vibrations of the whole earth that confirm exactly the previously developed theory of an earth core and shells. Elsasser and Bullard suggested that the earth's magnetic field is related to a self-excited dynamo in the core. Paleomagnetic orientations were found to vary between continents. The paleomagnetic data have revived Wegener's hypothesis (1911 to 1922) of continental drift. Perhaps Antarctica, South America, Africa, Australia, and peninsular India, carried on the backs of deep convection cells, began to separate approximately 250 million years ago.

Isotopic ages indicate that plants go back about two billion years, animals 600 million. The juvenile earth was probably unable to hold atmosphere or hydrosphere, and gases that were later expelled from the rocks probably did not include free oxygen, so that the first oxygen may have come from the decomposition of carbon dioxide during photosynthesis by the oldest plants. Animal life became possible after oxygen had accumulated.

Exploration of the upper air has shown that the earlier theories of atmospheric circulation were incorrect. At high latitudes the upper winds blow mostly east, a result of the Coriolis effect. A north-south exchange of heat and moisture is nevertheless effected, in Antarctica by high-level movements of air toward the pole and lower level movements away from it, in the northern hemisphere through the occasional whipping back and forth of the eastward moving jet stream (p. 122). Oceanographers have shown that turbid flows rush down submarine canyons (p. 71 and plate XIII), and that bottom currents, such as the counter current to the Gulf Stream (p. 142), move sand and silt on the floor of the deep ocean.

This book describes new knowledge. It does not emphasize sufficiently the incomplete or uncertain state of some theories, including the theory of continental drift.

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Pure and Applied Mathematics Series

Point Set Topology. Steven A. Gaal. Academic Press, New York, 1964. xiv + 317 pp. Illus. $9.75.

This is a textbook for a first-year graduate course and is therefore neither a treatise nor a one-semester affair for juniors and seniors. It has aspects of the former in its systematic treatment of some topics, but few of the latter; it would be difficult to carve an introductory one-semester course out of these rather firmly riveted 300 pages.

Beginning graduate texts on topology must treat certain topics—types of sets in topological spaces (open, closed, connected, compact, and locally compact), the various separation properties, continuous maps, metrizable spaces and metric spaces, convergence (sequences, and filters or nets), and processes for building new spaces from old ones. The introductory treatments for these being now well standardized, the distinguishing question is—what else appears in the text? As indicated by the subjects of the five chapters (topological spaces, separation properties, compactness and uniformization, continuity, and theory of convergence), the author has restricted himself essentially to the topics that have been mentioned; however, he has discussed some in considerable detail or in depth, notably uniform structures, the relation between paracompactness and full normality, and the relations between various separation properties. He has chosen to exclude algebraic topology, in sharp contrast to Hocking and Young, and to go into topological algebra no farther than the theorems of Stone-Weierstrass, Arzela-Ascoli, and Banach-Steinhaus, in contrast to Kelley. (He has, however, included material on real functions on linearly ordered spaces, with an eye to real variables.) In brief, here are 300 pages of general point set topology, done in detailed epsilonic style.

For each section there are exercises; these include too many explanations of solutions for my tastes. To postpone the treatment of functions to page 175 also seems questionable. There are excellent indexes of notation, authors, and subjects, and at the end of each chapter useful notes and a bibliography.

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Commentaries on the Literature

International Review of Forestry Research. vol. 1. John A. Romberger and Peitsa Mikola, Eds. Academic Press, New York, 1964. xii + 404 pp. Illus. $13.

In the preface to this first volume of a new series, the editors state that the series is addressed primarily to research workers, teachers, and advanced students, is academic and fundamental in its approach, and emphasizes biological principles. The articles published will contain reviews, summaries, commentaries, and syntheses based on the world literature, or they may deal with newly recognized problems. In any case, it is intended that they shall contain adequate and accurate surveys of existing literature. Although the publication is international in scope, the papers will be published in English, and a special effort will be made to keep the style simple. Authorship will be by invitation. Both authors and subjects will be selected with regard to study and research in forest science, whether or not they are attached directly to professional forestry proper. The editors are aided by an internationally constituted editorial advisory board.

The present volume contains seven articles: Kurt Mantel (University of Freiburg), "History of the international science of forestry with special consideration of Central Europe"; Leo Heikurainen (University of Helsinki), "Improvement of forest growth on poorly drained peat soils"; Carl Olof Tamm (Royal College of Forestry, Stockholm), "Determination of nutrient requirements of forest stands"; Charles W. Ralston (Duke University), "Evaluation of forest site productivity"; Lalit M. Srivastava (Harvard University), "Anatomy, chemistry, and physiology of bark"; Ken-ichi Hatano (University of Tokyo) and Suminiko Asakawa (Government Forestry Experiment Station, Tokyo), "Physiological processes in forest tree seeds during maturation, storage, and germination"; and A. D. Voûte (Institute for Biological Field Research, Arnhem, Netherlands), "Harmonious control of forest insects."

The editors' maiden voyage suggests that their ship will be a happy one. The book contains a wealth of valuable material, on several subjects, gathered together in one place for ready reference. It is well printed, illustrated,