

accomplished this work, is testified by the present condition of the Schools of Art.

He was the British Commissioner for the Exposition Universelle at Paris in 1855, and on his return to England, Marlborough House being required for the use of the Prince of Wales, the collections in his custody were removed to those iron buildings which had been erected by the Commissioners of 1851, and which were commonly known by the alliterative sobriquet of the Brompton Boilers. Here, in spite of opposition and obloquy, he gradually secured the perfection of the collections, notably by the purchase after long and difficult negotiation of the Soulage collection in 1857, and the provision of adequate buildings for their reception. But he did not rest satisfied with success; as early as the year 1858 he projected a vast chorus hall, realised in the Royal Albert Hall in 1871, and the Horticultural Gardens opened in 1862. A Select Committee of the House of Commons on South Kensington, which it was thought by many would reveal a tissue of "jobbery," converted several of his opponents to a sense of the ability and integrity with which he had administered its affairs.

Though styled the Department of Science and Art, little had been done for the propagation of science prior to the year 1859. The question then arose as to the propriety of doing something to justify the title or of dropping it altogether. Mr. Cole's sympathies lay rather with the art side of the question, but he was sufficiently alive to the importance of science to urge upon the Lords of the Committee of Council the formation of a proper system of science instruction. He had the instinct which selects the right man for the right place, and found in Colonel Donnelly a colleague who ably worked out the details of that science teaching which is now going on in 1500 science schools where over 59,000 students are under instruction.

Mr. Cole next initiated the Exhibition of 1862, to the executive of which he acted throughout as general adviser. The provision of funds for the erection of the Royal Albert Hall was the next pressing question, and these General Grey, the Queen's private secretary, and he, raised by a system of subscriptions for boxes and sittings.

It was determined that South Kensington should not enjoy a monopoly of the national collections, and in 1866 the East London Museum in Bethnal Green was projected. In the following year Mr. Cole was again Commissioner for Great Britain at the Paris Exhibition, a novel feature which he introduced there being a collection of all the newspapers published in the United Kingdom. It was whilst in Paris that Sir Joseph Whitworth first discussed with him his desire to assist mechanical science by the formation of those scholarships which have since promoted the scientific education of the artisan, and rendered it possible for a young man of distinguished ability to raise himself to a position which he could scarcely else hope to attain.

Though informed in 1870 by his medical adviser of the impaired action of his heart, he did not relax his active labours; not only did he, in the following year control the first of the Annual International Exhibitions, but found time to busy himself with the disposal of the sewage of our great towns. In 1872 he received the Gold Albert Medal from the Society of Arts. After 50 years of public service, Mr. Cole retired on a full pension specially awarded by the Treasury in May, 1873. But his retirement from the South Kensington Museum certainly meant no abandonment of work. Mr. Cole founded the School for Cookery; edited an edition of T. Love Peacock's works; projected and worked out many details of a universal catalogue of printed books; worked at the sewage question as affecting Birmingham and Manchester, in which he resided from 1876 till 1879, to prosecute his work.

Mr. Cole was nominated a C.B. in 1852, and created a K.C.B. in 1875. In 1855 he was made Officer of the

French Legion of Honour; in 1867 he received the Austrian Iron Crown.

Sir Henry Cole had recently been recommended caution on account of the condition of his heart, but no immediate danger was apprehended. On the day previous to his death he was engaged upon the public works that employed his time and thoughts. In the evening he became seriously ill, and died painlessly at 7.30 p.m. on Tuesday, April 18.

It is difficult to sum up the character of a man who has so recently passed away, but it may be said that his strong points were his retentive memory, his power of organisation, and his firmness of will. When all is said, he was a good and genial friend and a devoted servant of the public, and when the time comes for a history of English art education in the nineteenth century, it is not too much to say that one of the names which must stand to the fore will be that of Henry Cole.

#### NOTES

ON another page we make brief allusion to the irreparable loss which science has sustained in the death of Mr. Charles Darwin on the 19th instant, in his seventy-fourth year. We hope in an early number to refer in some detail to the vast and varied work which he has accomplished during the last half century. Yesterday, as was fitting, "he was laid among his peers in Westminster Abbey."

