

RESEARCH ITEMS

The Sargasso Sea

THE problem of the origin and extent of the weed in the Sargasso Sea, which has long been a debatable matter, is discussed by G. E. R. Deacon in a paper on the Sargasso Sea in the *Geographical Journal* of January. A century ago, Meyen argued that the weed grew as it drifted in the sea, that normal reproduction was vegetative and that the origin was in the Gulf of Mexico. Murray and Hjort did not subscribe to this theory; they believed that the weed would disappear if fresh supplies did not continually arrive from the coast. The weed certainly is not disappearing and there is not the least foundation for the statement of Tilden to that effect. It occurs in strips or patches, large and small, and is rarely out of sight in the whole area of the sea. Most of the weed belongs to two species, *Sargassum natans* and *S. fluitans*, but other forms are recognized. Mr. Deacon believes that there is little doubt that the weed is self-supporting, the total having been built up during centuries from plants drifted from the West Indies and by vegetative growth *in situ*. The annual contribution from the coasts is small. Evidence of vigorous vegetative growth, in leaves and branches free from Bryozoa, is abundant. Neither of the main forms, however, has been identified from the shores of the West Indies, but this does not preclude its original coastal origin. The absence of any field of weed on the coasts large enough to keep the Sargasso Sea as full as it is of weed shows that the weed must grow and multiply as it drifts, while the distribution of the currents is responsible for its accumulation and maintenance.

Excretion of Ammonia by Blowfly Larvæ

IN contrast with the vast majority of insects, which excrete the greater part of their nitrogenous waste in the form of uric acid and its salts, the larvæ of blowflies eliminate most of their waste nitrogen in the form of ammonia. This latter method of nitrogenous excretion results in a most economic procedure since it involves no loss of unburned carbon. Pamphlet No. 109 of the Council for Scientific and Industrial Research, Commonwealth of Australia, comprises two papers on the above subject by F. G. Lennox, the insect studied being *Lucilia cuprina*. In the first article, the rate and distribution of ammonia production form the main subject. It appears that practically all the ammonia produced in the mid-gut passes to the hind-gut via the Malpighian tubes. It does not reach its maximum until one or two days after the peak of larval growth. The second article is concerned with the enzymes responsible for ammonia production in the species named. Judging by the large quantity of ammonia liberated in the presence of adenosine, it is concluded that adenosine deaminase is probably an enzyme of major importance in blowfly larvæ. Deamination occurs chiefly in the midgut region where proteolysis can also be demonstrated. The few other insects known to excrete ammonia nitrogen include the larvæ of *L. sericata* (Hobson, 1931), and of *Calliphora vomitoria* (Wienland 1906). In order to establish the claim that the ammonia liberated by such larvæ is a product of their own metabolism and not of associated micro-organisms, the insects were reared from sterilized eggs in a sterile synthetic media. The details of the technique employed and the apparatus are fully described in the present pamphlet.

Rate of Growth and Timber Quality

L. P. V. JOHNSON, forest geneticist, National Research Laboratories, has reported the results of an examination of the effect of rate of growth upon timber quality carried out upon forty-three trees of hybrids and parents involving *Populus alba*, *P. grandidentata* and *P. tremuloides* (*Canadian J. Res.*, 20, 28; 1942). As these hybrids can usually be propagated readily by vegetative means and may have a rate of growth far in excess of their parents, the point is of great interest and the tentative conclusion—that rapid growth is not seriously detrimental to quality for paper pulp production—suggests great practical possibilities for these new hybrids. A short, thick habit of growth in these trees was found to be significantly correlated with high wood density, but correlation between growth-rate (in terms of annual increment of volume) and wood density was insignificant. In the same tree the fibres in wide annual rings were longer on the average than those in narrow rings—in the same annual ring the fibres of the early wood were shorter and thicker than those of the late wood. The last point recalls the observation of Priestley and Scott (*Proc. Leeds Phil. Soc.*, 3, 235; 1936) that the fibres among the vessels of the early wood of *Fraxinus* were shorter than those in the later wood.

Mechanism of Germination of Conidia of Erysiphe

THE mildews are characterized by a dispersal mechanism which seems to operate in relatively dry conditions and the conidia then seem to germinate and the infection to spread under low humidity conditions that would seem likely to militate against a mildew epidemic. Some very interesting observations and suggestions upon the subject appear in a paper by Harold J. Brodie and C. C. Neufeld of the Department of Botany, University of Manitoba (*Canadian J. Res.*, 20, 41; 1942). In *Erysiphe Polygoni* the conidium is cut off by a ring of wall material which forms from the periphery of the hypha inwards until a perforate disk is formed. Later, the pore in this disk is closed by a minute papilla by which alone the mature conidium remains attached until passively discharged. The wall of the conidium is relatively impermeable to water and stains enter only at the papillate end. This papilla thus seems to provide a permeable spot on the wall which is only exposed after detachment. The authors suggest that abstriction is thus followed by release of carbon dioxide and entry of oxygen through the papilla and that germination then starts even at low humidities. In support of this view they show that germination is checked in an atmosphere of nitrogen or in one containing 10 per cent carbon dioxide.

Volatile Reducing Substances in Vinegars

A STUDY of the volatile reducing substances in vinegar was reported by J. M. Whitmarsh to the Society of Public Analysts and Other Analytical Chemists on February 4. The Edwards and Nanji tests for oxidation and iodine values have been applied to a number of vinegars and the results compared with the results obtained by those authors. Estimations have been made of the amounts of various volatile reducing substances in vinegars and the presence of acetyl methyl carbinol in spirit vinegar has been demonstrated, contrary to several statements in the literature. The oxidation and iodine values of solutions of these volatile reducing

substances have been measured, and it is concluded that the distinctive values for spirit vinegar are due to its content of alcohol, and those for malt vinegar are due, largely if not entirely, to the presence of alcohol and acetyl methyl carbinol.

