

BOOK REVIEWS

Twelfth International Seaweed Symposium: edited by MARK A. RAGAN and CAROLYN BIRD, Kluwer Academic 1987, Dr. W. Junk Publishers, Dordrecht. 590 pp. £116.00.

This volume comprises papers presented at the XII International Seaweed Symposium held at St. Paulo, Brazil in 1986. These symposia are held every three years in different parts of the world and the published proceedings give a useful overview of the progress of the study and use of seaweeds during the last four decades. As in previous volumes the present proceedings cover a wide range of topics, but there is greater emphasis than in the past on the production and commercial use of seaweeds and their products. Particular attention is paid to cultivating seaweeds either for food purposes or to give higher yields or better quality of agar, carrageenan and alginates which are already widely used commercially. As 82 papers were presented it is not practicable to do more than list the general headings for a number and to mention some which are likely to be of more interest to readers of *Phytochemistry*.

Two plenary lectures were given one of which dealt very comprehensively with the seaweeds used as food in Japan, and the other with the uses of alginate, carrageen and agar in the food industry world wide. Four minisymposia cover a diversity of subjects from algal genetics, the production of *Spirulina* and other microalgae, biotechnology of algae and economic aspects of seaweed cultivation. In the first of these it is noteworthy that Chinese workers claim success in breeding new varieties of *Laminarias* giving improved yields of biomass and higher iodine content. There were seven papers on *Spirulina* indicating considerable optimism for the use of this organism as a food in the poorer countries. *Dunaliella* is considered to be a useful source of β -carotene. Biotechnological studies were mainly concerned with the development of techniques for improved culture. It would appear from the fourth minisymposium that the Far East is ahead of the West in seaweed cultivation, although interesting experiments are reported from the Isle of Man.

There are 58 contributed papers grouped under eight headings. Among six on 'Morphology and Taxonomy' one makes use of analytical pyrolysis and another is on the variation in protein content as determined by electrophoretic methods. Ten papers on 'Ecology and Distribu-

tion' are mainly concerned with environmental conditions including the effect of diesel oil contamination and the use of seaweeds as biomonitors of zinc levels in Cork Harbour, Ireland. The title 'Resources: Assessment, Development and Management' describes the content of the papers in this section. Eight of them cover red seaweeds in different countries and one *Sargassum* in the Philippines. Of a further nine papers on 'Cultivation' five deal with established and experimental culture of *Eucheuma*, *Gracilaria* and *Hypnea*. There are also papers on *Laminaria* and *Sargassum* cultivation in Brazil, Belgium and Florida. Seven papers under the heading 'Physiology' include the effect of toxic substances such as hydrazine and non-persistent oils which may be found in the sea. Three of the papers deal with nitrogen metabolism and critical light conditions and a final paper is on the presence of D-rhodoic acid in algae. Five papers in the section of 'Chemical Composition and Properties' deal with the possible antimicrobial and antitumour effect of seaweed extracts; two on seasonal variation in the composition of a *Gracilaria* sp.; one on ascorbic acid content in a wide variety of seaweeds, and finally a paper on the protein and amino acid analysis of *Gelidium* in Morocco. The section on "Chemical Structures and Characteristics" deals with variations in the composition of seaweed constituents. This includes two contributions on carrageen, two on alginate and one on agar. There are also papers on the extraction of hydrogenase and L-amino acid oxidase, the former from *Spirulina* and the latter from *Amphiroa crassissima*. A single paper on 'Molecular Biology and Molecular Genetics' concludes that the genes controlling the formation of L-gulonate lyase are carried on the chromosomes of a strain of *Klebsiella*.

All the papers are accompanied by extensive References mainly from the 1970s to 1986, and there are subject, chemical components, taxonomic and author indices. The volume is excellently produced and free from printing errors. It would be a valuable source of information for anyone involved in seaweed cultivation and exploitation. Unfortunately the high price prohibits individual purchase.

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