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Prospects in Systematics

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Edited by

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Preface

A prospect is a wide view; to prospect is to search with the promise of results of value to the prospector. Fifty years on from the foundation of the Systematics Association in 1937 it is appropriate to offer a critical review of the achievements of and developments in systematics over that period, and more particularly since the publication of the Association's seminal work *The New Systematics* edited by Sir Julian S. Huxley in 1940.

In the late 1930s, a biological dimension arising from genetical and ecological studies was being added to the then almost exclusively morphologically based taxonomy. This was an exciting period for systematists who were forced to rethink the principles of their subject, hence the prospect of *The New Systematics*. What was innovative in the 1930s has become routine in the 1980s. Therefore, it is fitting to readdress basal questions concerning the relevance of systematics to its consumers, the role it should play into the next century, and the major challenges systematics now faces.

Some 140 botanists, microbiologists, palaeontologists, and zoologists, theoreticians, practitioners, and users, drawn from 16 countries gathered in the rooms of the Royal Society of London on 1-3 July 1987 to consider such fundamental issues during an international symposium convened by the Systematics Association to mark its Golden Jubilee. The overall impression is of a vibrant subject adapting its concepts and practices to accommodate exciting new information from rapidly expanding areas of biology, but also one which needs to take increased note of the requirements of its users. Indeed, the main challenge for systematics in the coming decades emerges as the need to re-establish its central unifying position in biology; this can only be realized by fulfilling the demands of its consumers. To succeed in this will be to secure its future; to fail will result in an increasing decline in both credibility and resources.

Following a synopsis of the contribution of the Association, an assessment of the state of systematics, its products, user requirements, and constraints to development (Chapter 1), Mayr (Chapter 2) reviews recent historical developments and Heywood (Chapter 3) the structure of systematics itself. Patterson (Chapter 4) critically analyses new evolutionary theories and their impact, Claridge (Chapter 5) emphasizes the situation at and below the species level

with particular reference to concepts of allopatry and sympatry, Felsenstein (Chapter 6) focuses on techniques for the detection of phylogeny, and Hallam (Chapter 7) stresses the continuing relevance of palaeontology in contemporary systematics and evolutionary studies.

There is always a tendency to consider the newest technique as providing *the* answer. Dover (Chapter 8) reflects on the implications for systematics of recent advances in genetics, particularly problems of DNA replication and molecular drive. While Young (Chapter 9) and Ferguson (Chapter 10) show the value of the comparison of protein and nucleic acid homologies and isozyme studies, respectively, Joysey (Chapter 11) cautions on simplistic integration into systematics, as does Duckett (Chapter 12) for ultrastructural and Gower (Chapter 13) for numerical approaches. Phenetic and cladistic approaches are compared by Sneath (Chapter 14) who emphasizes the need to question what a particular classification is for.

In the rapidly expanding area of taxonomic information systems, Bisby (Chapter 15) stresses the importance of communication with users, while Watson and his colleagues (Chapter 16) demonstrate what can already be achieved. Dextre Clarke (Chapter 17) and Allkin (Chapter 18) look to the ways bibliographic databases and taxonomically intelligent databases could develop within the foreseeable future. Ride (Chapter 19) considers how Codes governing the basal taxonomic information, scientific names, need to evolve to accommodate modern user requirements. Those concerned with the use of names in microbiology (Nolan, Chapter 20), plant breeding (Pickersgill, Chapter 21), and medicine and veterinary science (Muller and Baker, Chapter 22), illustrate the relevance of systematics around the species level to diverse aspects of applied biology. Haskell and Morgan (Chapter 23) review user needs and obstacles to their fulfilment, and make proposals towards the future organization of the subject. Berry (Chapter 24) stresses the need for an increased level of understanding of the variety of life in the education of biologists. In conclusion, Margulis (Chapter 25) shows how the number of kingdoms of living organisms must be expanded to assimilate the wealth of new data of systematic relevance and the endosymbiotic theory of the evolution of eukaryote cells.

Although I was entrusted by the Association with the organization of the scientific aspects of this meeting, I benefited considerably from discussions with its Officers and Council members, particularly the late Dr A. R. Stone*. In these days of increasing specialization, such

* See obituary notices in *Coevolution and Systematics* (eds D. L. Hawksworth and A. R. Stone, 1986, Clarendon Press, Oxford, p. vii) and *The Linnean* (3, p. 53, 1986).

wide-ranging inputs are vital in the planning of multidisciplinary meetings and are a particular strength of the Systematics Association. The Association is also indebted to its distinguished Chairmen during the symposium, Professors W. G. Chaloner FRS, R. G. Davies, P. R. Day, A. Hallam, E. Mayr, P. H. A. Sneath, and H. W. Woolhouse; and to Professor K. Jones for his address at the Conference Dinner at Simpson's-in-the-Strand. Especial thanks are due to Professor R. G. Davies and Dr Z. Lawrence for their tireless efforts in ensuring the smooth-running of the symposium and its conjoint social events, and to Mrs M. S. Rainbow for clerical support.

Finally, the Royal Society of London is thanked both for a generous contribution towards the expenses incurred by overseas speakers, and for making its rooms available for this significant occasion.

Kew

D. L. H.

October 1987

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