POETRY AND SCIENCE

ON December 9, the P.E.N. (Poets, Playwrights, Editors, Essayists and Novelists) Club held an informal discussion on poetry and science. The participants were Prof. Herbert Dingle, professor of the history and philosophy of science, University College, London; N. W. Pirie, head of the Biochemistry Department, Rothamsted Experimental Station; G. S. Fraser, a poetic critic; and Stephen Spender, a well-known poet. The chairman was Kathleen Nott, a poet who has written about the subject under discussion.

At first sight it might appear that these branches of culture had little to do with each other. But Prof. Dingle gave instances of the antagonism between poets and scientists, and pointed out that the overt attacks arising from this antagonism in the past were made by the poets. This, he said, is understandable; at that time it was thought that there was a real external world, the truth about which was being increasingly found out by the scientists. To poets, this world seemed flat and distasteful, but at the back of their minds the uncomfortable thought grew that any alternative was mere illusion. In Prof. Dingle's opinion, however, there is no need for the poet to harbour such resentment. The philosophical background has altered; and with this alteration, the activities of poet and scientist appear compatible. Omar Khayyam compared the first appearance of light out of darkness to a flung stone, and to the noose of a rope. Scientists also have compared light to a moving particle, and to an agitated cord. Finally, they have settled down to an equation embracing both concepts; but it is nonsense to say that light is an equation. In fact, science is the organized description of the relations between experiences; poetry, the expression of the experiences themselves.

This description of the limits of science, abnegatory as it might seem, did not dispel the injured suspicion of the poets present. Stephen Spender, side-stepping Prof. Dingle and attacking Kathleen Nott, re-asserted the right of the individual to subjective knowledge of truth. He said that the psychologist may attribute the cause of conscience to infantile experiences; he himself might attribute it to God; what claim has science to the unique truth of the matter? Not only are the findings of science uncomfortable in detail; they are also so complicated that no one man can understand them, and increase of understanding brings with it disorientation and despair.

G. S. Fraser brought in some second-order corrections to complicate Prof. Dingle's neat separation of the subjects. The findings of science are themselves some of the experiences of the poet. Donne was aware of Copernicus, and this awareness brought on discomfort to which he gave poetic expression. The quality of exactness is not confined to science, for poetry has its own criteria of exactness. A difference between poet and scientist is that whereas one particularizes, the other generalizes.

N. W. Pirie broke down the icy rigidity which science is apt to assume in such discussions, and gave a warm and humorous description of the scientist at work. In a highly selected environment records of observations are made. These statements are no more dramatic in content than 'the cat sat on the mat'. Having puzzled over these statements, and discarded those he dislikes, the scientist begins to devise a theory (which must be generally plausible), and to shape it into a form acceptable for publication. The language of scientific publication, by a long-enforced tradition, is strangulated in the extreme; any poet could be excused for finding it repulsive—though the use of the word 'elegant' is permitted. But, said Mr. Pirie, let us turn from the first and last of these processes to the second; in the act of imaginative creation the poet is not far from the scientist.

Neither in the opening addresses nor in the general discussion did the representatives of science and poetry get to grips. Prof. Dingle renounced certain territorial claims, and thereby lowered the intracultural tension. But he discreetly omitted any reference to one defended area of science: that of attempted approximate consistency. Of course, it is absurd to say that light is identical with an equation. But the equation itself is (in the meaning of the words familiar to scientific men) true of light; and only by changing the frame of reference can we say that it is true of ripeness that 'ripeness is all'. The chorus of approval of Humpty-Dumpty's attitude to words obliterates the fact that his conversation with Alice, like much of this discussion, was inconclusive.

To comfort any class of humans, especially poets, is an amiable end. But the study of poetry from the viewpoints of anthropology, individual psychology or information theory has interested some poets and might increase the knowledge (if not the comfort) of more.

C. E. G. BAILEY

STUDY OF THE BRITISH FLORA DURING 1953

ADDITIONS to the knowledge of the British flora during 1953 have not included spectacular discoveries of the kind reported in 1951 [1] and 1952 [2], but the year has been marked by steady progress in many branches of research. The annual exhibition meeting of the Botanical Society of the British Isles, which was arranged in the lecture room of the British Museum (Natural History) on November 28, will be remembered for the close studies of small groups and demonstrations of new techniques rather than for the new species and hybrids to the British list, and extensions of range of previously known plants.

