

Research Items

The Bones of Comenius. Very shortly after the death of the great Czech scholar, John Amos Comenius, in Holland in 1670, his fame, and even his last resting place were forgotten owing to disturbed conditions both in his native land and in Holland. In the earlier part of the nineteenth century his memory was revived; but notwithstanding an abortive attempt to fix the site of his grave in 1871, it was only after the close of the War that the Czechoslovakian Government was able to make arrangements with the Dutch authorities for the disinterment of his remains. This was made possible by the discovery of the register recording his interment in November 1670, not in the 'great church' of Naarden, as had previously been thought, but in the 'Walloon' church. This edifice, after a varied history, had long been occupied as a military barracks. The records showed that the body of Comenius had been deposited in a 'common' grave, in which two further interments had followed after considerable intervals. Largely owing to the interest of Mr. R. J. Vonka, of the Czechoslovakian Legation, and Dr. R. A. B. Oosterhuis, of Amsterdam, this grave was identified and one of the three skeletons provisionally identified by its position and general condition as that of the great scholar. The remains have been examined and measured in detail by Prof. A. J. P. van den Broek and Prof. J. Matiegka, who after a close comparison with portraits of Comenius and such information as is available, pronounce the identification to be in all probability well founded. The skull is hyperbrachycephalic (cephalic index of 89.71), hypsicephalic (vertical index 77.64), eurymetopic and mesoprosopic. The orbits are large and the nose thin. The form and dimensions of the skull, in fact, are such as are frequently encountered in Czechoslovakia. Among the more noteworthy features are the breadth of forehead and the fact that, notwithstanding the age of the subject at the time of death, the sutures of the skull had not closed. The discovery of the remains and their character and method of identification are described in *Anthropologica* (Académie Tchèque des Sciences et des Arts, Prague, II^{me} Classe, 1933, just received).

Prehistoric Rock Paintings in Abyssinia. The Abbé Breuil describes in *L'Anthropologie* (44, No. 5-6) a number of rock-paintings in the Harrar (Abyssinia) which he examined in 1933, when Dr. Paul Weinert was engaged in the excavation of the palaeolithic cave of Porc-Epic at Diré-Daoua. One series of paintings was in the cave and a second was on a rock discovered by P. Azais at Sourré, sixty kilometres from Diré-Daoua. The cave of Porc-Epic is situated at the top of a cliff about 200 metres above the right bank of the River Diré-Daoua. Its deposits, separated by two thin layers of stalagmite, belong to mesolithic and upper palaeolithic cultures analogous to those of Kenya and South Africa. In the upper and middle deposits, mousterian-solutro-aurignacian implements are associated with geometrical microliths and a coarse pottery. On the right wall are a number of drawings, all more or less schematic, which are partly covered by deposits and, consequently, are older than the more recent stalagmite. The figures are highly conventionalised and, therefore, difficult of identification. Approximately, however, a list

can be established which includes twenty human figures comparable to the most schematic of southern Spain, one elephant, one lion, two carnivores with pointed muzzle and ears, thirteen antelopes, three Bovidae, etc. Nearly all are in bright red, but there are the remains of earlier figures in yellow ochre and a reddy-brown. The only remarkable figure is that of a stag, which is compared with a similar figure from Zara-Brouk (Addiet). The paintings on the rock at Sourré are of varied dating, distinguishable by the superpositions. They fall into eight classes which belong to two main periods, the five earlier stages being naturalistic, while of the later three, two are schematic phases united by a period of transition. There is a hunting scene, but all the remaining figures are of a pastoral character. They recall pre- and proto-dynastic Egypt. The identification of certain of the Bovidae raises an interesting point bearing on the domestication of these animals.

Mitogenetic Radiation. The announcement, twelve years ago, by Gurwitsch, of the emission of radiations from rapidly growing tissues, occasioned no little interest and even surprise in biological circles, coming as it did from a histologist with so high a reputation. Many have been the attempts to repeat his observations, but the results of succeeding investigators have yielded positive and negative results as consistently as the tossing of a coin. Dr. J. B. Bateman has rendered valuable service to biological workers in carrying out a critical survey of the literature of the last dozen years dealing with this subject ("Mitogenetic Radiation", *Biol. Rev.*, 10, 1, 42; 1935). The weight of the evidence tends slightly against the existence of such a phenomenon, and there is no ground at all to support the view that mitogenetic radiations, if they exist at all, have anything to do with ultra-violet radiation.

