AMONG the papers read at the closing meeting of the Royal Society, was one by Prof. Ewing, of the Dundee College, entitled, "Contributions to the Molecular Theory of Induced Magnetism," in which experiments of a novel and curious kind were described, leading to an important conclusion. Prof. Ewing has examined experimentally Weber's theory of molecular magnets, according to which the molecules of iron are always magnets, which point anyhow in an unmagnetized piece, but are turned round to point one way when the iron is magnetized. It is well known that in the development of this theory by Maxwell and others there has been much difficulty in reconciling the results of the theory with what is known about the magnetic quality of iron and steel, and many arbitrary assumptions have been suggested in order to make the theory fit the facts. Prof. Ewing's experiments have removed this difficulty, showing that no arbitrary assumptions are necessary, and that the known character of the magnetizing process may be deduced from the molecular theory in its simplest form. The experiments were made by means of a model in which a large number of small pivoted permanent magnets are grouped to represent the molecular structure of iron. When a magnetic field is applied, the action of the small magnets on one another makes them behave in a way that exactly agrees with the observed behaviour of a bar of solid iron when it is magnetized. The model exhibits all the variations of susceptibility which are known to take place, and explains how magnetic hysteresis occurs without anything like friction among the molecules.

ACCORDING to the *Ceylon Observer*, Mr. A. T. W. Marambe, of Kandy, the translator of "Gulliver's Travels" and the author of "A Practical Synopsis of Ceylon History," has in preparation a little work on the Veddah language. Many have attempted this task before, but without success. Besides Veddah songs, a description of habits and customs, &c., the book will have a completer list of words than has hitherto appeared.

AN exceptionally pretty and instructive series of new experiments, upon the action of carbon heated to whiteness in the electric arc on various gaseous compounds, are described in the current number of the *Berichte* by Prof. Lepsius, of Frankfurt. Perhaps the most important are a group of four experiments illustrating the relative combining powers of the four elements iodine, sulphur, phosphorus, and carbon. The apparatus employed consists of a specially modified Hofmann eudiometer, one limb of which is 40 mm. in diameter and 300 mm. long, and the other longer limb narrower and furnished with a mercury reservoir at its upper end. The wider limb, which is the reaction-tube, is furnished with a stop-cock at the top, and just below this are two tubuli through which the adjustable carbon poles are inserted. At the base of the wider limb a second stop-cock is placed so as to permit of the adjustment of the mercury. The gas to be experimented upon is introduced into the apparatus at the upper stop-cock by allowing mercury to run out at the base. Four such eudiometers are arranged in a row, and 100 c.c. of gas introduced into each. Into the first, hydriodic acid is introduced; into the second, sulphuretted hydrogen; into the third, phosphuretted hydrogen; and into the fourth, marsh-gas. The gases thus stand at the same level in each of the four reaction-tubes. The current from a battery whose electromotive force should amount to 60-80 volts is then allowed to pass between the carbon poles, which are, of course, in contact at first, and then gradually drawn away until the maximum arc is obtained. Each reaction may be performed separately, or all four may be allowed to proceed simultaneously by adopting an arrangement in multiple arc. In hydriodic acid the brilliant arc light is tinted a magnificent purple and the whole space above the mercury becomes filled with violet vapour of iodine. Notwithstanding the considerable heating effect of the discharge, the volume of gas perceptibly diminishes, the liberated iodine

rapidly depositing in minute crystals upon the walls of the tube. So rapid, indeed, is the diminution in volume, that mercury requires to be poured into the reservoir to prevent the entrance of air into the reaction-tube. In a very few minutes the reaction is complete, and the mercury ceases to rise. In sulphuretted hydrogen the light is coloured blue, and copious clouds of sulphur are produced, which settle upon the walls in the form of a white transparent coating. The volume of gas is considerably augmented, owing to the expansion by heat, and the reaction is likewise completed in a very brief space of time. In phosphuretted hydrogen the arc glows with a dazzling red light; the volume visibly augments at a rapid rate, and red clouds of phosphorus are thrown off, the glass walls being covered with red phosphorus, among which are to be found notable quantities of the ordinary yellow variety. The mercury attains its maximum height in the narrow limb in a minute at most from the moment of switching on the current. In the case of marsh-gas, the whiteness of the arc appears at first to be rendered more intense, and is surrounded by dense black clouds of carbon, which form a striking background. The upper part of the vessel, however, soon becomes covered with an opaque deposit, which perceptibly diminishes the brilliancy of the light. The volume appears to increase by leaps and bounds, and in a few seconds attains its maximum. At the end of the experiment, after cooling, the volume of hydrogen left in the first case is 50 c.c., in the second 100 c.c., in the third 150 c.c., and in the fourth case 200 c.c., thus showing in a most striking manner that an atom of iodine combines with one atom of hydrogen, sulphur with two, phosphorus with three, and carbon with four atoms of hydrogen.

