RESEARCH ITEMS

Salmon of the River Shannon

ARTHUR E. J. WENT has continued his researches on Irish salmon (*Proc. Roy. Irish Acad.*, **49**, Sect. B, No. 9; 1943). The work was undertaken in order to ascertain the differences in the stocks since the completion of the great dam at Partean on the River Shannon in 1929, which marked the beginning of a new stage in the history of the river as a habitat for salmon. After a few years the stocks of salmon in the river had decreased considerably in consequence of the construction and early operation of the hydro-electric plant. Apart from this decrease in numbers, which was of considerable importance both biologically and commercially, there is ample evidence that the characters of the stocks have also changed within the past twelve years or so. In 1940 a new fishing weir, known as the Thomand Weir, was completed, and this provided satisfactory facilities for the collection of suitable material for study. The incoming populations of the years 1927 and 1928 were compared with those of 1941. The incoming populations of 1941 were well conditioned and differed little from the pre-1929 runs. The following differences were found in the 1941 stock: average age of the smolts somewhat higher; a much larger proportion of grilse in the total runs; a much larger proportion of the total catch taken in June; total age of the fish more than a year less, three-year old fish predominating instead of four-year olds; and a considerable decrease in average weight due to the greater proportion of grilse.

Australian Freshwater Mollusca

TOM IREDALE has produced a "Basic List of the Freshwater Mollusca of Australia" (Contributions from the Australian Museum, Sydney, N.S.W., *Australian Zoologist*, **10**, Part 2; 1943). This is a sequel to the list of land Mollusca previously published in the same journal. The fundamental idea is to determine the relation between shell and environment. The shell characters vary much according to habitat. The study is of undoubted value, for many of these snails might serve as hosts for economically important parasites, especially trematodes. Some systematists may doubt whether the introduction of so many new generic and specific names can have any useful purpose, and they will hope that such names are not generally adopted without the most careful consideration.

Polyploidy in the Red Algæ

IN the Floridean red algæ, in addition to the usual haplobiontic and diplobiontic types of life-cycle, using the terms suggested by Svedelius, a few species bear sexual organs and tetrasporangia on the same filaments. In *Spermothamnion Turneri* (Mert.) Aresch., Miss Drew (*Ann. Bot.*, **7**, 25; 1943) finds sexual organs on tetrasporic and on normal haploid plants, and also on the haploid individuals degenerate sporangium mother cells. Since sex cells occur on haploid and diploid plants, the carposporophyte may be diploid, triploid or tetraploid; the diploid and triploid carpospores are viable, but tetraploid plants have not been recognized. The only previous case of triploidy in a member of the Florideæ was reported by Drew in 1939 in *Plumaria elegans*, where the plants are maintained by paraspore production. In *Spermothamnion Turneri* the triploid plants do not appear to fit into the life-cycle, though some evidence suggests that tetraspores may be formed on them. Miss Drew has studied this species in Great Britain and at Wood's Hole, and triploid plants have been found on both coasts. It is of interest to recognize these cases of polyploidy in Florideæ, and cytological investigation of other aberrant types should prove of interest. Such studies also emphasize the ability of plants of this group to produce similar plants and reproductive organs irrespective of the cytological condition of the tissues.

Sweet Clover Hybrids

W. K. SMITH (*J. Hered.*, **34**, 134; 1943) finds that the sweet clover hybrids *M. alba* × *M. dentata* are chlorophyll-deficient and soon die. By grafting these hybrids on *M. officinalis* they were raised to maturity and a few seedlings obtained by backcrossing the hybrids to *M. alba*. These backcross progeny are also weak, but it may be possible to transfer by this novel method the coumarin-free character of *M. dentata* to *M. alba* and thus provide a valuable economic plant. It is interesting to note that there appears to be stock-scion incompatibility between some plants of *M. officinalis* and the hybrids.

High Rate of Mutation

K. MAMPELL (*Proc. U.S. Nat. Acad. Sci.*, **29**, 137; 1943) finds that the progeny of a pair of *Drosophila pseudo-obscura* Race *B* had an abnormally high rate of mutation. About 2,000 mutations and nearly all types of characters have been found. A gene 'mutator', probably located on chromosome II, appears to be responsible for the increased mutation-rate. When heterozygous, the rate is 34 times that of the normal rate, and when homozygous it increases the rate 70 times: there is a linear response to loss of gene. The significance of such gene effects in evolution is important.

Instrument Transformers

IN a paper on this subject read in London before the Institution of Electrical Engineers on November 19, A. Hobson discusses ratio and phase-angle errors and means whereby improved accuracies may be obtained. Section 1 describes a new method of reducing current-transformer errors, using a compensator which may be either an integral part of the transformer or a separate unit for use with an existing transformer. The compensator employs normal design principles and does not depend on highly critical conditions such as saturated cores. Very high accuracies are obtained, and standard transformers may be constructed having almost unmeasurably small errors over the whole current range, using the most sensitive testing equipment. In Section 2 a method of testing voltage transformers is described in which the Arnold current transformer equipment may be adapted for this purpose. The set measures the difference in error between a standard and the test transformer. Section 3 deals with the estimation of the errors of three-phase star/star voltage transformers at their working burdens, from the results of tests at unity-power-factor burdens. Two methods are given, the first using the six phase-to-neutral test results usually provided by manufacturers, and the second, in which no three-phase calculations are involved, using the results of twelve special tests if

three phases are to be loaded or of six tests if only two phases are to be loaded.

