More rings around Uranus

The rings of Uranus, discovered in March 1977 when they occulted the light from a star, were at first thought to be five in number, including an outermost ring that seemed to be strangely eccentric to the rest. Last October, Cornell University's James Elliot, one of the discoverers, reported at a meeting that further study of the data had revealed a sixth ring, located between the second and third original ones. Last month the rings occulted two other stars, and a group of California researchers now says that there are two or possibly three more rings inside all the rest, thus totaling as many as nine. (They may also show in the Cornell data.)

In addition, they report, the latest observations show the eccentric ring to have precessed around the planet. In March 1977 the ring was farther from the planet on the "inbound" leg of the star's occultation path than on the outbound leg. Last month the situation was reversed. Such precession is expected, says Philip Nicholson of California Institute of Technology, who analyzed the recent observations, but it was detectable only because the ring is out-of-round.

The actual precession rate has not been determined. Since the eccentric ring also appears to vary considerably in width, however, it is possible that observations of additional occultations will enable the rate to be worked out. This could be valuable to the study of Uranus itself, Nicholson says, since the precession rate could be used to calculate the planet's oblateness, or equatorial bulge. A small bulge would mean that Uranus has most of its mass concentrated toward the center, such as in a planet with a substantial core and deep atmosphere, while a large bulge would imply a more homogeneous overall structure. (Previous attempts to measure the oblateness vary by a factor of nearly 3, says Nicholson, since they depended on the hard-to-measure precession of the nearly round orbits of Uranus's moons.)

The recent observations were made on April 10 by Eric Persson of the Hale Observatories, using the 2.5-meter telescope at Las Campanas Observatory in Chile. Also in the project were Caltech's Keith Matthews, Gerry Neugebauer and Peter Goldreich. □

Skylab maneuver set for June 11

A critical maneuver that could make a potentially life-or-death difference for the Skylab space station in orbit around the earth is now tentatively planned for June 11, according to NASA officials. There have been fears that the nearly-100-ton workshop may reenter the earth's atmosphere — with pieces possibly reaching the ground — before a space shuttle crew can reach it to boost it into a higher, longer-lived orbit. The upcoming maneuver, designed to reorient Skylab into a position with less atmospheric drag, is hoped to add from six months to a year to its present orbital lifetime.

Unoccupied and virtually out of touch with the earth since its final crew of astronauts departed in early 1974, Skylab was reactivated in March by commands radioed from the ground so that engineers could determine whether systems vital to the proposed maneuver were still in working order (SN: 3/18/78, p.167). The facility has turned out to be in surprisingly good shape, with pressurization systems, batteries, computers and other components all apparently ready to go.

Ground controllers will begin setting up the move about June 1, putting a new program into Skylab's on-board computer. Later they will fire up the control gyro system, and then reactivate the guidance system to turn Skylab so that its long axis is parallel to the earth's surface, and the solar panels are facing the sun but edge-on to the line of flight. (The station is currently in a slow roll.)

If the plan succeeds at extending Skylab's time aloft, an early space shuttle flight will carry up a TV-equipped booster rocket, which will be steered from the shuttle by remote control to a docking with the space station. The rocket will then be fired to lift Skylab to a higher orbit. Without the upcoming maneuver, however, the workshop might not be there when the shuttle arrives. Two weeks ago a House subcommittee withheld about $39 million in appropriations for the remotely controlled booster until it is established that the maneuver was successful.

Meanwhile, delays in the shuttle's development, particularly with its main engine, have caused uncertainty about when the craft will make its first orbital flight. The space agency has been aiming for March 1979, while publicly citing a more conservative prediction of between April and June. A recent official NASA statement, however, concedes that the engine problems "could cause the June date to slip," and one official told SCIENCE NEWS last week that "very officially — unofficially" the agency now expects the first flight to take place in "September at the earliest, probably October."

The Skylab-boosting mission had been scheduled for the third shuttle flight, but the space station's uncertain lifetime has caused planners to consider advancing it to the second flight. This could save as much as three months, but it would mean that the shuttle had only one previous orbital test under its belt. Yet now, says the official, with the delays, "even [flight number] one is a candidate these days." □

Fish sprout nerve spines in schools

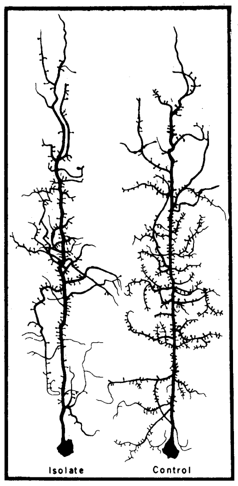
Young jewel fish reared in solitary confinement, patrolled by faceless observers, develop severe behavioral problems. They are fearful of other fish, unskilled in decision making and unable to discriminate among members of their own species. An anatomical difference has been detected between such isolates and normal, community-reared fish. One type of nerve cell has fewer branches and fewer and shorter spines in the deep layers of brains of the isolated fish, Richard G. Coss and Albert Globus report in the May 19 SCIENCE.

The spines on the branches of nerve cells are the sites of most input from other cells. Research in various experimental systems has suggested that the shape of the spines changes with their activity; electrical stimulation causing them to swell, visual deprivation resulting in long, thin stems. Coss suggests that the shape change, which can alter the conduction properties of the spine, may be an immediate response to activity. Growth of additional spines may then expand the system for later contingencies. Coss and Globus found the greatest differences between the isolate and normal fish among the spines close to the cell body (those they suggest are the oldest).

The anatomical studies stemmed from behavioral studies of social isolation. The isolates are confined in compartments where they can smell and hear each other (they growl), but all they can see are faceless cave characins (small tropical fish), which swim in the corridors between the compartments.

One behavioral difference Coss finds is in judgment. Normally, the fish are very accurate at calculating from another fish's size and orientation when it is worthwhile to attack and when it is best to flee. The inexperienced isolates show poor judgment. They usually give a perfunctory display of aggression, then become confused and turn around in the midst of an attack.

Coss finds that the fish's ability to recognize a face is instinctual. The isolate fish respond with unequivocal flight to a



Coss/Science

Nerve cell from isolated fish has fewer and thinner protrusions near the cell body. These cells are common in a brain area receiving input from a variety of senses, including touch and sight.