and the capital, Mayapan. This breakdown took place in the first half of the fifteenth century, probably about 1420.

The author presents the surviving fragments of this story in clear and attractive language, basing his statements on the the best authorities and some unpublished documents. His work as a whole is of high character, and will take a worthy rank in the historical literature of Spanish America.

PRIMITIVE DRILLS AND DRILLING.

To bore a hole seems a simple affair, but it took man a long time to learn how to do it. Mr. J. D. McGuire, in the *Report* of the United States National Museum for 1894 (just issued), devotes a hundred and twenty-five pages to the subject. He claims, indeed, in his opening sentence that "The earliest remains of man are found associated with implements of his manufacture in which holes have been artificially perforated." This is incorrect, as the remains of the Chellean period are not perforated, and he himself offers no evidence to that effect. Nor does he give the right explanation for the 'batons of command' of the cave period. They are arrow-straighteners and are still used by the Eskimo.

These are small matters. The article in all its leading features is clear, profound and convincing. He surveys all the forms of drills and hole-making implements of primitive times—pins, bodkins, needles, awls, etc.—and illustrates how they were used and for what purpose. Fire-drills are abundantly represented, and the theory that the Egyptian *Sam* is a drill is ably defended. Numerous cuts render the text easily comprehended, where mechanical devices are discussed.

THE STATE AND ITS SOIL.

PROF. FREDERICK RATZEL is one of the best known students of the relations of earth to man. His prize essay, 'Der Staat und sein Boden, geographisch betrachtet' (Leipzig, 1896, pp. 127), is a careful discussion of the influence which the soil and its accessories bear upon the character and development of the inhabitants. It considers the state as a 'territorial organism,' explains the connection between the natural and political areas, traces the development of this connection, and maintains the nigh inseparable association of the two.

Prof. Ratzel is always a clear, agreeable writer. His learning is adequate to his subject. To many readers, however, this and his other works will seem to be a little arid and incomplete, from the absence of warmth of touch, of psychical sympathy, or, perhaps, want of consideration for the predominance of the will and the emotions in the affairs and the evolution of mankind.

D. G. BRINTON.
UNIVERSITY OF PENNSYLVANIA.

SCIENTIFIC NOTES AND NEWS.

THE DAVY-FARADAY RESEARCH LABORATORY.

THE Davy-Faraday Research Laboratory, which we have already described, was opened by the Prince of Wales on December 21st. The laboratory, which Dr. Ludwig Mond has presented to the Royal Institution, has cost for its building, equipment and endowment about $500,000. The laboratory is to be devoted to research work in physics and chemistry, and Lord Rayleigh and Prof. Dewar have consented to undertake the directorship. Dr. Mond made an address in the course of which, according to the report in the London *Times*, he said that psrsons of either sex or any nationality would be welcome within its walls who could satisfy the laboratory commmittee that they were fully qualified to undertake original scientific research in pure and physical chemistry, and preference would naturally be given to those who had already published original work. If this country had distinguished itself in one way more than another in that glorious rivalry with other nations for extending our knowledge of natural phenomena and our power over the forces of nature it had been by the large num-

ber of contributors to our knowledge, who on the Continent would be called amateurs in science—men who devoted their lives to the study and advancement of science from pure love for the subject. He need only instance the names of Cavendish, Joule and Darwin to show that they included men of the very highest rank. In giving this laboratory to the English nation he had done so in the firm conviction that this country would continue to bring forth in the future, as it had done in the past, men of the same rank and of the same devotion to science for its own sake, and it was a fond hope of his that such men would find there all the facilities and all the necessary appliances for carrying out their researches. The further we advanced in the study of nature the more accurate and elaborate was the apparatus required, and the more difficult it became to carry on delicate work in a private laboratory. He had placed that laboratory in the center of London because he believed that this great city would continue to be the intellectual center of the civilized world, where the brightest minds would congregate. He had intrusted it to the Royal Institution so as to insure its being open to men and women of all schools and of all views on scientific questions.

THE MARINE BIOLOGY OF GREAT BRITAIN.

