foundation, he observed that relatively little practical instruction can be obtained from lectures alone, and that their utility is greatly increased by a course of practical work. The drawing office is an essential adjunct to academic instruction; engineering is a high art, the art of applying the great sources of power in nature to the use of man, and it is only to be acquired by experience, practice, and observation. The course to be given in municipal engineering will comprise lectures by Mr. R. Middleton, on water works, sewage works, and the like. The lectures on municipal hygiene will give elementary instruction as to the cause of disease, methods of disinfection and bacteriology, and other matters which strictly belong to medicine, but as to which the engineer ought to have information in order that he may be able to design municipal works with intelligence. The Chadwick Laboratory will afford opportunities to the students for practical work in the analysis of air, gas, water, and in other branches of practical chemistry. The trustees have also founded a Chadwick Scholarship, under which the sum of 100*l.* will be paid as an honorarium to a practising engineer taking the student as pupil, or as an alternative the sum will be paid to the student to augment the small salary he may receive as an improver.

A PLEA for increased instruction in geology is put forward by Prof. Logan Lobley in the volume of *Transactions* of the South-Eastern Union of Scientific Societies for 1898. He points out that an elementary knowledge of geology could be given in our secondary schools in part of the time usually allotted for geography, a subject over which much time is worse than wasted in burdening the youthful memory with names and statistics that really mean nothing to the average pupil. At present the place of geology in the early education of the people of this country, whether it be that of the school, the technical college, or the university, is an insignificant one, and unworthy of the general educational importance of the subject. As a remedy, Prof. Lobley proposes that geology should be made an obligatory subject for university pass degrees. He remarks: The great cause of the general absence of scientific teaching in England is the example set by our two ancient Universities in not requiring some knowledge of what are called the natural sciences for the ordinary pass degree. A graduate of either of these two world-renowned seats of learning may leave his Alma Mater, and with honours, and yet be without even an elementary acquaintance with any of these sciences. The consequence is that the great public schools omit science from their obligatory curriculum, and devote their attention to those subjects which are alone required to fit their pupils for obtaining, when at the universities, the pass degree. The practice and the curricula of the public schools again are followed by less important schools, and by the preparatory schools, and the standard of education so set up and made fashionable dominates the teaching of schools generally. Hence it is, in a great measure, that in England education in science is so far behind that of Germany, and we look in vain for geology in the curriculum of an ordinary middle-class school—Prof. Lobley is justified in pleading for increased attention to be paid to geology, but considering that in this country the elementary principles of the subject included under physical geography, which should form the basis of all geographical teaching, are almost entirely neglected in the average middle-class school, there seems little hope at present that geology will find a place in the school curriculum.

ON Friday last Mr. Long, M.P., President of the Board of Agriculture, performed the ceremony of opening the experimental farm of Lledwigan, Anglesey, which is rented and managed by the Agricultural Department of the University College of North Wales, Bangor. This college was the first in the kingdom to apply for and to make use of the grant voted by Parliament for the promotion of agricultural education. The area of the farm taken is 358 acres, and the farm is considered one of the best in the county. The aim of the Agricultural Department is to illustrate experimentally the theoretical teaching given at the college. The farm will, therefore, be used as a practising school for the in-college students, as a permanent experimental station where experiments extending for a series of years can be made, and also as a dairy school for the counties of Anglesey and Carnarvonshire. The Professor of Agriculture at the Bangor University College will reside at the farm as the head and manager. He will be assisted by a small committee of practical farmers, who will be entrusted with the equipping, stocking, and cropping of the farm, and with the control of the finances. The Board of Agriculture make a special grant of 200*l.* towards the maintenance of the farm as an experimental and educational centre. A capital sum of 4000*l.* was required for the stocking of the farm. The Drapers' Company have generously made a conditional grant of 1000*l.*, and the college hope to secure the remainder in due time. In formally opening the experimental farm Mr. Long remarked that for a long time practical agriculturists had looked with suspicious apprehension, even with something akin to contempt, upon scientific method and procedure, but that feeling had to a large extent disappeared, and farmers began to realise that, after all, science meant nothing more than accurate knowledge of the causes which produced certain results, and that such knowledge could not fail to be of use to those who had to produce the results as a means of earning their living. In 1888, excepting three agricultural colleges, certain scattered science and art classes, and two local schools in Cumberland and Cheshire, nothing was done for agricultural education. In 1889 Parliament gave a grant of 1630*l.*, and of that Bangor College received 200*l.* In 1889 the grant was increased to 2610*l.*, out of which Bangor received 400*l.* In 1890 Parliament voted 750,000*l.* to the County Councils to be spent on technical education. The Board of Agriculture thereupon took a new departure and applied the Parliamentary grant to general as distinguished from local projects. The amount of the grant has been increased from 2610*l.* to 6800*l.*, and of this sum 5900*l.* is paid to collegiate centres.

