

Radiological Monitoring of the Environment is arranged in two parts, the first containing the papers and the second the actual proceedings of the symposium. For most sessions, these comprise a rapporteur's account of a group of papers, followed by discussion. The book is well produced, but it is regrettable that its publication date is two years later than the date of the symposium.

L. BURKINSHAW

Primary Photoprocesses in Biology

By J. B. Thomas. Pp. x+323. (Amsterdam: North-Holland Publishing Company; New York: Interscience Publishers, a Division of John Wiley and Sons, Inc., 1965.) 72s.

PROFESSOR THOMAS, who is professor of biophysics at the State University of Utrecht, has here written a careful survey of photobiological reactions. It begins with a clear, though necessarily brief, discussion of mechanisms of molecular excitation by light, energy and charge transfer in condensed systems, and the mechanisms of photochemical reaction.

After this introductory material, there is a detailed review of the pigments and light reactions in photosynthesis. This is the longest and most sophisticated section of the book, not surprising since here Professor Thomas deals with his own field.

There follow reasonably detailed and up-to-date reviews of the chemistry of vision, phototaxes and phototropisms, animal and plant, light effects on reproduction and development in animals and plants, and bioluminescence. All these subjects are discussed critically and with some insight, though, in covering so broad a range, the author when outside his own field is sometimes a little at the mercy of the literature, as in taking too seriously an alleged demonstration that rhodopsin is an ATPase (p. 163), or that illumination crumples the outer segments of rods (p. 195).

The treatment is comparative in so far as that is possible, the comparisons of similar processes in different organisms, animal and plant, providing one of the most stimulating features of the book. There is an excellent table of references through 1963. The style is for the most part clear and readable, with an occasional lapse from English that will not bother anyone ("dialization" for dialysis (p. 139); "luminicity" for luminosity (p. 201)). On the other hand, I doubt that Professor Thomas meant to say, on page 55, that "all known visual pigments are aldehydes of vitamin A", rather than saying that of their chromophores; or "certain salt-water species, for example the sea lamprey" (p. 158), when the point is that this cyclostome spawns in fresh water and can live there permanently, though capable of migrating to the sea as an adult.

Altogether this is an interesting and valuable book and, in addition to providing useful surveys for specialists making excursions outside their own fields, is well suited as a text to introduce students to photobiology.

G. WALD

The Biology of Cancer

Edited by E. J. Ambrose and F. J. C. Roo. Pp. v+237. (London: D. Van Nostrand Company, Ltd.; Princeton, N.J.: D. Van Nostrand Company, Inc., 1966.) 60s.

THIS book is based on a course of lectures for science and medical graduates. It opens with a general chapter on cancer as a disease, followed by nine other chapters, on chromosomes, metabolic processes, surface properties of cells, invasive properties, tumour immunology, role of viruses, chemical carcinogenesis, chemotherapy, and a final chapter on "Future Strategy".

The authoritativeness of the book is ensured by the excellent collection of authors—Prof. P. C. Koller, Prof. J. Paul, Dr. G. C. Easty, Dr. P. Alexander, Dr. K. E. K.

Rowson, Dr. D. B. Clayson and Dr. J. A. Stock. The editors have contributed a chapter each and they have written the joint final chapter.

Apart from and above the great deal of valuable information presented, the editors and authors are to be congratulated on the eminent readability of the book. The material is laid out clearly and is treated lucidly. Each chapter is followed by a good select bibliography.

The one criticism which may be raised is the lack of a chapter on tumour cell population kinetics, a subject usually treated in radiobiological or radiotherapeutic publications. In a book on the biology of cancer, in which chemotherapy is discussed, it might have been appropriate to devote some space to cell population kinetics, even if—quite rightly—radiotherapy as such is not included. This is, however, a minor criticism of a very good book which should be of great value to biology graduates, medical students and practitioners alike.

L. G. LAJTHA

Chemistry of Vegetable Tannins

By E. Haslam. Pp. viii+179. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1966.) 47s. 6d.

THERE is a long felt need for a book of this kind, which gathers together the work on vegetable tannins in a concise form. The book is a fitting tribute to R. D. Haworth, to whom it is dedicated.

