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## How Scientists Can Help Foster Science Appreciation

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In the last issue of *The Scientist*, Morris H. Shamos, emeritus professor of physics at New York University, cast a cold eye on the concept of scientific literacy. He argued that a more reasonable goal in educating nonscientists about science might be science appreciation. Like music and art appreciation, science appreciation might be fostered without requiring the mastery of technical details that experts need to know. Furthermore, Shamos noted, the appreciation of science by a large segment of our society would have a more practical result than the attainment of scientific literacy (which, in reality, will only be achieved by a few). "A citizenry that understands what science is about," he wrote, "is less likely to be anti-science than one that has been forced into the mold of knowing about science" (*The Scientist*, October 3, page 9).

In my view, Shamos has made an important and timely distinction. The public has been complaining, ever more loudly, about the decline in the quality of instruction at our nation's schools. A smaller but no less vocal group, worried about the ability of the United States to compete successfully with other nations in the 1990s and beyond, has decried the falling science and math test

scores of even the best of our graduating high school students. And, as we all know, fewer and fewer of those graduating high school seniors are electing to major in science in college. Consequently, U.S. graduate programs are filled with students from other nations, who are eager to study science at our universities.

I have argued repeatedly for exposing students to the excitement of research early on, having been greatly impressed with the success of a group of small liberal arts colleges that turn out more than their expected share of science majors and future Ph.D. scientists; these science-active colleges get undergraduates involved in real research—not merely demonstration experiments—and that seems to make a real impact when they make career decisions. (See "Promoting undergraduate science: Students should participate in basic research," *The Scientist*, March 23, 1987, page 9). Praiseworthy though the programs at colleges like Swarthmore and Harvey Mudd are, we should acknowledge that they are really last-ditch efforts to salvage students who have not yet been turned off to science.

Clearly, the need for better

science education at the precollege level is urgent. And it is with students in grades 1 through 12 that Shamos' idea of pursuing the goal of science appreciation is most apt. At early and middle precollege level, we should not be channeling students towards science or any other vocation; rather, we should be exposing them to the excitement and stimulation of knowledge from all realms. Of course, this requires well-trained teachers who make their lessons interesting, and we should spare no expense in finding those teachers and rewarding them for their expertise.

There's a part in this process that scientists can play too. On page 5 of this issue, you can read about faculty members and post-doctoral fellows at the University of California, San Francisco, who have made it their business to help foster science appreciation through participation in the Science Education Partnership Program. This program links UCSF scientists with public school

teachers and their classes with the goal of increasing student interest in science. And there are other similar programs around the country. It is an encouraging development that will undoubtedly raise the level of science appreciation in this nation and, I hope, attract more students to careers in science.

While such programs are increasing in number, they are still the exception. It is regrettable that there exists such massive, high walls between universities and public schools. Ironically, some of the premier centers of scientific learning in our nation's largest cities are but a stone's throw away from some of our most squalid and unsuccessful public schools. The scientists at those centers have a responsibility, as do all citizens, to ensure that school children get what they deserve: a high-quality education. It should be the birthright of every child born in this the wealthiest nation on Earth. ■