Involved' is synonymous with 'Alberts'. "None of my children wanted to become scientists," he says, "because they thought it meant always being away from home."

Currently one of Alberts' major areas of involvement is precollege science education. In his position as Chairman of the National Academy of Sciences/ National Research Council Commission on Life Sciences (CLS), a position he has held since 1988, Alberts is attempting to channel some of the country's scientific abilities in biology to help society. He feels that precollege science education, an area everyone agrees appears to be getting worse instead of better, is an area of major importance that biologists can contribute to through their political clout. "There's a consensus that precollege science education is a disaster," Alberts explains, "the biology textbooks are worse than in the 1960s and the curricula are test-driven by exams that do not test the essence of science; it's a system in gridlock."

The CLS traditionally has not played a major role in precollege science education. But in response to its 1990 report, "Fulfilling the Promise: Biology Education in the Nation's Schools," a 150-page document that set forth the complex set of problems plaguing precollege science education, the Council decided to develop a plan for improvement. Unlike many other projects undertaken by the Academy, which are requested and subsequently funded by Congress, this program needed to seek its own funding. Now supported by the National Science Foundation (NSF), a group of 15 scientists and science educators are in the process of identifying outstanding teacher workshops, analyzing what qualities those in-services have, and suggesting ways to replicate these workshops at the major research universities throughout the US. The CLS is also beginning to establish a network system to disseminate that information. Ultimately, the network will consist of local groups that meet and evaluate textbooks, programs, and materials, share their expertise, and feed a larger network with this information, organized through the National Academy of Sciences. The network should be designed to provide answers to questions such as: What are the best kits available for a fifth-grade study of electricity? What is the best way to convince a school district to support a hands-on science curriculum? How much would it cost? The precollege science education workshop at the ASCB annual meeting in Boston last December (see story page 4) also contributed to the building of this information network.

Since curricula are determined by local governance, the most effective strategy is to set standards and identify outstanding curricula. "We're thinking of coming up with a 'Good Housekeeping Seal of Approval' for books, kits, and programs," Alberts explains, "given by a group comprised of both outstanding scientists and educators." Alberts witnessed firsthand the difficulty new teachers face in finding and working with good science materials through his daughter, who majored in biochemistry in college and is now a high school science teacher.
Why become involved in the first place? Not enough to do in the lab? "My phenotype is that when I see something irrational, I write someone, which often leads to my being assigned a new task," he explains. He also realized that something had to be done if scientific research was to receive support in the future. "We need science fans if we want them to continue supporting science research."

Once scientists begin working with young students, they get hooked and become involved with the students' sense of excitement, wonder, and natural curiosity. "Kids start out as natural scientists and school takes away all that natural interest," Alberts says. And he adds an impressive statistic: science is the favorite subject of first graders; by the time those students are in eighth grade, science is their least favorite subject.

Alberts applied his interest in science education to his own community by establishing the Science and Health Education Partnership (SEP) through UCSF. "Here was this great big university, right in the middle of the city, that never interacted with science teachers, throwing supplies and materials away that teachers could use." So he and the Vice Chancellor began an outreach program aimed at providing a support system for public school teachers through one-on-one relationships. By establishing these personal relationships, high school and middle school science teachers felt they had a link, a direct access to resources. The program has now grown and developed to include 10% of all public elementary school teachers in San Francisco. They are enrolled in an NSF-funded program aimed at spreading hands-on science throughout the entire school system within four years. These 100 teachers are learning to look at teaching in a completely different way: they must give up the idea of knowing all of the answers themselves, encourage cooperative learning, and not be afraid to say "I don't know." These teachers will in turn help to train the other 900 teachers in the city's school system. Beginning this program at the elementary level made sense because good teaching materials already exist at that level, there is no rigid curriculum, and teachers are with students all day, therefore having the flexibility needed to introduce hands-on science into the curriculum.

The teachers have been very appreciative of the support and consideration their opinions have been given, and their morale has improved correspondingly. However, the inertia in the system is one of those irrationalities that gets Alberts going. "All big systems are resistant to change independent of the personalities involved!" Alberts adds that scientists need to gain the trust of school officials and allow them to see that everyone has a vested interest in promoting change. He also says that everything will take more time than anticipated, so that patience is important. Last year, the program helped to establish a science material center for the school district, which appears to be a simple project, but is becoming more like setting up a giant hardware store.

How can Alberts do this and get his research done too? He admits that you can only spend a great deal of effort on public service if you have a good lab and people who can work independently with a minimum of supervision. In addition, many members of his lab have become involved in his education projects. The results are that they are impressed by what can happen, feel good about themselves for becoming involved, and get positive feedback. Alberts is quick to point out, however, that anyone thinking of
starting programs needs to understand that the work is too time-consuming to do without
the help of someone, at least part-time, to coordinate volunteers and keep up with the
paperwork. Alberts' hope is that some day soon each university will have a full-time
precollege science outreach person on staff. For now, he feels it is important that
scientists become involved because they have political clout that teachers do not have.
There are limited educational funding resources and many special interest groups vying
for those funds. Scientists need to make themselves heard in local schools. Scientists can
have credibility with educators because, as Alberts explains, "we have no ax to grind in
precollege education and no direct involvement."