The introductory chapter gives a short account of the structure of collagen, leading on to a discussion of how the vegetable tannins react with collagen in the tanning process. This serves to put the subject in perspective, but the scope of the book is wider; it is valuable reading for anyone with a general interest in plant phenols. Plant phenols of low molecular weight, for instance, their structure and analysis, and the subject of lignin biosynthesis also receive adequate treatment.

Given a working knowledge of chromatographic methods, the newcomer to the subject should have no difficulty in starting laboratory work without recourse to the original references once he has read the sections on the isolation and identification of condensed and hydrolysable tannins.

The chemistry and structural determination of the hydrolysable tannins (thirty-three pages) and the condensed tannins (twenty-three pages) are dealt with meticulously. There is no bias towards Haslam's own school in Sheffield; the contributions of all workers are included in a balanced account, and no essential information has been omitted.

Many of the schemes of biosynthesis are still hypothetical, but again the account is well written and the reader's appetite is whetted for more research in this relatively new field.

THOMAS A. SCOTT

OBITUARIES

Prof. W. J. Tulloch

PROF. WILLIAM J. TULLOCH, who occupied the chair of bacteriology in the University of St. Andrews for just over 40 years, retired in 1962 and died on August 26 this year. The combination of a Scottish father and a Belgian mother blended to produce a man of singular ability, energy and charm.

His outstanding services as teacher, investigator, administrator and adviser of students and colleagues have already been emphasized elsewhere. Rather than try to draw up a catalogue of his numerous researches, I shall endeavour to give some account of the way in which two of his most important contributions were developed. In view of his background, it is not surprising that in the

study of the phenomena of immunity he appeared to be influenced more by Bordet than by the German school. It is recorded that Ehrlich referred to Bordet as "sein schärfster Gegner". It was probably his interest in Bordet's work which led him to choose for the subject of his M.D. thesis "The Influence of Electrolytes on Agglutination". The technical ability and experience gained in this work made him a valuable guide and collaborator of his younger colleague, Craigie, in the application of immunological methods to the study of virus disease in which they expanded the earlier work of Mervyn Gordon. They infected rabbits with vaccinia and then used extracts of the crusts developed to immunize other rabbits. They had thus at their disposal immune sera containing antibodies for the virus but devoid of any demonstrable ones for the proteins or other antigens of animal tissues. Such sera were used to get specific precipitates with extracts of crusts due to variola or vaccinia in man but gave none with extracts of crusts due to variella or other skin lesions. Later it was found that the fixation of complement was a more delicate indicator of the antibody-antigen reaction which occurred in such mixtures. These reactions were later displaced by the cultivation of the infective agent of smallpox on the chick embryo which made the differentiation between variolous and vaccinal lesions possible. They were, however, an important step in the application of immunological methods in the study of virus disease and were published in full by the Medical Research Council^{1,2}.

When peculiarly severe epidemics of diphtheria occurred in the north of England about 1930 and were attributed to a starch fermenting variant of the *C. diphtheriae* described as *gravis*, Tulloch with characteristic energy and openness to new ideas initiated with the help of Murray a search for bacteria of this type in the eastern midlands of Scotland³⁻⁵. It was not found to play any significant part at that time, but the predominant bacterium was a finely growing variant, more fastidious in its nutrition, which was designated as *intermedius* to distinguish it from the *gravis* and *mitis* variants described in Leeds. This earlier work brought into relief the change in 1938 when an epidemic of peculiar severity visited Dundee and was found to attack in a surprising degree the children and adults who had undergone prophylactic immunization. The Dundee epidemic strain corresponded closely to the North of England *gravis* in most respects, but was more fastidious in its nutritive requirements. It was shown later by Chattaway, Happold and their colleagues^{6,7} to be nearer to the *intermedius* strain in requiring pantothenic acid when grown in a medium of known chemical composition. This work of Tulloch and his collaborators in combination with similar observations made by Hartley and a group of collaborators at Gateshead was fully described in an M.R.C. publication in 1950 (ref. 8).

The wide range of Tulloch's knowledge and his masterly assembly and analysis of observations recorded in the literature were never better shown than in his lecture to the Royal College of Physicians of Edinburgh as holder of the Lister Fellowship. This lecture, entitled "Medicine as an Aspect of General Biology", was given in 1956, and as it has not been published a brief indication of its content may not be out of place in this notice.

