

Institute to be tested amounted last year to 11,656, of which 10,005 were clinical thermometers. A small charge is made for work done for the trade, but the receipts from this source of revenue do not exceed £1,000. Incidentally, in connection with this work, there is a large amount of original investigation, and the staff employed are all men of proved scientific ability. New methods for obtaining more correct results and greater accuracy in measurement are constantly being investigated, and to this extent Section II. is equally with Section I. a laboratory of research. The experiments in Section II., however, are all directed towards the more accurate testing of instruments of precision. Some of the work done in this section is undertaken at the request of the staff of the Research Laboratory, and in connection with the experiments in pure science.

This Imperial Institute is under the immediate control of a Curatorium or Council, consisting of Professors of the University and Polytechnic, of engineering and technical experts, and of heads of industrial firms, presided over by a member of the Government. The selection of members of the staff, and permission to work at the Institute, rest with the Council. At first, applicants for admission were required to have obtained their Doctor's degree; but no such rule now holds. The ability to work, and the intention of prosecuting some original investigation previously approved by the Council, is a sufficient qualification. Each application for admission is considered on its merits. The Physical-Technical Imperial Institute is the crown of the series of coordinated Institutions which afford facilities for technical instruction in physical science, and opportunities for advanced research. In the city of Berlin are well represented the various educational agencies which have contributed so largely to the greatness of Germany; and the improvements which have been made of late years in the lighting and sanitation, in the postal and telephone arrangements of Berlin, are so many practical indications of the value of the education which the State and the city jointly provide. The Physical Institute is literally a temple dedicated to science, and its two divisions correspond with the twofold character of all scientific work—that which is undertaken with the sole object of widening the area of knowledge, and that which enables knowledge to be applied to the useful purposes of life. PHILIP MAGNUS.

#### THE PLANET JUPITER.

THIS bright planet now rises more than two hours and a half before midnight, and as his northern declination is about  $18\frac{1}{2}^{\circ}$ , he attains an altitude of about  $57^{\circ}$  when southing at about 5h. 15m. a.m. His apparent equatorial diameter this evening (Nov. 14) will be nearly  $40''\cdot 5$ , and is increasing daily, so that by the end of the year it will be  $45''\cdot 6$ , when the planet will be visible nearly all night, and remain above the horizon during a period of  $15\frac{1}{2}$  hours. He will arrive at opposition to the sun on January 24, 1896, and will then be displayed under the best conditions.

To those, however, who are disposed to study the complex and variable features exhibited by the belts, the present is an important time, for it is advisable that such markings should be watched during long periods, and that a large number of their transits should be recorded. Their individual rotation periods may then be ascertained, and the differences determined, together with the fluctuations of speed affecting the same objects. Details of this character can only be correctly derived when the observations are numerous and extend, at least, over a fairly long period of time. Materials of the kind alluded to, obtained in the early part of the opposition, are of special value for comparison with the observations made at the time of opposition, and with the terminal ones which may

be secured in the evenings of June 1896, just before the planet leaves us for a season.

The features of Jupiter, though liable to certain changes, are yet, in some of their leading characteristics, remarkably durable. Like the spots on the sun, many of the markings on the planet disappear and reappear under very similar aspects. In fact, we are not without evidence that a certain degree of periodicity regulates the visibility of certain spots on the disc. In 1870 there was an eruption of dark spots along a belt in about  $25^{\circ}$  north latitude. In 1880 the phenomena appear to have recurred, for the same belt became studded with black spots, and in 1891 similar appearances were repeated. These markings are remarkable, as possibly indicating a periodical recurrence at intervals of about ten or eleven years. But it may be gravely doubted whether, in the present state of our knowledge, the materials exist for suitably investigating the question as to cyclical changes in the Jovian spots. The individuality of observers must affect the matter to a considerable degree, as their drawings and descriptions of the same features are seldom in agreement.

In recent years, the great red spot has not been so much observed as formerly. It has lost its striking character and its novelty, and planetary students have somewhat neglected it for newer objects more readily within reach. During the last ten years the mean rotation period of the spot has been 9h. 55m. 41s.; but it has shown some irregular variations. The slackening motion of the spot which operated so perceptibly between 1879 and 1885, and added seven seconds to the rotation period, appears to have been checked in the latter year, and the rate has been pretty evenly maintained since that time.