Statistics of Variations. Dr. Hans Günther has recently published a little book which serves as a short but useful introduction to the statistics of variation ("Die Variabilität der Organismen und ihre Normgrenzen". Pp. 132. Leipzig: Thieme, 1935). It is divided into fourteen sections, some of which may be mentioned as indicating its scope and character: the causes and categories of variation, statistical and biometrical methods, the conception of the norm and of the abnormal, the limits of variation and of the norm, various types of biological statistical analysis, and special methods for the comparison of variations, as between, for example, races, populations, the sexes, the right and left halves of the body and different stages of development. Various general questions regarding the nature and limits of variations are discussed.

Lamellibranchs and a Cruciform Muscle. Mr. Alastair Graham, following up his recent investigations of the cruciform muscle of certain Lamellibranchs (*NATURE*, Sept. 29, 1934, p. 500), has compared in detail the anatomy of five bivalves belonging to the Tellinacea, *Gari tellineella*, *Tellina crassa*, *Macoma balthica*, *Scrobicularia plana* and *Donax vittatus* together with *Cultellus pollucidus* as typical of the Solenidae, and *Solecurtus scopula* and *S. chamosolen* as representing the *Solecurtidae* (*Proc. Roy. Soc. Edin.*, 54 (2), No.

15, 1934). The result of this work, as was foreshadowed in the previous paper, shows that the Solecurtidæ should be classified with the Tellinacea rather than with the Solenidæ. The Solecurtidæ, in common with the Tellinacea, possess a cruciform muscle and in many other respects resemble that group, whereas in the Solenidæ the cruciform muscle is absent. The Solecurtidæ have, however, several features which are characteristic of the Solenidæ and there appears to be an undoubted relationship. As the author suggests, "the Solecurtidæ are to be regarded as a group of Lamellibranchs linking the Tellinacea with the Solenacea, but themselves retaining many more primitive features than do the Solenacea, and therefore falling themselves into the former group". The Solenidæ probably separated from the ancestral forms of the Solecurtidæ and the other Tellinacea before the evolution of a cruciform muscle had taken place, and since their separation have evolved along a well-defined line of their own. It is an interesting fact and one not easily explained that in the two estuarine species of the Tellinacea, *Macoma balthica* and *Scrobicularia plana*, the length of the intestine has become greatly elongated by coiling.

New Fresh-Water Mollusca. Mr. Alan Mozley has described several new fresh-water molluscs from northern Asia (*Smithsonian Miscellaneous Collections*, 92, No. 2; 1934). These were collected during a journey made in the years 1932 and 1933 through certain parts of Siberia and northern Kazakstan, the object of the expedition being to investigate the molluscan fauna of the region. The new species are all very like known British forms, a *Valvata*, a *Lymnaea*, a *Planorbis* and a *Physa*, and there are three new sub-species of *Lymnaea (Galba) palustris* described. The descriptions are of the shells alone, in some cases at least, only dead shells being obtained. *Valvata antiquilina*, n.sp., from Lake Khomotenoze, apparently lived at some former time when the water-level stood considerably higher than at present. *Lymnaea palustris sandalensis*, n.subsp., comes from a small somewhat saline lake on the Steppe Sari Dala, south-west of Pavlodar, northern Kazakstan. Although distinguishable, these four sub-species resemble one another closely.

Tortrix Moth Pests of Fruit Trees. Messrs. G. L. Hey, of the Murphy Chemical Company, and F. J. D. Thomas, of the East Malling Research Station, have recently published an account of their investigations into the biology of *Cacæcia (Tortrix) podana*, Scop. (*J. Pomol. and Hort. Sci.*, 12, No. 4, pp. 293-310, December, 1934). The paper is the first of a series which is intended to include descriptions of a considerable number of Tortricidæ which infest fruit trees in Britain. *C. podana* was first described in 1854, and is now distributed throughout Europe, though it has not yet reached the United States. Characters of the larva in all its seven instars are described in the paper under review, and its depredations in each stage are considered. The pupa and mature insect receive shorter treatment. An extensive list of host plants, and a graphic description of damage done, give an idea of the economic significance of the pest. Methods of control depend upon the host plant. Larvæ can be removed from rhododendrons by spraying with lead arsenate, while this wash has little effect on the pest as it occurs on fruit trees, where the method of feeding is different. Traps

placed around a bright light at night exterminate considerable numbers of mature moths, and several parasites of the larva are known.