The thesis developed was that all infectious disease is a manifestation of a balance struck between the host and the invading parasite, but that this balance may exist at various levels. The best illustrations of this were provided by three diseases most studied in South and Central America—coccidioidomycosis, bartonellosis and yellow fever. The importance of different levels of balance between host and parasite is most strikingly illustrated by bartonella infection, which was ultimately shown to be responsible for two conditions long believed to be distinct diseases—Oroya fever, an acute condition with high mortality, in which the balance favours the parasite;

and Peruvian wart, a chronic condition with low mortality in which the balance favours the host. Tulloch went on to say that although the identity of the two conditions was all too convincingly suggested by Carrion's personal experiment—he infected himself with the juice of a Peruvian wart and died 39 days later of Oroya fever—it was not fully proved until many years later by the work of Noguchi and Battistini published in 1926.

Tulloch's death has removed from the ranks of those devoted to the study of medicine and microbiology a gifted teacher, an eager enquirer and a most generous colleague and collaborator.

J. W. McLEOD

¹ Burgess, W. L., Craigie, J., and Tulloch, W. J., *Diagnostic Value of the Vaccinia-Variola Flocculation Reaction*, M.R.C. Special Report Series No. 143 (1929).

² Craigie, J., and Tulloch, W. J., *Further Investigations of the Variola-Vaccinia Flocculation Reaction*, M.R.C. Special Report Series No. 156 (1931).

³ Murray, J. F., *J. Path. Bact.*, **41**, 97 (1935).

⁴ Murray, J. F., *Brit. J. Exp. Path.*, **16**, 384 (1935).

⁵ Murray, J. F., *Brit. J. Exp. Path.*, **18**, 532 (1935).

⁶ Chattaway, F. W., Happold, F. C., Sandford, Mary, Lythgoe, B., and Todd, A. R., *Nature*, **151**, 559 (1943).

⁷ Chattaway, F. W., Happold, F. C., and Sandford, Mary, *Biochem. J.*, **38**, 111 (1944).

⁸ Hartley, P., Tulloch, W. J., and others, *The Study of Diphtheria in Two Areas of Great Britain*, M.R.C. Special Report Series No. 272 (1950).

Prof. I. MacKenzie

IAN MACKENZIE, professor of surgery and head of the Department of Surgery at Victoria General Hospital, Halifax, Nova Scotia, died in Halifax on October 17 after a long illness at the early age of 56.

He was born in Edinburgh and received his medical education at the University of Edinburgh where he graduated in medicine in 1933, and then became an assistant in the department of bacteriology. He held various house appointments at the Edinburgh Royal Infirmary and at the Cumberland Infirmary, Carlisle. In 1939 he was awarded a Commonwealth fellowship for cancer research at the Rockefeller Institute, New York, where he worked under Dr. Peyton Rous.

Returning to Britain at the outbreak of the Second World War he served first with the 9th Lancers and later with the R.A.M.C. in France and the Middle East before being posted for special duties in 1942. He was parachuted into Yugoslavia to serve with Marshall Tito at partisan headquarters and later into occupied France for service with the French resistance movement. For this work he was awarded the Croix de Guerre with gold star and was mentioned in dispatches.

He returned to the Department of Surgery at the University of Edinburgh in 1946 and later moved to the Department of Surgery in the University of Durham, and it was in these two surgical departments that he became so interested in what proved to be a life interest in research. In 1957 he was appointed professor of surgery at Dalhousie University, Nova Scotia, and became consultant surgeon to the Canadian Forces Hospital, Halifax, and to Camp Hill Hospital (Department of Veterans' Affairs). He was joint author of a *Handbook of Surgery*. In 1958 he was elected a fellow of the Royal College of Surgeons of Canada, and of the American College of Surgeons in 1960.

He was a great man, both in peace and war, and in the latter his exploits were legendary. Whether it was ranging the Western desert with a surgical unit, or working with the partisans in Yugoslavia or the maquis in France, his qualities as a soldier and his excellence as a surgeon were an example to all.

He created a splendid Department of Surgery at Halifax, where he did a fine job in research, particularly in various aspects of cancer and allied tumours. He was a true Scot, with all the best of that nation's characteristics. As someone said of him at Dalhousie University, he fulfilled his true role of teacher, research worker and clinical operator of no mean stature. He leaves a widow, two daughters and a son.

WALTER MERCER