Organization Against Disease

The Sanitarians. A History of American Public Health. JOHN DUFFY. University of Illinois Press, Urbana, 1990. x, 331 pp. $32.50.

The Sanitarians is a comprehensive history of organized public health from the early colonies to the post-Reagan years, and as such provides the first modern synthesis of the rapidly developing field of public health history in the United States. Duffy's book discusses the establishment of city and state boards of health, the impact of epidemic diseases such as yellow fever and cholera, the disputes over quarantines, the efforts of sanitary reformers, the ravages of the Civil War, the successes of bacteriology, the professionalization of public health, the growth of the child health movement, the development of rural health programs, the beginnings of active federal intervention, the all-important influence of the New Deal, and, after the Second World War, the expansion of public health to deal with new environmental hazards and chronic diseases.

One central, recurrent, and familiar theme is the tendency of both politicians and public to support public health efforts in response to perceived crises and to lose interest when such crises have passed; another is the vocal cultural and ideological antagonism to government action on the part of many of the nation's more comfortable citizens and their relative lack of interest in the living conditions of the poor. In opposition to such laissez-faire attitudes, public health reformers emerge as a committed minority bent on social improvements, who have sometimes been successful in persuading both politicians and the public of the validity of their concerns.

Duffy, for long a leading scholar in the history of medicine and public health, is well qualified for the task of surveying and synthesizing recent scholarship dealing with the history of specific diseases (yellow fever, hookworm, pellagra, venereal disease, AIDS), state health departments (Massachusetts, Louisiana), city health departments (New York, Boston, Newark, Milwaukee), and federal agencies and other public health institutions (the National Institutes of Health, the U.S. Public Health Service, schools of public health). Some of the strongest parts of this new narrative history draw from Duffy's own earlier encyclopedic studies of New York City and New Orleans, but he also endeavors to give a reasonably balanced view of the rest of the nation, from Ohio to New Mexico to California.

Duffy manages a grand chronological sweep, crossing several centuries with sufficient detail to understand, in at least general terms, the changing shape of battles against yellow fever, smallpox, malaria, tuberculosis, the chronic diseases, venereal diseases, and AIDS. With a book of this scope, it is easy to complain of things omitted, but it does seem a pity that a volume likely to be used as a classroom text does not devote more space to the health of American Indian, slave, free black, and Hispanic populations. Duffy states that these groups receive little attention in his study because official health agencies have done little for them; as he explains in his introduction, he has generally allowed the limits and limitations of city and state health agencies to set the limits of his subject. Thus, for example, he gives us vivid descriptions of the horrifying environmental and sanitary conditions of 19th-century industrial cities but says little about the occupational hazards facing workers—hence accurately reflecting the priorities of city and state health departments through most of the 19th and 20th centuries. But if we are to develop perspective on the work of these official agencies, we need to know what they have failed, refused, or been unable to accomplish—perhaps almost as much as we need to recognize their many real successes in protecting the people's health against various onslaughts of the physical, biological, and social environment.

Despite these caveats, *The Sanitarians* fills a very important gap in the literature of the history of medicine. It will undoubtedly become a classic text for those interested in the history of public health in America. For historians, it will be a reference point for further elaboration and critique; for those working in public health, it will help explain the present shape of their field and provide ammunition for the continuing process of redefining its scope and boundaries in the future. The book is attractively produced and contains a useful selected bibliography.

