find it advantageous to start with the last chapter, "Summary and analysis," particularly those seriously concerned with divestiture or government exploration. People involved in any technical, management, or service phase of the oil business in a particular geographic area should find the coverage of that area of great interest. And anyone making a career of exploring for oil or gas should eventually read the entire book.

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Medical Matters in Antiquity

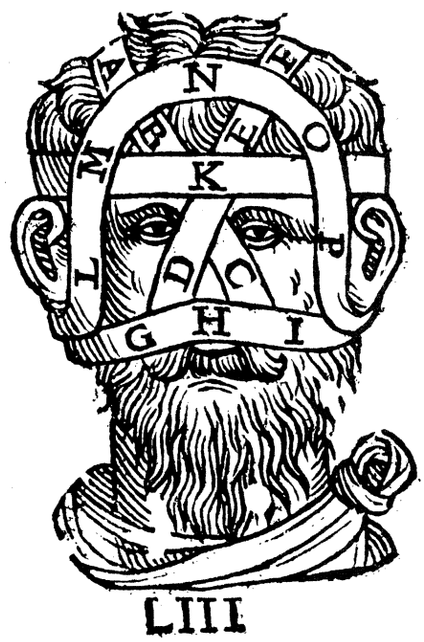
The Healing Hand. Man and Wound in the Ancient World. GUIDO MAJNO. Harvard University Press, Cambridge, Mass., 1975. xxvi, 572 pp., illus. $25. A Commonwealth Fund Book.

In this book Guido Majno, professor of pathology at the University of Massachusetts, has accomplished an important task. Begun as a historical preface to a monograph on inflammation a decade ago, the book has grown into a history of wound treatment in the ancient civilizations of Mesopotamia, Egypt, China, India, Greece, and Rome and among the early Arabs. Wounds lead to surgery and to other medical practices, as well as to concern with healing and infections, so that what may appear to be a relatively restricted subject is in fact so broad that at times Majno has difficulty in confining himself.

A "prelude" giving a short discussion of wounds, wound healing, and inflammation sets the tone for the book. The author is at heart an enthusiastic teacher, always taking sufficient space to describe basic biological principles, explanation of which is especially helpful for the nonmedical reader. He gives the impression that his studies have greatly enriched his own work and life and he now wishes to share his knowledge, and his joy in it.

It is with the Egyptians that Majno waxes particularly enthusiastic, writing a chapter of 71 pages in which he delves into medical practices as well as the deciphering of hieroglyphs. In this chapter, as elsewhere, Majno attempts to provide an interesting perspective on ancient practices by submitting them to 20th-century scientific scrutiny. Honey, he shows, will not support bacterial growth and is, in fact, mildly antibiotic as measured by modern laboratory methods. Thus the use of honey as constituent of wound dressings did make some sense. Similarly, the copper in blue eye makeup inhibits bacterial growth. The problems these and similar examples present for the historian, however, are not as simply solved as Majno would have us believe. To show mild antibiotic activity is not yet to prove that Egyptian physicians drew the same conclusion. In fact, there is in this book a tendency to assess early ideas and practices in terms of good and bad, of truth and error; hence on occasion this is history "as if," if only the ancients knew what we know today.

The Smith papyrus, Majno shows, is really a treatise on wounds, not a surgical one in the strict sense, for the knife is not used. In the Ebers papyrus there is an early statement about pus in wounds, making it one possible source for the later doctrine of laudable pus, the idea that good healing progresses only in the presence of a thick, white pus formation. A question of interpretation here is crucial: Majno maintains that the statement about a rotting wound may be "understood to mean that some pus is desirable as long as it is not excessive." If one were to insert "acceptable" for "desirable" the argument that this is "laudable pus" becomes blurred, it seems to me.



