"The two papers are beautifully complementary," says Tessier-Lavigne. "Together they each answer the major questions raised by the other's work." The Montreal group studied MAG's effects on an immortalized neuronal cell line, whose properties could differ from true neurons. Filbin, Walsh, and Doherty found, however, that the protein has the same effects on neurons that have been recently removed from animals. The Filbin group's experiments could not determine the degree to which MAG contributes to myelin's overall inhibitory effect, an answer that was filled in by the Montreal team, when they showed that MAG accounts for well over half of myelin's inhibitory activity.

But that leaves a third major question: As MAG is present in PNS myelin, why are peripheral nerves able to regenerate? The answer may lie partly in the fact that PNS myelin contains only one tenth as much MAG as does CNS myelin. In addition, MAG is probably not around when peripheral nerves regrow. That's because damaged peripheral nerves undergo a rapid cleanup that removes all of the myelin and debris downstream of the nerve cut. Only after the debris is gone can new neurites grow into the injured area, says Filbin. Cleanup of CNS neurons, on the other hand, is much slower, so MAG-containing myelin stays around much longer after nerve injury.

Still, MAG accounts for only 63% of the neurite inhibition from myelin, although the Montreal group has another, non–MAG-containing protein fraction that also has inhibitory effects. The culprit in that fraction could be Schwab's IN-1, McKerracher says.

If MAG is part of the reason why CNS neurons won't regenerate, then tricks for blocking MAG function may someday be useful for treating spinal cord injuries. But before researchers start thinking along those lines, they first must show that blocking MAG facilitates neuronal regrowth in animals with CNS injuries. The Montreal group has begun such experiments with John Roder of Mount Sinai Hospital in Toronto.

Roder's lab recently made mutant mice that lack a functional MAG gene, and the group plans to see whether CNS nerves can be coaxed to regenerate in the MAG-minus mice. "That's the acid test," says Roder. If MAG passes it, then researchers on the long trek toward nerve regeneration will have taken a significant step forward.

–Marcia Barinaga

SPACE SCIENCE

In Budget Crunch, FUSE Gets Trimmed

Astrophysicist George Sonneborn of the National Aeronautics and Space Administration's Goddard Space Flight Center sounded surprisingly upbeat last week, considering that NASA had just slashed the funding for his ultraviolet satellite project by more than half. Wesley Huntress, NASA's associate administrator for space science, had told Sonneborn and his colleagues at NASA-Goddard, Johns Hopkins University, and institutions in Canada and France that budget pressures are forcing the agency to "terminate" the Far Ultraviolet Spectroscopic Explorer (FUSE), a $250-million orbiting observatory that was due to fly by 2000. The agency did soften the blow, however, by offering FUSE a chance at resurrection as part of a much cheaper series of space science missions, with price tags of around $100 million. Sonneborn and his colleagues say they will seize the opportunity.

"We are now looking to redesign and restructure the program to do the most important science that FUSE was intended for," Sonneborn says. With a cheaper rocket, a lower orbit, a shorter life span, and less documentation, says FUSE participant Mark Perry of Johns Hopkins, it should be possible to shrink the price without serious compromises. "You put a lot in to get that last little bit out," he notes. If the redesign succeeds, the mission should yield many of the promised insights into the big bang and the structure of our galaxy, but it will no longer be a tempting target for NASA budget cutters.

Approved in 1989, FUSE was to have been the final and most expensive of an ongoing series of medium-sized space science missions known as the Explorer program, which has included the Cosmic Background Explorer and the International Ultraviolet Explorer. But as Huntress explained last week, NASA had planned the entire Explorer series during the early 1980s assuming 6% to 7% increases in its space science budget each year. "These anticipated augmentations have not materialized," he says. Something had to give.

Costing nearly twice as much as the next most expensive Explorer mission and still in the design stage, FUSE was the obvious place to cut, explains NASA spokesperson Donald Savage. But that's no reflection on its potential for science, says co-investigator Andrew Michalitsianos of NASA-Goddard. The far ultraviolet wavelengths FUSE was to detect are "one of the last unexplored regions of the spectrum," he notes, harboring clues to the makeup of the tenuous gases between the stars. And in 1990 a panel of astrophysicists led by John Bahcall of the Institute for Advanced Study in Princeton put FUSE high on its list of space science priorities.

ROBERT D. MCCLURE

Search light. By looking for absorption in the light of distant quasars like this one, known as 3C 273, FUSE would sample the makeup of interstellar gas.

Among its goals were to measure the temperature and composition of the interstellar medium by pointing spectroscopes toward distant stars, galaxies, and quasars and detecting wavelengths absorbed by the intervening gas. A key objective was to determine the ratio of ordinary hydrogen to the heavier isotope deuterium, which holds clues to the density and distribution of matter during the first minutes after the big bang, when those two isotopes formed. The Hubble Space Telescope has sampled this cosmic ratio in the region very close to our solar system. But because FUSE was designed to distinguish close-spaced absorption lines that blur together in Hubble spectra, it was expected to carry the measurements out to greater distances, says Sonneborn.

Researchers had also been counting on FUSE data to help explain a puzzling finding from earlier studies of our galaxy: the presence of patches of hot gas, reaching temperatures of a million degrees. The heat might be left over from the big bang, says Sonneborn, but the gas has had plenty of time to cool. "Why is it hot? Why is it still hot?" he asks.

NASA isn't asking FUSE scientists to give up on these questions—if they can address them within a budget less than half the size of the original project's. Technically, the old FUSE was part of the largest subset of Explorers, the Delta class, while the reborn FUSE mission would be part of a smaller class called the medium explorers, or MIDEX. Huntress predicts that the researchers can successfully trim the project down to size. But with 90 days to submit a revised plan and $150 million in costs to shed, Sonneborn and his colleagues will need all the optimism they can muster.

–Faye Flam