rails clean through, and several of the sleepers were splintered, a large piece of one being flung fully 40 yards, while the crater formed was upwards of 12 feet in diameter. This, the most striking of the experiments, was also the last.

SCIENTIFIC NEWS IN WASHINGTON.

Bibliography of the Iroquoian Languages. — The Los Angeles Base-Line. — Deep-Sea Models.

Bibliography of the Iroquoian Languages.

SOME ten years ago Mr. Pilling of the Bureau of Ethnology entered upon the formidable task of preparing a systematic and exhaustive exhibit of all printed and manuscript works giving information respecting the speech of the native races of North America. The need of such exhibit had become strikingly apparent. For nearly four hundred years information had been accumulating respecting the North American aborigines, and this accumulated information had been printed in many lands in many tongues. The subject was fast becoming, or had already become, buried in the *débris* of its own literature. Special students found themselves consuming an inordinate amount of time in acquiring even an imperfect knowledge of the literature of the special subject of their study.

Recognizing this condition, the labor of preparing a bibliography of North American linguistics was, as already indicated, systematically entered upon more than ten years ago, and has been continued with only such interruptions as were necessitated by other official duties. The work before us[1] closes the third chapter in this work.

The first chapter or division of the work was a bibliography of the Eskimo languages, issued in 1887; the second, a bibliography of the Siouan languages, issued in 1888; and the third, that of the Iroquoian, now before us; to be shortly followed by the Muskhogean, and later by the Algonquian and the Athabascan.

The aim to make the catalogue as exhaustive and complete as possible, and the dictionary plan of arrangement, carried to its extreme limit, remain the same as in the earlier bibliographies; and it may be added, that zeal in the pursuit of all information relating to the books catalogued, and fidelity in exhibiting this information, increase rather than diminish as time passes.

As a sample of Mr. Pilling's painstaking bibliographic research, the "Voyages of Baron Lathontan" may be cited. Seven pages of the bibliography are given to the careful and minute description of the eighteen editions of the work, which appeared in French, English, German, and Dutch. To collate these different editions, copies were borrowed from numerous sources, and photographs of titlepages made, that proof might be read from facsimiles. The careful scrutiny exercised in preparing these minute descriptions has developed the fact, that, from the original edition of 1703, two spurious editions of the same date were prepared. So far as ascertained, but one copy of the authentic edition is extant.

The catalogue contains in round numbers 950 titles, of which 800 relate to printed and 150 to manuscript matter. Of these, Mr. Pilling has himself seen and described 850, or 89 per cent; and of the remaining 11 per cent, about two-thirds have been seen and described for this catalogue by his correspondents. Thus about 95 or 96 per cent of the entries are at first-hand; and, further, 61 per cent of the entries were compared directly with the original sources while the proof was passing through his hands.

Of the various languages included under the general term "Iroquoian," — viz., Cayuga, Cherokee, Hochelaga, Huron, Iroquois, Maqua, Minqua, Mohawk, Oneida, Onondaga, Seneca, Tuscarora, and Wyandot, — more than half of the material catalogued relates to the Cherokee and Mohawk only; most of the Bible, for instance, having been printed in each of these languages. Printed dictionaries of the Huron, Mohawk, and Onondaga, and manuscript dictionaries of the Seneca and Tuscarora, are in existence. There are in print rather extensive grammatical treatises on the Cherokee, Huron, and Mohawk, and fragmentary grammatical notes on several of the remaining languages. Of the Cherokee texts, all except two spelling-books, published in 1819 and 1824 respectively, are in the Cherokee syllabary, these two having been printed before the invention of those characters.

The earliest printed record of any North American language appears to have been made by Cartier, whose first voyage was made in 1534, and the second in 1535. There is reason for believing that the original account of the first voyage contained a vocabulary of the people of New France; but, so far as known, no copy of this book is in existence, and the date of its publication is not known. The account of the second voyage was published at Paris in 1545, and contains a Huron vocabulary.

This is one of the rarest books in the entire list, only two copies having been known for the last three hundred years. Of these, one was bought in 1851, and lost in a ship on its way to America. The other and only known copy is in the British Museum. Of this "unique," Mr. Pilling gives a facsimile of the titlepage. Facsimiles are also given of several other rare, curious, or specially interesting books.

The work contains eight pages of addenda, which accumulated while the copy was in the printer's hands.

A chronologic list of authors at the end of the volume, covering eighteen pages, begins with Cartier in 1545, and ends with a list of nearly forty works issued in 1888. From an inspection of this list, it appears that interest in matters relating to the Iroquois was never greater than at present; and, while the literature of the subject has been accumulating during the past three hundred and forty years, more than half of it has appeared within the last forty.

[1] Bibliography of the Iroquoian Languages, by James Constantine Pilling.