THE committee of the British Association on the marine zoology, botany and geology of the Irish Sea presented, at the Liverpool meeting, its fourth and final report. The committee consisted of ten members, with Prof. W. A. Herdman as chairman and reporter. The report reviews the earlier work by the Liverpool Marine Biology Committee and the investigations carried out in the Puffin Island station since 1887. That committee, in addition to annual reports, has published three volumes of the fauna, recording 2,133 species. In 1892 the committee relinquished Puffin Island and built the new biological station at a very much more convenient and richer locality, Port Erin, at the southwest end of the Isle of Man. In the following year a second building—the Aquarium—was added, and since then the institution has been constantly in use and has proved increasingly useful each season, both to members of the committee and to other naturalists. Since the opening of the Port Erin station, in 1892, 56 biologists have paid over 200 longer or shorter visits for the purpose of working at the marine fauna and flora. The British Association Committee for the investigation of the Marine Zoology, Botany and Geology of the Irish Sea was appointed in 1892, and three previous reports have been submitted. The first, laid before the Nottingham meeting in 1893, gave an account of the limits and more prominent physical conditions of the area under investigation, with a brief interim notice of the dredging expeditions undertaken during the year. The second report, at the Oxford meeting in 1894, gave a fuller description of the methods of work on one of the dredging expeditions, and also included an account of the distribution of the submarine deposits of the area and a notice of the chief results of the year's work, including some new species. The third report, given at Ipswich, dealt chiefly with the submarine deposits, the investigation of the surface currents, and with the distribution of animals as shown from dredging statistics. In the present final report the committee gives for the first time a complete list of all the species recorded from the area of the Irish Sea investigated. This list fills 28 pages. The greater part of the work of the committee has been zoological; botany, however, has been represented by several investigators, and lists are given of the marine algæ, including diatoms.

DURING the last fifty years, says *Nature*, much work has been done by marine naturalists all round the British coasts, with a view to determining the distribution of those animals which live on the floor of the sea. It has been fully recognized that the localities frequented by many marine species are very definite and extremely limited in extent, and that both the nature of the sea bottom and the creatures which live there exhibit as much variety as we are accustomed to find on land. The Marine Biological Association, with the assistance of a grant made for the purpose by the Royal Society, has recently been engaged in an attempt to place our knowledge of this subject upon a sounder basis by investigating in detail some of

the grounds in the neighborhood of Plymouth, including important fishing grounds, with reference to the nature of the sea bottom at each locality, and the whole assemblage of animals found there. Detailed charts are being prepared to exhibit the variations which take place from point to point. No attempt has previously been made to study fishing grounds with such thoroughness, having regard not only to the fishes, but to the whole collection of animal life which forms the basis of the food upon which the fishes exist. The investigation, which has involved a large amount of dredging and trawling, as well as the identification of the numerous species captured, has been carried out by Mr. E. J. Allen, the Director of the Plymouth Laboratory.

GENERAL.

THE remains of Pasteur were removed, on December 26th, from the Cathedral of Notre Dame to the Pasteur Institute, where the cortège was met by members of the Academy, representatives of the government and delegates from learned societies and foreign countries. Speeches were made by M. Rambaud, M. Bodin; Sir John Evans, representing the British Association; Sir Dyce Duckworth, representing the Royal College of Physicians, and others. A mausoleum, to be decorated with designs illustrating Pasteur's contributions to science and industry, has been built at the Institute.

DR. THEODORE G. WORMLEY, since 1877 professor of chemistry and toxicology in the University of Pennsylvania and the author of important contributions to these sciences, died at Philadelphia on January 3d, aged seventy years.

THE death is announced, in his eightieth year, of Mr. Horatio Hale, of Clinton, Ontario, well known for his contributions to our knowledge of the languages and customs of the North American Indians.

DR. F. BUKA, professor of geometry in the University of Berlin, died on December 4th, at the age of forty-five years.

MR. EDWARD FALKENER, the English archæologist, died on December 17th, in his eighty-third year.

SIR HENRY MANCE has been elected President of the Institution of Electrical Engineers, London.

