

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. Living 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 Ana-

tomical 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 Sizarship; 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. Pember-ton, 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'Académie 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 rhabdocel and dendrocel Turbellarians, by M. Francotta.—New parasitic worms of *Uromastix acanthimurus*, by M. Fraipont.—Dynamo-electric