receive photographic instruction. Each of them will be required to perform at least ten hours' work, divided into five days of two hours each.

Some experience has already been attained in teaching photography upon a small scale (last year this department had sixteen students); but, should the present venture prove a successful one, it is hoped it may be adopted by other colleges, and that photography may in the future come to be regarded as a necessary portion of every professional man's college education. WM. H. PICKERING.

NOTES AND NEWS.

IT is generally known that Williams college secured a table early last year at Dohrn's international station at Naples. The table may be occupied by any American scientific scholar recommended by the faculty of the college. Any one wishing to use the table should send an application to President Carter, and the application should be accompanied by evidence of ability to improve the unrivalled facilities for original investigation afforded at Naples.

Each occupant is expected, soon after his return, to give a brief course of lectures at Williamstown on some subject connected with zoölogical work. The lectures by the first occupant, Dr. Edmund B. Wilson, formerly fellow in the Johns Hopkins university, are to be given in January and February.

In assigning the table, any regular graduate of Williams college will be recognized as entitled to precedence; but, in case no graduate of the college worthy of the honor is an applicant for the position, the appointment will be determined as far as possible by distinction already attained. The successful applicant will be at once informed of his appointment, and his name communicated to *Science* and the *American naturalist* for publication.

The table is at present used by Dr. Samuel F. Clarke, professor of natural history in Williams college, but will probably be vacated on or before April 1, 1884.

— The department of the interior, at the request of the Italian government, has issued a circular, calling attention to the Bufalini prize of five thousand lire for an essay on the experimental method in science, and giving the conditions under which writers must compete. The character of the essay may be gathered from the following extract from Bufalini's will: —

"Let the learned consider, therefore, whether they can pardon me for daring to appeal to them ten years after my death, and after that every twenty years, to solve the following problem: the necessity of the experimental method in arriving at the truth and the relation of all the sciences being assumed, it is required to demonstrate in a first part how far the said method is to be used in every scientific argument, and, in a second part, to what extent each of the sciences has availed itself thereof during the time that has elapsed since the last competition for a prize, and how they may be brought to a more faithful and complete observance of the method itself."

— According to *Nature*, a meeting was recently held in Sheffield for the purpose of carrying out, in connection with Firth college, a proposed technical department having reference to the trade of the district. Among those who spoke were Mr. Mundella and Dr. Sorby; and all agreed as to the desirability of establishing such a department, and the necessity of educating the captains as well as the privates of industry in the principles of their crafts. For that, Mr. Mundella insisted, is the true technical education. He gave the experience of a friend who has just been visiting the United States, and inspected the means for technical education existing there. The distinct conclusion was, "that there is more skill and intelligence in American industrial pursuits than there is in our English industrial pursuits."

— At the meeting of the Institution of civil engineers, Nov. 27, the paper read was on 'The new Eddystone lighthouse,' by Mr. William Tregarthen Douglass.

The necessity for the construction of a new lighthouse on the Eddystone rocks had arisen in consequence of the faulty state of the gneiss rock on which Smeaton's tower was erected, and the frequent eclipsing of the light by heavy seas during stormy weather. The latter defect was of little importance for many years after the erection of Smeaton's lighthouse, when individuality had not been given to coast-lights; but, with the numerous coast and ship lights now visible on the seas surrounding this country, a reliable distinctive character for every coast-light had become a necessity. The tower of the new Eddystone is a concave elliptic frustum, with a diameter of 37 feet at the bottom, standing on a cylindrical base 44 feet in diameter and 22 feet high, the upper surface forming a landing platform 2 feet 6 inches above high water. The cylindrical base prevents in a great measure the rise of heavy seas to the upper part of the tower, and has the further advantage of affording a convenient landing-platform, thus adding considerably to the opportunities of relieving the lighthouse. With the exception of the space occupied by the fresh-water tanks, the tower is solid for 25 feet 6 inches above high-water spring-tides. At the top of the solid portion the wall is 8 feet 6 inches thick, diminishing to 2 feet 3 inches in the thinnest part of the service-room. All the stones are dovetailed both horizontally and vertically, as at the Wolf Rock lighthouse. Each stone of the foundation-courses was sunk to a depth of not less than 1 foot below the surface of the surrounding rock, and was further secured by two Muntz-metal bolts 1¼ inches in diameter, passing through the stone and 9 inches into the rock below, the top and bottom of each stone being fox-wedged. The tower contains nine rooms, the seven uppermost having a diameter of 14 feet and a height of 10 feet. These rooms are fitted up for the accommodation of the light-keepers and the stores necessary for the efficient maintenance of the lights. They are rendered as far as possible fireproof, the floors being of granite covered with slate. The stairs and partitions are of iron, and the windows and shutters of gun-metal. The oil-rooms contain eighteen wrought-iron cisterns capable of storing 4,300 gallons of oil; and the water-tanks hold, when full, 4,700 gallons. The masonry consists of 2,171 stones, containing 62,133 cubic feet of granite, or 4,668 tons. The focal plane of the up-

