RESEARCH ITEMS

Blackening of Golgi Bodies by Osmium Tetroxide and Silver Nitrate

THE problem of the blackening of the Golgi apparatus in various silver and osmic techniques is an old and still unsolved one. Among recent investigations those of P. B. v. Weel and E. Ries are interesting. In a recent communication to the Editors, they claim that there is a Golgi complex containing certain granules which they call "lipochondria", which at some stages produce osmiophilic substances, and are associated with the fatty Golgi substance, which always reduces osmium tetroxide, and has certain adsorptive capacities. Weel notes that after feeding a starved frog (in the cells of the intestine of which a clearly marked reticular Golgi apparatus is present) on peptone and glucose, the reticulum disappears, and is rebuilt again at the end of the resorptive process. But with feeding on fructose, no alteration of the reticulum was noted. Weel insists that the Golgi substance contains fatty materials which are used and consumed by the cell in certain periods of activity. The results of Weel and Ries are sharply at variance with those of G. Chr. Hirsch, who believes that the blackening is due to an adsorption of reduced osmium, silver or iron, and not to any chemical action. While Weel's view, that the osmium tetroxide reaction is a chemical one with lipins existing in the Golgi apparatus, will meet with a considerable body of support, the presence of "lipochondria" seems more doubtful. The papers of Weel and Ries will be found in the *Z. Zellforsch.* and the *Z. vergl. Physiol.* of 1936–1939.

Salmon of the Owenduff (Ballycroy) River

A. W. E. J. WENT, of the Department of Agriculture, Fisheries Branch, Dublin, (*Proc. Roy. Irish Acad.*, **47**, Sect. B., No. 6; 1941) has investigated the fishes in this river—a good one for small salmon and sea-trout. The records for the most part depend on scales from rod-caught fish, but give a fairly accurate impression of the stocks of salmon. The bed of parts of the main river and its tributaries which are frequented by salmon and trout consists mainly of gravel, and good spawning facilities are available. The material for the research consisted of more than a thousand sets of scales and data taken from the rod-fisheries of the Owenduff River during the fishing seasons of 1930–1939 inclusive, and 106 similar sets from the net fishery in the estuary of the river in 1938, together with some data from the main tributaries. Owenduff is essentially a small salmon river and the bulk of the fish have spent two years or less feeding in the sea. Of the maiden fish 94 per cent migrated as two-year old smolts and 5·5 per cent as three-year old smolts. Grilse and small spring fish formed 75·8 of the total catch. Previously spawned fish amounted to 4·9 per cent of the total number. The growth of salmon and sea-trout up to the end of the second year in the sea in the two- and three-year smolt classes are compared. The growth-rate of the salmon in fresh water is considerably less than that of the sea-trout. On the other hand, in the sea the growth-rate of the salmon is very much greater than that of the sea-trout. "Although the sea-trout start life in the sea with an initial advantage in length of over 2 inches, by the end of the first winter in the sea the salmon are on an average about 7 inches longer than the sea-trout. This advantage is more than maintained in the second year in the sea."

Microlepidoptera of Ireland

THE study of these small moths has been comparatively neglected in Ireland, and generally it is the larger species of the Microlepidoptera that are best known. It appears that the Tortricidæ and Lampronidæ are the best-worked families, and the most neglected are the minute Nepticulidæ. B. P. Beirne has published an up-to-date list of all the species so far known or believed to occur in Ireland (*Proc. Roy. Irish Acad.*, **47**, Sect. B, No. 4). He records 709 species or 54 per cent of the British Microlepidoptera. Of these, 105 species are bracketed as incorrect or doubtful, thus leaving 46 per cent definitely recorded. The classification followed is that of Meyrick, which has been corrected and brought up to date. In describing the distribution of each species, the county-divisions of Praeger, as used in his "Irish Topographical Botany", are followed. In a country that has been so little explored for these insects remarks on the abundance or otherwise of a species are usually not very reliable. It appears that the best-worked county is Dublin, and along with Wicklow and Kerry these three counties are the only ones explored for the smaller species. This carefully prepared list will prove of great assistance to future collectors and observers, who will also find the bibliography at the end very helpful.

