

These experimenters worked with spectra obtained by prisms of quartz, rock-salt, and other refractive substances. Prof. Langley used the far purer spectrum obtained by reflection from the surface of one of Rutherford's diffraction-gratings ruled on speculum-metal. This showed the result that *the heat-maximum (of solar rays) in a normal spectrum is not in the infra-red rays, but is at least as far up the visible spectrum as the orange near the D-line.* This result is so important that we append the figures. In the upper line are the wavelengths of rays in millimetres; in the lower the corresponding reduced galvanometer deflections.

$\lambda$	'00035	'0004	'0005	'0006	'0007	'0008	'0009	'0010	'0011
$\delta$	12	55	207	256	198	129	80	58	41

[The H line in the violet has  $\lambda = '00039$ ; the D line in the orange has  $\lambda = '00059$ ; and the A line at the end of the visible red has  $\lambda = '00076$ .]

We give the above figures as stated by Prof. Langley; but we cannot help remarking that if these were obtained by letting sunlight fall upon strips of *polished metal* they cannot be accepted offhand as a true representation of the facts of solar radiation, as they merely in that case indicate the position of the maximum of *the rays absorbed by the metal surface employed.* A blackened surface would without doubt tell a very different tale and show a maximum for other rays.

In conclusion it may be pointed out that the fundamental principle of the bolometer is identical with that of Siemens' electrical pyrometer, where also changes of temperature are measured by changes in the electric resistance of a conductor. But though the principle be identical the application is quite novel; and we must congratulate Prof. Langley on the skill and ingenuity with which he has applied an unpromising principle to the construction of this most interesting and most promising instrument of research.

S. P. T.

### NOTES

THE announcement will be received with regret that Prof. Huxley, in consequence of the pressure of other duties, has been compelled to resign the Secretaryship of the Royal Society. It is believed that Prof. Michael Foster will probably be his successor.

SIR C. WYVILLE THOMSON has not yet resigned the chair of Natural History in Edinburgh University, though we regret to learn that he is likely to do so in a few days.

THE arrangements for the Crystal Palace Electrical Exhibition are progressing very satisfactorily. Major Flood Page has gone over to Paris to put himself in direct communication with the different administrations there and with the largest exhibitors. Applications for space have been very numerous, especially from English manufacturers. The Postmaster-General has signified his intention of sending all the apparatus now in Paris, and in addition there will be a considerable accession of modern apparatus in use in the Post Office Telegraph Department. The display will be essentially a display of the electric light. The whole of the building will be divided off and illuminated by the different inventors and manufacturers of lamps. The new Edison light will be shown in operation in the Concert Hall, and very great interest is evinced in the public display of this light. The effect produced by it in Paris was quite startling, and it is generally believed that Mr. Edison has solved the problem that he set himself, viz. to produce a light to supersede gas in our houses.

THE success of women in the late Honours Examinations of the University of London in Arts, Science, and Medicine was very remarkable. In the conjoint Honours Examination in Mathematics for candidates for the 1st B.A. and 1st B.Sc. Exa-

minations Miss Charlotte A. Scott obtained the first place in the first class, with marks qualifying for an exhibition. In the 1st B.A. Honours Examination in English subjects Miss M. L. G. Petrie obtained a precisely similar position, whilst two other ladies, Misses C. A. J. Cluer and H. E. Clay, were also placed in the first class. In the 1st B.A. Honours Examination in German, Misses A. Page and H. H. Brown were placed in the first class, the former qualifying for a prize. Miss F. H. Prideaux actually carried off the supreme honours in Human Anatomy at the Honours Examination of the 1st M.B., being placed first in the first class, and being awarded the Gold Medal in Anatomy. In the Honours Examination in Materia Medica and Pharmaceutical Chemistry Mrs. M. A. D. Scharlieb attained a place in the first class.