SOCIETIES AND ACADEMIES.

LONDON.

Entomological Society, October 5.—Mr. R. Trimen, F.R.S., President, in the chair.—The President announced that the late Mrs. Stainton had bequeathed to the Society such entomological works from her husband's library as were not already in its possession. This bequest was of great importance, and would add to the library a large number of works, many of which, formerly in the library of J. F. Stephens, were old and now scarce.—Mr. J. J. Walker exibited a black form of *Clytus mysticus*, L. (var. *hieroglyphicus*), taken by Mr. Newstead at Chester, where about 1 per cent. of the specimens were of that variety; also a black variety of *Leiopus nebulosus*, L., from the New Forest.—Mr. Tutt exhibited an example of *Euchloe cardamines*, irregularly suffused with black markings, and a series of local varieties of Lepidoptera from Wigtonshire.—Mr. S. Image exhibited a specimen of *Acidalia herbariata*, taken in Southampton Row.—Prof. Poulton showed and made remarks on specimens of *Precis octavia-natalensis* and *Precis sesamus*. These strikingly dissimilar insects had been shown by Mr. G. A. K. Marshall to be seasonal forms of the same species; from two eggs laid by a female of the first-mentioned (summer) form he had bred one imago resembling the parent, and one which was of the blue *sesamus* form.—On behalf of Dr. Knaggs, Mr. South exhibited a series of *Dicrorhampha*, the synonymy of which was discussed by him and Mr. Barrett, *D. flavidorsana*, Knaggs, being shown to be a good species.—Mr. Barrett exhibited and made remarks on specimens of *Lozopera beatricella*, Wals., from Folkestone, and the allied species.—Mr. Porritt showed examples of *Arctia lubricipeda*, obtained by continued selection of the parents, and probably the darkest ever bred in this country.—Mr. Adkin exhibited a long series of *Tæniocampa gothica*, to show the results of breeding by continued selection, and some remarkable forms of *Abraxas grossulariata* from Pitcaple.—Mr. F. Merrifield read a paper, illustrated by a large number of specimens, on the colouring of pupæ of *P. machaon* and *P. napi* caused by exposing the pupæ to coloured surroundings. The pupæ of both species were found to be modified by the surroundings of the larva, the effect being extremely marked in the case of *P. napi*. When the larvæ of the latter species were kept in a cage half orange-coloured and half black, all but four of the pupæ on the roof of the orange-coloured side were green with very little dark spotting, and all the pupæ on the roof of the black side were bone-coloured with numerous dark-brown spots. He regarded the phenomenon as protective. The exhibit was discussed by Prof. Poulton, who showed a similar series of specimens, and observed that he found the rays near the D line of the spectrum had the greatest influence upon the incipient pupæ, the effect diminishing towards either the red or the violet ends. The effect, therefore, appeared to be one of luminosity. Mr. Bateson

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stated that his own experience fully confirmed Mr. Merrifield's results, but was unable to see how the green coloration of the pupæ could be protective, at least in the winter brood. Mr. G. H. Verrall read a paper on Syrphidæ collected by Colonel Yerbury at Aden, the specimens, together with some rare British diptera, being exhibited by Colonel Yerbury. Papers were communicated by Mr. G. C. Champion on the Clavicorn Coleoptera of St. Vincent, Grenada, and the Grenadines; and by the Rev. T. A. Marshall on the British Braconidæ, Part viii.

PARIS.