The technique used by P. F. Yeo (University of Cambridge) in his exhibit of wild and cultivated specimens from six populations of *Euphrasia nemorosa* was of particular interest. He has overcome the difficulty of growing this partial parasite under satisfactory standard conditions by raising plants in pots which each contained a single plant of *Plantago lanceolata* to serve as a host. The method might well be adapted for the study of other critical parasitic

groups. Miss W. T. M. O'Connor (University of Liverpool) demonstrated the analysis of a suspected hybrid population between *Centaurium minus* and *C. littorale*. An analysis of differentiating taxonomic characters similar to that suggested by Wilmott[3] for discriminating *Euphrasia* taxa has been carried out, and Anderson's well-known 'hybrid index' method has been used in investigating the population. The selected characters were scored in each individual plant according to their agreement with the putative parents or their intermediacy, and the numerical index for each obtained by a summation of the scores. The structure of the population was then summarized in a frequency distribution.

An excellent example of the way in which modern experimental methods can be used to confirm and explain earlier inferences based on taxonomic and field observations was shown in the exhibit by J. D. Lovis and Miss M. D. Shivas (University of Leeds) on the synthesis of *Asplenium* × *breynii*. This fern has been found wild in small numbers in various mountainous parts of Britain, and is a triploid hybrid (somatic chromosome number, 108) between submontane diploid *A. trichomanes* ($2n = 72$) and *A. septentrionale*, which is a tetraploid ($2n = 144$). During the past year, six plants of the hybrid have been raised by hybridization experiments carried out at the Department of Botany, Leeds, and one of the plants became fertile. S. Walker (University of Leeds) exhibited the range of forms of *Dryopteris austriaca* (*D. dilatata*). This is normally tetraploid ($2n = 164$), but on Ben Lawers a diploid ($2n = 82$) plant occurs which differs in the fine cutting of the frond and very unevenly deltoid basal pinnæ. It forms sterile (triploid) hybrids with the tetraploid form, and it was suggested that it deserves specific rank.

Dr. F. H. Whitehead (University of Oxford), by a biometric method of discriminant analysis[4], using seed size, pollen size, and ratio of length to breadth of petals, showed that all the British material previously referred to as *Cerastium subtetrandrum* fall within the variation range of *C. tetrandrum* and are not justifiably interpreted as belonging to the Swedish taxon described by Murbeck. D. R. Glendinning also showed work likely to remove a name from the British list; his exhibit demonstrated that the characters attributed to *Polygala oxyptera* are produced by the influence of exposed conditions on plants of *P. vulgaris*, and he suggested that it should be included in that species.

Other careful studies of small groups of British plants included those by Dr. E. W. Davies, Miss P. A. Padmore and Prof. T. G. Tutin (all of University College, Leicester) on the *Carex flava* aggregate, *Ranunculus flammula* from Orkney and Shetland, and *Carex* Section *Acutae*, respectively; from Dr. J. H. Burnett, Miss S. M. Littleboy and Dr. E. F. Warburg (University of Oxford) on *Veronica* Section *Beccabunga*, *Apium*, and *Sorbus*, respectively; from M. C. F. Proctor (University of Cambridge) on variation and cytology of *Helianthemum guttatum* and allied species, and Miss A. Wylie (University of Manchester) on the genetical structure of the Caninae roses. F. N. Hepper (Royal Botanic Gardens, Kew) provided an exceptionally well-displayed exhibit to illustrate how populations of *Silene nutans* in Britain have developed their own characteristics[5]. Herbarium and living material was shown from the various populations, with electric switches provided, by means of which the localities from whence the specimens were collected could be illuminated on a large map of England and Wales set up as a background.

New plants to the British list on exhibition included one critical 'split', three hybrids and three aliens. D. E. Allen (University of Cambridge) showed *Cardamine crassifolia* Pourr. (= *C. monticola* Timb. Lag.), which he identified from a herbarium specimen collected in 1892 in Nant Frangon, Caernarvonshire. J. E. Lousley exhibited *Senecio* × *viscidulus* Scheele with its parents, *S. viscosus* and *S. sylvaticus*, from Frensham, Surrey; this hybrid is likely to be rare in Britain as the two parents seldom occur together. J. D. Lovis (University of Leeds) showed a living plant of an *Arum* from Arundel, Sussex, which from its morphology and chromosome number ($2n = 69$ or 70) seems likely to be a hybrid between *A. maculatum* and *A. neglectum*, with which it is associated. N. Y. Sandwith (Royal Botanic Gardens, Kew) displayed plants of *Hypochoeris glabra* and *H. radicata* from Wonersh, Surrey, with a plant which had intermediate characters and sterile achenes, indicating that it was a hybrid.