THE first meeting of the one hundred and twenty-eighth session of the Society of Arts will be held on Wednesday, November 16, when the opening address will be delivered by Sir Frederick J. Bramwell, F.R.S., chairman of the Council. The following are among the papers which will be read during the session:—The American system of heating towns by steam, by Capt. Douglas Galton, C.B., F.R.S.; practical hints on the manufacture of gelatine emulsions and plates for photographic purposes, by W. K. Burton; stained glass windows, by Lewis Foreman Day; photometric standards, by Harold Dixon; telephonic communication, by Lieut.-Col. C. E. Webber; the causes and remedies of bad trade, by Walter R. Browne, M.A.; the native tribes of the Hudson's Bay Territories, by Dr. Rae, F.R.S.; the manufacture of ordnance, by Col. Maitland; some practical aspects of recent investigations in nitrification, by R. Warrington; the production and use of gas for purposes of heating and motive power, by J. Emerson Dowson; gas for light-houses, by John Wigham (illustrated by an exhibition of some of the gas flames and apparatus used in lighthouses); the relation of botanical science to ornamental art, by F. Edward Hulme, F.L.S., F.S.A.; the storage of electricity, by Prof. Silvanus Thompson, D.Sc.; the high-pressure steam-engine, by Loftus Perkins; the industrial resources of Ireland, by J. Philips Bevan; a new chemical compound, and its application to the preservation of food, by Prof. Barff, M.A.; the distribution of time by a system of pneumatic clocks, by J. A. Berly; tonnage measurement, by Admiral Sir R. Spencer Robinson, K.C.B., F.R.S.; tools and cutting edges, by D. A. Aird; the teaching of forestry, by Col. G. F. Pearson; the art of turning, by P. W. Hasluck. The usual short course of Juvenile Lectures, given during the Christmas holidays, will be by Mr. W. H. Preece, F.R.S., the subject being "Recent Wonders of Electricity." The following are the subjects of the courses of the Cantor lectures for the session just about to commence:—First course, on some of the industrial uses of the calcium compounds, by Thomas Bolas, F.C.S.; second course, on recent advances in photography, by Capt. Abney, R.E., F.R.S.; third course, on hydraulic machinery, by Prof. John Perry; fourth course, on book illustration, old and new, by J. Comyns Carr. In connection with Capt. Abney's lectures, it is intended to arrange for an exhibition of photographic apparatus, processes, &c. These lectures originated in 1863, with a bequest to the Society of Arts by the late Dr. Cantor. Since that date three or more courses have been given every session, each course dealing with some application of science or art to industry or manufactures.

WE understand that Mr. Donald McAlister, Fellow and Lecturer of St. John's College, Cambridge, has undertaken to prepare for Messrs. Macmillan and Co. an English edition of Prof. Ernst Ziegler's "Text-Book of General and Special Pathological Anatomy," which is on all hands regarded as the standard authority on its subject. The book will range with Dr. M. Foster's "Text-Book of Physiology," Gegenbaur's "Comparative Anatomy," and other works published by the same firm.



THE eminent Italian geodesist, General Marquis J. Ricci, of Genoa, died at Novara on September 27, at the age of seventy years. The geodetic methods of Gauss, Bessel, and Baeyer were introduced into the geodetic work of Italy in great part through General Ricci, who was one of the original members and for long president of the Italian Commission for measuring the European degree.