Academy of Sciences, October 10.—M. van Tieghem in the chair.—Observations on the supposed transformation of fat into glycogen. by M. Berthelot. Comments upon the paper on this subject of M. Bouchard. The fact of the fixation of oxygen is undoubted, but the author regards the interpretation given to the facts observed as doubtful. It is probable that albuminoids may play a part in this temporary increase of weight. For a man to gain 40 grams of oxygen in an hour, means that nearly all the oxygen respired during that time must remain in the body. The respiratory coefficient under these conditions should be considerably reduced, and further experiments in this direction are very desirable.—Preparation and properties of calcium nitride, by M. Henri Moissan. Starting with pure crystallised calcium, prepared in the manner previously described, it is easy to prepare calcium nitride by the direct combination of the two elements. In the cold, nitrogen has no action upon calcium, but on gently heating a slow absorption takes place; the white metal becoming a bronze-yellow colour, the yellow colour attributed to calcium by previous workers being undoubtedly due to the presence of this nitride. At a low red heat the calcium catches fire and burns in the nitrogen, the absorption of the gas being very rapid. The reaction is best carried out in a nickel tube. At the temperature of the electric furnace the nitride is completely decomposed by carbon, calcium carbide remaining in the tube. Water decomposes it with violence, ammonia and calcium hydrate being formed. The suggestion is made that this substance may find a commercial application in the formation of ammonia from atmospheric nitrogen. On the results of Russian geodesic work in Manchuria, by M. Venukoff.—Remarks on the 50th volume of the "Mémoires de la Section topographique de l'État-Major général de Russie."—Observations of Perseid meteors made at Athens, by M. D. Eginitis.—On the integration of the problem of three bodies, limited to the first power of the disturbing mass, by MM. J. Perchot and W. Ebert.—On the energy of a magnetic field, by M. H. Pellat. It has been shown in a previous paper that the expression for the energy of an electrified system undergoes certain modifications if the quantity of heat is taken into account, that the medium gives to or takes from the exterior necessary to maintain its temperature constant during the change. In the present paper a similar expression is developed for the case of a magnetic field.—On a new iodide of tungsten, by M. Ed. Defacqz. By the reaction between aqueous hydrogen iodide and tungsten hexachloride a tungsten tetraiodide is produced, WI_4. The iodide is infusible, cannot be volatilised without decomposition, and is slowly altered by exposure to the air.—On a crystallised tungsten dioxide, and on a tungsto-lithium tungstate, by M. L. A. Hallopeau. By heating lithium paratungstate with hydrogen at a temperature near the fusing point of hard glass, crystallised tungsten dioxide WO_2 is formed.—Thermal study of the sub-oxide and dioxide of sodium, by M. de Forcrand.—On the combinations of lithium chloride with methylamine, by M. J. Bonnefoi. Pure anhydrous lithium chloride rapidly absorbs methylamine, and a study of the heats of formation and dissociation pressures shows that three distinct compounds are formed, $LiCl,CH_3.NH_2$; $LiCl,2CH_3NH_2$; and $LiCl.3CH_3NH_2$. The application of Clapyron's formula to the calculation of the heats of dissociation gives results closely agreeing with the experimental determinations.—On a diodo-quinoline, by M. C. Istrati. The introduction of the iodine is affected in the warm, in the presence of sulphuric acid. The iodo-quinoline isolated had the composition $C_2NH_5I_9$.—On phenyl-phosphoric and phenylene phosphoric acids, by M. P. Genvresse. These are obtained by the action of phosphorus pentoxide upon phenols.—The volumetric estimation of acetaldehyde, by M. X. Rocques. Rieter's method of titrating with alcoholic sulphurous acid is modified in such a manner as to increase the accuracy when strong solutions of aldehyde are under examination.—Thermal data relating to isoamylmaloric acid. Comparison with its isomer, suberic acid, by M. G. Massol.—Embryos without a maternal nucleous. by M. Yves Delage.—Air and water as factors in the food of certain Batrachians, by M. S. Jourdain. Under certain conditions the eggs of some frogs, during the period of embryonic development, borrow the constituent elements of the young animal from the stock of food materials which it contains, and from the air and water vapour of the surrounding medium.—On the composition and alimentary value of haricots, by M. Balland.—Remarks on an *aurora borealis*, observed at Guingamp, September 9, by M. V. Desjardins.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—La Fonderie: Prof. Le Verrier (Paris, Gauthier-Villars).—Notes on Water Supply: J. T. Rodda (King).—The Structure and Classification of Birds: F. E. Beddard (Longmans).—A Text-Book of Mineralogy: Prof. E. S. Dana, new edition (Chapman).—The Tides and Kindred Phenomena in the Solar System: Prof. G. H. Darwin (Murray).—The Story of Marco Polo (Murray).—Kepler's Traum vom Mond: L. Günther (Leipzig, Teubner).—The Story of the Farm: J. Long (*Rural World* Publishing Company).—Indiana, Department of Geology and Natural Resources: Twenty-second Annual Report (Indianapolis).—Les Ballons-Sondes et les Ascensions Internationales: W. de Fonvielle, deux édition (Paris, Gauthier-Villars).—Manual de l'Explorateur: E. Blin and M. Rollet de L'Isle (Paris, Gauthier-Villars).—How to Work Arithmetic: L. Norman (Rugby, Over).

PAMPHLETS.—Report and Transactions of the South-Eastern Union of Scientific Societies for 1898 (Taylor).—A Chemical Laboratory Course: A. F. Hogg (Darlington, Dodds).—Untersuchungen über die Theorie des Magnetismus, &c.: Prof. E. Dreher and Dr. K. F. Jordan (Berlin, Springer).—The School Cookery Book: M. Harrison (Macmillan).

SERIALS.—American Journal of Science, October (New Haven).—American Naturalist, September (Ginn).—Notes from the Leyden Museum, April and July (Leiden, Brill).—Himmel und Erde, October (Berlin, Paetel).

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