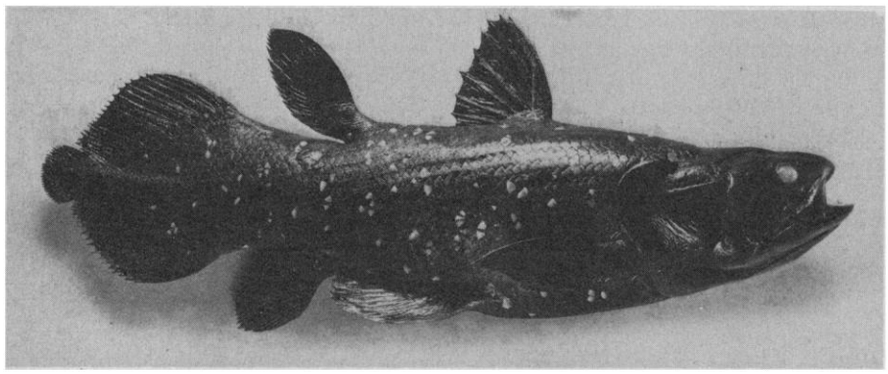

The coelacanth, *Latimeria chalumnae*. [From *The Biology and Physiology of the Living Coelacanth*]

brought it to the attention of an ichthyologist, and M. M. Smith, the spouse and co-worker of that fortunate investigator (J. L. B. Smith).

The focus of most of the articles is the systematic relationship of the coelacanth. M. D. Lagios plays the devil's advocate and argues that *Latimeria* is related more closely to elasmobranchs than to bony fishes (tetrapods and actinopterygians). His arguments cite the pituitary, rectal gland, and urea. Refutations are offered by L. J. V. Compagno (skeleton), E. O. Wiley (muscles), R. W. Griffith and P. K. T. Pang (osmoregulation), and G. Dingerkus (chromosomes). Interspersed are noncommittal articles by W. A. Miller (hard tissues), L. E. Rasmussen (biochemistry of brain fluid), T. Hayashida (bioassay of pituitary), S. E. Fisher and G. S. Whitt (creatine kinase isozymes), and J. B. Lombardini *et al.* (amino acids and taurine). Included is an article on "inferred natural history" (J. E. McCosker). The volume ends with transcribed excerpts of the discussion at the close of the symposium, where one learns that the participants were later to feast upon fillets of their study material (rumored to have been small ones).

The volume as a whole is interesting in a way entirely different from the appeal of its varied fare and its emphasis on the evolutionary byways of vertebrate osmoregulation. It represents the effort of a public aquarium to do more than exhibit living fishes to the gape and goggle of the curious onlooker. The expedition of the California Academy of Sciences to the Comoro Islands in 1975, while unsuccessful in obtaining a living coelacanth for exhibit at the Steinhart Aquarium, nevertheless returned with two frozen specimens, which served as the research material for many of the articles of this volume. Without the imaginative efforts of J. E. McCosker, director of the aquarium, the research would not have been performed, and the volume would never have appeared.

As a spirited review of the systematic position of *Latimeria*, the volume as a whole reinforces the view, while giving the devil his due, that the coelacanth is a primitive bony fish, not an elasmobranch. The articles on osmoregulation, chromosomes, and creatine kinase, in particular, extend beyond *Latimeria* itself and far into comparative vertebrate zoology. The volume thus has interest for zoologists other than those who enthuse, with appetites barely whetted, over "old fourlegs" and its affairs.

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Membrane Pathobiology

Plasma Membranes and Disease. DONALD F. H. WALLACH. Academic Press, New York, 1979. xii, 356 pp., illus. $44.50.

In *Plasma Membranes and Disease*, Wallach attempts a codification of human diseases that involve, or might involve, plasma membranes. The diverse array of diseases that may involve a membrane defect, at some etiological level, gives some indication of the functional repertoire of the plasma membrane. The book contains seven chapters, of which the first is a brief review of the composition, organization, and dynamics of the plasma membrane. The chapter is strong in its treatment of microviscosity and fluidity and gives a terse description of each of the nine classes of well-characterized proteins that are associated with surface membranes. It is less informative on the complex carbohydrates.

