FOREWORD

The bringing together of scientists with an interest in mushrooms from the standpoint of any subdivision of biology and persons having practical economic concerns with mushrooms and mushroom products is essential if there is to be an open exchange of information of common interest. The First International Conference on Mushroom Biology and Mushroom Products was created to achieve this objective. The location of the conference in Hong Kong is especially appropriate since The Chinese University of Hong Kong has previously been the host of many gatherings of mushroom specialists for workshops and conferences, as well as being an active center for mushroom research by faculty and students.

It should be recognized at the outset that when we speak of Mushroom Biology as the subdiscipline of mycology that is concerned with the scientific study of mushrooms, a broad definition of the term mushroom has been taken; namely, the mushroom is considered as a macrofungus with a distinctive fruiting body large enough to be seen with the naked eye and to be picked up by hand. Thus defined, a mushroom is not restricted to the class Basidiomycetes; it may be either epigeous or hypogeous; and it is not necessarily fleshy or edible.

The total worldwide production of cultivated mushrooms has increased dramatically during the past 10 to 15 years. A production of approximately 1,100,000 metric tons (fresh weight) in 1980 increased to over 4 million tons in 1992. The factors responsible for this tremendous acceleration of growth in mushroom production are many and include:

1. **Expansion of production in a large number of countries.** This has frequently occurred as a cottage type enterprise rather than as a highly mechanized industry. This has been especially important for developing countries, because a good profit can frequently be realized in a short time with a low capital outlay.
2. **Cultivation of many species other than *Agaricus bisporus* in increased amounts.** Examples are *Lentinus edodes, Pleurotus* spp., and *Auricularia* spp.
3. **Plastic bag cultivation of many species.** This has increased the biology efficiency, shortened the period from spawning to harvesting and made possible mushroom production on waste materials.
4. **A great increase in production of *Volvariella volvacea* has resulted from the use of a compost made of cotton wastes from the textile mills and/or cotton seed hulls which contain a higher proportion of cellulose than the traditional paddy straw substrate.** This same compost is also used successfully for the bag cultivation of *Pleurotus* and *Lentinus*.
5. **Demonstration of the existence of medicinally valuable substances in many**

mushrooms. Examples include the polysaccharides: krestin, lentinan, and schizophyllan which are produced by *Coriolus, Lentinus,* and *Schizophyllum*, respectively. These compounds are indicated for treatment of various types of cancer and as immuno-regulators that stimulate the host's immune system.

6. **Increased consumption of mushrooms as a consequence of their use in popular foods such as pizza, and increased consumption by many because of the recognition of mushrooms as a health food that is high in protein content and low in caloric value.**
7. **The overcoming of social and cultural taboos** in some countries about eating mushrooms through education, promotion and as a consequence of increased travel.
8. **Research advances in both basic and applied aspects of mushroom biology.**

This conference has as its goal the exchange of information about new findings in the various aspects of mushroom biology and mushroom products, including cultivation technology, nutritional and medicinal aspects of mushrooms, bioconversion and composting, genetics and breeding. In addition to lectures, oral presentations, and poster demonstrations on these topics, round table discussions have been arranged on various specialized topics, such as: protein-bound polysaccharides of medicinal importance, post-harvest processing, contamination of mushrooms and mushroom products, and the current status of biological knowledge and cultivation practices in *Volvariella volvacea*.

Representatives from 41 countries have registered for the conference. In addition to established mushroom scientists, the conference, through the support of UNESCO and other organizations, was enhanced by the attendance of enthusiastic younger scientists from a number of countries. Two years from now, when the Second International Conference on Mushroom Biology and Mushroom Products is held, it is anticipated that an equally interesting and exciting scientific menu will await mushroom biologists.

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PREFACE

Mushrooms are familiar items that have long been consumed as a food of high nutritive value and as a contribution to a healthy diet. Mushroom cultivation has traditionally served as a viable bioconversion process for the utilization of a wide range of abundantly available organic wastes. Mushrooms are produced today not only for their food value but also for their metabolic products, many of which possess antitumour, immunoregulatory and hypotensive functions without apparent adverse side effects. Therefore, it is clear that advances in mushroom cultivation technology and a better understanding of mushroom biology will bring long-term benefits to humankind.

At an early stage in the planning of the First International Conference on Mushroom Biology and Mushroom Products, held between 23-26 August 1993 in Hong Kong, we were most fortunate to receive rapid and positive guarantees of financial and moral support from the United Nations Educational, Scientific & Cultural Organization (UNESCO) Network for Microbial Resource Centres (MIRCENS), Concord Health Foods Limited (Hong Kong) and The Chinese University of Hong Kong, which were crucially important for the implementation of the Conference. To them, we express our special gratitude and thanks. Our sincere thanks also go to the UNESCO Regional Network for Microbiology in Southeast Asia, the International Society for Mushroom Science (ISMS), the International Union of Microbiological Societies (IUMS), The Croucher Foundation (Hong Kong), Carl Duisberg Gesellschaft - SEAPO (Thailand), Wakan Shoyaku Laboratory Company (Japan), Beijing-Hong Kong Academic Exchange Centre (Hong Kong), Giorgio Foods Inc. (USA) and Tak Fat Trading Company (Hong Kong) for their financial support.

The Conference provided a forum for the presentation of recent advances in the field, a meeting place for the discussion and exchange of ideas and, hopefully, served to promote future research and collaboration among researchers in both developed and developing countries.

The following topics are covered in this series of contributions:

(i) Fundamental Aspects of Mushroom Biology
(ii) Mushroom Cultivation and Bioconversion
(iii) Postharvest Processing and Quality Control
(iv) Nutritional and Medicinal Attributes of Mushrooms
(v) Future Prospects for Research and Development

These Proceedings are designed to give readers a cross-section of current research in the area and to explain how this research impacts on mushroom production and mushroom products. We extend our sincere thanks to all the contributing authors for their endeavours. In addition, we thank the staff of The Chinese University Press for their hard work in expediting the publication of this

volume in time for distribution during the Conference period. It is our hope that these Proceedings, in addition to providing information on recent advances in the areas of mushroom biology and mushroom products, will serve also to bring pleasant memories to all those scientists, some of whom travelled thousands of miles, who attended the Hong Kong Conference.

Finally, we acknowledge the excellent support given by Mr. W.C. Chan in the technical processing of the manuscripts.

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