Nose bandage from Greek antiquity. "Boxing had degenerated by 400 B.C. [It] was taken over by huge brutes [who] wore . . . sharp, cutting gloves." The physician (*iatreion*) treating a boxer with a nose or ear injury would "not bother to examine the rest of the body . . . Greek boxers . . . aimed only at the head." Concerning this type of bandage a Hippocratic author wrote, "Those who practice dexterity without judgement look forward to meeting a case of fractured nose, that they may apply the bandage. For a day or two, then, the physician glories in his performance, and the patient . . . is well pleased, but speedily . . . he complains of the incumbrance." [Reproduced in *The Healing Hand* from Guido Guidi's *De chirurgia*, courtesy of Biblioteca Nazionale Braidense, Milan]

The relatively short chapter on Arabic wound healing is mostly given over to the uses of gums, resins, balsams, and aromatic compounds. Spices and wines were also used, and the author does convince us that "the jump from spices to wounds to wine is not as long as it may seem." What is missing, however, is a bit more about the social and cultural context in which wounds occurred and in which they were treated. The Chinese, Indian, and Greek chapters suffer less from this defect, and I suppose it is unfair now to criticize Majno for not having written a still larger book.

There are really four chapters dealing with Greek surgery, if one includes those on Alexandria and Rome and the final chapter on Galen. The Hippocratic collection, Majno maintains, is at its best in matters surgical. Much of the daily practice of the *iatreion* was surgical, and hence we have come to use "the surgery" for the doctor's place of work. One should not forget, however, that both diet and drugs were probably used more frequently in therapeutic regimens than was surgery.

There are many photographs, illustrations, and diagrams in this book, greatly enhancing its value as a source for learning about ancient medicine and surgery. Many of Majno's interpretations depend upon translation and derivation of words, matters to which he pays a great deal of attention. I cannot help wondering what will happen when the sinologists, Egyptologists, and other scholars begin to look closely at this aspect of Majno's work.

As a historian of medicine I am concerned when I see Charles Daremberg favorably quoted regarding the Greeks: "They tried to explain nature while shutting their eyes." Much of Majno's own achievement is to show that this interpretation is no longer acceptable. Nor am I heartened to see him say of Galen, "He is still in disgrace." It is those of us who view Galenic medicine in this light, I am afraid, who should be in disgrace.

All this is not to say that Majno's accomplishment is not an impressive one indeed. Not since Henry Sigerist's two volumes of *A History of Medicine* have we seen such a large-scale discussion of ancient medicine. Majno understood the risks when he began, and I applaud him for seeing it through. He has given us a provocative, well-written book and has

provided a wealth of interpretation and 125 pages of bibliography and notes. Anthropologists, historians, biologists, and physicians will all find much that is interesting. This is a book that is a pleasure to read and to own.

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The Integument in Arthropoda

Biology of the Arthropod Cuticle. ANTHONY C. NEVILLE. Springer-Verlag, New York, 1975. xvi, 450 pp., illus. $62.40. Zoophysiology and Ecology, vol. 4/5.

Studies of the integument, that is, the cuticle and the single layer of epidermal cells that secrete it, are of fundamental importance in arthropod biology. Arthropods are epidermal organisms in the sense that vertebrates are mesodermal organisms. All their obvious and most of their characteristic features depend upon the epidermis, just as the obvious features of vertebrates depend upon the mesoderm. The cuticle is skin, skeleton, and food reserve. Arthropod biologists will therefore welcome Neville's successful attempt to draw together current cuticle research from many disciplines into a readable book. There is no longer any excuse for failing to give a detailed treatment of the cuticle in advanced biology courses.

Neville describes the general structure of cuticle, particularly the fibrous components, and illustrates the description with numerous electron micrographs and some diagrams. The components of cuticles of all sorts are now well known and we may expect that this description will last, although there is still much to be learned about the composition of the epicuticle and the cell components concerned in cuticle secretion. Structural macromolecules (chitin, proteins, lipids, pigments) are reviewed, and good diagrams and useful tables are included. If the list of some 20 cuticular enzymes reminds us that we still have much to learn about the way the cuticle functions as an extracellular reaction vessel, the discussion of cross-linking shows us how far we have come. Numerous linking mechanisms in addition to quinone tanning are now known.

