

munication between its inhabitants. We believed that it was only by nerve-fibres that intercommunication was established in the animal body. Bayliss and Starling showed that there was a postal system. Missives posted in the general circulation were duly delivered at their destinations. The manner in which they reached the right address is of particular importance for us; we must suppose that the missive or hormone circulating in the blood and the recipient for which they are intended have a special attraction or affinity for each other—one due to their physical constitution—and hence they, and only they, come together as the blood circulates round the body. Secretin is a hormone which effects its errand rapidly and immediately, whereas the growth or morphogenetic hormones, thrown into the circulation by the pituitary, pineal, thyroid, suprarenal, and genital glands, act slowly and remotely. But both are alike in this: the result depends not only on the nature of the hormone or missive, but also on the state of the local recipient. The local recipient may be specially greedy, as it were, and seize more than a fair share of the manna in circulation, or it may have "sticky fingers" and seize what is not really intended for local consumption. We can see that local growth—the development of a particular trait or feature—is dependent not only on the hormones supplied to that part, but also on the condition of the receptive mechanism of the part. Hence we can understand a local derangement of growth—an acromegaly or gigantism confined to a finger or to the eyebrow ridges, to the nose, to one side of the face, and such local manifestations are not uncommon. It is by a variation in the sensitiveness of the local recipient that we have an explanation of the endless variety to be found in the relative development of racial and individual features.

Some ten years after Starling had formulated the theory of hormones, Prof. W. B. Cannon, of Harvard University, piercing together the results of researches by Dr. T. R. Elliott and by himself on the action of the suprarenal glands, brought to light a very wonderful hormone mechanism—one which helps us in interpreting the action of growth-regulating hormones. When we are about to make a severe bodily effort it is necessary to flood our muscles with blood, so that they may have at their disposal the materials necessary for work—oxygen and blood-sugar, the fuel of muscular engines. At the beginning of a muscular effort the suprarenal glands are set going by messages passing to them from the central nervous system; they throw a hormone—adrenalin—into the circulating blood, which has a double effect; adrenalin acts on the flood-gates of the circulation, so that the major supply of blood passes to the muscles. At the same time it so acts on the liver that the blood circulating through that great organ becomes laden with blood-sugar. We here obtain a glimpse of the neat and effective manner in which hormones are utilised in the economy of the living body. From that glimpse we seem to obtain a clue to that remarkable disorder of growth in the human body known as acromegaly. It is a pathological manifestation of an adaptational mechanism with which we are all familiar. Nothing is better known to us than that our bodies respond to the burden they are made to bear. Our muscles increase in size and strength the more we use them; increase in the size of our muscles would be useless unless our bones also were strengthened to a corresponding degree. A greater blood supply is required to feed them, and hence the power of the heart has to be augmented; more oxygen is needed for their consumption, and hence the lung capacity has to be increased; more fuel is required—hence the whole digestive and assimilative

systems have to undergo a hypertrophy, including the apparatus of mastication. Such a power of co-ordinated response on the part of all the organs of the body to meet the needs of athletic training presupposes a co-ordinating mechanism. We have always regarded such a power of response as an inherent property of the living body, but in the light of our growing knowledge it is clear that we are here dealing with an hormonal mechanism, one in which the pituitary gland is primarily concerned. When we study the structural changes which take place in the first phase of acromegaly (see Keith, *Lancet*, ii., p. 993, 1911; i., p. 305, 1913), we find that not only are the bones enlarged and overgrown in a peculiar way, but also the muscles, the heart, the lungs, the organs of digestion, particularly the jaws; hence the marked changes in the face, for the form of the face is determined by the development of the upper and lower jaws. The rational interpretation of acromegaly is that it is a pathological disorder of the mechanism of adaptational response; in the healthy body the pituitary is throwing into the circulation just a sufficiency of a growth-regulating substance to sensitise muscles, bones, and other structures to give a normal response to the burden thrown on the body. But in acromegaly the body is so flooded with this substance that its tissues become hypersensitive and respond by overgrowth to efforts and movements of the slightest degree. It is not too much to expect, when we see how the body and features become transformed at the onset of acromegaly, that a fuller knowledge of these growth-mechanisms will give us a clue to the principles of race differentiation.

There must be many other mechanisms regulated by hormones with which we are as yet totally unacquainted. I will cite only one instance—that concerned in regulating the temperature of the body. We know that the thyroid and also the suprarenal glands are concerned in this mechanism; they have also to do with the deposition and absorption of pigment in the skin, which must be part of the heat-regulating mechanism. It is along such a path of inquiry that we expect to discover a clue to the question of race colour.