It is stated that Mr. Robert Hart, C.B., Inspector-General of Chinese Customs, is getting a series of elementary science works translated into Chinese. Many foreign books have already been translated into that language, but they have been intended either for the higher officials or for the students at the free Government schools. Mr. Hart however intends, it is said, to endeavour to have the present translations circulated amongst all classes of the people; and his high official position would doubtless give him facilities for this purpose not possessed by any other foreign servant of the Chinese Government. It was, we believe, owing to the enlightened exertions of this gentleman that the *Tungwan*, or Foreign College of Peking, was extended so as to embrace a scientific curriculum, as well as to train interpreters in foreign languages, which was its original aim. From a recent calendar it appears that this institution now has nine foreign professors, besides numerous native tutors, and is attended by 102 students. One department of the College is devoted to the preparation of books for the diffusion of scientific and general knowledge. This is said to have been kept in view as a prominent object from the beginning. Among the scientific subjects taught we find chemistry, natural history, mathematics, animal physiology, and astronomy. Students who display conspicuous merit are entitled to the first step of the nine degrees of official rank. They are then appointed to the discharge of official functions in connection with some leading department of the Government, but they are required to continue their studies at the College as "resident graduates." A complete course lasts for eight years, the first three of which are given exclusively to foreign languages, and the remainder to the acquisition of scientific and general knowledge. Most of the students, moreover, as they are intended for a special service, receive a stipend varying with the length of their study, but which never exceeds about 34 a month. This is certainly a good sign of the value attached by the rulers of China to Western knowledge; but everything does not present the same roseate hue in that country. We read that the line of telegraph erected from Soochow to Shanghai is being opposed by the agriculturists, who are placing all manner of obstacles in the way of the workmen employed. They pull up and destroy the poles, thinking that they act against the Fheng-shui, or geomantic influence, and are likely to lead to spiritual complications. Troops are stated to have been despatched to protect the line. Doubtless in time these deeply-rooted prejudices, which stand so much in the way of real internal improvements in China, will pass away; at present it must be acknowledged with regret that they are as living and active as ever. We notice that telephonic communication is about to be extensively employed in the large foreign settlement at Shanghai.

LOVERS of Japanese porcelain will be glad to hear, on the authority of the Consul-General of the United States in Japan, that the modern productions will in time, if indeed they do not already, far surpass the older manufactures of Satsuma, Owari, Imari, and Kutani wares. The chief want of Japanese porcelain is regular symmetry in the pieces, and uniformity in a set or number of pieces. The absence of these is due, he says, to the fact, that machines or forms for moulding are not used, and the ovens are so defective that the heat is not evenly distributed. The native manufacturers are now manifesting much interest in the improvement of their wares. At one place the clay pits are said to have been worked for two thousand years or more, and

the deposits seem scarcely more than scraped. Cobalt, used in colouring, is found in the same hills. The total value of the earthenware and porcelain exported from Japan to foreign countries during last year was valued at nearly one hundred thousand pounds sterling.

WITH the *Bilderschriften des Ostindischen Archipels und der Südsee*, Dr. A. B. Meyer begins the first part of a serial publication, which promises to be of great value to anthropologists. The distinguished curator of the Dresden Zoological Museum has undertaken, with the assistance of the Department of the Arts and Sciences, to issue a series of fac-similes, photographic or otherwise, of the most important objects in the extensive collection entrusted to his charge. This first part of the comprehensive project is devoted to the pictorial writings from Malaysia and the Pacific Islands, of which either the originals or exact copies are preserved in the Dresden Museum. As a detailed account of the series will be given on its completion, it will suffice here to state that the present number contains six folio photographic plates of the curious and hitherto undeciphered hieroglyphics or pictorial writings from North Célebes, the Pelew Islands and Easter Island. These are accompanied by eight folio pages of letterpress full of extremely interesting matter. For although no direct attempts are made at interpreting the texts, all previous essays of any value are collected, as well as such local myths or legends as may be likely to suggest a key to the interpretation of the writings. These are partly on wooden tablets, partly on prepared bast, partly also on the lintels and doorposts of the native houses that have been brought bodily to Europe. That they are all true writings, and not merely so much conventional ornamental work, a careful study of these plates will convince the most sceptical. Both the illustrations and the letterpress are produced in the sumptuous style characteristic of such publications in Germany.

