ground-cover of open forest lands. But it may instead mean weedy vegetation of trampled roadsides, as it does with *Aristida dichotoma*. Field experience usually enables the user to decide which meaning to read into a statement.

Very few species known to occur in Illinois have failed to be included. Dr. Jones's criterion for admission was his own examination of a valid specimen. In a nearly complete scrutiny, the reviewer found only 4 or 5 typographical errors or inadvertent slips, none of which is likely to mislead; possibly worth mentioning—on page 203, *Dodecatheon amethystinum*, for "Mo." read *Iowa*.

Numerous distributional problems remain to be solved, and additional species to be found, even in so thoroughly cultivated an area as Illinois. Such notes as "woods, local" for witch-hazel and for twinleaf (*Jeffersonia*), raise questions: are they restricted to few stations because of an undiscovered environmental requirement; are there unknown hazards in dispersal or establishment; or are they limited in their abilities to compete? When two entities are recognized where formerly one served, as in the trifoliolate sumacs, *Rhus aromatica* Ait. and *R. arenaria* (Greene) G. N. Jones, one asks whether it is only the latter that forms thickets over the extensive dune areas of the larger valleys or both species. Such problems may be solved by further field study; the new Flora should stimulate interest and activity in them.

A most appropriate feature of the book is the already-mentioned citation of collectors of rare or little-known species. The old-time collectors, too little known to present-day botanists, did much to preserve data now unobtainable. The earliest record noted is 1829, when S. B. Mead collected *Ceratophyllum echinatum*. Mead was perhaps the earliest resident collector. He prepared the first general list for the state, now practically unknown.

S. B. Mead. *Catalogue of plants growing spontaneously in the state of Illinois, the principal part near Augusta, Hancock County.* The Prairie Farmer, 6: 35–36, 60, 93, 119–122. 1846.—A manuscript version of this list was prepared in 1942 by Dorothy May Croker (Mrs. Frank Newton Gillette), and may be consulted at the Natural History Library, University of Illinois. Its title: *Mead's 1846 Illinois flora, with present-day names.* In it Mead's notes on locality and habitat are more conveniently arranged. The number of species is 895.

It is presumed that Mead's list, rather casually mentioned in I. A. Lapham's catalogue of Illinois plants (1857) was a major basis for it. Other early collectors were C. A. Geyer, M. S. Bebb, Elihu Hall, John Wolf, George Engelmann, Frederick Brendel, Jacob Schneck, T. J. Burrill, George Vasey, H. H. Babcock and G. H. French. Somewhat later were W. K. Higley, E. J. Hill, H. N. Patterson, W. E. Andrews, Robert Ridgway, H. Shearer, G. P. Clinton, A. B. Seymour, M. B. Waite, W. S. Moffatt, W. A. Nason, F. E. McDonald, L. M. Umbach and H. S. Pepoon. To mention living botanists, the collections of Agnes Chase, V. H. Chase, Gleason, Gates, George D. Fuller and E. J. Palmer are important. G. N. Jones has collected extensively within the past few years. In this work, as in herbarium studies and preparation of manuscript, he has had the able assistance of Florence Freeman Jones.

Botanists of Illinois and elsewhere have waited long for some one with the energy and ability of Dr. Jones to prepare a usable and modern guide to the flora of the state. Progress in systematic and other phases of botany will be accelerated by it.

ARTHUR G. VESTAL

UNIVERSITY OF ILLINOIS

MINERALS

Minerals of Might. By WILLIAM O. HOTCHKISS. vii + 206 pp. 14 graphs and maps. Lancaster, Pa.: The Jaques Cattell Press. 1945. $2.50.

"I AM afraid the nations of the world have neither the intelligence nor the character to postpone forever World War III." So states Mr. Lawyer, a fictitious character in "Minerals of Might," a thought-stimulating book by William O. Hotchkiss, president emeritus of Rensselaer Polytechnic Institute. That is a stern indictment of the peoples of the world but one which seems justified after an unemotional analysis of recent world news.

