

ACCORDING to *Science*, the investigation at Cornell University of problems in fresh-water biology the year through is made possible by a recent provision for a division of limnology in the department of invertebrate zoology in the University. Dr. James G. Needham, of Lake Forest College, has been appointed assistant professor of limnology to take charge of that work. He will enter upon his duties at Ithaca in February of next year. A site for a biological field station has just been selected on the Renwick Lagoon at the head of Cayuga Lake. The necessary station building and equipment will be provided in the spring.

The calendar of Tokyo Imperial University for 1905-6, a copy of which has just been received, shows that the total number of students enrolled in September, 1905, was 4517 as compared with 3771 in 1903. These students were divided among the constituent colleges as follows:—University Hall, 680; College of Law, 1545; College of Medicine, 641; College of Engineering, 549; College of Literature, 511; College of Science, 122; and College of Agriculture, 469. The number of students at the College of Science is small, probably because all scientific work of an applied kind seems to be apportioned to the colleges of engineering and agriculture, where such subjects as applied chemistry, mining and metallurgy, and agricultural chemistry are studied. The list of original scientific papers published by professors and students of the University is an imposing one, and fills more than forty pages of the calendar.

A copy of the prospectus of the agricultural department of Armstrong College, Newcastle-upon-Tyne, for the session 1906-7 has been received. Complete courses of work are provided in all departments of agriculture and forestry. The department is subsidised by the Board of Agriculture and by the education committees of the four northern county councils. The Northumberland County Council Experimental Station is worked in connection with the department under the supervision of Prof. D. A. Gilchrist. A special laboratory and the entire use of a byre for ten cows are available, at the Durham County Council Dairy Station, for daily research work. By an arrangement with H.M. Office of Woods, the Chopwell Woods, which extend to about 900 acres, are now placed under the control of the department, and are of great value in connection with the courses in forestry. Intending students will thus see that the college possesses every facility for the practical study of agricultural science.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, June 27.—Sir Archibald Geikie, Sec.R.S., president, in the chair.—Interference-phenomena in the Alps: Dr. Maria M. **Ogilvie Gordon**. The present paper, so far as it deals with the general structure of the Alps, was completed in April, 1905, but the author has since endeavoured to strengthen her line of argument by taking as a type the series of structural changes undergone in the largely igneous mountain-massive of Bufeure in the dolomites. After describing in detail the geology of the Bufeure Massive, the structural relation of the Western Alps and the Engadine to one another and to the whole mountain-system are discussed. From the arrangement of overthrusts, as well as from the distribution of the igneous intrusions in the Western Alps and in the Engadine, it is concluded that these were areas where leading cross-faults intersected the east-and-west Central Alpine band, and shows how the coalescence of these cross-faults with E.N.E.—W.S.W. faults on the north side and W.N.W.—E.S.E. faults on the south side defined two leading fault-curves, the one passing through the Engadine, the other passing through the Western Alps. The cross-segment comprising the Rhine-Ticino district between the Western Alps and the Engadine is regarded as anticlinal in character, segments having been down-thrown from it both towards the west and east, and overthrust masses have crept E. and S.E. from the Western Alps and westward from the Engadine. The relation of the