The second chapter is devoted to the role of membranes in neoplastic diseases. It does not purport to span the entire scope of the relationship between plasma membranes and cancer but focuses on some specific alterations caused in membranes by the small DNA viruses and by carcinogens. Wallach has studied the role of membranes in cancer for years, and his expertise makes the chapter a pleasure to read.

Diseases that affect erythrocytes and platelets are described in the third chapter. Some of the diseases discussed are quite rare, and some of the links to a plasma membrane component in the diseases are not direct. For example, red cells from patients with paroxysmal nocturnal hemoglobinuria are abnormally sensitive to complement. Granulocytes from these patients are relatively poor at chemotaxis. The primary lesion is not known, however, and it may not involve the plasma membrane per se.

The fourth chapter is, to me, the best. It deals with diseases of membrane receptors, and here the link to the plasma membrane is unequivocal. Wallach discusses the acetylcholine receptor and myasthenia gravis, thyrotropin receptors and Graves' disease, the insulin-receptor and insulin-insensitive forms of diabetes, the low-density lipoprotein receptor and familial hypercholesterolemia, and the immunoglobulin E receptor and allergic disease. The discussions are objective, and controversial issues are dealt with honestly and constructively.

Diseases caused by intracellular parasites are covered in the fifth chapter. The author concentrates on the mechanisms and selectivities that the parasites use to detect and then to penetrate the plasma membranes that surround the cells to be infected. The parasites discussed are viruses, bacteria, and protozoans, but by no means are all the known parasites in each of these categories described or even listed. There is no explanation for including influenza virus and the bacterium that causes leprosy, for example, and excluding polio virus and the bacterium that causes syphilis.

Diseases with unknown etiologies, like multiple sclerosis and Huntington's chorea, are discussed next. Wallach's speculations that tie the disease symptoms and characteristics to the plasma membrane are often fascinating and always presented fairly. Transport defects are covered in this chapter, and Wallach includes brush-border diseases and cystic fibrosis in this category. Like many others, Wallach focuses on the hyperosmolar sweat that is one of the defining

symptoms of cystic fibrosis, but he pays little attention to the abnormal mucus. No explanation is offered for how the transport abnormalities might cause the synthesis of this abnormal mucus.

In the final chapter, Wallach deals with therapeutic possibilities, chemotherapy, toxicity, and the pharmacology of the cytoskeleton. As is the case with the first chapter, this chapter's greatest value is as a concise review.

There is much in *Plasma Membranes and Disease* that is open to debate, but nowhere could I find data that were overinterpreted or unfairly presented. The author makes it clear where his opinions depart from those of the workers he is citing, and the tone is always thoughtful. The volume might have discussed other diseases whose relationships to the plasma membrane are at least as firm as those of paroxysmal nocturnal hemoglobinuria and scrapie. For example, pemphigus is a potentially lethal skin disorder characterized by an apparent loss of cell adhesion among the skin cells. Autoantibodies from patients with pemphigus react with a cell surface antigen that is widely distributed on squamous epithelia of mammals. For that matter, the entire class of morphogenetic defects could be included in such a book, since no reasonable hypotheses for birth defect mechanisms fail to consider the plasma membrane.

In the last analysis, however, the book is important not because of the particular diseases included for discussion, or even because of the discussions themselves, but because it marks a new stage in our concept of the plasma membrane and suggests a classification of disease according to the organelle most affected. Will such a nosology be useful and, if so, may we except books with titles like "Nuclear Membranes and Disease" and "The Golgi Apparatus and Disease"? Is it likely that the plasma membrane has more physiological significance than any other cell organelle and that it is the only structure that could be responsible for so diverse an array of pathologies? Finally, is it at all possible that the importance of the plasma membrane has been overemphasized by researchers desperate for a way to understand the biochemistry of shape and cell interactions—those ill-defined but often-discussed phenomena? The book should be read by biologists and clinicians interested in any of these questions.

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