STRATOSCOPE VIEW

A crowded galaxy

Seyfert galaxies are a class of spiral galaxies with very bright, compact nuclei. They are named for Dr. Carl K. Seyfert, who first catalogued some of them in the 1940's.

Interest in Seyferts was fairly marginal until the discovery of quasars in the last decade. Quasars look like stars on a photographic plate, but the energy output of a quasar is like that of a galaxy. For this reason astronomers suspect an evolutionary connection between quasars and galaxies. If one assumes that quasars represent an early stage in galactic development, then the Seyferts with their compact bright nuclei are a plausible intermediate link between the compact, bright quasars and the older developed galaxies with their more extended, less bright nuclei.

An important question in such theorizing is exactly how big a representative Seyfert nucleus is, and what goes on in it. A good answer to the question of size demands an image with sharper definition than a ground-based telescope can get. Such a view, of the Seyfert galaxy NGC 4151, which is about 30 million light years from the earth, has been provided by the March 26-27 flight of Stratoscope II (SN: 4/4, p. 343).

That instrument is a 36-inch telescope lifted by a balloon to altitudes around 80,000 feet, where it is above most of the atmosphere that distorts the images in ground-based telescopes. The Stratoscope project is funded by the National Science Foundation and the National Aeronautics and Space Administration and is directed by Drs. Martin Schwarzschild and Robert E. Danielson of Princeton University.

From the view of NGC 4151 obtained on the latest flight, Dr. Schwarzschild concludes that the nucleus of NGC 4151 is no more than 12 light years across. Before Stratoscope the estimate had been 70 light years.

"From earlier observations made at Palomar Observatory," Dr. Schwarzschild says, "one can argue that this same nucleus contains about 10 billion stars." So many stars confined in so small a space and moving at velocities averaging about 1,000 miles a second mean a high probability of stellar collisions. Dr. Schwarzschild estimates one stellar collision in four months in the Seyfert nucleus, compared to one in millions of years in a diffuse galactic neighborhood such as the earth inhabits.

Stellar collisions at these velocities will heat the colliding matter and produce light of the sort seen in Seyferts. If the diameter of the Seyfert nucleus is 12 light years, says Dr. Schwarzschild, stellar collisions would not account for all the observed brightness. But the nucleus may be smaller than that maximum; if it is, the collisions could account for all the bright light.

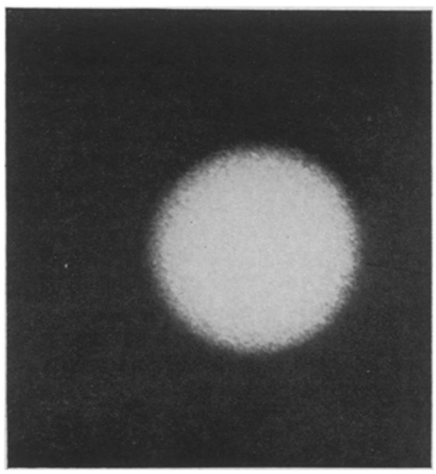
Dr. Schwarzschild suggests that the Seyfert nuclei may be weak quasars, and that the quasars themselves get their brightness from a similar process of stellar collision.

There is a mote in the eye of this model. Quasars and Seyfert galaxies produce radio and other radiation from mechanisms other than heating. Exactly how this nonthermal radiation fits into the picture is, at the moment, not clear.

In addition to galactic nuclei there are three other classes of objects of which astronomers have an urgent need for sharp images: planets, very bright nebulosities and double stars. These are the main objects of observation for Stratoscope II.

On March 26 and 27 none of the nebulosities nor double stars were well positioned for observation, so the flight concentrated on NGC 4151 and the planets Jupiter and Uranus.

The photographs of Jupiter were taken when the telescope was still cooling to its equilibrium temperature. Image restoration is therefore more complicated and Dr. Danielson is not yet sure how successful it was.



NSF

Uranus: The dark edges will tell.

The view of Uranus, however, came out with five times the resolution normally obtained by ground-based astronomy, and will be further enhanced by combining several images in a computer. The main question to be answered, says Dr. Danielson, is whether the planet has a clear or cloudy atmosphere. In interpreting spectra of the planet it is important to know the structure of the atmosphere the light comes through. Dr. Danielson wants to determine this from the darkening at the edges of the planet's disk. □

SCIENCE NEWSBRIEFS

SST wins one

Despite heavy flak, the supersonic transport limped through the House of Representatives, 176 to 163, last week. Withstanding attacks against its sonic boom, airport noise and environmental damage (SN: 5/23, p. 501), the controversial effort received $290 million for construction of two prototypes. The next step is Senate hearings, which should begin this summer. Based on the close House vote, SST opponents are confident of defeating the appropriations bill when it reaches the Senate. Says one, "We'll cream it." □

Soyuz launched

Last week the Soviet Union announced that it would leave major explorations of the moon to the United States and concentrate its energies on building large space stations in orbit around the earth. The announcement was made by Soviet cosmonaut Alexei Yeliseyev, a veteran of the Soyuz spacecraft series, who participated in the experimental building of a space station in orbit last year (SN: 10/18, p. 347).

This week, to prove their point, the Soviets sent Soyuz 9 with two cosmonauts into earth orbit for "scientific observations and photography of various geological features of the earth for the benefit of national economy," according to the Soviet news agency Tass. In addition, Soyuz 9 will conduct research on the influence of space flight on human organisms in near-earth orbit. □

Shrimp vs. starfish

Mated pairs of a rare shrimp, *Hymenocera elegans*, attack starfish and suck out their inner tissues. Some scientists regard the crown of thorns, which has been proliferating from the Red Sea to Hawaii (SN: 5/30, p. 525), as a serious menace to coral reefs; the shrimp has been proposed as a means of dealing with the starfish.

Dr. Irenaeus Eibl-Eibesfeldt of the Max-Planck-Institut für Verhaltensphysiologie has arrived in Australia to experiment with the possibility of using the shrimp to control the starfish on Australia's Great Barrier Reef. Dr. Eibl-Eibesfeldt, in his laboratory, has matched elegans against crowns, which lost.

The shrimp occur naturally on the reef, but are now very rare.

Extensive ecological studies will have to be done before any large-scale attempts are made to use the shrimp against the starfish. This is because of the possibility of uncontrolled shrimp proliferation. □