THE Committee on Photometric Studies appointed by the Board of Trade, have issued their report. Among other things they recommend that, for the determination of the illuminating power of coal gas, the use of the sperm candle should be discontinued, and that, for the future, Mr. Harcourt's air-gas flame, as defined in the appendix to the report, should be employed instead, as a means of affording with constancy the light of one average sperm candle. And in the event of any other mode of measuring the illuminating power of coal gas, such for instance as some modification of Messrs. Keates and Sugg's lamp or Mr. Methven's lamp being resorted to on account of its practical convenience, this other mode of measurement should be standardised, and from time to time checked, by comparison with Mr. Harcourt's air-gas flame, which should alone be taken as the official standard. The details of the experiments and evidence, on which the recommendations are based, are given in an appendix. These experiments were mostly conducted under the Committee's direction by Mr. Harold B. Dixon, the secretary to the Committee.

A JAMAICA correspondent writes that Mr. Maxwell Hall, M.A., F.R.A.S., has succeeded, with some aid from the Local Government, in establishing a regular system of meteorological observations throughout the island, and a summary of these is published monthly in the *Jamaica Gazette*. A daily telegram is also sent round the island, giving results of readings at the chief stations, and any premonitory hints that may be considered necessary in view of telegraphic information from the United States signal stations at Key West and Cuba. Thus both shipping and agricultural interests are well prepared for any storms or hurricanes that may be expected. "Mr. Maxwell Hall's work," our correspondent writes, "though not yet fully recognised by the Government, is carried on in a most commendable spirit, and there is no doubt that when the benefits of regular and trustworthy meteorological observations are apparent,



and Mr. Maxwell Hall's numerous contributions to astronomical science are more fully appreciated, we shall have in Jamaica a properly equipped meteorological department, doing valuable work in this region, in which the distribution of hurricanes, and sometimes earthquakes, have so important a bearing on human life and the general prosperity of the island." A Weather Observatory, we learn from the *Jamaica Gleaner*, has been established by Mr. Hall at the Government Cinchona Plantations, at the residence of Mr. Morris, director of the Botanical Department, who has undertaken voluntarily to give it personal and daily attention. This observatory is at a height of 4900 feet.

SPARROWS have multiplied to such an alarming extent in South Australia that a Commission appointed by the Government have sent in a report recommending means to be taken for their destruction, and rewards to be given for heads or eggs.

MR. J. H. WILLMORE, of Queenwood College, near Stockbridge, Hants, writes under date November 1: "A 'Storm-Petrel was found not far from here on Sunday week. The little bird was lying on its back on the top of a hedge, and had evidently been dead some days. On opening it one side of its body was found to be black, as if it had died from a blow. I imagine the very rough weather had driven it inland, and it had come into contact with one of the trees close by. These birds are, I believe, very rarely found so far inland, and, so far as I can learn, this is the first instance in this neighbourhood."

MR. PARK HARRISON has published, through Quaritch, an interesting account of an incised slate and various other objects discovered in an old structure at Towyn, Merionethshire. The slate is covered with many curious figures, evidently cut by the hand of man; and these Mr. Harrison endeavours to interpret. There are numerous illustrations, including an autotype reproduction of the slate itself and another with only the figures clearly brought out.

SINCE 1869 the Otago (New Zealand) Acclimatisation Society has, we learn from the *Colonies and India*, liberated 157,041 young trout, and has sent 135,110 trout ova to various parts of Otago. Since 1874 it has liberated 34,900 salmon fry, and in 1879 and 1880 it liberated 790 perch and 60 tench. Young American "White-fish" (*Coregonus albus*), let loose in the lakes in the Rotorua district about two years ago, have been recently met with by the natives; but as soon as it was discovered what the fish were they were returned to the water. The natives are delighted at the discovery. The Auckland Society has, through want of support, been compelled to sell by auction its stock of animals and plants.

THE Brighton Health Congress and a "Domestic and Scientific Exhibition" will be held in the Pavilion Dome and Museum in the second week of next month. The president of the Congress is the Earl of Chichester, and the president of the Exhibition is Dr. B. W. Richardson.

