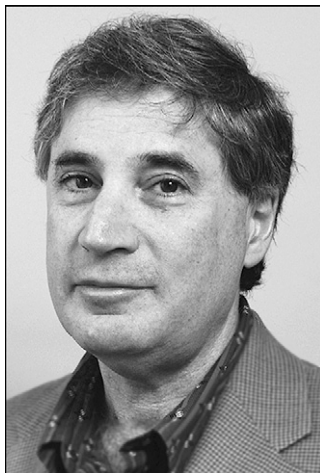


EDITORIAL

Message from the Editor in Chief



Edward Egelman

Prolegomena to Any Future Biophysics (with apologies to I. Kant)

The Biophysical Journal has had an impressive history over the last 47 years, serving as the main organ of the Biophysical Society as well as one of the main outlets in the world for the publication of biophysical research. Faced with the daunting task of detailing an agenda for the next five years of Biophysical Journal, it is tempting to write some trite platitudes about how I will strive to raise the standards for publication, increase the impact of the Journal, and broaden the base of those who publish in and read the Journal. While I hope that these ambitions will be realized (and I have outlined some specific initiatives toward achieving these goals at the end of this essay), I have decided to take a broader and more philosophical view in this editorial inaugurating my term as Editor in Chief.

Kant and physics

When Immanuel Kant published the *Prolegomena to any Future Metaphysics* in 1783, he attempted to answer fundamental questions such as how a science of nature was possible at a time when scientific thinking was beginning to completely change both human perception of the natural world as well as allow for an unprecedented human transformation of the natural world. The birth of science meant that

mystical views of the world could be replaced by testable naturalistic theories. It is hard for us to appreciate today how the development of mechanics had such a profound effect on human thought, since mechanics explained phenomena as diverse as the movement of the planets and the trajectory of cannon balls. The motion of “heavenly” bodies could now be reduced to natural law. The concept that the Earth is not the center of the universe was bitterly opposed, as acceptance of this notion appeared to lessen human significance within the universe.

It is ironic that when Kant surveyed the principles of a universal physics he separated out the principles that he maintained were truly universal and which must therefore exist a priori to empirical observation. One of these universals was the notion that “substance is permanent,” shown by Einstein 122 years later to be not true (rather, what is conserved or permanent is a sum involving both energy and matter). Another universal was that “every event is determined by a cause according to constant laws,” shown by quantum mechanics almost 150 years later to be less than universal when dealing with atoms and subatomic particles.

The defeat of vitalism

While physics made enormous advances in the century after the *Prolegomena* was published, biology suffered from a vitalistic outlook. Vitalism held that biological entities, whether cells or organisms, differed from nonliving objects

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by the presence of “vital” forces. Thus, life could not be reduced to the laws of physics and chemistry. Nevertheless, the basic principles of evolution were emerging during this period, even at a time when there was complete ignorance about the mechanism of heredity. The development of molecular biology over the past half century, which is the application of chemistry and physics to understanding the molecules responsible for living cells, may have an impact on human thought almost as profound as mechanics had 200 years ago. Biophysical approaches to studying molecules and cells continue to flourish. While it is difficult to quantify knowledge, it might be fair to say that most of our knowledge of biology has actually come from research conducted within the past 10 years. Hopefully, that statement captures the excitement of working in a field that is so rapidly developing that fundamental discoveries are continuously being made.

But science is not done in a vacuum. The cost of basic biomedical research must be shouldered by taxpayers, and we cannot expect that biophysical research will be funded without justification. The arguments in support of such research, from the treatment and cure of diseases to the engine of biotechnology driving a significant component of the U.S. economy in the future, must be widely disseminated. Unfortunately, the current climate poses challenges for biophysical science. In the face of overwhelming scientific evidence, why is there still such a refusal to accept the common origins of all existing life forms on the earth? In a study published in 2006 (1), it was found from surveys of people in 34 countries that only in Turkey was the acceptance of evolution lower than in the U.S. More troubling is the fact that the acceptance of evolution among adults has actually declined in the U.S. according to several studies. In response to the question posed in a survey by the NSF, “human beings are developed from earlier species of animals,” only 44% of adults said yes in 2004 while 53% of adults said yes in 2001. An NSF survey also revealed that 52% of U.S. adults believe that humans coexisted with dinosaurs (2). Just as the rejection of a geocentric view of the universe had a profound effect on the perception of humans’ role in the world, the recognition of human evolution from primitive organisms such as bacteria is similarly disturbing to a large sector of society. This is the reality that we must recognize, and we must make efforts to reach out to the nonscientific population to explain the firm foundations of molecular biology.

The coming period for BJ

The publication of all scientific journals continues to undergo a metamorphosis from print-based to electronic. This poses both problems and opportunities. The problem is that many scientific societies (including the Biophysical Society) relied upon selling hard copies of their journals and reprints as a significant source of revenue. The opportunities in moving more and more toward web-based publishing are still emerging. One of the greatest advantages of electronic publishing is that animations, movies, and very high-resolution figures can now be linked to articles, and we will try to do this routinely in the future. Supplementary material is available from many journals, but accessing it can be a deterrent for the normal reader. Links within BJ articles (either online or in a PDF) to supplementary figures will make these figures a much more integral part of the article. We will continue to explore ways in which electronic publishing will enhance the presentation of scientific results.

Another direction that we will pursue is publishing more minireviews that briefly summarize recent advances and emerging areas. These reviews will complement the original research articles that have been the main basis for BJ. We also want to have more structural articles published in BJ, so that BJ better represents biophysics overall. Tools such as x-ray crystallography, NMR spectroscopy, and three-dimensional electron microscopy have been powerful developments to emerge from biophysics, but articles employing these techniques are currently underrepresented within BJ.

Last, but certainly not least, I want to personally thank Bob Callender for his exemplary service to both the Biophysical Society and Biophysical Journal over the past five years. It is only by assuming his responsibilities that I realize how great his effort has been over the previous period.

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Editor in Chief

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