of them was neither scientific nor practical. Indeed they not only detracted from his reputation but also finally vitiated some of his theoretical views in science, notably on the evolution of man.

Miss George is not particularly concerned with Wallace's strange personality or with details of biography in the ordinary sense. For example, she notes in passing that Wallace married an 18-year-old girl when he was middle aged, but his wife and family life are never mentioned again. As she says at the outset, Miss George is primarily concerned with the history of Wallace's scientific ideas and their present status. She has diligently examined recent technical literature on subjects treated by Wallace. This endeavor is highly interesting and is successful on the whole, although Miss George is not always quite clear on modern evolutionary theory and sometimes remains muddled on points that were inevitably obscure to Wallace. Her writing is usually clear but lacks distinction.

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Paleobotany

Tretichnyye Flory Zapadnoy Sibiri [Tertiary Floras of Western Siberia]. P. I. Dorofeyev. Komarov Botanical Institute, Academy of Sciences of the U.S.S.R., Moscow, 1963. 346 pp. Illus.

The fossil floras described in this monograph occur at 20 localities in the West Siberian Lowland, most of the sites lying between 55° and 60° latitude along the rivers Tavda, Irtysh, and Ob'. The continental Tertiary deposits here, as in other parts of Soviet Asia, have been studied intensively during the past decade. P. I. Dorofeyev (or Dorofeev, as he prefers to transliterate it) of the Komarov Botanical Institute has been the principal investigator of fossil fruits and seeds. This volume, which summarizes, revises, and adds to his earlier reports, is a most welcome contribution.

The material is arranged in such a way that even those who are unfamiliar with the Russian language can obtain useful information. A map with the localities is provided on the first page of the brief introduction. A discussion of stratigraphy follows (the fossils were taken from both Oligocene and Miocene horizons); then each site is described individually and its fossils listed. This portion of the book concludes with a discussion of phytogeographic affinities and ancient Siberian climatic conditions and with a tabular list of 182 fossil species and their distribution in the Tertiary deposits of western Siberia. The remainder of the work presents formal descriptions of the species, many of them new, along with synonyms, nomenclatural changes, and comparisons with modern forms. Fifty plates, a bibliography, and a two-page English summary complete the volume. Unfortunately, the English summary does not list the 20 localities in the same numerical order as the introductory map; readers who ignore the Russian legend to the map will be confused.

Dorofeyev believes that the plant remains are derived from a single flora (American writers might say geoflora) that flourished in western Siberia with little change from the beginning of the Oligocene epoch until the end of the Miocene. The 129 genera in 72 families that have been identified indicate a warm temperate climate. The diversity of the fossil flora and the abundance of deciduous forms are in marked contrast to modern forests of the region, in which pine, larch, and fir predominate and in which species of broadleaf trees are few. Many genera of the ancient Siberian flora now occur only in eastern Asia, eastern North America, or both. Among these are *Taxodium, Glyptostrobus, Nyssa, Halesia, Fortunearia, Liriodendron, Leitneria*, and *Magnolia*. Although fruits and seeds of the Siberian deposits are fairly similar to those found in central European brown coals of the same age, the higher latitude of the former was not without effect: some of the more tropical elements of European brown coals—for example, Symplocaceae and Mastixioideae—are absent.

A paleobotanist must deal with floras consisting of dozens of families, and, obviously, he cannot be a specialist in all of them. Nevertheless, I am bewildered by some of Dorofeyev's statements with respect to modern *Nyssa* (familiar to Americans as tupelo or black gum), with which some of his most interesting fossils are allied. The endocarps (stones) of *Nyssa sylvatica* Marsh. are said to attain a length of 19 millimeters: actually, the maximum length is about 12 millimeters. The fossil fruit *N. macrocarpa* Dorof. is said to resemble the fruits of both *N. biflora* Walt. and *N. uniflora* Wangenh. (= *N. aquatica* L.), a puzzling statement, since fruits of these two modern species are very dissimilar. Most remarkable is the author's assertion that endocarps of these species contain two, three, or four seed cavities. In fact, fruits of both modern species have a single seed cavity, and in making this error, Dorofeyev missed an interesting point: his multilocular *Nyssa* fossils are structurally more primitive than unilocular fruits of modern *Nyssa*. Even granting the difficulty of obtaining modern material for comparison, these mistakes are inexcusable, for accurate descriptions of *Nyssa* fruits are to be found in the literature that Dorofeyev consulted in preparing his treatment.

