long been declining in activity and in the quality of their productions, had in a measure ceased jade-cutting a few years previous to the sacking of the Summer Palace, because the tribute of jade from the

ADE 15

Turkestan mines did not come to Peking during the Mohammed an rebellion. The imperial ateliers have not been maintained since 1860, but the treasures of jade again gathered at the Summer Palace were promptly sold or sent home by the Russian, English, and Italian troops, who in turn occupied that demesne in 1900 and 1901. The Winter Palace, the temples within the imperial inclosure, and the princes' palaces, in Peking, yielded up an enormous treasure of jade in 1900, nearly all of which has found its way since to Europe and America.

The uses to which jade has been put by the Chinese are almost endless. Discs of the stone, which when struck give forth a clear, resonant note, are used as temple gongs and musical instruments. Ritual vessels are made of it, and it is to this fact that Paleologue attributes the peculiar veneration in which the Chinese hold the stone. Tablets inscribed with sacred writings, bowls and vases of fantastic form and intricate design, statuettes of Buddha, perfect alike in conception and execution, candelabra, boxes, pencil-holders and all the paraphernalia of the writing-table, as well as buckles, bracelets, rings, hooks, buttons, and other ornaments, are all wrought with untiring patience and matchless skill from the same intractable material. Carved works of jade seldom bear any marks such as are seen on porcelain, whereby a date is indicated. Sometimes objects are inscribed with a poem or quotation, which may afford some clue to the date. All such marks are comparatively rare, and the style of ornamentation is generally the only guide. Extreme simplicity of design and purity of form characterize the earliest examples, while those of later periods are often marvels of fantastic and ornate decoration.

The Chinese rarely embellish their jade carvings with other substances, possibly owing to their excessive admi-

ration for the stone and the symbolism with which they surrounded it. The Hindus saw in jade, however, only a green background for encrustations of many-tinted gems and gold. It afforded them opportunities for the display of their cunning, as jewelers, to combine the softly shaded tones of the jade with rubies, diamonds, and other stones, as well as scarcely less brilliant enamel. As a material for artistic workmanship, jade was only known in India from the time of the Moguls, who encouraged its employment unstintingly. The arts of carying in frost-like open-work and of inlaying, which found such perfect expression in the Taj Mahal, were lavished in miniature on jade cups, beetle-boxes, sword and dagger hilts, and turban ornaments, for which there was an unfailing demand at court. Work of a less elaborate character was sometimes executed, and a large jadeite tortoise found in a water-tank at Allahabad is now in the South Kensington Museum. It is bluish gray in color, highly polished, and nearly 20 inches long. Although mines of jadeite exist in Burma, the Hindus probably drew the greater part of their supply from central Asia, and much of that now sold by them as Yarkand jade is only chloromelanite and serpentine.

When Captain Cook visited the middle island of New Zealand the natives told him it was called Te Wahi Pounanu. or "the place of the green stone," because all of their much-valued green stones came from that island. In old atlases the island is still called Tavai Poenammo, a corruption of the native name. The natives, like the primitive inhabitants of Europe, fashioned weapons called "Meri" from the coarser varieties. Like the celts of the Lakedwellers, too, many of their implements show traces of having been formed by sawing. There is a large block of New Zenland jade in the British Museum reNew York Museum of Natural History contains a similar piece from a primitive Alaskanworkshop. Of the finer and more translucent specimens of jade the New Zealanders carved their "tiki," These objects were worn about the neck, and are said by some to have been title deeds of land, as well as venerated charms and symbols of ancestor worship. There is a grotesque figure of New Zealand jade in the British Museum which was evidently carved with much care. The eyes are inlaid in mother-of-pearl.

Jade implements, chiefly celts, have been found along the entire coast of British Columbia and Alaska from the Straits of Fuca to the Arctic Sea, and arrow-heads have been brought from the Arctic coast of both Alaska and Siberia. Such stone implements were highly valued by the Indians, who in some cases still preserve them, although they no longer use them. The majority of jade celts which owe their origin to this region have been discovered in Indian graves, in shell heaps, and on the sites of former villages. Whether the jade thus employed was brought from Asia or found on the spot was for a long time an open question. The discovery of the mineral in situ in the vicinity of the Fraser River and in rolled pieces on the Lewes branch of the Yukon has placed its origin beyond dispute.

'divine stone,' and was valued next to the emerald, with which it was often confused by the early Spaniards. As a religious symbol, it was placed on the altars. It was carved by the Aztecs in the form of parrots' heads, fish, etc., and worn as a charm against kidney troubles and epilepsy. This superstitious esteem for the medicinal qualities of the stone was carried to Europe by the Spaniards, and at one time there existed jade merchants in Paris who sold medals of jade as a remedy for these diseases. The Aztecs also carved

masks from jade, which were used in the temples to cover the face of the most illustrious of the gods when the King fell ill. They did not remove them until the recovery or death of the patient. At other times these masks served as a decoration of the temple walls.

In Central and South America similar uses for jade and jade-like stones obtained, and, as in every other quarter of the globe where the stone was known and used, it was held in an esteem amounting, in many cases, to actual reverence.

Collections of jade are found in nearly all the great museums of Europe, perhaps the most notable being that of the South Kensington Museum, which possesses superb examples of the jewelinlaid Indian jade. The specimens in the British Museum are valuable chiefly from a mineralogical and archaeological point of view. A number of choice pieces are owned by the Musée Ethnographique in the Louvre and the Musée Guimet, in Paris. The Musée Chinois at Fontainebleau owes its fine collection of jade to the gifts of French officers to the Empress Eugenie after their return from the campaign in China in 1860. Jade objects which have been presented to the imperial family of Russia are exhibited in the Peter the Great Gallery at St Petersburg. Among the treasures of the Sultan in the old Seraglio at Constantinople are many sword hilts and other small objects of jude.

Although these museums contain many individually fine specimens of jade, no one of them possesses a truly complete collection. American collectors of Orientals have long shown their appreciation of the beauty of jade objects, and the collections of Messrs Brayton Ives, Henry Walters, Thomas Waggaman, and Frederick Ames contain many unique and perfect examples of the jade carver's art. It was left for an American, Mr Heber Bishop, of New

York, to make the first comprehensive and general collection of jade. The Bishop collection recently presented to the Metropolitan Museum of Art in

\*On December 10, 1902, since this article was written, Mr. Bishop died at his residence in New York City. By the terms of his will ample provision has been made for the preservation of his famous collection in a special room of the Metropolitan Museum of Art.

that city embraces every variety of the stone, and includes examples by prehistoric and primitive jade workers as well as the greatest gem-cutters of the Mogul and Chinese courts. Years of work have been devoted to the descriptive catalogue of this collection, which will be the authoritative work on the subject.

## SOME NOTES ON VENEZUELA

the American continent sighted by Columbus. During his third voyage, in 1498, he first saw the coast from the Island of Trinidad, and thought that it was another island; but the fresh water of the Gulf of Paria, whose shores he coasted for several weeks, soon convinced him that great continental rivers were pouring into the gulf, and that the vast Asiatic continent at last stretched before him. Sickness prevented him from making extended explorations of the coast and sent him back to Hispaniola.

The following year Alonzo de Ojeda, accompanied by the celebrated Amerigo Vespucci, traced a greater extent of the Venezuelan coast. It was Ojeda who gave the country its present name— Venezuela.\*

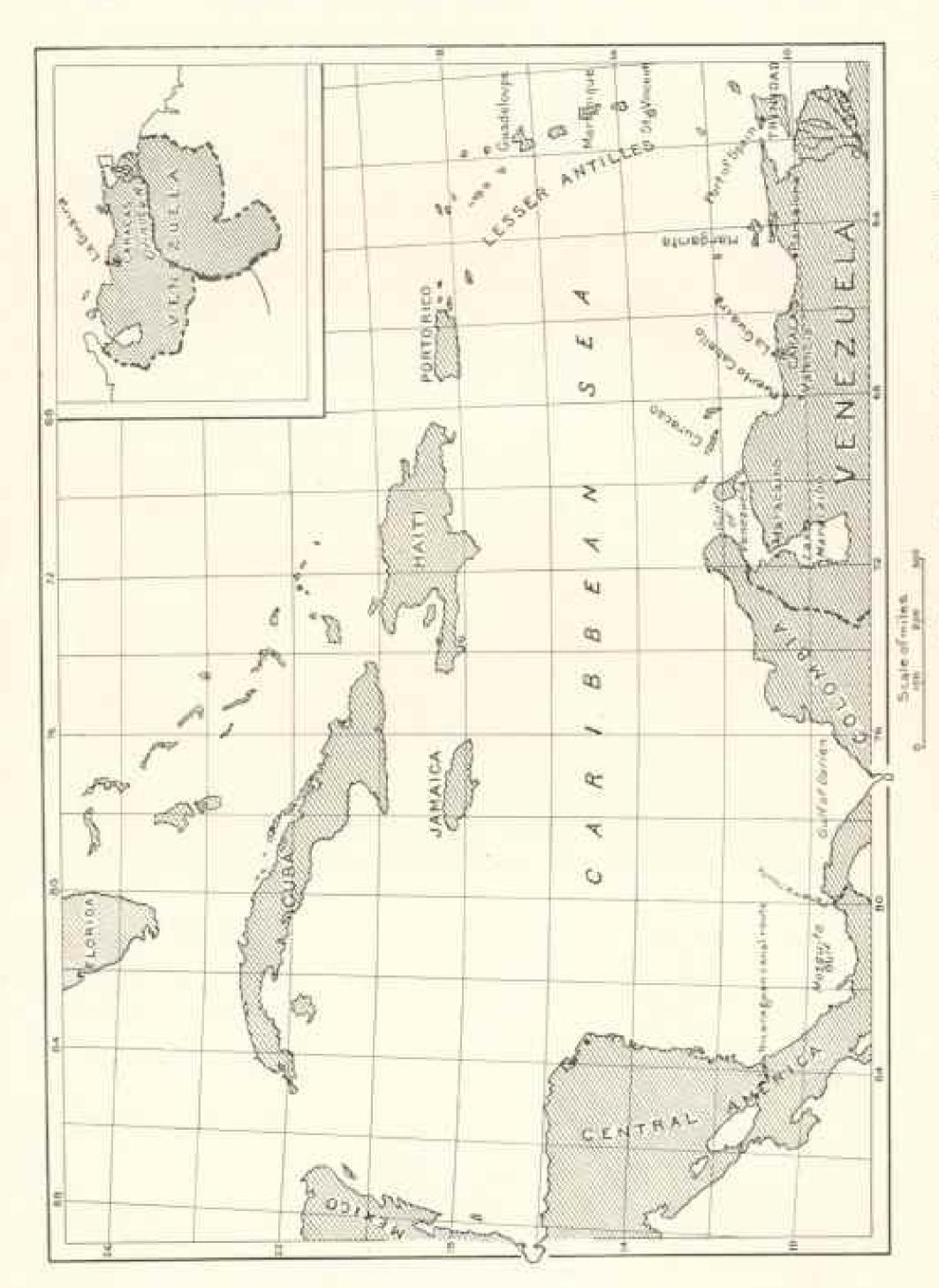
"Proceeding along the coast, he arrived at a vast, deep gulf resembling a tranquil lake, entering which he beheld on the eastern side a village, the construction of which struck him with surprise. It consisted of twenty large houses shaped like bells and built on piles driven into the bottom of the lake, which in this part was limpid and of

\*Washington Irving: "Life and Voyages of Christopher Columbus and the Voyages and Discoveries of the Companions of Columbus." Five vols. Vol. IV, p. 166, G. P. Putnam's Sons, New York. little depth. Each house was provided with a drawbridge and with camoes, by which communication was carried on. From these resemblances to the Italian city, Ojeda gave to the bay the name of the Gulf of Venice, and it is called to the present day Venezuela, or Little Venice. The Indian name was Coquibacoa."

After a small skirmish Ojeda "sent a detachment of twenty seven Spaniards on a visit to the interior. For nine days they were conducted from town to town and feasted and almost idolized by the Indians, who regarded them as angelic beings, performing their natural dances and games and chanting their traditional ballads for their entertainment.

"The natives of this part were distinguished for the symmetry of their forms; the females in particular appeared to the Spaniards to surpass all they had yet beheld in the New World for grace and beauty. Neither did the men display in the least degree that jealousy which prevailed in the other parts of the coast.

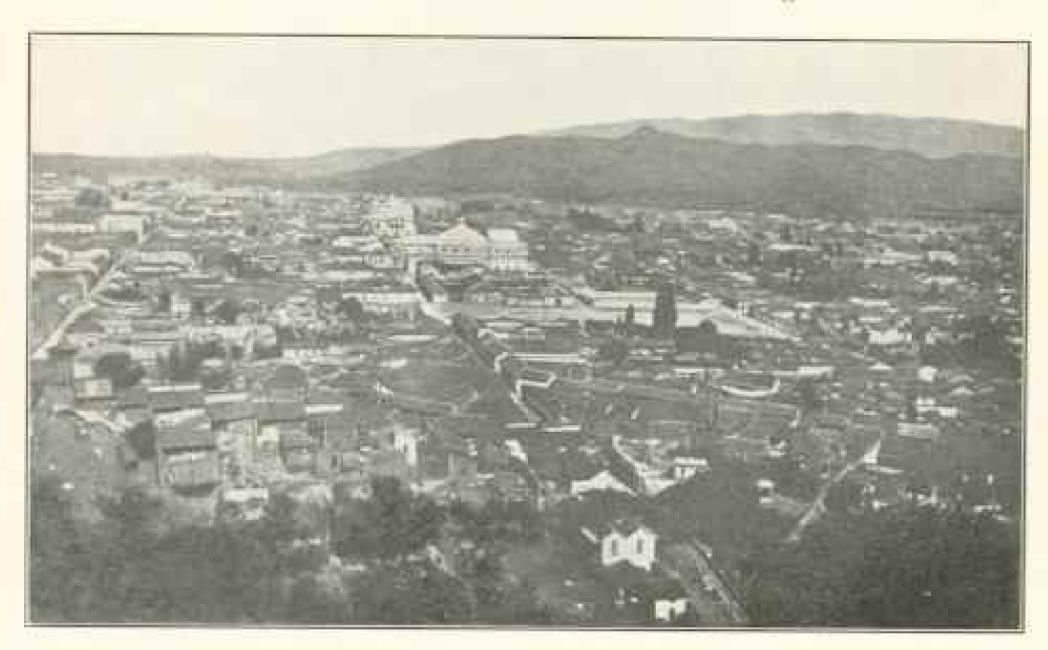
on their return to the ship the whole country was aroused, pouring forth its population, male and female, to do them honor. Some bore them in litters or hammocks, that they might not be fatigued with the journey, and happy was the Indian who had the honor of



Ontline Map Showing Geographical Relation of Venezuela to the Isthmian Canal Routes, to the Map Showing Geographical Relation of Venezuela to the Indies and Florida

bearing a Spaniard on his shoulders across a river. Others loaded themselves with the presents that had been 
bestowed on their guests, consisting of 
rich plumes, weapons of various kinds, 
and tropical birds and animals. In this 
way they returned in triumphant procession to the ships, the woods and 
shores resounding with their songs and 
shouts."

