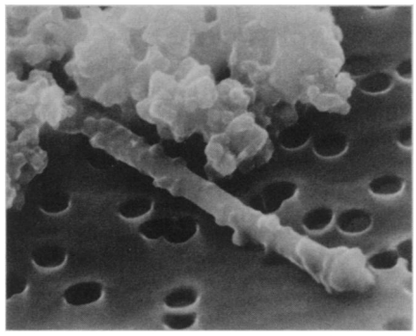
Crystal whiskers of interplanetary dust

Crystals that formed when primordial gas condensed into solid particles that were the solar system's building blocks may have been observed high in earth's atmosphere. Researchers believe this to be the first evidence of unaltered primitive material from the solar system's beginnings because the particles have unusual crystal forms — rods, ribbons and platelets — that have not been observed on earth.

J. P. Bradley and D. E. Brownlee of the University of Washington's astronomy department and D. R. Veblen of the Johns Hopkins University report in the Feb. 10 NATURE on grains of enstatite ($MgSiO_3$) that were found in micrometeorites gathered from the stratosphere. They are particles of class CP, chondritic porous, a type rarely found on earth because its porosity, fragility and micron scale cannot resist the heat of atmospheric entry. The investigators caught these particles by exposing silicone oil-coated plates to the air during a series of NASA U-2 research flights that began in 1976.

Although the mineral enstatite, or pyroxene, is common on earth, in various crystalline shapes, it has never been observed on earth or in lunar samples to form as rods and ribbons (whiskers), or platelets. This, along with internal microstructures in the crystals, leads Bradley to say, "There is no doubt that [the particles] are extraterrestrial. ... These particles have to be least as old as the origin of the solar system. There is strong evidence that they were formed by direct gas-to-particle condensation."



Bradley et al./Nature

Scanning electron micrograph of enstatite ($MgSiO_3$) rod (about 5 microns in length) within an interplanetary dust particle.

Bradley and his co-workers are excited about these findings because, he says, "it was predicted 20 years ago that if gaseous condensates can occur, they would manifest themselves in these forms," as whiskers and platelets. In their paper, they carefully refute the possibility that these crystalline forms can grow under terrestrial conditions and conclude that the most consistent hypothesis is that "the enstatite formed by primary condensation from a nebular gas cloud." The grains may have reached earth as part of a passing comet, but "we have no way of proving that right now," says Brownlee. The discovery's importance lies in what it may tell planetary astronomers about conditions during the solar system's origin.

Bradley is optimistic they will find more unusual condensates of other mineral compositions. He has begun examining other mineral phases and has already found other anomalous crystalline forms. "I have the feeling the enstatite whiskers were just the tip of the iceberg," he says. —*A. Chen*

Honoring the heart of an invention

Robert K. Jarvik, developer of the artificial heart that was the first to be permanently implanted in a human, found it "a little bit amusing" to be named "Inventor of the Year." At a news conference in Washington, D.C., this week, sponsored by Intellectual Property Owners, Inc., a trade association of patent holders that awards the honor annually, Jarvik pointed out that he holds no patents on the Jarvik-7 heart, now beating in the chest of Barney B. Clark at the University of Utah Medical Center (SN: 12/11/82, p. 372).

Jarvik explained that the artificial heart was not a "one-person invention." He acknowledged that many inventors and steady improvements in technology contributed to the 25-year development effort. "You have to take the time to refine this technology gradually, or it won't work at all," Jarvik said. "One reason this heart does work is that we didn't make radical changes." Jarvik developed the heart's multilayer internal diaphragm.

Future refinements are likely to be patented, Jarvik said. One is a battery-driven, portable heart driver to replace the cumbersome, compressed-air unit now required. The portable system, invented by a German researcher working with the Utah team, will weigh about 8½ pounds with an 8- to 10-hour battery life and will fit within a case about the size of a camera bag.

The valve failure in Clark's artificial heart (SN: 12/18 & 25/82, p. 388) and earlier failures during animal tests have led to a stronger valve design for future models, Jarvik said. The Utah team is now working to turn the Jarvik-7 heart, essentially a handcrafted, laboratory device, into a less expensive, high-quality, manufactured product. Jarvik predicted that the artificial heart could be widely available within 5 to 10 years, at a cost of, perhaps, $20,000.

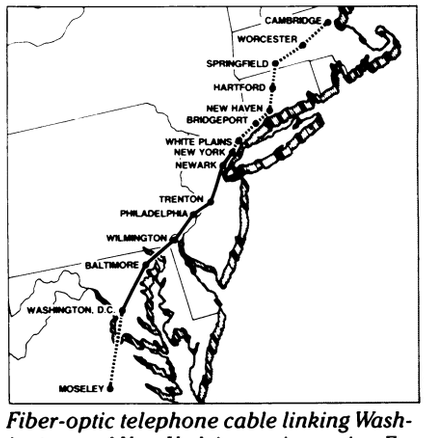
Meanwhile, the Food and Drug Administration has approved implantation of six more of the original Jarvik-7 models. Clark's condition, on his 75th day of living with an artificial heart, was upgraded from "serious but stable" to "fair," but he remains in intensive care because of lung and kidney problems. —*I. Peterson*

Light conversations New York to D.C.

The use of light pulses carried by glass fibers in place of wire-carried electrical signals in telephonic transmissions has grown very rapidly from small experimental beginnings only a few years ago (SN: 5/30/81, p. 346). On Feb. 10 the American Telephone and Telegraph Co. put into service a fiber-optic telephone link between New York and Washington, D.C. They claim that this is the first such link between major metropolitan centers and the largest in terms of information transmission capacity.

There are 372 route miles between New York and Washington and 30,000 miles of fiber. Within a year or so, extensions to Moseley, Va. (a suburb of Richmond), and Cambridge, Mass., are expected to be in operation. Capacity of the line now in service varies from 40,000 to 80,000 simultaneous conversations in different parts of the route. In the beginning it will carry about 5,000 conversations and gradually take up the growth in service over the next few years. The first part of a system linking the major cities of California from Sacramento to San Diego is expected to go into service later this month. By 1985, 900 additional route miles are in prospect.

Fiber-optic communication was made possible by the development, at the beginning of the last decade, of glass fibers pure enough to transmit the light acceptably and tiny semiconductor lasers to serve as sources of the signal. Fiber-optic signals are digital, not analog as in traditional electronic telephony. The signal does not mimic the shape of a vocal signal (analog); it is a series of light pulses representing a code into which the vocal signal has been analyzed. This should not make a perceptible difference for talkers, but it does make it easier for computers to communicate with other computers. Those transmissions should go faster and with much lower error rates than at present. —*D.E. Thomsen*



AT&T

Fiber-optic telephone cable linking Washington and New York is now in service. Extensions to Virginia and Massachusetts are expected to operate by Jan. 1, 1984.