REVIEWS

California Serpentines: Flora, Vegetation, Geology, Soils, and Management Problems. By ARTHUR R. KRUCKEBERG. University of California Publications in Botany, Vol. 78. 1985. $10.95. ISBN 0-520-09701-7 (pbk).

Was there field botany in California before "serpentine"? Yes—but as this volume eloquently explains, attempts to understand serpentine-plant relationships have prompted a great deal of important fieldwork and have enriched our systematic, ecological, and evolutionary literature. Arthur Kruckeberg worked on serpentine problems in California during the height of serpentine enthusiasm in the 1950s. His professional interest in serpentine continues, and he is well versed in the international literature on ultramafic research. I can think of no one better qualified to assemble this sort of comprehensive review.

Kruckeberg first discusses the slowness of California botanists to appreciate the nature of serpentine habitats. These collectors were attracted to the sterile, rocky slopes that harbored so many endemics, disjuncts, and puzzling distributions. But they didn't say much about the rocks and soils involved. Discussion of calcium-magnesium imbalances and the host of related physiological problems in serpentine soils did not surface in California botanical or agricultural literature until the 1930s.

The sections on geology, soil and mineral nutrition, and physiological and morphological responses are well developed with more than enough detail for most readers. After discussing ultramafic, serpentinite, peridotite, and other rock and mineral terms, Kruckeberg reverts to the common and convenient usage of "serpentine" for rock, soil, or vegetation of ultramafic affinity. One uncited reference that is relevant to the physiological response section is J. L. Jenkinson's work on *Pinus ponderosa* seedlings from serpentine and non-serpentine sources grown on serpentine and non-serpentine soils (U.S. Forest Service Resarch Paper PSW-127/1977).

Some botanical readers may pass over the above sections quickly and settle down to see if their favorite serpentine taxa are dealt with properly in the serpentine vegetation and flora sections (with related appendices). A great deal of information is summarized in helpful ways in this material. One value of such summaries is to prod constructive critics into new fieldwork to check on apparent inconsistencies and omissions.

The highlight of this volume may be the *Streptanthus* case history in the evolutionary ecology section. After review of established principles of ecotypic adaptation to serpentine, the principles are applied to *Streptanthus,* a genus on which Kruckeberg speaks with great authority. This is a most interesting discussion.

The volume concludes with sections on exploitation threats and conservation needs. Although California serpentines have been mined for well over a century for mercury and chromium, massive geothermal developments and open-pit mining operations for trace amounts of gold and nickel pose new threats. Not mentioned is a serpentine mineral use that is declining—asbestos. Only two asbestos mines currently operate in the United States, and one is within the New Idria serpentine mass. A defunct asbestos mine nearby is considered one of the greatest "toxic waste" problems in California.—JAMES R. GRIFFIN, Hastings Natural History Reservation, Carmel Valley, CA 93924.

Vascular Plants of the Channel Islands of Southern California and Guadalupe Island, Baja California, Mexico. By GARY D. WALLACE. Contributions in Science, No. 365, Natural History Museum of Los Angeles County. 1985. 136 pp., $18.00 + $1.80 shipping. (Available from the bookstore, Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007.)