"Minerals of Might" is a book which every American citizen should read even if he has to forego his daily game of bridge to do it. There is information in it which should cause him to ponder well before he casts his next votes for those who will formulate and execute our foreign and domestic policies. The book explains clearly the differences between the "have" and the "have not" nations and sheds considerable light on the economic pressures which lead to war, cleverly concealed as they are under ideological cloaks. It shows, too, that rich as America is, she is not self-sufficient in many of the minerals most necessary to our welfare, happiness and defense. The statement "Of most of our resources we have used more in the last thirty years than we had used before in all history—more in 30 years than in the preceding 30 centuries" may be prophetic of future accelerated use.

Although the book contains a great many statistics it is not stuffy. The data are given in such a way that reading is easy and the few charts shown may be omitted if the reader so desires. It is evident from the treatment that Dr. Hotchkiss is an educator. He

does not deal with his subject as something set apart from reality as many scientists do. Rather, he integrates it with our everyday lives and the lives of our children. Moreover, he gives enough of the historical and social background of the many minerals discussed to enable the casual reader to enhance his education. Incidentally, there is a quotation from John Stuart Mill on page 42 which should be required reading for every one of us.

The role which minerals play in the national defense is explained and the rate at which war depletes the reserves of exhaustible critical minerals is emphasized. We now have enough evidence to predict that war of the future will differ markedly from war of the past, both in materiel and personnel. The differences will be felt in our mineral reserves. Unfortunately it appears that the greatest load may be thrown upon the items least able to bear it, such as mica, chromium, cobalt, molybdenum and tungsten. The farther advanced our technology becomes the more we will come to depend on the rare and unusual materials.

Starting with iron ore, Dr. Hotchkiss discusses world production, use and probable reserves of the major metals: copper, lead, zinc, aluminum, tin, manganese and many of the minor metals and minerals. In each discussion he emphasizes the part which the mineral plays in maintaining our mechanized civilization and he tells us something of the effort required to win the metal from its earthy prison. I wonder if all of us truly appreciate the fact that to secure one ton of iron we must dig two tons of ore; or to secure one ton of copper we must dig 83 tons of ore! And the quality of our reserves is diminishing.

Special emphasis is placed upon depletion of high quality iron ore reserves, but Dr. Hotchkiss believes that research will solve most of the beneficiation problems and that the Lake Superior region will be our major source of supply for many years to come. Contrasted with statements relative to research making available presently non-commercial mineral bodies is the statement that magnesium is the only metal available in inexhaustible quantities. Apparently it awaits a Mushet and a Bessemer.

Water is little thought of as a major mineral resource, yet without adequate quantities of it industry as well as agriculture would suffer severe restrictions. Dr. Hotchkiss discusses water as a mineral resource in the production of power. While that use of it is admittedly of high importance other industrial uses are, too; and those he fails to mention even though it is known that the retreat of ground water supplies is giving concern to the geologists of at least two eastern industrial states.

Oil, coal and natural gas are the principal sources of energy available to us in sufficiently large quantities at prices which we can afford to pay. Dr. Hotchkiss's discussion of oil and coal while brief is sufficient to give the layman about all he needs to know to read his newspaper more intelligently and to help him understand the world negotiations now under way. The fact that coal resources in the United States are adequate for thousands of years coupled with the advances made in the chemistry of coal promises a bright future for many industries. Supplementing the discussion of coal resources Dr. Hotchkiss points out that improvements in efficiency in the use of coal are to be expected, which if consummated will extend our reserves several-fold. His discussion of energy sources is completed with factual references to the possible use of solar energy and wind power. It is interesting to note that he was as unconscious of the development of atomic energy as most of the rest of us.

Mineral resources are so important to the life of all nations that a separate section was devoted to them in the Atlantic Charter. Dr. Hotchkiss's discussion of the limitations of the language of that section are well thought out and the opinions he advances are worthy of more extended study. He also discusses the stockpiling of strategic and critical materials toward a time when they may be needed to help defend us against an enemy now unknown. His recommendation is that we stockpile material from our own reserves in order to assist in balancing employment in slack times. This reviewer is of the school which believes we should purchase material for stockpiling from abroad and leave our own reserves intact for the better development of our future—the point is controversial.

CHARLES M. PARKER

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