

RESEARCH ITEMS

Myohæmoglobin and the Crush Syndrome

A COMMON type of air-raid casualty is the person who has remained trapped for several hours with a limb crushed or compressed beneath debris. Such patients, after their release and admission to hospital, frequently develop a characteristic set of symptoms which has been called the 'crush syndrome'. The most striking features of this condition, apart from surgical shock, are the excretion of myohæmoglobin in the urine and the onset of severe renal failure, which often ends in death from uræmia. Bywaters and Popjak (*Surg. Gynec. Obst.*, 75, 612; 1942) attempted to reproduce this condition in rabbits by experimental crushing or compression of the leg muscles. They found that surgical shock ensued as in man, but there was no myohæmoglobinuria and no renal damage. The absence of myohæmoglobinuria was readily explained by the finding that rabbit's muscles contain practically no myohæmoglobin, and the results naturally suggested that the renal damage which occurs in man might in some way be caused by the renal excretion of myohæmoglobin. Bywaters and Stead (*Quart. J. Exp. Physiol.*, 33, 53; 1944) have investigated this possibility and they find that while injection of myohæmoglobin into normal rabbits (with alkaline urine) does not damage the kidney, injection into rabbits with acid urine or into rabbits after limb crushing does produce severe kidney damage which may be fatal. It seems that in the crush syndrome both myohæmoglobin and various acid breakdown-products are liberated from the crushed muscle, and the excretion of myohæmoglobin in an acid urine is the main cause of the renal damage, though why myohæmoglobin should damage the kidney is not yet clear.

Pancreatic Extracts and Cell Growth *in vitro*

J. N. Davidson and C. Waymouth (*Quart. J. Exp. Physiol.*, 33, 19; 1944) have shown that a simple extract of pancreas (pancreatin) contains substances which influence the growth of chick heart fibroblasts *in vitro*. Two factors have so far been separated and they have been partially purified, but not completely so. One factor, which the authors consider may be lecithinase A, has a striking effect on the morphology of the cells in culture. Normal fibroblast cultures nourished with embryo extract present the appearance of a loose network of elongated cells with oval nuclei; under the influence of this pancreatic factor the appearance alters to one of closely packed polygonal cells with round nuclei. The second factor stimulates growth of the culture (as judged by the increase of nucleoprotein phosphorus), and its action seems to be similar to that of embryo extract. This factor probably comprises polypeptides and certain breakdown products of nucleic acids, substances which may well serve as raw materials for nucleoprotein synthesis. Trypsin and ribonuclease, though present in the crude extract, were absent from the fractions finally employed, and are therefore excluded.

Lower jaw of Stegocephalia

THE Stegocephalia are generally regarded as the amphibian order that most nearly approaches the stem of the Reptilia, and consequently in them one is most likely to find morphological relationships that will help in understanding the conditions met with in reptiles. A comprehensive and comparative

account of the lower jaw of the Stegocephalia is furnished by T. Nilsson (*Kungl. Svenska Vetensk. Akad. Hand.*, 21; 1944). The following homologies are suggested: the bone up to now regarded as the 'splenial' of the Stegocephalians is termed the pre-splenial, while that in the reptiles is probably the fusion of pre- and post-splenials; the posterior meckelian foramen is the posterior mylohyoid, the anterior meckelian is the anterior mylohyoid and the post-symphysial foramen is the lingual foramen of reptiles. Owing to the considerable amount of overlapping in the dermal bones their superficial outlines do not indicate accurately their extension at deeper levels. The foramina and canals in the bones of the jaw allow of an attempt at a restoration of the nerves and blood vessels, and on this certain new names of general application are proposed for them. In considering the veins it is suggested that there were in the head of the Stegocephalian a series of sinuses similar to those in many living reptiles and that these served for the exuviation of the head and possibly to frighten enemies.

Scottish Cephalopods

FOR a number of years the Fishery Board for Scotland collected marine fauna over the Scottish area, using this term in a wide sense, and the Cephalopoda in this collection, together with those of the Royal Scottish Museum, Millport Marine Biological Station and the University of Glasgow, form the basis for an account of this group by A. C. Stephen (*Trans. Roy. Soc. Edin.*, 61, Pt. 1; 1944). In all 47 species and one variety are dealt with, but some of these are not strictly Scottish although, occurring in adjacent waters, they might be found within the narrower limits at any time. None of them is a new species; but our knowledge of the areas of distribution of some of them has been considerably extended. There is evidence to show that an increase in the flow of the North Atlantic Drift has been responsible for the immigration of several forms in comparatively recent years. These species are mainly southern forms like *Ommatostrephes sagittatus* and *Stenoteuthis caroli*; on the other hand, *Rossia glaucopsis*, a northern form, appears to have become more rare.

Termites of New Zealand

J. M. KELSEY has given (*N.Z. J. Sci. and Tech.*, May 1944) an account of the termites known from New Zealand and their identification. It appears that there are only two species indigenous to the Dominion, namely, *Calotermes brouni* Frogg. and *Stolotermes ruficeps* Brauer. In addition to these, there are eight species of Australian termites that have been accidentally introduced at one time or another. Of the native species, *C. brouni* does extensive damage to wooden buildings, posts, poles and trees. Attempts are now being made to find an effective means for its control. The other species, namely, *S. ruficeps*, is invariably found in decaying timber and has not so far been found attacking buildings. Of the Australian species, three kinds belong to the family Rhinotermitidae and are members of the genus *Coptotermes*. Four species are members of the Calotermidae, and of these three belong to the genus *Calotermes* and one to *Porotermes*. The Termitidae are represented by a single species of *Eutermes*. The paper gives detailed descriptions of the eight species referred to above, together with illustrations of the chief distinguishing characters that separate them.