Venezuela has a larger area than the combined areas of the great States of The republic has three zones—hot, temperate, and cool—according to the elevation of the land. The lowlands in the northwest are very torrid. Here great quantities of coffee and cacao are raised, which form the largest agricultural exports of the country. The cacao is sent mainly to France, Germany, and Spain, and the coffee, which averages a yearly crop of 55,000 tons, to the United States. South and east of the lowlands, extending eastward to Ca-

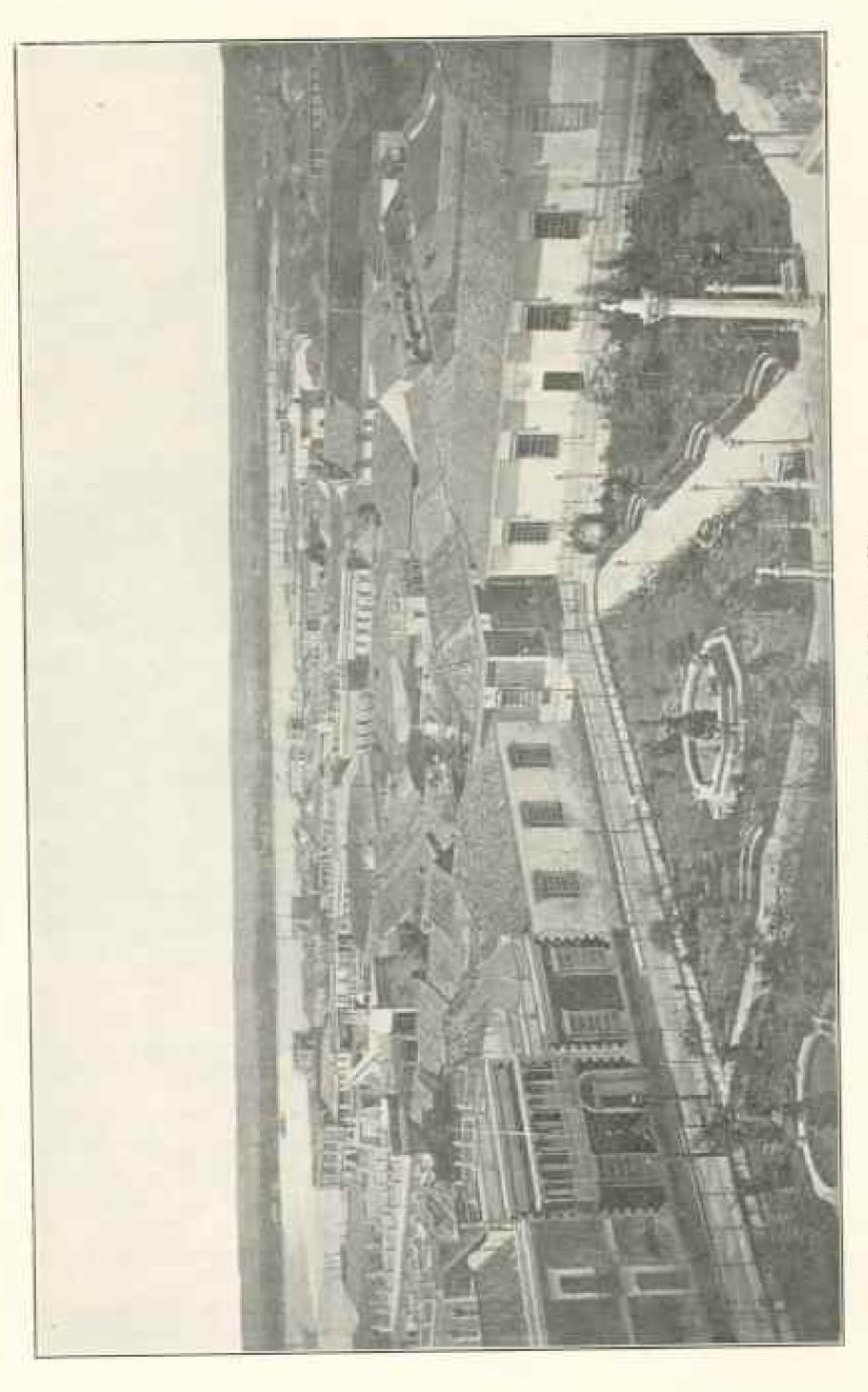


A View of Caracas

Texas, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Oklahoma, and Arkansas. In figures its area amounts to about 590,000 square miles. The population is 500,000 less than that of Massachusetts. In 1891 it was 2,323,527. The capital, Caracas, has 75,000 inhabitants, Maracaibo 35,000, La Guaira 15,000, and Barcelona about 13,000. About one person out of every one hundred is pure white, while the others are descendants of black slaves, mulattoes, etc., and Indians.

racas, are high mountains, where, the climate being temperate, most of the people live. Caracas, the capital, is 3,000 feet above the sea. Trade winds prevent the extremes of heat suffered in the corresponding latitude of northern Africa. The mean temperature at Caracas is only 71°.2 Fahr. On the coast it averages from ten to twelve degrees higher.

Vast llanes, or great plains, stretch south of the mountains, making splendid runs for cattle. South again of the





The University-Caracas

plains, beyond the Orinoco, are vast forests, from which the natives get rubber, tropical woods, and vanilla. There are also gold diggings south of the Orinoco, which yielded over \$600,000 for export in 1900.

Almost nothing is manufactured belarger share of the imports come from the United States \$3.271,000 worth in tained mainly from customs duties.

1901, consisting of flour, lard, hardware, and cotton goods, on all of which a heavy duty was levied. England and Germany send the next largest amount of goods. Venezuela sent in return to the United States in 1901 \$6,645,000 worth of coffee, cacao, and skins, all enyoud the cheapest grades of goods. The tering free of duty. The annual revenue of Venezuela is about \$7,500,000, ob-

# AN INTRODUCTION TO PHYSICAL GEOGRAPHY\*

URING the last few years the general public has felt a deeper interest in the facts of the earth-in what the earth is and what it hides—than it has probably ever expe-

rienced before. The fearful upheavals in Martinique, St Vincent, and Guatemala, attended by a general natural unrest throughout the globe, have aroused a wide spread desire to understand what

"An Introduction to Physical Geography. By Grove Karl Gilbert and Albert Perry Brigham. With 263 illustrations. Pp. 380. 552 x 8 inches. New York : D. Appleton & Co. 1902.

is known-little though that knowledge is-of the mysterious forces writhing under the earth's crust. The coal strike in the United States has aroused an interest of a different character—an inquiry as to what coal is and how it happens to be stored in certain localities and not in others as well. The prolonged and successful agitation for irrigation in the West and for forest reservations has also had its share in arousing the public to other questions relating to physical geography, as, for instance. weathering and soils, forests and rainfall.

Therefore a book about Physical Geography, written in a simple and interesting manner and not loaded down with innumerable technical terms which are of value to the specialist but not to the general public, is especially welcome. Such a volume has recently been written by Messrs G. K. Gilbert and A. P. Brigham, and published by Messrs D. Appleton & Co., of New York. The authors modestly call the work "An Introduction to Physical Geography." It is planned especially as a text-book for schools and has already gained much success. A second edi-

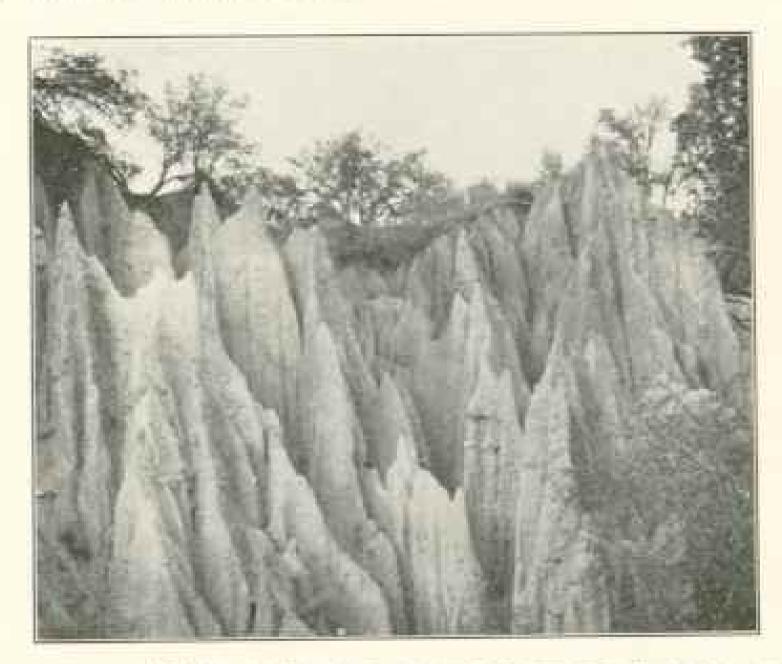


From Gilbert's and Brigham's "Introduction to Physical Geography." D. Appleion & Co. Figure No. 1-Watkins Glen; a Gorge Carved from Beds of Shale

tion was called for within a few weeks of the publication of the first. But the volume will gain a wider field than the ordinary text-book, for it will appeal to that growing class of amateurs who have been seeking a plain but fascinating description of the present and past facts of the earth.

The treatment, so far as possible, is concrete. Wherever practicable, each

Figure No. 1 is a picture of the noted Watkins Glen, which during the process of time a small stream has carved in the soft rock of the mountain. In some places the stream has cut to a depth of 200 feet; sometimes the gorge is scarcely more than 10 feet wide, and at others broadens into large amphitheaters, in which one's voice echoes and reechoes with weird effects. The



From Gilbert's and Brigham's "Introduction to Physical Geography." B. Appleton & Co.

Figure No. 2.—A Pebbly Rock Carved by Rain; Russian River, California

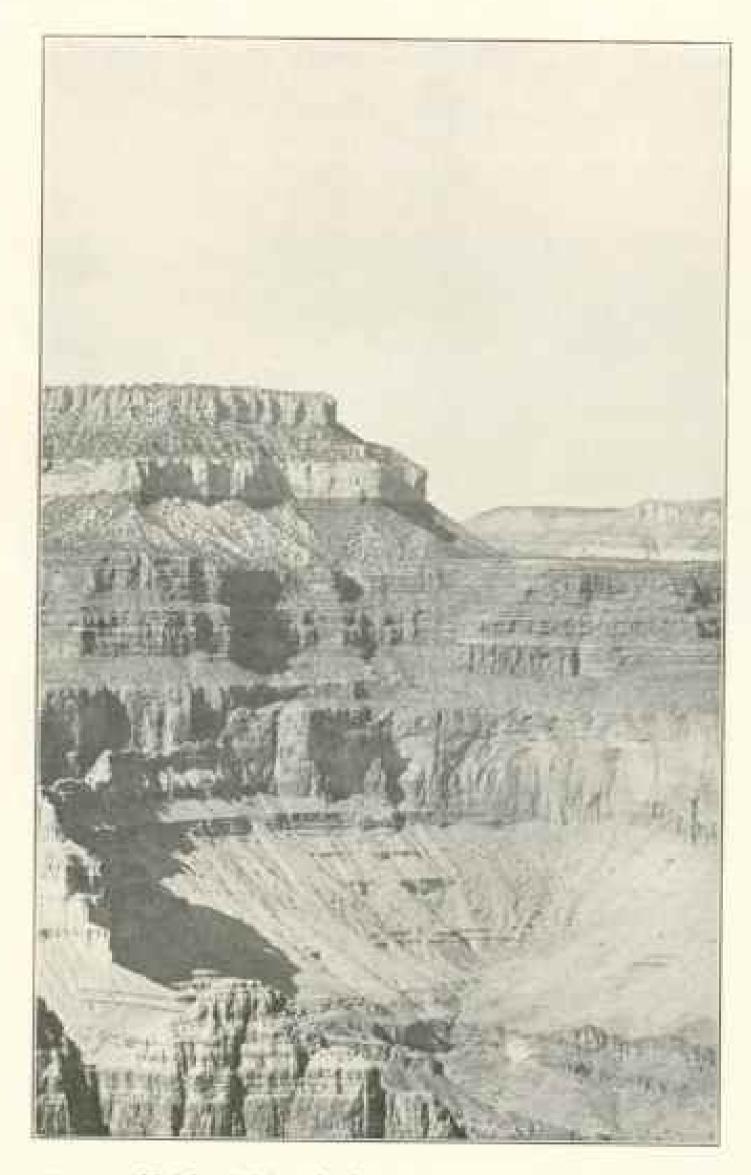
subject is opened with a type case, illustrated by a picture of some graphic example. About one-half of the book is given to the lands. The relation of organisms to the earth is introduced wherever appropriate.