AT Monday's meeting of the Royal Geographical Society Lord Aberdare announced that the Founder's (gold) medal had been awarded to Dr. Gustav Nachtigal for his journey through Eastern Sahara in the years 1869 to 1875; and the Patron's (gold) medal to Sir John Kirk, K.C.M.G., M.D., her Majesty's Consul-General at Zanzibar, for his long-continued and unremitting services to geography in Dr. Livingstone's Zambesi expedition in 1858-63, and in the assistance he had rendered to successive expeditions in East Africa during his fifteen years' residence in Zanzibar.

ALTHOUGH he has bequeathed most of his large fortune to the French Government for scientific purposes, M. Henry Giffard has left legacies to several scientific institutions.

FROM a *Daily News* telegram we learn that on Monday night the Eclipse Expedition arrived at Gibraltar, all well. A stiff gale and heavy sea were encountered in the Bay of Biscay, but no damage was done to the instruments.

PROF. HÆCKEL has reached Egypt on his way home from Ceylon; on returning to Germany after finishing his researches in Egypt, he will publish an account of his tour.

WE regret to state that M. Eugene Frederic Kæstner, the inventor of the Electrical Thermophone, which has produced such striking effects in Germany and in Paris, died a few days ago at Strasburg after a long illness. He was only thirty years of age. This ingenious and laborious young man was the only son of M. Frederic Kæstner, who has written a number of most interesting works on the music of nature and musical philosophy. It was only owing to the illness of M. Kæstner and his inability to do any work at all for the last few months that his wonderful instrument had not been sent to in the Electrical Exhibitions of Paris and the Crystal Palace, but it is stated that steps will be taken to send it to the Munich Exhibition.

THE second edition of Vol. I. of Thomson and Tait's "Treatise on Natural Philosophy" is now nearly completed; Part ii. being in the press and to be published very soon by the Cambridge University Press. The work has been carefully revised, and amended in many parts. The parts "On the Attraction of

Ellipsoids," and "On the Equilibrium of Rotating Liquid Masses," have been re-written, with the addition of some results of fresh investigations in the last-mentioned parts.

THERE is also now in the press, very nearly ready for publication, a volume of Mathematical and Physical Papers, by Sir William Thomson. Generally the papers are arranged according to the date of first publication, but in some cases this rule is departed from and the articles on one particular line of research brought together. Amongst the more important papers included in this volume may be noticed the series of papers "On the Dynamical Theory of Heat," published from 1851 to 1878, with the addition of one on "Thermodynamic Motivity," published in 1879. Also the joint papers by Dr. Joule and Sir William Thomson on a long series of researches on "The Thermal Effects of Fluids in Motion," which they carried out together during the years 1853 to 1862. The volume includes also papers "On the Thermodynamics of Electrolysis" and "On the Theory of Electrodynamical Machines," which has acquired so much of general interest through the extensive practical applications which have been made of it for electric lighting and the electrical transmission of power within the last ten years. Additions and annotations have been made in many parts of the volume, but the original papers are given without even verbal change. Corrections, where errors have been found, have been distinctly marked in every case, and in most cases dated. This first volume includes all of Sir William Thomson's papers published between 1841 and 1853, except those which appeared ten years ago in his volume of collected papers on "Electrostatics and Magnetism." It will be followed as speedily as possible by other volumes completing the series to the present date.

THE second volume of the "Mathematical and Physical Papers" of Prof. G. G. Stokes, is now nearly complete, and will shortly be published. A third volume is in preparation, and it is intended to complete the series as soon as possible.

JUDGING from newspaper reports and private letters which we have received, much dissatisfaction has been created in Sydney by the recent appointment of two professors to fill the chairs of natural history and of anatomy and physiology in the University; and we think there can be no question that this dissatisfaction is of only too reasonable a kind. It seems, that instead of advertising the chairs as vacant, the Senate, at an unusually small meeting, hurried through the nomination and election of the two candidates who have been chosen, with the result of obtaining for the chairs of anatomy and physiology, a gentleman who, since he left college fifteen years ago, has had no connection with anatomical or physiological work; and for the chair of natural history, an elderly gentleman who has been all his life a master of a grammar school. As the emoluments attaching to these chairs are sufficient to attract men of the highest standing from any part of the world, it is difficult to speak in strong enough terms of the conduct of the meeting of Senate at which the appointments were made; and we sincerely hope, for the sake of science as well as for that of the University, that public opinion in Sydney may prove strong enough to prevent the recurrence of any such—to use the mildest term—mis-guided policy.

