

## RESEARCH ITEMS

## Columbia River Salmon

THE *Stanford Ichthyological Bulletin* (2, No. 6; Dec. 1943), published by the Natural History Museum of Stanford University, contains a paper by John C. Marr on "Age, Length, and Weight Studies of Three Species of Columbia River Salmon (*Onchorhynchus keta*, *O. gorbuscha* and *O. kisutch*)", being Contrib. No. 9, Department of Research, Fish Commission of Oregon. The salmon runs of the Columbia River have held an important place in the economic structure of Oregon and Washington since the beginning of their exploitation in the 1860's. The fishing intensity has increased constantly and the reduction of spawning areas, brought about by the construction of dams and other developments of water resources, have acted unfavourably to modify natural conditions and the productivity of the fisheries. In the genus *Onchorhynchus* the most important commercially is the chinook salmon *O. tshawytscha*; the next in importance are the steelhead *Salmo gairdneri*, the blueback *Onchorhynchus nerka*, the silver salmon *O. kisutch* and the chum *O. keta*, while the pink salmon *O. gorbuscha* is not sufficiently numerous to be of commercial importance. As the runs of the chinook and blueback which ascend to the higher reaches of the river system are seriously depleted, the trend of the catch of silvers and chums has been upward in recent years due to an increased fishing intensity. Since they spawn in the lower tributaries they have suffered relatively less from the destruction of spawning beds. Thus they will probably become increasingly important in the commercial fishery, and their life-histories are now being thoroughly investigated. The present work deals in detail mainly with the age, length and weight of *Onchorhynchus keta* and *O. kisutch*. It is demonstrated that, in comparison with data from other localities, in both from south to north there is a decrease in mean length at the same age; older fish are progressively more abundant and the runs are progressively earlier.

## An Interesting Larval Trematode

R. M. Cable and Richard A. McLean record the occurrence of *Cercaria clausi* Monticelli, a marine larval trematode, on the west coast of Florida (*Notulae Naturae*, Academy of Natural Sciences of Philadelphia, No. 129; 1943). This is a rare type of cercaria which has the peculiar habit of forming rosettes, the tails clinging together and the bodies sticking out from the centre of the mass. The present specimens were found inhabiting the marine prosobranch gastropod *Lamellaria leucosphæra*, which in captivity gave out the cercariae. There is an interesting point, namely, that the host of this worm is recorded as both *Lamellaria leucosphæra* and *Trivia europea*. Recent classification places *Lamellaria* and *Trivia* very close together and both possess pelagic larvæ of the echinospira type. It may very well be that the miracidium enters the host when in this pelagic echinospira phase. A search for such larvæ might be fruitful and of interest. If this supposition were proved, it would indicate a final host which was pelagic and not of necessity living always in the near neighbourhood of the mollusc. Photographs are given of the larvæ in this paper, but clear drawings are much needed also.

## Sporulation in Yeast

C. C. Lindegren and E. Hamilton (*Bot. Gaz.*, 105, 316; 1944) and C. C. Lindegren and G. Lindegren (*Bot. Gaz.*, 105, 305; 1944) have discussed the process of spore formation in yeast. After describing a new medium which gives the maximum spore formation of cultures, they show that the genetic constitution has a considerable influence upon spore formation. Legitimately diploid strains sporulate regularly and well, whereas single-spore cultures which may be either haploid or illegitimately diploid are irregular and sparse. The analysis of forty baker's yeasts showed that some were diploid while others were of single spore origin. Sporulation occurs more readily at the edge of the colonies where many of the cells are autolysed. These cells may supply necessary nutrients for the sporulation. It was known from the work of Nickerson and Thieman that riboflavin and sodium glutarate were specific substances for conjugation and sporulation. The parallelism with the paraphyses in *Pyrenomyces* and with the structure of bacterial colonies is pointed out. From the cytological investigations of Lindegren and of Badian it would appear that chromosomes exist in bacteria and that they undergo similar changes to those observed in higher plants. There are two chromosomes in the diplophase of yeast. In a further paper by C. C. Lindegren and G. Lindegren (*Proc. U.S. Nat. Acad. Sci.*, 29, 306; 1944) it is shown that the four spores of one ascus of certain strains of *Saccharomyces cerevisiae*, which persistently produce haploid cultures from single spores, are of two types. Pairing and sporulation occur regularly and easily between but not within these two types. It is believed that allelomorphs controlling incompatibility are present as in fungi. The authors confirm the fact that *Torula* forms are imperfect forms of *Saccharomyces* and when properly mated produce copulation tubes of the pattern of *Zygosaccharomyces*.

## Iso-allelomorphism

C. Stern and E. W. Schaeffer (*Proc. U.S. Nat. Acad. Sci.*, 29, 361; 1944) provide evidence for an important aspect in evolution. Three strains of *D. melanogaster* were homozygous and similar, except for the genes on the fourth chromosome which contains cubitus interruptus. At normal culturing temperatures 25-26°, these three strains all appeared to contain the similar normal allelomorph of *ci*. When raised at 14° one strain gives *ci* type individuals as well as normal. When this locus containing the normal allelomorph is present in flies deficient for the partner chromosome (hemizygotes) a different strain produces *ci* type individuals. When tested as heterozygotes with *ci* and especially with *ciw*, the normal allelomorphs of *ci* in the three strains are further separated. These *iso*-alleles have been found in many loci in *Drosophila* and in other organisms previously. The importance of the *ci* case is that the wild types in the three strains tested were found to be different. The prevalence of these small genic differences which have no immediate striking or switch effect is of great importance in evolution.