Two hundred and sixty-three illustrations, all very well chosen and admirably engraved, accompany the text. By permission of the publishers, six typical illustrations are reproduced in this Magazine. chasm is at the head of Seneca Lake, New York, from which, winding and curving abruptly, it penetrates Glen Mountain for a distance of three miles.

Figure No. 2 is a graphic example of the effect of rain wash. Rain has soaked and softened the rock; then little rills have started, and have gradually worn deep channels of their own, making the high pinnacles.

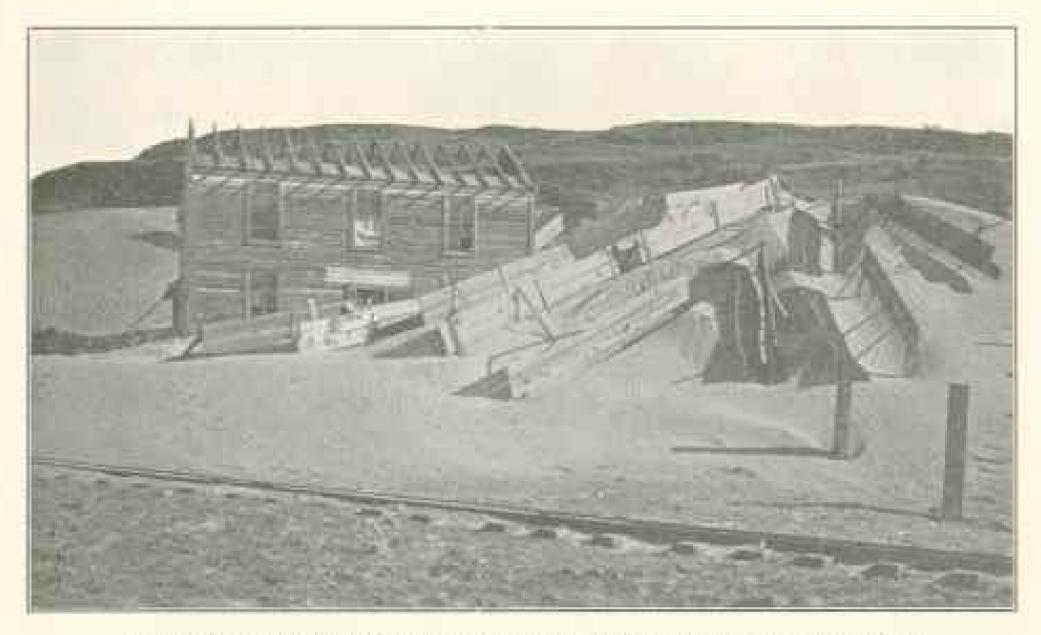
Figure No. 3 illustrates the different kinds of rock, some hard and some

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From Gilbert's and Brigham a " Introduction to Physical Geography." D. Appleton & Co.

Figure 3.—Rock Edges (limestone and sandstone) and Waste Slopes (concealing shale). Grand Canyon of the Colorado River, Arizona



From Gilbert's and Brigham's "Introduction to Physical Geography." D. Appleton & Co.

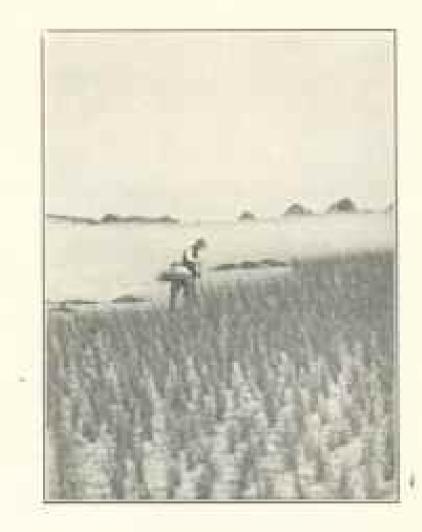
Figure 4.—The Last House in Riggs, Oregon, a Village Overwhelmed by Dunes. Attempts to hold the sand back by fences were unsuccessful

soft, of which almost every mountain is made.

Figure No. 4, an example of wind work, shows a substantial house in Oregon nearly buried by drifting sand. In Chinese Turkestan, Sven Hedin has recently discovered the ruins of great temples where flourished 2,000 years ago cities with a high degree of culture and civilization. Here in the heart of Asia populous cities and lakes have been buried beneath drifting dunes.

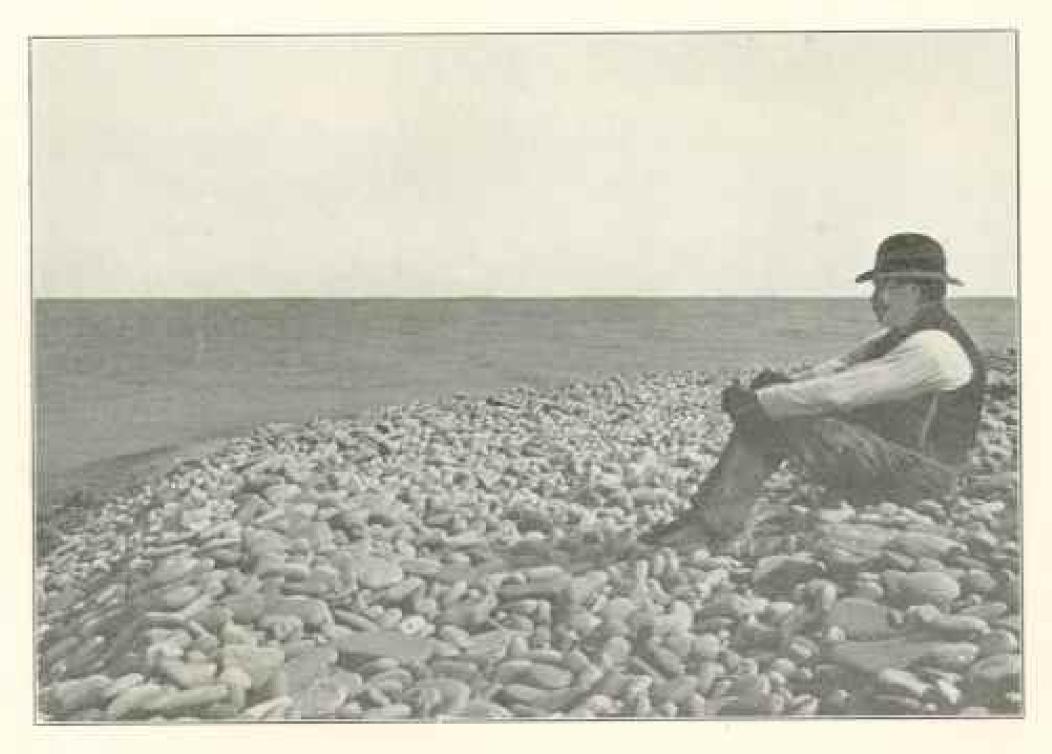
Figure No. 5 shows how some of the people of Cape Cod, Massachusetts, check the advance of the sand by planting grass, which binds the sand and keeps the wind from lifting it. Common oleanders are used for this purpose in Bermuda. Where no effort has been made to check its advance, a dune has been known to migrate as much as 70 feet in one year.

The authors of "An Introduction to Physical Geography" are very well



From Gilbert's and Brigham's "Introduction to Physical Geography." D. Appleton & Co.

Figure No. 5.—Planting Grass to Stop the Drifting of Sand, near Provincetown, Cape Cod, Mass.



From Odbert's and Brigham's "Introduction to Physical Geography." D. Appleton & Co.

A Traveling Beach on the Shore of Lake Ontario. The stones originally angular become rounded as the waves roll them along

known in the scientific world. Mr Gilbert, geologist of the U.S. Geological Survey, is a past president of the Ameri- "Lake Bonneville," etc. Mr Brigham can Association for the Advancement of Science. He was the recipient of the Wollaston Prize of the Geological So-

ciety of England in 1899, and is the auther of 'Geology of Henry Mountains,' is head of the department of geology in Colgate University and the anthor of a well-known text-book of geology.

## DR SVEN HEDIN

THE distinguished Swedish explorer, Dr Sven Hedin, who ended his last famous expedition to Central Asia in December, 1901, " is at present receiving one continuous series

of evations throughout Europe. He has given lecturing tours in Sweden. Russia, Denmark, England and Scotland, and after New Year's commences a tour in Germany, France, Austria and Hungary, and Norway. It had been hoped that he would visit America this winter, but he writes that his

"See the National Geographic Magazine for March, 1902, page 96.



Photo by Dahllof, Stockholm

Dr Sven Hedin in His Study, Stockholm



Republished from the Rudletin of the American Geographical Society at New York.

Outline Map of Peary's Sledge Routes and Surveys

engagements in Europe make a trip across the Atlantic impossible this year,

Sven Hedin was born in Stockholm, February 19, 1865. He was educated at the universities of Upsala, Berlin, and Halle, and from the last received the honorary degree of Ph. D. His first journey of exploration was in 1885-'86, from Persia to Mesopotamia; in 1891 he traveled in Turkestan; during 1892-'95 he traveled right across Asia from Russia to Peking, penetrat-

ing Tibet and studying the Lob-nor district. The results he published in a splendid volume, "Through Asia" (Harper and Bros.). His latest and most important expedition was begun in 1899, and has yielded valuable information about the geography of Chinese Turkestan and Tibet, and of the cities which flourished in the Lob-nor region 2000 years ago and have long since been buried beneath the desert sands.

## PEARY ON THE NORTH POLE

N a lecture before the National Geographic Society November 29, 1902, Commander Robert E. Peary stated very emphatically that he believed the North Pole could be reached by making Cape Hekla, in northern Grinnell Land, the starting point for the sledging trip north. The average distance of Peary's four Arctic sledge journeys over the ice is slightly greater than the distance from Hekla to the Pole and back. If the next arctic explorer will make Cape Hekla his base. will pass the winter there, and starting from that point in spring fight his way as many miles northward over the ice as Peary averaged in his four journeys under equal conditions, he will gain the Pole itself and have ample time to return before the ice pack becomes impassable. To quote from Mr. Peary's address:

There are two facts I wish to bring to your attention, not in a boastful manner, but as bearing upon the feasibility of reaching the Pole. First, the average air-line distance from start to finish of four sledge journeys which I have made in high arctic latitudes is the same as the distance from the northern shore of Grinnell Land to the Pole. Second, the air-line distance from start to finish of my 1900 sledge journey is

such that had my starting point been in the same latitude as that of Abruzzi it would have taken me to the Pole, or had my starting point been in the same latitude as Nansen's or on the northern shore of Grinnell Land, it would have carried me beyond the Pole.

dence to state boldly that the Pole can be reached, and yet it is a fact, even though the struggle for it has been going on unsuccessfully for years and years. Each time we have come a little nearer, each time we have learned a little more, and I say to you here to-night that it is not an impossibility; that it can be done, and that it is no more difficult than many of the great projects which we see being pushed to completion every day and which require money, persistence, hard work, and some ability to bring the full fruition.

The man who can secure a starting point in early spring on the northern coast of Grinnell Land, who has with him the proper party and the proper equipment and experience, will hold within his grasp the last geographical prize that the earth has to offer—the prize which will rank with the prize which Columbus won for himself and his countrymen, a fame which will last as long as human life exists on the globe."

## PLAN FOR CLIMBING MT McKINLEY\*

BY ALFRED H. BROOKS AND D. L. REABURN

OF THE U. S. GEOLOGICAL SURVEY

URING the past summer the writers were engaged in a reconnaissance survey in Alaska which extended from the Pacific coast through the Alaskan Range and along its western base to Yukon waters. The route of travel lay close to the foot of Mt McKinley, and though it was no part of the plan to ascend the mountain, for which there was neither time nor facilities, time was taken to climb its slopes to snow line, and the members of the party were undoubtedly the first white men to approach the summit.

The Alaskan Range is a rugged mountain mass which extends to the northeast from the vicinity of Lake Clark, and sweeping around the great Sushitna Basin forms the watershed between Cook Inlet on the southeast and the Kuskokwim and Tanana waters on the northwest. On the east and south it rises by a series of footbills from the Sushitua River lowland and on the west it falls off abruptly to a gravel-floored plateau, which slopes gradually toward Kuskokwim waters. The southern end of the range has not been explored, but the peaks probably have attitudes of from 7,000 to 9,000 feet, while to the northward the relief increases very much and the range culminates in Mt. McKinley, over 1 20,000 feet in height. and Mt Foraker, fourteen miles to the southwest, about 17,000 feet. To the

northeast the range includes a number of peaks which are from 10,000 to 14,000 feet high, Mt Hayes, lying between the headwaters of the Cantwell and Delta rivers, being the highest. The crest line of the range lies near its western margin.

In 1898 Eldridge and Muldrow S surveyed the Sushitna River, while Mendenhall traversed the eastern end of the range; Spurr and Post crossed the southern end, and Peters and Brooks. explored the region to the north along the Tanana River. In the following year, Lieut. Joseph S. Herron, U.S. A... made an exploration in the southern part of the Alaskan Range and also of a part of the Kuskokwim basin. These investigations, together with the explorations carried out by the writers, have outlined this great mountain mass. which, as has been shown, contains several of the highest peaks on the continent. The results of these surveys have given not only geographic data, but also thrown much light on the conditions of travel, distribution of timber, and on the climate of this province. The time, therefore, seems now ripe to plan an ascension of Mt McKinley.

Mt McKinley (latitude 63° 04', longitude 151°, see map) lies in about the center of the range, measured in a northeast-southwest direction, and its summit is only about ten miles distant

<sup>&</sup>quot;Published by permission of the Director of the United States Geological Survey.

<sup>\*</sup> A report embodying the results of this expedition is now in preparation.

