chapters on myometrial anatomy, histology and histochemistry, and physiology; the process of labor, the puerperium, and lactation; and a final one on maternal physiological adjustments to pregnancy.

Although the material in each of these scholarly monographs is technical enough to provide source material for other investigators, the clinical orientation can be seen from the contents so briefly noted above. This book, and its announced companion volume 2 on the physiological and biochemical aspects of the fetus and newborn, can go a long way toward moving the whole specialty into the new era in obstetrics of which these young scientists cum practicing obstetricians and their like-minded colleagues are examples.

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Defects in Solids

Calculation of the Properties of Vacancies and Interstitials. Proceedings of a conference, Shenandoah National Park, Va., May 1966. U.S. Department of Commerce, Washington, D.C., 1967 (available from Superintendent of Documents, Washington, D.C.). viii + 202 pp., illus. $2.50. National Bureau of Standards Miscellaneous Publication No. 287.

Many of the properties of solids are controlled by defects within them. Point defects such as vacant lattice sites, impurity atoms, and interstitial atoms give rise to such diverse phenomena as electrical conductivity in semiconductors, color of ionic crystals, and changes in the strength of metals. This fact was recognized a half a century ago, and careful theoretical consideration of these properties has been in progress since then, with the present conference describing the state of the art. Because of the exceeding difficulty of the problems, the progress has been slow, and, although new techniques are continually being proposed, one rarely sees a major breakthrough. Usually one starts with two-body interatomic potentials, since more accurate ones cannot be dealt with at the present time, and sums the energies of the interactions of an extra, foreign, or missing atom with all the other atoms in a crystal, and the energies of the interactions of the atoms in their distorted positions with each other. However, an interatomic potential must first either be calculated from first principles or be obtained by empirical matching to experimental data. Either technique encounters difficulties, since the electronic environment of a defect in a crystal is different from that assumed in either the calculated or the empirical potential, and the situation becomes even worse for small defect clusters where the symmetry may differ from that of the lattice. But even having an acceptable potential, one is still faced with the formidable problem of calculating the sums of interactions with the other atoms in the lattice when the defect has caused distortion of the position of the atoms and, in nonmetals, distortion of the charge distribution. Hence, calculations either of equilibrium positions or of a series of positions occupied during migration of the defect necessitate iterative computations of successive relaxations of neighboring atoms and the effect of these relaxations on their neighbors, and so on. Thirty years ago Mott and Littleton made such a computation for some alkali halides by dividing the crystal into a local region around the defect in which the distortions of positions of individual ions were considered, and the rest of the crystal, whose distortion was treated by elastic continuum theory. Today, with the advent of high-speed computers, many more individual relaxations may be included (up to about 600 atoms on the best available computers), but the problem must still be treated in the same way by matching this result to an elastic continuum. These methods are discussed in the present conference proceedings, with the conclusion that the results are reasonably satisfactory for vacancy-type defects but leave much to be desired for interstitial defects, which produce larger distortions.

Point defects in metals not only distort the position of atoms but also distort the electron configuration in their neighborhood and, hence, give rise to changes in such phenomena as electrical resistivity. Furthermore, the presence of defects causes alteration in the periodicity of mass points in the lattice and changes the normal modes of lattice vibration, which in turn alter the phonon spectrum of the crystal. Such changes affect the thermal and electrical conductivities. Theoretical calculations of the electronic and vibrational phenomena associated with point defects are also included in the conference proceedings.

The conference report is intended for the specialist, not the casual reader, and there is no attempt in the papers to educate the reader or even to define the jargon of the field. However, lengthy reports by study panels at the conference are included which review and summarize the three main areas of investigation: energies and configurations, electronic states, and vibrational states. These reports will be of great value to anyone who, having a background in solid state physics, wants to be brought quickly up to date (1966) in the field.

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Theory of Liquids

Liquid Metals. N. H. MARCH. Pergamon, New York, 1968. viii + 133 pp., illus. $7. International Series of Monographs in Natural Philosophy, vol. 15.

Although the foundations of a statistical theory of liquids were laid some years ago, the theory is still at a primitive stage of development. This is because of enormous mathematical complications arising out of the strong interactions between the atoms and out of their state of disorder. In liquid metals there is an additional complication because of the presence of "free" electrons. This mediation by the electrons brings about a radical change in the coulomb law of force between the ions. It is legitimate to say that we do not as yet know the precise form of this effective ion-ion interaction. Nevertheless, during recent years considerable progress, both theoretical and experimental, has been made in our understanding of the physics of liquid metals. In fact, a vast amount of literature has accumulated in this field. It is no mean task to summarize this knowledge in a monograph of some 125 pages. Judging purely from the amount of literature and the difficulty of the field, I am inclined to say that the author of the present work has done a reasonably good job.

There are in all nine chapters in this book. Chapters 1, 2, 4, and 5 are devoted to the static structure factor of a liquid and to a discussion of the method for calculating the interionic potential from a knowledge of the structure factor by using the three well-known statistical theories. March and his collaborators were the first to develop this

method. Results for the interionic potentials of many simple metals are given, but a critical discussion is lacking. Chapter 3 gives a simple account of the role the electrons play in shielding the coulomb interaction of the ions. It is a standard textbook kind of discussion. Chapter 6 deals with the phenomenon of melting. Strangely enough, the author discusses an empirical relation by Mukherjee and considers it to provide strong support for dielectric screening theory. He could have easily found in the literature more convincing examples in support of this theory.