This is not the first occasion on which the doctrine of hormones has been applied to biological problems at the British Association. In his presidential address to the Zoological Section at Sheffield in 1910 Prof. G. C. Bourne applied the theory to the problems of evolution; its bearing was examined in more detail in an address to the same section by Prof. Arthur Dendy during the meeting at Portsmouth in 1911. At the meeting of the association at Newcastle in 1916 Prof. MacBride devoted part of his address to the morphogenetic bearings of hormones. Very soon after Starling formulated the hormone theory, Dr. J. T. Cunningham applied it to explain the phenomena of heredity (*Proc. Zool. Soc. London*, p. 434, 1908). Nay, rightly conceived, Darwin's theory of pan-genesis is very much of the same character as the modern theory of hormones.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Prof. G. H. F. Nuttall, Quick professor of biology, has received from Mr. P. A. Molteno, of Trinity College, a letter dated October 23 desiring to present to the University a sum of 20,000*l.* to provide suitable buildings and fittings for an institute for research in parasitology, and a further sum of 10,000*l.* to provide an income for the upkeep and maintenance of the institute. Plans have been drawn

up by Mr. Harry Redfern for the erection of this institute on the Downing site.

The special lectures by Sir J. J. Thomson on positive rays, and by Prof. Eddington on the theory of relativity and gravitation, have been postponed until the Lent term.

The recommendations of the General Board of Studies on (a) a proposed readership in geography, (b) a proposed readership in agricultural physiology, and (c) a proposed readership in estate management have been passed by the Senate.

The University is full to overflowing, and the difficulty of obtaining accommodation has been met only partially by extending the limits to a $2\frac{1}{2}$ -mile radius from Great St. Mary's Church. Practically all the colleges are strictly limiting their numbers. One of the most striking characteristics of the post-war population is the enormous increase in the numbers of men pursuing the study of natural, economic, and mechanical sciences. For example, the engineering school has now between 600 and 700 students; in the chemistry school between 1100 and 1200 names have been entered for lectures and nearly 1000 for practical work; while, instead of the 100 expected, some 240 students attended the elementary class in physiology. The difficulties of accommodation are severe now, but next year and the year after, when these students have passed the elementary stage and require more elaborate equipment and teaching, the situation will be almost impossible unless steps are taken to increase the laboratory accommodation and teaching resources. The difficulty in doing so is partly that of building—though, fortunately, the building strike has just been settled—and partly that of providing the funds required for construction, equipment, and *personnel*. Some help in this direction may be expected from the State, but the State will not be able to replace the private benefactor in assisting the University in its present exceptional opportunity of promoting the teaching of and research in science.

OXFORD.—The question of admitting women to matriculation and degrees has entered upon a new phase. It had been intended to seek Parliamentary sanction for the framing by the University of provisions for the removal of the academic disabilities of women. It now appears that, by the unsolicited action of the House of Commons itself, the way will be opened for the admission of women to matriculation and degrees without any special appeal to Parliament for the purpose. Legislation with this object will probably be undertaken in the near future.

Col. Thomas E. Lawrence, a leading authority on the topography, ethnology, and languages of Arabia and Mesopotamia, distinguished also for his political and military services in the late Arabian anti-Turkish campaign, has been elected to a research fellowship at All Souls College.

In Congregation on November 11, the statute making Greek optional in Responsions, which was thrown out by Convocation in June last, was re-introduced with a fresh preamble, under which it will be possible for amendments to be moved limiting the exemption from compulsory Greek to candidates for honours in science or mathematics, and to candidates for a pass degree. The preamble, after speeches by Mr. Barker, of New College, and Prof. Gilbert Murray, passed without a division.

DR. J. H. GRINDLEY, of Cork, has been appointed principal of the Dudley Technical College.

DR. ALEX HILL is resigning the principalship of University College, Southampton, in order to devote his full activities to the Universities Bureau, of which he is secretary.

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MISS M. E. LAING has been appointed research assistant in physical chemistry in connection with the Leverhulme chair of physical chemistry at the University of Bristol.

A READER in estate management is shortly to be appointed by the General Board of Studies of the University of Cambridge at an annual stipend of 500*l.* Applications for the post must be sent to the Vice-Chancellor on or before November 30.

APPLICATIONS are invited by the Senate of the University of London for the Keddey Fletcher-Warr studentships for the promotion of post-graduate research. The studentships are open to men and women, tenable for three years, and of the annual value of not less than 200*l.* Applications must be received by the Academic Registrar of the University of London, South Kensington, S.W.7, not later than December 31 next.