per light is 133 feet above high water, its nautical range is 17½ miles, and in clear weather it overlaps the beam of the electric lights from the Lizard Point. The lantern is of the cylindrical helically-framed type adopted by the Trinity House. The light is derived from two six-wick 'Douglass' burners, the illuminant being colza-oil. With a clear atmosphere, and the light of the Plymouth breakwater lighthouse (10 miles distant) distinctly visible, the lower burner only is worked at its minimum intensity of 450 candles, giving an intensity of the flashes of the optical apparatus of 37,800 candles; but, whenever the atmosphere is so thick as to impair the visibility of the breakwater-light, the full power of two burners is put in action, with the aggregate intensity of 1,900 candles for the lamps, and an intensity of the optical apparatus of 159,600 candles. This intensity is about 23.3 times greater than that of the fixed light latterly exhibited from Smeaton's tower, and about 3,282 times that of the light first exhibited in the tower from tallow candles. The new tower was built at a distance of 130 feet from Smeaton's lighthouse, a large portion of the foundation being laid below the level of low-water spring-tides. The estimate for the work was £78,000, and the cost £59,255. The first landing at the rock was made in July, 1878, and the work was carried on until December. Around the foundation of the base of the tower a strong cofferdam of brick and Roman cement was built for getting in the foundations. By June, 1879, the work was sufficiently advanced for the stones to be laid in the lower courses, and every thing was arranged for H.R.H. the Duke of Edinburgh to lay the foundation-stone on the 12th of the month; but, the weather being stormy, the ceremony was postponed until the 19th of August. On the 17th of July, 1880, the cylindrical base was completed, and the 38th course by the early part of November. On the 1st of June, 1881, the Duke of Edinburgh, when passing up the Channel in H.M.S. Lively, landed at the rock, and laid the last stone of the tower. On the 18th of May, 1882, the Duke of Edinburgh completed the work by lighting the lamps and formally opening the lighthouse. The edifice was thus erected and fitted up within four years of its commencement, and one year under the time estimated. The whole of the stones, averaging more than 2 tons each, were landed and hoisted direct into the work from the deck of the steam-tender Hercules, by a chain-fall working between an iron crane fixed at the centre of the tower, and a steam-winch on the deck of the Hercules, which was moored at a distance of 30 fathoms from the rock.

The town council and inhabitants of Plymouth having expressed a desire that Smeaton's lighthouse should be re-erected on Plymouth Hoe, in lieu of the Trinity House sea-mark thereat, the Trinity House made over to the authorities at Plymouth the lantern and four rooms of the tower. After the removal of the structure to the floor of the lower room, the entrance-doorway, and well-staircase leading from it to the lower room, were filled in with masonry, and an iron mast was fixed at the centre of the top of the frustum.

— The U. S. naval institute offers a prize of a gold medal, one hundred dollars, and a life membership, to the writer of the best essay offered on the subject of 'The best method for the reconstruction and increase of the navy.' The judges selected to adjudge the prize are Dr. D. C. Gilman, Admiral C. R. P. Rodgers, Senator J. R. Hawley.

— E. & F. N. Spon announce the publication at an early date of a book on 'Sorghum, its culture and manufacture economically considered,' by Peter Collier; also 'Electricity, magnetism, and electro-telegraphy,' by D. T. Lockwood.

— Professor Gustavus Hinrichs, director of the Iowa weather-service, has again issued an attractive annual pamphlet, entitled this year 'The seasons in Iowa, and a calendar for 1884,' with appropriate illustrations, and much valuable meteorological information. The notable weather features of the several months are given in detail; so that observers may judge at any time whether an occurrence is normal and probably to be continued, or abnormal and likely soon to disappear. The chief peculiarity of the climate is its variability, common to interior stations on the track of frequent cyclonic storms, and of which several striking examples are given; and there is found to be much probability of a cold snap late in January, a snow-storm at the close of April, a cold spell in May, tornadoes in June, squalls in July, heavy local rains in August, and frost early in September. Since 1875, tornadoes have occurred in Iowa on the following dates: April 8, 18, **21**, 23; May 9, 13, 18, 19; June 1, 4, **9**, **11**, 12, 14, **17**, 24; July 2; Oct. 8, 15, 28, 30 (the more severe ones in bold type). June is the month most disturbed by these storms; and directly after it a three-month period, July 3 to Oct. 8, has no record of tornadoes. It is said that the danger from tornadoes in Iowa has been greatly exaggerated. The rainfall maps for every month and for the year are repeated from last year. Precipitation is almost three times as great in summer as in winter. Professor Hinrichs hopes next year to illustrate his annual from home sources exclusively, and asks for sketches and photographs of halos, hail-stones, destructive effect of wind and lightning, meteors, cloud-forms, or any other phenomena. Drawings of Iowa scenery, as well as detailed maps of storms, hail, and floods, will all be welcome. We wish the director success in his excellent work.