A Wilt of Snapdragons. A serious disease of snapdragons recently occurred near Pretoria, South Africa. It was very swift in its action, for affected plants were often apparently healthy one day, and permanently wilted the next. The young roots and the base of the stem rotted and were frequently discoloured. The cause of this troublesome malady was investigated by Dr. Margaretha G. Mes ("A Wilt of Snapdragon, *Antirrhinum majus*, in South Africa", *S.A. J. Sci.*, 31, pp. 281-287, Nov. 1934). Two fungi were isolated from diseased tissues, one belonging to the genus *Phytophthora*, and the other to *Fusarium*, but infection experiments demonstrated that the former was the real pathogen. *Fusarium* was, however, responsible for discoloration of wilted plants. The disease-producing organism was identified as *Phytophthora pini*, var. *antirrhini*, but appears to have been classified also as a form of *P. cactorum*. Zoospores have been demonstrated, and the antheridia and oogonia are typical of the genus.

Vernalisation. Since the publication of Bulletin No. 9 on vernalisation by the Herbage Bureau, Aberystwyth, research on the subject has been proceeding rapidly in the U.S.S.R. The many conflicting statements that have appeared in the scientific and popular literature, however, have made it desirable that an authoritative account of the subject should be given, and the Bureau, with the collaboration of Prof. N. A. Maksimov, of the Institute of Grain Husbandry, Saratov, U.S.S.R., has issued a further publication, "The Theoretical Significance of Vernalization" as Bulletin No. 16 in the Herbage Publication Series (Aberystwyth: Imp. Bur. Plant Genetics, 2s. 6d.). Since the discovery that by subjecting partially soaked seed to low temperatures, winter varieties of cereals could acquire the properties of spring varieties, that is, yield the same summer, the investigations have been extended to other types of plants. In the case of soy bean and cotton, vernalisation is effected by exposure of soaked seed to sufficiently high temperatures, after which fruit is formed successfully, even if subsequent temperatures would normally be too low. On the theoretical side, Lysenko's views are discussed in full, the most important of which seems to be that growth and development are essentially different phenomena. The plant, although in an apparently dormant condition, may be undergoing transitional developmental processes which can be profoundly affected by external conditions. Changes in the nature of the plant's composition are also brought about by vernalisation, both the colloidal properties of the protoplasm and the staining reaction of the embryonic tissue being altered after treatment. The first idea, that vernalisation actually accelerated plant development, is now regarded as needing modification. The truer interpretation seems to be that part of the growth period, which normally takes place in the field, can be transferred back to the early germination stages. The question as to whether or not vernalisation is an irreversible process is still a debatable point.

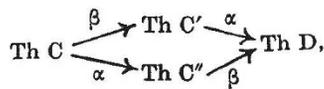
Recent Changes of Level in Japan. In the latest number of its *Bulletin* (12, 851-860; 1934), the Earthquake Research Institute has issued a valuable series of plates that illustrate recent changes of level

in Japan. During the last two years, a new line of precise levels has been carried out along the route bordering the east coast from near Tokyo northwards to Kamaisi and thence across the Main Island to Akita. Throughout the whole course of more than 350 miles, the crust since the last surveys (usually made between 1894 and 1900) has, with a few small exceptions, subsided. The principal movements are described by Messrs. T. Terada and N. Miyabe (*Tokyo Imp. Acad. Proc.*, 10, 557-560; 1934). They consist of V-shaped depressions, one of which, about 100 miles north-north-east of Tokyo, has reached a depth of 32 in. in about thirty-six years. It lies in a line with the valley of the River Natui, a zone of frequent earthquakes. Another, of about 6 in. in thirty-four years, occurs on the cross-country route about 36 miles south-east of Akita. Some miles nearer the latter town, the curve of depression shows a marked break where it crosses the fault associated with the severe earthquake of March 15, 1914.

The Oxygen Afterglow. E. M. Stoddart (*Proc. Roy. Soc.*, A, Dec. 1, 1934) has investigated the afterglow obtained in oxygen, both in electrodeless high-frequency discharges and in discharges between aluminium electrodes. Pure oxygen showed no afterglow with electrodeless excitation, whether or not the surfaces of the tube were 'poisoned' with water vapour. This poisoning had been found by former workers to be necessary for the afterglow. No afterglow was produced by the addition of various other gases including nitrogen. With the electrode discharge, no afterglow was found with pure oxygen, but the addition of a little nitrogen produced a powerful afterglow. By connecting the tube with a trap cooled in a carbon dioxide freezing mixture, nitric oxide was shown to play a part in the afterglow. The afterglow gradually disappeared and nitrogen peroxide could be recovered from the cooled trap. No nitrogen peroxide was found in the electrodeless discharges. A spectral examination of the afterglow showed weak diffuse bands which are not oxygen bands. The author concludes that nitric oxide is formed by a process involving the metal electrodes in the tube, and that the emitter is the same as is present in the chemi-luminescence of nitric oxide and ozone.