THE South-Eastern Railway Company have withdrawn their opposition to the underground electric railway, which it is proposed to construct from Charing Cross, at a point near the north-west end of Northumberland Avenue, passing under the River Thames, and terminating at Vine Street, under the loop-line station of the Waterloo terminus of the London and South-Western Railway. The Parliamentary Committee have passed the bill.

THE French Government is making preparations to send out an Antarctic expedition to Cape Horn. M. Mascart, the head

of the Bureau Central, has been communicated with, for the appointment of meteorological and magnetical observers. The expedition will be fitted out for a period of eighteen months, and 2½ million francs have been voted for it.

By authorisation of the Russian Minister of Public Instruction, the Imperial University of St. Petersburg is about to found an astronomical observatory, which will be of small size conformably to its principal object, which is to facilitate the studies of those who are engaged in the University curriculum. The principal pieces forming the *matériel* will be two refractors, with Merz object-glasses, one 6 inches aperture, the other 4 inches, parallactic mounting and clockwork motion, several transportable astronomical instruments, and an astronomical clock with some other secondary instruments.

WE take the following from the *Photographic News*:—"They are going to try a strange experiment in Paris. The idea is to combine amusement with scientific instruction, by producing at one of the theatres a series of scientific dramas. The *Folies Dramatiques* is the theatre chosen for the purpose, and the experiment is to commence during the summer months. Already three plays have been provided for this bold scheme, and their titles indicate plainly in what direction the audience is to be instructed. The first drama is called 'Denis Pepin, or the Invention of Steam'; the second is entitled 'Kepler, or Astronomy and the Astrologer'; and the third is 'Gutenberg, or the Invention of Printing.' We would suggest yet another title: 'The Triumvirate—Niepce, Daguerre, Talbot—or the Invention of Photography.'"

AT a recent meeting of the Seismological Society of Japan, Prof. Milne read a paper on the "Distribution of Seismic Activity in Japan." This paper was to a great extent founded on communications received from almost all parts of Japan in answer to inquiries respecting the occurrence of earthquakes in various districts. As the result of these inquiries during the past two years, Mr. Milne had received, in addition to general opinions respecting the seismic activity of various districts, a very large number of actual records. Commencing in the north and proceeding to the south, notes and catalogues of earthquake intensity for the whole country were given. Thus for Hakodate, in Yezo, from 1876 to 1880 a catalogue of forty-two earthquakes was given. By comparing this catalogue with that of Sapporo, in the same island, it was seen that ten at least of the Hakodate shocks had been felt at Sapporo, eighty miles to the north-east; and similarly it was shown that seven of the shocks were felt at Tokio, five hundred miles to the south. From the times at which a shock was felt in different localities, its intensity and the like, origins for certain shocks were roughly computed. The district around Tokio is of course that which is being most thoroughly investigated; and as it was only possible to obtain accurate observations as to the time at which shocks were felt at one or two localities, and farther, as it was shown that the direction in which the earth moved at any given point as indicated by a seismometer did not necessarily indicate the direction from which the earth waves were advancing, Mr. Milne has adopted the following simple method as an assistance in tracing earthquakes to their origins. All important towns within a radius of one hundred miles from Tokio have been furnished with bundles of post-cards, one of which is posted every week stating whether earthquakes have or have not been felt. In this way, at the end of last year, Mr. Milne found that the greater number of the earthquakes which were felt in Tokio had only been felt in the towns to the north of that city, and a short distance to the south. This fact being established the barrier of post-cards was continued about two hundred miles still farther north, with the result of inclosing, so to speak, the origin of several shocks, and tracing others to the sea-shore. The latter could no longer be pursued by means of post-cards, and instru-

mental observations alone had to be relied on for the determination of their origin. These observations, so far as they have at present gone, show in a remarkable manner how a large mountain range absorbs earthquake energy. Thus, it is very seldom that an earthquake travelling from the north passes beyond the Hakone range of mountains to the south of Tokio. Earthquakes having their origin on either side of such a range rarely travel to the other side, however large their area of activity on their own side may be. The whole of Japan has in this way been divided into districts of varying seismic activities. By two separate systems of investigation Mr. Milne showed that, if instruments of ordinary sensitiveness were distributed throughout Japan there would on the average be recorded, at the lowest estimate, over 1200 shocks per year, or about three shocks per day, which is a number greater than that obtained by Prof. Hein for the whole world.

