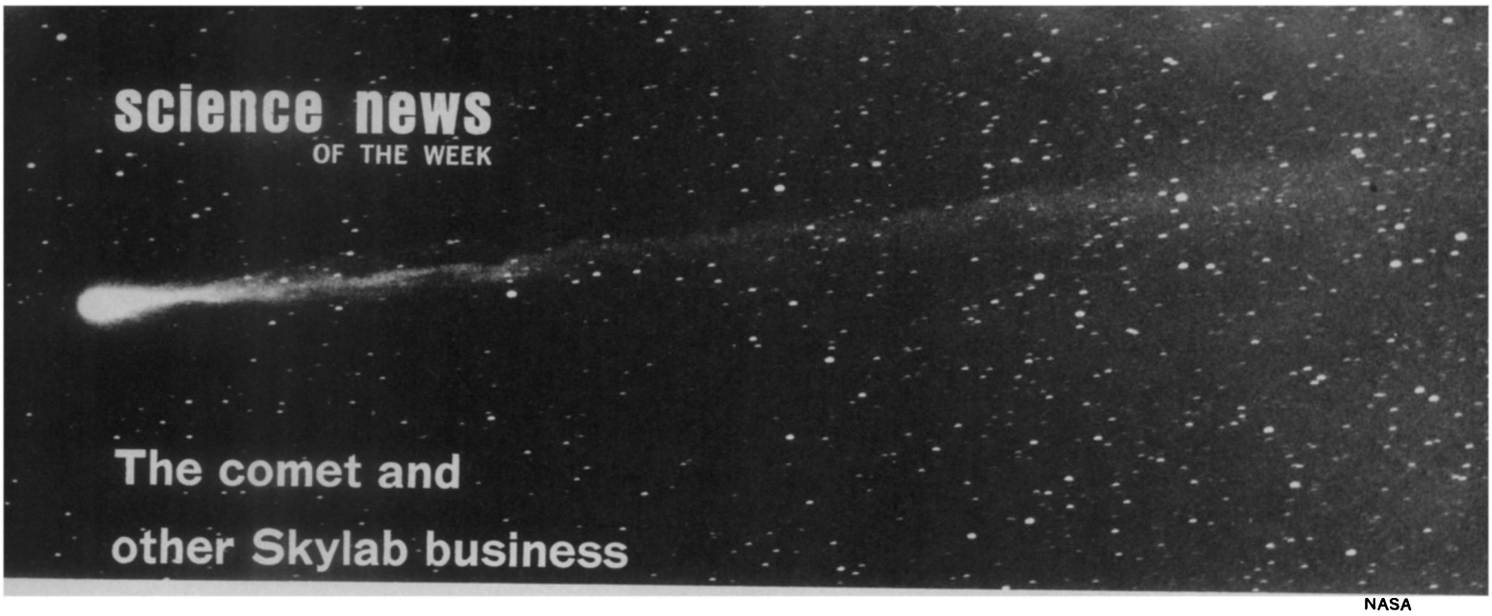

The comet and other Skylab business

NASA

The astronauts got a comet for Christmas. Skylab 3 crewmen Gerald Carr and William Pogue spent almost seven hours outside their 118-foot space station on Christmas Day, changing film packs, retrieving samples and photographing the much heralded comet Kohoutek. Ironically, though its orbital viewpoint enables Skylab to make extreme ultraviolet and other measurements that are difficult or impossible from earth, the spacewalkers could not see the comet because of its nearness to the sun.

Also, the Christmas comet has not been shaping up as the super spectacular of the skies that was predicted and hoped for. It is, however, the first to be examined with such an arsenal of sophisticated instruments. "It may be a disappointment to the general public," says Sdenek Sekanina of the Smithsonian Astrophysical Observatory, "but . . . this comet is still going to be number one as far as scientific results are concerned."

The most valuable data, such as the really high resolution photos, will not be available to scientists until the astronauts return to earth. Television pictures transmitted to the ground, however, have shown the comet to be about as bright as Venus—magnitude minus four—with a visible tail that appears on TV monitors to be about 300,000 miles long.

In addition, Skylab is being aided and abetted by hordes of ground-based observers intently studying the comet with their own techniques. One of their findings, says Stephen Maran, head of NASA's Operation Kohoutek, is the presence in the comet's head of a complex molecule called methyl cyanide, formerly known only in the centers of galaxies where the stars themselves are being formed. This could suggest that comets are formed in interstellar space rather than among the planets, or perhaps that interplanetary space bears a closer resemblance than has been believed to the depths of space beyond. "The significance of the molecule," says Ernest Hildner of the High Altitude Observatory in Boulder, Colo., "will be debated for some time to come."

On Dec. 28, the comet passed at its closest distance to the sun, about 13.2 million miles, and headed around toward its rendezvous with earth. On the same day, the astronauts got to talk with the comet's discoverer, Czech astronomer Lubos Kohoutek himself. The comet should pass within about 75 million miles of the earth on Jan. 5.

Kohoutek has only been a fraction of Skylab's business, however. The sun-watching telescopes at the end of the space station have given physicist-astronaut Edward Gibson a dream view of spectacular solar activity, including man's best view of the largest sunspot of 1973 as well as of a titanic solar flare described by astronomers as the biggest since 1946.

Some of Skylab's work has been made considerably more difficult by the failure of one of the three main control gyroscopes (SN: 12/1/73, p. 344) which makes maneuvering the 100-ton station (it has all its inertia even without its weight) both tricky and fuel consuming. Lately a second gyro has been showing slight, brief slowdowns, one of which posed piloting difficulties for Gibson during the Christmas spacewalk. Some of the experiments, such as an X-ray scan of Cygnus X-1, have been delayed by the gyro problems because of their need for reorienting the station.

There have been a host of other problems—both malfunctions and human errors—in the course of the flight, although many of them are only minor. One of the less minor ones was Pogue's failure to put the proper filters on the multi-spectral cameras of Skylab's Earth Resources Experiments Package. Nine of the 18 earth resources photo runs to date were originally thought to have been rendered about 80 percent useless, although engineers have been developing a "workaround" technique that they say ought to save most of the data by altering the film processing. Geothermal steam sites, mineral deposits and forest fires are among the subjects to be salvaged.

Besides the three human astronauts, there are about 1,000 gypsy moth eggs aboard Skylab, sent along by the Department of Agriculture in hopes that weightlessness might somehow shorten the insects' diapause, or hibernation period, so that scientists can raise more generations of them to sterilize and release in hopes of combating the forest pest. About a dozen of the eggs have hatched after only six weeks in space—normal diapause is six months—and although the number is far too small to be significant, the researchers are excited, since their search for other methods on earth has been in vain.

The astronauts seem to have adapted to their weightless environment with no residual problems. In fact, relieved of the constant downward pull of gravity, they seem actually to have grown with height increases as great as 1.75 inches. This probably happened on previous flights, too, according to Johnson Space Center physicians, but Skylab 3 is the first mission to include continuing, complete body measurements. The stretching should disappear back on earth, as gravity again takes its inexorable toll on the crew.

Despite the faltering second gyro, officials now seem to feel, after some admittedly uncertain days, that the mission is likely to last out most, if not all, of its maximum 84 days. With Kohoutek nearing the earth, with the northern hemisphere's winter putting new light on its natural resources, and with several experiments to be completed due to early delays, there are still busy weeks ahead for Skylab. □

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