and the laterites that cover immense areas of the intertropics. Marine deposits of Cambrian through Lower Carboniferous age are widespread in the Sahara and Atlas regions, but, with the exception of a brief Saharan invasion by the Cenomanian sea, Africa has been essentially emergent for the last quarter billion years.

Apart from granites of metamorphic or intrusive origin, endogenous rocks are represented by the West African dolerites of probable Triassic age, thick basaltic fissure extrusions that terminated the Karroo sequence in Triassic time, extensive basaltic and silicic lavas of probably mainly Tertiary age in East Africa, carbonatites at a number of places, and the "Great Dike" of Southern Rhodesia which has an outcrop more than 300 miles (480 km) long and 3 to 4 miles (4.8 to 6.4 km) wide, on the same alignment as the rift valleys and Madagascar.

The tectonic picture is the least satisfactory, as might be expected when such a map is based primarily on reconnaissance mapping. The compilers inform us that the original documents were so heterogeneous with respect to structural data that only those faults were retained "which mark an abnormal contact or constitute a lineament." Smaller structures like the Vredefort Ring almost vanish at this scale. Except in the Atlas Mountains and parts of the Sahara, Madagascar, the Rift Valleys, and the Middle East, little structural grain is apparent. Rather we see a number of granitic or Precambrian centers or continental basins separated by overlying or bounding rocks like plums in a pudding. Furon and Lombard warn that "circumspection is recommended when applying to Africa the preconceived notions derived from studies made in other parts of the world."

The difficulty of compiling from heterogenous sources inevitably shows up in small particulars like the meridional "fault" at 20° East and the tropic of Capricorn. Inevitably, in a couple of decades, there will be a new and better map, but this map at this time excites only admiration. The distributors have with all propriety characterized it as "A milestone in African research." It is also a challenge and a reason to hope for the future mineral economy of Africa. And it should be mentioned that it is, in addition, an achievement in pure cartography—the registration is perfect, and although the compilers were a little stingy with symbolic lettering, the color discrimination is so good that most isolated unlettered patches can be identified without trouble.

PRESTON E. CLOUD, JR.
School of Earth Sciences, University of Minnesota

Organic Chemistry

Chemistry and Technology of Explosives. vol. 1. Tadeusz Urbański. Translated from the Polish by Irena Jeczalikowa and Sylvia Laverton. Pergamon, London; Macmillan, New York, 1964. xvi + 635 pp. Illus. $15.

This is the first volume of the English-language edition of Tadeusz Urbański's three-volume work; it is an expanded and revised version of the editions published in Polish (1953–1954), in Czech (1958–1959), and currently being published in German. The author has undertaken the monumental task of reviewing and summarizing the entire literature on the synthesis, manufacture, and chemical properties of explosives and related compounds. The result is far more encyclopedic than might be inferred from the title.

Volume 1 traces, with more than 1400 literature citations, the scientific and technological development of carbon-nitro compounds, only a few of which have been utilized in quantity production of explosives. Nearly a fourth of the volume is devoted to nitration processes, and the survey of the early literature provides an interesting study of the development of organic chemistry. It is refreshing to be reminded that picric acid was prepared by the action of nitric acid on indigo (Waulfe, 1771), or that nitrogen was recognized as the linking atom in carbon-nitro compounds because their reduction yielded amines, while reading about electrophilic substitution, molecular orbitals, infrared and x-ray spectra, and nuclear magnetic resonance. For those more particularly interested in explosives, volume 1 includes a broad survey of the physical and chemical properties of commercial and military explosives. The toxicity of aromatic nitro compounds and related problems of industrial hygiene are especially well treated. Numerous production processes are described; unfortunately many of them date from World War I or were those used only in Japan and Germany during World War II. The treatment of aliphatic nitro compounds is overly brief, particularly in view of the prominence accorded polynitro-aliphatic compounds in the recent literature. Many of the explosive properties reported date from pre-World War I and are described in outmoded terms. For example, ammonium picrate is "more powerful" than TNT because of a higher detonation rate.

The organization of the volume occasionally results in repetitious discussion, because nitration processes, general properties, specific compounds, and manufacture are treated in separate chapters. Despite these minor criticisms and a number of typographical errors, this book makes a worthwhile contribution; the translation is excellent, and complete author and subject indices greatly enhance the value of the book. One looks forward with interest to volumes 2 and 3, which promise to cover the other classes of explosive compounds and explosive compositions—and even to provide a brief treatment of rocket fuels.

ROBERT W. VAN DOLAH
Explosives Research Center, Bureau of Mines, U.S. Department of the Interior, Pittsburgh, Pennsylvania

New Books

Biological and Medical Sciences

Agricultural Genetics. James L. Brewbaker. Prentice-Hall, Englewood Cliffs, N.J., 1964. 170 pp. Illus. Paper, $2.95; cloth, $4.95.

Allgemeine Cytologie. Eine Einführung in die funktionelle Morphologie der Zelle. Ekkehard Grundmann. Thieme, Stuttgart, Germany, 1964. 435 pp. Illus. DM. 59.70.

Analytical Methods for Pesticides, Plant Growth Regulators, and Food Additives. vol. 2, *Insecticides* (637 pp., $23); vol. 3, *Fungicides, Nematocides and Soil Fumigants, Rodenticides, and Food and Feed Additives* (251 pp., $12). Academic Press, New York, 1964. Illus.

Animal and Clinical Pharmacologic Techniques in Drug Evaluation. John H. Nodine and Peter E. Siegler, Eds. Year Book Medical Publishers, Chicago, 1964. 680 pp. Illus. $18.

Animal Behavior. Its evolutionary and neurological basis. V. G. Dethier and Eliot Stellar. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1964. 128 pp. Illus. Paper, $1.75; cloth, $3.95.

Animal Physiology. Knut Schmidt-Nielsen. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1964. 128 pp. Illus. Paper, $1.75; cloth, $3.95.

(Continued on page 1232)