

become completely plugged up by a growth of cellular tissue. The embryos obtained have been classified in sixteen stages. The early stages of development are singularly like the corresponding stages in the Chelonia, especially as regards the foetal membranes; there being a long canal behind the embryo leading to the exterior, and known as the posterior amniotic canal, which has hitherto been found only in Chelonians, in which it was discovered a few years ago by Prof. Mitsukuri, of Tokyo. Prof. Dendy's results thus strongly confirm the views of those naturalists who regard the Tuatara as being at least as closely related to the turtles as it is to the lizards. In the later stages of the development the young animal has a strongly developed pattern of longitudinal and transverse stripes, which disappear before hatching, the adult animal being usually spotted. This observation is a striking confirmation of the general laws of coloration observed in young birds and mammals, which are commonly striped. The eggs which Prof. Dendy investigated were collected for him by Mr. P. Henaghan, principal keeper on Stephen's Island, who showed indefatigable zeal in the pursuit, and made many valuable observations on the habits of the Tuatara. Permission was granted to Prof. Dendy by the Government to collect both eggs and specimens for scientific investigation, and the result of Mr. Henaghan's observations has been to show that eggs can be obtained all the year round by those who know where to look for them. Fortunately for the Tuatara Mr. Henaghan appears to be the only collector who does know at present, and it is to be hoped that before his knowledge is made public the Government will take steps to prohibit the taking of eggs as well as of adults, for we believe the wording of the Act leaves the eggs unprotected. We believe that two German collectors have lately made vigorous, but as yet unsuccessful, efforts to collect the eggs.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. E. W. Barnes, bracketed Second Wrangler 1896, Class I., first division Mathematical Tripos, Part II, 1897, has been elected to a fellowship at Trinity College.

Prof. Liveing has been appointed a University Governor of the South-eastern Agricultural College, Wye, for five years.

Prof. Flinders Petrie has presented to the Museum of Anatomy and Anthropology nineteen cases of skulls and bones from his excavations at Hierakonopolis, including remains of the prehistoric and earliest dynastic races in Egypt. Prof. Macalister remarks that with this addition the University collections in Egyptian anthropology are probably the largest in Europe; it consists of specimens representing all periods of Egyptian history from prehistoric times down to the battle of Tel-el-Kebir.

Prof. Foster will this term give a weekly lecture on the history of Physiology. The first lecture, on Monday, October 24, will be on Claude Bernard.

The Reader in Geography, Mr. Yule Oldham, lectures this term on the geography of Europe and on physical geography.

The University of Sydney is to become affiliated to the University of Cambridge, and students in arts or in science who have pursued a certain course at Sydney will be entitled to the privileges of affiliated students.

MR. JOHN CORBETT, formerly M.P. for Mid-Worcestershire, has offered to give 50,000*l.* for founding and endowing a school of agriculture for sons of tenant farmers for the county of Worcester and district.

ONE of the most recent of the many educational conferences held in the United States during the past ten years, was that of a Committee on Physical Geography appointed under the National Educational Association. As is usual in such cases, the members of the Committee were selected from a wide range of educational institutions, including universities, colleges, endowed schools, and public schools (in the American sense of the term); the expert in the scientific aspects of the subject being thus associated with the practised teacher, who is familiar with the capacities and limitations of young scholars. The preliminary report of the Committee is published in the *Journal of School Geography* for September. It is strongly urged that the physical environment of man should constitute the leading theme of the subject, and that irrelevant items from astronomy,

principles of physics, topics from historical geology, and the classification of animals and plants should be carefully excluded, in order to give time for the proper development of physical geography itself.

THREE members of a series, to be known as the Harvard geographical models, constructed by Mr. G. C. Curtis from designs by Prof. W. M. Davis, have been reproduced in a durable composition by Messrs. Ginn and Co., educational publishers, Boston, Mass., as aids in systematic geographical teaching. The models, 25 by 19 inches in size, may be used in elementary classes in illustration of type forms, such as mountains, peaks, ridges, glaciers, valleys, plains, volcanoes, capes, islands, rivers, lakes, deltas, bays, &c. They also serve for more advanced instruction in rational or explanatory physical geography. The second model is derived from the first by elevation, whereby a low and flat coastal plain is added to the mountainous background. The third is derived from the first by depression, whereby the valleys among the mountains are transformed into bays, and the ridges stand forth as promontories, the coast-line being changed from a simple to a very irregular outline. Many applications of the principles thus taught may be made in all grades of geographical teaching.

THE annual meeting of the governors of University College, Liverpool, was held on Saturday last. The Earl of Derby, president of the college, occupied the chair, and, in moving the adoption of Principal Glazebrook's report, which was of a very satisfactory character, he said that though much had been done, much yet remained to be accomplished. A pressing need was a proper building for the department of physics, and another very pressing need was a suitable building for the school of human anatomy. Prof. Oliver Lodge deserved to be furnished with adequate means for the important work in which he was engaged. That, however, might be postponed so that the more pressing equipment of a building for the school of human anatomy might be provided. The cost would be about 20,000*l.*, and he would contribute a quarter of this sum if other benefactors were forthcoming. It was announced by the treasurer that besides the 5000*l.* from Lord Derby, he had that day received a cheque for 2000*l.* from Mr. Ralph Brocklebank, for the school of anatomy. Incidentally it was mentioned that the land, buildings, and endowments of University College represented a total value of 400,000*l.*, though the college was founded only in October 1880.

COPIES of the prospectuses of the Day and Evening Classes held at the South-Western Polytechnic have been received. This Polytechnic has been built and equipped at a cost of nearly 55,000*l.*, the greater part of which has been raised by voluntary subscriptions. The institute at present possesses a fixed endowment of 1500*l.* annually from the Charity Commissioners. The London County Council will also contribute to the institute an annual sum, depending upon the amount of educational work carried on; and it is anticipated that this contribution will average about 3500*l.* annually. The Principal is Prof. Herbert Tomlinson, F.R.S., and from the prospectuses referred to we see that the operations of the institute are of a kind which will benefit industry and encourage scientific study. The Day College comprises two departments, viz. the technical department, in which students are instructed in the principles of applied science, and the general department, which aims at giving a general education, or special training in science, art, literature, or commerce. The evening classes and lectures are designed to supplement, and not to supersede, the training of the workshop. Among the subjects taught in the mathematical classes we notice the calculus and its application to electrical and other engineering problems. The subjects taught at the Polytechnic cover a wide range, as they also do in other London polytechnics; and they provide all who wish to learn with facilities for doing so.

THE trustees of the late Sir Edwin Chadwick have founded in memory of the great sanitarian a course of lectures and demonstrations in municipal hygiene at University College, London, and have devoted a sum of 700*l.* a year to the endowment of a chair of municipal engineering and a lectureship of municipal hygiene. They have given the further sum of 1000*l.* for the purpose of instruments and appliances, and for the amplification of existing laboratories. The *British Medical Journal* reports that, on Wednesday, October 12, Prof. Osbert Chadwick, son of Sir Edwin Chadwick, delivered an inaugural address opening the first course. After giving a sketch of the history of the

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 exhibited 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 *Leioptus 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 Wigtownshire.—Mr. S. Image exhibited a specimen of *Acidalia herbariata*, taken in Southampton Row.—Prof. Poulton showed and made remarks on specimens of *Precis octavina-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 beatrixella*, 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 *Teniocampa 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