

address to the Royal Microscopical Society. Renault's work ranged over the field of fossil vascular cryptogams and gymnosperms, within which the real triumphs of fossil botany have been won. To Renault we owe the reconstruction of that unique family the Botryopteridæ, at present regarded as the most authentic group of Palæozoic ferns, also the extraordinarily perfect knowledge that we possess of the gymnospermous Cordaitæ. Dr. Scott's address, together with a list of Renault's more important contributions, is published in the April number of the Journal of the society.

DR. R. PEROTTI, writing in the *Atti dei Lincei*, xv., 5, describes observations on the distribution of nitrifying bacteria in Italy. Samples of soil were taken from various districts, and cultures made by Beyerinck's method, and in every case nitrifying bacteria were found in greater or less abundance, the best results being obtained from Rieti, Messina, and Cerignola.

PROF. GIACINTO MARTORELLI has had the rare fortune to obtain a specimen, believed to be the first, of Ross's polar gull (*Rhodostethia rosea*, Macgill.) from the Mediterranean, killed in the neighbourhood of Sardinia. The specimen in question reached him on January 10 of this year in the flesh, though decomposition was setting in. It appears to be a young bird, being 30 centimetres in length, and possibly this may account for its being found so far from its northern haunts. The discovery is announced in the *Rendiconto del R. Istituto Lombardo*, xxxix., 4, and the specimen has been stuffed and given to the Turati collection.

DR. F. EREDIA, of the Central Meteorological Office at Rome, has published in the official reports an account of a fall of dust on February 6. The occurrence was considered to be of sufficient importance to issue circulars to various observatories requesting particulars of the fall; the reports show that the dust was observed in Sicily, Lower Calabria, and other places, accompanied by thunderstorms, rain or hail, and strong south-easterly and south-westerly winds. The cyclonic conditions existing at the time would favour the conveyance of dust from Africa over the Mediterranean in the upper regions of the atmosphere, and although no analysis appears to have been made, the distribution of barometric pressure and other conditions seem to confirm the African origin of the phenomenon.

THE director of the Mauritius Observatory contributed to the eighth International Geographic Congress a useful paper on the climate of Pamplemousses. The results of the observations at Port Louis for 1860-6 were communicated to the British Association in 1867 by the late Dr. Meldrum; those commenced at Pamplemousses in 1874 form the basis of the present paper. The following are the mean annual and absolute extreme values of some of the meteorological elements:—air temperature 73°·4, 94°·7 in December, 50°·8 in June; humidity 75·1 per cent., 98·5 per cent. in January, 34·0 per cent. in November; resultant wind velocity 9·2 miles per hour; the maximum velocity recorded in an hour was 103·3 miles (old factor 3) on April 29, 1892. Cyclones are said to be of immense benefit to the island, as one of the principal sources of rainfall. Taking an area of 20° square, of which Mauritius occupies nearly the centre, 237 cyclones were recorded in the years 1854-1903. The greater number occurred between December and March, and not one was recorded between June and September; their occurrence appears to be most frequent five years after, and least frequent one year before, the epoch of minimum solar activity.

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THE principal article in *Concrete and Constructional Engineering* (vol. i., No. 2) is by Captain Sewell, of the United States Army. It deals with the introduction of reinforced concrete in the United States, and is a commentary on the various systems and methods of applying this material adopted in that country. The article is illustrated by views and details of important buildings.

AT the last meeting of the Institution of Mechanical Engineers an interesting paper was read by Mr. Louis Greaven on petroleum fuel in locomotives on the Tehuantepec National Railroad of America. It gives the actual results of a year's experience, and the information should prove of service to others who contemplate adopting oil fuel in railway working.

IN a paper read before the Birmingham section of the Institution of Electrical Engineers on April 25, Dr. D. K. Morris and Mr. G. A. Lister proposed a standard test for transformers and transformer iron. The method involves but one set of connections, three instruments, and the normal supply, and necessitates the use of two similar transformers. It is a modification of that first described in 1892 by Ayrton and Sumpner, and is an application of the Kapp-Hopkinson or differential method of testing direct-current machines. The behaviour of a transformer when loaded at various power factors is, they find, best considered by means of a regulation diagram which they have constructed. The short-circuit test can equally well be carried out with the transformer core excited. The three-point wattmeter method is probably the most accurate means of measuring power factor and current when carrying out single-phase tests on transformers or motors from a three-phase supply. By bringing the supply to the middle point in the testing transformer when carrying out the differential test, symmetrical conditions are obtained, thus permitting of a normal determination of the various losses. By varying the voltage only and taking wattmeter readings the core loss of a transformer may be separated into hysteresis and eddy-current loss by the method of the total index. Wattmeter readings in combination with the three-point method serve as the best means of measuring the temperature rise in heating tests. The method of constant induced voltage affords a ready means of finding the true hysteresis loss, and is probably the best way of testing iron samples.

