

complete contrast, there follow reviews on the diffusion and ultracentrifugation of proteins with their heavy reliance on commercial instruments. The principles of the methods, however, rather than detailed descriptions of equipment, are emphasized. An account of the study of non-Newtonian liquids in capillary viscometers pays welcome attention to experimental difficulties and illustrates by numerical examples possible sources of errors.

Research on unimolecular protein films has too few exponents; perhaps the present discussion of techniques and their application to the determination of molecular weights and diffusion coefficients on the microscale will stimulate more interest in this field. The book ends with a description of the measurement of light-scattering by proteins; it emphasizes the particular suitability of this technique for determining the molecular weight and asymmetry of large proteins and also for studying the kinetics of processes such as aggregation and denaturation. Like its two forerunners, this volume contains a wealth of illustrations and tables. Bearing this and the number of contributors in mind, the price is very reasonable. It is a pity that differential ultra-violet spectrophotometry has not been mentioned, but perhaps its value has only been realized since this series was planned.

D. T. ELMORE

## CHROMOSOME NUMBERS AND TAXONOMY

Chromosome Numbers of Central and Northwest European Plant Species

By Åskell Löve and Doris Löve. ("Opera Botanica" a Societate Botanica Lundensi, Vol. 5.) Pp. 581. (Stockholm: Almqvist and Wiksell, 1961.) 40 kronor.

THIS latest manual is intended as a reference work to the chromosome numbers so far reported for plant species and subspecies known to occur in central and north-west Europe as circumscribed by the authors. It lists 5,490 species and 1,360 subspecies of Pteridophytes, Gymnosperms and Angiosperms, of which chromosome counts are given for 4,417, that is, 80.7 per cent. Diploid and basic numbers are given: the basic numbers are calculated from the lowest diploid number known in the group in question, or are theoretical when only apparently polyploid numbers have so far been reported. An appendix lists new counts which have not been previously published, together with an indication of the source of the material and the name and institutional address of the worker concerned.

On the critical question of the taxonomic identification of the plants, the numbers of which are listed in the main text, the authors point out that most chromosome numbers are determined either by "cytologists lacking taxonomic training or by taxonomists lacking cytological skill and experience". They have not found it feasible to distinguish between those counts based on cultivated material and those based on spontaneous material.

This compilation must surely be the last of a distinguished series of chromosome lists to reproduce all numbers and counts reported, irrespective of the origin of the material or checks on its identity. What is now needed is much more selective chromosome information—for example, lists of accredited numbers for more restricted regions, discarding earlier or doubtful records and including only counts determined from spontaneous material growing within the region in question.

At the moment most chromosome number compilations, including the present one, serve more as a systematic guide to the relevant literature than as a basis for taxonomic, phytogeographical and similar conclusions. It cannot be stressed too often that reported numbers for species have to be sifted through and verified in perhaps the majority of

cases before they can be accepted. If even the most elementary conditions are laid down before numbers are accepted for inclusion in, say, a Flora, it is surprising how few numbers in the literature are found to satisfy these conditions.

Certainly the Löves have performed a signal service in making the source references available to us (the bibliography runs to nearly 200 pages) and this book should find a place on all taxonomists' shelves. The introduction of some 15 pages, in addition to outlining the scope of the work and giving the limits of the area covered and statistical data, includes an essay on the systematic arrangement adopted and a section somewhat ambiguously entitled "Limitation of Categories". The point of view of the authors is summarized by their acceptance of Mayr's definition of species as "groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups". As readers familiar with the Löves' work will expect, they adhere to the view that, with certain exceptions, all taxa differing in chromosome number are logically regarded as distinct species. Consequently, they do not recognize infraspecific polyploidy (apart from sporadic variants), an attitude that receives diminishing support to-day.

These views affect, of course, the taxonomic treatment adopted in the text. This would be of little moment but for the fact that they have found it necessary to make a number of nomenclatural changes (the details published in *Botaniska Notiser*, 114: 33, 48; 1961), some concerning the status of the groups concerned, others consequent on the adoption of narrow generic limits, especially in cases where cytological evidence apparently lends support. Thus *Lycopodium* is split into *Lycopodium 'sensu stricto'*, *Diphysium*, *Lepidotis* and *Huperzia*; and *Euphorbia* into *Tithymalus*, *Agaloma*, *Poinsettia* and *Chamaesyce*.

The volume is well produced, as we have come to expect from *Opera Botanica*. There are several misprints and minor errors. The foregoing criticisms apart, the Löves are to be congratulated on their immense industry and patience in producing this work. It must have been indeed a labour of love.

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## BIOLOGY AND HUMANITY

Biology and the Nature of Man

Based upon the Riddell Memorial Lectures Thirty-third Series delivered at King's College in the University of Durham on 7, 8 and 9 March, 1961. By Dr. W. H. Thorpe. Pp. xii + 122. (London, New York and Toronto: Oxford University Press, 1962.) 12s. 6d.

THIS collection of lectures by Dr. W. H. Thorpe, the thirty-third series of the Riddell Memorial Lectures, is in the manner and on the scale of the fourteenth series, namely, those delivered by the late Sir Edmund Whittaker. Biologist and mathematician respectively, they discuss the fundamentals of scientific theory and of belief: as a result they confirm the Christian religion in its sacramental aspect as paramount for the Universe and for experience. It is significant that the latter position at least is also reached on archæological grounds in a recent book by Prof. E. O. James. Taken all in all, this is a remarkable degree of agreement between a trio of scholars in such widely different fields of research.

In the chapters now before us, Dr. Thorpe discusses (1) the origin of man, (2) the mind of man and its origin, (3) the origin of man's moral nature, (4) the distinctiveness of man's moral nature, (5) the destiny of man. The terms of these lectures request that they should be given "with particular emphasis on and reference to the bearing of such developments on the ethics and tenets of Christianity". This wish has indeed been faithfully fulfilled. As a result, a distinguished natural scientist finds himself dealing with matters essentially theological and philosophical. As he