head to the ivory part. It belongs to the large sealing and walrus harpoon. A similar specimen is in the collections of the British museum. Both these specimens show two perforations at the lower end of the harpoon-head which are not found in the modern ones. Probably these served for holding the harpoon-head to the shaft by means of a thin line, in order to prevent the head from coming off before the seal or walrus was struck.

NOTES AND NEWS.

A GEOLOGICAL society has been founded at Brussels. The foundation of such a society was planned in 1872, after the meeting of the archeological and prehistorical congress; the efforts, however, were unsuccessful, though this became the impulse for the foundation of the geological society at Liege. Mr. A. Houzeau de Letaie took up the old plan, and on April 17, 1887, the foundation of the society, under the name 'Société Belge de géologie de paléontologie et d'hydrologie,' was announced.

— The fourth annual convention of the Association of official agricultural chemists will meet at the U. S. department of agriculture in Washington on Tuesday, Aug. 16, at ten o'clock. Tuesday and Wednesday will be devoted to a discussion of the method of analysis of commercial fertilizers; Thursday and Friday, to cattle-food and dairy-products.

— The advance of education in India is marked by the post-office statistics for the ten years ending March 31, 1886. The number of letters increased from 119,000,000 to 238,000,000 per annum, and the increase in the number of newspapers sent was no less than 115 per cent.

— Mr. Edwin Arnold has just presented to the Indian institute at Oxford, through the vice-chancellor of the university, the Buddhist manuscripts and Pali books given to him by the priests of Ceylon during his recent visit to that island.

— Bates college has received an offer of thirty thousand dollars provided an additional hundred thousand dollars be raised by subscription among the friends and alumni of the college. Of this hundred thousand dollars, it is understood that nearly one-half is already subscribed. It is proposed to spend at least twenty-five thousand dollars of the total amount in founding an observatory.

— Harvard university announces a considerable expansion of its courses in English for next year. Professor Child will offer courses in the English Bible and in Spenser. Professor Briggs will lecture on English literature from Shakspeare to Dryden, excluding Milton. Professor Hill will add to his usual course on the prose writers of the seventeenth and eighteenth centuries a course on the prose writers of the nineteenth century. Mr. Wendell will take a class through the study of the English drama, excluding Shakspeare.

— The Students' aid society of Boston has aided over four hundred worthy students since its organization. Most of the beneficiaries have become teachers. President Freeman of Wellesley recently told what had become of the twenty-five girls aided by the society who graduated from Wellesley in 1886. Three of them are teaching in foreign countries, two among the colored population in the south, and two among the Mormons. Six are at the head of girls' schools in various portions of the country.

— The American public health association will hold its fifteenth annual meeting at Memphis, Tenn., on Nov. 8 to 11, 1887. The topics which have been selected for discussion are, 1°, the pollution of water-supplies; 2°, the disposal of refuse matter of cities; 3°, the disposal of refuse matter of villages, summer resorts, and isolated tenements; 4°, animal diseases dangerous to man.

— Bacteriologists are studying with great thoroughness and persistence the characteristics of the typhoid bacillus. M. Chautemesse, in the course of his researches, has found that this microbe forms spores at a temperature between 19° and 48° C. It develops even in sterilized water. At a temperature of 45° C. the cultivations live for several days, but are destroyed by boiling. The bacilli are destroyed by a solution of bichloride of mercury of the strength of 1 to 20,000, and by a solution of sulphate of quinine, 1 to 800. Carbolic acid, 1 to 400, has no effect upon them, and they are not affected by hydrochloric acid. This latter observation would seem to indicate that the germ would retain its vitality in the gastric juice.