THE last number of the *Journal* of the North China branch of the Royal Asiatic Society contains a long and learned paper by Dr. Bretschneider, of the Russian Legation at Peking, on Chinese Botany. The plan of the work, of which the present is only an instalment, is explained as follows. It is divided into a general and a particular part. The first, which forms the substance of the present paper, begins with a review of the history of botany, agriculture, and *Materia Medica* of the Chinese and other Eastern Asiatic nations, and enters into some details concerning the most prominent treatises and authors in these departments. In the same chapter he shows the method employed by the Chinese in describing plants and in investigating botany and *materia medica*. Another chapter is devoted to the important question of identifying Chinese names of plants with the scientific botanical names, and to recording the attempts made by European scholars to ascertain the botanical names of the plants described in Chinese books. The first part will conclude with an alphabetical list of Chinese works, and another of Chinese authors quoted in native botanical treatises. In the second part, the author will give a history of Chinese domestic, ornamental, medicinal, and other plants used for economic purposes, as far as these have come to the knowledge of botanists. The work, it will thus be seen, involves a vast amount of laborious research in European as well as Chinese literature. The present number contains chapters on the history of the development of botanical knowledge among the various peoples of Eastern Asia, and on the scientific determination of the plants mentioned in Chinese works, together with an index of Chinese writers on botany, and an appendix on celebrated mountains in China, which are frequently mentioned in Chinese botanical works. Dr. Guppy, R.N., gives some notes on the hydrology of the Yangtze, Yellow River, and Peiho, and also on the geology of Takow in Formosa. The other paper is by Father Dechevrens, S.J., on the climate of Shanghai. The number closes with a list of the ferns found in the valley of the Foochow River.

THE fourth number of the *Memoirs* of the Science Department of the University of Tokio is a monograph on the geology of the environs of Tokio, by Prof. Brauns; while the fifth contains a paper by Prof. Mendenhall on the force of gravity at Tokio and on the summit of Fujiyama. Dr. Naumann, the head of the Japanese Geological Survey, has recently published a monograph on Japanese elephants. The writer has found remains of these mammals in various widely separated districts. This paper will be found in vol. xxviii. of the "*Palæontographica*," published by Fischer of Cassel, and is entitled "*Ueber Japanische Elefanten der Vorzeit.*"

In the Belgian Academy, M. Plateau has lately called attention to a small illusion. He describes an arrangement which, at first sight, he says, might be thought capable of realising perpetual motion. A capillary tube is inserted obliquely in distilled

water, so that the latter nearly fills it. Into this liquid column, at the top, dips the small orifice of another tube, which reaches a little way in the same oblique direction, then turns downwards, the vertical portion being wider, and not reaching the water. Suppose this bent tube filled with water. It then forms a siphon, the shorter branch of which is immersed in a liquid in equilibrium, while the longer descends several centimetres below the surface of that liquid. Does it not appear as though the water should flow incessantly through the siphon, and, regaining the vessel, be engaged in perpetual circulation? As a matter of fact, the water is drawn upwards in the vertical portion of tube till its free surface reaches a part of the oblique part of the same tube, when it stops. M. Plateau accounts for the effects by suction exerted by the small concave liquid surface between the two tubes.

A NEW dynamo-electric machine, recently brought before the Belgian Academy by M. Plücker, has the peculiarity that a solenoid is substituted for the electromagnet as an organ for excitation of the induction currents. The horizontal coils of the solenoid, which is of special form, are traversed by the currents produced by the machine itself. The apparatus rotated within the solenoid is a wheel with coils arranged nearly like those of the Gramme ring. The whole system is inclosed in an iron armature meant to increase the inductive action. M. Plücker states that he replaced the solenoid with electromagnets, and the apparatus produced the same effect. He seems merely to claim the advantage of less weight and volume.