M. LIARD, the head of the University Department of the French Ministry of Education, has been elected a member of the Academy of Moral Sciences in the place of the late M. Jules Simon.

THE tercentenary of the birth of Descartes has been celebrated at Tours by the local archæological society, two addresses being delivered and verses composed by M. Sully Prudhomme being recited. A pilgrimage has also been made to the house at La Haye in which Descartes was born.

THE jubilee of the entrance into professional life of Dr. Roussel, of Paris, has been celebrated at the Sorbonne. Mr. Barthou, Minister of the Interior, presented him with a gold medal, and his bust was unveiled. In 1874 Dr. Roussel, who has been a Deputy and is now a Senator, carried a bill for the protection of infants placed out at nurse. This measure checked the abuses of baby farming. Dr. Roussel has also effected legislation against drunkenness, for the protection of foundlings, and for gratuitous medical aid for the poor.

MR. FREDERICK IVES gave a lecture, on December 16th, at the Fine Arts Societies Galleries in London, on his method of photography in natural colors, and exhibited photographs so taken.

AT the annual business meeting of the Geological Society of Washington, held December 23, 1896, officers for the ensuing year were elected as follows: President, Arnold Hague; Vice-Presidents, J. S. Diller and Whitman Cross (re-elected); Treasurer, M. R. Campbell; Secretaries, C. Willard Hayes and T. W. Stanton (re-elected); Members-at-Large of Council, S. F. Emmons, G. K. Gilbert, R. T. Hill, G. P. Merrill and Chas. D. Walcott. Mr. Walcott subsequently tendered his resignation from the Council, leaving a vacancy.

THE American Economic Association held a successful meeting at Baltimore, ending December 31st. The following officers were elected: President, Henry C. Adams, Ph. D., Michigan; Vice-Presidents, Franklin H. Giddings, M. A., Columbia, E. R. L. Gould, Ph D.,

Johns Hopkins, Roland P. Falkner, Ph. D., Pennsylvania; Secretary, Walter F. Wilcox, Ph. D., Cornell; Treasurer, Charles H. Hull, Ph. D., Cornell.

THE Swedish Consul-General at Shanghai has telegraphed to Stockholm that Dr. Sven Hedin, the Scandinavian traveller, has arrived at Liang-chau-fu, in Kansu, to the northeast of Lake Koko Nor, after a successful journey through the unknown regions of northern Tibet by way of Tsaidam and Koto Nor. Dr. Sven Hedin hopes to reach Peking in two months' time.

DR. ANDRÉE proposes to repeat his attempt to reach the North Pole by balloon this year. Dr. Knut Frankel expects to accompany him as meteorologist in place of Dr. Ekholm. It is also reported that MM. Godard and Surcouf, two French aëronauts, propose making a similar attempt in 1898.

THE *Lancet* states that some interesting 'Druidical' remains on and around Dartmoor have been destroyed by the contractors of the Newton Royal District Council, who have broken up the stones for repairing the surface of the roads. The remains known as the Stone-avenue, at Bel Tor corner on Sherberton-common, have been demolished, and several 'hut circles' and 'mainhir' have completely disappeared. Fortunately the work of destruction has been now stopped by the energetic action of Exeter antiquaries, but the loss of these interesting relics is much to be deplored.

ACCORDING to the report of the Board of Health of New York City the death rate for 1896 was 21.54 as compared with 23.105 in 1895, and an average of 26.63 for the five preceding years. The total number of deaths during 1896 was 41,652, and of births 55,723. The estimated population of New York City on July 1st was 1,934,077.

THE Common Council of Brooklyn voted November 30th to establish a public library for that city, in the interest of which a public meeting will be held at the Brooklyn Academy of Music, January 14, 1897, in connection with the joint meeting of the New York Library Association and New York Library Club which occurs the same day at the Art Institute.

THE New York *Evening Post* reports that in the Berlin Museum of Ethnology the large and valuable collections of Gustav Nachtigal have now been placed. These collections date from 1884–85 and comprise all sorts of objects from the west coast of Africa, beginning on the Orange River south and ending on the Volta north. All the objects are flawless, and among them are full native equipment in weapons, tools, apparel, religious rites, household utensils, etc., the finest pieces coming from Borneo, Wadai, Darfoor, Kordofan, and from the districts along the Niger and in the Sudan. Some of the native garbs are exquisitely woven and ornamented, silk and gold.