THE additions to the Zoological Society's Gardens during the past week include a Bosman's Potto (*Perodicticus potto*) from West Africa, presented by Mr. P. S. S. Radcliffe; a Harnessed Antelope (*Tragelaphus scriptus* ♂), a — Antelope (*Cervicapra* sp. in. ♂), two Marabou Storks (*Leptoptilus crumeniferus*) from Gambia, West Africa, presented by Dr. Percy Rendall; an English Wild Bull (*Bos taurus*, var.) from Chartley, Staffordshire, presented by the Earl Ferrers; a Ring-tailed Coati (*Nasua rufa* ♀) from Buenos Ayres, presented by Mr. C. W. Blacklock; two Tigers (*Felis tigris* ♂ ♀) from India, presented by H.R.H. the Duke of Clarence and Avondale; a Wedge-tailed Eagle (*Aquila audax*) from Australia, presented by Captain Salvin; an Alligator (*Alligator mississippiensis*) from the Mississippi, presented by Mr. Alexander Finlay; two Nightingales (*Daulias lusciniæ*), British, presented by Mr. J. Young, F.Z.S.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on July 3 = 16h. 47m. 29s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
(1) G.C. 4373	—	Greenish-blue.	h. m. s. 17 58 19	+66 37
(2) 387 Birm.	5 6	Reddish-yellow.	16 40 33	+ 8 47
(3) π Herculis	3	Yellow.	17 11 12	+36 56
(4) ε Herculis	3·4	Bluish-white.	16 56 6	+31 5
(5) 202 Schj.	8	Very red.	17 23 15	-19 24
(6) V Boötis	Var.	Reddish-yellow.	14 25 20	+39 21

Remarks.

(1) This is the planetary nebula famous in the history of astronomy as the first nebula which was examined by the spectroscope. The nebula, though small, is remarkably bright, and the lines in its spectrum are at least as bright as those in the nebula of Orion. The three principal lines in the green, and the hydrogen line at G, are seen without any difficulty.

Vogel mapped two faint lines near λ 518 and 554, but these require confirmation. With a 10-inch refractor I have had no great difficulty in glimpsing these fainter lines, but I was unable to confirm their positions. The line at 518 is very suggestive of carbon, and that at 554 of manganese, and, if possible, comparisons with these substances should be made where a large aperture is available. I have very little doubt also, from my own observations, that there are many lines between F and G. Another observation of importance will be that of the character of the brightest line. Observers differ very considerably on this point, some maintaining that it is perfectly sharp on both edges, and others that it is softened off on the more refrangible edge. For this observation it is not desirable to use high dispersion. In the General Catalogue the nebula is described thus:—"A planetary nebula; very bright; pretty small; suddenly brighter in the middle to a very small nucleus." Webb compares the telescopic appearance of the nebula with that of a star out of focus.

(2) Vogel describes the spectrum of this star as a very fine one of the solar type (Class II.a), whereas Dunér calls it Group II. According to the latter observer the banded spectrum is feebly developed, 2, 3, and 7 being very narrow, and the remaining bands appearing only as lines. From these observations it is not possible to say whether the star belongs to an early species of the group or a late one. In either case the bands would be narrow, but if the star be at an early stage the bright carbon flutings ought to be very manifest, and if at a late stage, there ought to be dark lines in addition to the narrow bands. Vogel may have mistaken the narrow bands for lines.

(3 and 4) These are stars of the solar type and of Group IV. respectively. The usual detailed observations are required in each case.

(5) This star, according to Dunér, has a well-marked spectrum of Group VI., the blue zone, however, being very feeble. The green and yellow zones are separated by a wide and dark band; the bands 4 and 5 are not visible. Further details or peculiarities should be looked for.

(6) This variable has a well-marked spectrum of Group II. (Dunér). The range is but small—7.0-9.4 in a period of 266 days—and it will be interesting to ascertain whether the bright hydrogen lines appear at maximum as in stars of greater range. Dunér states that though the spectrum is not a very bright one, its characteristics are by no means difficult to observe. There will be a maximum about July 6.

