OUR ASTRONOMICAL COLUMN.

STONYHURST DRAWINGS OF SUN-SPOTS AND FACULÆ.—A little more light on the relation of faculæ to spots is contained in a paper communicated by the Rev. Walter Sidgreaves to the Royal Astronomical Society in December 1891. None of the drawings of solar phenomena made at Stonyhurst under the late Father Perry's direction afforded a clear instance of faculæ preceding the birth of a spot. Neither was there any positive evidence of the birth of a spot before the appearance of faculæ; while every spot of importance was attended from the beginning with at least a small surrounding of faculæ. No absolute priority of one or the other could therefore be regarded as proved. During the minimum of 1889, however, Father Sidgreaves observed two cases in which faculæ undoubtedly appeared before any trace of a spot could be detected. "On June 29, a small patch of faculæ was sketched near the eastern limb, in latitude $-40°{\cdot}5$, and in longitude 252°. There was no trace of a spot in the neighbourhood, and neither spot nor faculæ had been seen near the position for years. On the following day a small round spot appeared in latitude $-40°{\cdot}3$, and longitude $252°{\cdot}2$—that is, in the midst of the faculæ, the faculæ on this day being visible only just close round the spot." A similar development was recorded at the end of July, in latitude $-22°$, and longitude 155°. Both the faculæ and spots were new, and clearly distinguished; hence, so far as these observations are concerned, their evidence clearly indicates that the birth of some spots is preceded by the appearance of faculæ.

SOME APPARENTLY VARIABLE NEBULÆ.—Mr. Lewis Swift, in his ninth catalogue of new nebulæ discovered at the Warner Observatory (*Astr. Nach.*, 3004), noted his inability to re-find a nebula previously seen in R.A. 3h. 36m. 0s., Decl. 95° 2′·1. A further examination of the region led this observer to suspect that the object formerly located in the position given must have been a comet (*Astr. Nach.*, 3014). Dr. Dreyer has looked up the observations of nebulæ in the region in question, and the information thus obtained leads him to conclude that the object is most probably a variable nebula (*Monthly Notices*, December 1891). The nebula appears to have been visible in 1827, 1848, 1850, 1851, 1856, and 1889, while it was not seen in 1785, 1855, 1864, 1865, 1872, 1875, 1877, and 1890, although it was specially looked for on two or three of these occasions. The two nebulæ *h* 229 and *h* 882, which Prof. Winnecke found were periodically variable (and his observations were supported by later ones made by other observers), are believed by Dr. Dreyer to owe their apparent fluctuations of light to disturbing atmospheric influences. *h* 1452 is a similar diffused nebula with slight condensation, which Sir John Herschel suspected to be variable. But in this case, also, conclusive evidence of variability is wanting.

THE CRYSTAL PALACE ELECTRICAL EXHIBITION.

THE Electrical Exhibition at the Crystal Palace was opened on Saturday last. It is an Exhibition of great interest, not only to electricians but to the public, and should do much to enlighten ordinary visitors as to the methods and results of electrical science. At the present stage we need refer only to some parts of the display. When the Exhibition is complete, we shall give a fuller account of the principal exhibits.

Much attention will, of course, be devoted to the section containing the generating machinery. Every important type of generating apparatus is shown in this department. Among the large exhibits is a 350 horse-power Davey, Paxman engine, capable of driving a powerful Kapp dynamo; and Messrs. Crompton and Co. exhibit a dynamo combined with a Willans engine of 200 horse-power—the dynamo being capable of running nearly 4000 8 candle-power glow lamps. There are many gas-engines, some of which are shown by Messrs. Crossley Brothers, the original proprietors of the Otto gas-engine. Other exhibitors are the British Gas Engine Company, with cycle engines; Messrs. Dick Kerr and Co., with the Griffin gas-engine; Messrs. J. E. H. Andrew and Co., with the Stockport gas-engine; and Messrs. Day and Co., with a new form of gas-engine. All of these engines are used to drive dynamos of various makers.

A most interesting exhibit is sent by the Postmaster-General, who displays a complete set of telegraphic apparatus. A large projector or search-light is shown by Messrs. Crompton and Co., who also exhibit, among other things, an electric crane capable of hoisting about a ton. No fewer than 10,000 glow lamps in one group are shown on a wire screen by the Edison-Swan Company, and arc lights, poles, regulators, and samples of submarine cables are displayed by Messrs. Siemens Brothers. A model of an electric launch built for use on the Thames is included among the exhibits of Messrs. Woodhouse and Rawson; and a full-sized electric tram-car is shown by the Brush Electrical Engineering Company, who have also in the Exhibition various dynamos, arc lamps, and other objects.

The exhibits in connection with telephony cannot fail to attract notice, and will do more than any amount of verbal explanation to make its principles intelligible. The National Telephone Company are arranging rooms where London operatic and other performances may be heard by visitors on payment of a small fee; and two stands belonging to the Consolidated Telephone Company, one in the nave, and another in the gallery, are connected by telephone.