Separate sections of the book deal with the phylogeny, physical properties (including mechanical and optical properties), and physiology of cuticle. Interest in electrical properties is increasing, but the permeability studies that used to be so popular seem to be on the wane. The physiology section is a mixed bag. There is a need for a more detailed treatment of the sequences that result in cuticle deposition and their control, while subjects such as water relations belong with permeability and the control of chitin orientation relates to microfibrillar architecture. In the final chapter Neville lists outstanding cuticle problems remaining to be solved. The chapter includes useful discussion points for students, but the author has missed an opportunity. Most of the topics are details of interest to the specialist, but some are destined to illuminate pathways in the mainstream of biology and these should have been singled out.

Neville is at his best in discussing supermolecular architecture and the orientation of microfibrils. Cuticles may have regions in which the fibers have preferred orientations, but most commonly the cuticle is made up of laminae of parallel microfibrils that change orientation slightly from layer to layer in an anticlockwise helicoid. This helicoidal fibril arrangement has general relevance in biology and may be found in chromosomes, cholesteric liquid crystals, egg shell proteins, and tunicate cellulose, as well as in the chitin-protein complexes of cuticle. Neville explores all aspects of helicoidal architecture and makes a case for the self-assembly of cuticle helicoids from liquid crystals.

Neville keeps a balance between presenting his personal view and reviewing the literature, coverage of which is up to date through 1973, with some 1974 and 1975 references. Occasionally Neville sits unnecessarily and precariously on a fence of his own erecting. In discussing the source of cuticular proteins, for example, he refers to growing evidence suggesting that cuticular proteins are not synthesized by the epidermis but are transported across it from the blood. He does not evaluate this evidence, which indeed is largely contradicted by the knowledge that the epidermis can secrete cuticle in tissue culture.

If the book has weaknesses they are probably a reflection of the present state of research. There is a lack of information about the epidermal cell itself and about its role in the precisely timed sequential secretion by which cuticle is made and the way the sequence is controlled. There is also a lack of consideration of growth and the forces that model the shape of arthropods both at the cellular and at the macroscopic level. In view of the importance of the epicuticle as the primary barrier to the environment, surprisingly little is said about it, and it is not illustrated in any electron micrographs or detailed diagrams.

These are minor criticisms. The care in preparation, the quality of production, and its author's interdisciplinary sweep combine to make this book a sensible addition to the libraries of most biologists. Nearly all the workers on arthropod cuticle are still alive and active, and I am sure that they hope the author will keep up with their new work for a second edition, which will no doubt be needed after the stimulus given to the field by the first.

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Organelle Genetics

Genetics and Biogenesis of Mitochondria and Chloroplasts. Papers from a colloquium, Columbus, Ohio, Sept. 1974. C. WILLIAM BIRKY, JR., PHILIP S. PERLMAN, and THOMAS J. BYERS, Eds. Ohio State University Press, Columbus, 1976. x, 362 pp., illus. $15. Ohio State University Biosciences Colloquia.

This collection of papers is devoted principally to reviews of organelle genetics in higher plants, mammalian cells, and lower eukaryotes. It will serve scientists in this field as a fairly comprehensive update of Sager's 1972 review of the field, *Cytoplasmic Genes and Organelles*. The papers are for the most part also general enough to interest people whose concern with the field is more casual. In several instances, however, recent significant work is not mentioned, owing to the fact that the papers were prepared more than 18 months ago.

Mitochondria are especially well treated in the book; the coverage is largely limited to mammalian cells and yeast, however. A noteworthy exception is the chapter on mitochondrial genetics by C. William Birky, Jr., which includes a thorough discussion of recent advances in ciliates, *Aspergillus*, and *Neurospora*, as well as yeast. Philip S. Perlman has written an excellent review of the genetic analysis and molecular biology of cytoplasmic petite mutants of yeast. His discussion of ethidium bromide mutagenesis, together with a section in the chapter by Henry R. Mahler *et al.*, will be particularly useful, as will the chapter by David E. Griffiths on the selection of mutants resistant to specific inhibitors of the adenosine triphosphatase complex.