A SERIES of free public lectures has been arranged for delivery in the botanical lecture-room of the University of Glasgow during the winter session, 1919-20, at 8.30 p.m., on the second Monday of each month from November to March inclusive. The list of lectures, including that by Prof. C. H. Desch, on November 10, on "The Growth of Crystals," is as follows:—On December 8, "Scotland and France," Prof. R. S. Rait; on January 12, "The Language of the Poilus"; on February 9, "The Beginnings of Geography," Prof. J. W. Gregory; and on March 8, "Finance and Reconstruction," Prof. W. R. Scott.

PROF. JOHN COX will resume on Monday next, at 6.30 p.m., the course of lectures on modern scientific discoveries and their practical application to life and industry at Gresham College, Basinghall Street, F.C.2, by a lecture on "Oersted and the Telegraph." These lectures are given mainly with the view of enforcing the need that applied science is necessary, not only for the commercial prosperity of any modern community, but also for its very existence. Other lectures in the course deal with long-distance telephony, the motor and dynamo, the nature of light, streamlines and aeroplanes, sound-ranging, directional wireless, listening under water, radio-activity, etc.

THE annual general meeting of the Science Masters' Association will be held at the London Day Training College, Southampton Row, W.C.1, on Tuesday and Wednesday, January 6 and 7, 1920, under the presidency of Mr. W. W. Vaughan, master of Wellington College. Among the subjects to be discussed are:—The Teaching of Organic Chemistry; Biology in the School Science Syllabus; Laboratory Management—(a) Training of Assistants and (b) Cost of Apparatus; Science Teaching in the Early Stages—(a) Science in the Preparatory School and in Common Entrance and Entrance Scholarship Examinations for Public Schools, and (b) Teaching Junior Forms; and The Divorce of Laboratory and Class-room Courses.

A CONFERENCE of representative men and women which met at the Bedford College for Women (University of London) on November 5 unanimously decided on carrying out an extension which will involve an appeal to the public for funds. In order to organise the appeal, an executive committee has been appointed, of which Col. Sir Hildred Carlile, Bart., M.P., is chairman and Viscountess Elveden hon. treasurer. The college, built to accommodate 400 students, now has 550. The proportion of science students has greatly increased, and is now one-third of the total number. In the chemistry department the students number 130, and the working places are only forty-six. In the matter of residence the same difficulties occur; despite the addition of three new

hostels, there remains this term a long waiting list of students wishing to come into residence. It is hoped that the appeal will enable the college to make provision for the increased demands made upon it by the attention now given to higher education for women.

SOCIETIES AND ACADEMIES.

LONDON.

Zoological Society, October 21.—Prof. E. W. MacBride, vice-president, in the chair.—E. G. Boulenger: Report on the research experiments on methods of rat destruction carried out at the society's gardens.—Dr. A. Smith Woodward: The zoological position and affinities of Tarsius.

PARIS.

Academy of Sciences, October 13.—M. Léon Guignard in the chair.—C. Moureu and C. Dufraisse: The stabilisation of acrolein. The methods of spontaneous alteration of acrolein. The spontaneous transformation into disacryl, the soluble resin, appears to be a modification undergone by pure acrolein. Acrolein purified with the greatest care always underwent this spontaneous condensation on standing. The speed of transformation can be modified by light, high temperature, and the presence of impurities.—R. Bourgeois: A collection of paintings of clouds.—M. Leblanc: Very rapid rotations.—P. Bouteux: A family of multiform functions, integrals of a differential equation of the first order.—J. Andrade: The weighing of a friction during the relative sliding of two solids in contact.—E. Belot: The movement of translation of a gaseous vortex ring in a resisting medium.—H. Vanderlinden: The ephemeris of the Borrelly comet, 1910c.—G. Sagnac: The absolute mechanics of waves and the Newtonian relativity of energy.—Q. Majorana: Gravitation.—G. Claude: The industrial employment of extremely high pressures. In compressing gases to pressures of 1000 atmospheres, no difficulties may be expected to arise in the pumps of the compressors or in the receivers, which can easily be made of sufficient strength to give security. The real difficulty will arise in the connections, which must be absolutely tight if serious losses are to be avoided. The author has constructed apparatus which, after charging with gas compressed to 1000 atmospheres and immersing in water, allowed no bubbles of gas to escape.—A. Bolland: Microchemical reactions of thiosulphuric acid.—V. Cremieu and A. Lepape: The separation by solidification of pure carbon dioxide from a gaseous mixture. Starting with a mixture containing 95 per cent. of carbon dioxide, cooling to 80° C., and compressing slightly, the solid carbon dioxide precipitated is chemically pure.—J. Guyot and L. J. Simon: The action of concentrated sulphuric acid on methyl alcohol.—J. Révil and P. Combaz: The age and the conditions of formation of the lignites of Voglans in the Chambéry region. A discussion and criticism of the views recently put forward by M. Goreeix.—I. Bartheux: Succession of old eruptive rocks in the Arabian Desert.—J. Pellegrin: New contribution to the ichthyological fauna of Lake Tchad.—F. Ladreyt: The complex symbiotic cell.—J. Amar: Respiration in confined air.—F. Bordas: The preparation and conservation of sera and vaccines by drying in an absolute vacuum. The vaccines are dried in a high vacuum and the water-vapour evolved is removed by freezing. After drying, the tube is sealed and the vaccine thus removed from the action of both water and oxygen. The activity of such preparations can be preserved for several years.