French Jura Mountains to the Alpine system is then discussed, and it is pointed out that the Swiss-French plain flanking the Western Alps presents the same essential features of structure in relation to the Western Alps on its east side and the French Jura Mountains on its west as those elucidated for the Rhine-Ticino cross-segment. The strike-curve round the west formed by the Jura Mountains and the ranges of Dauphiné is interpreted as the peripheral plicational system in the Alps, showing that the region between the Hungarian basin and the mountain-groups of Central France has been under the influence of the westward thrust. The general principle of structure is the sagging of crust-blocks by means of normal faults towards bands or localities of crust-weakness or subsidence, and the reverse or overthrust-movements which may take place from within these bands or localities. The paper affords evidence of differential rates of movement in different parts of a thrust-mass or fault-block undergoing horizontal displacement, both in respect of the laterally-adjacent parts of a thrust-mass and also of the subjacent layers. The maps and sections show that the actual deformations which characterise a thrust-mass have a different direction of strike on either side of an axial band of maximum horizontal displacement. Several examples in the dolomites are described where there has apparently been a local reversal of the regional westward movement. While each individual case demands special examination, an explanation that satisfies certain cases is provided. At localities where the base of the thrust-mass is open to inflows of igneous rock, the igneous material may ascend and be carried onward with the gliding mass. After consolidation of such igneous inflows, they present resisting bodies within the thrust-mass, which, in the same way as any massive developments of sedimentary material, impede the advance of rock-material in the same direction as before. The tendency is for the material of the thrust-mass to be plicated and faulted as it is driven against a resisting body, widening out in a direction parallel with the resisting mass, and piling up the material to such an extent that local reversal of the direction of overlapping is produced.—The influence of pressure and porosity on the motion of subsurface water: W. R. **Baldwin-Wiseman**. The author commences the paper with a brief historical summary of the researches which have been conducted since 1830 on the motion and behaviour of underground water. In discussing the influence of the porosity of a rock on the rate of flow of water through it, he describes the variations in porosity which may occur in restricted areas of the same rock, due to superincumbent pressure, faulting, and the intrusion of dykes. He describes experiments on the rate of desiccation and soakage of rocks. A lengthy series of laboratory experiments, conducted with specially devised apparatus to afford a constant pressure and to eliminate all errors due to lateral flow, are explained, and it is demonstrated that there is not a uniform relation between flow and pressure in rocks over a considerable range of pressure. Various attempts at determining the range of the cone of depletion in strata are passed in review, and a method based upon an experimental determination of the variation of internal pressure in a rock-mass when charged with water and subjected to a considerable difference of pressure on the two faces is outlined. In the concluding portion of the paper data collected during various hydrological surveys are discussed, and the influence of surface-configuration and stratigraphical sequence on the subsurface water-contours are pointed out.

DUBLIN.

Royal Irish Academy, June 25.—Dr. F. A. Tarleton, president, in the chair.—Note on the action of emulsine on β -glycosides: Prof. Hugh **Ryan** and G. **Ebrill**. This paper shows that emulsine hydrolyses the galactoside of α -naphthol in aqueous solution, but is inactive towards the arabinosides of cresol, β -naphthol, and carvacrol, as well as the tetracetyl derivatives of the glucosides of β -naphthol and cresol.—The composition of a nitrogen mineral water at St. Edmundsbury, Lucan, co. Dublin: Dr. W. E. **Adeney**. The mineral water which forms the subject of this paper flows from a spring which is situated in the

demesne of St. Edmundsbury, Lucan. The water is super-saturated with nitrogen, and as it rises to the surface of the spring large bubbles of that gas mixed with small quantities of carbon dioxide are constantly evolved, giving it the appearance somewhat of ebullition; hence the name of the "Boiling Well" by which it is marked on the Ordnance maps. The dissolved gases were found to be as follows, expressed in volumes at 0° C., and 760 mm. bar., per 1000 volumes of the water:—carbon dioxide, 1.4077; oxygen, 0.0; nitrogen, 27.13. The water contains about ninety grains of mineral matter per gallon. The chief constituents are:—calcium bicarbonate, 35.2 grains; sodium chloride, 41.24 grains; magnesium chloride, 9.4 grains; and magnesium sulphate, 3.24 grains, per gallon. It also contains small quantities of ferrous bicarbonate, potassium chloride, and traces of lithium chloride and of barium sulphate. It is probable that the excess of nitrogen which this water holds in solution was derived from the fermentative decomposition of nitrates; 1.8 parts nitric nitrogen per 100,000 parts of the water would, on decomposition, yield 14 c.c. nitrogen, at 0° C., and 760 mm. bar., which represents about the quantity in excess of the gas in solution. The fact that after several days of strong frost, and at a time when the temperature of the air was 32° F., that of the water, as it rose to the surface of the spring, was 60°·5 F., shows that the water must rise from a considerable depth below the surface of the ground, and this suggests an explanation as to how the water holds so large an excess of nitrogen in solution. A careful examination was also made of the water to ascertain whether it contained any matters which would render it unfit to be drunk, but with negative results.

