the dicots, general chemical features of dicots (a series of generalizations that I do not find especially helpful), alkaloid-families of dicots, and the occurrences of pseudoindicans and salicylic acid; and a list of general chemotaxonomic references. The main body of the book, however, represents a disciplined survey of the families in alphabetical order. For each family there is a brief taxonomic description, a reference to the size of the family, discussion of some salient anatomical features, and, finally, consideration of the chemical characteristics. This last topic represents, of course, the bulk of the discussion. Natural groups of chemical components are discussed under separate headings. At the end of each section there is a brief résumé of key observations concerning possible taxonomic implications of the chemical data as it is presently known. The nonchemical material on each family is presented succinctly, without being overextended, and serves to complement the chemical treatment.

Perhaps the single most emphatic point that the book makes (although it is made indirectly) concerns the tremendous amount of data which remain to be obtained. For example, the family Amaranthaceae contains approximately 64 genera and 850 species. It is a betacyanin-producing family, and these compounds are probably mutually exclusive with anthocyanin pigments. Though anthocyanins are lacking, closely related flavonoid pigments occur in the family, and it would be of interest to know in detail which flavonoids are synthesized in the Amaranthaceae. Yet, as shown by Hegnauer, who summarizes our knowledge of the flavonoid chemistry of the Amaranthaceae in about one-third of a page, practically no useful information on flavonoids is presently available, despite the occurrence of a rare isoflavone-type flavonoid in *Iresine celosioides* L.

A well-known alkaloid chemist recently stated that ". . . tens of thousands of new alkaloids remain to be discovered in the vast plant kingdom" [E. Leete, *Science* **147**, 1000 (1965)]. If this is a reasonable estimate, then our present knowledge of even these most intensively investigated compounds is quite fragmentary. The question of whether or not it is possible, or perhaps feasible, to collect the necessary chemical data primarily for taxonomic purposes introduces many subjective factors, but despite all these Hegnauer has shown that even the fragmentary data have very interesting taxonomic correlations. More data may be expected to reinforce such correlations sufficiently to provide many important taxonomic insights.

The book should prove to be valuable to many biologists who wish to correlate a variety of specific observations with plant chemistry—for example, the correlations between insect feeding or breeding patterns, plant taxonomic groups, and prominent features of their secondary chemistry.

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Nucleic Acids

Die Nucleinsäuren. Eine einführende Darstellung ihrer Chemie, Biochemie, und Funktionen. Eberhard Harbers, gemeinsam mit Götz F. Domagk und Werner Müller. Thieme, Stuttgart, 1964. 315 pp. Illus. DM. 68.

This is a very well produced book, beautifully printed on good paper and adequately illustrated, though perhaps with too much reliance on graphs that are simply borrowed from the literature rather than prepared to serve the didactic purpose of an introductory textbook. I do not consider the book successful as an introduction into the chemistry, biochemistry, and functions of the nucleic acids. One could, it is true, question whether such a task can be performed, at the present time, with a reasonable hope of success. A scientific discipline can best be reviewed, especially in a book of moderate dimensions, at the beginning logarithmic stage of its development and again in the stationary phase. In the middle stage of development, with the daily avalanche of facts and fancies, the view becomes obscured.

Of the less than 250 pages occupied by the text, only one-fifth is concerned with the chemistry of the nucleic acids, and this quite sketchy section includes the nucleic acid constituents. The imbalance thus created is felt throughout the book; there can be little doubt that chemistry remains the only true and solid basis for an introduction into this field. There follow chapters on metabolism, biosynthesis, the nucleic acids of tumor cells, the effects of drugs and radiations, and other topics. The so-called genetic code is hidden, rather weirdly, in the section on RNA metabolism. The book impresses me as poorly organized and lacking in authority. An appendix of 21 pages purports to describe the experimental procedures used in nucleic acid research. It is essentially useless; this difficult field requires more than a bird's-eye view.

A large bibliography comprising roughly 2000 references creates high hopes which are disappointed when the rather bizarre selection of papers is noted; moreover, in the short text, only passing reference can be made to most of the papers cited. There is no author index, nor does the bibliography include references to the pages on which the particular papers are cited. The subject index of less than five pages is most inadequate. The writing is undistinguished and turgid, though not more so than a large part of German scientific literature. I was amused by this passage: ". . . die mit einer UV-Lampe lokalisierten 'Spots' . . . ." When I was a child, we would have called these things *Flecke* and not *Schpotz*.

There are footnote references to papers published as late as 1964. One may feel some apprehension that a textbook so crammed with the newest things will age very fast. I must conclude that, like the "Great American Novel," the good textbook on nucleic acids remains unwritten.

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Indian Woody Plants

Indian Woods: Their Identification, Properties, and Uses. vol. 2, *Linaceae to Moringaceae.* S. S. Ghosh, K. Ramesh Rao, and S. K. Purkayastha, Eds. Forest Research Institute and Colleges, Dehra Dun, India, 1963. x + 383 pp. Plates. $11.70.

