Scheduling science aboard the shuttle

The May 5 explosion at one of two plants manufacturing the ammonium perchlorate oxidizer for the space shuttle's solid-propellant booster rockets has added yet another uncertainty to the struggle to get the shuttle program flying again. A new plant is to be built by the oxidizer manufacturer whose facility was destroyed, while an addition is planned by the other firm. But it is yet unclear how soon production will be back to normal, or how existing supplies (some of which go to the Defense Department) will be allocated until that rate is reached. As of this week, according to a NASA official, there was only enough ammonium perchlorate left for four shuttle missions, and production for a fifth flight is just getting underway.

The first shuttle launch since Challenger has now been delayed from late August until at least Sept. 3, several NASA officials said this week. They estimate the oxidizer shortage could make itself felt for two years. At present there are 18 shuttle missions scheduled to take place over that span, and the agency is now working to minimize the effects of the oxidizer shortage.

Among the 18 flights are seven science-oriented missions. Some can be delayed if necessary, but others depend on being launched within narrow ranges of dates. First on the science list is Magellan, to map the surface of Venus by radar. Now targeted for launch next April 27, it is to be the first U.S. spacecraft sent to another planet since 1978. It depends on Venus being in the proper position, however, and if the launch is delayed past May 27, it will have to wait until May of 1991. Magellan has been on the fifth mission in line, but in order to keep it on schedule, NASA this week had all but committed itself to moving the mission up to number four.

Also tightly limited in its launch window is the Galileo orbiter and probe of Jupiter, now set for launch on Oct. 8, 1989. Galileo, too, has a few weeks' cushion, but if delayed too much it will face a 22-month delay. Galileo and Magellan have priority on the calendar, but the oxidizer shortage could force choices to be made among the other candidates.

The Hubble Space Telescope will be operating from an orbit around the earth, so its launching is not locked to the positions of other planets. However, it is expensive to keep on the ground. It is now set for a flight next June 1, though project officials say privately that Aug. 30 may be a more realistic date.

A mission called Astro 1, which will operate from within the shuttle's payload bay, originally consisted primarily of three ultraviolet telescopes, but it now includes an X-ray telescope to look at the supernova 1987A. Like the Hubble telescope, it does not have to be launched in a certain short time span, except that astronomers want it to be in orbit before it misses key events in the young supernova's evolution.

Other science missions in the first two years of the shuttle's new life include the Gamma Ray Observatory (one of a series of "great observatories" that are a major part of NASA's new science plans), a life-sciences mission using the European Spacelab research module, and a mission called Atlas 1, which is to be the first in a series of spacecraft designed to study the sun throughout an entire 11-year cycle of solar activity. *— J. Eberhart*

Growing a fibrous superconductor

One challenge in working with the recently discovered high-temperature superconductors is finding a way to produce these brittle ceramic materials as wires. Researchers at Stanford University have now taken one step toward that goal by using a laser-based technique to grow thin fibers capable of carrying a large current.

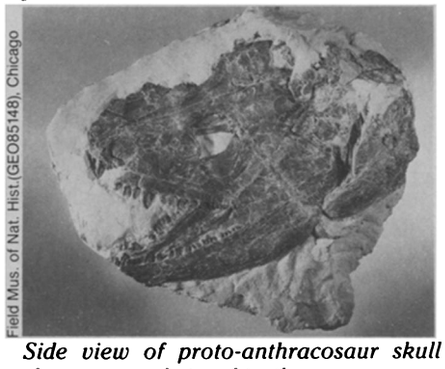
The Stanford group applies a technique known as laser-heated pedestal growth, conventionally used for rapidly growing small-diameter single crystals. Using appropriate amounts of finely ground oxides or carbonates of bismuth, calcium, strontium and copper, the researchers process the ingredients into small rectangular rods. A tightly focused laser beam first melts the top of a rod. A second, narrower rod acting as a seed crystal is dipped into the molten material, then slowly withdrawn at a rate of 1.5 to 50 millimeters per hour to produce a fiber. As the fiber lengthens, the laser beam melts more of the original rod to sustain this growth.

The resulting fibers are usually between 0.25 and 1 millimeter in diameter and up to 40 millimeters long. Theoretically, there is no limit on the length of fibers that can be grown using this technique, says Robert S. Feigelson, who led the work. Preliminary measurements show that typical fibers can withstand a pulsed current of at least 60,000 amperes per square centimeter at 68 kelvins before the fibers lose their superconducting properties.

With their laser technique, the Stanford researchers say they have a simple, controlled method for producing high-quality fibers. By changing the material's composition, the speed at which the seed rod is withdrawn and other conditions, they can study how various parameters affect the fiber's properties. The researchers describe their advance in the June 17 SCIENCE. *— I. Peterson*

Ancient amphibians found in Iowa

Geologists in Iowa have discovered a large fossil bed containing the oldest well-preserved land vertebrates known to exist in North America. Dated at 335 million years old, from the Carboniferous period, these fossils of early amphibians will help scientists trace the evolutionary path from water to life on land.



Side view of proto-anthracosaur skull shows eye socket and teeth.

"I would say it's a major discovery," says John R. Bolt of Chicago's Field Museum of Natural History. Worldwide, only 22 fossil sites of comparable age are known, and most of those have yielded limited numbers of fragmentary specimens. At the Iowa site, Bolt says, "the material is quite well preserved." He reports the find in the June 23 NATURE along with R.M. McKay and B.J. Witzke of Iowa's Geological Survey Bureau in Iowa City and M.P. McAdams of the William Penn College in Oskaloosa, Iowa.

The researchers found two types of tetrapods, or four-legged animals, that do not readily fit into any known species. These creatures reached about 3 to 5 feet in length and probably resembled giant salamanders, McKay says. While they had well-developed legs for walking on land, they apparently spent most of their time in the water. Of particular interest is an amphibian that was informally dubbed proto-anthracosaur. This newly identified animal combines advanced amphibian characteristics with features similar to those of the most primitive known tetrapods.

Paleontologists have long debated which form of fish spawned the first amphibians to crawl onto land. The proto-anthracosaur "may lead to some hypotheses as to what sort of fish ancestors we should expect for the early tetrapods," Bolt told SCIENCE NEWS.

In examining the fossil bed, the researchers also identified many fish species that may have served as food for the strong-jawed, toothy amphibians. However, McKay notes, "I don't know who was preying on whom because some of the fish were about 10 feet long. And they had big teeth." *— R. Monastersky*