

out and leave the discussion to biologists, and that scientists have a faith of their own. The first is asserted without explanation and the second seems curious in light of the first. Schofield's third point is interesting. I think most scientists take on faith that there is some understandable pattern to the things we can observe, that we are on the right track in investigating that pattern by the methods of science, and that we are closing in on something that corresponds to our intuitive idea of reality. That belief is a matter of our meta-science, or perhaps of our psychology, not part of the science itself, which deals only with the observable world. The important thing for the present discussion is that this belief neither confirms nor contradicts religion.

Michael Todhunter asks to debate the evidence for evolution in the fossil record. Books have been written on that subject—I cited two in my Opinion piece. The practical political issue is this: What should our public schools teach when confronted with disagreements they are not themselves able to resolve? The answer is easy. Almost all the most respected biologists are saying that evolution is the theory that works and that it is the central organizing principle of modern biology. If the school boards have any sense, that is what their schools will teach despite a few dissenters, some of whom offer genuine scientific challenges to the theory and most of whom have other agendas. The schools should be teaching their students that all theories have wrinkles that remain to be ironed out. They should be teaching that all theories are tentative and our understanding is always incomplete, but that science progresses by building on what we know best. Well-established theories such as evolution work too well not to have mostly permanent truth in them, even though the theories will evolve in response to new evidence. We should be helping the school boards by educating their constituents.

Contrary to Schofield's advice, all kinds of scientists should be explaining to the public what science is about and emphasizing its strengths and its limitations, because the public and not the courts will decide where this country will go in the 21st century.

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US lacks nuclear-power infrastructure

I read with great interest the hopeful items about the coming nuclear power boom (PHYSICS TODAY, February 2006, pages 11 and 19), but I would like to point out that the US has lost the infrastructure to build these plants. Because of economics, the US no longer has the heavy industry capable of building the reactor heads and steam generators that new plants require. Reactor owners looking to replace aging plant components must contract with Japanese, Korean, or Italian companies for the heavy forging and machine work that was once done in America, and compete against other interests for both valuable plant time and floor space to get their components finished. American nuclear plants are just not a 600-pound gorilla that can command the marketplace anymore.

America is also losing the quality battle for smaller components such as pumps, valves, and circuit breakers. Many of the smaller vendors and foundries that once produced pumps, piping, and valves to the ASME Boiler and Pressure Vessel Code (a nuclear requirement) have been swallowed up by mergers, leaving only a few suppliers. And those few have had little incentive to keep a costly quality program that meets the requirements of a nuclear supplier as defined in the Code of Federal Regulations (10CFR50, appendix B) because the market for nuclear replacement parts is scant. Other suppliers have lost control of their quality programs because of such factors as off-shore production and the loss of tribal knowledge due to an aging workforce and downsizing.

This isn't to say that America won't produce new nuclear power generating stations, but a lot of infrastructure investment will be needed to bring the US back to the level where we can make them using American resources and labor.

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Training teachers for college

I have enjoyed the articles about physics education that have appeared in the past several months. They have generated a great deal of knowledge that needs to be integrated into educa-

tional programs at all levels. However, I have noticed that much of the discussion about training has focused on K–12 teachers, who are trained in the baccalaureate education programs of colleges and universities. This focus is important, but it avoids a long-standing problem: how to train college and university professors.

Professors are rarely required to have taken education courses, yet they must usually demonstrate a dedication to teaching and state some philosophy of teaching. A prospective professor's approach to teaching must apparently be developed independently. Most physics professors have developed their approaches to teaching through their experiences as graduate students and postdocs.

I believe that current and prospective professors would be well served by a series of courses or training sessions, implemented at many colleges and universities worldwide, that distill current physics education knowledge and provide a venue for practicing it with other students. The courses could be offered as part of undergraduate or graduate curricula or in pre-employment or professional-development training sessions. Alternatively, training sessions could be implemented as an ongoing part of the annual conferences of the various scientific professional societies, and then funding could be secured for conference attendees. (This approach could also work for K–12 teachers.) Implementation of training courses would be helpful not only to current professors but also to those who, like me, are employed in industry but would eventually like a teaching career.

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Diverse thoughts on diversity in physics

I read Shirley Malcom's "Diversity in Physics" article (PHYSICS TODAY, June 2006, page 44) with great interest. As a physics student in college, I often marveled at just how white and male all of my classmates and professors were.

I have been teaching physics for four years in a public high school in Massachusetts, and I think I can address at least one piece of the puzzle. In my first year as a teacher, I made the classic novice error of teaching as I had