— The publications of the census office so long expected are now being issued in rapid succession by the Government printing-office. Thus far, three quarto volumes, besides the compendium, have appeared, and several others are very near completion. The three which have been issued are those upon population, manufactures, and agriculture. The first, which saw the light some two months ago, comprises 'Population, part 1,' as issued by the census office a year and a half ago, with, as additions, the tables relating to race, nativity, age, sex, parentage, occupations, illiteracy, the defective, dependent, and delinquent classes, and the newspaper and periodical press. The tabular matter is preceded by a somewhat full discus-

sion of the progress and movement of population, which is illustrated by numerous colored charts relating to the progress of settlement, and the distribution of the different elements of the population. Other subjects, such as inter-state migration, immigration and nativity of the population, and occupations, are ably discussed by the late superintendent, Gen. Walker, in remarks introductory to the tables relating to these subjects. The volume is a bulky one, contianing, with its full index, 1,050 pages. It contains, also, forty-two colored maps, of which twenty-eight are double-page maps, and thirty other full-page illustrations.

The volume upon manufactures, which has but recently appeared, is an equally bulky tome, comprising 1,248 pages. The opening discussion, by Gen. Walker, is brief, comprising but thirty-five pages; and, while it is suggestive rather than exhaustive, it skims the cream from the whole body of statistics. The tables present: 1°. General statistics regarding manufactures, by states and territories, in 1880, 1870, 1860, and 1850; 2°. The statistics for the whole country, of certain specified industries, some three hundred and fifty in number; 3°. Similar statistics for each state and territory; 4°. General statistics by counties; 5°. Statistics regarding selected branches of manufactures by counties; 6°. The manufactures of a hundred leading cities; and 7°. Special statistics regarding certain leading industries. The statistical portion of the volume occupies four hundred and seventy-six pages. The report of Mr. Hollerith upon 'Power' consists of tables, showing by states the amount of steam and of water power in use, and also the power applied to certain leading industries in the several states. The statistics are prefaced by a few pages of discussion, in which the leading points are brought out. The report is accompanied by four colored charts of the eastern part of the United States, showing, by shades of color, the total power in use, the steam-power, and the water-power, each in proportion to area, and the local excess of steam and of water power. There are also three sheets of diagrams, illustrating the proportions of power in different industries and in the several states and territories. In his able treatise upon the Factory system of the country, Col. Wright sketches the origin and history of that system; treats of its evil effects, both moral and physical, particularly upon women and children, of its influence upon wages, prices, and production; and summarizes the legislation of the several states in regard to factory operatives. To the houses of factory operatives he devotes much attention, illustrating his text with plans and elevations of many houses for operatives, selected from foreign and American examples. This paper is a very instructive one, both economically and socially. The report of Mr. Fitch, upon Interchangeable mechanism, treats of the manufacture of fire-arms, ammunition, sewing-machines, locomotives, watches, clocks, and agricultural implements. He sketches the history and progress of these branches of manufacture in this country, and details the most recent improvements. This report, as well as that by the same author upon hardware and cutlery, is fully illustrated with cuts. The report upon Iron and steel production, by James M. Swank, secretary of the American iron and steel association, is here reprinted. It was first issued by the census office as a separate publication, being the first complete report published by that office. Mr. Swank precedes the statistics of production by a very full discussion, and closes the report with an extremely interesting and valuable history of the iron and steel industry, not only in this country, but in the civilized world; beginning with Tubal Cain, in the seventh generation after Adam. The report is illustrated with six double-page charts, showing the iron-producing regions of the country, and the production, by counties, of pig-iron, rolled iron, wrought-iron blooms, and steel. The report upon Silk manufacture, by Mr. Wyckoff, consists of a summary of its history, and a very full sketch of its present condition in this country. That upon Cotton manufacture, by Mr. Atkinson, is extremely brief, comprising only sixteen pages: it opens with a summary of the cotton-producing countries of the globe, the sources of supply of the staple, and goes on to discuss the methods of manufacture, and the relative qualities of the product of this and European countries, and the facilities offered by different parts of this country for this industry. The report of Mr. Bond consists entirely of statistics relating to the industry of wool manufactures, prefaced by a few introductory remarks. The report upon Chemical products treats of the production of soda, manufactured manures, phosphates, sulphur and sulphuric acid, potassium bichromate, potash, phosphorus, borax, bromine, nitroglycerine, acetate of lime and salt. The volume closes with Mr. Weeks's report upon Glass manufacture. In addition to full statistics regarding this industry, Mr. Weeks summarizes and discusses the statistics fully. This portion of the report is followed by a treatise upon glass, the materials used in its manufacture, and the methods employed both in manufacture and in working. The report closes with a history of the industry from the earliest historic times. An admirably full and complete general index is given, in addition to the indices to the several reports. Probably with a view to a separate publication of each special report, each is paged by itself on the top, while at the bottom the paging runs consecutively through the volume.

— S. E. Cassino & Co. desire us to state that they have bought the interest of Estes & Lauriat in the 'Standard natural history,' and are now the sole publishers of that work.

Mr. J. H. Emerton, whose name was given as a contributor to this work, writes that he is only so in so far as a part of the chapter on spiders is quoted from what he had published elsewhere.

— *La Nature*, Dec. 15, 1883, apologizes for an error in stating that Mr. Ferry crossed the English Channel on the water-tricycle figured in *Science*, Dec. 14, and gives illustrations of the tricycle, convertible into a boat, in which the passage was actually made.