EDINBURGH.

Royal Society, July 2.—Prof. Crum Brown, vice-president, in the chair.—The use of soluble Prussian blue in investigating the reducing power of animal tissue: Dr. D. Fraser **Harris**. The method of experiment was to inject the blood vessels of either decerebrate cats and rabbits or the isolated surviving kidney or liver of pig or sheep. In the latter cases the blue of the potassio-ferric-ferrocyanide is in the capillaries reduced to the pale green or colourless compound, the di-potassio-ferrous-ferrocyanide—a vital reduction expressed, *not* by a deoxidation, but by change of trivalent iron into divalent iron. Irrigation with H_2O_2 restored the blue colour. In the experiments on the kidney, when the pressure of injection rose to 100 mm. of mercury, a colourless, gelatinous artificial urine dropped from the ureter, and the pelvis of the kidney was filled with colourless gelatin; this leuco material at once became blue on irrigation with H_2O_2 . Various considerations showed that the green or leuco condition resulted neither from the action of the alkaline salts of blood and tissues nor from putrefaction, but proved the existence within the blood of "reducing substances." The leuco compound ten years after formation within capillaries can still be, by the H_2O_2 , restored to the blue condition. The least perfect reduction is in the great vessels, the most perfect in the thin-walled capillaries, *i.e.* in those vessels which are supplying material for anabolism to the living cells endowed with a high reducing capacity.—The viscosity of solutions, part i.: C. Ranken and Dr. W. W. Taylor. The paper contained an account of the apparatus, and also the measurements of aqueous solutions of electrolytes and non-electrolytes at various temperatures and concentrations. Of the substances examined, mercuric cyanide is the only one with a temperature coefficient smaller than that of water. Dilute solutions of carbamide at low temperatures have "negative relative viscosity," being probably the first example of a non-electrolyte in water which is known to exhibit it.—Two lecture experiments in illustration of the theory of ionisation: Dr. W. W. Taylor. (1) To show that the ionisation of an acid is diminished by addition of salts of an acid; addition of dilute nitric acid or of strong solution of potassium nitrate does not coagulate albumen; together they do so immediately. (2) To show that a weak acid turns out a strong acid from its salts; acetic acid solution or strong solution of potassium nitrate does not coagulate albumen; together

they do so. This can be shown not to be due to potassium acetate.

July 13.—Dr. R. H. Traquair, vice-president, in the chair.—Obituary notice of S. P. Langley: Dr. W. Peddie.—The recent epidemic of trypanosomiasis in Mauritius; its cause and progress: Dr. Alex. Edington and Dr. J. M. Coutts. The authors believe that the infection did not come from India with a cargo of cattle, as has been stated, but that it had been already in the island in a latent form. This belief is further strengthened by information recently obtained that a case of trypanosomiasis actually existed on the adjacent French island of Réunion in August, 1901, which antedated the earliest date in Mauritius. Cattle which had been made immune to the trypanosome were found to be still susceptible to the *Trypanosoma brucei*—the parasite of the tsetse-fly, which is thus proved to be specifically distinct. The parasites totally disappear in the blood of immunised cattle. In goats the infection is evinced by progressive emaciation and death after about two months; but although their blood is virulent and produces trypanosomes in susceptible animals, no trypanosomes could be detected in the blood fluids or tissues of the goats. According to the report for 1904 of the director of the Health Department of Mauritius, the epidemic is slowly but surely diminishing. The importation of mules, which are very susceptible to the disease, tends more than anything else to maintain the disease in an active form.—Note on the smolt to grilse stage of the salmon, with exhibition of a marked fish recaptured: W. L. Calderwood. In 1905 the Tay Fisheries Company marked about 6500 smolts by the attachment of a small piece of silver wire to the dorsal fin. On June 1, 1906, the first grilse marked with a wire was taken in the Tay. Since then four other fish had been recaptured. The one exhibited was 24 inches long; fully a year before, when marked with the wire, it was about 5 inches long. Its growth during its residence in the salt water was estimated at from three to six ounces per month.—The effect of precipitation films on the conductivity of electrolytes, part i. W. S. Millar and Dr. W. W. Taylor. The paper contained an account of results obtained by use of the alternating current and telephone method with films of aluminium hydroxide, chromic hydroxide, and cupric ferrocyanide. The solutions compared were the chlorides, bromides, and sulphates of potassium, sodium, and ammonium; sodium ammonium tartrate, and sodium ammonium racemate.—The theory of alternants in the historical order of development up to 1860, and the theory of circulants in the historical order of development up to 1860: Dr. Thomas Muir.—The length of a pair of tangents to a conic: Prof. Anglin.

