Phytochemistry, 1973, Vol. 12, pp. 1517 to 1520. Pergamon Press. Printed in England.

BOOK REVIEWS

Carbon-Fluorine Compounds—Chemistry, Biochemistry and Biological Activities. A Ciba Foundation Symposium. Elsevier, Amsterdam/Excerpta Medica, London/North-Holland, New York. 1972. 417 + viii pp. £6.26.

THIS book consists of the proceedings of a Ciba Foundation Symposium (1971) devoted to the subject of those fluorinated compounds which are of pharmacological significance and which have attracted the attention of research workers in human and veterinary medicine, pure chemistry, animal and plant biochemistry and environmental pollution. For nearly 30 years, since J. S. C. Marais made known his remarkable discovery that the main toxic principle of the poisonous *Dichapetalum cymosum* is a monofluoroacetate, groups of scientists of various disciplines have been slowly accumulating information about fluorine compounds which behave pharmacologically like monofluoroacetic acid. Monofluoroacetate is now known to occur in a much wider range of toxic plants than was originally thought. The fourteen papers of this symposium with accompanying discussions under the chairmanship of Sir Rudolph Peters can be said to summarise much of the investigations to date. The Chairman's own wide experience and knowledge of the subject is reflected in the emphasis on the studies of toxic CF compounds (including those in African, Australian and South American plants as well as medically important synthetic preparations) and their effects in relation to the Kreb's tricarboxylic acid cycle and other physiological processes. Some of the discussions contain much useful information which at the time of the symposium was unpublished (although some of it is now) especially that on the metabolism of fluoroacetate and related compounds by plant and animal tissues.

Three chemical contributions by J. E. G. Barnett, P. W. Kent and N. F. Taylor cover fluorine as a substituent for oxygen, the structure and activity of fluoro-sugars and the biological effects of fluorinated monosaccharides. Fluoroamino acids and protein synthesis are dealt with by L. Fowden who believes (as do other workers) that such nitrogenous entities will ultimately be found in nature.

The considerable interest in fluorinated compounds in human medicine is shown in several papers. The hormonal properties of fluorosteroids are reviewed by A. Wettstein and C. Heidelberger gives an account of his work on fluorinated pyrimidine and nucleotides, especially 5-fluorouracil which is used for the treatment of solid cancers. The effect of fluoroacetate on the liver is described by P. Buffa (one of the pioneers in this field) and in brain mitochondria by E. M. Gal. The important role that micro-organisms may play in the degradation of carbon–fluorine compounds is very well covered by P. Goldman and in the subsequent discussion. It is indeed fortunate that soil does contain organisms which can degrade fluoroacetate if the ability to synthesise it is more widespread in the common plant kingdom than has hitherto been suspected [MILLER, G. W. *et al.* (1968) *Atmos. Envir.* **2**, 187].

There are two erudite contributions by A. G. Sharpe on the physical properties of the carbon–fluorine bond and on NMR studies of fluorine-containing macromolecules such as *N*-fluoroacetylglucosamines, fluorokinase and fluorinated peptides by R. A. Dwek.

B. C. Saunders then discusses the stability of the carbon–fluorine bond and gives examples of circumstances when it is in fact cleaved, sometimes very simply; for example, from fluoroacetate by boiling with 30% NaOH. Finally, in the topical subjects of ecology and environmental pollution, J. L. Shupe describes fluoride toxicity in animals resulting from the ingestion of fluoride-contaminated pastures and exposure to industrial pollution.

The book is well produced and does not contain many errors although there are a few minor mistakes in some of the references. Two which must be corrected (p. 70) are those of: Marais [which should be *Onderstepoort, J. Vet. Sci. Anim. Ind.* **20,** 67 (1944)] and Singer and Armstrong [which should be *Anal. Chem.* **26,** 904 (1954)]. Also, the level of fluoroacetate in some of the Australian plants is printed as being as high as 12 500 μg/g of dry tissue when 2500 μg/g is more correct. Again, the view is expressed that most soils contain a few thousands of parts per million of total fluoride and that those in which carbon–fluorine containing plants grow are very rich in fluoride. This is not really so. Whilst some arable soils and clays do contain large amounts of fluoride (occasionally nearly 10 000 μg/g), the range of 200–500 μg/g of air dry material is considered usual and the recently reported analyses of the soils growing twelve species of these toxic tropical plants has revealed the highest total fluorine content to be little more than 200 μg/g and one soil contained as little as 11 μg/g indicating that the plants are true fluorine accumulators [*New Phytologist* **71,** 839, 855 (1972)]. Furthermore, it is generally thought that these particular plants have extroardinarily deep root systems, especially the African Dichapetalaceae, the tap roots of which may be as much as 30 m deep; however, from the work of A. C. Léemann [*Bull. Soc. Bot. Genêve* **29,** 72 (1938)] and A. O. D. Mogg [*S. Afr. J. Sci.* **27,** 368 (1930)], it would seem that in fact the roots normally penetrate the soil to a depth of only approximately 3 m and, exceptionally, to 12 m but they may spread *laterally* 30 m or more. Finally, one other observation worth making is that fluorine has *never* been reported to occur in nature in its free elemental state (as one contributor suggests) and its electronegativeness and reactivity should certainly preclude such a possibility.

The book will be of interest to anyone involved in the biochemical aspects of fluorine, whether in animal or plant physiology, and it is predicted that it will be found in the laboratories of many research workers.

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Recent Advances in Phytochemistry, Vol. 4: edited by V. C. RUNECKLES and J. E. WATKIN Appleton–Century–Crofts, New York, 1972. ix + 317 pp. $24.95.

THE VOLUME under review constitutes a collection of lectures given at the Ninth Annual Symposium of The Phytochemical Society of North America in 1969. Collections such as this vary greatly in style and quality and the present one is no exception. The subject of the Symposium was plant phenolics and the content of the Lectures covered simple phenols to lignin, from a chemical, biochemical and physiological angle. The final chapter (by Tom J. Mabry) renders an authoritative and readable account of recent progress in areas of