The Leech-Book Era

Medicine in Medieval England. C. H. TALBOT. Oldbourne, London, 1970 (U.S. distributor, Elsevier, New York). 222 pp. + plates. $6.75. Oldbourne History of Science Library.

This brief and informative volume embraces much more than "medicine in medieval England." Although focused on England, it is, in fact, a compressed panoramic account of the whole of medieval medicine. The broad approach is revealed in the very first chapter, "Anglo-Saxon medicine," which considers the leech books of early English medicine. Contrary to popular opinion, these were not mere collections of primitive remedies and medical folklore. Greek medical treatises in Latin translation were used to a surprising extent. To convey a sense of what might have been available to 10th-century leech-book authors, Talbot describes the medical literature of late antiquity, thus providing a setting and context for the restricted field of Anglo-Saxon medicine. By consistently elucidating medical trends and developments in England against the larger background of Arabic and Continental medicine—there are special chapters devoted to Arabic medicine and the medical schools of Salerno and Montpellier—Talbot has produced an eminently readable and informative series of brief chapters on the whole of medieval medicine.

Because the book is addressed to the general reader, Talbot has deliberately omitted footnotes, but he assures us that "nothing is said here which is not found in the original texts or in manuscripts." The stamp of authority and sound scholarship is evident throughout, and Talbot's assertion may be accepted with confidence. Chapters on medical education, surgery, anatomy, the ordinary practitioner (as contrasted with prestigious court and university physicians), medical ethics and etiquette, hygiene, epidemics, and hospitals are testimony to the breadth of coverage.

We learn that medical education was the greatest obstacle to progress. Although the establishment of medical faculties with authority to issue degrees was a praiseworthy medieval contribution, reliance on standard texts and traditional authorities made progress difficult and often impossible. Emphasis on medical theory to the detriment of practice was typical. (Although practical experience outside the university was eventually required for a medical degree, the nature of this experience is not described in the book.) Also detrimental was the tendency to allow physicians, who were usually ignorant of surgery, to judge the admissibility of surgeons, who were frequently learned in contemporary theory, to practice their art.

Despite the inadequacy of medical training, important innovations were occasionally made. Dissection was widely practiced and played a role in medical education, although few significant additions to anatomy and physiology resulted. Practical experience, buttressed by the courage of conviction, sometimes enabled physicians and surgeons to overcome the severe limitations of medical education and traditional opinion. For example surgeons like Theodoric, bishop of Cervia, and Henri de Mondeville rejected the prevailing idea that the successful treatment of wounds required the generation of pus.

Relying on selected, but typical, examples, Talbot has successfully conveyed a genuine sense of the richness and variety of medieval medicine. Its few strengths and achievements and its glaring weaknesses are vividly portrayed.

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Experimental Lung Cancer

Inhalation Carcinogenesis. Proceedings of a conference, Gatlinburg, Tenn., Oct. 1969. M. G. HANNA, JR., P. NETTESHEIM, and J. R. GILBERT, Eds. U.S. Atomic Energy Commission, Oak Ridge, Tenn., 1970 (available as CONF-691001 from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). xi, 524 pp., illus. Paper, $3. AEC Symposium Series, No. 18.

Experiments on animal models have had limited success in verifying the associations revealed by population studies between lung cancer and inhaled tobacco smoke and between lung cancer and environmental air pollution. Many factors have contributed to failures, including the use of single agents, instability of aerosols, low doses delivered to alveolar or bronchial cells, and insufficiently long or intense exposure. The decision by the National Cancer Institute in 1969 to fund a special lung cancer program at over $1 million a year reflects the hope that with increased effort these problems can be solved.

It is a sign of the difficulties in inhalation toxicology and of the relative newness of the field that techniques for inhalation exposure of animals occupy a large proportion of the papers in this symposium volume. Another large segment is devoted to the results of exposure of animals, especially Syrian hamsters and dogs, to radioactive particles, to bland particles in combination with chemical carcinogens, especially benzo[*a*]pyrene, and to that complex mixture, tobacco. There are important reminders about the sizes of populations needed for showing effects, about the evidence for specific agents from occupational exposure in human workers, and about the use of mathematical models in dosimetry and in the clearance of radioactive particles which are applicable to other agents.

The volume is not a complete status report on the experimental lung cancer. Its strong points are its detailed presentations of several methods for inhalation exposure; some discussion of mathematical models both for particle deposition and removal and for dose-response of radionuclides; and its adequate coverage of experiments with radioactive particles such as radon daughters found in uranium mine air, with europium 152–154, and with the chemical carcinogen benzo[*a*]pyrene combined with mechanical and chemical cofactors (stainless steel hooks, pellet implantation and cholesterol, chromate dust, and vitamin A deficiency).

Omitted are such host factors as the immunology of tumors, the effects of aging, and the failure of surveillance systems for errors of cellular differentiation. Perhaps more pertinent to model systems is the basic consideration of how sex, age, nutritional status, and so forth affect the comparability of models. The protective action of vitamin A against benzo[*a*]pyrene-induced neoplasia in hamsters and in tissue culture is described. That the sequence of exposure—whether daily, continuous, or in interrupted periods which permit semisynchronization of cell populations—may be as important as cofactor agents entering other than by inhalation is largely ignored. The only noninhalant agent or cofactor described is

nitrosamine, for which the lung is the principal target regardless of its mode of entry. Certain respiratory viruses behave similarly, going to lung preferentially, and these also may be important as cofactors or as initiators of DNA alterations in pulmonary cells.

