J. Membrane Biol. 129, 1 (1992)

The Journal of
Membrane Biology

Editorial

Theory and Experimentalism in Biological Sciences

This year is the twentieth anniversary of the fluid mosaic model, Jon Singer's ground-breaking idea that ushered in, we might say, the modern era of membrane biology. To mark this event, we launch a new series in the Journal, ***Pivotal Ideas,*** a series that will survey ideas which have proven seminal to the field. Rather than the customary sort of reviews, these will be personal accounts which will recall the climate and setting in which the ideas were spawned. These accounts are meant to give us a close feel of how the ideas have arisen—their sources, their historical context, their repercussions. The accounts also may let out tidbits about how the ideas were received by the scientific community and how they eventually fared—all this may carry juicy homilies for the new generation of researchers. Appropriately, Jon Singer's paper (page 3) starts out this series; other papers will follow from time to time.

We believe that there is a need for such a forum, because ideas, even the most influential ones, are tending to get buried in the literature by the seemingly never ebbing flood of experimental facts in the biological fields. Ideas are the lifeblood of science; every true scientist knows that theory is the motor of the scientific enterprise. But there has developed in recent years a lamentable trend among biological experimentalists of forgetting the sources from which they suckle. What gets celebrated is the latest "breakthrough," meaning the latest find, while the theoretical framework behind it, the ideas that nursed and guided it, all too often are forgotten. And things are not helped by the disposition of space in journals, giving theory short shrift.

Serendipity, it is true, has played a large role in biology, and at times so loudly that a casual onlooker may get the impression that that is what drives the science. But there is no discovery without theory; discovery, including the occasional serendipitous windfall, requires a prepared mind and often even a prepared collective mind. In the absence of theory, all we would have is a miscellanea of incidents, a collage of ephemeras without sense and direction.

The predominance of empiricism, perhaps, reflects the state of a younger science. The issue would hardly come up in physics. There, a long tradition keeps the theoretical efforts separate from the experimental ones, and both theoretician and experimenter are accorded their dues. But physicists have it better. Their story lines are simple and clearly drawn, unmistakably going from a few theoretical high spots to the experiments. Thus, no one would argue that visions—in fact, breathtaking visions—are the heart of that science.

In contrast, the endeavors of biologists are more like strenuous minuets between theorists and empiricists, where these partners are not always in step and may change hats. So the view gets blurred and it is not easy to see who leads whom. The ***Pivotal Ideas*** series, we hope, will redress that.

The mentioned way of doing things in biology is racked with wasteful effort and fields become overgrazed, but it also has its advantages: it insures that theory is disciplined by a massive body of facts and (what cannot be said for modern physics) with short time constants. As with all endeavors, there will be different opinions on how to best pursue science. The most extreme one I have heard belonged to John Hunter, an eighteenth-century British anatomist, who is alleged to have said: "Why think? Why not try the experiment?" On the other end is the witty counsel given by the astronomer Arthur Eddington: ". . . not to put too much weight on experimenal results until they are confirmed by theory." Given these two extremes, I trust, we can agree on a middle of the road.

Werner R. Loewenstein
April 5, 1992