A SERIOUS difficulty recently occurred at Berlin, in connection with a system of supply of "ground water" by "natural filtration" (a part of the Berlin water supply having been taken since 1877 from near the Tegeler Lake, by means of a series of twenty-three wells running parallel with the shore; the water was pumped into a small covered reservoir, then to another at Charlottenburg, 6 or 7 kilom. distant, whence pumps supply the city). Complaints arose on account of the water, though clear at first, getting turbid ere long, and depositing an ochreous sediment found to consist of amorphous hydrated oxide of iron, but also very largely of algæ, dead and alive; *Crenothrix kühniana* (a plant of thready form), being most noticeable. The source of the plants could neither be located in surface-water, nor in the neighbouring lake; and there is reason to believe the plant lives and grows in the ground itself. After sundry attempted remedies it seemed that artificial filtration would be necessary. It was found that water brought directly from the wells to the filter, gave, after filtration and rest, the usual deposit. But by exposing this well-water to the air, so that all the iron was oxidised and deposited before filtration, it was possible to get a filtered water which remained clear; though it is not known whether this filtered water was really free of spores, and would continue clear after being in contact with the iron of the service. Iron seems essential to the existence of *Crenothrix*, and is proved to be present in its threads. The filter-sand was very much fouled, and, because of the difficulty of keeping out spores, it was thought best to abandon the wells altogether, and to use water taken directly from the lakes and filtered in the usual way. Prof. Nichols (who reports these facts in the *Franklin Institute Journal*) refers to somewhat similar troubles having been experienced at Halle, and at a town in the east of Massachusetts.

THE following subjects are announced by the Belgian Academy for prize competition:—In mathematical and physical sciences: Establish, by new experiments, the theory of reactions of bodies in the so-called nascent state. Prove the accuracy or falsity of the following proposition by Fermat: To decompose a cube into two other cubes, a fourth power, and generally any power into two powers of the same name, above the second power, is im-

possible. New spectroscopic researches required as to whether, especially, the sun does or does not contain the essential constituent principles of organic compounds. Extend, as much as possible, the theories of points and straight lines of Steiner, Kirkman, Cayley, Salmon, Hesse, and Bauer, to the properties which are, for superior plane curves, for surfaces, and for skew curves, the analogues of theorems of Pascal and Brianchon. In natural sciences: New researches required on germination of seeds, especially on assimilation of nutritive stores by the embryos. New researches required on development of Trematodes, from the histogenic and organogenic points of view. New stratigraphical, lithological, and palæontological researches required, to fix the arrangement or the order of succession of layers of the formation called Ardennais by Dumont, and at present considered a Cambrian. Medals valued at 800 francs will be given as prizes in the first division; medals of 600 francs in the second. Memoirs may be written in French, Dutch, or Latin, and should be sent (in the usual form) to the Secretary, before August 1, 1883.

THE number of large carnivorous animals killed in Algeria is diminishing yearly with great rapidity. In 1879 the Government paid for 166 heads of lions and panthers; and in 1880 only for 128, viz. 16 lions, 100 adult panthers, and 16 young. It is certain that in a very few years they will be entirely extirpated. They are now very seldom met with, except in some mountainous parts, and almost wholly deserted districts of Constantine province. When the conquest was made, they were occasionally seen at the gates of Algiers, and so frequently on the sea-coast, that a cape near Arzav received the name of "La Montagne des Lions," which it has retained.

THE electrical perturbations were so frequent on the French lines from April 16 to 20, that measures had to be taken by the Minister of Postal Telegraphy to meet this contingency. The electrical equilibrium was restored on the 21st. These electrical perturbations were noticed on the telegraphic lines of Germany, Belgium, and Italy, and of England, according to the notice which was published by the French Administration in the official paper of the Government.

A SLIGHT earthquake shock was felt at Geneva on Thursday, and a smart one on the previous Monday in the Vaudois and Jura. On both these days the telegraphic wires here were affected, which produced a violent oscillation of the needles. Similar perturbations were observed at other stations. A violent earthquake is reported from Syra (Greece). The shocks lasted nearly a minute, yet but little damage was done. On the Ætolian coast the sea has still its blood-red colour, and the smell of sulphuretted hydrogen becomes more and more intense.