OUR ASTRONOMICAL COLUMN.

COMETS 1906b and 1906c.—A set of new elements for the orbit of comet 1906b is published by Herr M. Ebell in No. 4087 of the *Astronomische Nachrichten*. An ephemeris for alternate days is also given, extending from May 4 to July 7, and shows that this comet is still in the southern part of the constellation Leo, about half-way between τ and ν Leonis. It is moving very slowly in a south-eastern direction, its present brightness being about 0·5 of that at the time of its discovery.

A set of new elements for comet 1906c, computed by Miss Lamson, of the U.S. Naval Observatory, appears in No. 4086 of the same journal.

THE ASTRONOMICAL AND ASTROPHYSICAL SOCIETY OF AMERICA.—At the seventh annual meeting of this society, held in December last at New York, some forty papers on astronomical subjects were submitted.

Short abstracts of thirty-three interesting papers are given by Prof. H. Jacoby in No. 586 of *Science*, and amongst those which have not been noted previously in these columns may be mentioned the following:—A note on Prof. Burnham's forthcoming catalogue of double stars; a brief description of the vacant regions of the sky, by Prof. Barnard; an announcement concerning the publication

of the observations of sun-spots made by the late Dr. C. H. Peters, extending over the period 1860-1870, and including the determination of more than 13,000 heliographic positions of spots on more than 1100 days; a paper by Prof. W. H. Pickering on planetary inversion, which the author illustrated by experiments with a gyro-scope; and an account of the foundation, and the partial destruction by fire, of the Philadelphia Observatory, by Prof. M. Snyder.

SOLAR PROMINENCES DURING 1905.—The usual annual summary of the prominence observations carried out at the Catania Observatory during the past year is published by Prof. Mascari in No. 4, vol. xxxv., of the *Memorie della Società degli Spettroscopisti Italiani*.

The results show that the mean daily frequency of prominences observed was greater in 1905 than in 1904 and 1903, but the increase was not so great as might have been expected. As in previous years, it is seen that the increase in mean daily frequency corresponds with a decrease in heliographic latitude. In 1904 the mean daily frequency was 2.90 and the mean latitude $36^{\circ}.6$, whilst for 1905 the corresponding figures were 3.05 and $30^{\circ}.8$. The mean altitude of the prominences during 1904 was $43^{\circ}.7$, and in 1905 it was $44^{\circ}.1$; the corresponding extensions of the prominences along the solar limb were $7^{\circ}.27$ and $8^{\circ}.77$.

The greater frequency of prominences in the sun's northern hemisphere still persists, the values for 1905 being 1.77 for the northern and 1.28 for the southern hemisphere.

THE PERIOD OF β LYRÆ.—Referring to the recent note by Mr. Roberts on the increasing period of β Lyræ, Prof. Schaeberle suggests another possible cause which may account for that phenomenon.

It is now generally accepted that incandescent bodies have the power of repelling fine particles of their component matter to great distances, and Prof. Schaeberle suggests that, at a certain stage in the life-history of such a body, the decrease in mass may be so rapid as to cause an increase in the periodic time of any other body belonging to the system. If part of the ejected mass afterwards returns to the parent body other changes will obviously occur (*Observatory*, No. 370).

THE SIXTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

WHEN the International Congress of Applied Chemistry, assembled at Berlin in 1903, chose Rome as its next meeting-place, the fear was expressed by some that the Italian chemical industry might not perhaps be of sufficient magnitude to ensure a large attendance at the next congress. The brilliant success of the meeting which has just terminated has shown, however, that these fears were entirely without justification, and the number of important communications from the Italian members of the congress proves the reality of the progress which Italy has made of late years in chemical industry.