THE William Gossage Laboratory and the extension of the chemical laboratories of University College, Liverpool were opened on December 12th, by the Earl of Derby. The former includes a large laboratory with accommodations for 44 advanced students, and in the basement is an additional lecture room to seat 70 or 80, a preparation room and a gas-analysis room. The other new buildings comprise a metallurgical laboratory, with furnaces and other equipments, an important addition to the research laboratory, store-room for apparatus and chemicals, a dynamo room, electric-accumulator room, and a heating chamber. The William Gossage Laboratory was built by Mr. F. H. Gossage and Mr. T. Sutton Timmons, at a cost of £7,000, and presented to University College. To connect the laboratory with the old building, other buildings are being provided by public subscription, and the cost will be about £4,000. The opening address was delivered by Prof. W. Ramsay.

IT is reported that patents for inventions which relate to the production of electrical energy, or in which electricity is in any way employed, are refused in Turkey. There is nothing in the law to warrant any such refusal, and the only explanation afforded by the Turkish authorities is that orders have been received 'from the Palace' forbidding the grant of patents for such inventions. The fees paid on application are not returned.

MR. FRANCIS GALTON recently contributed to the *Fortnightly Review* an article describing

how a system similar to that of the Morse code might be used in signalling to the planets. We now find in a leading daily paper an article with the headline 'Mars is Signalling Us,' including an account of the method by which the signals are recorded in 'one of the great European observatories.'

It is probable that but few people realize the number of 'scientific' journals published in America. One of these which has now concluded its tenth volume is devoted to 'Koreshanity,' founded on "Koreshan astronomy, the basis of which makes the sun the center and the earth the circumference of the universe, from which it is conclusive that the earth is a hollow sphere, with its habitable surface concave, forming an integral, alchemico-organic structure, which, as demonstrated in the cellular cosmogonic system, perpetuates itself through the eternal and causative forces and functions operating within it."

A petition has been received asking subscriptions in aid of those who suffered from the effects of a waterspout on the island of St. Michael, in the Azores. It is stated in the petition that on November 25th a great waterspout broke over the city of Povoacao, of about twenty-five thousand inhabitants. Almost in an instant the deluge mounted above the roofs of the houses, after tearing up the pavement of the streets in its course, and digging trenches in them, in some places fifteen feet below their ordinary level. It was in the night that the waterspout broke, and the great torrent, rushing down the slopes to the sea, tore a wide channel through nine miles of country, bearing away the homes of thousands of people and causing great destruction of life.

A serious landslide has occurred near Rathmore, County Kerry, Ireland. Part of the earth composing a bog, carrying with it rocks, trees, houses and animals, has been swept into the river Flesk and the lakes of Kilarny.

Giant's Causeway, in the north of Ireland, from the early part of the last century down to the present day, has been visited by a largely increasing number of persons without let or hindrance, and it is now annually visited by about 80,000 persons. A small limited liability company was formed in June last for the purpose of enclosing the causeway and making a profit out of it by charging a toll for admission. A few months ago they began to put up an iron fence, and they have brought an action against three gentlemen who persisted in walking over the causeway. To defend the public right of access to it, the National Footpath Preservation Society has issued an appeal for funds to defend the case.

According to cablegrams to the London *Times*, vigorous measures are being taken in South Africa to stop the spread of the rinderpest. The Premier of Cape Colony has stated that the disease had not advanced towards the colony in the past two months. The government were utilizing the peculiar geographical advantages of the country, which would enable the border to be fenced from the Atlantic on one side to the Indian Ocean on the other, and they entertained distinct hopes of saving the colony and Pondoland from the ravages of the epidemic. The government, Sir Gordon Sprigg added, were doing everything that was humanly possible to that end, and the farmers and natives, to whom he had fully explained the situation, were anxiously assisting the efforts of the government by every means in their power. Major Leutwein, Governor of German Southwest Africa, took measures at the beginning of October to prevent the introduction of rinderpest into the colony. The southern border has been entirely closed by means of patrols between the existing stations, and in the Simon Kopper territory, near the Kalahari desert, an additional station has been erected. The eastern frontier is guarded by stations and patrols which, though sufficient to prevent men or cattle from crossing the border, are unable to hinder the movements of game or wild animals. To the north and northeast similar measures are being taken to prevent the introduction of the disease from the neighborhood of Lake Ngami. It is to be hoped that the praiseworthy efforts of the German authorities to prevent the spread of the rinderpest may be crowded with success.