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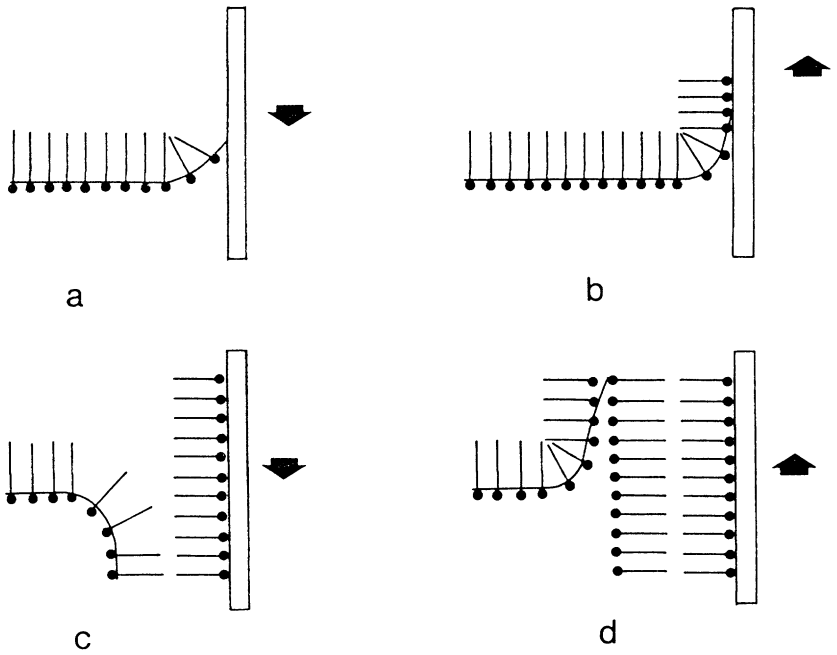
Assembled Molecules

Langmuir-Blodgett Films. GARETH ROBERTS, Ed. Plenum, New York, 1990. xiv, 425 pp., illus. $85.

Langmuir-Blodgett (LB) films are thin organic films that can be organized into multilayer molecular assemblies one monolayer at a time. The films are made by first spreading the molecules onto a water surface from a dilute solution, after which the solvent evaporates, leaving the molecules floating on the surface. Compression leads to a densely packed monolayer that can be transferred to a solid substrate by dipping the substrate through this air-water interface. Multilayers can be constructed by successive dipping through the water surface, with the surface pressure kept constant. Only special types of molecules behave in this controlled manner. These so-called amphiphilic molecules have two different end groups—one hydrophilic and the other hydrophobic. When a monolayer is formed on a water surface, amphiphiles naturally orient themselves with the hydrophilic portion in the water and the hydrophobic portion in the air. Current research efforts on Langmuir-Blodgett films are aimed toward designing, for specific scientific or technological goals, films using a variety of new amphiphiles or using common amphiphiles containing additional molecular moieties.

Although monomolecular assemblies on substrates have been studied for over half a century, a resurgence of interest in LB films is taking place, partly owing to their potential applications in optical and electronic devices. Indeed, in this book the hope is expressed that tailor-made organic films can replace some of the very thin inorganic ones widely used in the electronics industry, as well as perform entirely new functions. Four international LB conferences held in the last ten years attest to the high level of activity in this field. Though their proceedings have been published in *Thin Solid Films*, until now the only book that systematically describes the methods and research findings on LB films has been George Gaines's *Insoluble Monolayers at the Liquid Gas Interface* published in 1966. Thus *Langmuir-Blodgett Films*, an up-to-date account of the field, fills a large gap.

The book is a collection of chapters written by experts and, although the styles vary, is quite readable. One is led through all phases of development and activity in this field, from types of compounds, techniques of assembly, and methods of characterization, to potential applications. The book starts out with a historical perspective, which I found most fascinating, providing



"Deposition of multilayers by the Langmuir-Blodgett technique: (a) first immersion, (b) first withdrawal, (c) second immersion, (d) second withdrawal." [From *Langmuir-Blodgett Films*]

insight into the early development of LB films. Next, starting with the fatty acids and their salts, the reader is introduced to many of the new compounds containing, for example, unsaturated groups, aromatic groups, chromophores, or polymers. The Langmuir-Blodgett assembly process, much of which is more art and recipes than science, is covered in detail—many of the "tricks of the trade" known to the experts and baffling to the novice are described. Techniques for characterization of the films are presented, compared, and evaluated. Almost all of the important optical and electrical methods, together with current results, are described in sufficient detail to give the reader a good idea as to their applicability and significance.