As to the visible aspect of the spot, it is now extremely faint, and can only be discerned on a good night of definition. Its feeble outlines are generally lost amid the very dark and well-marked boundaries of the belts in its immediate vicinity. But on a good night it is seen as a pinkish discolouration of the bright zone outlying the great southern equatorial belt, though its beautiful oval outline is distinguished with difficulty.

One of the interesting features of recent oppositions of Jupiter has been the series of dark and white spots plentifully arranged along the northern side of the great northern equatorial belt. These markings move swifter than the red spot, but not much so, for their period is 9h. 55m. 35s., or only six seconds less. They show changes, for sometimes one may be seen exceedingly dark, if not absolutely black, and just like a satellite-shadow in transit; but in a week or two a great decadence of tone may have affected it, and it appears scarcely darker than the belt on which it lies. These markings, so prominently fringing the northern belt, have certainly been visible during the last ten years. In 1885 I found their motion about eight seconds swifter than that of the red spot, but there were irregularities. Different spots, though in the same longitude and, probably, of the same character, do not yield coincident times of rotation, nor does any one object maintain exactly the same rate during a long period of time. The current in which they are situated, and by which they are transported to different longitudes, evidently suffers inequalities of speed, which are probably due to local disturbances underlying it.

These features of the northern belt are still very pronounced. On the morning of September 27, I observed two very dark spots projecting north from the belt and preceding the red spot at intervals of about four and two hours. The red spot follows Mr. Marth's zero meridian (System II.) by about seven minutes, but I have only obtained two observations since Jupiter has been visible as a morning star, and neither of these was very satisfactory.

During ensuing months it will be important to make as many drawings as possible, and to secure a large number of transits of the various markings. Among others the following may be specially mentioned :

(1) Light and dark spots near the equator (period 9h. 50m. 6s. in 1880, increased to 9h. 50m. 30s. in 1888).

(2) Dark spots on a belt in latitude  $25^{\circ}+$  (period 9h. 48m. in 1880, increased to about 9h. 49½m. in 1891).

(3) Dark spots and breaks in a very narrow belt in latitude  $35^{\circ}+$  (period 9h. 55m. 39s. in 1895).

(4) Light and dark spots in the region south of the red spot (period 9h. 55m. 18s., and apparently unchangeable between 1880 and 1891).

In the course of his work, the observer will also detect other features worthy of attention.

From eye-estimated transits the periods of the various objects can be very accurately ascertained, and Mr. Marth's valuable ephemerides for physical observations of Jupiter, published in *Monthly Notices* (June and supplementary numbers, 1895), will assist the student to reduce his own materials.

W. F. DENNING.

### NOTES.

THE Royal Society's medals have this year been adjudicated by the President and Council as follows :—The Copley Medal to Prof. Karl Weierstrass, For. Mem. R.S., for his investigations in pure mathematics ; a Royal Medal to Prof. James Alfred Ewing, F.R.S., for his investigations on magnetic induction in iron and other metals ; a Royal Medal to Dr. John Murray, for his services to biological science and oceanography in connection with the *Challenger* reports, and for his original contributions to the same ; and the Davy Medal to Prof. William Ramsay, F.R.S., for his share in the discovery of argon, and for his discoveries regarding gaseous constituents of terrestrial minerals. Her Majesty the Queen has been graciously pleased to approve of the award of the Royal Medals. The medals will, as usual, be presented at the anniversary meeting on St. Andrew's day (November 30). The Society will dine together at the Whitehall Rooms on the evening of the same day.