The final adjustment of surveys have not yet been made, so that the exact altitudes can not now be given.

For reports on these expeditions see Vol. VII, Twentieth Annual Report, U. S. Geol. Survey.

["Explorations in Alaska in 1899." War Dept., Adjutant-General's Office, No. XXXI, March, 1901.

from the western margin and between forty and fifty miles from the eastern margin of the mountains. It is evident, therefore, that an expedition to climb the mountain should approach it from the northwest. This is especially true as the gravel-floored plateau on the northwest side of the range is, for the most part, above timber and, as it affords good traveling, gives ready access to the base of the mountains, where good

grass is plentiful. The mountain itself is dome-shaped and has two summits two miles apart, differing about 1,000 feet in altitude, the southernmost being the highest. Its northwestern slope is drained by a large glacier, which discharges into a river tributary to the Toklat. The most feasible route to the top of the mountain is probably across this glacier or by a ridge which separates it from a glacier flowing to the west and draining into the Tatlathna River. The topographic map now being prepared will aid the climbers, but some preliminary exploratory work to pick out the best route would have to be done. The ascent of the mountain itself would not seem to present serious difficulties to experienced mountain climbers. The fact that the snow line is about 7,000 feet, instead of being nearly at sea-level, as at St Elias, gives the Mt McKinley ascent a decided advantage. The upper limit of spruce timber is about 2,500 feet, but willow sufficient for fuel is found up to 4,000 feet. Pack-horses could find ample grass up to 3,500 feet, and by a careful choice of route could probably be taken up to snow line, on the slope of the mountain.

While the writers must disclaim any personal knowledge of high mountain climbing, yet their study of the question would lead them to believe that Mt McKinley could be ascended by making one camp at the base and three on the slopes. The base camp would be within the zone of grass and fuel,

the next at snow line, and the other two at convenient points between the snow line and the summit.

The actual ascent of the mountain will present the difficulties, toils, and dangers with which the experienced mountaineer is familiar and against which he will prepare himself as far as possible. A very serious difficulty for which the average mountaineer might be less prepared is the long and difficult journey to the base of the mountain. Though Mt McKinley in an air line is only about 150 miles distant from tide water, yet to reach its northwest base from Cook Inlet necessitates a journey of at least 400 miles. This distance was traversed by the writers in about two months, but the progress was less rapid than it would have been excepting for the necessity of carrying on survevs and of exploring for a route. The party, consisting of seven men, made the journey on foot, while twenty packhorses, most of which were loaded with provisions, carried the outfit. The time required for the journey and the energy spent in overcoming obstacles, such as chopping trails, traversing swamps, and crossing rivers, makes the reaching of the base of Mt McKinley a serious undertaking.

Our experience and knowledge of the region would lead us to propose three general plans for reaching the northwest foot of the mountain from which, as had been shown, the ascent should best be made. The first two plans involve a summer journey only. while the third would take a year for its execution. An examination of the map (page 32) will show that Mt McKinley lies about half way between the unvigable waters on Cook Inlet and the Yukon River, which is navigated by river steamers. Either of these could be used as a point of departure for the long inland journey. If the project to climb the mountain were to be accomplished in one season,



Mrt. McKinley Region Alaska.

Scate m 140

Motore Va Guilegiat, Survey Party.

the base could be reached from either Cook Inlet or from the Yukon from near the mouth of the Tanana.

If the Cook Inlet route were chosen, the party should land at Tyonek between the 15th of May and the 1st of June, equipped and provisioned for a three and a half months' journey. The journey from Seattle to Cook Inlet takes about ten days by ocean steamer. For a party of seven men twenty horses would be needed, and every additional man would require about three additional horses. From Tyonek a boat would be dispatched with a part of the provisions to meet the party at the Skwentna, so as to lighten the burden of the horses and to aid in crossing the river. From this point the boat would be sent to the Keechatno, a central fork of the Ventna, and here again would be used for crossing. The pack-train would take a northerly course from Tyonek, crossing the Beluga near the head of tide water, and thence heading directly for the lower canyon on the Skwentna; then after crossing the Keechatna would follow our trail across the Alaskan Range by way of Rainy Pass at the head of Happy River. After reaching the Kuskokwim waters it would turn to the northeast and follow the base of the range, the route being identical with that followed by our party. If such a party had exceptionally good luck (and season were an early one), it might reach the base of the mountain by the first of July. Here a camp would be established at the upper limit of timber, where good grass would be found for the horses. Climatic conditions permitting, a month could then be spent in exploring and ascending the mountain. The quickest way out of the country would probably be to the northward, either to the mouth of the Cantwell or to the mouth of the Toklat, from which point a boat could probably be secured to the Yukon. In

the absence of any boat, a raft would be constructed and in a few days the current would carry the party to the Yukon. The cost of such an expedition could be approximated at \$15,000

for a party of ten men.

The second plan is to go to Dawson by rail and steamer and thence down the Yukon to the mouth of the Tanana by steamer. In the event of an early season, the party would leave Skagway on Lynn Canal about June 1st, which can be reached by steamer from Seattle in four days, and the mouth of the Tanana could be reached by the middle of June. From this point, if possible, a steamer should be secured to take the party, outfit, and several horses one or two hundred miles up the Toklat to the head of steamboat navigation. The continuation of the journey would be by canoes or small boats, which would carry the supplies, while the horses would be sent across country. When the river became too shallow for canoe transportation the horses would be utilized to portage the outfit to the base of the mountain. It is expected that the expedition would be ready to begin the ascent of the mountain by the middle of July. The cost of an expedition by the Yukon route can be estimated at about \$12,000.

As an introduction to the third plan it may be said that in an expedition of this kind the party is liable to be worn out by the difficulties incident to the journey to the base of the mountain. The necessity of carrying provisions for the entire trip limits the size of the party, and hence the daily tasks must be shared by all its members. Under even the best conditions, the matter of chopping trails, building bridges, crossing rivers, the incessant annoyance by mosquitoes, has a telling effect on the strength of the men, in the course of even a few weeks. It would, therefore, be advisable, if possible, to furnish each man with a saddle horse if the overland route is taken, and thus save his strength for the task of ascending the mountain. These extra horses would, however, involve an additional expenditure of \$1,000 or \$2,000. The same holds true in regard to the trip from the Tanana with canoes, where the energies of the party would be spent in portaging and in dragging the canoes up against swift currents. Such work is very hard and before very long will have a marked effect on even the strongest. It is possible, therefore, that if the base of Mt McKinley was reached by either of these routes, the energy of the members of the party would be at a low ebb and not at all equal to the task of making the ascent. It should also be noted that by the two plans proposed the base of the mountain would not be reached earlier than the first or middle of July. The midsummer is very unfavorable for reaching the summit, as it is usually shrouded in clouds, and clear days are very exceptional. The clearest weather and most favorable conditions will be found in June.

In view of these facts, it is quite possible that even the best chosen and best equipped party would not be successful in the ascent of the mountain. It is the belief of the writers that success could only be assured by wintering a party in the region and transporting the provisions and outfits to the base of the mountain during the winter and early spring, when dogs could be used. With such a plan it would be possible to reserve the strength of the members of the party for the actual ascent. The writers would propose that a party be outfitted with a year's provisions, which should be sent to the mouth of the Tanana by steamer, either by way of Dawson or St Michaels. From this point a steamer should be chartered to carry the expedition to the head of steamboat navigation on the Toklat. This could probably be accomplished by the first of July, and the party could spend the re-

mainder of the open season in boating the outfit up the Toklat and in establishing the winter camp at some convenient point.

During the winter, with the aid of dog teams, an advance party would establish a camp at timber line near the base of the mountain, and also cache provisions at convenient points on the lower slopes of the mountain. This being accomplished during the winter months, when transportation is easy by means of dog teams, the party would be prepared to take advantage of the clear weather of June to make the ascent, which, as has been shown, is a very important consideration.

A modification of this plan would be to take a steamer up the Kuskokwim, which is known to be navigable as far as the forks, and very probably above. The objection to the Kuskokwim route is that it involves a very long steamboat journey, probably five hundred or six hundred miles, up a river about which very little is known. The mouth of the Kuskokwim lies out of the usual routes of travel, and the river is not easily ac-

cessible compared with the Yukon. The chief point is to obtain steamboat navigation to as near a point to the base of the mountain as possible, then establish a base camp, and distribute the supplies during the winter months. It probably would be advisable to take a few horses for the winter trip, as they could be utilized for transportation both during the summer and winter. If this was done feed would have to be carried for winter use, though, time permitting, it would be possible to cut grass for hay.

The winter plan does not necessitate the entire parties spending a year in the undertaking. It would be possible for one section to prepare the way during the summer and early winter months. while another joined them in March or April by traveling from Dawson with

dog teams.

It is the belief of the writers that if the winter trip were undertaken there would be every reason to anticipate a successful result for the expedition. The objection to the plan is, of course, the time which would be required, and also the very heavy additional expense. While it is difficult to estimate the cost of the winter party, it is safe to say that it would not be less than \$25,000 and might easily be double that amount.

In closing, the writers would strongly urge that if the expedition is undertaken that it be put under the direction of a man who is not only an experienced mountaineer but who has also had long training in frontier life and exploratory work, for the success of the expedition must depend in a very large measure on its leadership. They would also urge the necessity of having ample funds to thoroughly equip the party, and that each member be especially chosen for the work in hand. It is hoped that this article may encourage the organization of an expedition, so that the credit for the ascension of the highest peak on the continent may fall to some American mountaineer.

# WHAT THE UNITED STATES GOVERNMENT DOES TO PROMOTE AGRICULTURE

T may be stated without exaggeration that no government in the world does so much as the United States to promote the agricultural interests of the country. A ten has been imported which is now being grown successfully in South Carolina. In a short while enough Sumatra tobacco will be grown in Connecticut to satisfy the American market, which has been paying \$6,000,000 annually to import Sumatra tobacco. A new variety of long staple cotton, having nearly double the value of the old variety, has been created; new wheats and new rices have been introduced, and even a new orange, which will resist frost more vigorously than those now grown in Florida. These are only a few instances of products which are now being successfully raised within the United States as a result of the watchfulness and teaching of the Department of Agriculture. The fixed capital of agriculture in the United States amounts to twenty billions of dollars, or four times that invested in manufactures. How the

American farmer and the consumer are protected and assisted by expert care may be seen from the following abstract of the last annual report of Hon. James Wilson, Secretary of Agriculture, who has done more for the agricultural interests of the United States than any man in its history:

#### INSPECTION OF MEAT

The Bureau of Animal Industry has made nearly 60,000,000 ante-mortem inspections for the year, at a cost of a fraction over one cent each. The number of post-mortem inspections was nearly 39,000,000. The meat-inspection stamp was affixed to over 23,000. 000 packages of meat products, and the number of certificates of ordinary inspection issued for meat products for export, exclusive of horseflesh, was 32,744. The quantity of pork examined microscopically and exported exceeded 35,000,000 pounds. Altogether, the value of exports of animals and animal productions for the year amounted. 10 \$244,733,062.

#### LONG STAPLE COTTON

One of the greatest needs in improving the cotton industry in the United
States has been to secure a long staple
upland variety of good quality and productiveness. Several varieties of the
ideal type have been produced, and the
past year's experiments show conclusively that these varieties can be made
permanent. Egypt and South Africa
are waking up to their possibilities in
cotton production, and we must develop
and grow better and more productive
varieties than will be grown by our
competitors.

#### AMERICAN TEA

The work on the growing of American tea was continued during the year at Pinehurst, near Summerville, S. C., in cooperation with Dr Shepard. There are now about 100 acres in tea gardens. The yield of tea in these gardens last year was about 4,500 pounds and this year will be about 9,000 pounds of marketable tea. During the year careful attention was given to reducing the cost of the production of tea, with very satisfactory results. A tea farm will be established in Texas if suitable land and cooperation can be secured.

### LAND GRANT COLLEGES

Statistics of attendance at the landgrant colleges show over 42,000 students enrolled, an increase over the previous year of 7 per cent. The attendance for the four-year course in agriculture increased more than 26 per cent. The Secretary points to the marked success of agricultural high schools in Minnesota and Nebraska as an indication that there is a demand for agricultural courses with those afforded in various manual arts in the city high schools. He states that all over the country farmers are sending their children to public high schools and paying for their tuition:

## GROWING SUMATRA TOHACCO

The commercial success of the shadegrown Sumatra tobacco in the Connecticut Valley has now been fully assured. and the plan adopted by which last year's crop, after being carefully cured and sorted under the direction of the department's experts, was catalogued and offered for sale at public auction, under the supervision of the committee of tobacco brokers, with Hon. E. Stevens Henry, M. C., as chairman, proved highly satisfactory. The ordinary tobacco grown in the open fields in Connecticut brings from 18 to 20 cents a pound. The average price paid for the shade-grown tobacco was \$1.20 a pound. The cost of this tobacco, baled and ready for market, averaged 5114 cents a pound. The net profit per acre on the best crop raised on a lot of about six acres exceeded \$1,000 per acre. The reports from cigar manufacturers show that the leaf of this Connecticut, grown Sumatra tobacco has successfully stood the test of manufacture.

At the present time the department is advising and instructing thirty-eight growers in Connecticut and Massachusetts cultivating 645 acres of shade to-bacco. It may be said of this line of department work that it has demonstrated our ability to produce a leaf for which about \$6,000,000 have annually been paid to foreign countries.

The tobacco situation in Texas and Ohio has been thoroughly studied with a view to the production of a desirable type of filler tobacco equal to the imported Cuban leaf, and it is believed that by careful methods of cultivation, fermentation, and assorting this can be done. In fact, leaf has actually been grown that cannot be distinguished from the imported Cuban when properly fermented.

