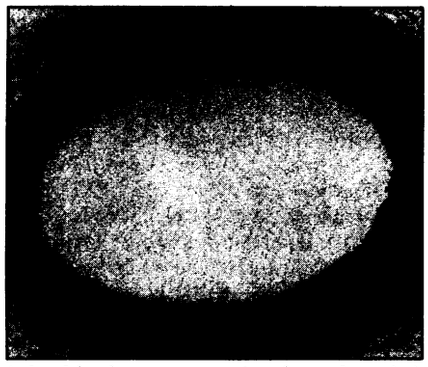
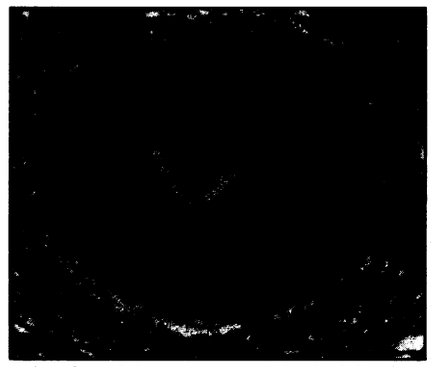


A healthy heart artery (no fatty deposits).



A hardened heart artery (blocked by fats).

National Institutes of Health

arteries.

Wissler and his team fed 25 monkeys radioactively labeled, high-cholesterol diets for a year. Five of the monkeys were then autopsied to establish that the diet had truly triggered atherosclerosis and to establish the extent and location of atherosclerotic plaques in coronary arteries. The remaining monkeys were divided into four groups. One group continued for another year on the high-fat, high-cholesterol diet; one was treated with a low-fat, cholesterol-free diet; one with the low-fat, low-cholesterol diet plus cholestyramine, and one with the high-fat, high-cholesterol diet plus cholestyramine. All of these animals were then autopsied.

The results indicated that the drug could reduce cholesterol in the blood by 20 to 25 percent, more than drugs already on the market can achieve (5 to 15 percent). More crucial, the results showed that the drug could actually reverse atherosclerosis—evidence that has been weak for other cholesterol-lowering drugs on the market, at least in primates. Specifically, there was a five-sixth reduction in plaques in animals fed the low-cholesterol diet and the drug, substantial, but lesser, reduction in those monkeys given the low-cholesterol diet but no drug, and even some reduction in the plaques of animals given the drug with the disease-producing diet.

"I think cholestyramine is the most effective drug now available [for] lowering serum cholesterol," Wissler concludes. "It's logical that it would be safer because it isn't absorbed by the body."

Basil M. Rifkind of the National Heart and Lung Institute is also enthusiastic about cholestyramine. Three years ago, Wissler and his co-workers used high-cholesterol diets to induce artherosclerosis in primates, then made the atherosclerosis regress by putting the animals back on a normal diet. "This was the first evidence from primates that we could reverse atherosclerosis," Rifkind told SCIENCE NEWS. "Now we are getting more evidence that we can do it not only with diet, but with a drug."

Rifkind is now setting up a study to see whether cholestyramine can reverse atherosclerosis in people. He is in the final stages of recruiting some 3,500 men, all of whom have a pattern of high cholesterol and other blood fats that put them in a high-risk category for heart attacks.

Still another important question is whether cholestyramine can reverse old, calcified arterial plaques as well as ones produced over a relatively short time by a severe diet. Wissler and his colleagues are now tackling this problem. □

Seedlings in search of the dark

Two biologists studying insects and banana trees in the Costa Rican jungle have discovered a phenomenon that some dirt farmers claim is common knowledge.

"Hell, my daddy has known that for years," one Florida farmer told biologist Donald R. Strong Jr. "We call it beans chasing poles." Strong calls it "skototropism," growth toward darkness. But regardless of who found it first, it is an important and previously undescribed adaptation that helps climbing vines find host trees.

Strong, an insect ecologist, and his student Thomas S. Ray Jr. from Florida State University in Tallahassee report skototropism in the Nov. 21 SCIENCE. They discovered it while walking through the tropical rain forest toward their banana patch to study insect infestations. For two days, Strong says, he walked by a *Carapa* tree and noticed a tangle of vine seedlings converging on the dark trunk from the surrounding leaf litter. For two nights, he thought about this siege-in-slow-motion, and finally, together, Strong and Ray came up with a theory: Rather than growing toward light, the climbing vine seedlings might actually be growing toward the darkness (the tree trunk). This adaptation, if true, would help young plants find a host on which to start their slow ascent toward the lighter forest canopy.

