Forest Ecology: Sukachev's Concept of "Biogeocoenoses"

Fundamentals of Forest Biogeocoenology. V. N. Sukachev and N. V. Dylis, Eds. Botanical Institute and Laboratory of Forest Science, Academy of Sciences of the U.S.S.R., Moscow, 1964. 574 pp. Illus.

Fundamentals of Forest Biogeocoenology was written by 16 men and women who are connected with the Botanical Institute or the Laboratory of Forest Science of the Academy of Sciences of the U.S.S.R. The senior editor Vladimir Nikolaevich Sukachev, who is a member of the Academy, has guided the field of forest ecology in Russia since the beginning of this century and has developed the concept of "biogeocoenology." The other editor, N. V. Dylis, is a forest ecologist and geobotanist.

Although the book is entitled *Forest Biogeocoenology*, its scope is much broader for it is concerned with the general, complicated phenomenon of interplay between the environment and the plant community (the Greek word *Koinos* means common), as well as with the interplay between the components of such a community. In the Western world the closest term perhaps is "an ecosystem."

Chapter 1, by Sukachev, is concerned with the fundamentals of biogeocoenology, its relation to ecosystems, geographical landscapes, facies, and the like, and with its place among the other branches of science.

The different components of forest biogeocoenoses are considered in chapters 2 through 6. In chapter 2, "Atmosphere as a component of biogeocoenosis" (41 pp.), A. A. Molchanov (director, Laboratory of Forest Science, Academy of Sciences, U.S.S.R.) discusses light, heat, rainfall, dust, and noxious gases and their effect on forest vegetation. Chapter 3, "Phytocoenosis" (125 pp.), by N. V. Dylis, J. L. Zelniker, and V. G. Karpov, is concerned with plant physiology and plant ecology. Animals, both vertebrates and invertebrates, as a component of biogeocoenosis are dealt with in chapter 4 (84 pp.) by P. M. Rafes, L. G. Dinesman, and T. S. Perel. Chapter 5 (70 pp.), prepared by S. E. Egorova, M. G. Enikeeva, and B. S. Bol'shakova, treats microorganisms and their part in a biogeocoenosis. Inevitably the chapter is largely on soil microorganisms, although some space is devoted to the relation of the microorganisms to the plants, the animals, and the atmosphere. Chapter 6 (85 pp.), by S. B. Zonn, is chiefly concerned with the physical properties of soil, its structure, and its dynamics, in both young plantations and well-established forests.

In chapter 7 (29 pp.), on the dynamics of forest biogeocoenoses, Sukachev treats the following topics: plant succession, evolution of the biogeocoenological cover of the earth, and changes in forest biogeocoenoses caused by exogenous influences—changing geomorphology, glaciation, and human activities. The principles of classification of forest biogeocoenosis are considered by N. V. Dylis (chapter 8, 15 pp.). V. D. Alexandrova deals with the possible relevance of cybernetics in forest biogeocoenology (chapter 9, 10 pp.). In the concluding, unnumbered chapter (7 pp.), Sukachev discusses the theoretical and practical importance of the field.

The Fundamentals of Forest Biogeocoenology is written in Russian, and there is no English summary. This means that only a few in America will be able to read this interesting and informative book.

Those who know the Russian language will note that the book provides a complete account of the development of the ecological (if I may use an obsolete term) concept in Russia. The bibliography of more than 1000 Russian publications (up to 1964 and with a few titles in Ukrainian) will make the volume invaluable for reference purposes. The list of literature in Western languages includes some 500 titles (up to 1962).

For those who do not read Russian, I offer the following suggestions: (i) The concept of Sukachev's biogeocoenology and its practical applications is treated in Blanckmeister and Kienitz's *Der Wald und die Forstwirtschaft* (Berlin, 1963); (ii) Sukachev himself outlined his concept of "biogeocoenoses" and compared it with Tansley's "ecosystems" in a paper presented at the Symposium on Forest Types and Ecosystems, held at the Ninth Botanical Congress, Montreal, 1959 [*Silva Fennica* **105**, 94 (1960)]; (iii) V. J. Krajina of the University of British Columbia, who "outlined the areas of agreements [and disagreements] of the eighteen papers read at the [Montreal] Symposium" analyzed Sukachev's concept of the new discipline and seemed to prefer the term "biogeocoenose" to the term "ecosystem" [*Silva Fennica* **105**, pp. 53, 107 (1960)]. It appears then that Sukachev's ideas have found a response among Western ecologists. Perusing Krajina's comments, a reader may gain a sufficient understanding of Sukachev's theses to appreciate the importance of his book.

Incidentally, there is a publisher's note at the end of the book which indicates that only 2300 copies were printed. This means that the whole edition will be sold out immediately and that the book will be out of print even before it has reached the bookstores.

NICHOLAS T. MIROV
Research Associate in Geography, University of California, Berkeley

Chemical Data

Chemotaxonomie der Pflanzen. vol. 3, Dicotyledoneae: Acanthaceae-Cyrillaceae. R. Hegnauer. Birkhäuser, Basel, Switzerland, 1964. 743 pp. Illus. F. 123.

This volume, third in a projected series of five, covers the Dicotyledoneae (in which families are listed alphabetically) through the family Cyrillaceae. My review of volume 2 [*Science* **145**, 259 (1964)] was concerned in large part with what the book did not do (and which no book could do at the present time); in this review I wish to emphasize the content of the series.

The nature of the work is encyclopedic and its coverage of the literature comprehensive. Although the title may suggest an effort to utilize chemical data to develop a taxonomic system, this is not the case. Actually, the purpose of the author seems to be to organize all available chemical data within an arbitrary taxonomic framework for the convenience of biologists. When it is pertinent to call attention to interesting and suggestive chemical correlations, this is done, but little phylogeny is included, and the highly speculative nature of that which is included is made clear by the author.

The first 41 pages of volume 3 represent a somewhat disjunct discussion of (in order) taxonomic systems of

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.

RALPH E. ALSTON
Department of Botany,
University of Texas, Austin

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.

ERWIN CHARGAFF
Columbia University,
New York, New York

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