

## RESEARCH ITEMS

### Development of the Liver in the Salmon

HELEN I. BATTLE has investigated the hepatogenesis of the Atlantic salmon (*Salmo salar* L.) (*Canadian J. Res.*, 20, Sec. D, No. 4; April, 1942). Little is known about the early embryology of the liver in teleostean fishes, especially of the Atlantic salmon, and this detailed study is a valuable contribution to the subject. Many problems of interest arise, not merely in the embryonic phases but also following the larval period, when the liver undergoes an enlargement, and a differential growth accompanies the metamorphosis of other structures already observed as constituting the transition from parr to smolt. The present work deals with the gross morphological changes in the liver during development from the initial appearance of the 'anlage' in the 4-mm. embryo to the adult. A later paper will deal with the simultaneous histogenesis.

### American Freshwater Amphipoda

CLARENCE R. SHOEMAKER has given useful keys to the families and genera of American freshwater Amphipoda, describes several new species, and re-describes others imperfectly known ('Notes on Some American Freshwater Amphipod Crustaceans and Descriptions of a New Genus and Two New Species', *Smithsonian Misc. Coll.*, 101, No. 9. Smithsonian Institution of Washington, Publication 3675; 1942). Among the new species are some interesting cave-dwellers. One is from a cave in Cuba described first by Ada L. Weckel and now placed in the new genus *Weckelia*, another is a large *Crangonyx* from caves in Pennsylvania, discovered by Kenneth Dearolf, representing a new species, *Crangonyx dearolfi*. Four families of freshwater Amphipoda are so far known from America: Corophiidae, Talitridae, Haustoriidae and Gammaridae. Only one genus each is represented in the Corophiidae (Corophium), Talitridae (Hyaella), and Haustoriidae (Pontoporeia), but there are two sections in the Gammaridae, the Gammarus and Crangonyx sections, with several genera.

### Translocations in *Apotettix eurycephalus*

R. K. Nabours, F. M. Stebbins and W. R. B. Robertson (*J. Exp. Zool.*, 38, 239; 1941) report further results from X-raying males of *Apotettix eurycephalus*. Among the translocations observed in the progeny were two translocations: between chromosomes 1 and 4 and between chromosome 1 and the X-chromosome. Genetical analysis of the genes *OTG* and *W* and cytological evidence enable the authors to place the genes on chromosome 1 in respect to the centromere. In the case of the reciprocal translocation involving the X-chromosome and chromosome 1, it was found that the autosomal gene *W* had become transferred to the X-chromosome and showed sex linkage. Considerable data of the viability of animals with different chromosome abnormalities were obtained and it was shown that quite frequently a zygote with an abnormal chromosome constitution lived until the third or fourth instar.

### Localized Chiasmata in *Fritillaria Meleagris*

MEIOSIS in normal *Fritillaria Meleagris* is characterized by the bivalents being held together at metaphase by chiasmata strongly localized near the centromere. By treating the early stage of meiosis with colchicine and with heat, H. N. Barber (*J.*

*Genetics*, 43, 359; 1942) has been able to analyse the phenomenon more fully. He finds that heat treatment at the time of chromosome pairing reduces the chiasma frequency and tends to increase the proximal localization. On the other hand, treatment with colchicine reduces the chiasma frequency, and localization disappears. Indeed with colchicine pairing takes place at several places on the chromosome, which results in considerable interlocking. The interpretation given is that heat reduces the time limit of pairing and thus reduces the chiasma frequency without influencing the general method of pairing. Colchicine, on the other hand, by influencing the region of the centromere, reduces its advantage in pairing and slows the general rate of pairing. Normal localization in *F. Meleagris*, therefore, is taken as depending on an early limit of pairing and a centromere control of the contact points of the chromosome.

