tures generally take place long before twenty-four hours have elapsed.

Dots were made on the roots (*Vicia Faba*) at different distances from their tips, so that the spaces thus marked out could be measured by means of a microscope. The beans were placed during the experiment in closely-shutting tin boxes, nearly filled with damp peat.

A considerable number of experiments were thus made, and the results obtained do not confirm those of Wiesner, but agree rather with Sachs' statement, that cutting off the tip of a bean root does not seriously hinder its growth. They show, moreover, that the effect of the operation is transitory, and that as the roots recover from the shock, they may actually grow more quickly than the uninjured specimens. Thus in one of the experiments the roots were marked at 2 mm. and 5 mm. from the apex, and the intervening space was measured after 3h. 10m., and again an additional interval of 3h. 5m. During the first 3h. 10m., if the growth of the normal roots be taken as equal to 100, that of the "cut" ones was 78; during the second period the proportion was:—normal to "cut" as 100 to 102; that is to say, the "cut" roots grew more quickly than the uninjured ones.

Other experiments gave the same result; on the other hand some cases occurred in which the power of recovery was not so rapid or well marked. Thus in one experiment the growths (per cent.) after twelve hours were in the proportion:—Normal : Cut : : 100 : 83, so that the growth of the "cut" roots was less by 17 per cent. than that of the uninjured ones.

On the whole the experiments show distinctly that a loss of geotropism may occur without serious interference with growth. The author then goes on to show that even if this were not so, it could still be shown that Wiesner's conclusion is incorrect.

If a root is split by two longitudinal incisions into three lamellæ, and if it be placed horizontally, so that the cut-surfaces are in a vertical plane, Sachs has shown that the central portion of the root containing the chief part of the vascular tissue, is capable of bending geotropically downwards. It was therefore thought desirable to compare the rates of growth of such split roots with others whose tips had been cut off. The result showed that the "cut" roots grow much more vigorously than the split ones. Thus we have in one experiment—

Cut : split : : 100 : 68·7.
In another—Cut : split : : 100 : 67·4.

Yet here the only clear geotropism that took place was among the split roots.

Thus Wiesner's argument falls to the ground, for, if retarded growth were the cause of "cut" roots being less geotropic than uninjured ones, it is clear that "split" ought to be even less geotropic than the "cut" roots, instead of exactly the reverse of this being the case.

The results here given are of some general interest, as showing, that although geotropism is a phenomenon of growth, it need not necessarily be subject to strictly the same conditions as undisturbed growth.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The following lectures on natural science are being given this term;—

Chemistry and Physics: Prof. Liveing on General Principles of Chemistry; Mr. Sell (Demonstrator), Elementary Chemistry; General Course, Mr. Main, St. John's College; Organic Chemistry, Mr. P. Muir, Caius College; Sound, Mr. Trotter, Trinity College; Electricity and Magnetism, Mr. Garnett, St. John's College; Papers on Elementary Physics, Mr. Shaw, Emmanuel College; Elementary Optics and Electricity, Mr. Glazebrook, Trinity College; Crystallography, Prof. Lewis; Physics (advanced), Mr. Garnett, St. John's College; Advanced Demonstrations on Light, Elasticity, and Sound, will be given by Mr. Glazebrook, and Mr. Shaw will give elementary demonstrations on Optics and Electricity, both in the Cavendish Laboratory. Practical Chemistry, in the University, St. John's, and Caius College Laboratories.

Biology:—Elementary, Dr. Michael Foster; Advanced Physiology, Mr. Langley; Physiology of Respiration and Animal Heat, Dr. Gaskell; the Eye and Vision, Mr. Lea; Physiology, for Tripos and 2nd M.B., Mr. Hill, Downing College; Human Anatomy, Demonstrations for Tripos students, Dr. Creighton; Mechanics of Human Skeleton, Mr. McAlister, at old Anatomical School; Mr. Sedgwick, Embryology of Mammals and Birds, in Mr. Balfour's Laboratory, followed by practical work; Advanced Course on Mammalia, by the Demonstrator of Comparative Anatomy at New Museums. In Botany, Prof. Babington will lecture on Morphology and Classification; Dr. Vines, on Morphology, chiefly Cryptogamic, with practical work, at Christ's College; Mr. Saunders, on Histology, at Downing College, Mr. Hicks, Sidney College, papers in Elementary Botany. Mr. Vines is also giving an elementary course of lectures on General Physiology and Life History of Typical Plants, in the Botanical Lecture Room, New Museum.