Although this work is not as magnificently done as *The London Clay Flora* of Reid and Chandler or Kirchheimer's *Die Laubgewächse der Braunkohlenzeit*, it must share a place with those volumes on the shelves of the few who specialize in Tertiary fruits and seeds. The many botanists who are interested in the phylogeny and distribution of modern seed plants should acquaint themselves with the book, and anyone who thinks that the fossil record of angiosperms consists only of leaf impressions should at least examine the plates.

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Mathematics

Foundations of General Topology. Ákos Császár. Translated by K. Császár. Pergamon, London; Macmillan, New York, 1963. xx + 380 pp. Illus. $15.

The present work is an expansion of the first edition—*Fondements de la Topologie Générale* (Akadémiai Kiadó, Budapest, 1960). The author's goal is to treat uniform, proximity, and topological structures from a common viewpoint. He accomplishes this by developing a very general theory of "syntopogenous" structures in which the above emerge as special cases. The idea is simple and interesting. A syn-

topogenous structure on a set E is a family of partial orders on $P(E)$, satisfying certain natural conditions. The family defining a topology, for example, consists of a single order, $A < B$ meaning that B is a neighborhood of A.

The subject is treated in exhaustive detail—too exhaustive for almost anyone. (An index of notation contains more than 100 entries.) Fortunately, the introduction includes an excellent summary of the principal definitions and results.

The reader should have some background in general topology. The book proper starts with a review of elementary facts about relations in general and continues through 20 chapters of painstaking discussion of "semi-topogenous," "topogenous," "perfect," "biperfect," "simple," and "symmetric" orders or structures, and of generalizations to them of the definitions and main theorems about continuity, product spaces, separation axioms, convergence of filter bases, completion, and compactification.

Let E be a set. A *topogenous order* on E is a relation $<$ on $P(E)$ satisfying: $0 < 0$; $E < E$; $A < B$ implies $A \subset B$; $A \subset A' < B' \subset B$ implies $A < B$ (so far, a "semi-topogenous" order); and $A < B$ and $A' < B'$ implies $A \cup A' < B \cup B'$ and $A \cap A' < B \cap B'$. A topogenous order $<$ is said to be *perfect* if $A_i < B_i$ implies $\bigcup_i A_i < \bigcup_i B_i$ (over arbitrary index sets), *symmetric* if $A < B$ implies $E - B < E - A$. A *syntopogenous structure* on E is a family of topogenous orders directed by $\subset$ and such that for each $<$ there exists $<'$ such that $A < B$ implies $A <' C <' B$ for some C. Such a structure is called perfect or symmetric in case all its members are perfect or symmetric, respectively. A syntopogenous structure with just one member is *simple*. The familiar structures arise from taking the conditions two at a time: simple and perfect $\longleftrightarrow$ topology; simple and symmetric $\longleftrightarrow$ proximity; perfect and symmetric $\longleftrightarrow$ uniformity. For example, if $\{<\}$ is perfect, then the family $\{G: G < G\}$ is a topology on E; and the correspondence thus defined from simple, perfect syntopogenous structures to topologies is one-one and onto. Clearly, this work should be of great interest to those who deal with the foundations of general topology.

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New Books

Biological and Medical Sciences

Physical Factors and Modification of Radiation Injury. Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1964. 716 pp. Illus. Paper, $12. Sixty-five papers, some of which were presented at a conference sponsored by the Academy on 29 November–1 December 1962. The others are the result of meetings of the Conference on Modification of Radiation Injury by Bone Marrow Transplantation and Chemical Protection—a joint session with the Academy's conference on 1 December and separate sessions at the Sloan-Kettering Institute for Cancer Research on 2–3 December 1962. The volume is published as vol. 114 (art. 1) of the Academy's *Annals*.

Physical Properties of the Steriod Hormones. Lewis L. Engel, Ed. Macmillan, New York, 1963. 496 pp. Illus. $15.

Physiological Foundations of Behavior. Charles M. Child. Hafner, New York (reprint of 1924 edition), 1964. 348 pp. Illus. $7.50.

The Physiology and Biochemistry of Herbicides. L. J. Audus, Ed. Academic Press, New York, 1964. 575 pp. Illus. $16.50.

Primary Processes in Photosynthesis. Martin D. Kamen. Academic Press, New York, 1963. 195 pp. Illus. $5.50.

Principles of Preventive Psychiatry. Gerald Caplan. Basic Books, New York, 1964. 320 pp. $6.50.

Problems of Sleep and Dream in Children. Ernest Harms, Ed. Pergamon, London; Macmillan, New York, 1964. 153 pp. $6.50.

Problems of the Biochemistry of the Nervous System. A. V. Palladin, Ed. Translated from the Russian edition (Kiev, 1959) by F. S. Freisinger. Pergaman, London; Macmillan, New York, 1964. 342 pp. Illus. $11.50.