Transmission of Monosomics

W. H. GREENLEAF (*Proc. Nat. Acad. Sci.*, **27**, 427–430; 1941) has analysed the transmission of n-1 gametes through the ovule of the monosomic-*P* of *Nicotiana tabacum*. Although a ratio of 3 monosomics to 1 normal plant is expected, only 4 per cent monosomic–*P*, are found. There is no Renner effect; every embryo sac is formed from the megaspore at the chalazal end. There is, however, a reduction in the number of seeds in a monosomic, and the author shows that the embryo-sacs arising from n-1 megaspores are much delayed in development as compared with normal. He suggests that delayed pollination might increase the proportion of monosomics in the progeny.

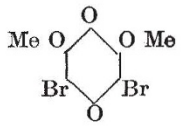
Phosphorus Trifluoride and Oxyfluoride

THE reactions between phosphorus pentoxide and simple fluorides and chlorides and with fluorapatite have been studied by G. Tarbutton, E. P. Egan and S. G. Frary (*J. Amer. Chem. Soc.*, **63**, 1782; 1941) and the physical properties of PF_3 and POF_3 have been re-examined. The melting and boiling points found are: PF_3, m.pt. −151·5°, b.p. −101·8; POF_3, m.p. −39·1° at 785 mm. (it sublimes at −39·5°), b.p. −39·7°. The vapour pressure curves were determined and the latent heats calculated. A small amount of difluophosphoric acid HPO_2F_2 (b.p. 108°–111°) was isolated; no previous record of this compound could be found.

Hexamethoxybenzene

IN the course of some experiments on derivatives of pentahydroxybenzene, hexamethoxybenzene has been prepared by Sir Robert Robinson and C. Vasey (*J. Chem. Soc.*, 660; 1941). A solution of tetramethoxydiacetoxybenzene in methyl alcohol by hydrolysis and methylation gave hexamethoxybenzene, white needles, m.pt. 81°, b.pt. *ca.* 278°, readily soluble in common organic solvents and moderately readily soluble in water; it can be

recrystallized from hot water. The starting substance for the preparation of the tetramethoxy compound was dibromodimethoxy-*p*-benzoquinone:



This was converted by sodium methoxide in methyl alcohol into tetramethoxy-*p*-benzoquinone, and by the action of zinc dust in acetic acid-sodium acetate solution the tetramethoxydiacetoxy compound was obtained. Hexahydroxybenzene is also formed by another process described by W. Baker (*J. Chem. Soc.*, 663; 1941).

Steady Flow of a Viscous Fluid through a Leaky Tube

THE classical work of Poiseuille on the steady flow of a viscous liquid through straight tubes of uniform circular section and with impervious walls is not directly applicable to conditions arising in biological problems. Here a similar flow occurs through tubes with membranous walls such as the fine capillaries through the walls of which nutritious fluids get from the blood to working (for example, muscle) cells. F. J. Turton (*Phil. Mag.*, **32**, 457; 1941) gives a theoretical treatment of this type of problem applicable to data supplied from the Cambridge Biochemical Laboratory by J. F. Danielli. The investigation shows that with leaky walls the pressure gradient may approximate closely to the constancy found with non-leaky tubes, but for certain conditions known to exist in practice, the mathematical results show considerable departure from constant pressure gradient. At the end of the paper the author offers to help any biologist wishing to use the mathematical results.