#### EXPORTS OF FRUIT

He reports investigations having for

their purpose the extension of the export trade in fruits and vegetables, and improvement in methods of handling these products for foreign and domestic use. Several experimental shipments have been made to European markets. The results have been fully satisfactory, the net returns in most cases exceeding domestic values. The net returns are largely influenced by the kind of packages and methods of packing and shipping.

The examination of imported food products for the purpose of determining whether they contain substances injurious to life has been continued by the Bureau of Chemistry. Particular attention has been given to the adulterations of olive oils, with the object of securing an honest market for domestic oils now compelled to compete with cheaper and adulterated oils. Important investigations have been made in the sugar laboratory with a view to

table sirups.

#### WEATHER BUREAU WARNINGS

improving the quality and quantity of

The past year affords gratifying evidence of the value of forecast warnings of the Weather Bureau in saving life and property. Ample testimony is afforded that the value of property thus saved from loss amounts to many times the cost of maintaining the Bureau. The Secretary urges the desirability of extending the distribution of daily forecasts coextensively with the rural free delivery. Of the 10,000 rural free delivery routes existing August 1, 1902, it has been found possible to serve only 1,000. To make the distribution coextensive with the rural free delivery would, he estimates, cost about \$100,000.

#### APPALACHIAN FOREST RESERVE

The Secretary enters an earnest plea for the establishment of the Appalachian Forest Reserve. He states that the water power, at an aggregate annual value of \$20,000,000, is being gradually destroyed through increasing irregularity in the flow; that the soils washed down from the mountain slopes are rendering annually less navigable the Ohio, Tennessee, Mississippi, and other rivers. These are the results of the deforestation of these mountain slopes. He states that the rate of land crosion on these slopes from which the forest cover has been removed is as great now in a single year as during ten centuries when covered with primeval forests.

#### WORK IN FORESTRY

Interest in forestry and a perception of its possibilities as a great national resource have developed so swiftly in the United States that the discrepancy between the capacity for government service of this branch of the department and its opportunities was never so great as now. During the past year the Burean of Forestry has notably increased its store of knowledge on which all forestry depends and has made large gains in introducing practical management of forests of both public and private ownership. Its field-work has engaged 162 men and has been carried on in fortytwo states and territories.

Extensive studies were made of commercial trees during the year, and studies of the forest and its industrial relations were made in Michigan, Kentucky, Ohio, Texas, New Mexico, Arizona, South Dakota, Wyoming, Montana, California, and Iowa.

#### STUDY OF SOILS

The soil survey has been greatly extended, and the division of soil management started during the year gives promise of highly important results. The Bureau of Soils now employs a force of over one hundred persons, seventy-five of whom have had scientific training. The usefulness of this bureau has been greatly extended by cooperation with state institutions, experiment stations, boards of agriculture, and geological surveys, as well as with other bureaus and divisions of this department of the government. An assistant has been furnished to the War Department to organize a soil survey in the Philippines. The area surveyed and mapped during the fiscal year was over 14,500 square miles, or not far from 10,000,000 acres, making a total survey to date of over 14,500,000 acres. This area is distributed in twenty-five states and territories and in Porto Rico.

#### PUBLICATIONS

The publication work of the department has been unprecedently active. The total number of publications issued was 757. The total number of pages of new matter edited for publication was S1,184. The aggregate number of copies of all publications issued was 10,586,580. Of this number 6,150,000 were Farmers' Bulletins, and of these the Congressional distribution took 4,289,126. Including the Year-book and other reports paid for by special appropriations, the cost of the publication work amounts to about \$800,000, but the number of publications is still inadequate to supply the demand.

#### GROWTH OF INDUSTRY

The Secretary concludes his report with some interesting figures illustrative of the magnitude of the agricultural industry. In 1900 the fixed capital of agriculture was about twenty billions of dollars, or four times that invested in manufacture. In that year there were nearly five million seven hundred and forty farms in the country, covering eight hundred and forty-one million acres, four hundred and fifteen millions of which consisted of improved land. According to the returns of the last census, about forty million people, or more than half

of the total population in 1900, resided on farms. Of the twenty-nine million persons reported as engaged in gainful occupations, ten million-more than a third-were employed in agricultural pursuits. The produce of American agriculture in 1899, including farm animals and other products, aggregated nearly five billion dollars. The most valuable crop was Indian corn, \$828,-000,000; then hay and forage, \$484,-000,000; then cotton, \$324,000,000; wheat returned \$370,000,000, and oats \$217,000,000. The animals sold and slaughtered during the year were valued at over \$900,000,000, the products of the dairy gave \$472,000,000, while poultry and eggs returned over \$281,-000,000. The concluding statement of the Secretary is that results in the work of the government for agriculture are justifying expenditures, and "the future will still further show the value of science applied to the farm."

#### EXTRACT FROM PRESIDENT ROOSE-VELT'S MESSAGE TO CONGRESS. DECEMBER, 1902

In no department of governmental work in recent years has there been greater success than in that of giving scientific aid to the farming population, thereby showing them how most efficiently to help themselves. There is no need of insisting upon its importance, for the welfare of the farmer is fundamentally necessary to the welfare of the Republic as a whole. In addition to such work as quarantine against animal and vegetable plagues, and warring against them when here introduced, much efficient help has been rendered to the farmer by the introduction of new plants specially fitted for cultivation under the peculiar conditions existing in different portions of the country. New cereals have been established in the semi-arid West. For instance, the practicability of producing the best types of macaroni wheats in regions of

an annual rainfall of only ten inches or thereabouts has been conclusively demonstrated. Through the introduction of new rices in Louisiana and Texas, the production of rice in this country has been made to about equal the home demand. In the southwest the possibility of regrassing overstocked range lands has been demonstrated; in the north many new forage crops have been introduced, while in the east it has been shown that some of our choicest fruits can be stored and shipped in such a way as to find a profitable market abroad.

# GEOGRAPHIC NOTES

IS GERMANY THE CAUSE OF DEN-MARK'S REFUSAL TO SELL HER WEST INDIAN POSSESSIONS?

GERMANY has always wanted a naval station in the West Indies, but has been unable to obtain one on account of the Monroe Doctrine.

Some years ago Denmark offered to sell the Danish West Indies to the United States, but the United States Congress did not accept. Recently another treaty was made and ratified by the United States Congress, but this time, for some unknown, mysterious reason, Denmark refused to sell. Why?

It is well known that Germany has always wanted Denmark, and if by some peaceable means the kingdom of Denmark should become a State of the German Empire, the Danish West Indies would not have changed sovereigns, but yet the German fleet could have its station there.

Would the Monroe Doctrine interfere with this arrangement?

#### THE AMOUNT OF WATER HIDDEN BENEATH THE SURFACE

THE amount of water within the crust of the earth, says Professor Charles S. Slichter, in a paper entitled "The Motion of Underground Waters," recently published by the U. S. Geological Survey, is enormous, amounting to 565,000 million million cubic yards. This vast accumulation, if placed upon the earth, would cover its entire surface to a uniform depth of from 3,000

to 3,500 feet. His estimate is based upon the supposition that the average depth which waters can penetrate beneath the surface is six miles below the land and five miles below the ocean floor.

Experiments have shown that not only sands and gravels are porous, but rocks supposed to be solid and compact may be traversed by water. Even so hard a rock as Montello granite, selected for the sarcophagus of the tomb of General Grant on account of its great strength, shows a porosity of 0.23 per cent. The most productive water-bearing rocks are found to be the porous sandstones, and in some cases limestones whose inner texture has been chemically dissolved.

The great mass of ground water slowly percolates through sand and gravel deposits, sandstone, and other porous material under a wide extent of territory. Though its motion carries it but a fraction of a mile in a year, this ground water is so widespread and often so accessible as to be of the greatest economic importance.

The water supply in many sections of the United States depends on an understanding of the water deep beneath the surface. Hence the study of underground water conditions is one of the most important works of the U.S. Geological Survey. It is carried on in arid regions, where water for irrigation is of the greatest value. In the middle west, where grazing and successful

farming largely depend on it, and in the east, where an unpolluted supply for domestic and municipal use is yearly becoming a more serious problem.

### LOUBAT PRIZES

Throught the generosity of the Duke of Loubat, whose interest in American studies is well known, two prizes, to be called the Loubat Prizes, have been established at Columbia University, to be awarded every five years for the best original works dealing with North America at any period preceding the Declaration of Independence. The value of the first prize is not less than one thousand dollars, and that of the second prize not less than four hundred dollars, and the competition is open to all persons, whether citizens of the United States or of any other country.

These prizes are offered in the year 1903, and the undersigned have been delegated to act as a Committee of Award. Original manuscripts, books, and pamphlets offered in competition may be sent to any member of the committee prior to June, 1903. The conditions of the award are as follows:

(a) That the work submitted shall treat of the history, geography, or numismatics of North America prior to 1776, or of some topic comprised within these general subjects.

(b) That it shall embody the results of original research, be written by a single person, and be submitted by the

author himself.

(c) That it be written in the English

language.

(a') That if a printed work, it shall have been published for the first time not prior to 1898, and if in manuscript, the author shall agree to publish the work within one year from the date of the award.

(e) That the committee is empowered to withhold one prize or both if no works, or but a single work, be deemed

worthy of the award.

(f) That all works submitted shall be placed, after the award, in the library of Columbia University, and that five copies of the prize-winning works shall be presented to Columbia University for distribution according to the conditions prescribed in Mr. Loubat's deed of gift.

(g) It is furthermore requested that all copies printed subsequent to the award should bear upon the title-page

the words:

LOUBAT PRIZE.

Columbia University, in the City of
New York.

Competitors should address all communications to any of the undersigned:

Professor William M. Sloane, Columbia University (chairman)—History.

Dr Alexander Graham Bell, President National Geographic Society—Geog-

raphy.

Dr George N. Olcott, Lecturer on Roman Archæology, Columbia University—Numismatics.

#### SUBDUING THE NILE

DECEMBER, 1902, marked the opening of the great Nile reseryoir and dam, which will increase by one-fourth the farming land of Egypt. Stated differently, Egypt before the reservoir was built had about 10,500 square miles of arable land stretching along the Nile; the resevoir will give her 2,500 square miles more, so that this great work will add an area twice the size of Rhode Island to the farming land of the country. Chalmers Roberts in "The World's Work" for December presents a capital article on this enormous engineering task so successfully achieved. The following paragraphs may be quoted: "

"It is estimated that the permanent benefit resulting will reach \$100,000,000. There will be added to the revenue from the sale of water and from taxation on

\*The World's Work, Vol. 5, No. 2, Subduing the Nile. By Chalmers Roberts.

the irrigated lands \$10,000,000. government will further realize considerable sums from the sale of reclaimed public lands and indirect revenues traceable to the country's augmented producing capacity. Egypt is virtually rainless, but wherever the Nile water can be regularly supplied to the soil the most beautiful crops follow, which, like cotton and sugar, command high prices because of their excellence. With a reliable water supply, farming in Egypt can be pursued with practically certain success. Four or five hundredweight of long staple cotton per acre may be expected, which, owing to its excellence. easily sells for two cents a pound more than American cotton sells for, which in its turn does not average two hundredweight to the acre. Even with the general depression of sugar in the world's markets Egyptian agriculture is confident of obtaining similar advantages for its cane product.

the reservoir at Assuan will contain 1,000,000,000 tons of water. This reservoir, according to Sir Benjamin Baker, will hold more than enough water to make one year's full domestic supply to every city, town, and village in the United Kingdom, with its 42,000,000 inhabitants. During the three or four summer months when the Nile is low, and the needs of cultivators are greatest, the flow from the reservoir will be equivalent to a river double the size of the Thames in mean annual flood con-

dition.

"Here will be created in the heart of the African desert a lake having two or three times the superficial area of Lake Geneva, in Switzerland, and throwing back water for a distance of 140 miles."

#### GOVERNMENT MAPS RECENTLY ISSUED

A NUMBER of topographic maps of portions of New York State have just left the press of the United States Geological Survey and are available to the public. They are maps of the Phelps, Weedsport, Morrisville, and Waverly quadrangles, in the central portion of the State; the Canajoharie, Willsboro (Lake Champlain), and Oyster Bay quadrangles in eastern New York, and the Lockport and Ningara Falls and vicinity quadrangles in the western portion.

The survey has also issued a new and accurate topographic map of portions of Sauk, Columbia, and Adams counties, Wisconsin, on either side of the Wisconsin River between Filbourn and Portage. The map is known as that of the Briggsville quadrangle and is on a scale of about one inch to the mile. A map of portions of Marathon, Lincoln, and Langdale counties, in the center of the State, is now in press.

The Geological Survey has also reprinted its topographic map of part of the Lake Michigan shore known as the Racine sheet, which includes the cities of Racine and Kenesha and about ten

miles of the country to the west. It is on the same scale as that of the Briggsville quadrangle and forms an exceptionally accurate map of the region.

# TESTING THE CURRENTS OF LAKE ERIE.

THE past season 80 bottles have been set adrift in and near Sandusky Bay in order to learn about the currents. To attract attention, a small board, painted orange and black, was attached to each bottle, and inside a notice to the finder offering him a small reward to report place and time of finding; also a map of the bay and neighboring portion of Lake Erie, on which the finder could mark the spot.

So far, 44 of the bottles have been heard from. When found within two or three days, as frequently occurred, the course the bottle had taken could generally be accounted for by examining the wind record for the period it

was floating and a day or two before. Inside the bay the course of the bottle depends largely on whether water is entering or leaving the bay, and this depends mainly on the direction and velocity of the wind compared with the way it has been blowing for some hours or days before.

The bottles displaced about 700 cubic centimeters and, except the first 26,

were weighted with sand to make them sink beneath the board. In a few instances bottles one, three, and five feet beneath the surface were started simultaneously.

An account of these experiments will be published in the next annual report of the Ohio Academy of Science.

E. L. Moseley.

Sandwiky, Ohio, December 15, 1902.