Messrs. Croggon and Co. show lightning conductors of the latest type applied to a model church, in connection with which a peal of bells are rung by electricity from a keyboard. Various styles of fittings for domestic electric lighting are displayed in a series of rooms in the galleries; and these will no doubt attract very general attention. The Medical Battery Company show well how electricity is applied in various departments of medical practice.

The Exhibition has been organized with so much care, and on so great a scale, that it is sure to be widely appreciated.

THE SMITHSONIAN INSTITUTION.

PROF. S. P. LANGLEY, Secretary of the Smithsonian Institution, has submitted to the Board of Regents his Report for the year ended June 30, 1891. It includes, among other things, an account of the work placed by Congress under the charge of the Institution in the National Museum, the Bureau of Ethnology, and the National Zoological Park.

As in a previous Report, Prof. Langley refers to the fact that owing to the changing value of money the purchasing power of the Smithsonian Fund, in the language of a Committee of the Regents, "while nominally fixed, is growing actually less year by year, and of less and less importance in the work it accomplishes with reference to the immense extension of the country since the Government accepted the trust"; and he urges that the fund should be enlarged, "if only to represent the original position of its finances relatively to those of the country and institutions of learning." If we may judge from the general tone of the Report, the required increase is more likely to be obtained from private benefactors than from the Government. Quite lately, as we recorded at the time, the Institution obtained from Mr. Thomas G. Hodgkins, of Setauket, Long Island, a handsome donation of 200,000 dollars.

By reducing expenses in other directions, the Institution has been able to revert to its early practice of aiding investigators carrying on original research. Among the special grants may be named that of 500 dollars to Prof. A. A. Michelson, of Clark University, for continuing his important work upon a universal standard of measure founded on the wave-length of light; also a sum of 600 dollars placed at the disposal of Prof. E. W. Morley, to procure a special apparatus for determinations of the density of oxygen and hydrogen, an investigation requiring extreme precision and delicacy of manipulation, and promising results of wide application; while a sum of 200 dollars was placed at the disposal of Dr. Wolcott Gibbs, for investigations at his laboratory in Newport upon chemical compounds.

To Prof. E. S. Holden, Director of the Lick Observatory, California, a grant of 200 dollars was made, to assist in perfecting his apparatus for securing photographs of the moon. The results of his studies in this field Prof. Holden has offered to place at the disposal of the Smithsonian Institution for publication at some future day, should it seem desirable.

Prof. Pickering, Director of the Harvard Observatory, has also placed at the disposal of the Institution for publication a very valuable series of photographs of the moon, which have been secured at the Harvard Observatory, and which will be supplemented by photographs to be taken at the Harvard Observatory high-altitude station in the mountains of Peru.

The Director of the Paris Observatory, Admiral Mouchez,

has likewise promised his co-operation in securing lunar photographs of the highest degree of excellence now attainable.

With the aid of these three prominent Observatories, which have given especial attention to the subject of lunar photography, it is proposed to prepare a volume representing upon a large scale the best results that can be secured, thus placing on record a detailed description of the lunar surface, the value of which for comparison with observations and photographs of the future can scarcely be over-estimated.

In furtherance of the plan for the establishment of standard sizes of screws and of diameters of tubing, &c., for astronomical and physical apparatus—a subject which has received the attention of Committees of the National Academy of Science, as also of the American Association for the Advancement of Science—a few standards have been tentatively adopted, and copies of these are attainable by all interested in securing uniformity in this class of work.

No memoir was added to the Smithsonian "Contributions to Knowledge" during the year, but a paper presenting an account of new experiments in aero-dynamics by Prof. Langley was in course of preparation. These investigations were made at private charge, but it is in accordance with a policy long ago counselled by the Board of Regents that they should be published in a volume of the Institution's "Contributions."

A statement relating to the establishment of an Astro-physical Observatory as a part of the Smithsonian Institution has already appeared in NATURE (vol. xliv. p. 254). With regard to this Observatory, Prof. Langley recalls the fact that preparations for it had been made by the late Secretary, Prof. Baird. A special interest was taken in the proposed Astro-physical Observatory by the late Dr. J. H. Kidder, formerly Curator of Exchanges in the Smithsonian Institution, and the sum of 5000 dollars was received from his executors for this purpose. A like sum of 5000 dollars was presented personally to the Secretary by Dr. Alexander Graham Bell for prosecuting physical investigations, and particularly those upon radiant energy; and this sum was, with the consent and approval of the donor, placed to the credit of the Smithsonian Institution upon the same footing as the Kidder bequest. Congress was asked to appropriate 10,000 dollars for annual maintenance, and this sum was granted, and became available on July 1 last.

Speaking of the National Museum, Prof. Langley notes that at the close of the fiscal year the present building had been occupied one decade, and that during that period the total number of specimens of all kinds catalogued and ready for exhibition or study had increased from about 193,000 to more than 3,000,000. This rate of growth, as he says, is "probably unprecedented in the history of Museums." The development of the collections has not, however, proceeded "in such a symmetrical and consistent manner as is essential to the necessities of the work"; and such is the competition for "material," that the Museum is often unable to hold its own, not only with foreign Governments and with local Museums in other American cities, but even with private collectors. More space and a larger staff of curators are urgently needed.

