erations. *Lawrence and Oppenheimer* will hurt and outrage many people. It may be some time before the scientific community makes its collective judgment upon the accuracy and justice of this book.

ALICE KIMBALL SMITH
Radcliffe Institute,
Cambridge, Massachusetts

Reproductive Processes

Reproduction in the Female Mammal. Proceedings of the 13th Easter School in Agricultural Science, Nottingham, England, 1966. G. E. LAMMING and E. C. AMOROSO, Eds. Plenum, New York; Butterworths, London, 1967. xii + 583 pp., illus. $32.

Biology of Gestation. Vol. 1, The Maternal Organism. N. S. ASSALI, Ed. Academic Press, New York, 1968. xiv + 507 pp., illus. $27.

It is a natural and generous impulse of participants in a successful multidisciplinary conference to wish to communicate the stimulus of the experience to a larger audience. It is, however, a very difficult thing to accomplish, for the spontaneity and nuances which are of the very nature of such conferences are largely lost when the transcript is "smoothed" into acceptable form for publication. Lamming and Amoroso, the editors of *Reproduction in the Female Mammal*, have overcome many of the difficulties of their assignment and have brought the proceedings into book form with unusual speed. The accomplishment is well worth the effort it doubtless cost them, for they have avoided the outmoding of data which is still another pitfall for editors of proceedings.

The 28 essays, grouped into seven large categories, are reproduced as formal papers without interruption. Each is immediately followed by the comments made upon it in discussion. Each comment has been cast as a single short paragraph with the essayist's reply beside it. Much of the color lost through this formal method of reporting is restored by Amoroso in the concluding chapter, "Symposium in perspective." This chapter transcends the usual "closing remarks" in that Amoroso, with his accustomed kindly wit and urbane philosophy, synthesizes the material presented throughout the four days of the conference as well as summarizing it. One obtains a sense of the vigorous expressions of opinion which enlivened the meeting and catches some of the sparks generated by nascent ideas and enthusiastic championship of new concepts. Amoroso does not hesitate to note that, to some extent, the symposium sacrificed depth for the sake of expanse, but he recognizes the inevitability of this when so broad a topic is covered in so short a time.

Although the scope of the conference was indeed disconcertingly broad, individual essays are specific and down to earth, in large part reporting, with appropriate background, the work of the essayist and his associates. For potential readers wishing to know what they may expect to find in a book with so all-embracing a title, the seven categories into which the presentations were grouped may be listed: Hypothalamic Control of Reproductive Processes; Separation, Purification and Immuno-Assay of Gonadotrophins; Cyclic Variation of Gonadotrophin Secretion and Release; Comparative Aspects of Reproduction in Poultry; Interrelationships between the Pituitary Gland and the Corpus Luteum; Artificial Control of Reproduction; Hormonal Control of Uterine Reactions.

It can be seen that endocrinology, in its physiological and pharmacological aspects and particularly the currently active field of neurological-endocrinological relations, was the focal point of the symposium. The 160 participants represented countries throughout the world. Academic affiliations were largely to institutions of veterinary medicine and animal husbandry, with faculties of human anatomy, physiology, biochemistry, and pharmacology also represented. Sheep, swine, cattle, and poultry led among the experimental animals studied—the last, though a nonmammal, included because it is the source of much germane information.

As an encyclopedic source book the volume is exceedingly valuable, surpassing the usual "year book" because of the frank evaluation of data which emerges from the discussions and the thought-provoking hypotheses cautiously advanced by competent authorities. To those who might consider such a work too far removed from the problems of human reproduction to have medical pertinence, the dictum of Donald Barron of Yale, voiced elsewhere, may be cited: "Animal experiments are carried out to obtain *vistas* and to get ideas of the *mechanisms of biological operation*" (italics are the reviewer's).

This thought forms an appropriate transition to the second work under review. Although, with a single exception, all of the authors of papers in the Assali volume are obstetricians or affiliated with obstetrical departments, and the focus is upon human gestation, the monographs composing the volume concentrate upon the basic science aspects of gestation. Indeed, an initial thought which strikes the reader is how far the progressive modern obstetrician has come from the not-too-distant day of the classic "baby doctor." The 13 authors have all done significant research in the fields of which they write, and their monographs exhibit comprehensive scholarship and wide personal contacts with colleagues in many related disciplines.

Since one of the purposes of the book is to "provide a source of basic information to the clinician," it is no small satisfaction to discover that all of the authors are skilled teachers knowing how to present such complicated matters as "The Stockholm concept of estrogen biosynthesis in the fetoplacental unit at midpregnancy" in comprehensible form and, even more important, knowing what complicated matter to include and what, tactfully, to omit.

A second purpose is served: "to interest . . . the student, the research worker, and the academically oriented individual in the general field of reproduction and in the specific fields of obstetrics and pediatrics." The coupling of those two specialties is significant and illustrates the enlightened attitude pervading the book. Not only is the "feto-placental-maternal unit" stressed over and over again both anatomically and physiologically, but emphasis is given to the overlap in spheres of clinical responsibility: the obstetrician's role extending on into neonatal life, the pediatrician's interests reaching far back into antenatal life.

The opening chapter deals with a subject rated as one of the major preoccupations of the Easter School conference, "The neural control of ovulation." In addition to a good review of currently available information, a final section dealing with "certain critical questions [which] are totally unanswered" provides a stimulating counterpart to the first section of the Easter School volume. The second chapter, "Gametogenesis to implantation," provides another parallel between the two volumes, but with the third, "Morphology of the placenta," Assali's group commences consideration of later stages of gestation than the Easter School dealt with. Physiology and hormones of the placenta come next, followed by

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.

ELIZABETH M. RAMSEY
Department of Embryology,
Carnegie Institution of Washington,
Baltimore, Maryland

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.

A. C. DAMASK
Physics Department, Queens College of the City University of New York, Flushing, New York

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