PARIS.

Academy of Sciences, July 25.—M. H. Poincaré in the chair.—The president announced the death of M. Brouardel.—The toxic action and localisation of the radium emanation: Ch. Bouchard and V. Balthazard. The presence in the peritoneum of the guinea-pig of 2 grams of barium sulphate containing about 5 mgr. of radium sulphate proved fatal to the animal. In a control experiment with the same quantity of barium sulphate free from radium, the animal suffered no inconvenience. The distribution of the radium emanation in the various organs of the animal after death was determined by an electrical method. The suprarenal capsules showed the largest proportion of the emanation, the lungs, skin, liver, and kidneys showing decreasing amounts. The author points out that from the chemical inertness of the emanation this selective action of the organs of the body is unexpected.—The results of two deep borings in Picardy: J. Gosselot. The boring at Saigneville was carried to a depth of 425.95 metres, the Devonian being encountered at a depth of 408 metres. The strata met with are compared with those encountered in the boring at Péronne, the latter having a depth of 500 metres.—The extension of vectorial algebra with the aid of the theory of binary forms, with applications to the theory of elasticity: Emile Waelsch.—A class of integral series: Michel Pétrovitch.—Lagrange's projection applied to the map of European

Russia: N. de Zinger.—The mobility of the ions produced by the Nernst lamp: L. Bloch.—The experimental study of telegraphic transmission: M. Devaux-Charbonnel.—The relation existing between electrical resistance and the viscosity of electrolytic solutions: P. Massoulier. The conductivity of solutions of potassium chloride in glycerol has been measured for varying concentrations of glycerol. The resistance was not found to be strictly proportional to the viscosity, but there is obviously a relation between the two magnitudes, since while the viscosity varied from 1 to 5.6, the product of conductivity and viscosity only changed from 1 to 1.3. Similar results were obtained on measuring the conductivity and viscosity of potassium chloride in sugar solutions.—The influence of pressure and form of discharge on the formation of ozone: A. Chassy. At pressures below 6 cm. no ozone is formed, no matter how long the experiment is prolonged. This effect would appear to be due to a change in the nature of the discharge at this pressure.—Contribution to the study of ultramarine: C. Chabrie and F. Levallois. The prolonged action of an aqueous solution of silver nitrate at 140° C. upon ultramarine gives sulphuric acid and silver nitrite, together with nitric oxide.—Zirconium silicide (ZrSi₂) and titanium silicide (TiSi₂): Otto Hönigschmid. The reduction of zirconium oxide and the double fluorides of zirconium and titanium by the alumino-thermal method in presence of a large excess of silicon gives the silicides TiSi₂ and ZrSi₂.—The alloys of lead and calcium: L. Hackspill. The best method of preparing these alloys is the electrolysis of fused calcium salts with a molten lead kathode. Alloys containing from 7 per cent. to 21 per cent. of calcium were heated in a vacuum to about 1000° C.; lead distilled off, and the alloy remaining had the composition Pb₂Ca₂ in each case.—Kathode phosphorescence spectra of terbium and dysprosium diluted with lime: G. Urbain.—Radio-active lead extracted from pitchblende: Jean Danyez, jun.—The constitution of hordenine: F. Léger. Hordenine gives picric acid when treated with nitric acid, and trimethylamine on the dry distillation of its iodomethylate. The formula (OH)C₆H₇.CH₂.CH₂.N(CH₃)₂ is suggested as the most probable.