— We learn from the London *Electrical review* (April 22) that Prof. E. Frankland, the well-known professor of chemistry, has recently patented some improvements which he has devised in storage-batteries, the object aimed at being the avoidance of both buckling and the gradual detachment of the active composition from the metallic portion of the plates, both these effects being brought about by the expansion of the active material during the use of the battery. This is effected, firstly, by so enclosing or embedding the active composition in the metallic portion of the plate as to prevent its falling out; and, secondly, by giving sufficient strength to the plate to enable it to resist bending or buckling. Professor Frankland em-

ploys as the active material the hardening mixture of oxide of lead and sulphuric acid, for which letters patent were granted to him in the year 1882 (No. 4,303); and whilst this mixture is in a pasty condition he moulds it into small cylinders or rods of convenient length and thickness, either by rolling, pressure through a draw-plate or tube, or other convenient means, and then flattens them on two opposite sides by pressure between two flat boards or otherwise. After these flattened cylinders have become sufficiently hard, they are placed in rows in a casting mould of dimensions corresponding to the size of the battery-plate required, and at such distances apart and from the edges of the mould as to give sufficient space for the quantity of metal necessary to impart adequate strength and rigidity to the plate. Suitable molten metal, such as lead or an alloy of lead and antimony, is then poured into the mould until the interstices between the flattened cylinders are completely filled. In this way a plate is obtained, in which the active material is incased except on the flattened sides of the cylinders overlaid with metal, so that it cannot subsequently fall out during the charging and discharging of the battery, or even when subjected to considerable rough usage.

— At a recent meeting of the Physical society, London, Mr. C. V. Boys described some methods of producing very fine glass fibres. The author finds it best to use very small quantities at high temperatures, and that the velocity of separation should be as great as possible. To obtain a great velocity, Mr. Boys used a cross-bow and straw arrow, to the tail of which a thin rod of the substance to be drawn is cemented. The free end of the rod is held between the fingers, and, when the middle part has been heated to the required temperature, the string of the cross-bow is suddenly released, thus projecting the arrow with great velocity, and drawing out a long fine fibre. By this means fibres of glass less than one ten-thousandth of an inch in diameter can be made. The author has also experimented on many minerals, such as quartz, sapphire, ruby, garnet, felspar, fluor-spar, augite, emerald, etc., with more or less success. Ruby, sapphire, and fluor-spar cannot well be drawn into fibres by this process, but quartz, augite, and felspar give very satisfactory results. Garnet, when treated at low temperatures, yields fibres exhibiting the most beautiful colors. Some very interesting results have been obtained with quartz, from which fibres less than one hundred-thousandth of an inch in diameter have been obtained. It cannot be drawn directly from the crystal, but has to be slowly heated, fused, and cast in a thin rod, which rod is attached to the arrow as previously described. Quartz fibre exhibits remarkable properties, as it seems to be free from torsional fatigue, so evident in glass and metallic fibres, and on this account is most valuable for instruments requiring torsional control. The tenacity of such fibres is about fifty tons on the square inch.

— The London *Times* publishes a telegram from Vienna to the effect that a Greek scholar, M. Papageorgiu, residing in Philippopolis, has discovered an ancient manuscript containing portions of Aristotle's works. The manuscript is of the fourteenth century, and contains one hundred and eighty pages, which comprises four books of the treatise 'On the heavens,' two books of 'On generation and decay,' the first three books of 'On the soul,' and parts of the 'Sophistical refutations.' The manuscript is in an excellent state of preservation, the vellum being clean and strong, and all the writing perfectly legible. There are marginal annotations of the fifteenth century. M. Papageorgiu, on completing his researches, will publish an account of them in pamphlet form. The chief point brought out thus far by him is that the newly found manuscript differs in some important particulars from Didot's and other existing editions. Moreover, it contains extracts only from the genuine Aristotelian writings, and nothing from the writings which are usually held to be spurious.

— J. Liznar (*Wiener akad. Anzeiger*, 1887) has arranged and computed the observations on terrestrial magnetism of the international polar stations of Fort Rae and Jan Mayen, in order to inquire into the existence of a period of twenty-six days of the magnetical phenomena. As the periodical oscillations of the magnetical elements are the greater the closer we approach the magnetical pole, the observations of Fort Rae, Cumberland Sound, and Jan Mayen were the most favorable for these researches. As those of Cumberland Sound were not published until the close of last year, Liznar confined himself to arranging the available material from Fort Rae and Jan Mayen. The result of his inquiries is, that the amplitude of the period of the oscillations of declination is 55.1′ at Fort Rae, 34.8′ at Jan Mayen, while it is only 0.4′ at Vienna, and 1.4′ at Pawlowsk. The length of the period is 25.85 days, while former computations gave a value of 25.97 days. These results show that the rotation of the sun, which is the probable cause of these periods, has a far greater influence on the magnetical elements, as might have been anticipated from observations in lower latitudes.

