

phantus." In any case, it is to be hoped that someone before long will make as searching a study of Arabic algoristic impulsion toward modern algebra as Klein has made of Greek philosophical stimuli. Historians meanwhile will be grateful not only for the reappearance of Klein's study in a more convenient form, but also for the very welcome inclusion (in an appendix, pp. 313-353) of a long-desired English translation of Vieta's *Isagoge in artem analyticam*—the chief contribution made by "the true founder of modern mathematics."

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Surfaces and Interactions

The Cell Periphery, Metastasis and Other Contact Phenomena. LEONARD WEISS. North-Holland, Amsterdam; Wiley, New York, 1967. 388 pp., illus. \$17.50. *Frontiers of Biology*, vol. 7.

It was once expected that the insights into control mechanisms derived from the study of single cells would be immediately applicable to the mammalian cell. One of the principal difficulties—both technically and theoretically—in exploiting these gains has been evaluating the importance of cell-cell interactions. It has always been appreciated that the physiology of cells, with respect to rates of reactions, must be determined by the highly organized environment existing in tissues where cells are closely and precisely juxtaposed. Many biologists, however, from the very beginning of the studies with single cells of higher organisms, have reserved the further possibility that the cell was regulated also at a primary level and that "contacts" in some way determined the biological capacity of the cell. Whether with respect to the regulation of physiological processes or to the determination of the biological potential of the cell, an increasing number of phenomena, such as induction, morphogenesis, immunological responses, contact inhibition, and metastasis, are being considered as determined by "contacts."

It is therefore particularly useful that there has appeared at this time a comprehensive, sound, and clear account of what is known about that part of the cell—the cell periphery—which is involved in contacts. Weiss has reviewed the chemical constitution

of the surface, as now known, and given some account of physical and physiological dynamics in the peripheral zone. The various theories that have been advanced to explain cellular aggregation are considered. These include possible formation of antigen-antibody-like complexes, pairing or coordination involving cations, and stabilization of cells at critical distances by virtue of secondary minima that exist, theoretically, in the potential fields between identically charged particles in close contact. The experimental details given demonstrate the techniques and the inadequacies of many of the techniques needed for studying cells isolated from tissues.

Some of the physics and physical chemistry of the interaction of charged particles, mostly derived from studies of lyophobic colloids in dilute solutions, is given as a possible basis for understanding cellular interactions. The larger size of the particles, that is, the cells, and the concentrated nature of the solutions in which they interact are only a few of the formidable problems involved in the application of studies from simpler systems. The very valuable technique of cell electrophoresis, so beautifully exploited by Weiss himself, is described in considerable and useful detail.

It would be hoped that the vast quantity of data accumulated would permit an understanding of the molecular basis of cellular contacts and of any behavioral or functional changes. Perhaps the most valuable aspect of Weiss's presentation is the judicious (and gentle) way he has indicated that there are not enough data on any aspect of any problem to permit one to come to any conclusion. This is important, for many have accepted conclusions, especially concerning differences between normal and malignant cells in respect to surface properties, charge densities, and chemical constitution, without appreciating the limited nature of the available data or the technical and theoretical difficulties involved in obtaining and interpreting data. The detailed consideration of some of the findings from which conclusions have been drawn is perhaps the best way to reveal the nature of the difficulties.

The greatest difficulty in the field in general would appear to be the communication gap that exists between the biologist and the physical chemist working on these problems. The biologist describing behavior of cells—for example, movement at epiboly—rarely

reports ionic strength or any physical constant which would be useful to the physical chemist trying to formulate mechanisms. On the other hand, the physical chemist uses models—for example, one using rigid steel plates to elucidate potential changes on interaction of charged particles—whose value is not appreciated by many biologists. The inadequacy of our present understanding of contact phenomena is thus due not only to the absence of critical information and to the complexity of the situation but also to a lack of appreciation of what each of the two disciplines can offer. Weiss's presentation should help to reduce this communication gap and make for a more productive effort between the two groups—one which may very well reveal an important mechanism of control peculiar to higher organisms.

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Henry E. Sigerist: Autobiographical Writings. Selected and translated by NORA SIGERIST BACON. McGill University Press, Montreal, 1966. xiv + 247 pp. \$5.75.

Few individuals have influenced the field of medical history in the United States as much as Henry E. Sigerist (1891-1957). Director of the Johns Hopkins Institute of the History of Medicine from 1932 until 1947, Sigerist affected countless physicians, founded the *Bulletin of the History of Medicine*, contributed to the reorganization of the American Association for the History of Medicine, and gave powerful impetus to the development of medical history as an aspect of American scholarship. His interesting life and diverse activities make this volume, containing an unfinished autobiography and diary entries, rewarding reading.

The autobiography furnishes an account of the formation of a medical historian. Educated in the classical tradition, Sigerist's humanistic orientation persisted throughout his medical training, causing him some concern until he discovered, in medical history, a field in which he could combine his various interests. After postdoctoral study with Sudhoff, Sigerist succeeded him to the chair of medical history at Leipzig's Institute of the History of Medicine. Later, anticipating Hitler's rise to power, Sigerist acceded to William Welch's