Shuttle scientists: An endangered species?

In 1978, three years before the first shuttle launching, NASA introduced a new category of space-fliers without astronaut status. Unlike full-time astronauts, the new breed – called payload specialist – was conceived specifically to handle the details of astronomy, biology and other scientific missions, which the agency envisioned as a major thrust of the shuttle era. The whole point, as NASA described it, was that "participation by individuals associated with the investigations should enhance the probability of successful achievement of payload objectives."

Now, however, NASA is changing – or at least rewriting – the rules, in a way that has raised some concern about whether the quality of science aboard the shuttle will get short shrift. The agency is not barring payload specialists, most of them full-time researchers who are able to stay much closer to their science than can most astronauts. But NASA is redefining payload specialists as those who "perform specialized functions with respect to operation of one or more payloads or other essential mission activities."

The difference is subtle, and not a hard-and-fast rule, but it reflects a longtime conflict between the "professional astronauts" and the "professional scientists." According to the new policy, "emphasis will be on using the astronaut cadre whenever possible." And therein lies the rub.

One payload specialist, for example, is Drew Gaffney, a cardiologist and associate professor at the University of Texas Southwestern Medical Center in Dallas. He is to make his maiden flight in June when the shuttle carries the Spacelab research module on a mission devoted to the life sciences. He is not an astronaut, however, and he says his goal is to continue in medicine, not to abandon his career for that of an astronaut. Gaffney worries whether researchers will have fewer opportunities to work aboard the shuttle in the future.

"I am concerned that the changes in the policy will make it more difficult for the science community to have its members on board the shuttle doing their experiments," he says. "The change in policy seems to be a lessening of the emphasis on top-quality science at a time when the agency is being asked to focus itself more toward its science activities."

NASA now employs 96 astronauts – 44 pilots and 52 "mission specialists," of whom 22 have PhDs in various scientific fields. Only about 5 of those have participated in experiments associated with their disciplines, and many of the rest would like to do the same. But payload specialists represent competition with the astronauts for a finite number of flight opportunities.

"The scientists want someone who's up to speed working with data in a specific field," says NASA spokesman Charles Redmond, but involving astronauts in a mission's scientific needs might save training time. Adds Redmond, "There's friction on both sides." – *J. Eberhart*

Knotty evolutionary tree in plant world

A tiny bacterium living in Dutch ponds is now the center of a debate concerning how higher plants first acquired the ability to harvest energy from the sun. In the Jan. 26 NATURE, two groups of researchers report conflicting evolutionary tales for this organism, called *Prochlorothrix*, which is actually a form of blue-green algae.

For decades biologists have worked with the idea that more than a billion years ago, a primordial marriage of convenience granted green plants the gift of photosynthesis. Green plant cells contain organelles called chloroplasts that hold all the machinery for photosynthesis, and scientists think chloroplasts evolved from free-living bacteria that were swallowed by more complex cells, which could not photosynthesize on their own.

When first identified in 1985, *Prochlorothrix* intrigued biologists because it has both chlorophyll *a* and chlorophyll *b* – a combination of photosynthetic pigments that closely resembles the pigments inside chloroplasts. In contrast, almost all other blue-green algae (now known as cyanobacteria) lack chlorophyll *b*. The pigment similarity between *Prochlorothrix* and green plants led some researchers to speculate that this organism might be a free-living close relative of the chloroplast.

Two research teams have now completed the first genetic comparisons of *Prochlorothrix*, other cyanobacteria and chloroplasts from several kinds of plants. While one comparison places *Prochlorothrix* closer to chloroplasts than the cyanobacteria are, another study sits on the opposite side of the evolutionary fence.

To compare the organisms, Clifford W. Morden and Susan S. Golden of Texas A&M University in College Station focused on a protein that figures in photosynthesis. They found that in both chloroplasts and *Prochlorothrix*, the gene coding for this protein lacks seven amino acids that are included in the genes of other cyanobacteria. They conclude that *Prochlorothrix* is part of a lineage including chloroplasts that branched away from other cyanobacteria.

In the other study, Seán Turner and colleagues at Indiana University in Bloomington as well at the University of Amsterdam based their comparisons on genetic sequences for a segment of ribosomal RNA. Their results indicate that *Prochlorothrix* is no more closely related to chloroplasts than other cyanobacteria are. As one explanation for the pigment similarity, the researchers suggest that both chloroplasts and *Prochlorothrix* could have separately evolved chlorophyll *b*.

Microbiologist John Waterbury at the Woods Hole (Mass.) Oceanographic Institution says the debate cannot be resolved at this stage. However, he notes that the amino acid study suffers because the researchers used a relatively short sequence for comparison. "Probably when all else shakes out, it will fall into the [RNA] interpretation," he says. Researchers recently identified a marine organism similar to *Prochlorothrix* (SN: 7/30/88, p.68), and Waterbury says it will be interesting to see where this new organism fits into the evolutionary tangle. – *R. Monastersky*

Imagery boosts breast milk

A mother whose newborn lies hospitalized in an intensive care unit often finds it difficult to provide breast milk for her infant. With direct feeding prohibited, she may opt to give the child breast milk expressed with a breast pump. But the anxiety, fatigue and emotional distress that generally accompany having a sick infant often serve as powerful inhibitors of lactation.

Stephen D.K. Feher and his colleagues at the University of New Mexico in Albuquerque sought to reduce stress and improve milk production in 30 mothers of hospitalized premature infants through the use of guided relaxation and imagery techniques provided on a 20-minute audiotape. After about one week, average milk production among women who listened to the tape daily was more than 1.5 times that of mothers who did not listen to the tape, they report in the January PEDIATRICS. Among mothers with the sickest babies, milk production in tape-listeners was more than double that in control moms.

"There was a relationship between the number of times a mother listened to the tape and the actual volume of milk she expressed," John D. Johnson, one of the researchers, told SCIENCE NEWS. The tape included a guided relaxation of muscle groups with deep breathing, and descriptions of pleasant surroundings, milk flowing in the breasts and the baby's warm skin against the mother.

The findings need verification with longer-term studies, the authors caution. □