

## Research Items

### Effect of the Medium on Radium-sensitivity of Cells

IN a communication addressed to the Editor, Dr. G. Harker, of the Cancer Research Committee, University of Sydney, describes the extension of his observations (NATURE, 137, 190; 1936) on the inhibiting effect of radiation from radium plaques on the inversion of sucrose by living yeast cells, an effect now found also with X-radiation. If during irradiation with radium the cells are kept in suspension by gentle stirring, the inversion of sucrose is less than in the unstirred cells, although, owing to settling, the latter are much closer to the radium. The magnitude, and even the direction, of this effect are dependent on the neutral salt content of the medium. Since Loof-bourow *et al.* (NATURE, 139, 589; 1937) have shown that stimulating substances may be liberated from irradiated cells, Dr. Harker removed the aqueous suspension fluid by centrifuging the suspension of cells after 18 hours irradiation by 30 mgm. of radium, and re-suspended the cells in fresh sucrose. It was found that the passage of substances from the cells into the liquid increased inversion in both this and the non-irradiated control specimen, but the increase was greater in the irradiated one. When the cells were irradiated in 10 per cent sucrose solution with the same quantity of radium, after 5 hours exposure the extent of inversion by the re-suspended yeast was less than that of the control; after 18 hours it was greater. It is concluded that in the early stages stimulating, and in the later stages inhibiting, substances are given off into the solution by irradiated yeast cells, and that the solution in contact with the cells plays an important part in these effects.

### Anatomy of the Ox

WHILE a considerable amount of work has been done on the dog and horse, so that the anatomy of these animals is now fairly well known, not nearly so much has been done on cattle. In a recent publication, H. N. Chelva Ayyangar (Imp. Council Agri. Research, Sci. Monograph No. 11, 1937) has provided a detailed account of the course, constitution and distribution of the nerves supplying the levator anguli scapuli and rhomboideus muscles and of the formation of the phrenic nerve in the ox. In the same monograph are included descriptions of forty-seven deviations from the normal course or constitution of various arteries and nerves in the same animal. Thirty-seven of these have already appeared separately, but are here gathered together. The monograph is fully illustrated by seventy-one diagrams or photographs of the actual dissections.

### Biology of Rhodesian Diptera

THE attention of students of Diptera is directed to two papers by Mr. Alexander Cuthbertson (*Proc. and Trans. Rhodesia Sci. Assoc.*, 35, August 1937). These articles deal with the biology of various Diptera inhabiting Rhodesia. In the first paper are given short accounts of the larva and pupa of *Solva* (Xylophagidae) and of species of *Tabanus*, *Rhynchomyia* and *Tricylea*, which are also figured in the text. Three new species of Asilidae are also described by

Dr. E. O. Engel, of Munich, who collaborated with the author. In the second paper there are given biological notes and observations on various Diptera, including accounts of a number of species of Asilidae and the prey which they had captured.

### Sense Organs of Fishes

A CONDENSER-COUPLED five-stage amplifier, a Matthews's oscillograph, a loud-speaker and a delicate perfusion method were employed by A. Sand (*Proc. Roy. Soc., B*, No. 833, Aug., 1937) to investigate the mechanism of the lateral sense organs of fishes. The types employed were the roach, the rudd, the plaice, the dogfish and three species of rays. The receptors of the lateral line system show a common mode of behaviour with those of the semicircular canals, which is perhaps not surprising when one takes into consideration the origin of the two sets of organs. Excitation is brought about by the movement of the fluid in the canal; that it is a fluid is demonstrated by the ease with which it can be utilized in perfusion. It is a system of great mechanical sensitivity and can appreciate tapping, made with a hammer on the table on which the specimen lies, that is too slight for perception with the hand. There is a spontaneous frequency of discharge from the individual end-organs, and a slow movement of the fluid in the canal produces a response over and above these. Over the greater portion of the range of stimulation the receptor organs obey the logarithmic law. The two directions of flow in the canal have contrary effects, that in one direction being excitatory and in the other inhibitory. The lateral-line sensory system is shown to be remarkably sensitive to low-frequency vibrations.

### Polychaetes from the Indian Ocean

THE Polychaetes collected by the John Murray Expedition 1933-34 have yielded a high proportion of new forms. Mr. C. C. A. Monro, to whose care was allotted the task of describing the collection, has found it necessary to create one new genus, thirteen new species and four new varieties (John Murray Expedition 1933-34, Scientific Reports, 4, No. 8, Polychaeta, 1937). Several of these came from deep water, whence, indeed, much of the collection came. Of the new species may be mentioned a *Nereis* with remarkably long pedal languets and a *Eunice* with extremely long and highly pectinate gills. Some of the species taken were previously known from localities in parts of the world far removed from the Indian Ocean. Thus from 1519 metres and below in the Arabian Sea comes a specimen of the Magellan *Goniada eximia* Ehlers, and from the Gulf of Aden at 91 metres an example of *Chaetozone setosa* Malmgren, the single specimen being inseparable from one of the same species taken at Spitsbergen. This *Chaetozone* had not previously been recorded from tropical seas. These and some other similar records again emphasize the cosmopolitan distribution of many Polychaetes, and form one of the most valuable features of this excellent report.