— In *Scribner's magazine* for July, Prof. D. A. Sargent, M.D., of Harvard college, who is an au-

thority on the general subject of athletics, will publish his first extended article in that field, under the title 'The physical proportions of the typical man.' In it Professor Sargent will give a standard of physical measurement, based on the measurements of ten thousand individuals. This furnishes a basis of comparison by which any person can gauge his proportions with those of the typical man. The article will contain charts for this purpose, founded on these observations.

— Messrs. G. P. Putnam's Sons, New York, have published a seventh edition of 'Voice, song, and speech,' by Lenox Browne and Emil Behnke. Six editions of this work have been exhausted since its publication three years ago. The last two editions have been published in cheaper form, in compliance with what was believed to be a public demand. In order to attain this end, the most expensive item of the earlier editions has been omitted; namely, the photographs of the larynx and soft palate during the tone-production, engravings being substituted. In all other respects the book remains unaltered.

— The final excursion (to the region of the Upper Delaware, the Shawangunk Mountains, and the Catskills) arranged in connection with the spring course of lectures on geology, of the Philadelphia academy of sciences, will extend over a period of two weeks, beginning with the first week in July. The field-study will comprise an examination of the Devonian rocks, with their contained fossils, and the general phenomena of glaciation, erosion, and mountain and valley formation.

— Several papers on 'French traits,' by W. C. Brownell, the first of which, on 'The social instinct,' will appear in *Scribner's magazine* for July, are the fruit of discriminating observation by one who has a keen appreciation of, and sympathy with, the French mind. In these essays it is said that Mr. Brownell will make many striking comparisons between English and American, and French social life and customs.

— The well-known catalogue of scientific books issued by D. Van Nostrand, New York, has been entirely revised to date. All the new and more important works in the different branches of science have been added, and considerable reductions in prices have been made.

— The latest biography in the American statesmen series is 'Henry Clay,' by Carl Schurz (Boston, Houghton, Mifflin & Co.). Mr. Schurz takes two volumes to tell the story of the great leader's life, and he does it with marked vivacity of style, and accuracy of detail. The design of the entire series is being as faithfully carried out as it was well conceived.

— Professor Arthur T. Hadley of Yale has been made lecturer on railroad administration at Harvard. This is a well-deserved compliment to Professor Hadley's abilities.

— The list of royal authors is to be increased by the addition of the name of King Leopold of the Belgians, who is preparing a somewhat elaborate history of the conquest of England by the Normans. The king recently visited the battle-field of Hastings in order to locate the spot where Harold fell.

— The general council of the University of Glasgow has decided that the establishment of a chair of education in the university is necessary.

— Eaton now has 964 names on its roll, the largest number on record. At Harrow 541 are registered.

— At the University of London recently, twenty-five ladies were presented for the A.B. degree, ten of them with honor, and two for the B.Sc. degree.

— Professor Prestwich has resigned the chair of geology at Oxford, feeling himself unable to carry on the great amount of work required.

— The Russian government is about to have a series of pipe-lines laid down for the conveyance of petroleum over the Suram Pass, a distance of thirty-five miles. At present the oil is transported over the pass in short trains of six tank-cars each, with two engines to each train. Upon the completion of the pipe-lines, the oil will be pumped from reservoirs at Michalova, on the Tiflis side of the Pass, directly into similar reservoirs at Kirrill, on the Batum side.

— A company in London, England, furnishes water, at a pressure of 700 pounds to the square inch, to customers, for running elevators, printing-presses, pumps, etc., through the medium of water-motors. The company has twenty miles of main laid, and furnishes water for 458 motors.

— The sixtieth annual meeting of the German natural scientists and physicians will be held at Wiesbaden from Sept. 18 to Sept. 24 next. In connection with the meeting, an exhibition has been arranged for, to include new and complete sets of apparatus, instruments, and so forth.