Solutions of Wave Equations

PROF. E. SCHRÖDINGER, now at the Dublin Institute of Advanced Studies, invites the collaboration of mathematicians in the detailed investigation of certain new types of wave equation. He points out (*Proc. Roy. Irish Acad.*, **47**, 1; 1941) that a decisive advance in quantum theory was made in 1934 by the hypothesis of E. Fermi. This asserts that just as Maxwellian waves are descriptive of the motion of light-quanta, but responsible for the forces between electrically charged particles, so the wave fields of de Broglie-Schrödinger-Dirac are descriptive of electrons but responsible for a new kind of forces between heavy particles. The mathematical expression of this leads to wave equations of a new type, and it is very desirable that the solutions of these equations should be fully investigated. A method which seems likely to be very useful is that of taking mean values over a sphere. This method reduces the number of independent variables from four to two. There is also a much more general method which is applicable to the "enlarged wave equation" of any conservative system, but it is not clear whether, in practice, this is as useful as what appear to be more special devices.

Magnitudes and Colours of Northern Stars

THE measurement of stellar brightness and colour depends so much on instrumental and atmospheric conditions that photometric catalogues prepared at various observatories are apt to exhibit large discrepancies. The establishment by the International Astronomical Union, twenty years ago, of the North Polar Sequence of standard stars was not altogether successful in removing these difficulties, mainly because the standards were too few, too bright, and too scattered. The obvious remedy was to increase the number of standards. Nearly ten years work to this end at the Mt. Wilson Observatory has now culminated in the issue of a Catalogue (Carnegie Institution of Washington, Publication 532; 1941) of magnitudes and colours for 2,271 stars north of declination +80°. Work on the new catalogue began by a systematic intercomparison of nine well-known polar catalogues; the provisional magnitudes so deduced prepared the way for the reduction of the more recent photographic observations (more than a hundred plates) on which the catalogue chiefly depends. These plates were taken with the 5-inch Ross camera at Mt. Wilson, and were measured in thermo-electric photometers. The limiting magnitude adopted was that of the B.D. Catalogue, roughly 11·0 photovisual. The magnitudes catalogued, photographic and photovisual, are given to two decimal places, and are weighted means of the new data and the older catalogue values, though the new values are also given separately. The probable error of a catalogue entry is about ±0·012 mag. for a photographic, and ±0·015 mag. for a photovisual value. These definitive magnitudes seem likely to supersede the old standards at once; and the scope of the catalogue is such that they may have an even longer life than the values they displace.

Polarization of the Corona

G. W. ALLEN has published a paper (*Mon. Not. Roy. Astro. Soc.*, **101**, 5; 1941) which contains the polarization observations made on the solar corona by the Australian Eclipse Expedition to South Africa on October 1, 1940. The chief object of the investigation was to determine to what extent the polarization of the corona varied with colour. The camera was fitted with a 6-inch Dallmeyer lens of focal length 36 inches. It was fed from an 8-inch coelostat with silvered mirror and gramophone motor drive. About an inch in front of the plate a 2½-inch disk of 'Polaroid' was placed in such a way that it could be rotated through 90°, and it was oriented to rotate from a polar to an equatorial direction. Interchangeable blue and red filters were mounted between the plate and the 'Polaroid' and two exposures were made on each plate, one with the 'Polaroid' oriented in a polar direction and the other with equatorial 'Polaroid'. One great difficulty in corona photometry arises from the correction for fogging by extraneous light, and at great distances from the sun on the long exposures this extraneous light was much brighter than the corona. The calibration of the photographic plates was effected by the use of a platinum step wedge placed in contact with the plate, and exposure was made inside the camera with the same colour filters, 'Polaroid' and plates as were used for the eclipse. A full description is given of the measurements of the photographs with the Radcliffe Observatory, Pretoria, photo-electric microphotometer, of corrections which were made owing to the incompleteness of the polarization of the 'Polaroids', etc. It was found that the polarization of the corona was practically independent of colour from 4600 A. to 6250 A. and also that it was almost independent of limb distance from 7′ to 40′. The degree of polarization was 41 per cent for red and 43 per cent for blue light.