Geology:—Prof. Hughes, Stratigraphical Geology, the district around Cambridge; Fossil Echinids and Corals, and also Petrology, Mr. Tawney; Elementary Geology, Dr. Roberts; Class Work, Mr. Marr; Field Lectures, Prof. Hughes.

The Demonstrator of Mechanism is lecturing on Applied Mechanics at the Museum of Mechanism; and the workshops and drawing office are open for practical work.

Prof. Stokes is lecturing on Optics.

C. N. Adams (Exeter School) and S. Skinner (Dulwich College) have been recommended for Natural Science Open Scholarships at Christ's College.

At Newnham College Mr. Garnett is lecturing on Dynamics, Miss Scott on Integral Calculus, and Miss Harland on Euclid and Algebra.

THE Spring Session of the Royal Agricultural College, Cirencester, ended on Wednesday, 19th inst., when the diploma, certificates, and prizes were distributed to the successful candidates by Prof. Nevil Story-Maskelyne, M.P., who has been recently elected to the Council of the College. Mr. Maskelyne, in his address to the students, pointed out the great value of a study of the lower organisms, and the immense influence which these have on the pursuit of agriculture, as is seen in the process of nitrification, the changes taking place in milk, in cheese, and the like.

At St. John's College, L. J. Fuller has been elected to a Natural Science Exhibition.

At Trinity College W. B. Ransom (2nd year) has been elected to a Foundation Scholarship; H. Wilson Fox, H. Head, M. Miley, G. P. Bidder, and W. Gordon, to Exhibitions; and J. R. Green to a Foundation Sizorship; all for Natural Science.

EDINBURGH.—Prof. James Cossar Ewart, M.D., has been appointed to the Chair of Natural History in Edinburgh University, vacant by the resignation of Prof. Ray Lankester. Prof. Ewart at present holds the corresponding chair in the University of Aberdeen.

SCIENTIFIC SERIALS

WE have received Nos. 44, 45, and 46 of the *Scottish Naturalist*. The papers on Scotch botany and zoology continue to be of great interest; and to these are added an occasional one on Scotch geology. No. 46 (April) contains a report of an interesting lecture, by Prof. Traill, on "The Modes of Dispersion of the Seeds of Scottish Wild Plants."

Journal of the Franklin Institute, March.—A new theory of the suspension system with stiffening truss (continued), by A. J. Du Bois. The adhesion of flat driving belts, by R. Grimshaw.—Car-journal boxes, with Wendell's latest improvement, by C. H. Roney.—Thompson's patent wet pulveriser, by the same.—A new method of determining phosphoric acid, by H. Pemberton, jun.—The analysis of iron ores containing both phosphoric and titanic acids, by T. M. Drown and P. W. Shimer. The condition of sulphur in coal and its relations to coking, by T. M. Drown.—Natural filtration at Berlin, by W. R. Nichols.—Silk culture in the United States, by L. Blodget.

Bulletin de l'Academie Royale des Sciences de Belgique, No. 1, 1882.—On a sure astronomical criterion of the existence of a fluid layer within the terrestrial crust, by M. Folie.—A small illusion, by M. Plateau.—New observations of the effects of lightning on trees placed near a telegraph wire, by M. Montigny.—Influence of respiration on the circulation (third paper), by M. Fredericq.—On a method of determination of latitude, by M. Adam.—Researches on the dialysis of arable soils, by M. Petermann.—On the excretory apparatus of rhabdocœl and dendrocœl Turbellarians, by M. Francotta.—New parasitic worms of *Uromastix acanthinurus*, by M. Fraipont.—Dynamo-electric

machine with inductor-solenoid and continuous current, by M. Plücker.—Reports, &c.

