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# BOOK REVIEWS

*Soils: A New Global View*. By T.R. Paton, G.S. Humphreys and P.B. Mitchell. Yale University Press, P.O. Box 209040, New Haven, Connecticut 06520-9040, U.S.A. Cloth, 213 pages. US$20.00 (ISBN 0-300-06609-0).

Controversial indeed! Mincing no words, and not kowtowing to niceties of expression, the authors take on most of the world's pedologists, who are somewhat pejoratively labeled as "The Zonalists" for their traditional view that soils (pedologic profiles) owe their origin to the interaction of climate, time, organisms, parent material and topography. In this respect, the book's title, "Soils: A New Global View", is benign; a more appropriate appellation might be "Soil Morphology and Genesis: a Heretical View."

The authors are in the School of Earth Sciences at Macquarie University in Australia. Their fundamental premises are: (1) that the traditional concept of zonal soils (A/B/C horizons) is inherently flawed, and that removal (eluviation) of fine materials from the A horizon cannot explain the accumulation (illuviation) of clay at the top of the B horizon and hence the formation of "texture contrast" soils; and (2) that the widely applied "US Soil Taxonomy" and similar classification of world-wide soils, rather than being beneficial, have merely contributed to "pedological atrophy."

Accordingly, the first six chapters of the book set forth the authors' view about soil-forming processes, focusing on weathering and leaching, inheritance and formation of new minerals, bioturbation, rainwash, eolian activity, and soil creep. The remaining five chapters describe the global distribution of soils based on a plate tectonic view of relative landscape stability. Three appendices provide supporting documentation. Several page-size color plates illustrate the authors' concept of "mobile soil horizons"; in particular, these plates show multiple stonelayers in catena sequences that are attributed to bioturbation and rainwash processes, rather than to the more traditionally invoked "soil creep."

The authors save some of their scientific invective about the Zonalists until the last few chapters. Specifically, they opine that the plainlands of European Russia and the Midwestern plains of North America, which have been glaciated and from where the concept of zonal soils developed, have a "remarkably aberrant style of soil formation." In essence, the authors conclude that type areas for pedogenesis are located on continental plate centers that are not at present subject to permafrost, or have been subject to glaciation during the Pleistocene, namely, in Australia, Africa, cratonic South America and peninsular India.

The "new global view of soils" is certainly up-to-date as well as controversial, for it integrates a wide variety of concepts stemming from recent investigations in geomorphology, the biological sciences, and plate tectonics. Emphasizing the authors' viewpoints and field experience, most examples are drawn from Australia, southeast Asia and, to a lesser degree, from tropical Africa. The examples from North America and northern Europe are mostly given to illustrate the insufficiency of the existing "zonalistic view" of pedogenesis.

The book is not for beginning students in the earth sciences, for it presupposes a substantial knowledge of soil formation and geological processes, as well as the philosophy that underlies various classifications of soils. However, it serves as an excellent senior-level or graduate reference to discuss, if not vigorously debate, the merits and limitations of soil morphology and genesis. Given the cost of modern paperback books, this one is of good value. Indeed, there is no other book like it presently available. Its style of writing will intrigue most readers, although many traditionalists will not agree with the conclusions. It certainly will be of great interest to geologists, pedologists and geographers throughout the English-speaking world.

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*Gemstones of Afghanistan*. By Gary W. Bowersox and Bonita E. Chamberlin. Geoscience Press, Inc., P.O. Box 42948, Tucson, Arizona 85733, U.S.A., 1995, 220 p. US$60.00, hardbound (ISBN 9-945005-19-9).

Gemstones of Afghanistan is one of a growing number of books categorized as "topographical mineralogy" in *Mineralogical Abstracts*. Recently, I have reviewed two others on these pages: Emeralds of Pakistan and Mineralogy of Arizona.

Afghanistan is a geological and mineralogical treasure house that is but poorly known. Home to such

unusual rocks as ophiolites and whiteschists, and the seat of lapis lazuli mines first worked in 6500 B.C., this Texas-size landlocked nation occupies a lost corner of our globe. The country is chiefly inhospitable, arid, and rugged, with 36 mountain peaks that exceed 6000 meters in elevation. It is a country that has been torn by tribal and international strife for centuries. Bowersox and Chamberlin have travelled extensively in Afghanistan over many years to visit a myriad of mineral localities, mines, and markets. They express an unusual sympathy and understanding for this complex nation. One aim of their book is to stimulate a postwar (*i.e.*, post-1979 Soviet invasion) economy in mineral development through appropriate technology and training.

The book is divided into eight chapters. The opening chapter offers geographical and geological background, giving the plate-tectonic history of Afghanistan. Chapter two is a historical sketch of the country, with a chronological account of geological exploration. The following five chapters deal with, successively, lapis lazuli deposits of Badakhshan (III), spinel mines of Badakhshan (IV), ruby and sapphire deposits of Jegdalek and Gandamak (V), emerald deposits of the Panjshir Valley (VI), and tourmaline, aquamarine and kunzite deposits of Nuristan (VII). It is, in this reviewer's opinion, the light-metal (Li, Be, B) deposits of Nuristan that offer the greatest promise for world-class development. The closing eighth chapter treats mineral deposits and economic development potential.

Certainly this book abounds with useful and interesting information. Nevertheless, I found the writing unclear and erratic, as though taken from ill-ordered file cards. Subjects are not pursued methodically, and references to photos (most of which are excellent) and to figures and maps (most of which are unsatisfactory) are helter-skelter. Photos nos. 34 and 47 appear to have been omitted. Consistency has been overlooked. Examples: in places the Paleocene is mentioned, elsewhere the Eocene rests directly on the Cretaceous. Emeralds in the same deposit are said to occur in strongly altered diorite-gabbro dykes or sills (p. 123), in skarn (p. 128), and in "quartz and ankerite (iron carbonate) (sic) veins" (p. 129).

Then, there are just too many errors to let pass. A few: the Cambrian is omitted from "the standard geologic column ... of the USGS" (fig. 1.8); the chemical formulae for calcite (p. 59) and several other minerals in the text are haywire; lapis (*viz.* lazurite) crystals are not "a solid solution of different members of the feldspar group" (p. 60); the Oligocene was not "about 600 million years ago" (p. 105), and so on.

The book closes with four appendices. The first gives the properties of several of the gemstones discussed in the text. Treatment is spotty, and again, several chemical formulae are in error. The second appendix gives the coordinates of 1423 "gem and mineral deposits (sic), occurrences, and showings in Afghanistan." This is a useful compilation, running from aluminum, amethyst, apatite... to tourmaline, tungsten, uranium. The third appendix is a glossary of about 120 terms. The majority of the definitions would find little favor with mineralogists or geologists. However, you'll learn what is a krowl, a lakh, and a mujahideen. The final appendix lists selected reading, some 100 references (a few are incomplete). These, plus the hundreds of others cited in the text's chapters, are an immensely useful resource to anyone who wishes to pursue work on the mineralogy, geology, or ethnography of this fabled land.

In summary, this is a book with much information nominally hard to come by, dealing with a neglected but clearly fascinating nook of our planet. However, if it is to reappear in a second edition, the heavy hand of an experienced editor and an eagle-eyed geologist proofreader are absolute necessities.

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