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October 20.—M. Léon Guignard in the chair.—M. Henneguy: An account of the work of the late Gustav Retzius.—G. Bigourdan: A project of uranographic classification, completing other classifications in present use.—A. Blondel: The characteristics of oscillation of lamps with three electrodes, utilised as generators of sustained oscillations.—M. de Chardonnet: Remark on a communication of Gen. Bourgeois. The use of autochrome plates instead of hand-paintings for clouds is suggested as being more practical. As regards the question of the stability of the images, some coloured photographs of the sky taken ten years ago, now presented to the Academy, are still in a good state of preservation.—M. Petrovitch: Definite integrals, of which the decimal part is expressed with the aid of prime numbers.—G. Kolossoff: The movement of a solid in an indefinite liquid.—A. Foch: The resonance of water-mains provided with an air-chamber.—A. Bichet: A system of aiming at objects in the air. Suggestions for a new means of mounting telescopes, searchlights, and guns for improving the aim at moving objects in the air.—G. Chavanne, L. P. Clerc, and L. J. Simon: Analyses of German aviation petrols. The results given were obtained by a combination of careful fractional distillation with the measurement of the critical solution temperature of the fractions in aniline, details of which have been given in earlier communications. Twenty specimens were examined, the composition of which averaged 10 per cent. aromatic hydrocarbons, 40 per cent. saturated cyclic hydrocarbons, and 50 per cent. paraffins. The deviations of the separate specimens from the average were very small.—P. Robin: The peroxide of benzaldehyde. A study of the decomposition by prolonged boiling in benzene solution, and of the prolonged oxidation with iodine and sodium carbonate.—J. Bartheux: Cretaceous volcanic rocks of Egypt and Sinai.—G. B. M. Flamand: The discovery of a lens of coal at Port-Gueydon. Two analyses are given, together with reasons for supposing that this deposit really belongs to the Coal Measures.—M. Bezagu: Variations of the respiration of leaf-cells with age.—A. Sartory: A new fungus of the genus *Scopulariopsis* isolated from a case of onychomycosis.

BOOKS RECEIVED.

- The Philosophy of Conflict, and Other Essays in War-time. By H. Ellis. Second series. Pp. 299. (London: Constable and Co., Ltd.) 6s. 6d. net.
- Organic Chemistry for Students of Medicine. By Prof. J. Walker. Second edition. Pp. xi+332. (London: Gurney and Jackson.) 10s. 6d. net.
- Essays in Common Sense Philosophy. By C. E. M. Joad. Pp. 252. (London: The Swarthmore Press, Ltd.) 8s. 6d. net.
- The Struggle in the Air, 1914-1918. By Major C. C. Turner. Pp. viii+288. (London: E. Arnold.) 15s. net.
- Iron Bacteria. By Dr. D. Ellis. Pp. xix+179+v plates. (London: Methuen and Co., Ltd.) 10s. 6d. net.
- The Venereal Problem. By E. T. Burke. Pp. 208. (London: H. Kimpton.) 7s. 6d. net.
- Some Wonders of Matter. By the Right Rev. J. E. Mercer. Pp. 195. (London: S.P.C.K.) 5s. net.
- Joseph Dalton Hooker. By Prof. F. O. Bower. Pp. 62. (London: S.P.C.K.) 2s. net.
- Herschel. By the Rev. H. Macpherson. Pp. 78. (London: S.P.C.K.) 2s. net.
- The Profession of Chemistry. By R. B. Pilcher. Pp. xiv+199. (London: Constable and Co., Ltd.) 6s. 6d. net.