things that OAO II could not see. "We had hoped," says Dr. James E. Kupperian Jr., project scientist at NASA's Goddard Space Flight Center in Greenbelt, Md., "to work into some of the more rare and unusual objects such as quasars, galaxies and the composition of interstellar dust and its relationship to the birth of stars." OAO III had only one experiment—the Goddard Experiment Package—which contained a 38-inch telescope and a large spectrometer. The telescope could have studied objects as dim as the 12th magnitude—one-eighth as bright as the faintest stars measurable by the 16-inch telescope on OAO II. The spectrometer would have obtained pictures in the ultraviolet with a resolution some five times as accurate as OAO II.

"We were counting heavily on being able to use this instrument to do some of the things that cannot be done with any other instruments scheduled to fly in the program," says Goddard's Dr. Albert Boggess, principal investigator for the observatory.

For example, astronomers were hoping that its improvements over OAO II would allow them to study the brightest quasar, 3C 273, in the constellation Virgo, which is of the 13th magnitude in the visible light. The prime target, however, was to be interstellar dust. Although scientists do not agree on the composition of the dust, they do agree that it may hold the key to the origin and evolution of stars. OAO III could have looked at large bits of the spectrum in widths of 2, 8, or 64 angstroms.

Although a 32-inch Princeton University telescope scheduled for launch on OAO IV sometime next year will have the ability to look at the spectrum in greater detail—at one-tenth angstrom resolution—it is a highly specialized instrument designed primarily to study interstellar gases and not the dust itself. Scientists believe this solid material captures gas—hydrogen, for example—and that the dust may provide a catalyst for formation of more interstellar molecules (SN: 8/8, p. 124). OAO III was designed to monitor the gross change in the scattering of starlight by the interstellar dust—and thus determine the composition of the dust itself. OAO IV would then look at the molecules.

In addition to the Princeton telescope, OAO IV is to fly an X-ray experiment provided by the University College in London and the University of Leicester. This will study the X-ray emission of stars and nebulas as well as the interstellar absorption of helium and the heavier elements.

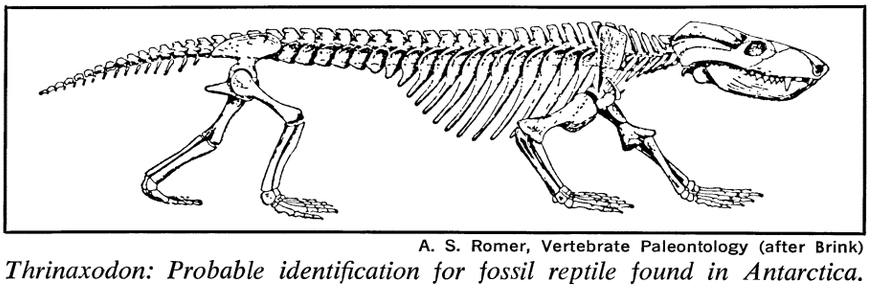
Meanwhile, the astronomers are looking at what is left of the OAO III program: certain duplicate parts contained in a prototype of the observatory. Much of what was found by OAO II needs to be refined, and much of what OAO IV is scheduled to do would have complemented the expected findings of OAO III. The logical question, therefore, is whether the space agency can economically fly the observatory again.

"We really don't know yet," says Dr. Boggess, "when we will be able to fly the OAO III prototype." Cost and the NASA budget are a big factor. But how the loss of two observatories out of four would affect the total return of the program is a great concern.

NASA is setting up a board to investigate this week's failure. □

FIRST DAY SUCCESS

Whole fossils in Antarctica



A. S. Romer, Vertebrate Paleontology (after Brink)

Thrinaxodon: Probable identification for fossil reptile found in Antarctica.

Last year a team of geologists and paleontologists headed by Dr. David Elliot of the Ohio State University's Institute of Polar Studies discovered fragments of the 200-million-year-old remains of a *Lystrosaurus*—a small, hippopotamus-like reptile—at Coalsack Bluff in the Transantarctic Mountains. These were the first fossil reptile bones found in Antarctica, and their discovery generated a great deal of excitement among paleontologists (SN: 3/28, p. 324).

This year, Dr. Elliot led another expedition to look for Antarctic fossils, this time near McGregor Glacier, 350 miles from the South Pole and about 150 miles southeast of Coalsack Bluff.

The scientists were transported by Navy helicopter from the McGregor camp to windswept Transantarctic Mountain sites ten miles away. On the first day of field work, Nov. 10, Dr. James Collinson, a member of the team, discovered a complete fossil skeleton. The ten-inch skeleton turned out to be that of a cynodont, a mammal-like reptile that was a contemporary and distant relative of *Lystrosaurus*.

Both cynodonts and *Lystrosaurus* are members of the order Therapsida—the reptilian ancestors of the mammals. But while *Lystrosaurus* ranged in length from two to four feet and was apparently aquatic, cynodonts were a little smaller—ranging from slightly larger than a rat to the size of a wolf. The cynodonts were four-legged carnivores with dog-like teeth. They first appeared in the late Permian and flourished in the early Triassic.

The skeleton found at McGregor Glacier measures ten inches from snout to tail base and is approximately 200 million years old. Though they have not had an opportunity yet to examine the fossil, Drs. Edwin Colbert of the Museum of Northern Arizona and Nicholas Hotten of the Smithsonian Institution agree that the reported size and age probably identify it as a member of the genus *Thrinaxodon*.

Since Dr. Collinson's discovery, intensive search by other members of the team has yielded a large collection of fossil bones. Fossils discovered during the first two weeks of field work include parts of a dozen *Lystrosaurus* skulls and a variety of small primitive reptiles that are as yet unidentified.

These fossils allow geologists to correlate rock strata within a 150-mile section of the Transantarctic Mountains. But more important, their nature, age and location make them a significant addition to the rapidly accumulating evidence in support of the view that Africa, South America, Australia, India and Antarctica were once parts of a supercontinent, Gondwanaland, that split up more than 150 million years ago. It is more reasonable to assume that these continents were once joined together, scientists say, than to believe that identical species arose simultaneously and independently on continents separated by hundreds of miles of seawater.

These new finds, says Dr. Colbert, who participated in the studies last year at Coalsack Bluff, are significant. Cynodont remains of the same age as Dr. Collinson's skeleton had been found in similar rock strata in South America and India. The new fossils, says Dr. Colbert, tie Antarctica to Africa more firmly than ever before and make it very probable that the continents were joined together when these animals first roamed them.

The expedition, part of the National Science Foundation's Antarctic Research Program, is also carrying out geological studies in the area. □