

## Biotechnology Education

### Commentary: Have We Received the Wakeup Call?

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A few months ago, in a commentary in *Cell*, Dr. Bruce Alberts issued what he called *A Wakeup Call for Science Faculty* [1]. In this thought-provoking piece, he challenged us as teachers of basic sciences to change the way we teach the introductory science courses in our colleges and universities. There are far too many introductory survey courses in our institutions that fill the students with “. . . the most important facts that our own particular discipline has discovered about the natural world, without conveying to them how we came to know and understand these facts.” [1] This approach is patently insufficient in a world of sequenced genomes and the nearly exponential increase in our understanding of everything from macromolecular interactions to the developmental biology of entire organisms. The “information dump” approach has resulted in too many of our students choosing fields other than science for their studies, a generation of science teachers who are poorly schooled in the methods and concepts of scientific discovery, and a public that is so mistrusting of scientific discovery that they are willing to believe that from time to time living things fail to obey the laws of chemistry and physics and are molded by such things as “intelligent design.” It is now time to listen to this “wakeup call” and decide how we as biochemists and molecular biologists can help solve this critical problem. Our first task is to listen to the “call” and then enter a discussion about how to meet the enormous challenges of education not only for our future scientists but also for a workforce at many levels and for a public that is increasingly skeptical about and alienated from modern science.

Although I don't expect that major changes in undergraduate survey courses in biology, chemistry, and physics will happen immediately, there is enough work ongoing at our leading educational institutions to ensure that it will happen. For our part, we need to pay close attention to the changes in thinking and curricula because they will dramatically affect how we teach our courses at the advanced levels. Indeed, we need to be a part of the earliest discus-

sions. For example, what will the students learn, and what will they be prepared to learn in advanced courses? Will the present course structures be appropriate for educating our students in the modern discoveries of our field if they actually arrive with an appreciation of discovery science? Is a survey course in biochemistry and molecular biology the best vehicle for conveying the excitement of understanding enzyme evolution, the complexity of developmental processes, modern genetics, and epigenetics? What is the best way to have students appreciate our knowledge of health and disease at a molecular level? Many of us have ideas for curricula that could much more effectively convey the knowledge and excitement of the modern molecular life sciences, but unless we engage early on in the discussion of how we restructure our most basic courses, we will lose our chance to control the shape of our advanced courses.

How much of our current course design is based on history, turf, or the requirements our undergraduate students face for entry into medical schools? None of these are sufficient in themselves to eliminate progress toward new approaches, but these barriers should not be underestimated. This discussion will therefore require not only honest academic discourse within institutions but also the engagement of national organizations that represent scientists, professional schools, and graduate science programs. Just organizing it will be complex, and there is no guarantee of either cooperation or success. Regardless, we must begin an active dialog to determine the best course of action.

It will require gathering and evaluating our concepts for informing the changes in basic science education if we are to take a leading role in ensuring that accurate and modern biochemistry and molecular biology are at the core of whatever curricular changes occur. Therefore, as a journal dedicated to the teaching of biochemistry and molecular biology, I hope that you will utilize BAMBED and join me in a discussion that will begin to answer Dr. Alberts' wakeup call.

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#### REFERENCES

- [1] B. Alberts (2005) A wakeup call for science faculty, *Cell* **123**, 739–741.