# GEOGRAPHIC LITERATURE

The Uganda Protectorate. By Sir Harry Johnston. With 506 illustrations from drawings and photographs by the author, 48 full-page colored plates by the author, and 9 maps. Two vols. Pp. 1018. 8 x 10 inches. New York: Dodd, Mead & Co. 1902. \$12.50 met.

This is one of the most important works relating to Africa that has been published in recent years. The completion of the Uganda Railway during the past year, opening this vast equatorial province to direct communication with the world, makes the work specially timely. Sir Harry Johnston describes the tremendous work done by the British government toward pacifying and educating the Uganda peoples. The task is costing many millions of pounds sterling, but the commercial profits that will ensue will, in his opinion, far outbalance the expense. The larger part of the two volumes is devoted to a description of the varied races, the animals, and the plant life in the protectorate. An unusual feature are fifty colored plates from drawings by Sir Harry Johnston and over 500 illustrations from photographs taken by him during his twenty months of exploration in Uganda. The following extract from the author's preface gives a very good idea of the protectorate:

"The territories which are comprised

within the limits of the Uganda Protectorate during the time of my administration of that portion of the British sphere in East Africa certainly contain within an area of some 150,000 square miles nearly all the wonders, most of the extremes, the most signal beauties, and some of the horrors of the Dark Continent. Portions of their surface are endowed with the healthiest climate to be found anywhere in tropical Africa; yet there are also some districts of extreme insalubrity.

"The Uganda Protectorate offers to the naturalist the most remarkable known forms amongst the African mammals, birds, fish, butterflies, and earth-worms, one of which is as large as a snake and is colored a brilliant verditer-blue. In this protectorate there are forests of a tropical luxuriance only to be matched in parts of the Congo Free State and in the Cameroons. Probably in no part of Africa are there such vast woods of conifers. There are other districts as hideously desert and void of any form of vegetation as the worst part of the Sabara. There is the largest continuous area of marsh to be met with in any part of Africa, and perhaps the most considerable area of tableland and mountain rising continuously above 6,000 feet. Here is probably reached the highest point on the whole of the African continent, namely, the lottiest Here is the largest lake in Africa, which gives birth to the main branch of the longest river in that continent. There may be seen here perhaps the biggest extinct volcano in the world—Elgon. The protectorate, lying on either side of the equator, contains over a hundred square miles of perpetual snow and ice. It also contains a few spots in the relatively low-lying valley of the Nile, where the average daily heat is perhaps higher than in any other part of Africa.

" Within the limits of this protectorate are to be found specimens of nearly all of the most marked types of African man-Congo pigmies and the low, apelike types of the Elgon and Semliki forests; the handsome Bahima, who are negroids as much related to the ancient Egyptians as to the average negro; the gigantic Turkana, the wiry, stunted Andorobo, the Apollo-like Masai, the naked Nile tribes, and the scrupulously clothed Baganda. These last again are enthusiastic, casuistic Christians, while other tribes of the Nile province are fanatical Mohammedans. The Bahima are, or were, ardent believers in witchcraft. The Basoga polytheists are burdened with a multiplicity of minor deities, while the Masai and kindred races have practically no religion at all.

"Cannibalism lingers in the western corners of the protectorate, while the natives of the other parts are importing tinned apricots or are printing and publishing in their own language summaries of their past history. This is the country of the okapi, the whale-headed stork, the chimpanzee, and the five-horned giraffe, the rhinoceroses with the longest horns, and the elephants with the biggest tasks."

gest tusks.

Animals Before Man in America. By F. A. Lucas. Illustrated. Pp. 285. 5 x 7 14 inches. New York: D. Appleton & Co. 1902. \$1.25 mt.

So little is generally known of the

American continent that this book by Mr Lucas will be very welcome, especially as it is written in simple, untechnical language.

Europe. By Frank G. Carpenter. With maps and illustrations. Pp. 456. 51/2 x 71/2 inches. New York: American Book Co. 1902. 70c.

This volume is one of Carpenter's geographical readers for children. It is a simple, reliable, and interesting description of the countries of Europe.

A Ribbon of Iron. By Annette M. B. Meakin. Illustrated. Pp. 320. 516 x 8 inches. Westminster: Archibald Constable & Co. New York: E. P. Dutton & Co. 1902. \$2 mcl.

Miss Meakin describes the incidents and sights of a trip on the Siberian Railway in 1900, just before the Boxer troubles.

The Land of the Amazons. Translated from the French of Baron de Santa-Anna Nery by George Humphery. With illustrations and map. Pp. 405. 6 x 9 inches. London: Sands & Co. New York: E. P. Dutton & Co. 1901.

The first edition of this standard work on Brazil appeared in 1884; a second edition followed in 1899. The author gives a very complete account of the nature of the country, of the character and life of the inhabitants, native and foreign, and of the explorations of the Amazon. Mr Humphery has made such a free and smooth translation that the fact that the work is a translation does not appear.

Strange Lands Near Home. Illustrated, Pp. 138. Boston: Ginn & Co. 1902. W. E. Curtis, H. Butterworth, Frederick Schwatka, and other entertaining anthors contribute to this little volume brief sketches of Mexico, the West Indies, and South America. The book makes an attractive reader for young people.

William H. Alexander, Observer of the U. S. Weather Bureau, is the author of a bulletin entitled "Hurricanes, especially those of Porto Rico and St Kitts." recently published by the Bureau. The chapter headings are: Theories as to the Origin and Movements of Rotary Storms;

Premonitory Signs of the Existence and Movement of a Hurricane; The Approach and Passage of a West Indian Hurricane — Suggestions Relative to Preparations for the Storm; Barometers, Their Care and Their Use; The United States Weather Bureau in the West Indian; Porto Rico and its Hurricanes; St Kitts and its Hurricanes; Brief Historical Notes on West Indian Hurricanes, Earthquakes, etc.

# NATIONAL GEOGRAPHIC SOCIETY

November 21, 1902.— Dr G. K. Gilbert, of the Board of Manogers, in the chair. Mr O. H. Tittmann gave an address on the "Work of the U. S. Coast and Geodetic Survey," of which he is the honored Superintendent. The address is published in full in this number. At the conclusion of the paper Dr Gilbert stated that the address was so complete that he doubted whether there were any points upon which questions could be asked. If members present, however, had any questions to present, they were welcome to do so.

There being no questions, Dr Gilbert said that he would like to ask how the valuable charts and maps published by the Coast and Geodetic Survey could be obtained by the public. Mr Tittmann replied that a certain number of each edition were allotted to Congressmen and Senators for distribution among their constituents, and also a few copies were given to libraries. If a citizen was not able to obtain a map through his Congressman or Senator, he could purchase it from the Survey for a nominal sum.

November 14, 1902.—Vice President W. J. McGee, I.L.D., in the chair. Dr David T. David T. Dav. Chief of the Division of Mineral Resources of the U.S. Geological Survey, gave an illustrated address on "The Coal Resources of the United States."

November 22, 1902.—Dr G. K. Gilbert in the chair. Commander Robert E. Peary, U.S. N., gave an illustrated address on his "Explorations in the Arctics, 1898-1102."

## ANNOUNCEMENTS.

REGULAR MINUTINGS.

January 2.—Annual meeting. Reports and elections.

January 16.—"The Work of the Hydro" graphic Office, Navy Department." Commander W. H. Southerland

January 30.—"The Work of the Office of Experiment Stations, Agricultural Depart-

February 13.—"The Work of the Census Office." Hon. William R. Merriam.

February 27.—"The Work of the Naval Observatory." Capt. Charles H. Davis.

March 13.—"The Work of the Geological Survey." Hon Charles D. Walcott.

March 27.—"The Work of the Library of Congress." Hon Herbert Putnam.

#### POPULAR LEGITURES

January 9.—"The Turk and His Rebellious Subjects." Mr William E. Curtis. (Illustrated.)

January 23 -- 'The Tragedy of Saint Pierre.''
Mr George Kennan. (Illustrated.)

February 6. - "From New York to London by Rail via Bering Strait." Mr Harry de Windt.

February 20.—"The Geographic Distribution of Insanity in the United States." Dr W. A. White, Director of the Binghampton State Hospital, New York.

Provisional arrangements have also been made for lectures on Colombia and the Isthmian Canal; America Before the Advent of Man; Russia of Today (by Paul du Chaillu), and a lecture by Mr John Muir.

The Lenten Course of five lectures will be delivered in Columbia Theater, F street, near Twelfth, at 4.20 o'clock, on Wednesday afternoons of February 11, 18, 25, and March 4, 11.

The subject of this course and the speakers assigned for the special topics will be announced in a later program.

# MEMBERS

OF THE

# NATIONAL GEOGRAPHIC SOCIETY\*

(Сокинство то Опсимини 1, 1902).

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"In May, 1902, by amendment to the by hws of the Society, a class of Fellows was established. The election of Fellows is vested in the Board of Managers. No Fellows have yet been elected, nor will any elections be made before January 1, 1903.

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Andrews, Mrs Jennie Parker.	The Calonial Hotel
APLIN, S. A. (Stephen Arnold), Geol. Survey, 1330 F st. 1917 I street	
ASPINWALL, J. A. (John Abel), St. Thomas P. E. Ch. 17 Dupont circle	

Auseria, O. P. (Oscar Phelps), 1333 F st. (Bu. of Stat.). 1620 Mass, ave Averia, F. L. (Frank Lloyd), Office Sup. Arch. 1479 Columbia road Avres, H. B. (Horace Beemer). U. S. Geological Survey Avres, Miss Susanne Caroline. 1813 13 street

Babb, Cyrus C. (Cyrus Cates), Geol. Survey. 1118 Rhode Island ave BACON, Samuel H., 404 7 street. 1326 Columbia road Barney, Chas. B. (Charles Brooks), 911 F street. 1424 Staughton street Balley, Mrs F. H. (Anna Bailey). 1815 Riggs place Bailey, Lt. Cindr. F. H. (Frank Harvey), Bu. Steam Eng. 1815 Riggs pl Bailey, Vernon, Department of Agriculture. 1834 Kalomma avenue Baind, Cmdr. G. W. (George Washington), Navy Dept. 1505 R. Lave Bairo, James W. (James Wooster), War Dept. 734 Flintst., Brightwood Baker, Frank, National Zoological Park. 1728 Columbia road Baker, Marcus, 1439 K street 1905 16 street Baltowin, David H. (David Henry), Geol. Survey. 1000 24 street BALDWIN, M. W. (Marcus Wickliffe), Bu. Eng. and Pr. 3000 13 street Baldwin, S. Torrey (Stephen Torrey), Navy Department. 925 S street Baldwin, Wm. D. (William Dickson), 25 Grant place. 1734 Q street BALLINGER, M. F. or Minnie F. (Minnie Fazio). The Riggs House Balloch, G. W. (George Williamson), 1006 F st. 2445 Brightwood ave BARBER, A. W. (Amherst Willoughby), G. L. Off. 703 East Capitol st Barnard, E. C. (Edward Chester), Geol. Survey. 1807 G street BARNARD, Job. U. S. Court-House. 1306 Rhode Island avenue Barnum, Miss Charlotte C. (Charlotte C---). Coast Survey Barrington, Wm. L. (William Leadbeater). 3514 N street Bartleff, Lt. Cmdr. Charles W., U. S. N. Navy Department BARTLETT, Miss Harriet. 122 East Capitol street Bartlett, John R. (John Russell), Navy Department. 1622-21 street Barron, L. Leland (Leslie Leland), 604 H. street Basserr, Frank H. (Frank Howard), War Department. 2200 13 street Batters, R. Grosvenor (Robert Grosvenor), 1317 F street. 501-18 street BAUER, L. A. (Louis Agricola), Coast and Good. Survey. 1925 I street BAYLOR, J. B. (James Bowen). Coast and Geodetic Survey BEAMAN, George H. (George Herbert). 2232 Massachusetts avenue Beaman, W. M. (William Major), Gool. Survey. The Maury, 19 & G sts Bens, E. C. (Edward Crosby), Geol. Survey. 1227 11 street Beck, William H. (William Henry), 1424 N. Y. ave. The Bancroft BECKER, Edmund, Light-House Board. 1315 Yale street Bell, Aileen A. (Aileen Adine). 1521 35 street Bell, Alexander Graham. 1331 Connecticut avenue Bell, A. Melville (Alexander Melville). 1525 35 street Bell, Charles J., 1405 G street. 1327 Connecticut avenue Bell, Byt. Brig. Gen. Geo. (George). 1909 G street