Strong and Ray conducted a number of experiments with *Monstera gigantea* seedlings to see whether the philodendron-like vines grow *toward* the dark or *away from* the light. They found that the seedlings will turn and grow toward a dark object, regardless of its relationship to the brightest sector of the horizon and that the object's silhouette must fill more than a few degrees of that horizon. The skoStrong says, "skototropism is not an odd curiosity. We don't appreciate it in the temperate regions, but vines are an extremely important life form, comprising a substantial portion of the biomass of the tropical forest. Skototropism is probably a fairly common phenomenon, he says, and any climbing vine would be a reasontotropic response ceases, they found, when a seedling finds the object, and it is replaced by positive phototropism, movement toward the light.

"Although it might seem like it," able test of the theory. What about pole beans, SCIENCE NEWS wondered? It seems as if they would exhibit skototropism, too, but this is unknown, Strong says. Ray, now an undergraduate, would like to find out and switch the answer from "common knowledge" to science during his graduate work. □

Ozone from orbit: A lowdown look

The latest device to probe the uncertain state of the atmosphere's ozone layer was launched Nov. 19 as part of the fifth Atmosphere Explorer satellite, AE-E. Called a backscatter ultraviolet spectrometer, it will make direct measurements of ozone concentrations, from an orbit that can be altered to bring it to within 130 kilometers of the earth.

The satellite follows only six weeks behind its predecessor, AE-D (SN: 10/18/75, p. 245), which carries a sensor to measure nitric oxide, believed to be a significant factor in atmospheric ozone balance. Although AE-D is in a polar orbit and AE-E is in a near-equatorial one (ranging from 20°N to 20°S), the places where the orbits cross will enable scientists to compare ozone and nitric-oxide measurements from the same regions.

This will not be the first time that ozone data have been gathered from orbit. The Nimbus 4 satellite has been doing just that (from much higher altitudes) with the same kind of sensor ever since it was launched in 1970. The AE-E probe's sensor, in fact, was originally a spare from the Nimbus program. Early this year, with Nimbus long in orbit, the sensor was being modified for use in balloon-borne measurements when researchers at the National Aeronautics and Space Administration's Goddard Space Flight Center suddenly decided that it could be better used in the low-orbit AE-E.

"In 1970," says Donald Heath of Goddard, the principal AE-E ozone investigator, "we knew ozone measurement was necessary, but until scientists began to become alarmed about the possible depletion of the ozone layer some 22 to 25 kilometers above us, we were not aware of the critical necessity to understand what is happening there." In what, by the murky calendars of high-technology man-

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agement, amounts to a crash program, a go-ahead was hustled out of NASA headquarters, the sensor was sent back to the manufacturer for modification of the modifications and Goddard engineers scurried to reshuffle the satellite's existing instrument load to accommodate the additional black box. Fortunately, the main structure of AE-E had been designed in response to a 1967 NASA study calling for a flexible framework adaptable to a variety of payloads. When, after two months, the realtered sensor was delivered to Goddard, says project manager David W. Grimes, "it took us only eight hours to do the integration"—an assembly-and-checkout procedure that has been known to take weeks.

The sensor works by comparing the solar ultraviolet radiation reflected from the ozone layer with that arriving directly from the sun. The more ozone, the more radiation is absorbed. The less ozone, in other words, the "brighter" the atmosphere. To enable its lowest-altitude measurements, the satellite carries a rocket motor which can be fired to reduce its perigee (closest point to earth) for several orbits, then fired again to raise it before atmospheric drag becomes fatal. □

A vidicon eye on the infrared

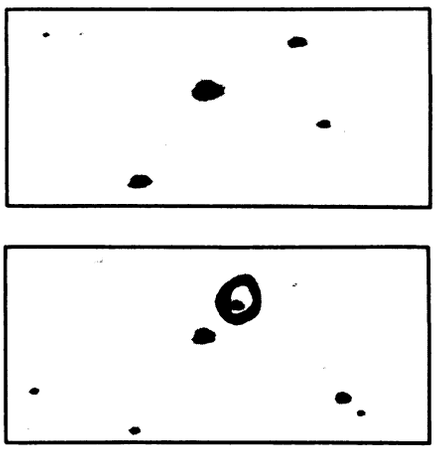
The infrared is a range of the electromagnetic spectrum in which there is a lot of astrophysical action. It is produced by objects that are cooler than those that emit visible light (hundreds of degrees Kelvin rather than thousands), and thus it is the characteristic emission of stars at their birth and in their infancy and sometimes as they die. Infrared is especially important in cosmology because observations in that range may reveal enough cool "hidden" matter to end the long debate over whether the universe is open or closed.