### Respiratory Channels in the Tomato Fruit

K. A. GLENDENNING, biochemist at the National Research Laboratories, Ottawa, has followed up some observations upon the respiratory activity of the detached fruit of the tomato with a study of the behaviour of the fruit while still attached to the plant (*Canadian J. Res.*, 20 (4); April, 1942). There is clear evidence that the ripening colour change on the vine involved at first a rise in respiration, to the yellow orange stage, followed by a decline as the fruits ripened to full red. A similar respiratory drift had been noted in detached fruits, and there the remarkable fact had been observed that this rise and fall may be abolished completely and the associated colour changes seriously modified, by blocking the stem scar area with melted wax. It is known that the act of detachment does not interfere seriously with respiratory activity so it was interesting to see if any region could be blocked in the still attached fruits so as to modify the respiratory ripening changes similarly. It was found that fruits failed to show the normal colour changes when melted wax was applied to the area of the fruit ordinarily covered by the calyx and also to the parts of the pedicel immediately adjacent to the receptacle and to the receptacle itself in the angle between pedicel and fruit. Most of these fruits abscised relatively early. The area of free gaseous interchange in the attached tomato fruit thus appears to be associated with this surface region of the fruit.

### Carboniferous Lycopods

J. M. SCHOPF's recent work on American material makes valuable progress with the fossil Lycopods. One paper (*Illinois Geol. Surv., Rep. of Investigations*, 50) deals with isolated megaspores, which are now coming to be used as one of the means for recognizing individual coal seams. Various types are discussed, including ones belonging to Lycopod seeds for which a genus is made. A second paper (*ibid.*, Circular 73) consists of a critical discussion of the Lycopod seeds *Lepidocarpon*, which are numerous in America. A third (*ibid.*, Report of Investigations, 75) deals with the rather obscure genus *Mazocarpon* Benson. A new species is described from abundant male and female cones which are so well preserved that the single large archegonium of the female prothallus is clearly seen. Various points are cleared up; for example, the ligule which is recognized; and it is interesting that the idea that this is the cone of *Sigillaria* is strongly supported, and also that the

megaspores are shown to be one of the commonest types in coal seams. The idea that this cone shows an approach to the seed production of *Lepidocarpon* must be given up. It is specialized on different lines, but at the same time it is not yet clear how the spores were shed. This remarkable material should be able to provide information on this and other points of the life-history of *Sigillaria*.

#### Constitution of Agar

In some experiments described by W. G. M. Jones and S. Peat (*J. Chem. Soc.*, 225; 1942) evidence is presented that agar is the sulphuric acid ester of a linear polygalactose, the unit chain being composed of nine *d*-galactose residues mutually combined by 1:3-glycosidic linkages, and terminating at the reducing end by a residue of *l*-galactose, united with the rest of the chain by a glycosidic linkage engaging  $C_4$  and not  $C_3$ . The *l*-galactose member is esterified at  $C_6$  with sulphuric acid. This structure is shown to account for some reactions studied. The interesting suggestion is made that in the biological synthesis of agar a sulphate fulfils a similar function to the phosphate in the enzymatic synthesis of starch from glucose 1-phosphate, and this is explained more fully. The phosphoric acid is not retained in the starch, but with the agar the sulphuric acid, functioning as *d*-galactose 1-sulphate, remains with an adjusted orientation as an integral part of the molecule.

#### Copper Compounds

THE hydrated blue gel thrown down by addition of a base to a cupric salt solution passes into black cupric oxide at a rate depending on the conditions of formation. H. B. Weiser, W. O. Milligan and E. L. Cook (*J. Amer. Chem. Soc.*, 64, 503; 1942), by phase rule and X-ray diffraction methods, have shown that  $Cu(OH)_2$  is the only compound formed in the  $CuO-H_2O$  system, although four definite lower hydrates have been reported by another worker. The brown to black oxide  $CuO$  is formed by spontaneous decomposition of the cupric hydroxide gel, this being (as has long been known) accelerated by contact with dilute alkali. If the ratio of equivalents of cupric sulphate to alkali in a mixture is less than or equal to 1, the blue precipitate is pure cupric hydroxide; if it is equal to or greater than 1.33, the precipitate is basic sulphate,  $4CuO, SO_3, 3H_2O$ , identical with the mineral brochantite; if the ratio is 1.25, it is a new compound,  $5CuO, SO_3, xH_2O$ ; if between 1 and 1.25 a mixture of this and cupric hydroxide; if between 1.25 and 1.33 a mixture of the two basic sulphates formulated above. The identity of the new basic salt  $5CuO, SO_3, xH_2O$  was established by several methods, including analysis of crystals.