Stellar Continuous Spectra

A PROTRACTED investigation of the continuous radiation emitted by stars has been conducted in France during the last decade by MM. Barbier and Chalonge and their collaborators. The work was finished just before the German occupation and the results have apparently been printed in *Annales d'Astrophysique* (**4**, 1 ; 1941). A corrected proof has now reached the United States, and an article by J. L. Greenstein (*Astrophys. J.*, **97**, 445 ; 1943) summarizes the authors' conclusions, and reprints in full their numerical results. The measurements were made on the energy distribution in the ultra-violet spectra of 204 stars, mostly of the early types, and are given in the form of two spectrophotometric gradients φ_1 and φ_2 for the regions to the red and to the violet of the Balmer limit respectively. Zero points for the observed gradients were obtained by comparing the spectra of the stars with the continuum given by hydrogen discharge tubes, which were themselves frequently compared with standard filament lamps. The tabulated gradients have an average probable error of about $\pm 0{\cdot}04$ for spectral types earlier than *G0*. Also tabulated are the values of the discontinuity *D* in the logarithm of the intensity on crossing the Balmer limit : on the average, these have probable errors of $\pm 0{\cdot}01$. The mean gradients for 17 normal *A0* stars are given as $\varphi_1 = +1{\cdot}00$ (colour temperature 16,500° K.) and $\varphi_2 = +1{\cdot}39$ (colour temperature 10,500° K.), the uncertainty here being of the order of $\pm 0{\cdot}10$ owing to the great difficulty experienced in accurately comparing the blue hydrogen tubes with the reddish filament lamps. Several variable stars were studied, and the effect of interstellar absorption on the shape of the energy distribution curves of reddened stars is discussed. The results throw doubt on the λ^{-1} law of interstellar absorption, which had been thought to be fairly well established. The paper concludes with a valuable table giving statistical data (φ_1, φ_2, *D* and their standard deviations) for normal stars arranged according to spectral type.

Movements in Chromospheric Eruptions

M. A. ELLISON has used his spectrohelioscope at Sherborne during the past two years to collect information on the lateral and vertical movements of chromospheric eruptions (*Mon. Not. Roy. Astro. Soc.*, **103**, 1 ; 1943). 187 measures were made, on twenty-two eruptions, on the average at three-minute intervals, and the means show a red-shift for all values of line-width lying between 1·75 and 5 A. The red-shift is intimately connected with the growth and decay of each eruption, and is not inherent in the bright hydrogen from which the eruption is generated. Various reasons are given to show that a Doppler interpretation is very improbable, and it is suggested that the red-shift is an effect of asymmetry in the contour arising from increased absorption on the violet side of the emission line. On the supposition that the eruption is a centre from which matter capable of producing absorption is being expelled, it is probable that the amount of this matter and also the absorption produced by it will increase with the line-width and intensity of the eruption in accordance with the observations. The growth and decay of line-width during the progress of ten eruptions show that there is the same general sequence for all eruptions, namely, a rapid rise to maximum brightness and line-width is followed by a slow decline, the durations of rise and fall being in the ratio of about 1 to 4. In 95 eruptions there were no cases where lateral movements could be detected with any certainty. Where there were apparent lateral movements a satisfactory explanation could be found either by outward diffusion or by the fading of one part of the bright emission followed by an increase in brightness of an adjacent part.

Photographic Observations of Comets at Riverview College Observatory

D. J. K. O'CONNELL has described the results of the photography of five comets, Comet Finsler (1937*f*), Comet Kozik-Peltier (1939*a*), Comet Cunningham (1940*d*), Comet de Kock (1941*c*) and Comet van Gent (1941*d*) (*Mon. Not. Roy. Astro. Soc.*, **103**, 4). The instruments used were a 6¾-in. lens (focal length 130 cm.) and a 4-in. Ross-Grubb-Parsons lens (focal length 46 cm.), and, except for the plate of Comet van Gent, the telescope was guided on the comet. The plates were measured on the measuring machine at Mount Stromlo Observatory, by permission of Dr. Woolley, and the reduction was made by a method described by Dr. Comrie (*J. Brit. Astro. Assoc.*, **39**, 203 ; 1929). Each plate was reduced with two sets of three comparison stars, and a table gives the results of each solution, together with the comparison stars and their respective dependences.

Gradients and Colour Temperatures of γ Cassiopeiæ

D. L. EDWARDS has described the results of colour-temperature observations at the Norman Lockyer Observatory of γ Cassiopeiæ from June 1938 to October 1941, using objective-prism spectra of δ and γ Cass. (*Mon. Not. Roy. Astro. Soc.*, **103**, 4). Although the comparison star, δ Cassiopeiæ, is a variable, the range of magnitude is only 0·07, and it is probably of Algol type, so there seemed to be no reason why it should not be used for a gradient comparison, and it is probably devoid of temperature variation. The instrument used was the 12-in. McClean prismatic camera, stopped down to 4 in. to give convenient exposure time, and adjusted to give the spectrum in good focus at regions near *Hα* and *Hγ*. The instrument has a dispersion of about 32 A./mm. at *Hγ*. Fast panchromatic plates which were specially made for the purpose were used, and these were sensitive to approximately 7000 A. The results are shown in a table which gives the gradient difference between the two stars in the sense γ-δ, after correcting for atmospheric extinction, the absolute gradient of γ, and the corresponding colour temperature, this latter being obtained by assuming the point 1·00 for the Greenwich zero. There is at first a fairly rapid decrease of gradient, implying an increase in colour temperature, and this continued until April 1939, after which there was a sudden change, with a slight average increase followed by a further fall in absolute gradient to a minimum in February 1940, when the temperature reached the high value of more than 24,000°. An interesting relation exists between gradient and the number of Balmer emission lines in the spectrum during one stage of the star's outburst, but this relation does not appear to be permanent. Various changes in the spectrum accompanied the gradient changes, a few of which are mentioned, but a detailed description of these will be dealt with in a later paper.