As a physical scientist I welcome the advent of a journal of integrative physiology. From my perspective, I would like to indicate special opportunities I see for this journal.

I recognize that physiology is both an experimental and an applied science, but also that it must have a conceptual structure that is comprehensive and goes beyond immediate experimental details and clinical applications. Physiology as a maturing science must develop a set of principles, laws of nature, that bound and determine the actions of living organisms. These laws may also show how time structure (function) arises from spatial structure (form). Thus, I would like to see authors of papers submitted to this journal trying to reach out clearly and distinctly to enunciate those principles, if at first only as hypotheses. Comprehensive views are welcome here.

This journal should publish papers that reach toward deeper foundations of chemistry and physics so that the laws of physiology gradually emerge as integrations of these parent subjects and compatible with them. In my view, there is only one science. Physiological principles should be expressible in terms of physics and chemistry, and not only in the empirical, less profound form of equivalent networks of the engineering kind. For example, to state that some y changes in a way that is proportional to a change in x is an engineering description, not a physiological statement. To make it a physiological statement, a set of physical or chemical principles must be involved to account for the apparent causal relations.

I would like to see issues in developmental and comparative physiology examined at a level of principles, rather than mere description. Our duty is clear: we must always be on the lookout for principles. Description is one starting point in the search for principles, but description is not sufficient; or in any case, it can go on almost mindlessly if we fail to keep up the intellectual pressure for synthesis and integration. What does it really mean that ontogeny recapitulates phylogeny? How is it that as a system constructs itself it reenacts some of the stages of its ancient past? How is the past stored so this result is obtained? What is the physics of this kind of historicity?

It seems to me that major physiological variables of all kinds have magnitudes that can be decomposed usefully into several components: 1) the magnitude set by development, 2) incremental changes associated with age or life status, and 3) incremental changes associated with steady-state operating conditions. Genetics, systems at the epigenetic level, and immediate processing all merge, but make their separate contributions to the magnitudes we observe in our experiment. Out of the suggested decomposition, perhaps we can find the set of principles behind observed behavior.

We cannot immediately answer questions about the principles of self-organization, or evolution as they are manifested both microscopically and macroscopically, but if we keep the search for them as our focus, then some day we will succeed. Otherwise, we stumble.

A. S. Iberall
Associate Editor