Radiation Medicine. A. I. Burnazyan and A. V. Lebedinskii, Ed. Translated from the Russian edition (Moscow, 1960) by Harry Asher. Pergamon, London; Macmillan, New York, 1964. 375 pp. Illus. $12.

Radiation, Radioactivity, and Insects. R. D. O'Brien and L. S. Wolfe. Academic Press, New York, 1964. 227 pp. Illus. Paper, $3.45; cloth, $5.95.

Recent Advances in Food Science. vol. 3, *Biochemistry and Biophysics in Food Research*. J. Muil Leitch and Douglas N. Rhodes, Eds. Butterworth, Washington, D.C., 1963. 339 pp. Illus. $13.95 (31 papers).

Residue Reviews. Residues of pesticides and other foreign chemicals in foods and feeds. vol. 4. Francis A. Gunther, Ed. Academic Press, New York; Springer, Berlin, 1963. 175 pp. Illus. $6.

Separation Methods in Biochemistry. C. J. O. R. Morris and P. Morris. Interscience (Wiley), New York, 1964. 895 pp. Illus. $17.50.

The Septum of the Cat. Orlando J. Andy and Heinz Stephan. Thomas, Springfield, Ill., 1964. 96 pp. Illus. $6.75.

Short Guide to Geo-Botanical Surveying. S. V. Viktorov, Ye A. Vostokova, and D. D. Vyshivkin. Translated from the Russian edition (Moscow, 1959) by J. M. Maclennan. Pergamon, London; Macmillan, New York, 1964. 170 pp. Illus. $9.

Social Behavior and Organization Among Vertebrates. William Etkin, Ed. Univ. of Chicago Press, Chicago, 1964. 319 pp. Illus. $7.50.

Standard Methods of Clinical Chemistry. vol 4. David Seligson, Ed. Academic Press, New York, 1963. 277 pp. Illus. $7.50.

Stochastic Models in Medicine and Biology. Proceedings of a symposium (Madison, Wis.), June 1963. John Gurland, Ed. Univ. of Wisconsin Press, Madison, 1964. 409 pp. Illus. $6 (13 papers).

General

Philosophy of Science. The Delaware Seminar. vol. 2, 1962–1963. Bernard Baumrin, Ed. Interscience (Wiley), New York, 1963. 569 pp. Illus. $14.50. Pt. 1, Scientific Explanation, Prediction, and Theories (contributors: P. K. Feyerabend, N. Rescher, W. Sellars, S. Bromberger, M. Scriven); pt. 2, Space and Time (contributors: D. Shapere, A. Grünbaum, H. Putnam); pt. 3, Particles, Fields, and Quantum Mechanics (contributors: E. L. Hill, A. Pais, P. Suppes); pt. 4, Induction and Measurement (contributors: W. C. Salmon, B. Ellis); pt. 5, Science and Man (contributors: E. C. Pollard, R. B. Lindsay, S. M. McCurrin); pt. 6, Cosmology (contributors: N. R. Hanson and J. A. Wheeler).

Research with Primates. Proceedings of a conference held near Beaverton, Ore., in May 1962. Donald E. Pickering, Ed. Oregon Regional Primate Research Center, Beaverton, 1963 (order from Tektronix Foundation, Beaverton). 108 pp. Illus. $2.50. Dedication of the Oregon Regional Primate Research Center.

Royal Society of London, Yearbook, 1964. The Society, London, 1964. 333 pp. $3.15. Contents: Past officers, calendar; lists of members, committees and boards (including names of those who serve on them); lists of medals, lectures, publications, and the various fellowships, professorships, and appointments. The information is correct as of 31 December 1963.

A Russian Scientific Reader. E. J. D. Warne. Allen and Unwin, London, 1964. 82 pp. Paper, 10s.

Science and Ideas. Selected readings. Arnold B. Arons and Alfred M. Bork, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1964. 288 pp. Illus. Paper, $3.95.

Science Citation Index. An international interdisciplinary index to the literature of science. vols. 1–5. Prepared and published by the Inst. for Scientific Information, Philadelphia, 1963. 2704 pp. $700.

Word Association Norms. Grade school through college. David S. Palermo and James J. Jenkins. Univ. of Minnesota Press, Minneapolis, 1964. 479 pp. $7.50.

The Year of the Gorilla. George B. Schaller. Univ. of Chicago Press, Chicago, Ill., 1964. 272 pp. Illus. $5.95.

You and Your Cells. Leo Schneider. Harcourt, Brace and World, New York, 1964. 157 pp. Illus. $3.75.