A. FOWLER.

ANNULAR ECLIPSE OF JUNE 17.—The number of the *Comptes rendus* for June 23 contains observations of this eclipse made at various Observatories. The Emperor of Brazil took the time of second contact at Nice Observatory; MM. Charlois, Javelle, and Perrotin those of first and last contact. At Lyons Observatory, M. Gonnissiat made some measures of the position-angle of the shadow. M. Trépiéd at Algiers succeeded in taking 26 photographs, the times of first and last contact also being noted. The maximum of the eclipse was indicated on the curves of a self-registering thermometer by a fall in temperature of 1°.4. Clouds prevented good observations at Meudon, but four photographs were taken by M. Trouvelot. M. de la Baume went from Meudon Observatory to Canea to observe the eclipse, and a telegram was received from him by M. Janssen stating that the weather was favourable, and that he had been able to obtain photographs of the ring and of its spectrum. M. Janssen also noted that one of the objects of the expedition to Canea was to obtain a photographic spectrum of the annulus, in order to see if the spectrum of the extreme edge of the sun's disk showed the bands of oxygen, and from the telegram received it seems probable that the question will be settled. The photographs obtained at Meudon show the granular structure of the solar surface so well visible during an eclipse, and the granulation can be traced right up to the edge of the moon, thus affording another proof of the excessive rarity of the lunar atmosphere.

YARNALL'S STAR CATALOGUE.—The Catalogue of stars observed at the United States Naval Observatory during the years 1845 to 1877, and prepared for publication by Prof. M. Yarnall, has been revised and corrected, and the stars re-numbered by Prof. Edgar Frisby. In preparing this edition a re-examination of all anonymous stars has been made; the named stars have been compared with those of existing catalogues, the names being changed whenever necessary, and new

names that existed previous to the publication of the Catalogue have been supplied. The errata in previous editions, pointed out by Profs. Holden, Krueger, and Millosevich, and Dr. Peters, have also been corrected, and the many notes to the Catalogue referring to the mistakes in the second edition, and the changes that have been made, indicate that the task of revision has not been a light one. As the object of the revision was merely for the purpose of correcting mistakes, no observations have been added or any unfinished observation completed, excepting such as were observed but omitted from the Catalogue, the apparent additions being found in some of the published volumes or in an unfinished state in the observing-books. The stars in the Catalogue have all been compared with standard catalogues as far as possible, and Prof. Frisby confidently believes that most of the mistakes have been corrected.

PHOTOGRAPHS OF THE SURFACE OF MARS.—Prof. W. H. Pickering, in the June number of the *Sidereal Messenger*, makes some remarks on fourteen photographs of the planet Mars taken by Mr. Wilson. Seven negatives were taken on April 9, between 22h. 56m. and 23h. 41m. G.M.T., and seven more were taken on April 10, between 23h. 20m. and 23h. 32m. Thus the same face of the planet was presented in both cases. Distinct and identifiable spots and markings are well shown in all the photographs, but in those taken on the latter date the white spot surrounding the south pole is seen considerably larger. It has been known for some years that the size of these polar spots varied gradually from time to time, apparently diminishing in the summer and increasing in the winter of their respective hemispheres. This, however, appears to be the first time that the precise date and approximate extent of one of these accessions has been observed. The appearances described are said to be so conspicuous upon each of the fourteen photographs that no one who had once seen them would have any difficulty in deciding on which of the dates any particular plate was taken.

LIGHTNING SPECTRA.—Mr. W. E. Woods, of Washington, has used a Browning's pocket spectroscope to study the spectrum of lightning during a thunderstorm (*Sidereal Messenger*, June 1890). In several instances he observed what appeared to be bright lines superposed on a faint continuous spectrum; and in each case, when the continuous spectrum was bright enough to be seen, shaded flutings were visible. It is, however, much to be regretted that no diagram or statement as to the approximate position of the lines and fluting is given.

THE MARINE BIOLOGICAL ASSOCIATION.

AT the annual general meeting of the Marine Biological Association, held at the rooms of the Royal Society on Wednesday, June 25, the following Report was submitted by the Council, and unanimously adopted. We omit only the list of those who went as a deputation to the Chancellor of the Exchequer on May 15.

The Council has met nine times during the past year, and the attendance has been fully up to the average of previous years.

The business transacted by the Council has had reference—

(1) To the maintenance and general efficiency of the Laboratory.

(2) To the prosecution of special investigations on economic subjects.

(3) To the financial position of the Association.

(1) It was found necessary to alter the communications between the storage reservoirs and the pumps of the Laboratory at Plymouth, and orders were given to Messrs. Leete, Edwards, and Norman, to supply a new valve-box, connection-pipes, &c. The cost of these alterations has been considerable, but it is satisfactory to note that the results have been very beneficial, and have produced a marked improvement both in the working of the pumps and in the water in circulation.

The Director reports that there was some little trouble over the sea-water in June and July 1889, during the hot weather, and during the alterations to the supply-pipes, which prevented more than one of the storage reservoirs being in use; but that since then, and especially after the alterations were completed, the water has been of admirable quality, and all the animals have done remarkably well.

Great improvement has lately been effected in the Aquarium at a very trifling cost, by hanging curtains between the top of the