The alien aquatic *Egeria densa* (Planch.) Casp. was exhibited fresh in a tank by Miss L. W. Frost with a map showing its distribution in a canal in south Lancashire. It is known to have been introduced by an aquarist and is now thoroughly established, though restricted to the warm water coming from a mill effluent. Miss V. Gordon showed *Epilobium linnaeoides* Hook. f. collected at Helsby, Cheshire, in 1938 and found well established for more than a mile west of Leenane, Co. Galway, in 1953. In view of the rapidity with which the allied *E. pedunculare* A. Cunn. has spread in remote parts of Britain, the progress of this recently discovered species will be watched with special interest. B. T. Ward and J. F. Shillito exhibited *Cuscuta australis* R. Br. subsp. *cesatiana* (Bertolini) Yunckner from Enfield, Middlesex, and Barking, south Essex, as a parasite on various weeds and on garden asters.

Two exhibits gave additional information about important recent discoveries in Scotland. Dr. H. Godwin (Botany School, Cambridge) showed a single pollen grain of *Koenigia islandica* from late-glacial deposits at Whitrig Bog, Berwickshire. This species was first reported for Britain as a living plant from Skye in 1950[6], and evidence of its occurrence in late-glacial times is therefore of special interest. J. E. Lousley exhibited photographs and specimens of *Artemisia norvegica* from the locality in north-west Scotland where it was recently discovered by Sir Christopher Cox[2]. Some important earlier discoveries, and plants which have been the subject of recent papers in *Watsonia*, were illustrated by a fine series of sheets of mounted specimens from the herbarium of the British Museum (Natural History), which also loaned important material to supplement other exhibits. Dr. A. Melderis showed some interesting grasses he collected on the Society's visit to Forres, including true *Poa laxa* from the Cairngorms which seems to have been misunderstood in Britain. Miss M. S. Campbell showed living and dried material of *Erophila conferta* from Essex[7] and Perthshire[8].

Extensions of range of species already known included Prof. D. A. Webb's (Trinity College, Dublin) discovery of *Erica mackaiana* in west Donegal; this is only known elsewhere in Connemara and northern Spain, and it is very unfortunate that the new locality is threatened by hydro-electric development of the lough around which the plant grows. R. A. Graham exhibited photographs, paintings and speci-

mens of *Epipogium aphyllum* from Buckinghamshire. Here he found more flowering spikes of this rare orchid in one season than had been found altogether in Britain in a century, and it also reappeared in 1953 in an Oxfordshire wood where it had been seen previously. P. M. Benoit showed specimens of *Hypericum undulatum* from Merioneth, where he found it in August 1951; this plant has hitherto been known only from Devon, Cornwall and Pembrokeshire, and the new locality is the most northerly recorded. Another important discovery from Wales is that of *Lotus hispidus* from Haverfordwest, Pembrokeshire, where it was found by F. W. Adams, who also showed *Carex punctata* which grew with it, as it frequently does elsewhere. Miss S. Hooper showed *Tillaea muscosa* from Surrey, from which county it has not been previously reported. A. C. Jermy had interesting maps and specimens illustrating the variation and extension of range of *Naias marina* since its first discovery in the Norfolk Broads in 1883, while Dr. D. Coombe (University of Cambridge) showed detailed distribution maps of four species of *Impatiens* in Britain, illustrating their present status and dates of first evidence.

An exceptionally ingenious exhibit by J. F. M. Cannon (British Museum (Natural History)) and Miss M. J. Herbert showed the epiphytic flora of some trees by a stream near Flatford Mill. Possible dispersal agencies were illustrated by models, and an analysis of frequency of occurrence in relation to dispersal mechanism had been carried out. Two unusual plants found as epiphytes were *Fagopyrum sagittatum*, believed to have come from a field sown with buckwheat the previous year, and *Parapholis strigosa* from a salt-marsh—the nearest being half a mile away. Dr. D. P. M. Guile showed a one-inch map of the whole of the Brecon Beacons National Park, coloured for the associations recognized in his ecological survey and accompanied by a book with photographs and accounts of the main ecological types.