Some interesting statements are made with regard to the work of the Bureau of Ethnology. At the close of the last fiscal year, specific exploration of the mound area by the United States ceased, except so far as it was found necessary to correct errors and supply omissions. A large part of the results of the work of several past years is in print, though not yet issued. A plan of general archæological field work has been practically initiated by a systematic exploration of the tide-water regions of the District of Columbia, Maryland, Virginia, and the Ohio Valley, which determined among other points of interest that the implication of great antiquity to forms of stone implements of America which have hitherto been classed with European palæoliths in age as well as in fabrication has not been substantiated by the ascertained facts.

Careful exploration of the Verde Valley in Arizona followed that before made of other parts of the large south-western region of the United States in which the presence of many extensive ruins has given rise to fanciful theories. The data as classified and discussed have shown that the hypothesis of a vanished race enjoying high civilization, which has been proposed to account for the architecture of the ruined structures is unnecessary.

The attention already given to Indian languages has been continued, in recognition of the fact that some of them are fast passing beyond the possibility of record and study, and that the ethnic classification of all of the Indian tribes can be made accurate only through the determination of their linguistic divisions and connections. The studies upon aboriginal mythology and religious practices have also been continued, with special attention to the ghost dances and "Messiah religion," which have produced important consequences bearing upon the problem of proper national dealing with the Indians. Official misconception of their religious philosophy, which has been forcedly transfigured by the absorption of Christianity so as to present more apparent than actual antagonism to civilization, has occasioned needless loss of life and treasure.

With regard to the National Zoological Park, Prof. Langley says the primary object for which Congress was asked to establish it was to secure the preservation of those American animals that are already nearly extinct, and this object it was thought would be best attained by the establishment of a large inclosure in which such animals could be kept in a seclusion as nearly as possible like that of their native haunts. Congress has been so unwilling to provide the necessary funds that the Smithsonian Institution has found it hard to realize the original design. Nevertheless, the development of the Park proceeded steadily during the year, as few changes as possible being made in its natural features. Trees have been planted in different parts, in some places for ornament, in others to secure the proper seclusion of animals; and a considerable area of open land has been prepared for lawn and pasture grounds. Near what is for the present the principal entrance is a disused quarry, from which arise precipitous cliffs and bold rocky ledges. It seemed particularly well fitted for the construction of dens and yards for bears. A series of caverns has been blasted in the rock and inclosed by a stout iron fence. Within the fence are large and commodious yards, in which have been constructed bathing pools, with water flowing constantly from a large spring outside the Park. The result has been a place admirably adapted for the health and general welfare of the animals, as well as a most picturesque and striking feature.

Already the establishment of a National Zoological Park under the management and guidance of the Smithsonian Institution has attracted the attention of similar institutions and of naturalists in other countries, and liberal offers of gifts and exchanges have been made.

From Sumatra, from the islands of the Pacific, from the shores of Alaska, and from American national parks, have come offers of gifts or terms of purchase, but it has been necessary to defer acceptance of all these offers owing to lack of funds even to pay for transportation.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, December 17, 1891.—Dr. W. H. Perkin, F.R.S., Vice-President, in the chair.—The following papers were read:—The composition of cooked vegetables, by Miss K. J. Williams. The vegetables examined after cooking were the artichoke (Jerusalem), broad bean, haricot bean, beetroot, cabbage, carrot, cauliflower, celery, cucumber, lettuce, mushroom, onion (Spanish), parsnip, pea (green), potato, radish, salsafy, scarlet-runner, sea-kale, spinach, tomato, turnip, and vegetable marrow. Ultimate analyses of the cooked vegetables were made, and their heats of combustion determined. The woody fibre, cellulose, fat, and the carbohydrates convertible into glucose were also estimated.—Metallic hydrosulphides, by S. E. Linder and H. Picton. The authors have investigated the sulphides of copper, mercury, arsenic, antimony, cadmium, zinc, bismuth, silver, indium, and gold; and find that, with the single exception of bismuth, all these metals form hydrosulphides of a more or less complicated character. These compounds, when treated with acids, in most cases lose part of their sulphuretted hydrogen, and form still more complicated hydrosulphides. Copper forms a soluble hydrosulphide possessing the composition $7CuS,H_2S$; this, on treatment with acetic acid in presence of excess of sulphuretted hydrogen, yields a substance of the composition $9CuS,H_2S$; if no excess of sulphuretted hydrogen be present, the compound $22CuS,H_2S$ is obtained. Hydrochloric acid produces still further condensation. Mercuric sulphide forms products approximately represented by the formulæ $31HgS,H_2S$ and $62HgS,H_2S$. The latter formula represents the substance obtained in presence of acid, and is a very stable substance. Zinc sulphide solution