Equilibrium between Cuprous and Cupric Compounds

MANY cuprous compounds tend to decompose into cupric compounds and copper, and the chief controlling factor governing this instability has been shown by J. E. B. Randles (*J. Chem. Soc.*, 802; 1941) to be the degree of covalency or electrovalency of the bonding between the copper ions and neighbouring ions or molecules, which depends mainly on the polarizability of the latter. The transition from ionic to covalent type depends on a large decrease of ionic charge and so of electrostatic interaction. As the polarizability of the anions or molecules interacting with the copper ions increases, the interaction energy increases and the cuprous compound becomes more stable. The equilibrium between cuprous and cupric ions in presence of metallic copper was investigated with different compounds, and the results confirm the theoretical deductions.

Absorption Spectra of Unsaturated Ketones

THE absorption spectra of a number of β -unsaturated ketones have been examined by L. K. Evans and A. E. Gillam (*J. Chem. Soc.*, 815; 1941). Woodward (*J. Amer. Chem. Soc.*, 63, 1123; 1941) has tabulated the wave-lengths of the absorption maxima in many ketones, and his data show that they fall into three classes according to the substitution of the C=C—C=O group, the locations of the intense absorption bands being as follows: monosubstitution (α or β), 2250 ± 50 A.; disubstitution ($\alpha\beta$ or $\beta\beta$), 2390 ± 50 A.; trisubstitution ($\alpha\beta\beta$) $\pm 2540 \pm 50$ A. The nature of the substitution of the chromophoric group in these compounds can thus be predicted from the location of the main absorption band. Evans and Gillam find that, with very few exceptions, this generalization is well obeyed, which increases the usefulness of absorption spectra in the elucidation of organic structure. The study of the effect of substituting simple $\alpha\beta$ -unsaturated ketones with methyl groups showed that a larger bathochromic effect is produced by substitution on the β -carbon atom than by substitution on the α -carbon atom. Other types of compounds are also discussed in the paper.

Measurement of the Flow of Liquids and Gases

A USEFUL summary of methods used for measuring the flow of liquids and gases is given in a paper by E. Ower and the subsequent discussion (*Trans. Inst. Chem. Eng.*, 18, 87; 1940). The various types of instruments used are described and the methods of calculation discussed, and there is a short bibliography of recent literature.

Time Bases

O. S. PUCKLE, in a paper read before the Institution of Electrical Engineers on February 4, refers to the development of various types of time bases employing hard and soft valves, both for general- and special-purpose applications, the aim of the paper being to elucidate the principles involved rather than to describe the actual instruments in detail. Several little-known devices are described, and the highly important technique of producing and controlling pulses is considered. The results of recent investigations into some peculiarities of the gas-discharge triode are included, and presented in the form of an appendix.

Radial Velocity Curve of δ Cephei

INVESTIGATIONS of radial velocity curves of Cepheids have been published by Rufus and other Michigan observers, and these indicate the existence of marked relative displacements between spectral lines originating at different levels in the stellar atmosphere. These levels have been taken as equivalent to the heights of the same lines in the solar chromosphere. It is significant that Jacobsen and Mendenhall found no convincing evidence for the existence of relative displacements, and the same conclusion was reached by Petrie, who obtained about a hundred single-prism spectrograms of δ Cephei, using the same instrument as the earlier Michigan observers. H. A. Brück and H. E. Green have now discussed this subject (*Mon. Not. Roy. Astro. Soc.*, 101, 8). They have made use of a number of four-prism spectrograms of δ Cephei which had been secured with the Newall 25-in. refractor of the Solar Physics Observatory, Cambridge, and which had been originally used for a spectrophotometric study of line intensities and their variations during the cycle. These spectrograms have a dispersion of 13 A./mm. near $H\gamma$ and are in good focus over a wavelength region extending from λ 4250 to λ 4650. The negative results of Petrie and Jacobsen were confirmed, no definite relative displacements between lines of different atmospheric levels being detected. It is possible that small differences between the velocity curves of groups of neutral iron and ionized titanium lines exist, and there is some evidence for relative shifts in the case of the neutral calcium line λ 4425.6.

Solar Parallax and Mass of the Moon

THE Astronomer Royal has published a paper on "The Solar Parallax and the Mass of the Moon from Observations of Eros at the Opposition of 1931" (*Mon. Not. Roy. Astro. Soc.*, 101, 8); this is a summary of his complete results (*Mem. Roy. Astro. Soc.*, 66, Part 2). Independent determinations from observations of R.A. and Declination are in good agreement and the value adopted for the solar parallax is $8.7904'' \pm 0.0010''$. The probable error which has been assigned to the final value of the solar parallax is based on the high internal accordance of the results, and the question arises regarding a possible systematic source of error due to differential atmospheric dispersion. A discussion of this problem shows that the effects of colour differences between Eros and the reference stars tend to assume a random nature and the general effect is small. A description of the procedure adopted for the determination of the constant of the lunar equation is given, and the value derived from the Eros observations is $6.4390'' \pm 0.0015''$, and from this and the solar parallax the reciprocal of the mass of the moon is $81.271'' \pm 0.021''$. From this value and that of the constant of precession, $5493.156''$, the computed value of the constant of nutation is $9.2266'' \pm 0.0008''$; this is much larger than the adopted value, $9.210''$. An unexplained discordance has existed between the observed value of the constant of nutation and the value inferred from the observed values of the constant of precession and the mass of the moon, and it is remarkable that the new value of the mass of the moon has increased this discrepancy. It is highly desirable that an accurate value of the constant of nutation should be determined from observations specially planned for the purpose.