SCIENTIFIC BOOKS

PROGRESS BY COOPERATION

The New Systematics. Edited by JULIAN HUXLEY. 583 pp. Oxford University Press. $6.00.

A GROUP of the best British cytologists, ecologists, geneticists and taxonomists convened in June, 1937, in Burlington House, London, in the rooms of the Linnean Society and founded an "Association for the Study of Systematics in Relation to General Biology" under the presidency of Julian S. Huxley.

The society, recognizing that the supremacy of the morphological methods in taxonomy had lasted long enough, aimed to bring together a large group of general and taxonomic biologists to study, not only how recent advances and discoveries in various branches of general biology could further taxonomy, but also how taxonomy could reciprocate this help (". . . daring the reproaches of his biological colleagues the taxonomist maintains that his subject is the alpha and has the potentiability of becoming the omega of a very considerable part at least of biological knowledge"—Turrill).

Many of the opinions expressed by the founders of the society are hardly original, most of them had been said better and years ago in Scandinavia and Germany. Yet the founding of the society may well be a milestone in the history of biology as it represents the first *large-scale organized cooperative effort* to get away from old-fashioned outlooks and methods in taxonomy.

The following list of chapters may give an idea of the scope of the society's first book:

W. B. TURRILL: Experimental and synthetic plant taxonomy (simple cultivation under approximately uniform conditions; under varied but controlled or known conditions; cytological experiments; genetical experiments).

N. W. TIMOFEEFF-RESSOVSKY: Mutations and geographical variation.

C. D. DARLINGTON: Taxonomic species and genetic systems (the role of structural change; the decay of sexual reproduction; genetic isolation; hybridity, phylogeny; etc.).

SEWALL WRIGHT: The statistical consequences of Mendelian heredity in relation to speciation.

H. J. MULLER: Bearings of the "Drosophila" work on systematics.

LANCELOT HOGBEN: Problems of the origins of species. ("There is no one problem of the origin of species. There are many problems of the origins of species.")

E. B. WORTHINGTON: Geographical differentiation in fresh waters with special reference to fish.

C. DIVER: The problem of closely related species living in the same area. ("The aim of taxonomy is more than the mere pigeon-holing of different organisms on some convenient but completely arbitrary system of card-indexing. It seeks to establish relationships, and to determine what degree of dissimilarity is consistent with placing two individuals within the same species.")

E. J. SALISBURY: Ecological aspects of plant taxonomy (interesting conclusions, *vide* pp. 358–361).

W. H. THORPE: Ecology and the future of systematics.

G. R. DE BEER: Embryology and taxonomy. ("Two little embryos in spirit, whose names I have omitted to attach, and at present I am quite unable to say to what class they belong. They may be lizards or small birds, or very young mammalia.")

W. J. ARKELL and J. A. MOY-THOMAS: Palaeontology and the taxonomic problem. ("The question 'What constitutes a species?' always so troublesome to the neontologist, hardly concerns the palaeontologist, since the more he learns of phylogeny the more arbitrary must be the distinctions he draws between his species. He is, in fact, torn between two irreconcilable endeavours; for as a phylogenist he strives to reveal closer and closer relationships, while as a systematist he must point out differences and divide up his material into units bearing distinct names.")

J. RAMSBOTTOM: Taxonomic problems in Fungi (summary of special mycological problems, p. 412).

T. A. SPRAGUE: Taxonomic botany, with special reference to the Angiosperms.

W. T. CALMAN: A museum zoologist's view of taxonomy. ("What is very remarkable and significant, however, in this constant influx of novelties, is the rarity of the unexpected. The diversity is indeed unending, but it runs in well-defined channels.")

J. S. L. GILMOUR: Taxonomy and philosophy. ("A number of questions connected with the theoretical side of their work which are by no means satisfactorily settled and . . . . these points of disagreement are frequently a hindrance to progress in taxonomic practice.")

JOHN SMART: Entomological systematics examined as a practical problem. ("Steps should be taken to prove the worthiness of systematics for recognition as a discipline by the academic world. The present objection to recognition would, possibly, be largely removed if systematists showed genuine signs of adopting real rational and scientific methods for the coordination and recording of their information, and the prosecution of their work. It is possible that these findings may have an application to a wider field than Entomological Systematics alone.")

E. B. FORD: Polymorphism and taxonomy.

H. H. ALLAN: Natural hybridization in relation to taxonomy.

M. B. CRANE: The origin and behaviour of cultivated plants. ("The taxonomist has generally regarded the study of cultivated plants with suspicion. He has tended, possibly on account of a false philosophical distinction between natural and artificial conditions, to ignore all cultivated plants as outside his discipline or as forming a secondary applied branch of it, namely, economic botany. The geneticist, on the other hand, following Darwin's example, has found convenient and useful material in cultivated plants and domestic animals, with their wealth of analysable varieties and frequent high fecundity in crosses.")