Chapter 7 deals with the phenomena of electrical transport in liquid metals. It is a well-written chapter, but better accounts can be found elsewhere. In chapter 8 the author discusses the dynamics of atomic motions in liquids. This chapter is a mere glossary of formulas and does not much help the beginner to understand the field. The theory of electron states in liquid metals is well summarized in the last chapter. I have my doubts, however, whether a reader who is not familiar with Green's function techniques will be able to follow intelligently the discussion in this chapter. There are six useful appendices in the book.

My feeling is that the author has been severely handicapped by trying to condense the vast amount of knowledge that has accumulated during recent years on the physics of liquid metals into a tiny monograph. The result is a book which is useful if and only if it is read in conjunction with other, more detailed texts and review articles.

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Plants in Beringia

Flora of Alaska and Neighboring Territories. ERIC HULTÉN. Stanford University Press, Stanford, Calif., 1968. xxii + 1008 pp., illus. $35.

In this handsome volume, the distinguished Swedish author has crystallized his thoughts and experience of more than half a century as they bear upon the vascular plants of Alaska and their role in circumpolar vegetation. His *Flora of Kamchatka and the Adjacent Islands* (1927–1930), *Outline of the History of Arctic and Boreal Biota during the Quaternary Period* (1937), *Flora of the Aleutian Islands* (1937), *Flora of Alaska and Yukon* (1941–1950), and *The Circumpolar Plants* (1962) are so many giant stepping-stones to this impressive synthesis.

The central emphasis of the book is on the historical importance of Beringia as an intercontinental land bridge and the significant role of Alaska as a great northern biological *refugium* during Pleistocene glaciation. These ideas were first enunciated in Hultén's 1937 thesis: ". . . the present ranges of Alaskan plants seemed to demonstrate that Beringia had been a pathway for the interchange of biota and that its Asian and American remnants lie at the center of many distributional patterns." The successive openings and closings of Bering Strait in response to fluctuation in ocean level caused by glacier formation and melt acted as a spigot to turn periodically off and on the migration and intermingling of plants and animals between Siberia and Alaska from Miocene time until the final interdiction of movement by land some 10,000 years ago.

Because, as the author notes, plants and animals have little respect for political boundaries, Hultén's Alaska is not coincidental with the outlines of our 49th state. For both floristic and cartographic reasons, he includes the Yukon Territory, an interstitial arm of British Columbia, parts of the Northwest Territories, and the Chukchi Peninsula of Siberia. Inclusion of the last "helps to make clear the important overlapping of the floras of the two continents" and certainly makes this the first flora of an American state to deal also with a portion of the Soviet Union! The area involved adds up to a total of nearly 1,000,000 square miles, ranging from Point Barrow at the north to the southern Aleutians, and from Attu Island on the west to the eastern border of the Yukon. Within this vast area ("about four times the size of Texas") the author accounts for more than 1500 species of vascular plants belonging to more than 300 genera. These are distributed in Alaska proper over four major floral regions: the coastal coniferous forest extending southward down the Panhandle, the coniferous forest of the interior, the treeless tundra of the Arctic slope, and the likewise treeless Pacific shores of the various islands and peninsulas. The Aleutian Islands, dominated by Pacific coastal plants, might almost constitute a fifth.

The first botanical collections in Alaska were made by Steller, the German naturalist with Bering's 1841 voyage of discovery, but the first extensive ones were those of Chamisso and Eschsholtz, published in the results of Kotzebue's *Rurik* expedition (1826–1936). The Harriman Alaska Expedition of 1899 led to the preparation by Standley of a manuscript flora, but this remained unpublished. An early and indefatigable collector in interior Alaska was J. P. Anderson, whose *Flora of Alaska and Adjacent Parts of Canada* appeared in 1959. Establishment of the Arctic Research Laboratory at Point Barrow in 1946 opened the northern area to vigorous biological investigation, and the vascular plants were summarized by Wiggins and Thomas in *A Flora of the Alaskan Arctic Slope* in 1962. Both this laboratory and the Arctic Institute of North America sponsored Hultén in four profitable summers of preparatory field work. The author notes that the quantity of research material available to him for writing the present volume was at least three times that available in 1950.

Following the concise introductory material and a master key to families and genera, 937 pages are devoted to taxonomic treatment, providing keys, descriptions, synonymy, habitat and range information, and frequently biological, taxonomic, or ethnobotanical notes. The author's concept of species and other categories is conservative, in line with his strong and conscious emphasis upon intercontinental similarities among circumpolar plants. He finds the subspecific category useful for his purposes and employs it extensively. He allows for extensive hybridization, and groups the numerous apomicts into morphological units that correspond to sexually reproducing species. For each of the more than 1700 taxa there are provided simple but diagnostic line drawings and a pair of distributional maps, one showing occurrence within the area defined, the second indicating the complete circumpolar distribution of the species. As Hultén remarks, "The circumpolar range maps . . . should offer a welcome opportunity to study the geographical affinities of the flora in detail, and to provide a basis for phytogeographical theory and speculation that has not earlier been available. For many purposes they may be found to be the most useful contribution I have made in preparing this flora." A special feature is the inclusion of 49 colored photographs by the author, superb in both quality and reproduction. The volume closes with a glossary of botanic