THE *Daily News* Naples Correspondent writes on the 21st:—"The central crater of Mount Etna has been throwing up ashes for the last two or three days, covering the pure new snow lately fallen with a stratum of black ashes on the south-east side. The mud eruption at Paterna continues, but is limited to one crater, from which flows hot and liquid mud."

THOSE interested in the very wide region included in "the East," will find the "Bibliotheca Orientalis," published by Trübner and Co., very useful. It is stated to be a complete list of books, papers, serials, and essays published in 1881 in England and the Colonies, Germany, and France, on the History, Languages, Religions, Antiquities, and Literature of the East, compiled by Charles Friederici. This is the sixth year of publication.

A SIMPLE new thermometer, said to be very sensitive, has been described (*Jour. de Phys.*, April) by Mr. Michelson. It depends on the expansion of hardened caoutchouc by heat.

A very thin strip of the substance is attached to a similar strip of copper. The lower end of the double strip is fixed, and the other has attached to it a fine glass fibre bent at a right angle, through which, as the strip bends under heat, motion is imparted to a very light silvered-glass mirror, hung by a cocoon fibre. The displacement of the mirror is observed with a telescope and reflected scale, or by the movement of a spot of light. To avoid sudden changes of temperature, the double strip is inclosed in a metallic case having a slit opposite the strip. In a modification, which the author has not yet tried, the strip is reversed, and the lower end enters a highly resistant liquid, in which it faces a metallic point; the two serve as electrodes, connected with a galvanometer and a Wheatstone bridge.

AT the thirteenth annual meeting of the Norfolk and Norwich Naturalists' Society, the president stated that during the session which was past, a considerable number of papers had been read and specimens exhibited, which were not of interest to scientific people only. The popular taste demanded something beyond that. The society had endeavoured to meet this requirement. The number and strength of the Naturalists' Society grows with its years. At the last annual meeting the society numbered 202 members; the number now reached is 234. A very good feature has been the formation of a naturalists' library. The concluding portion of the address was occupied with a survey of certain features in the Ornithology of Norfolk at the present day, some of which were a cause of congratulation and others of regret. As, for instance, the short-eared owl, which had for some years ceased to be a resident species in Norfolk, had again been known to nest and rear its young in both divisions of the county; and the hawfinch seemed yearly to increase in favourable localities.

ONE more American serial comes to us in the shape of the Scientific *Proceedings* of the Ohio Mechanics' Institute, containing a number of papers of practical importance, including a long one on Economy of Fuel, by Mr. N. W. Perry.

WE have on our Table the following books:—Volumetric Analysis, 4th edition, by F. Sutton (Churchill and Co.); A Manual of Botany, 4th edition, by R. Bentley (Churchill); Permanence and Evolution, by S. E. B. Bouverie-Pusey (Kegan Paul); Annuaire de l'Academie Royale de Belgique (1882, Brussels); Observations on Cup-shaped and other Lapidarian Sculptures in the Old World and in America, by Charles Rau (Washington); Vibratory Motion and Sound, by Prof. J. D. Everett (Longman); Microscopical Section Cutting, by Sylvester Marsh (Churchill); The Fishes of Great Britain and Ireland, by Francis Day (Williams and Norgate); The Scientific Bases of National Progress, by J. Gore, F.R.S. (Williams and Norgate); Jamaica Institute Lectures, 1881 (Kingston, Jamaica); The Butterflies of Europe, Part vii., by H. C. Lang (Reeve and Co.); A Visit to Madeira, by Deonis Embleton, M.D. (Churchill); Religion and Philosophy in Germany, by Heinrich Heine, translated by John Snodgrass (Trübner); A Monograph of the British Fossil Cephalopoda, Part i. by J. F. Blake (Van Voorst); Elementary Physiology, by A. Findlater (Chambers); Vital Statistics: Small Pox and Vaccination, by Dr. C. T. Pearce; (E. W. Allen); A Manual of the Geology of India, by V. Ball (Calcutta); Rivers and Canals, 2 vols., by L. F. V. Harcourt (Clarendon Press); The Sphygmograph, by Dr. Dudgeon (Baillièere, Tindall, and Co.); On Failure of Brain Power, by Dr. Julius Althaus (Longmans); Plane Geometrical Drawing, by F. E. Hulme F.S.A. (Longmans); The Action of Lightning, by Major Parnell, R.E. (Lockwood); Beauty, and the Laws Governing its Development, by Joseph Hands (E. W. Allen); New Views of Matter, Life, Motion, and Resistance, by Joseph Hands (E. W. Allen); Astronomical Observations made at Dun-ink, Part 4 (Hodges, Foster, and Co.); Houses and Farms in America, by Dr. G. H. Everett (C. Dickie); Modern Metrology, by L. D'A. Jackson

