“Systems biology”–What’s in a name?

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SIX YEARS AGO, in an Editorial entitled “And now for something completely different?”, written to coincide with the beginning of my term as Editor-in-Chief of The American Journal of Physiology-Cell Physiology, I wondered how the journal might adapt and move forward arm in arm with the new physiology. At that time, “Systems Biology” was in its embryonic stage. As I bring my editorship of this journal to a close, Systems Biology has now burst onto the scientific landscape in a major way. Departments of Physiology have closed their doors in many institutions, but Systems Biology groups are springing up like mushrooms on a damp Fall morning. A question often asked in the hallowed halls of the American Physiological Society is whether Systems Biology is the new Physiology to which we must now adapt? Well, yes and no. While it is difficult to find two scientists who can agree on the absolute definition of Systems Biology, it is clear that it encompasses much of what passed as (molecular) physiology in former times and more (e.g., synthetic biology). Thus, whereas quantification, modeling, molecular biology, biochemistry, imaging at all scales, chemical biology, biophysics, and engineering are some of the disciplines that can be utilized for the dissection of a biological “System,” the name Systems Biology suggests different things to different people. While a major thrust of the Systems Biology concept is undoubtedly to integrate and promote the application of sophisticated quantitative analysis of living biological systems into the scientific endeavor, ultimately, each group and department will manufacture and support its own interpretation of the term Systems Biology. Achieving specific research goals requires support at various levels from institutions, foundations, governments, and philanthropists. The recruitment of personnel and provision of research resources is peculiar to each group but must be justified programmatically to support the local research enterprise. With this in mind, the power of the term Systems Biology is that it suggests something fresh, new, exciting, modern, and forward thinking. This terminology is a positive message to attract new talent and resources into areas in which many of us have been working for decades. It has shaken off the (albeit unjustified) cobwebs that are associated with the term physiology and, as such, it is a very welcome advance. The bottom line, however, is that it is not necessary to develop a “one-size-fits-all” definition of Systems Biology. Scientific progress will continue to evolve in a collaborative manner, using multiple and newly developed approaches, disciplines, and techniques that together are suitable and necessary to answer biological questions of physiological importance. With these issues in mind, the Systems Biology conundrum was perhaps best summarized by the Great Bard, William Shakespeare, who wrote: “What’s in a name? That which we call a rose by any other name would smell as sweet.”

As a component of the American Physiological Society, AJP-Cell Physiology is and will continue to be a part of this intellectual and technical revolution–whether it be in the area of molecular systems, cell systems, or whole body systems. The type of manuscripts that are submitted to AJP-Cell Physiology will continue to evolve but will certainly continue to include more traditional physiological approaches as well as newer methodologies. Indeed, our call for manuscripts on “The Systems Biology of the Mitochondrion” was a great success–over 40 original articles and reviews were published under this banner in 2006–2007.

For the past 6 years, I have had the privilege of serving as Editor-in-Chief of the AJP-Cell Physiology. At this time, I thank all of my team of devoted and talented Associate Editors (Seth Alper, John Geibel, William Gerthoffer, Kathy Griendling, Paul Insel, Kathleen Sweeney, and Jennifer Stow, as well as Kevin Strange during my first 3-year term) and the support staff at the APS main office in Bethesda who have been involved with presubmission and postsubmission activities, technical support, and managerial support during my tenure. I wish Paul Insel all the best as he takes over the reins while I ride off into the sunset (but not for very long!!).