—The action of phenylmagnesium bromide on the esters of the dialkylamido-benzoyl-benzoic acids: J. Pérard.—The introduction of the dinaphthopyryl and xanthyl radicals into electronegative molecules: R. Fosse and A. Robyn.—The diamino-acids derived from ovalbumen: L. Hugouneq and J. Galimard. Egg-albumin has furnished 2.14 per cent. of arginine and 2.15 per cent. of lysine.—The mixed crystals of barium chloride and bromide: Jean Herbette.—The production of a new elementary species of maize by traumatism: L. Blaringhem.—The disease of wine known as "la graisse": F. Kayser and E. Manceau.—New observations on the retrocerebral apparatus of rotifers: P. Marais de Beauchamp.—A new method of obtaining crystals of hæmatin in the medico-legal diagnosis of blood spots: MM. Sarda and Caffart.—The Gault and Genomanian of the Seybouse basin: J. Blayac.—The liquefaction of volcanic carbonic acid in Auvergne. The poison spring of Montpensier: Ph. Glangeaud.—The resistivity of mineral waters, their coefficient of variation with temperature, and the differentiation of natural mineral waters from similar waters made artificially: D. Negreano.—The structure of the Fusilinidæ: Henri Douville.—The formation of ground ice: J. de Schokalsky. A detailed account of observations on the formation of ground ice in Lake Ladoga, near St. Petersburg.

CAPE TOWN.

South African Philosophical Society. June 27.—Dr. J. D. F. Gilchrist in the chair.—Opisthobranchiata of South Africa: Prof. Berg. Forty new species are described, of which several represent new genera. Both rectibranchs and nudibranchs are well represented. Among the former are eight new species of Aplysia. The difference between the fauna of the east and west coast is marked in these marine animals, the region west of the Cape Peninsula having forms of northern character; the region to the east of the Cape of Good Hope has more of a tropical Indian character.—Dr. R. Broom communi-

cated five papers:—(1) The early development of the appendicular skeleton of the ostrich, with remarks on the origin of birds. In the early embryo there are three well-developed toes and two others rudimentary. In the pelvis the pubis and ischium are directed downwards and united by pro-cartilage. In the wing there are evidences of four digits. The author holds that birds are descended from bipedal reptiles intermediate between the Pterosaurs and the carnivorous Dinosaurs. (2) Note on the lacertilian shoulder girdle. It is held that all the various cartilaginous and bony bars found in front of the shoulder girdle are merely parts of the true scapula and coracoid. (3) Some little-known bones in the mammalian skull. A number of bones typically present in the reptilian skull, but not generally recognised as occurring among mammals, are shown to be present occasionally. (4) A new cynodont reptile from the Molteno beds of Aliwal North. A description is given of a new cynodont, the first reptile that has been discovered in the Molteno beds. (5) A new rhynchocephalian reptile from the Upper Beaufort beds of South Africa. A description of a lower jaw of a small reptile allied to Homœosaurus. This is the oldest true rhynchocephalian known.—Notes on South African cycads: Prof. H. H. W. Pearson. Field observations upon *Encephalartos Friderici-Guilielmi*, Lehm., *E. Villosus*, Lem., *E. Altensteinii*, Lehm., and a species of *Stangeria*. Evidence in support of the insect pollination of *E. Villosus* is adduced. In *E. Friderici-Guilielmi* and *E. Altensteinii* the cones are laterally placed, and the growth of the stem is therefore monopodial. The importance of subterranean branching as a means of vegetative reproduction in *Stangeria* and in *E. Friderici-Guilielmi* is discussed.

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