Limitations of space prevent reference to the remainder of the exhibits, an account of which will appear later in the *Proceedings* of the Society. The meeting was attended by about two hundred and fifty members and guests. J. E. LOUSLEY

[1] Lousley, J. E., *Nature*, **168**, 934 (1951).
[2] Lousley, J. E., *Nature*, **171**, 335 (1953).
[3] Wilmott, A. J., *Proc. Linn. Soc.*, **162**, 31 (1950).
[4] Whitehead, F. H., *New Phyt.* (in the press).
[5] Hepper, F. N., *Watsonia*, **2**, 80 (1951).
[6] Burtt, B. L., *Kew Bull.*, 266 (1950).
[7] Wilmott, A. J., *Watsonia*, **1**, 137 (1949).
[8] Campbell, M. S., *Scot. Nat.*, **63**, 49 (1951).

CACAO RESEARCH IN TRINIDAD

REPORT FOR 1945–51

THE development of research on the cacao tree started late but has been rapid, thanks chiefly to the activities of two centres—the Imperial College of Tropical Agriculture in Trinidad and the West African Cacao Institute at Tafo, Gold Coast. The Imperial College gave attention to cacao problems from its inception in 1922, and a small research scheme was established there in 1930, on which reports were published annually up to 1944. The scheme was expanded in 1947 and now employs eleven research workers, being financed jointly by the United Kingdom Government (under the Colonial Development and Welfare Act) and the Cocoa, Chocolate and Confectionery Alliance, Ltd. (representing the chocolate manufacturers of the United Kingdom).

The first report on the post-war phase of the research, which has recently been issued*, comprises twenty-seven technical papers under five headings and is summarized in an introduction by H. J. Page.

Selection, breeding and propagation. The wide variation between individual trees in the seedling cacao population of Trinidad estates suggested early attention to selection and vegetative propagation, with the dual object of providing improved planting material for the grower and genetically uniform trees for the research worker. A technique for rooting cuttings was found, and from 1937 onwards clonal trials were planted, in which each clone was represented by some trees on their own roots and some propagated by budding on seedling rootstocks. F. W. Cope reports in detail on the results of these trials up to 1951. In spite of careful initial selection, only about one in three of the clones has given heavy yields; but the best are very good and "may confidently be expected to yield several times as heavily as unselected material". The good clones have all performed better on their own roots than on seedling rootstocks; some of the poor clones yielded more as buddings.

Now that a number of clones have been established and tested, attention is shifting to the combination of desirable characters in new genotypes; and crosses have also been made to throw light on the genetics of self-sterility in cacao. A collection of cacao types and *Theobroma* species is being steadily built up, and since the report was written an expedition has been collecting in Colombia along the tributaries of the Upper Orinoco and Amazon.

H. Evans describes recent investigations on the propagation of cacao. The technique for rooting cuttings has been much improved by his detailed analysis of the physiological factors controlling the process. The results are of practical value as well as scientific interest, because the use of cuttings as commercial planting material is spreading. In Trinidad alone the annual nursery production is now of the order of a quarter of a million plants, and large numbers are raised in some other countries.

Soils and nutritional factors. Papers are included on the deterioration of cacao soils in Trinidad (F. Hardy) and on the results of a mulching experiment carried on for ten years (T. E. Wasowicz and G. Havord). Soil deterioration under cacao is a common problem wherever the crop is grown, and particularly where it is grown on marginal soil types. It is marked by changes in the organic surface layer, and sometimes by an actual truncation of the soil profile as a result of erosion. The first essentials for renovation are to re-establish crumb structure in the surface layer and to raise the level of available nutrients. Striking results have been obtained by mulching, but at high costs which further research may lessen.

Three papers by H. Evans and others dealing with the mineral nutrition of cocoa are of outstanding interest. Some of the diagnostic methods found useful elsewhere for determining mineral deficiencies

* A Report on Cacao Research 1945–51. Pp. 132. (Imperial College of Tropical Agriculture, St. Augustine, Trinidad, B.W.I., 1953.) 25*s*.