(Lockwood); The Coming Transit of Venus, by William Peck (R. Symon); The Horse in Motion, by J. B. D. Stillman (Trübner); Bibliotheca Orientalis, by C. Friederici (Trübner); Contributions to the History of the Development of the Human Race, by Geiger (Trübner).

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus radiatus* ♀) from India, presented by Mr. W. T. Fremlin; a Two-spotted Paradoxure (*Nandinia binotata*) from West Africa, presented by Mr. A. N. Blyth; a Rufous Rat Kangaroo (*Hypsiprymnus rufescens* ♀) from Australia, presented by Mr. C. Caravossi; two Cockateels (*Calopsitta nova hollandiae* ♂ ♀) from Australia, presented by Mr. W. C. Atkinson; a Common Raven (*Corvus corax*), British, presented by Mr. H. E. Langton; a Roseate Cockatoo (*Cacatua roseicapilla*) from Australia, presented by Mrs. Ramsay; a Lanner Falcon (*Falco lanarius*), from East Europe, presented by Mr. J. E. Harting, F.Z.S.; a Common Night Heron (*Nycticorax griseus*), European, presented by Mr. H. D. Compton; a Lesser White-nosed Monkey (*Cercopithecus petaurista* ♂) from West Africa, a Cabot's Horned Tragopan (*Cerionis caboti* ♂), from South-West China, deposited; a Silvery Gibbon (*Hylobates leuciscus*) from Java, a Mongoose Lemur (*Lemur mongoz* ♂), a Red-fronted Lemur (*Lemur rufifrons* ♂), two Grey-headed Love Birds (*Agapornis cana* ♀ ♀) from Madagascar, a Squirrel Monkey (*Chrysotrrix sciurea*), a — Squirrel Monkey (*Chrysotrrix*, sp. inc.) from Guiana, two Rufous-tailed Pheasants (*Euplocamus erythrophthalmus* ♂ ♀) from Malacca, a Wheatear (*Saxicola enanthe*), a Meadow Pipit (*Anthus pratensis*), a Red-start (*Phenicura rutililla*), British, a Burchell's Zebra (*Equus burchelli* ♂) from South Africa, purchased; an Eland (*Oreos canna* ♂), two Short-headed Phalangers (*Belideus breviceps*), a Squirrel-like Phalanger (*Belideus sciureus*), four Slender Ducks (*Anas gibberifrons*), two Common Cormorants (*Phalacrocorax carbo*), bred in the Gardens.

#### OUR ASTRONOMICAL COLUMN

THE OBSERVATORY OF TRINITY COLLEGE, DUBLIN.—The fourth part of "Astronomical Observations and Researches made at Dunsink" has just appeared under the editorship of Mr. J. L. E. Dreyer. It contains the results of about 1140 observations of 321 red stars, chiefly taken from Schjellerup's Catalogue, made with the meridian-circle of the Dunsink Observatory, the object-glass of which has an aperture of 6.38 inches, the instrument being the work of Piston and Martins of Berlin. The observations were commenced by Dr. Copeland in July, 1875, and continued by him up to the end of March, 1876. Mr. Dreyer commenced observations in September, 1878, and the series was finished in November, 1880. As far as possible, it has been the object to secure four complete observations of each star. The separate results are printed, with the corresponding dates and estimates of the magnitudes of the stars which have a particular interest from the fact of so many of the red stars being variable. The Dublin observations show this to be the case in a striking degree, and not only is there variation in the brightness of many of the objects, but it is hardly possible to doubt that they establish changes of colour from time to time in some of the stars. Thus we find No. 5 (Schjellerup) was white on November 14, 1875, and deep orange three months later. No. 143 was considered orange on February 28, 1876, but showed no colour on March 19; in March, 1880, it was again orange. No. 186 had no colour on April 30, 1880, but was deep orange on June 10 following; and there are a number of similar cases, too many, it would appear, to allow of their being attributable to varying conditions of atmosphere.