Golgi Bodies

REALIZING that much of the extensive work that has been done on the Golgi elements is based upon empirical procedures because of the lack of knowledge of their chemical nature and composition, Dr. J. R. Baker (*Quart. J. Micro. Sci.*, 85, Pt. 1; 1944) has tackled the problem of their structure from a new point of view. For the purpose of this study the author took the spermatocytes and early spermatids of the snail *Helix aspersa*, intestinal cells from the newt *Triturus vulgaris* and cells from the anterior mesenteric ganglion of the rabbit *Oryctolagus cuniculus*, which he considered gave him a wide enough range of animals and tissues to allow generalizing. Structurally, it was found that the Golgi element consists of four parts, the 'neutral red vacuoles', a dense lipoid containing substance in various shapes, a diffuse lipoid-containing substance filling in the interstices and a Golgi product which arises in the vacuole by synthesis by the element. The first part of the paper consists of a description of the structures found, checked up where possible against the structures visible in the living cell. The second part is an account of the chemical nature of the structures and their reactions to various techniques.

Sex Determination in *Habrobracon*

P. W. WHITING (*J. Hered.*, 34, 355; 1943) has summarized the recent data on sex determination in the parasitic wasp *Habrobracon*. Formerly it was believed that the female was XY and the male haploid X or Y, or diploid XX or YY in respect to the sex determiners. It is now shown that sex determination is controlled by a series of multiple allelomorphs in such a way that the heterozygotes are female, and the haploids and homozygotes are male. Some rather novel results are obtained consequently in sex linkage and in the nature and occurrence of sex mosaics. Haploid mosaic males appear at a frequency between 1 in 500 and 1 in 5,000 in the progeny of heterozygous females. They arise from binucleate eggs. In a few cases trinucleate eggs must have been involved. Also females have arisen without fertilization as a result of doubling of the chromosome number in the oögonia. Dispermy is relatively frequent, but the expected androgenesis is rare. The sex reactions of the insect were known to be associated with the head, but it is now known that an insect with female eyes and male antennæ reacts as a female, thus limiting considerably the tissues which are associated with sex reactions.

Plant Growth Substances

THE relation between molecular configuration and activity of plant growth substances or auxins has yet to be elucidated; but V. T. Stoutemeyer (*Proc. Amer. Soc. Hort. Sci.*, 42, 365; 1943) reports that the addition of methyl, hydrogen and isoprene groups at various positions on naphthalene acetic acid does not reduce its root-forming properties. The addition of the isoprene group in some cases actually increased activity, while tetrahydronaphthalene acetic acid usually caused the production of a greater weight of roots per cutting (without increasing the number of cuttings rooted) than the unreduced acid. The same worker later reports that while naphthalene butyric acid is as effective as (and less toxic than) the corresponding acetic acid, and the isoprene ester of the naphthalene butyric acid is still more effective, α -naphthalene α -propionic and α -naphthalene β -propionic acid were both less effective than α -naphthalene acetic acid.

Effect of Methyl Cellulose on Water-loss in Plants

IN a short note, I. M. Feller and V. R. Gardner (*Proc. Amer. Soc. Hort. Sci.*, 43, 183; 1943) describe an experiment, the results of which may have far-reaching consequences. They show that the addition of a 1 per cent or 2 per cent aqueous suspension of methyl cellulose to bare soil or to soil in which plants were growing in a greenhouse reduced water loss from both soil and plant by as much as 50 per cent without exerting any observable harmful effects on the plants. Initial treatment remained effective for three months. If further experiments show that repeated treatments have no harmful effects on the soil and on plant growth, these experiments may prove to be of prime importance in at least a limited field of horticulture.

Polythene as a High-Frequency Dielectric

Prof. Willis Jackson and Mr. J. S. A. Forsyth recently read a paper on this subject in London before the Institution of Electrical Engineers. The paper is mainly concerned with the power factor of polythene which, being normally of the order of 0.00015-0.0003, renders the material very suitable as a high-frequency dielectric. Oxidation may occur, however, during the processing of the material in the manufacture of cables and mouldings; this increases the power factor and leads also to difficulties in extrusion. These effects may be virtually eliminated by the use of small amounts of antioxidants. The measurable power factor of pure polythene is scarcely concordant with the supposedly non-polar nature of the substance, and a number of possible explanations of the small basic power factor have been investigated. Measurements of power factor over wide frequency and temperature ranges show that its variation for pure polythene is extremely sluggish, but that oxidation causes the appearance of marked peaks; these observations are examined in the light of present theories of dipole loss. A brief account is given of the structure of polythene, and of its main physical and mechanical properties.

Observations of Eros at the Cape Observatory

A PAPER on observations of Eros during 1938 and 1942, communicated by H.M. Astronomer at the Cape (*Mon. Not. Roy. Astro. Soc.*, 104, 3; 1944), includes a short description of the instruments used and of the method of reduction of the plates, etc. In 1938 the observations were made with the astrographic telescope west of the pier. In 1942 the first two or three exposures were generally made with the telescope west of the pier before Eros reached the meridian, then observations were made with the Victoria telescope near the meridian. Finally, the astrographic telescope was reversed and several exposures were made with the telescope east of the pier. The same plate was used for the two sets of exposures with the astrographic telescope and hence the mean of the two sets should eliminate any displacement due to tilt of the plate. The plates during 1938 were taken by Dr. R. H. Stoy, and in 1942 they were generally taken by Dr. J. Jackson. Tables with the results of the observations in the two years are given; but for 1938 the observed positions only are given, corrected for parallax and referred to the equinox of 1938.0. For 1942 an ephemeris by Stracke was available, and for comparison with this ephemeris it is only necessary to subtract the light-time from the time of observation, corrections for parallax and aberration having been applied to the positions given.