The Limits of the Continuous β -Ray Spectrum. H. O. W. Richardson has recently discussed the low energy β -rays of radium E and W. J. Henderson has investigated the high energy limit of the β -rays from thorium C and C" (*Proc. Roy. Soc.*, A, Dec. 1). The deposit of radium E was made on a thin aluminium foil and was placed in a Wilson expansion chamber. The energies of the electrons were deduced from their range, and in evaluating the distribution, corrections were made to allow for the loss of the ends of tracks by passing out of the illuminated field and in other ways. A number of the tracks observed are of secondary origin, but there is some evidence of a low energy group of β -rays from radium E. The paper by W. J. Henderson describes an analysis of fast γ -rays from thorium C and C", using the semicircular magnetic focusing method with a pair of Geiger-Müller counters as a detector. The counters are mounted so that a β -ray passes through both counters, which are separated by a thin mica sheet. Only coincident discharges of the counters are recorded, and this method reduces by a factor of 25 the effect of the γ -rays from the source, which would otherwise mask the β -rays

completely in spite of the lead screening. The distribution curves for the sources of thorium B + C + C" slope steeply down to an end point at 2.25×10^6 volts, while those for the sources of thorium C" prepared pure by recoil have an end point at 1.795×10^6 volts. Beyond these limits there is a slight background and a line at H ρ 10,280 known to arise from thorium C". The experiments show that in the two alternative modes of decay of thorium C,



the maximum energies by the two paths balance exactly. This is in accordance with the theoretical suggestions of Ellis and Mott, according to which the maximum energy of the β -rays represents the difference in binding energies between the parent and product nuclei. The energy missing when a β -particle of lower energy is emitted has not yet been traced.

Magnetic Properties of Bivalent Samarium. Although bivalent samarium compounds have been reported as non-existent, P. W. Selwood (*J. Amer. Chem. Soc.*, 56, 2392; 1934) has prepared the dibromide by heating the tribromide in hydrogen and has measured its magnetic susceptibility. This is found, at various temperatures between about 100° and 400° abs., to be almost the same as that of trivalent europium. This is the result which would be anticipated from the Sommerfeld-Kossel rule, which states that ions with equal numbers of electrons often have very similar properties. The arrangement of electrons in trivalent europium is (from the 4f shell outwards) $4f^6 5s^2 5p^6$. In bivalent samarium it is probably the 6s and one of the 5d electrons which are lost, $4f^5 5s^2 5p^6 5d(^2 6s)$. The remaining 5d electron, however, migrates to the 4f shell, thus producing a configuration identical with that of trivalent europium. The result is of added interest because both samarium and europium have anomalous temperature coefficients of magnetic susceptibility. A previously reported discrepancy in the susceptibilities of the compounds Sm_2O_3 and SmBr_3 , of trivalent samarium, was not found.

Atomic Weight of Protactinium. A specimen of protactinium oxide which showed no impurities by the X-ray method has been prepared and utilised in the determination of the atomic weight of protactinium (A. V. Grosse, *J. Amer. Chem. Soc.*, 56, 2501; 1934). Potassium protactinium fluoride, K_2PaF_7 , crystallises in beautiful colourless needles, can be dried to constant weight, and can be reconverted into the oxide by treating with sulphuric acid, diluting, precipitating with ammonia and igniting. In two determinations, 0.091907 gm. and 0.070047 gm. of K_2PaF_7 gave, respectively, 0.056274 gm. and 0.042913 gm. of Pa_2O_5 . The atomic weights of protactinium calculated are 230.4 and 230.8, the mean value, 230.6 or 231 ± 0.5 , being in good agreement with Aston's mass-spectrograph results on actinium lead ($\text{AcD} = 207$). The compound PaCl_5 , discovered by Grosse (*J. Amer. Chem. Soc.*, 56, 2200; 1934), might be more suitable for the precision atomic weight determination planned, but larger quantities of protactinium (which is now available for use in ordinary chemical manipulations) are desirable.