No. 2.—Determinism and liberty; liberty demonstrated by mechanics, by M. Delbœuf.—On the origin of the Devonian limestones of Belgium, by M. Dewalque.—On the zircon of the quarries of Nil St. Vincent, by M. Renard.—On monochlorised chloride of acetyl, by M. Krutwig.—Influence of respiration on the circulation (fourth paper), by M. Fredericq.—Funeral discourses on M. Schwann and Col. Aden.—Reports, &c.

Archives des Sciences Physiques et Naturelles, March.—Influence of physico-chemical media on living beings; influence of different kinds of food on the development of the frog, by I. Yung.—Disinfections with sulphurous anhydride; siphonoid apparatus with special *transvaseur*; description of apparatus and management, by V. Fatio.—Swiss geological review for 1881 (continued), by E. Favre.

Révue d'Anthropologie, tome v., fasc. 1, 1882.—M. Paul Topinard's paper, on the weight of the brain, gives a comprehensive summary of all that had been done by Broca in this branch of craniology since the foundation of the mother-society at Paris, in 1861. Broca's tables, including upwards of 1000 of his own observations, were being revised by himself at the time of his death, and these, the further revision of which has been intrusted to M. Topinard, are given at length, together with his own emendations, from which he has been led to conclude that excessive weight of the brain cannot, *primâ facie*, be accepted as an evidence of great intellectuality, but may fairly be assumed to depend upon some cerebral abnormality. Thus he is of opinion, that even in the case of Cuvier's brain, whose exceptionally large weight (1829 grammes) has long made it rank among cerebral marvels, the well-attested presence of hydrocephalus during the infancy of the great naturalist was not without influence on the subsequent cranial enlargement. Finally, he believes that we are justified in assuming that a well organised brain will not *very largely* exceed the mean, having due reference to age, sex, and stature. From Broca's tables we obtain a cerebral mean of 1325 for men generally, and of 1142 for women generally; the greatest weight among the former being attained between the ages of thirty and thirty-five, and among the latter, somewhat earlier. After the age of fifty-five, the diminution is rapid, and at the age of eighty it has reached the mean of 100 grammes, although the loss sometimes amounts to 250 grammes. The means for the prime of life are 1421 for men, and 1269 for women. In considering the data generally, it is essential to bear in mind that the individuals under observation were of necessity derived from the less favourable class supplied by asylums and hospitals, and, therefore, presenting generally traces of disease, more especially of the brain, La Salpetrière and Bicêtre having yielded the greater number of the brains, commented on by Broca. The great desideratum of modern cerebral inquiry is the careful determination of the difference of the weight of the brain among mentally sound individuals belonging to the two distinct classes of those who are engaged in intellectual pursuits, and those whose vocations demand great muscular activity. Broca considered that form was more important than weight in estimating intellectual capacity, which possibly depends upon qualitative, and perhaps chemically inappreciable, rather than mere quantitative, relations. —M. Topinard, in a paper on the cephalic index, as determined according to Broca's method on the living subject, and after death explains the grounds on which he, in harmony with Prof. Vogt, has been led to consider as unnecessary and even erroneous, the reduction which it has hitherto been thought imperative to make, in order to bring the cephalometric estimate into complete accord with the craniometric determinations. He believes we ought to compare the two without making any reduction.—The capacity of the Black African races for becoming acclimatised, which is treated at great length by Dr. A. Corre, forms the subject of the only other original article in the *Révue*. The author, whose views are based upon observations made during many years residence in Senegal and other African inter-tropical regions, regards the African blacks as destined from the inherent inferiority of the race to give place in course of time to European immigrants. Beyond the possession of immunity against yellow fever and certain forms of marsh fever, he considers them to be inferior to whites in their powers of resistance against disease and general climatic conditions, and consequently inapt for military service, or for the purposes of colonisation, while finally he believes that the inaptitude of the negro for every high form of sociological development is such that there is only one of two things to be anticipated in regard to the lands occupied by the black races, viz. that where the latter are the masters, barbarism will prevail, and that where they fall into subjection to civilised peoples, their numbers will gradually, but surely diminish, in spite of the more favourable conditions in which they will be placed.