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Editorial

A Festschrift for David L. Hawksworth

Systematic biology has undergone dramatic development over the last decades. This was chiefly due to the ease of generating DNA sequence data, which dramatically increased with next-generation sequencing. Although these new technologies allowed us to address issues unthought-of a few decades ago, the interpretation of patterns and deep understanding of the biology of organisms has become even more important. Integrative Taxonomy aims at merging data from OMICS technologies and phenotypical traits of organisms to better understand diversity on the planet. Mycology has been on the forefront of these developments and as one of the leaders in mycology, David L. Hawksworth, has been instrumental in synthesizing results from modern approaches and relating them to our understanding of morphological and chemical diversity in fungi. Integrative taxonomy also provides important insights for other disciplines in biology and beyond for making data-based decisions to solve socio-political challenges connected with biodiversity (German National Academy of Sciences Leopoldina, 2014: Challenges and Opportunities of Integrative Taxonomy for Research and Society: Taxonomic Research in the Era of OMICS Technologies. June 2014 Statement ISBN: 978-3-8047-3291-9). Specifically, the effective management of biodiversity depends on a better knowledge of evolutionary processes, including the differentiation and delimitation of species using molecular methods, but also studying the evolution of phenotypic characters. Open-minded expert taxonomists have been a cornerstone of the process that has led systematic biology to a modern integrated approach. An excellent example of such a taxonomist is David Hawksworth, who is celebrated in this Festschrift on the occasion of his retirement from Universidad Complutense in Madrid (Spain) where he served as Professor for the last 15 y.

David Leslie Hawksworth (DLH as he was called during his directorship in the IMI) was born in 1946 in Sheffield, Yorkshire, UK. He received his B.Sc. in 1967, and Ph.D. in 1970 from the University of Leicester (UK). In 1969 he started his academic career as a mycologist at the Commonwealth Mycological Institute and became its Director (then renamed as the International Mycological Institute) from 1983 until 1997. His main responsibility at the IMI was to direct, reorientated, and develop the intergovernmental institute into a world-class research and training centre. This included the relocation of the institute from Kew to Egham in 1992, and growing the directly earned annual income at the Institute from under £100 K in 1982 to £ 1.5 million in 1996 through a Strategic Development Plan. During the last 15 y David worked at the University Complutense of Madrid (UCM) in Spain, where he joined the SYSTEMOL research group at the Department of Biología Vegetal II.

It is a pleasure to honour David, one of the most eminent mycologists in the world. The relevance of his work is based on some qualities that are well developed in his personality: one is his enormous knowledge of anything that has ever been published on fungal taxonomy, his extraordinary private library – in part donated to the UCM – has certainly been an invaluable resource in this regard. He also has an incredible efficiency in transforming research into scientific publications; he has authored or co-authored over 600 scientific papers and book chapters on mycology including lichenology, systematics, moreover he authored, co-authored, edited or co-edited 56 books. A third quality of DLH as a researcher is his instinct for recognising the potential interest of a topic, and another one, equally important, is his open attitude in face of scientific progress. As a result, he is always an enquiring scientist – as evidenced by the constant incorporation of new methodologies to his research. However, DLH has not only been an incredible active and prolific scientist, but has made important contributions to science management and as advisor and member of countless committees in international projects.

In one recent interview in the mycological journal "Mushroom, the Journal of Wild Mushrooming" (2008), kindly facilitated by our colleague and his wife Patricia Wiltshire, David Hawksworth defined his profile as a researcher:

> *I don't really think of myself as primarily a lichenologist, as I have worked with many groups of fungi over the years. I never worked just on lichen-forming fungi, and my first job [1967] at the then Commonwealth (later International) Mycological Institute at Kew was responsibility for the identification of ascomycetes in culture sent in for identification from all over the world. I also have interests in broader aspects of biodiversity assessment, conservation, environmental monitoring, systematics, biological nomenclature, and latterly also forensic science. I admire those who can focus on a particular group of fungi for half a century or more and produce stupendous works of immense and lasting value, but I too easily become side tracked by fascinating fungi I encounter or problems that intrigue me.*