Most infrared does not imprint on photographic film, and all of it is invisible to the human eye. Therefore many astronomers, optical scientists and engineers are at work on ways to record it. One such device, a special kind of vidicon tube, has recently been completed by two astrophysicists from the Los Alamos Scientific Laboratory, Brook Sandford and Charles Gow, and an electro-optical engineer from the Los Alamos Branch of EG&G, Jack Jekowski. It has already found at least one thing astronomers didn't know was there.

The celestial emanations are first received by a special infrared-sensitive television-camera tube, which is called an intensified silicon-intensified (I-SIT) vidicon. Produced for Los Alamos by RCA, it is the only one of its kind in existence. It is sensitive to images in the near infrared, beyond the range of the eye and photographic film. It is coupled to an infrared image-intensifier tube which uses electronic means to increase the brightness of faint images.

Time exposures obtained with this combination are recorded on videotape. The tape is processed through a special editing system developed by EG&G that enhances the definition in the pictures by putting together as many as 600 separate frames. The tones of the enhanced image are then converted to digital pulses on a magnetic tape, and that is processed by CDC 7600 computers to produce sharp black-and-white prints.

Sandford is especially interested in using the device to look for optically invisible haloes around galaxies that those astronomers who postulate a closed universe hope are there. "The most probable candidates for halo mass objects are cool, dwarf stars," he says. "These radiate chiefly at 1 micron in the near infrared and would be undetectable on the blue photographic plates traditionally used to study galaxy structure."

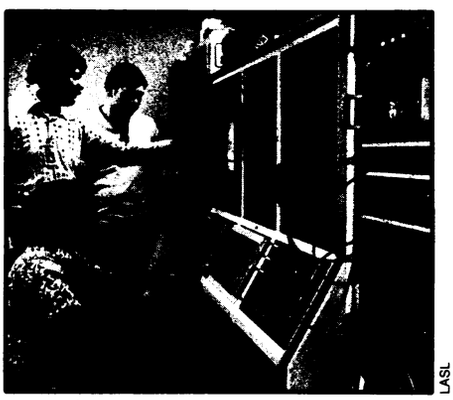


Infrared star in Cygnus (circled) does not show up in an ordinary red-light photo.

So far the group has not found any galactic haloes. They have been looking closer to home, within the dust and hydrogen clouds of our own galaxy and other likely places for young cool stars.

To calibrate the equipment they used the U.S. Naval Observatory's 40-inch telescope at Flagstaff, Ariz., and resurveyed some areas of the northern sky that the California Institute of Technology surveyed in the two-micron infrared range in 1966. In so doing they found two truly infrared stars. Both objects had been seen in the Caltech survey, but one of them had been identified with a faint visible red star. The present observers see no visible star in that location, and they believe the object is an infrared-only star. Seven other Caltech identifications were confirmed. The survey also took pictures of the Orion nebula in the infrared light emitted by its helium gas.

Soon the group hopes to get time on the 82-inch telescope at the University of Texas's McDonald Observatory at Fort Davis, Tex., to improve the Orion observations. Later, if as they hope, they can book time on other large telescopes, they will try other regions where stars may be forming: nebulas like Orion, the ionized hydrogen clouds and the Herbig-Haro objects, small regions emitting radiation characteristic of hydrogen and sulfur gases and metal vapors. Then they hope to go on to look for the haloes around the galaxies that may be enough to close the universe. □



LASL

Los Alamos group at computer console.

Nebuchadnezzar's arrow

Archaeologists from Hebrew University in Jerusalem have discovered a layer of ashes and charred wood on the earthen floor of an ancient watchtower in the Jewish Quarter of the old city that may be the remains of a structure destroyed during Nebuchadnezzar's invasion in 586 B.C. Among the ashes were found several arrowheads, at least one of which appears to be foreign, a kind used by Babylonian mercenaries.

The discovery was made during excavation of the "First Wall" of Jerusalem, dating from the Israelite Kingdom, which was described by the ancient Jewish historian Josephus Flavius, but whose existence was doubted by most archaeologists until the current dig was begun. In announcing the finds, the university called remains of the old wall "among the most significant historical monuments discovered so far in Jerusalem." The chief archaeologist at the excavations, Nahman Avigad, told newsmen that discovery of the ashes and arrowheads constitutes the first direct evidence of Nebuchadnezzar's siege. (Remains of buildings presumably destroyed by the Babylonians have been known for some time, however, largely as a result of work by British archaeologist Kathleen Kenyon.)

The watchtower lies to the west and up a hill from Temple Mount, in an area most historians believed was not enclosed by the city wall until the second century B.C. At that time, the Hasmonean kings (descendants of Judas Maccabeus) were busy expanding their empire and fortifying their