BELT, E. Oliver, M. D. (Edward Oliver), The Farragut, 922 17 street Benher, M. V. (Melitta Viola), P. O. Dept., Room 222. 2010 35 street BENNETT, Frank V. (Frank Vincent). The Arlington Benner, Walter J. (Walter James), 24 and M sts. 1248 Princeton st Benson, Berry (Berry Greenwood). 341 Trumbull street Bengmann, H. H. (Henry Hermann), 511 7 street. 1444 Bacon street Behnadou, Lient. J. B. Navy Department Berry, James, Weather Bureau. 14 3 street SE BICKFORD, Capt. Nathan, 914 F street. 32 Quincy street Bien, Morris, General Land Office. Takoma Park, D. C Bigslow, Frank H. (Frank Hagar), Weather Bureau. 1625 Mass, ave Biggiow, Otis, Avenel, Md. 1501 18 street BINGHAM, Judge E. F. (Edward Franklin), Court-House. 1907 H street Bingham, D. J. (David Judson), U. S. A., retired. Bissiert, Peter. "Twin Oaks," Woodley lane Black, H. Campbell (Henry Campbell). 2516 14 street Blair, H. B. (Herbert Buxton), Geol. Survey. 3025 16 street Blair, John S. (John Sylvanus), 1416 F street. 1820 I street Blood, Ellen E. (Ellen Elizabeth), P. O. Dept. 516 East Capitol street BLOUNT, Henry F. (Henry Fitch), 1405 G st. The Oaks, 3101 31 street Blowers, Miss Etta (Miss Hosetta), Census Office. 602 M street SE Boardman, Wid. J. (William Jarvis). 1801 P street BOARMAN, Mrs. L. M. (L. M-). 1104 Maryland avenue SW Boxo, Mary E. (Mary Eachus), Blake School. 818 New Jersey avenue Boxn, S. R. (Samuel Robert), 321 41 street. 13 Iowa circle Bottineau, John B. (John Baptiste). 315 A street NE Boungeat, Mrs B. K. (Bella Kilbourn), Lib. of Cong. 1629 R street Bouldes, E. D. (Ellie Daniel), General Land Office. 1211 13 street Boungury, Katharine, P. O. Department. 2118 Wyoming avenue Boyce, Lizzie F. (Elizabeth Ficklen), The Grafton Beadford, R. B. (Royal Bird), Navy Department. 1522 P street Bradley, Geo. L. (George Lothrop). 1503 21 street BRADLEY, Mrs Laura A. (Laura Ann). 936 I street BREWER, Clara G. (Clara Gertrude). The Stratford, Mt. Pleasant BRICKENSTEIN, J. H. (John Henry), Patent Office. 1603 19 street BRIGHT, Rich'd R. (Richard Riggs), Navy Dept. 218 Maryland ave. NE BEISTOL, Rev. Dr. Frank M. 330 C street BETTTON, Alex. (Alexander). Glover Bldg., 1419 F street. 1836 S street Brodie, Basil M. (Basil M --- ), Treasury Dept. 1330 New York ave BROOKS, Alfred H. (Alfred Hulse), Gool. Survey. 1320 Wallach place Brooks, N. M. (Newton May), P. O. Department. 224 A street SE Brown, Miss Rachel C. (Rachel Cuthbert), Bu. Ind. Aff. 1008 N st Brown, Geo. H. (George Hay), Off. Pub. Bdgs. & Gds. 1357 Roanoke st Brown, Geo. W. (George Whitfield), 1406 G st. 1710 Connecticut ave

Brown, L. K. (Lewis Kirk), Treasury Department. 134 C street SE 705 15 street Brows, L. S. (Lorenzo Starr). Browne, Aldis B. (Aldis Birdsey), 1419 F street. 1528 P street The Partland BROWNE, Alice Key. Brumbaugh, G. M., M. D. (Gaius Marcus). 905 Massachusetts avenue 635 Maryland avenue NE Buck, Miss Ada P. (Ada Pamelia). Buell, H. L. (Herbert Luther), Off. Chief of Engineers. 1701 V street BULKLEY, Barry, Bond building, 14 and N. Y. ave. Barton's, 15 st near H Bumphrey, M. H. (Marvin H---), care J. C. Burrows, U. S. Senate Bumstead, Albert H. (Albert Hoit), Geol. Survey. 734 12 street Bunker, William Mitchell, Room 19, 1417 G street, Hotel Normandie Burchell, N. L. (Norval Landon), 1325 F street. 1102 Vermont avenue Glencarlyn, Va BURDETT, S. S. (Samuel Swinfin), 925 F St. 1026 Vermont avenue Burderr, Walter W., 1307 F street. 1333 S street Bungless, C. H. (Charles Hyde), 1341 S street. 1339 14 street Bunn, W. H. (William Henry). 218 C street Burt, G. Rodney. BUTLER, W. H. (William Henry), 609 C street. 200 8 street SW 1742 Q street BYNUM, Maud. Byrnes, Eugene A. (Eugene Alexander), Patent Office. 2530 13 street 1828 H street Cales, Samuel Prescott, War Department. 2817 14 street Callana, John, Wash, & Norf. Str. whf., foot 7 street. The Landmore Calvert, Edgar B. (Edgar Bassett), Weather Bureau. Carvo, J. B. (Joaquin Bernardo), Costa Rican Legation. 2111 S street 924 Distreet SW Campbell, Miss Anna. 1841 R street Campbell, William S. (William Shaw). Navy Department Capps, Naval Constructor W. L. 1715 Lincoln ave. NE Carleron, M. A. (Mark Alfred), Dept. of Agric. Carmony, John D. (John Doyle), 314 9 street. 1211 Vermont avenue CARPENTER, Frank G. (Frank George). 1318 Vermont avenue Cana, Wilbur J. (Wilbur John), Department of State. The Gladstone Carr, W. K. (William Kearny), 1008 F street. 1413 K street Carrott, Mitchell (Alexander Mitchell), Columbian Univ. The Cairo 1320 Emerson street Carter, W. F., Treasury Department. 1431 L street CARVER, Frank N. (Frank Noble), 1416 F street. 1428 Euclid place Catlin. Capt. Robert. 3 Grant place CHAMBERLAIN, Miss Jane E. Chambers, Lieut. E. B. (Emmet Butler). 6 1 street NE Chandler, G. V. (George Vose), Patent Office. 218 C street SE

CHAPMAN, R. H. (Robert Hollister), Geol. Survey.

Chester, Major James, t. s. a., retired.

Chester, Josephine M. (Miss Josephine M.).

Cherry, Chas. H. (Charles Henry), Winder Building.

2033 Florida avenue

1115 S street

601 21 street

1016 11 street

Chickering, J. W. (John White). The Portner CHILTON, Robt. S. (Robert S. . . . ), State Dept. 225 Delaware avenue NE Churn, Mrs C. F. (Caroline F---). 1721 Corcoran street CLAFLIN, Price Colby, 907 F street. 1117 O street Clastert, Chas. W. (Charles William), 422 5 street. 803 A street SE CLAPP, J. M. (John Martin). 1024 Vermont avenue CLARK, Charles S. (Charles Shedd), Dennison School. The Manhattan 600 13 street CLARK, Egbert A., D. D. S. (Egbert Asahel). CLARKE, S. A. (Samuel Asahel), Law Librarian. General Land Office 1513 S street CLAY, Gen. Cecil, Department of Justice. CLEAVER, F. M. (Frank M.), Weather Bureau. 2311 M street 1615 Florida avenue Colk, T. L. (Theodore Lee), 13 Corcoran Bldg. Conger, Miss Florence W. (Florence West), Station C. 1141 N. H. ave Coolings, L. A. (Louis Arthur), 1403 F street. 1423 Welling place 1704 Q street Conra, Lais F. (Luis Felipe). Cornish, Major G. G. (G-----------------------). 225 1 street SE 1154 17 street Corson, Geo. E. (George Edgar), War Department. Sun building Corrox, John B. (John B---). COVILLE, Frederick V. (Frederick Vernon), Dept. Agr. 1836 Californiaave Cowsell, Arthur, Wyatt building, 1403 F street. 634 I street NE Cox, W. P. (William Porter), 532 17 street. 315 Florida avenue Cox, W. V. (William Van Zandt), 2d Nat. Bk. Emery pl., Brightwood COYLE, B. J. (Bernard J --- ). 834 13 street Crans, Augustus, Jr., 604 14 street. 1344 F street 1532 9 street Chew, J. H. (James Hart), Room 510, P. O. Dept. CRIDLER, Hon. Thos. W. (Thomas Wilbur). Cleveland Park Crosny, Oscar T. (Oscar Terry), Atlantic Building. CROSS, Whitman (Charles Whitman), Gool. Survey. 2138 Bancroft pl Chowell, Mrs Anna S. (Anna Silliman). 938 I street 32 Grant place Culbertson, Mrs Anna G. Cuastings, H. S. (Horace Stuart), Kellogg Building. 1756 K street Curry, J. L. M. (Jabez Lamar Monroe). 1736 M street CHERY, W. W. (William Wallace), Pension Building. 1510 9 street Curris, Henry A. (Henry Adams), Winder Building. Takoma Park Curtis, William E. (William Eleroy), Post Bldg. 1801 Connecticut ave Cushing, S. C. (Sallie Corwin). 320 Indiana avenue 110 East Capitol street Cuarts, Geo. W. N. (George Washington Neale). Custis, J. B. Gregg (James Bayard Gregg). 912 15 street

Dall, Wm. H. (William Healey), Smithsonian Institution. 1119 12 street Danton, N. H. (Nelson Horatio), Geol. Survey. Daugherty, Rev. Jerome, S. J., Georgetown College. Georgetown Univ-Daveneore, J. L. (James La Roy), Bureau of Pensions. 2501 14 street Davis, Arthur P. (Arthur Powell), 1330 F street. 2212 1 street

3323 Holmead ave

2572 University pl

Ridge road East

Davis, Mrs Jennie T. (Jennie Taylor), Geol. Sur.

Dawson, Thos. F. (Thomas Fulton), Star Building.

Dawes, Charles G. (Hon. Charles Gates)

DAY, David T. (David Talbot), Geol. Survey. 1302 R street DE CAINDRY, Wm. A. (William Augustin), War Dept. 914 Farragut sq DE MERITT, J. H. (John Henry). 1335 Vermont avenue Detweiler, F. M. (Frederick May), 420-422 11 street. 504 I street Devine, John T. (John T---). The Shoreham, 15 and H streets Deveneux, Mrs M. (Maria). 3016 Dumbarton avenue 7 and D streets 1747 Rhode Island avenue Dewey, George. DEWEY, Lyster H. (Lyster Hoxie), Dept. of Agric. 1337 Wallach pl Dickins, Capt. F. W. (Francis William), v. s. N. 1334 19 street Dickson, Med. Insp. S. H. (Samuel Henry), v. s. n., Marine Bar. 732 21 st DILLER, J. S. (Joseph Silas), Gool. Survey. 1454 Staughton street Dodge, Arthur J. (Arthur J.—), 1403 F street. Hotel Stratford Doebmann, Rev. J. E. A. (Rev. John E --- ). 927 Westminster at Donn, Edw. W. (Edward William), 913 G street. 1708 16 street Doungers, Ed. (Edward), 721 14 street. 928 I street Douglass, Mrs Helen. Cedar Hill, Anacostia Downing, Mrs Mary. 1006 11 street DOYLE, John T. (John Thomas), Civil Service Com. 2104 Wyoming ave Du Bois, Chas. L. (Charles Lamartine), Gen. Land Off. 1421 Chapin st Duffield, Will Ward, Coast Survey. 1631 Q street Dumont, Jas. A. (James Allen), Treasury Dept. 2009 Kalorama ave Duncan, D. Wallace (David Wallace), Off. Aud. P. O. Dept. 115 5 st. NE Duncasson, Chas. C. (Charles Coltman), 317-319 9 street. 1300 17 st Durron, Maj. Clarence Edward. War Department Dyr. P. E. (Peleg Edwin), 514 11 street. 1403 L street DYKE, Miss Nellie C. (Ellen Cooper). 1702 9 street Easterling, H. V. (Horace Virgil), War Department. 1541 9 street Enson, Jno. Joy (John Joy), 900 F street. 1324 16 street Edwards, Thos., Jr., 225 Pa. ave. SE. 18 North Carolina ave. SE EIMBROK, William, Coast Survey. 1106 New York avenue Eldridge, G. H. (George Homans), Geol. Survey. Chevy Chase, Md Emmons, S. F. (Samuel Franklin), 1330 F street. 1721 H street Exocus, Mrs Annie H. ERBACH, John, Gool. Survey. 122 3 street SE Estabrook, Leon M. (Leon M---). 1026 17 street EVERMANN, Barton W. (Barton Warren), Fish Commission. 412 T street Ezpone, Richard (Count Richard von). 918 N street

FAIRFIELD, W. B. (Walter Browne), Coast Survey. 1717 De Sales street

Fairley, Frances S. (Frances Sarah).

Farabee, L. T. (Louis T.), Bureau of Pensions. 313 East Capitol street 1615 Florida avenue Fanquhan, Henry, Census Office. 2013 Massachusetts avenue Fromer, Charles M. (Charles Mather). 1340 Q street Fiske, Rev. A. S. (Asa Severance). Fischer, E. G. (Ernst Georg), Coast Survey. 436 New York avenue 1915 Kalorama ave Fishen, Robert J. (Robert Strettle Jones), 614 F st. 3062 Q street Frrem, C. H. (Charles Hall), Geol. Survey. Frren, Henry W. (Henry Winslow). 1518 Connecticut avenue Frem, James E. (James Edwin), 1406 G st. 1747 Rhode Island ave Flercher, Miss A. C. (Alice Cunningham). 214 1 street SE FLETCHER, L. C. (Louis Cass), Geol. Survey. Chapin flats, 1415 Chapin st FLUTCHER, Robert, M. D., Medical Museum. The Portland The Westover, 16 and U streets Flixe, Weston, Public Library. FLYNN, H. F. (Harry Franklin), Coast Survey. 31 B street SE Foore, Morris J. (Morris Julius), War Department. 1729 H street FORNEY, Edward O. (Edward Otis), Patent Office. 514 E street Fogwood, Gen. W. H. (W-H-). 1425 Euclid place 1402 Binney street Foster, Miss E. B. (Ellen Burroughs). 1509 Rhode Island avenue Forsyth, Geo. A. (George Alexander). 1323 18 street Foster, John W. (John Watson). FOWLER, Edwin H. (Edwin Horatio), Coast Survey. 1126 East Cap, st FRAILEY, L. A. (Leonard August), Navy Pay Office. The Gloucester The Buckingham FRANKENPIELD, H. C. (Harry Crawford), Weather Bu. 1834 I street French, Geo. N. (George Norris), Treasury Department. 2212 F street FRENCH, Owen B., Coast Survey FRISHY, Prof. Edgar. 1607 31 street FULLER, Chf. Jus. M. W. (Melville Weston), Supreme Court. 1801 F st Fulton, H. K. (Horace Kimball), 314 9 street. 1211 Vermont avenue