Volume 2 of a projected six-volume work on Indian woods has been published within 5 years of the first volume. Much of the text is based on compilation from the literature, but this does not detract from its usefulness. The anatomical diagnoses, determinations of physical and mechanical properties, decay resistance tests, and

working qualities of the timbers are all from original observations and experiments performed at the Forest Research Institute and Colleges, Dehra Dun, India. Wood specimens used for study are those of the famous Gamble collections to which over 3000 new specimens have been added. All specimens have been examined for accuracy of identification and dubious material discarded. It is noteworthy that all of the wood specimens studied are associated with corresponding herbarium voucher specimens, presumably deposited in the forest herbarium at Dehra Dun. To undertake the monumental task of describing and commenting upon 1600 species of Indian woody plants is a daring feat during these days of "molecularization," and perhaps could only be accomplished by the dedication to service and research that has long characterized the wood anatomists and forest officers at Dehra Dun.

The format of the second volume closely parallels the plan of volume 1. Woods of 23 plant families are treated, and 263 species are considered in more or less detail. Introductory material, essential to the understanding of volume 2, is provided in pages xix to liii of volume 1.

Family descriptions are fairly complete, and data are given on the size, geographic distribution, and economic value of each group. A taxonomic discussion is often included for the families that are well represented in India by woody plants. Generic and species outlines follow the plan for families, and the anatomical characteristics of all species within genera are usually treated together. Botanists could wish for microscopic descriptions of the wood anatomy, but only the gross structure is presented. Perhaps inclusion of the former would have seriously delayed production of these volumes. A bibliography is included at the end of each family treatment; these are up to date and broad in coverage.

Arrangement of families within the volume follows Bentham and Hooker's system, as modified on anatomical grounds more recently by Metcalfe and Chalk. Nomenclature has been a problem to the authors, and for convenience they have chosen to utilize that supplied by Brandis in his *Indian Trees*; however, recent changes in nomenclature are recognized in an appendix to the volume. Vernacular names are presented for each species. Important species are illustrated by reasonably good halftones; these are all of $\times 10$ magnification and consist only of transverse views.

The publication of *Indian Woods* is an ambitious project. One can only applaud the efforts of those engaged in it and hope for its early completion.

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Radiation Research: From Molecules to Man

Current Topics in Radiation Research. vol. 1. Michael Ebert and Alma Howard, Eds. North-Holland, Amsterdam, 1965. viii + 272 pp. Illus. $8.40.

In the preface the editors write that they "felt . . . a real contribution to radiation research could be made by inviting individual workers to summarize their subjects from their own point of view, free from the requirements of handbooks or review articles. . . ." They also believe that such a series would enable authors to cut across the traditional frontiers of their parent disciplines, and would encourage a measure of spontaneity.

Volume 1 contains six essays, arranged more or less in the order molecule to man. In the first of these, on electron spin resonance, K. G. Zimmer and A. Müller succeed admirably in making a difficult subject readable. Their discussions on DNA studies and on the mode of action of radioprotectors will be of particular interest to radiation biologists. The second chapter, by K. F. Nakken, is devoted to radical scavengers and radioprotection and complements chapter 1. Nakken evaluates radical scavenger mechanisms in chemical test systems and in terms of radiation protection and sensitization. By emphasizing mode of action, the authors of these chapters have presented their material in a way that readers should find meaningful and stimulating.

H.-J. Melching presents, in great detail, the available information relating to the influence of serotonin on radiation effects in mammals. This chapter (the third) illustrates well the difficulties that may be encountered in applying pharmacological methods to problems of mechanism. A summary by the author would have been helpful, because for the most part, it is left to the reader to develop a point of view.

Primary interest in the chapter by L. G. Lajtha, "Response of bone marrow stem cells to ionizing radiation" (chapter 4), centers in the behavior of cells in vivo and of the bone marrow as an organ. Problems of stem cell identity, methods of study, radiation sensitivity and recovery, and general problems of feedback control mechanisms are discussed with great clarity and economy. In view of the broad interests of the author and his talents as writer and as investigator, the brevity of this essay is a disappointment, but that is its only disappointing feature.

The chapter which follows, by M. M. Elkind and W. K. Sinclair, also deals with recovery in irradiated mammalian cells. Here the focus is on experiments, from the authors' laboratories, in which cultured cells from Chinese hamsters are used. The steps that lead to and strengthen their important concept of intracellular repair are described in convincing detail. Application of this concept to the behavior of mouse stem cells irradiated in vivo by Till and McCulloch [*Rad. Res.* **18**, 96 (1963)] is discussed by Lajtha in chapter 4.

The choice of subject and authors for the final chapter, "Leukaemia incidence in children in relation to radiation exposure in early life," by Alice Stewart and David Hewitt, is timely and fortunate. If, indeed, it is argued that " . . . the epidemiological method has a low power of resolution," the present chapter shows it to be an exceedingly effective tool in skillful hands. Although they deal primarily with problems involved in evaluating the risk of radiogenic leukemia, the authors also give an authoritative discussion of other factors that influence the incidence of childhood leukemia.

A volume such as this will, by its nature, be made up of chapters that differ widely in manner of presentation. In the present case it can be surmised that the editors supplied only minimum guide lines. The results are, on the whole, very satisfactory. We look forward to the next volume of the series.

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