The five-paper section on cellular and functional injury following inhalation exposure is not immediately relevant to carcinogenesis, but it establishes the sensitivity of radioactive thymidine indices of DNA synthesis and cell turnover in the alveolar portion of the respiratory tract, which reflect injury to the lung. Susceptibility of the lung to bacterial infection is also a sensitive measure of injury. However, no clear case can yet be made for relationships between cell turnover and carcinoma or between susceptibility to infection and carcinoma.

The results of cigarette-smoking experiments in rodents and dogs are important to hasten abandonment of such exposure by humans, to locate the carcinogenic agent, and perhaps to stimulate development of a "safer" cigarette. W. Dontenwill's experiments on long-term exposure of hamsters, mice, and rats to cigarette smoke to simulate human exposure have evolved to allow analysis of epithelial changes, including tumors in the larynx and precancerous lesions beyond, and of deposition by ^{14}C labeling of cigarette smoke. In the hamster about 48 percent of deposition is in the head and palate and 52 percent in larynx, trachea, and lungs. In these experiments and also in Auerbach's the airway epithelial changes are impressive, though invasive tumors are infrequent. Cigarette smoke causes accumulation of macrophages in alveoli, and this effect in the absence of clearance of these cells may have important sequelae. The book serves as a description of the techniques of inhalational exposure, a review of some aspects of cell injury, and a progress report on the special subject of inhalation exposure in experimental carcinogenesis. Plans pointing toward a "systems" approach to inhalation carcinogenesis by the National Cancer Institute, the National Institute for Environmental Health Sciences, and the Atomic Energy Commission are described. It should be of greatest interest to investigators in this field.

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Sponges

The Biology of the Porifera. Proceedings of a symposium, London, Sept. 1968. W. G. FRY, Ed. Published for the Zoological Society of London by Academic Press, New York, 1970. xxviii, 512 pp., illus. $22.50. Symposia of the Zoological Society of London, No. 25.

This volume is the proceedings of a symposium on the biology of sponges which virtually all the investigators in the world currently working with this phylum attended. Approximately 50 people were there. The papers presented at the symposium are ordered under five headings: The Palaeontological Evidence, Spicules and Evolution, Ecology and Biogeography, Biochemistry and the Cell Surface, and Cells, Integration and Morphogenesis. The proceedings as a whole make interesting reading because many of the papers present conflicting views and because there are so few investigators working on sponges that everyone has to be a generalist. It is refreshing to read a paper by an ecologist that refers to a study by an embryologist and vice versa. By and large the students of sponge systematics and phylogeny handle controversial issues in a respectable manner. The investigators working on the biochemistry of the sponge cell surface, however, have gotten to the point where one party, A. S. G. Curtis, denies the existence of the species-specific cell sorting out that the other two investigators in this area, A. P. MacLennan and T. Humphreys, use as an assay in their work. This case seems more like stubbornness than controversy.

One of the highlights of the meeting was the report of W. D. Hartman and T. F. Goreau on coralline sponges. The fossil record indicates that sponges were dominant reef builders during Paleozoic times; there has been no good evidence that sponges play such a role today. Hartman and Goreau have discovered a class of sponges, initially thought to be corals, that appears to be continually consolidating the bases of reefs today in much the same way the fossil forms did.

The part of the symposium that I found the most interesting was the section on integration and morphogenesis. The work that is summarized here is forcing zoologists to change the way they look at sponges. Traditionally the Porifera have been distinguished from more complex animal phyla because they do not have a consistent organization above a cellular level. This diagnosis has led to the view that sponges are bags of cells. The elegant experiments of H. Mergner on the formation of the osculum have shown that tissue layers are probably the most important units in the integration of morphogenetic events in sponges. This point is also made very convincingly in the papers of R. Borojević and C. Lévi, who review their excellent histological and experimental studies which define at least some of the factors that control the histogenesis of the various cell types in sponges during embryogenesis.

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Productivity in Plants

Physiological Aspects of Crop Yield. Proceedings of a symposium, Lincoln, Neb., Jan. 1969. JERRY D. EASTIN, F. A. HASKINS, C. Y. SULLIVAN, and C. H. M. VAN BAVEL, Eds. American Society of Agronomy and Crop Science Society of America, Madison, Wis., 1969. xx, 396 pp., illus. $10; to members of the societies, $8.

Based on 16 lectures, this conference report intends to cover the strictly theoretical aspects of the study of crop yield, from climatology to biochemistry and physiology, and selected practical measures. The task seems formidable, but by careful choice of speakers and restrictions of the topic the organizers have succeeded in it. They present a homogeneous, well-balanced volume with contributions of a uniformly high standard and hardly any overlapping.

The dominating theme is the production of organic matter in photosynthesis in relation to microclimate and crop morphology and the distribution of the organic matter leading to the practical yield. Comprehensive treatments are given of plant morphology and leaf pattern, irradiance, gas exchange, and water stress in crop stands, as well as of the biochemistry of photosynthesis and photorespiration insofar as knowledge of these processes is required for understanding production. Perhaps the most striking link between theory and practice is the demonstration of the importance of the "source to sink" principle of nutrient transport for the formation of the plant products. Strictly practical measures for increasing yield, called manipulations, are treated only by means of examples, and more could