



*Integrating  
the Life Sciences  
from Molecule to  
Organism*

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# The American Physiological Society

9650 Rockville Pike, Bethesda, Maryland 20814-3991 (USA)

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Dear Dr. Berg,

The American Physiological Society (APS) appreciates the opportunity to provide input into the strategic planning process at the National Institute of General Medical Sciences (NIGMS). The physiology community represents a diverse group of researchers, many of whom have an interest in the activities of the NIGMS. Below we address some of the questions posed on the NIGMS strategic planning website.

With respect to new and emerging areas, approaches and technologies in basic biomedical research, we would like to stress the importance of integrative approaches to research. Research into the fundamental molecular components of life has provided the raw materials for understanding the functions of cells, tissues, organ systems, whole organisms and even populations. However, despite tremendous gains in biomedical research there remains a need to apply the findings of molecular biology to organisms in all of their physiological complexity. Doing so will lead to a better understanding of human health and disease, and facilitate the development of new treatments and prevention strategies. Recent breakthroughs in proteomic and metabolomic techniques provide examples of the type of basic research findings that should be translated to the whole organ and whole organism levels. Carrying out this type of research requires formation of multidisciplinary collaborations and research teams, and support of those collaborations should be a particular priority for the NIGMS. We believe that this is best accomplished by continuing to devote resources to high quality, innovative investigator-initiated research through the R01 grant mechanism.

Currently researchers are trained to approach biological problems at a reductionist level, but in order to confirm insights and apply findings from less complex systems (i.e. *in vitro* models) to whole organisms, researchers need to develop a set of skills that combines knowledge of molecular biology with *in vivo* systems. The key to bridging this knowledge gap lies in providing training programs and opportunities in integrative biology. Education should focus on bringing together scientists with diverse skills and expertise to exchange knowledge, i.e. scientists who focus on the description of molecular events would benefit from working with researchers who define mechanisms in animal models and *vice versa*. The next generation of researchers will need diverse skills to carry out translational research, bridging basic and clinical science. In the past, the NIGMS has offered short courses in integrative and systems pharmacology. These programs have been highly successful and should be continued and expanded.

Encouraging diversity in the biomedical research workforce is a priority for the APS, and we appreciate the support that has come from NIGMS and other NIH institutes over the years. In addition to NIGMS' existing programs, we suggest that applications for center grants and program project grants should include a demonstration that efforts are made to include underrepresented minorities and women as active members of research teams.

In closing, the APS appreciates this opportunity to provide input and looks forward to the forthcoming strategic plan for NIGMS.

Sincerely,

Dale Benos, Ph.D.  
President  
American Physiological Society