— With its issue for May 5 last, the *Central-Organ für die Interessen des Realschulwesens* published a most valuable list of all the works on Scandinavia and its literature that appeared during the year 1886.

— The King of Italy has signed a decree authorizing the publication of a new and complete edition of Galileo's works, at the expense of the state. The ministry of education has, with the co-operation of leading scientists, undertaken the preparation of this edition. It will comprise twenty quarto volumes, of about five hundred pages each.

— Work on the tunnel under the Hudson, between Jersey City and New York, has recommenced, and an average progress of three feet per day is being made. Incandescent electric lights are being substituted for the arc lights previously employed.

— There are at present upwards of one hundred miles of cable-railway in operation in this country, and about fifty miles in course of construction.

— The Clarendon press, Oxford, propose to publish from time to time, under the title 'Annals of botany,' original papers, adequately illustrated, on subjects pertaining to all branches of botanical science; also articles on the history of botany, reviews and criticisms of botanical works, reports of progress in the different departments of the science, short notes and letters. A record of botanical works published in the English language will be a special feature.

— The French are preparing a series of monographs identical in scope and character with the very successful 'English men of letters' series. The title will be 'Les grands écrivains français,' and the following volumes are already announced: 'Victor Cousin,' by M. Jules Simon; 'Madame de Sévigné,' by M. Gaston Boissier; 'George Sand,' by M. Caro; 'Turgot,' by M. Léon Say; 'Montesquieu,' by M. Sorel; 'Voltaire,' by M. Brunetière; 'Villon,' by M. Gaston Paris; 'D'Aubigné,' by M. Guillaume Guizot; 'Racine,' by M. Anatole France; 'Boileau,' by M. Brunetière; 'Pascal,' by M. Havet; 'Rousseau,' by M. Cherbuliez; 'Joseph de Maistre,' by the Vicomte E. Melchior de Vogüé; 'Lamartine,' by M. de Pomairols; 'Balzac,' by M. Paul Bourget; 'Musset,' by M. Jules Lemaître; 'Sainte-Beuve,' by M. Taine; and 'Guizot,' by M. G. Monod.

— Sir Henry Roscoe, M.P., has introduced a bill into parliament to make provision in day-schools by which young persons who have passed through the public elementary schools, and others, may obtain further instruction in technical subjects. The bill empowers any school board, local authority, or managers of a public elementary school, to provide day technical and commercial schools and classes for the purpose of giving instruction in any of certain subjects. These include the several science subjects which are specified in the directory of the science and art department, and in which that department undertakes to examine. The following subjects are also included: the use of ordinary tools, commercial arithmetic, commercial geography, book-keeping, French, German, and other foreign languages, and freehand and machine drawing. The addition of other subjects may be sanctioned from time to time by the committee of council on education or by the science and art department. For the purpose of carrying on these schools and classes, the power of school boards, other local authorities, and school managers, is to be in every respect the same as for providing ordinary elementary schools. Moreover, they are to have power to provide, or contribute to the maintenance of, laboratories and workshops in endowed schools for the purpose of carrying on classes or instruction under the bill. However, all these schools and classes are to be subject to the inspection of the officers of the committee of education or of the science and art department; and before a scholar is admitted he must have passed the sixth standard or some equivalent examination. The education committee and the science and art department are authorized to give grants on such conditions as they may lay down for any of the subjects taught in these technical or commercial schools or classes. For the purpose of obtaining grants, a technical school or class must be one carried on under minutes to be made by the science and art department, and laid on the table of the house of commons in the same way as the minutes that regulate the grants of the education department.

— Beginning with September, 1887, the University of Kansas will offer, in addition to the general and special courses already in existence, a four-years' course in electrical engineering.

— The date of inauguration of the mineral exhibition at Lima, Peru, has been changed from Oct. 1, 1887, to June 21, 1888.

LETTERS TO THE EDITOR.

***The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Height of a meteor.

MY observation of the course of the meteor which appeared at about 8.42 on the evening of June 15