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, April 5.—J. W. Hulke, F.R.S., president, in the chair.—W. J. H. Mylne was elected a Fellow, and M. Alphonse Milne-Edwards, of Paris, a Foreign Correspondent of the Society.—Geological age of the Taconic system, by Prof. J. D. Dana, F.M.G.S. The author takes exception to some remarks made before the Geological Society by Dr. T. Sterry Hunt on November 16 last. Dr. Sterry Hunt has thrown doubt on the results arrived at by the geologists who have studied the relations of the so-called Taconic strata, not in consequence of any observations of his own, but on the general ground that "where newer strata are in unconformable contact with older ones, the effect of lateral movements of compression, involving the two series, is generally to cause the newer and more yielding strata to dip towards, and even beneath the edge of the older rock—a result due to folds, often with inversion, sometimes passing into faults." It was pointed out in opposition to these views, that the observations of Emmons, H. D. and W. B. Rogers, Mather, Sir W. Logan, James Hall, E. Hitchcock, C. H. Hitchcock, Hager, and Wing, prove that the Taconic schists and limestones are in conformable succession and of Silurian age. The stratigraphical structure of the Taconic range is, indeed, so simple that all observers who have studied it have described the schists and limestones as conformable; and numerous characteristic Silurian fossils have been found in both. This view had been maintained by Dr. Sterry Hunt himself till 1878, when he first propounded his new interpretation of the strata in question; but the latter was not based on any fresh facts or observations. The author's own observations on the subject, carried on during many years, were detailed and illustrated by a map of the whole of the Taconic range. In conclusion, he pointed out that, even if Dr. Sterry Hunt's general principle were conceded, and he was not by any means himself prepared to make such a concession, it would have no bearing on the point at issue; for the supposed younger strata do not dip against the Taconic schists. In opposition to the view that the geological age of strata can be inferred from their mineral characters, he pointed out what remarkably different rocks have been produced by the metamorphism, in different degrees, of the strata of the Taconic range.—On some Nodular Felsites in the Bala Group of North Wales, by Prof. T. G. Bonney, F.R.S.—On the Cambrian (Sedgw.) and Silurian rocks of Scandinavia, by J. E. Marr, B.A., F.G.S. The author has examined the following areas of Cambrian and Silurian rocks in Scandinavia:—(1) Dalecarlia, (2) Ostrogothia and Westrogothia, (3) Christiania, (4) Scania, (5) Baltic Isles. A sketch of the stratigraphy of each of these regions was given, and the author gave the following conclusions:—

Silurian.	Mudstones of Ramsåsa and Bjersjölagård	= Ludlow.
	Cardiola beds: *Cyrtograptus* and *Retiolites* Shales	= Wenlock.
	Lobiferus Shales: Upper part of Brachiopod beds	= May Hill
Cambrian.	Lower part of Brachiopod beds	= Upper Bala.
	Trinucleus Shales: *Beyrichii* Limestone ...	= Middle Bala.
	Kärgårde Shales: Cystidean Limestone ...	= Lower Bala.
	&c.	= &c.

A correlation with the beds of Bohemia was also given. The author pointed out that there is evidence of a physical break, varying in amount, as well as of a palæontological one between the Cambrian and Silurian of Scandinavia. Several of the beds of Scandinavia admit of a very exact parallel with strata in the English Lake district. The author considered that the fauna of these Scandinavian deposits affords evidence of migrations. This can be shown by observing that the same forms occur in two beds of different age, but are absent from an intermediate one; or by tracing beds laterally, and showing that the forms occur in an earlier deposit in one locality than in another. The author considered the black shales deep-water deposits, and accounted