The observed positions of the 321 stars are formed into a general Catalogue for 1875.0, with the corresponding precessions, which will have much value in the study of the proper motions of the red stars.

THE OBSERVATORY OF MOSCOW.—Prof. Bredichin has issued the first part of vol. viii. of *Annales de l'Observatoire de Moscou*, which in addition to meridian observations, contains a continuation of his researches upon the tails of comets, the

present publication including the comets 1881 *b* and *c*, and the fourth or great comet of 1825. Prof. Bredichin has reprinted the long series of physical observations on the latter body made by Dunlop at Paramatta N.S.W., which originally appeared in Brewster's *Edinburgh Journal of Science*, 1827, and which have been a good deal overlooked, that periodical, on the continent at least, not being easy of access. Dunlop's drawings are reproduced, and there are several figures of the two bright comets of 1881. With regard to his investigations generally, Prof. Bredichin concludes: "Mes recherches sur toutes les Comètes, dont les observations j'ai pu trouver dans la littérature astronomique (36 comètes) me mettent maintenant en état de calculer d'avance pour chaque grande Comète qui paraîtrait les positions et la figure de ses queues de tous les trois types. Il est évident que la quantité relative des substances caudales de différents types ne peut pas être déterminée d'avance, et par conséquent c'est seulement l'observation qui pourra nous montrer et la clarté relative des types et l'absence possible de tel ou tel d'entre eux. Mais en tout cas, les positions et la forme générale de celle des queues, qui deviendra, accessible à la vision, seront en accord avec ses positions et sa figure calculées d'avance."

THE PRESENT COMET.—The following positions for Greenwich midnight are from the elements published last week. On April 16 the calculated place was in error -7s. in R.A. and -2' in declination, but the errors will be increasing.

	R.A.		Decl.	Log. distance from	
	h.	m.		Earth.	Sun.
May 2 ...	20	52.4	+ 69 53	9.9904	0.0793
4 ...	21	22.6	71 40	9.9818	0.0632
6 ...	21	59.5	73 9	9.9740	0.0461
8 ...	22	43.4	74 10	9.9671	0.0280
10 ...	23	32.8	+ 74 35	9.9610	0.0087

The perihelion distance in the orbit referred to which depends on observations to April 6 is 0.0560; M. Bigourdan, from observations at Paris to April 11, finds it 0.0602.

#### GEOTROPISM AND GROWTH<sup>1</sup>

IF the *punctum vegetationis* of a root is removed by a transverse section, the root loses more or less completely the power of curving geotropically downwards when placed in a horizontal position. This curious experiment was originally made by Ciesielski, and has been confirmed by the observations described in "The Power of Movement in Plants" (chap. xi.). The theory founded by Mr. Darwin in these observations is that the *punctum veg.* is the part of the root which is sensitive to gravitation, and that a stimulus is thence transmitted to the region of growth where the geotropic curvature takes place. But it is evident that the facts are capable of a different interpretation, it might be supposed that cutting off the tip of the root acts merely as a shock, and prevents the occurrence of geotropism, just as any other severe injury might do so. This view has recently been brought forward by Wiesner ("Das Bewegungsvermögen der Pflanzen," 1881, p. 97), and is supported by him with a number of experiments on the growth of decapitated roots. The results of some of Wiesner's experiments are given below, the figures representing the amount of growth per cent. in twenty-four hours:—

Maize.		or as 100 : 52.9
Normal Roots.	Decapitated Roots.	
77.5	41	
Peas.		,, 100 : 22.7
42.7	9.7	
Vicia Faba.		,, 100 : 66.6
90	60	

Wiesner believes that this difference in growth between the normal roots and those of which tips had been cut off is sufficient to account for the disturbance in geotropism. It should be added that in Wiesner's experiments geotropism was not so completely checked by cutting off the tips of the roots as in those given in the "Movements of Plants."

In the present paper the intervals of time between the observations on the rate of growth were shorter than in Wiesner's experiments—namely, about three hours instead of twenty-four hours; the reason for this difference being that geotropic curva-

<sup>1</sup> A paper read before the Linnean Society, April 6, by Mr. Francis Darwin.