In contrast to the book's very good beginning, the treatment of the last three subjects dealt with is slightly less satisfying. The discussion of spectroscopy is based largely on older work from the author's institution, with only brief mention of newer studies. Although interesting, the study of biomolecular assemblies is clearly not as advanced as other LB work, simply because the molecules are more complicated and the experiments more difficult. Finally, proposed applications for LB films are discussed including electron beam lithography, pyroelectric infrared detectors, nonlinear optical effects, sensors, and modifications to semiconductor devices. Though these seem feasible, we all wait for the realization of the first significant application, possibly in biosensing, to spur the field on even more. It is to be hoped that this last chapter will stimulate new ideas for further scientific and technological applications.

In spite of a few minor flaws, *Langmuir-Blodgett Films* is well worth reading both for experts, for whom it forms a handy reference, and for those desiring to learn something about LB films. The authors have covered the subject thoroughly, as indicated by the numerous references. The book can be read from almost any point without too much dependence on facts and details presented earlier in the text. It also should make clear to those in the field where more research is needed and should become as important a key to future development of the field as Gaines's book was many years ago.

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Birds under Selection

Evolutionary Dynamics of a Natural Population. The Large Cactus Finch of the Galapagos. B. ROSEMARY GRANT and PETER R. GRANT. University of Chicago Press, Chicago, 1990. xx, 350 pp., illus. $65; paper, $24.95.

Genetic variation is the raw material of evolution, and elucidating how variation is generated and maintained is a principal aim of evolutionary biology. In this excellent monograph, Rosemary and Peter Grant recount the results of an intensive investigation of the factors influencing morphological variation in a population of the large cactus finch (one of Darwin's finches) on the small, isolated island of Genovesa. This population exhibits an unusual amount of variation in beak dimensions, compared with continental finches. Such variation is of particular interest because the evolution of beak characters is a prominent feature of the adaptive radiation of Darwin's finches. A central message in their story is the importance of environmental variation in evolutionary dynamics. The fieldwork, begun in 1973 and completed in 1988, spanned several finch generations and natural climatic perturbations, including severe droughts and years of high rainfall. Given that experimental manipulations of this population were immoral, illegal, and even impractical, the detailed profile of the population provided by a long time series proved essential for addressing fundamental questions about the nature and consequences of variation.

Badly stated, the authors' essential conclusions are as follows. Species are not static but dynamic entities, capable of dramatic change. A highly variable, unpredictable rainfall regime causes marked fluctuations in the availabilities of finch foodstuffs. This in turn drives substantial annual variation in survivorship, reproduction, and population structure, produces a high variance in reproductive success, and leads to a shifting regime of directional selection on beak morphology. In many years selection appears to be weak or absent, but in others it is strong. Following an El Niño event in 1983, *Opuntia* flowers and fruit became scarce and birds adept at utilizing these resources, because of their relatively long bills, were initially disfavored. But later in the drought, selection acted in the opposite direction; birds with larger bills are better able to tear open dried-out *Opuntia* pads. Parent-offspring regressions showed that beak characters are highly heritable, providing substantial potential for rapid evolution in response to selection. Small sample sizes precluded a direct assessment of this possibility; a perennial frustration of field studies is that sample sizes are often too low to provide strong tests of hypotheses. Grant and Grant use an indirect method to argue that the consecutive, opposing selective episodes canceled each other out. Although the population is never quite in demographic or evolutionary equilibrium (indeed, one has the sense that even an 11-year time slice may not adequately characterize the dynamic character of this species), the authors conclude that it fluctuates around an optimal phenotype, a peak in an adaptive landscape determined by the availability of different food types and the presence of competing finch species. These conclusions recapitulate, in a study tightly focused on a single species, a number of the themes developed by Peter Grant in his earlier, more