Indeed, he has been intrigued by a number of diverse problems, most of them subsequently becoming new fields of research, including coevolution and organismic interactions. He organised an international symposium on *Coevolution and Systematics* as early as 1986. He has also been a pioneer in the fields of bioindication or the study of the diversity of fungi growing on lichens (lichenicolous fungi). In fact in bioindication his *Qualitative scale for estimating sulphur dioxide air pollution in England and Wales using epiphytic lichens* (in collaboration with Francis Rose) in 1970 has been the starting point and a seminal paper in bioindication science; this work has been cited over 600 times (Google Scholar). Similarly he spearheaded the revival of the study of lichenicolous fungi, describing many new genera and species, and demonstrating also their remarkable biology.

The contribution of DLH to lichenology is widely recognised and in 2002 he was awarded with the Acharius Medal by the International Association for Lichenology. For his contributions to mycology in general he received the Ainsworth Medal from the International Mycological Association in 2014. His contributions to the development of a modern classification of ascomycetes has been one of his major achievements. Together with Ove Eriksson from Umeå (Sweden) he developed a general-purpose classification of all ascomycetous fungi, through establishing a periodical edition of *Systema Ascomycetum*. Moreover, he achieved the integration of lichens into the overall system for the fungi through different contributions, e.g. editions of the *Dictionary of the Fungi*, *Index of Fungi*, and *Systema Ascomycetum*.

One of most celebrated of David's achievements was to develop an estimate of the number of fungal species, which has had a huge impact on fungal biology. His studies led him to estimate that there are about 1.5 million species of fungi on Earth; the establishment of this figure was especially important since it helped to introduce microorganisms and fungi into the international debates on biodiversity issues, ensuring through publications and service on committees that due note was taken of their magnitude and importance.

David's career would not be properly described without reference to his contributions to biological nomenclature, being one of the essential architects in its modernization. He contributed decisively to raise the level of awareness amongst systematists of the need for increased user-orientation of their activity. One of his main achievements in this regard were his contributions to major changes incorporated into the International Code of Botanical Nomenclature in 1993, reducing name changes for non-scientific reasons, convening discussions between representatives of the different Codes in 1994–6, and serving as founding chair of the IUBS/IUMS International Committee on Bionomenclature.

One of the most successful aspects of DLH's career is his role as editor. Apart from his participation as author or editor of more than 50 books covering a wide thematic score, he has also brilliantly served as Executive/Senior Editor developing *The Lichenologist* into a premier international scientific journal in its field (1970–1988) and *Mycological Research* (2000–2008) in the process raising its impact factor to 2.9. Currently he is serving as Editor-in-Chief of *Biodiversity and Conservation* and *IMA Fungus*.

He has contributed to the development of the International Union of Biological Sciences (IUBS) programmes in biodiversity and bionomenclature, through participation in appropriate committees, and also as President (from 1994 to 97) and Chair of the UK IOB IUBS Liaison Group. His participation in the International Union of Biological Sciences has significantly contributed to the development of programmes in biodiversity and bionomenclature. His activities have enhanced an appreciation of the scientific aspects of biodiversity through edited volumes and articles, acting as a focal point coordinator for the GEF/UNEP *Global Biodiversity Assessment*. Within the International Mycological Association he has also been at the forefront of the movement to change the *International Code of Nomenclature for algae, fungi and plants* (ICN), paving the way for the abolishment of dual nomenclature for fungi, the acceptance of electronic publication, and deleting the requirement of Latin descriptions. Lastly, he remains actively involved in establishing lists of fungal names to gain protected status, to be recommended by the Nomenclature Committee for Fungi (NCF) to the General Committee on Nomenclature for action at the next International Botanical Congress in Schenzen, China, in 2017.

David L. Hawksworth is probably best described as a holistic mycologist, someone who covers all aspects, and has a deep love for fungi and a strongly rooted belief about their importance and role on this planet. The current special issue of *Fungal Biology* dedicated to DLH includes 11 contributions, all employing an integrated systematic approach to studying fungal biodiversity. Although these by no means can do justice to his extraordinary career, we hope that he finds some enjoyment in the breadth of topics covered, and the relevance that these fungi portray to society.

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