Subsidized mining by microbe

To the editor:

The article "Mining by Microbe" (*Bio/Technology* **11:**1250, November) suggests that using gluconic-acid producing bacteria to solubilize phosphate rock would provide an energy-efficient process relative to the usual method of treating the phosphate rock with sulfuric acid, and that genetic optimization would provide a basis for biological production of the world's second largest bulk agricultural chemical.

Based on the figures the authors provide, it seems that 10 grams of glucose are required to solubilize about 6 milliequivalents of phosphate. Thus, 0.056 moles of glucose solubilize 0.002 moles of phosphate. Converting to weights, 10 grams of glucose yields about 0.2 grams of phosphate. With glucose at a price of $0.14 per pound, and technical phosphoric acid at $0.40, it appears that from a dollar's worth of raw material (glucose), one can obtain about six cents worth of phosphoric acid. This makes no allowance for other raw material costs, or processing or capital costs, etc., and it is clear that even if one assumes that a corn starch producer could make glucose available at half this price, the technology looks remarkably unattractive. I can't see that genetic engineering or other research would make the process viable, but big subsidies might!

R.I. Mateles
Candida Corporation
Suite A-1706
175 West Jackson Blvd.
Chicago, IL 60604

Goldstein and Rogers reply:

Dr. Mateles' analysis that all of the 1% glucose feedstock is converted into gluconic acid when, in fact, only 1% is bioconverted into gluconic acid (i.e., 99% of the glucose passes through the system unconverted). We regret that this was not made clear in the article. The yield of soluble Pi is far greater than that predicted by simple gluconic acid dissolution. We discuss one possible reason for this in the legend of Figure 2. These facts and a number of related process engineering considerations makes the projected economics of large-scale production dramatically different from Dr. Mateles' off-the-cuff analysis. In addition, and as we point out, society currently pays for low priced phosphate fertilizers in the currency of environmental quality and the use of precious nonrenewable resources.

Alan H. Goldstein
Department of Biology
California State University
Los Angeles, California

Robert D. Rogers
The Idaho National
Engineering Laboratory
Idaho Falls, ID

Agracetus agita

To the editor:

George Kidd's commentary on agbiotech, "The dramatic fall and rise of Agracetus" (*Bio/Technology* **12:**122, February) is misleading as it gives the impression that Agracetus' successes resulted through a shift from *Rhizobium* to transgenic plant research after I resigned as vice president of R&D in July, 1989.

In fact, *Rhizobium* work—at its most active stage—involved only part-time efforts of one Ph.D. and his technicians. In comparison, prior to 1989, *ten* Ph.D.s and their technicians worked full-time on transgenic plant projects. Prior to 1989, the key transgenic soybean and cotton patent applications (referred to in Kidd's article) were filed. Also, while I was with Agracetus, other companies paid for the service of inserting foreign genes into their seeds by particle propulsion. Again, the impression of Kidd's article is that such services were initiated after I left Agracetus.

Winston J. Brill
R&D Innovator
4134 Cherokee Drive
Madison, WI 53711

To the editor:

I read with great surprise the commentary on agbiotech by George Kidd entitled "The dramatic fall and rise of Agracetus." Kidd described a company that was totally different from the one that I was a part of from December 1982, to December 1990.

From day one, the main commercial objective of Agracetus (before mid-1984, the company was known as Cetus Madison Corporation) has been to exploit the advances in recombinant DNA technology to develop "transgenic plants" with enhanced values.

I know that for a fact because I was the *only* Ph.D. scientist in the company who performed *Rhizobium* R&D at Agracetus. Even so, I and my technical assistants (from 2 to 4 depending on the years) had never been full-time on *Rhizobium* R&D. My group was always involved in the R&D activities of several non-*Rhizobium* projects. The *Rhizobium* project was put in place because, at one time, the management was looking for a "shorter-term" project to demonstrate that the company was capable of making technological advances while the majority of the company remained focused on the development of transgenic plants. Agracetus fully recognized the small size of the *Rhizobium* market and allocated its resources accordingly.

Despite the small effort, the *Rhizobium* Gold Coat inoculant soybean was test marketed in 1988, after several successful trials by Agracetus and by several state universities (results published). The market test revealed the unwelcome fact that U.S. farmers, although willing to pay for the inoculant, were not willing to spend the effort necessary to coat their soybean seeds properly. That not only affected the performance of the inoculant but also created a potential for gumming up their planters with the residue. The performance of the inoculant was not in dispute.