The Los Angeles Base-Line.

The "Yolo Base," as it is familiarly known to geodesists, being the base-line measured in Yolo County, Cal., in 1881, for the transcontinental triangulation of the United States Coast and Geodetic Survey, was, in point of rapidity and accuracy of measurement, the best work of the kind ever performed. That measurement was made under the immediate supervision of Professor George Davidson, assistant United States Coast and Geodetic Survey, with the five-metre compensating base apparatus, which had been constructed at the office of the survey in Washington, under the supervision of Assistant C. A. Schott, and in accordance with a design prepared and submitted by him. The length of the "Yolo Base" was 17,486.5119 metres (10.86 miles). It was measured twice throughout its entire length, with a third measurement covering less than half (42.8 per cent) of its length. The two measurements and partial measurement occupied a total of forty-six days.

The recent measurement of a Coast and Geodetic Survey base-line near Los Angeles, Cal., which was concluded on the 16th of February, afforded to Professor Davidson, under whose supervision the work was also done, an opportunity of fulfilling his announced purpose of "breaking all records" of base measurements.

The "Los Angeles Base" is roughly 17,496 metres in length, or 9.5 metres longer than "Yolo Base." Although the weather was extremely unfavorable, the work having been pushed in the frequent severe rain-storms, which converted the line into a route of deep mud, standing pools, and rushing streams, three full measurements were completed in 46.75 days, the average measurement per day having been 1,122.73 metres, against an average of 912.5 in the "Yolo Base;" the longest measurement in a single day having been 2,000 metres, against 1,620 metres on the "Yolo Base;" and the cost, exclusive of the expenses connected with the establishment of monuments at the ends of the lines, was $8,000, against $15,578 for the measurement of Yolo.

It is hardly to be expected that the accuracy of the Yolo measurement, which involved a probable error of ±0.035 of an inch per statute mile, or .38 of an inch in a length of 10.8657 miles, will be surpassed by that of the Los Angeles Base. If it is even equalled, the Los Angeles Base measurement will signalize again the unequalled proficiency of American officers.

Deep-Sea Models.

Mr. E. E. Court of the Hydrographic Office of the Navy Department has published two excellent models, — one of the Atlantic Ocean, the other of the Caribbean Sea. These accurate and neatly finished models convey an excellent idea of the configuration of the bottom of the sea which is only inadequately expressed to the in-

experienced eye by means of contour-lines. Therefore these models have a highly educational value, and will be used to the greatest advantage in the teaching of geography. One of the features most strikingly shown in the model of the Atlantic Ocean is the extent of the continental shelves both of the Old and of the New World. The abruptness with which oceanic islands rise from the greatest depths is also well shown. The deep valleys of the Gulf of St. Lawrence, of the Florida Strait, south of Cuba, and at the mouth of the Kongo, appear very distinctly and clearly, and the bold relief of the Mediterranean Sea is seen to be in striking contrast to the oceanic depths. The undulations of the ocean are shown not less clearly. The great transatlantic cables are shown. Mr. Court deserves the thanks of teachers of geography for having undertaken a work of this magnitude. As the prices are very reasonable, — being ninety dollars for the model of the Atlantic Ocean, and seventy dollars for that of the Caribbean Sea, — it is to be hoped that universities and colleges will possess themselves of these valuable works. The author has also published photographs of these models, which show the relief to good advantage, although of course not as clearly as the models themselves.

HEALTH MATTERS.

London, Ancient and Modern, from a Sanitary Point of View.

IN *Nature* of Feb. 7 is an abstract of a lecture delivered by Dr. G. V. Poore at the Sanitary Institute on Thursday, Jan, 24. Dr. Poore began by reminding his hearers that the mere age of London was one of the reasons why it became unwholesome. Roman London was buried deeply among rubbish of all kinds, much of which was putrescible, and therefore a source of danger in the soil.

Ancient London was well placed, and magnificently supplied with water, for, in addition to the Thames, there were many streams, such as Westbourne, Tybourne, the Fleet River, Walbrook, and Langbourne, which originally were sources of pure water. All these brooks, however, had become disgracefully fouled, and for very shame had been covered over. One great drawback to the site of London was the proximity of marshy land on every side except the north-west, and formerly from this cause malarial fever and dysentery were great causes of the high death-rate.

In mediæval London, and even down to the eighteenth century, the houses were not so closely packed as they are now. Reference to Aggas's map (time of Elizabeth) would show that there was a great deal of garden-ground within the city; and, on comparing this map with Newcourt's map (Charles II.), it was evident that just before the Plague and the Fire the crowding of houses had become very much greater than it was in the time of the Tudor monarchs, who discouraged building near or in London.