N. I. VAVILOV: The new systematics of cultivated plants. ("We regard classical systematics, which works only with Linnean species, as merely a first step in biological knowl-

edge and quite superficial for the purposes of practical plant and animal breeding. Nor does it satisfy the requirements of a thorough study of species from an evolutionary point of view. We are now entering an epoch of differential, ecological, physiological and genetic classification. It is an immense work. The ocean of knowledge is practically untouched by biologists. It requires the joint labors of many different specialists—physiologists, cytologists, geneticists, systematists and biochemists. It requires the international spirit, the cooperative work of investigators throughout the whole world.'')

DR. JULIAN HUXLEY, who edited the book, contributed a general introductory chapter, often critically summarizing the essential contents of subsequent chapters.

"The New Systematics" is the society's first large cooperative publication. It is not a manual that will help a young taxonomist anxious to start working along new lines with as simple indications as the morphologists and anatomists of one or two generations ago found in Strasburger or Chamberlain. It is much more a collection of discussions and essays which one will have to read, reread and compare to make the best use of. Most of us taxonomists, feeling as we all do that our methods resemble more those of the bibliographer than those of the accurate experimental scientist, will gladly make this effort and will be rewarded by discovering a volume as inspiring as Linné's "Philosophia" and De Candolle's "Phytographie." Yet it carries another message. Linné (eighteenth century) taught us new methods of investigation and description; De Candolle (nineteenth century), in addition to these, new methods of documentation. The message of this twentieth century book is that taxonomy is going to be a field of cooperative research. This is important news for all who take the future of American science to heart, for nowhere in the world at present are conditions so suitable for large-scale cooperative research as in the New World.

The book shows better than any similar recent publication how the old taxonomist, who preferred the company of plants to that of men—the interesting figure of a generation ago, whose love for the *scientia amabilis* resulted very often from a desire to escape human society, will have to make place for another type of scientist anxious to cooperate and to organize collaboration with and between workers in many branches of general biology.

Julian Huxley on his last visit to this country urged the foundation of a society similar to the British society. May this book in the States be a stimulus to bring American taxonomists and general biologists closer together.

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SPECIAL ARTICLES

A CANCEROGENIC TISSUE EXTRACT FROM HUMAN SOURCES[1]

AN extract has been prepared from the livers of persons who died of cancer which on subcutaneous injection into mice produced sarcomas at the site of injection.

In one experiment 9,420 grams of liver obtained from eight cases were extracted. These people had carcinoma of the stomach (three cases), carcinoma of the lung (two cases), carcinoma of the esophagus, pancreas, and rectum (one case of each). There were no carcinoma metastases visible in the livers grossly or microscopically.

The livers were ground and preserved in an equal volume of 95 per cent. alcohol. They were then saponified with alcoholic KOH for 24 hours in a steam bath, a volume of water equal to that of the alcohol in the mixture being added. The material was then extracted repeatedly with ethylene dichloride. This extract was evaporated to dryness at reduced pressure and the residue was resaponified. The final unsaponifiable residue so obtained was a flaky brown material with a disagreeable odor.

This residue was dissolved by warming with sesame oil. The oil has been tested repeatedly, unheated and after heating, and found not to be cancerogenic. About half a gram of extract dissolved in .5 cc of sesame oil was injected subcutaneously in 56 mice on June 1, 1939. The test of the potency of the extract was by no means quantitative because great but variable amounts were lost by sloughing at the site of injection. The mice used were of our own albino stock. They were of both sexes and were from 55 to 83 days old at the time of injection. Over two thousand mice of this stock have been used in a series of long-time experiments and a spontaneous spindle cell sarcoma has never been observed in them. The stock carries a small incidence of spontaneous mammary gland tumors, lymphatic diseases and lung tumors.

The first tumor appeared between five and six months after injection, and the mouse died on December 7, 1939, 182 days after injection. The tumor was large, measuring $33 \times 25 \times 22$ mm. It lay in the subcutaneous tissues and infiltrated the underlying muscle and overlying skin. It had not metastasized. Microscopically it was a spindle cell sarcoma, which resembled the sarcomas induced by the common carcinogens.

At this time 37 of the original 56 mice were living. Some of these quickly developed tumors, so that at

[1] This work was aided by a grant from the National Advisory Cancer Council.