The New York Academy of Medicine will celebrate the semi-centennial of its foundation on January 29th. There will be exercises in

Carnegie Hall at which addresses will be made by President Cleveland, Prof. Jacobi and others, and afterwards there will be a reception at the building of the Academy, the corner stone of which was laid by President Cleveland in 1889.

BRANCHES of the British Medical Association are being formed in the leading cities of Canada as a preliminary of the visit of the Association next year. Montreal, Ottawa, Halifax and Winnipeg have already strong local branches.

UNIVERSITY AND EDUCATIONAL NEWS.

THE cablegram report that Alfred Nobel had left his fortune to Stockholm University is now said to be incorrect. A cablegram from Stockholm, dated December 31st, states that the fortune, valued at $10,000,000, is almost entirely bequeathed for the foundation of an international fund for the advancement of scientific research.

THE Stevens Institute of Technology, Hoboken, N. J., will celebrate its twenty-fifth anniversary on February 18th and 19th.

PRESIDENT HARPER, of the University of Chicago, has announced a deficit for the year of $48,000, and that retrenchment will be necessary especially in the direction of scholarships and assistance to students.

GEN. G. W. C. LEE has resigned from the presidency of Washington and Lee University, to take effect at the end of the academic year.

AT the inauguration of the Lyons University, the rector, M. Compayré, announced a donation to the University of £4,000. The *British Medical Journal* states that the donor is M. Auguste Falcouz, a Lyons banker. The interest of this sum is to be disposed of as follows: Every two years a prize of £40 sterling will be given to the students of each of the four faculties—literature, science, law and medicine—who write the best essay on a current subject. All French students under 30 years of age can compete. The subject of the essay will be chosen by the Council of the Lyons University a year in advance. Every two years instruments for the science and medical faculties will also be bought. When fifty years have elapsed, the Lyons University will have entire control over the capital in order to be able to meet the demands of scientific progress.

THE Austrian government has brought in a bill on the salaries of university professors. The present salary of a professor is now about $1,200, and he receives in addition the fees from students attending his courses. It is now proposed to raise somewhat the fixed salaries and let the fees of students go to the state. This would equalize the salaries of professors, but is being opposed especially by professors in the medical school whose required courses are attended by a large number of students.

WE recently referred to the action of the regents of the University of the State of New York making it illegal for colleges of the State to give the degrees A. B. and Ph. D. *causa honoris*. When colleges in other states either voluntarily or by compulsion cease giving the Ph. D. degree *causa honoris* and for study *in absentia*, those who wish to possess this 'honor' without the education it represents will need to go to the newly founded 'university' at Buenos Ayres. It appears that they can there receive the degree by a course of study in extent (information regarding its thoroughness is lacking) about equal to that in an American college as far as the end of the sophomore year. The candidates for the doctorate, it appears, need not know any mathematics, but they must study one science—geography, and that of both the 'old and new continents.'

A SECOND university will be opened in Japan during the present year. It will be at Kyoto and will for the present only include professional schools. It is also reported that a Dutch university will be established in Pretoria. An English university at Cape Town seems to be much needed.

PROF. B. HATSHECK, of Prague, has been called to the chair of zoology in the University of Vienna, vacant by the resignation of Prof. K. Claus. Prof. Th. Curtius, of Kiel, has been called to the chair of chemistry at Bonn, vacant through the death of Kekulé. Dr. P. E. Study, associate professor of mathematics at Bonn, has been called to the chair of mathematics at Greifswald. Dr. Schüsler, of the