Parker's map (1720) would also show that after the Fire the houses were not so closely packed as in the days of the Stuarts, for in this map a surprising amount of garden-ground is visible within the walls. At this time, also, Moorfields was not built upon, and remained as a playground and air space, as it had done for centuries previously. That mediæval London was very unhealthy, a perfect fever-den, there could be no doubt. The Black Death in 1349, and the Sweating Sickness two centuries later, were times of great mortality which struck the popular mind; but it was not till 1593, when bills of mortality were first introduced, that we began to have any certain knowledge of the amount or the kind of disease prevalent. There was reason to think, however, that in the eighteenth century (after the Fire and the Great Plague) the deaths exceeded the births by about 600,000 in the hundred years.

The fatal diseases were mainly malarial fever, small-pox, typhus, measles, and (latterly) whooping-cough. The causes of the enormous mortality of mediæval London were due (1) to the marshy undrained soil, fouled with refuse of every kind; (2) the filthy state of the unpaved city, and a perfectly swinish condition of the houses of the lower orders; (3) the ill-nourished and drunken condition of the masses, among whom a taint of scurvy was very common; (4) the condition of superstition and brutality (as evidenced by the punishments and the pastimes), which made any measures of public health impracticable; (5) the bad management of epidemics, with a total neglect to separate the sick from the sound; and, finally, the medical faculty were scarcely less ignorant and superstitious than their patients.

Turning to modern London, the lecturer said there had been a great and manifest improvement; but, when we looked at the low figure which is called the London death-rate, several things must be taken into consideration: e.g., (1) the London of the registrar-general included large districts, such as Lewisham, Wandsworth, Fulham, etc., which, in great part, were scarcely urban in character, and these, being occupied largely by well-to-do persons, lowered the average death-rate for the whole city; (2) London being a city in which wealthy people abounded, its death-rate must not, in fairness, be compared to a city packed with undiluted operatives; (3) the mobility of the population was so great, that this fact must vitiate the statistics, and it was to be remembered that nothing quickened the departure of an individual from London more than ill health; (4) the age distribution in London was very abnormal, it was largely recruited by selected adults from the country, and there was a great deficit in the extreme ages, among which (the very young and very old) death-rate is always highest; (5) again, the diminishing birth-rate (that for 1887 was 2.8 below the average of the previous ten years) very greatly diminished the death-rate in a city where 158 children out of every 1000 born die before they are one year old.

It was difficult to believe that Londoners were very robust, when more than 25 per cent of them had recourse to the public hospitals in the course of the year.

The cause of the diminished death-rate (which was very considerably reduced after every allowance had been made) was due (1) to the increase of knowledge, not only among doctors, but among the people generally, for it must be remembered that "self-preservation is the first law of nature;" (2) vaccination, and the modern plan of treating infectious diseases by the prompt separation of the patients, had done a great deal (the total absence of small-pox and typhus were mainly due to these causes); (3) the cheapness of food, clothing, and fuel, had, of course, diminished the tendency to disease, and the ease with which fresh fruit and vegetables were to be got had abolished the taint of scurvy which was so fatal to previous generations; (4) the water-supply had been improved, and the intake of the water companies was now removed to a portion of the river less tainted with sewage than that formerly in use; (5) although the system of sewage-disposal was an undoubted evil, and had caused three or four epidemics of cholera, and was the foster-mother of typhoid, still it was probable that so far the balance for good was in its favor, because it had removed a good deal of filth from dwellings.

The outlook in the future was dashed by three considerations: (1) The system of sewerage and water-supply had increased overcrowding by enabling houses of any height to be built without inconvenience to the occupant, and without any curtilage whatever; and, since all sanitarians recognized that overcrowding was the greatest of all sanitary evils, it was impossible to shut one's eyes to this danger. (2) There was an expensive and menacing "loose end" to sanitation in the shape of 150,000,000 gallons of sewage pouring into the Thames every day. The only proper destination of organic refuse was the soil, and it was not possible to see the end of the gigantic blunder that had been committed in throwing it into the water. (3) The rapid increase of population along the valley of the Thames, where sewage-disposal is on the same lines as in London, must make the English apprehensive for their water-supply, because the various tricks played with sewage in the shape of precipitations, etc., were not probably of a kind to make the effluent a desirable or a wholesome beverage. If the evil effects of free trade are to be counteracted, it will be by returning the refuse of towns free of cost to the impoverished agriculturist. "If we go on as we are going," said the lecturer, in conclusion, "and if our brethren in the colonies follow our bad example, as they appear to be doing, it will be a Chinaman rather than a visitor from New Zealand who will sit in contemplation on the ruins of London Bridge."

LARGE deposits of lead and silver ores and coal have recently been discovered in the district of Kouban, Russia, on the Black Sea.