#### Renin

It was known that the intravenous injection of saline extracts from fresh kidneys causes a prolonged rise in blood pressure, and this has been shown to be due to the presence in the extract of a protein renin, soluble in water and dilute salt solutions, insoluble in alcohol and deactivated by heat and capable of purification by fractional precipitation by ammonium sulphate. O. Schales (*J. Amer. Chem. Soc.*, 64, 561; 1942) has now described a method by means of which it can be obtained in good yields and with a high degree of purity. This is a long and rather complicated process, which is set out in detail. Renin appears to be a pseudoglobulin. No evidence of the presence of a removable prosthetic group has so far been found.

#### Structure of Complex Fluorides

INTEREST has recently been taken in the determination of the structures of complex ions containing fluorine and apparently having the unusual co-ordination number of 7. Cubic crystals of potassium and ammonium heptafluorozirconates contain the  $ZrF_7'''$  ion with point-group symmetry of  $C_{3v} - 3m$ . The fluoxyniobate ion  $NbOF_6'''$  has a similar configuration in cubic crystals of  $K_3 NbOF_6$ . Monoclinic crystals of the isomorphous  $K_3 NbF_7$  and  $K_3 TaF_7$  contain the complexes  $NbF_7''$  and  $TaF_7''$  with the point-group symmetry  $C_{2v} - mm$ . J. L. Hoard and M. B. Williams (*J. Amer. Chem. Soc.*, 64, 633; 1942) have now examined the structure of  $(NH_4)_2 SiF_7$  by X-ray analysis. The result shows that this does not contain an ion with 7-covalency similar to those just mentioned, but the crystals are ordered aggregates of  $NH_4^+$ ,  $F^-$  and octahedral  $SiF_6''$  ions, and hence the salt (which was discovered by Marignac in 1859) can best be represented by the double-salt formula  $(NH_4)_2 SiF_6, NH_4 F$ . Some of the interatomic distances are 10 per cent larger than anticipated for the co-ordination number involved. This is correlated with the very soft character and limited stability of the crystals, and the unusually large effects of thermal vibrations on the observed intensities of the diffraction maxima.

#### Defects in Glassware

At a meeting of the Society of Glass Technology on June 16-17, A. J. Holland, Eric Preston and W. E. S. Turner presented a paper on "Cords, Surface Finish and the Quality of Glassware". Omitting from consideration those defects classed as stones, seeds or blisters, the two main defects which impair the quality of glassware are those which occur in the body of the glass due to the presence of 'cords', and those present on the surface and which are largely dependent on mould conditions. A comparison was made of direct-shadow, polariscopic and photo-optical methods of determining cordiness. For routine comparisons and control, the direct-shadow method is extremely sensitive and excellent degrees of cord estimation can be accomplished in this way if preliminary standards are first set up over a sufficiently wide range—a 'figure of merit' was obtained depending on the range of cordiness covered by the reference samples. A thermostatically controlled centrifuge was also set up to separate from finely powdered glass samples glass of differing densities, and in this way an estimate of cord could be obtained either by giving the total density spread of a sample, or the mass-density distribution in the form of a grading curve. The defects which occur on the surface of the ware arising from contact with moulds or tools used in shaping the glass object have been but little investigated. A general comparison of surface conditions can be made, again, by a shadow method, but an optical method is to be preferred. It is even more difficult to give a numerical value for surface condition than for cord, but again a satisfactory 'figure of merit' is obtainable from standards set up and photographed at magnifications between 50 and 100 under conditions of oblique illumination. A scheme is in hand, however, for the utilization of an optical method, which, as in the case of cords, would give a value independent of the observer's judgment. In view of the minuteness of the surface unevennesses, however, it is not anticipated that such a method would be very sensitive.