M. LOEWY, sub-director of the National Observatory of Paris, has been appointed by the Government to report on the state of French provincial observatories, which have recently received a credit of 4000*l.* from the French Parliament. These establishments are five in number:—(1) Marseilles, directed by M. Stephan, with MM. Borelly and Coggia and two computers, has a credit of 1250*l.* The principal work is observation of nebulae by Stephan, revision of Rumker's catalogue, discovery of comets and small planets, study of intra-Mercurial planets by Borelly, determinations by the Gauss method of absolute magnetic declination, &c. (2) Toulouse Observatory, directed by Bailaud, with a budget of 880*l.* and a municipal subvention of 200*l.* for printing the observations. A magnetic pavilion has been built with compass constructed by Brüner. The principal work

is the observation of sun-spots, cataloguing variable stars, and observation of August meteors; not less than 1300 were tabulated on the last occasion of their appearance. (3) Bordeaux, directed by Rayet, with a credit of 1200*l.* The regular work has not yet begun, but observations have been made on comets and the red spot on Jupiter. (4) Lyons, directed by André, the credit given by the Government being 800*l.*; the amount of subvention paid by the city is not stated. The principal feature of this observatory is its connection with three meteorological stations situated in the vicinity—one at Tête d'Or, the second at Mont Verdun, and the third at Ampius. The regular astronomical work has not yet been begun. (5) Algiers, directed by M. Trepied, has a credit of 1500*l.* from the Government. The principal work has been the observation of Jupiter's satellites.

A VETERAN watchmaker at Vouvry, Switzerland, claims to have invented a process by which watches will run for years without winding up. A sealed box containing two watches intrusted to the municipal authorities on January 19, 1879, has just been opened, and the watches were found going.

THE Council of the Institute of Civil Engineers have issued their usual lists of subjects for papers in connection with the various premiums which they award. A copy can be obtained at the Institute, 25, Great George Street, Westminster.

M. HANS H. REUSCH describes in the Danish *Naturen* (No. 9, 1881), a new find of Silurian formation on the western coast of Norway, at Ulven, two miles south of Bergen. The fjeld consists here of conglomerate, sandstone, and clay slate, with concretions of limestone which contain remains of Silurian corals, casts of graptolites, and trilobites. The formation is equivalent to that of Central Norway.

SEVERAL further experiments have taken place at the Paris Opera in electric lighting. The success has been very great for the incandescent light in the hall, and for the Brush system on the staircase. For the first time gas has been wholly suppressed in several parts of the house.

IN the *Times* of October 29 is a very interesting account of the present condition of the St. Gothard Tunnel, from a correspondent who went through it.

IN *Bulletin* vol. vi. No. 2 of the United States Geological and Geographical Survey, Mr. S. H. Scudder gives an analysis of the insect remains found in the rich Tertiary Lake Basin at Florissant, Colorado, in anticipation of his forthcoming memoir on the subject.

MR. LATIMER CLARK has printed, in the form of a pamphlet a list of the rare and curious books relating to Electricity and Magnetism which he exhibits at the Paris Exhibition.

THE additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. G. Aldridge; a Ring-tailed Coati (*Nasua rufa*) from South America, presented by Mr. Francis B. Norcliffe; a Tarantula Spider (*Mygale*, sp. inc.), a Millipede (*Julus*, sp. inc.) from Pernambuco, presented by Mr. Charles C. Craven; a Smooth-headed Capuchin (*Cebus monachus* ♂) from South America, a Richardson's Skua (*Stercorarius crepidatus*), British, four Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, deposited; a Hooded Crow (*Corvus cornix*), a Common Rook (*Corvus frugilegus*), two Grey Plovers (*Squatarola helvetica*), a Ruff (*Machetes pugnax*), a Bar-tailed Godwit (*Limosa lapponica*), British, a Green-cheeked Amazon (*Chrysotis viridigenalis*) from Columbia, a Finsch's Amazon (*Chrysotis finschi*) from Mexico, purchased; four — Finches (*Coryphospingus cristatus* ♂ ♂ ♀ ♀) from Bolivia, on approval.