Pathogenicity of *Ophiobolus graminis*

THE complex pathogenicity of the fungus *Ophiobolus graminis* on cereals is discussed in a brief paper by N. H. White and G. A. McIntyre (*J. Coun. Sci. and Ind. Res. Australia*, 16, 2; May 1943). Eight single-spore isolates of the organism, derived from

eight ascospores within a single ascus, were grown upon three different media and inoculated on two kinds of sandy loam soil. All three of these factors affected the pathogenicity. One strain produced no disease; another infected 89 per cent of the plants. Relative differences between isolates were not the same for different media, though straw medium was generally most suitable and soil medium least so. Differences in pathogenicity due to variation in cropping soil were usually small, but changed with the isolates. Any control of this fungus must therefore overcome the extreme variability of the pathogen.

#### Composite Nature of Spotted Wilt Virus

D. O. NORRIS announces in a short note (*J. Coun. Sci. and Ind. Res. Australia*, 16, 2; May 1943) that the spotted wilt virus of tomatoes is a mixture of at least three strains. The virus was obtained from potatoes at Canberra, and the three components form necrotic, ringspot and mild symptoms respectively. The necrotic strain appears to be identical with tomato tip blight described by Milbrath (1939) in Oregon. This discovery should explain the many observed variations in the severity of spotted wilt, for the symptoms will thus vary according to the number and ratio of strains which are present.

#### The Sprengnether Vertical Seismograph

WILLIAM SPRENGNETHER, JUN., of St. Louis, has designed an instrument to meet the demand for a simple, low-priced, short-period vertical-component seismograph of fairly high sensitivity (*Trans. Amer. Geophys. Union*, 1941). The frame consists of a rigid truss with a long hinge-bar at right angles to it. Above the rear end of the truss a weight is carried by a vertical bar on which it is adjustable in order to regulate the period by setting the centre of gravity in any desired relationship to the point of suspension from the spiral spring. The principal part of the mass consists of this counterweight and of a brass box at the forward end of the truss containing a pair of elliptical brass spools on which are wound flat coils; and to a lesser extent of a copper plate supported on a forward extension of the boom or truss, adding to the inertia mass of the moving system. The hinge consists of two pairs of thin crossed springs attached to the hinge-bar of the moving system and to a rigid cross-piece fastened to the frame. The coil-box is free to move between the poles of a large, powerful Alnico magnet. The copper plate moves between the poles of three pairs of commercial Alnico horse-shoe magnets, by which critical damping is easily obtained. Wires are led from the coil-box over the frame to the neighbourhood of the hinge-line and thence to a galvanometer. The period chosen in the case of one such instrument used at Saint Louis University lies between the microseisms, which usually have periods of 4-7 sec., and the local traffic disturbances, which have periods less than a second. The magnification is about 3,000. The instrument not only produces good records of local earthquakes, but it will also react to the shorter periods in the beginning of distant earthquakes to such an extent as to produce a sharp record of the beginning where horizontal seismographs of moderate high sensitivity will fail to do so.

#### Experimental Measurement of Irrigation Water

A PAPER with the title "Medición de las aguas en las estaciones experimentales de riego", by Prof. Juan L. Raggio, with the collaboration of Juan C.

Dragonetti and Adolfo E. Foglia, describes the method adopted for measuring with precision the volumes of water used for irrigation purposes at the experimental station attached to the Institute of Mechanics and Hydraulics at the University of Buenos Aires (*Rev. Fac. Agron. y Vet.*, 10, 111; 1943). An account of the gauges which were used is supplied, and the previous work of Prof. Giulio De Marchi is utilized. He showed how a simple calculation could determine the dimensions of the gauge ("Dispositivi per la misura di quota". *L'Energia Elettrica*, published in 1936-37), and continuing the work on his lines, a study has been made of the hydraulic processes developed in the gauge. A brief description of the irrigation system of the station follows, and a full account is given of the experiments carried out with the gauge to determine the coefficient of expense for various volumes. The paper is illustrated by a number of diagrams and by a chart showing the relation between the theoretical and actual volumes of water and also the coefficient of expense. On the basis of 5.5 litres of water per second, it is shown that the errors existing between the theoretical and actual figures do not exceed 4 per cent. A short appendix deals with the experimental plant on which the agricultural hydraulics of the Faculty of Agriculture of the University of Buenos Aires depends and in which the gauge was utilized.

#### Differential Corrections to Double Star Orbits

W. P. HIRST has shown how an approximate arithmetical method can be used for applying differential corrections to the elements of the orbit of a double star (*Mon. Not. Roy. Astro. Soc.*, 103, 6; 1943). The usual procedure for deriving these differential corrections by the method of least squares was criticized some years ago by van den Bos, who pointed out that the result obtained is scarcely worth the work, and also that the elements that make the sum of the squares of the residuals a minimum are not necessarily the most probable (*U.O. Circ.*, 98; 1937). He described in the same issue a graphical method based on the residuals in position angle only. This method consists of plotting the residuals in angle as ordinates against any convenient abscissa, such as the mean anomaly, or even the serial number of the measure, and comparing this graph in turn with the graphs of the differential coefficients of the equation of condition in angle, plotted against the same abscissa. The residual curve is corrected differentially after each comparison to remove any systematic resemblance between the residual curve and the coefficient curve. The residual curve is then compared with the next coefficient curve and again corrected, and so on, until no further resemblance with a coefficient curve can be detected. Hirst's method is based on that of van den Bos, but it is much less laborious, and is applied to the orbit of A.417 (A.D.S. 16497). It starts with the function  $\delta\theta/\delta e$ , which is zero at periastron and apastron, positive from periastron to apastron in the direction of motion, and negative in the other half of its orbit. Hence, if the preliminary value assigned to  $e$  is too small there will be, on the average, an excess of positive residuals in the half of the orbit after periastron as compared with those in the half preceding periastron. On this basis, it is shown that very satisfactory results are obtained with much less labour than is involved in the least square method.