### Ecology of Soil Fungi

FACTORS which govern the numbers of soil fungi are of vital importance for the maintenance of continued fertility. Investigations into the effects of manurial treatment, season and crop upon the quantity and quality of soil micro-organisms have not been numerous, but Dr. Jagjiwan Singh has recently published the results of such a research problem (*Ann. App. Biol.*, 24, 1, 154-168, Feb. 1937). A direct correlation between soil fertility as measured by crop growth, and the number of fungi and Actinomycetes, has been established for two fields at the Rothamsted Experimental Station. Barn field, with permanent mangolds, and Broadbalk, with permanent wheat, are the two fields concerned. No dominant effect of the crop upon the soil micro-flora has been observed, nor can any effect of seasonal periodicity be claimed. Manurial treatments do not appear to induce specific fungal floras, though there was some evidence that *Penicillium* and *Dematiium* species were more widely distributed in the Barn field, whilst *Fusarium* was most common in the permanent wheat land.

### Long-range Weather Forecasting

SIR GILBERT WALKER has recently published an account of the methods adopted by the German Institute for Long-Range Weather Forecasting, under the directorship of F. Bauer, for its regular ten-day forecasts (*Quart. J. Roy. Meteorol. Soc.*, Oct. 1937). Statistical relationships connecting German weather with five-day means of pressure and temperature at distant centres of action are employed, also the method of studying the sequences of weather that followed the synoptic situations most resembling that of the forecast day; but apart from the thoroughness with which these parts of the work are done, there is nothing essentially novel about them. New ideas are, however, introduced in the conception of what may be translated as the 'broad-weather' situation—a condition of the atmosphere persisting for several days during which it controls the weather, being itself governed by conditions both in the troposphere and lower stratosphere. It has been found that the movements of regions of rising and falling surface pressure determined for a 24-hour interval, and defined by 24-hour isallobars, are usually almost completely in accordance with the gradient wind at a height of 5 km. and not with winds near the ground. At times, however, the 'steering' of the 24-hour isallobaric regions is by winds in the stratosphere, and that of the 3-hour isallobars by the winds of the lower troposphere. It has been found that the mean duration of a 'broad-weather' situation is  $5\frac{1}{2}$  days, and that their life-histories are closely connected with the formation and decay of 'highs' and 'lows' in the stratosphere. Since isallobaric systems most often move from some westerly point, this method would be less effective in British forecasting, where identification of the systems is hampered by paucity of observations to westward.

### Rare Gases from the Hot Springs of Bath

OLDER examinations of the gases from Bath Springs had shown that these contained helium, argon and neon. The helium could be attributed to radioactive change and the argon might be derived from the atmosphere, but the reported presence of a large proportion of neon was unexplained, since this gas is less soluble than argon in water. M. W.

Travers (*J. Chem. Soc.*, 1561; 1937) has analysed the gases from the King's Well and the Cross Spring and finds that the rare-gas fraction in each case consists of argon with about 12 per cent of helium and only 0.1 per cent of neon. The helium is certainly the product of radioactive change; the argon and neon are probably of atmospheric origin, the neon content being about half that in the atmosphere on account of its lower solubility. The gases from the springs were found to be free from oxygen but contained carbon dioxide; they contained about 13 c.c. of rare gas per litre. The rare gases were separated by means of fractionation by cooling.

### Gypsum and Anhydrite

THE important transition temperature of gypsum and anhydrite:  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} \rightleftharpoons \text{CaSO}_4 + 2\text{H}_2\text{O}$ , was given as  $63.5^\circ$  by van't Hoff and his co-workers and has been generally accepted. Very different temperatures have been reported by later experimenters. A. E. Hill (*J. Amer. Chem. Soc.*, 59, 2242; 1937) has made a careful revision of this matter, particular attention being given to the attainment of equilibrium. It was known that anhydrite solutions could remain unsaturated or supersaturated for months, and hence an attempt was made to reach equilibrium from both directions, at  $65^\circ$ ,  $45^\circ$  and  $35^\circ$ . From the solubility curves and previous data, it was found that a solubility curve could be drawn between the temperatures of  $20^\circ$  and  $100^\circ$  which was found to cut the well-authenticated curve for gypsum at  $42^\circ$ , which is the transition temperature. It will be seen that the new figure is about  $20^\circ$  lower than van't Hoff's figure of  $63.5$ – $66^\circ$ . The usual difficulty of reaching equilibrium from the side of supersaturation was encountered.

### Glide in Crystals

PROF. ANDRADE and his school are carrying out extensive work on the glide phenomena in strained single crystals. E. N. da C. Andrade and L. C. Tsien (*Proc. Roy. Soc.*, A, 163, 1; 1937) have investigated slip in single crystals of sodium and potassium which belong to the body centred cubic system. Work on other metals which crystallize in this system shows that glide usually takes place in the [111] direction, but that the glide plane is not, as it generally is in other structures, the most closely packed plane. The sodium and potassium crystals were formed by cooling a tube of the molten metal progressively from one end, and were stretched under paraffin oil. The slip markings on the surface of the crystal were correlated with X-ray Laue diagrams of the crystal structure. The direction of glide was always very close to a [111] direction. The glide plane was (123) in these experiments, in which the angle between the axis of the wire and the 123 plane lay between  $30^\circ$  and  $50^\circ$ . Single crystals of molybdenum were prepared by a method in which a region of high temperature gradient was made to travel along a wire which was maintained at a high temperature (Andrade, *Proc. Roy. Soc.*, A, 163, 16; 1937). The structure is body centred cubic, and experiments on the glide phenomena (L. C. Tsien and Y. S. Chow, *Proc. Roy. Soc.*, A, 163, 19; 1937) show that the glide direction is [111]. The glide plane is different at different temperatures, being very near a (110) plane at  $100^\circ\text{C}$ ., and a (112) plane at  $300^\circ$  and  $20^\circ$ . It appears that the gliding is not connected with the closeness of packing of the planes.