THE following is a list of those who have been recommended by the President and Council of the Royal Society for election into the Council for the year 1896, at the anniversary meeting on November 30 :—President : Sir Joseph Lister, Bart. Treasurer : Sir John Evans, K.C.B. Secretaries : Prof. Michael Foster, the Lord Rayleigh. Foreign Secretary : Dr. Edward Frankland. Other members of the Council : Mr. William Crookes, Sir Joseph Fyrrer, K.C.S.I., Mr. Lazarus Fletcher, Dr. Walter Holbrook Gaskell, Dr. William Huggins, the Lord Kelvin, Prof. Alexander B. W. Kennedy, Prof. Horace Lamb, Prof. Edwin Ray Lankester, Prof. Charles Lapworth, Major Percy Alexander MacMahon, R.A., Prof. John Henry Poynting, Prof. Arthur William Rücker, Mr. Osbert Salvin, Prof. Harry Marshall Ward, Admiral William James Lloyd Wharton, C.B.

THE Trustees of the British Museum have decided not to fill up for the present the Keepership of Zoology, vacant by Dr. Günther's retirement, but to appoint two additional Assistant-Keepers from the existing staff, so that there will be one for each of the three sections into which the department will be divided for administration purposes, viz. insects, other invertebrates, and vertebrates. Sir William Flower will undertake the principal duties of Keeper of the Department, in addition to those of Director of the Natural History division of the Museum. A junior assistant will be appointed by competition, so as to keep up the numerical strength of the staff of the department. He will probably be attached to the entomological section, which

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although already the largest, still requires strengthening in order to cope with the arrangement of the vast number of specimens continually being added to the collection.

WE notice the announcement that, on November 20, Mr. Balfour will receive a deputation from the Association of Chambers of Commerce, in reference to the adoption of the metric system. Our readers will remember that this subject has been considered by a Select Committee of the House of Commons, which has recommended that the metric system of weights and measures be at once legalised for all purposes, and, after a lapse of two years, be rendered compulsory by Act of Parliament. The deputation will present to the First Lord of the Treasury memorials which have been prepared by the Association and by the Leeds and other Chambers of Commerce, urging the Government to bring in a Bill next Session for the purpose of carrying out these recommendations. We trust that the need for the reform of our present cumbersome system will be forcibly impressed upon the Government.

A STRONG American Committee is being formed to act with the Huxley Memorial Committee. *Science* states that substantially all the American scientific men who have been thought of as possibly willing to serve have, so far as approached, signified their willingness to do what they can in the matter. The biologists are likely to be well represented, particularly, and the leaders in scientific work in every field will do their full share. It is hoped and anticipated by our contemporary that the contributions from the United States will rival those of Great Britain, and exceed those of any other nation.

THE suggestion put forward by us, a fortnight ago, that the London County Council, or some other public body, should reciprocate the erection of a statue to Newton by the Paris Municipality, has not passed unnoticed in France. We indicated either Laplace or Lavoisier as a suitable subject for a statue in London ; but the *Petit Journal*, in commending the idea, suggests that the right person to be honoured is Voltaire, who was an exile in England from 1726 to 1729, and who returned to France a great admirer of Newton. Voltaire was an enthusiastic exponent of Newtonian principles, and it was largely due to his support of them, in scientific and popular writings, that Descartes' vortex theory was rejected by the Paris Academy of Sciences.

The second International Congress of Applied Chemistry will be held in Paris next year. The Congress will be organised in ten sections, under the following heads : (1) Sugar and sugar-refinery ; (2) Industries concerned with fermentation ; (3) Agricultural industries ; (4) Agricultural chemistry ; (5) Official and commercial analyses of substances liable to duty ; (6) Industrial chemistry ; (7) Photography ; (8) Metallurgy, mining, and explosives ; (9) Biology, medical, pharmaceutical, and hygienic analysis ; (10) Electro-chemistry. An International Exhibition of Chemical and Agricultural Industries will be held during the Congress, and for that purpose the Government has given the use of the whole of the Palais de l'Industrie.

A SIGN of advance in Africa comes to us in the shape of an announcement of the establishment of a monthly journal of South African science, arts, and crafts. The *Scientific African* (for that is the name of the new periodical) will contain popular scientific articles, written by experts, on South African animals, plants, rocks, and minerals, and giving information as to the habits, uses, and occurrences of organic and inorganic matter in South Africa and elsewhere. All the industries of South Africa, in the Colony, Transvaal, Free State, Rhodesia, &c., will be described, with photographic illustrations of the interiors of factories, the workings of mines and collieries, bridges,