1126 5 street Gage, N. P. (Nathaniel Parker), Seaton School. Gale, Thos. M. (Thomas Monroe), 1414 F street. 1314 L street Gallauder, E. M. (Edward Miner), Gallaudet College. 1 Kendall Green GANNETT, Henry, U. S. Geol. Survey. 1881 3 street Ganner, S. S. (Samuel Stinson), Geol. Survey. 2556 University place Garnier, Madeleine A. (Madeleine Adelaide), P. O. Dept. 1829 Oregon ave 1248 Princeton st Garriott, E. B. (Edward Bennett), Weather Bureau. Garrison, Miss Carl L. (Carl Louise). Phelps School. 1300 Lydecker ave GATES, Merrill E. (Merrill Edwards), 1429 N. Y. ave. 1315 N. H. ave Garsoner, Albert S. (Albert Samuel), Bureau Ethnology. 2020 15 street. Grison, George, 13th street and Pennsylvania avenue. 1434 R. Lavenue Gilbert, Mrs C. E. (C- Evelyn). 1455 Missouri avenue Gilbert, G. K. (Grove Karl), Geol. Survey. \_1919 16 street Cleveland Park, D. C. GILLAM, Frank, Weather Bureau. GHLETT, Alfred S. (Alfred Silas), Philadelphia. 1614 20 street

Gilman, Daniel C. (Daniel Coit), 1439 K street. 614 Park avenue, Balto GLOVER, C. C. (Charles Carroll), Riggs National Bank. 20 Lafayette sq Glover, John J., Department of Justice. 1505 R street 942 Westminster st Godfrey, E. D. (Eliasaph David), Pension Office. Goldman, E. A. (Edward Alphonso), Department of Agriculture. Goode, Rich'd U. (Richard Urquhart), Geol. Survey. Lanier Heights Gorham, Geo. C. (George Congdon), Bond Building. 1763 Q street Graham, Andrew B. (Andrew Butler), 1230 Pa. ave. 1407 16 street Graham, Agnes M. (Agnes Montgomery). 1732 Connecticut avenue 2000 H street Granderey, Maj. Clement de. 1918 H street Ghant, Alex. (Alexander), P. O. Department. 1347 L street 927 Massachusetts avenue GRAVES, Edward. GREELY, A. W. (Adolphus W.), War Department. 1914 G street Green, Bernard B. (Bernard Richardson), Lib. of Cong. 1738 N street Green, Darius A. (Darius Alonzo), Navy Department. 1123 17 street Gheene, Dr Edw. L. (Edward Lee), Catholic University. Brookland Greene, Samuel H. (Samuel Harrison). 1320 Q street Gheene, Mrs Wallace (Josie Craig). 904 S street Griswold, H. A. (Henry Adams). Maple avenue, Anacostia Grosvenor, Gilbert H. (Gilbert Hovey), Corcoran Bldg. 1328 18 street

HAUKNEY, Fielder Poston, 2806 Pa. ave. 2602 Pennsylvania avenue Haunen, A. B. (Alexander Burton), Court-House. 1818 H street HAGUE, Arnold, Geol. Survey. 1724 I street Hall, C. L. or Cyrus L. (Cyrus Lyman). 1354 Yale street Hall, Sam'l K. (Samuel Kellogg), Govt. Printing Office. 421 H street HALL, W. L. Bureau of Forestry Hamilton, Dr William, Bureau of Education. 1023 Vermont avenue Hamlin, Teunis S. (Tennis Slingerland). 1306 Connecticut avenue Hansen, John (J. A. H. John). 704 7 street Harding, Miss Gena R. (Gena Russell). The Shoreham Hardwick, S. H., Southern Railway Co. 1315 New Hampshire avenue Harlan, Justice John M. (John Marshall), Sup. Court. 1401 Euclid pl Harris, W. T. (William Torrey), Bureau of Education. 1303 P street Haurison, Miss Carrie. 1322 14 street 2005 Kalorama avenue Harr, A. (Abraham), 420 7 street. Harr, Amos W. (Amos Winfield), 625 F street. 717 10 street Hanvey, Lt. Col. Philip F., Dep. Surg. Gen., U. S. A. Surg. Gen. Office HAVEN, Henry L. (Henry Langdon), 628 F street. 2005 I street HAWLEY, John M. (John Mitchell), Navy Department. 1514 R street 1512 Corcoran street HAY, E. B. (Edwin Barrett), 1425 N. Y. avenue. HAY, John, State Department. 800 16 street HAY, W. P. (William Perry). 311 F street

Navy Department HAYDEN, Lieut, Everett. HAYES, C. Willard (Charles Willard). Geological Survey 1445 Mass, avenue Hazano, Daniel L. (Daniel Lyman), Coast Survey. The Hamilton, 14 and K streets HAZLETT, Isanc. HEAD, J. F. (John Frazier). 2015 R street 921 18 street Hearn, Hon. A. (Augustine). HEARST, Mrs Phebe A. (Phebe Apperson). 1400 N. H. avenue 1618 17 street Heaton, A. G. (Augustus George). Heidrick, Henry B. (Henry Benjamin), Naval Obser'y. 2301 32 street 2026 Hillyer place HEGER, Col. A. (Anthony). HEILPRIN, Giles F. (Giles Fabian), 1208 F street. 926 B street SW Hendenson, C. W. (Charles W---), 507 12 street. The Chapin Henderson, Julia (Julia Doty), Indian Office. 1826 G street HENDERSON, John B., Jr. (John Brooks), 1416 F st. 1601 Florida ave Henderson, Miss N. (N--). Address unknown. HENDORS, M. (Matthew), General Land Office. The Garfield, 901 13 st Hennig, Frederick, Washington Barracks. 1831 5 street Henry, A. J. (Alfred Judson), Weather Bureau. 1322 Columbia road HENRY, E. S. (Edwin Stanton), Patent Office. 1320 Columbia road HERBERT, Hon. H. A. (Hilery Abner), 1419 G street. 1612 21 street Herrand, Joseph S. (Joseph Sutherland), War Department. The Donald Herron, Wm. H. (William Harrison), Geol. Survey. 1508 Q street HEURICH, Christian, 26 and Water streets. 1307 New Hampshire ave Hickey, Susanna G. (Susanna Goode), Harrison School. 1202 Q street Library of Congress HICKS, Frederick C. (Frederick C--). The Concord Higgson, Mrs Walter. Treasury Department Higginson, Rear Admiral F. J. HILL, E. J. (Ebenezer J---), House Reps. The Cochran. Norwalk, Conn. HILL, David J. (David Jayne), Department of State. 1313 K street 323 East Cap. st HINDMARSH, W. B. (Walter B.), Light-House Board. 1404 L street Histor, Dr William, 1400 H street. Hirthcock, A. S. (Albert Spear), Dept. of Agric. 80 R street 1709 35 street Hrrz, John, Volta Bureau. 201 2 street SE Hodges, J. W. (John Walter), Hodgkins, W. C. (William Chandler), Coast and Geodetic Survey. Hoegelsberger, Mrs Nora, Central High School. 924 Massachusetts ave Holingook, Theodore Lewis, 1420 New York avenue. Cleveland park Holden, Henry P. (Henry Prichard), Bureau of Pensions. 1211 I street. Holliger, Frank S. (Frank Samuel), War Department. 1112 N. Y. ave HOLMEAD, Alfred H. (Alfred H--), Interstate Com. Com. The Iowa Holmes, W. H. (William Henry), National Museum. 1444 Staughton st HOLT, H. P. R. (Henry Peter Renouf), Treasury Dept. Takoma Park HOPKINS, Archibald, Court of Claims. 1826 Massachusetts avenue 1324 18 street Hopkins, James H. (James Herron).

HOPKINS, Martha G., Bureau Engraving and Printing. 2034 G street Houndlower, Jos. C. (Joseph Coerten), 1509 H street. 1402 M street Hoster, F. M. (Francis Marion), Bu. of Nav., Navy Dept. 1204 S street House, Franklin H. (Franklin Horatio), Atlantic Bldg. 1315 T street Housen, Helen M. (Helen Maria), 1330 F street. 332 Indiana avenue HOVEY-KING, Alvin, Bureau of Statistics. 1732 21 street HOWARD, A. L. (Arcturus Lee). 124 S street Howard, I. O. (Leland O.), Department of Agriculture. 1386 30 street Howell, Edwin E. (Edwin Eugene), 612 17 street, 2032 G street Hoyr, Henry M. (Henry Martyn), Dept. of Justice. 1516 K street Hubbahd, Mrs Gardiner Greene. "Twin Oaks," Woodley lane HUTCHINS, Stilson. 1603 Massachusetts avenue Hume, Frank, 454 Pennsylvania avenue. 1235 Massachusetts avenue Hurcheson, David, Library of Congress. 401 B street NE Hurchison, Miss Jessie E. (Jessie Elizabeth), P. O. Dept. 305 D street Huxronn, Maj. W. P. (William Pitkin), Atlantic Bldg. 1800 H street Hynk, Miss E. R. (Eliza Reed), Off. Comp. Cur., Treas. Dept. 1326 I st Hyde, John, Department of Agriculture. Laufer Heights Hyrson, Laurence M. (Laurence Maxwell), Corcoran Bldg. 623 S. C. ave

IDE, George R. (George Russell), Patent Office.

801 A street SE

Jackson, Sheldon, Bureau of Education. The Concord, 1701 Oregon ave James, Mrs Sarah S. (Sarah Stubbs). 1517 O street Janson, Ernest N., Navy Department. 802 Rhode Island avenue JEWELL, Claudius B. 1324 Vermont avenue Jourson, A. B. (Arnold Burges), Treasury Department. Johnson, Arthur E. (Arthur Edward), War Dept. 1833 Vermont ave Johnson, Enoch G. (Enoch George), House of Reps. 1827 Corcoran st Johnson, Frank E. (Frank Evan), Treasury Department. 1845 R street Johnson, Theo. H. (Theodore Halfdan), Geol. Survey. 1115 S st Johnson, Willard D. (Willard Drake), Geol. Survey. Johnston, James M. (James Marion), Riggs Nat'l Bank. 1628 K street Johnston, John A. (John ---). 1752 Q street Jones, Dr. E. S. (Edward Salmon), Treasury Department. The Cairo Jones, Louise Tayler. 1840 21 street Jones, Col. W. A. (William Albert), Balto, and Phila. 1800 Conn. ave Jupp, Geo. H. (George Herbert), 420-422 11 street. 511 3 street NE

Kasson, John A. (John Adam).

Kattelmann, Carl.

Kauffmann, S. H. (Samuel Hay), 1101 Pa. ave.

Keiller, Mrs William.

The Portner, 15 and U streets

Kelly, Joseph T., D. D. (Joseph Thomas).

1367 Kenesaw street

Kempen, Chas. E. (Charles E--), Treasury Dept. 1310 Riggs street Kendall, Frederick A. (Frederick Albert), 533 15 st. 1455 W street KENDALL, Maj. H. M. (Henry Myron), E. S. A. Soldiers Home Kennan, George. The Mendota KERN, J. Q. (Josiah Quincy), Winder Bldg., 17 and F sts. 507 6 street Kirber, Bessie J. (Bessie Juliet). 2025 Massachusetts avenue Kimball, Dr E. G. (Ephraim Gardner), Jefferson Sch'l. 1204 Mass, ave KIMBALL, H. H. (Herbert Harvey), Weather Bureau. 317 T street Kimball, S. I. (Sumber I----), Life-Saving Service. 1316 R. Lave KING, Frank B. (Frank Bockins). 1442 Rhode Island avenue KING, F. H. (Franklin Hiram), Bu. of Soils, Dept. Agric. 2059 street SW King, George A. (George Anderson), 728 17 street. 1611 28 street 405 C street SE Kirry, Chi. Eng. Absalom, u. s. N. Klakhing, A. (Alfred), Hydrographic Office, Navy Dept. 1137 N. J. ave KNAPP, Martin A. (Martin Augustine), Sun Building. The Portland Koehper, E. A. (Egon Anthony). 2234 Q street 735 7 street KRAEMER, Charles. Kürel, Stephen J. (Stephen Joseph), 1330 F st. 628 East Cap, street Kumler, B. W. (Benjamin Walter), Civil Serv. Com. Kensington, Md Kumler, Mrs J. P. E. (Abignil Goulding). 2005 Massachusetts avenue Kurtz, Dr John. 3142 P street

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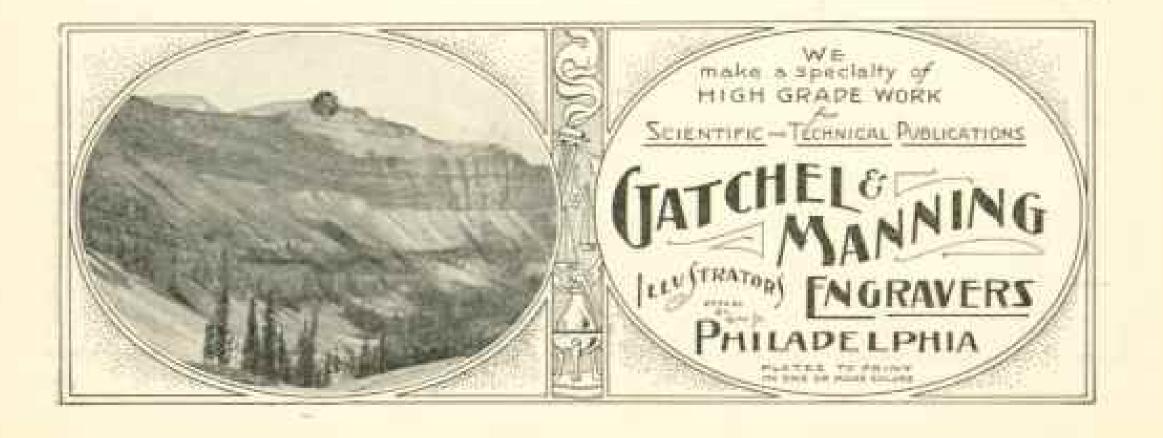
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