The meeting was opened on April 26 under the most favourable auspices by the King and Queen in person, accompanied by the Minister of Public Instruction and other high officials. The place of meeting was the magnificent Palace of Justice, then brought into use for the first time; in fact, it is not yet wholly completed as regards the internal decorations. There being a large number of rooms in the building, space was easily found for the sixteen sections into which the congress was compelled to subdivide itself. The number of British members was more than thirty, and on the whole the attendance from other countries was very satisfactory, even China being represented. It is somewhat of a novelty to hear speeches in Chinese at European scientific meetings, and shows that the awakening of the Celestial Empire is becoming an accomplished fact. Such a congress is an interesting study in ethnology as well as philology. Officially only four languages are supposed to be used, namely, English, French, German, and Italian; but the greatest leniency is shown in this respect, and the reporters must sometimes rely on summaries made by the speakers themselves.

Among the papers read before the full meeting of the congress the most important was undoubtedly Dr. Adolph Frank's description of his process for the direct utilisation

of the nitrogen of the atmosphere for the production of artificial manure and other chemical products. Dr. Frank's invention is not only ingenious, but its effects on the future of the human race will probably be of the greatest importance. The inventor is a veteran in agricultural chemistry; he it was who, more than fifty years ago, introduced the potash salts of Stassfurt to the notice of agriculturists. Now nearly three million tons of these salts are used annually by agriculturists all over the world. The problem of the fixation of atmospheric nitrogen has often been attacked, for the first time on a large scale during the French Revolution. At that time France, surrounded by her enemies, was cut off from the supply of saltpetre necessary for national defence. A committee of French chemists then established the saltpetre farms where the nitrifying organisms, with which we have since become more intimately acquainted, produced the necessary means of defence. We in Great Britain, however, are still entirely dependent upon foreign sources for the explosives necessary for our national defence, and it is only by the establishment of some such process as Dr. Frank's in Great Britain that we shall place ourselves in safety in this respect. The invention is not a complicated one, the difficulties consisting chiefly in the solution of new problems of chemical engineering. Calcium carbide is first produced and then heated with nitrogen obtained by the fractional distillation of liquid air. During this distillation oxygen is obtained as a by-product, and may be utilised for the production of nitric acid from ammonia, which, again, is one of the substances produced by Dr. Frank. The first raw material obtained is calcium cyanamide, and it is this that is used as a nitrogenous manure, numerous experiments having shown that the nitrogen which it contains can be easily assimilated by plants. For countries such as Italy, and more especially India, with large agricultural populations who do not possess sufficient cattle to supply the requisite nitrogenous manure, this direct utilisation of the inexhaustible nitrogen of the atmosphere cannot fail to be of enormous importance; but to the chemist the calcium cyanamide has other attractions. From it have been produced, not only ammonia and nitric acid, but also urea and guanidine. We are therefore on the high road towards the artificial production of the alkaloids, and the next step will probably be the building up of substances directly assimilable by human beings, in other words, artificial foods.

But while chemists revelled in these anticipations they did not forget more practical subjects. An excellent paper by Sir William Ramsay gave a clear and exhaustive account of the present state of the sewage question in Great Britain. Special attention was given by the author to the bacterial methods of sewage disposal which are now being so widely adopted. M. Moissan, whose work with the electric furnace is so well known, gave the results of his experiments on the distillation of metals. All metals, indeed all substances, are volatile at a temperature below 3500° C., therefore M. Moissan draws the conclusion that the temperature of the sun cannot exceed this; it must, indeed, be somewhat less, as the bulk of the elements of which it consists are volatile at a lower temperature than the maximum mentioned. No doubt the data with which Prof. Moissan has furnished chemists will be utilised for practical purposes, especially in the purification of metals.

Many of the papers read before the various sections contained matter of great scientific interest. The report of the International Committee on the Unification of Analytical Methods was presented by Dr. Lunge, and will be of great assistance to analysts in different countries who wish to secure uniform results. Prof. W. N. Hartley's paper on the use of the spectrograph in analysis aroused much interest in the photographic section. It is certainly a great advantage to be able to make a quantitative analysis of a rare object in metal without defacing it in any way, and the convenience of the method will no doubt ensure it general acceptance when it becomes better known. Another communication made to the inorganic chemistry section was of interest, inasmuch as it holds out hopes of a considerable reduction in the price of photographic and other glass of high quality. Hitherto such glass has been made in the expensive pot furnaces, but the author of the paper, Herr F. Heller, states that he has succeeded in making