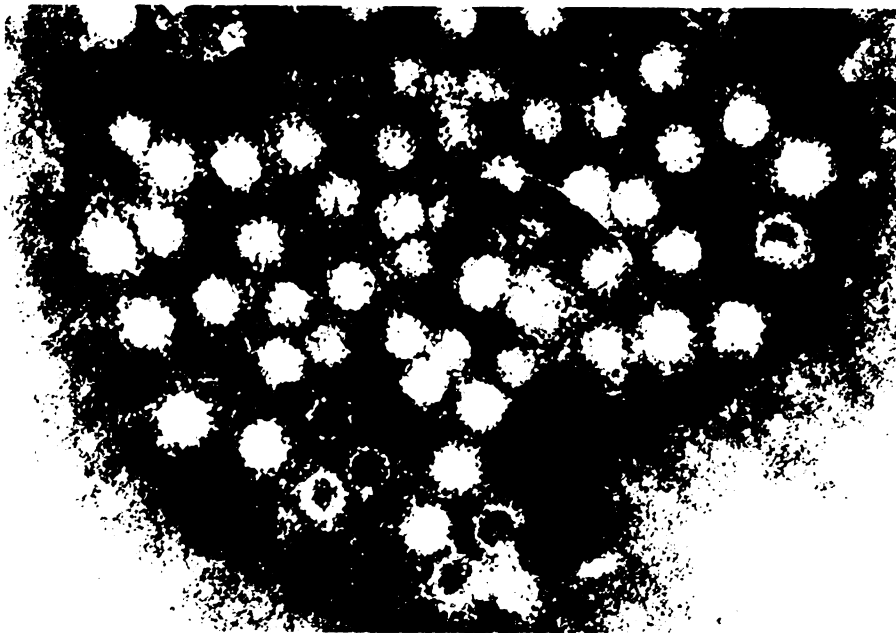


## Visualization of infectious hepatitis virus



NIH  
*Virus-like particles (magnified 225,000 times) from patient with hepatitis A.*

Infectious hepatitis is a disease that causes inflammation of the liver. It is accompanied by fever, nausea, fatigue and jaundice and can lead to many weeks of debilitating illness. It afflicts at least 50,000 Americans each year.

Infectious hepatitis, or hepatitis A—as opposed to blood hepatitis, or hepatitis B—is usually spread by direct contact or by contaminated drinking water or food. Thus, there are frequently large community-wide outbreaks. Scientists have long suspected that infectious hepatitis is caused by a virus, and have shown that the disease can be transmitted experimentally to volunteers, but efforts by many investigators to isolate causative agents in cell cultures have failed. Now a team of investigators at the National Institute of Allergy and Infectious Diseases reports in the Dec. 7 *SCIENCE* that they have visualized, for the first time, the virus that causes infectious hepatitis.

Since Stephen M. Feinstone, Albert Z. Kapikian and Robert H. Purcell knew that the stools of patients with hepatitis A are infectious for about two

weeks before and two weeks after onset of clinical symptoms, they decided to examine stool specimens from hepatitis A patients using immune electron microscopy. Kapikian had previously used this method for detecting, in a stool filtrate, the "Norwalk" agent, which is similar to the hepatitis A virus. The Norwalk agent was found to be associated with a form of acute infectious nonbacterial gastroenteritis—intestinal flu—in humans.

The immune electron microscopy method involves the use of blood from convalescent patients that usually contains an antibody specific for a causative organism. This antibody, when mixed with infective material, coats the infecting particles and makes them appear in groups or as readily recognizable individual units. The procedure enables the recognition—not possible by conventional electron microscopic examination—of a very small virus that may be present in small numbers.

In their initial experiment, the NIAID team examined stool filtrates that had been obtained from four adult volun-

teers before and after they were infected with hepatitis A. The scientists found small, virus-like particles in two of the four acute illness specimens after incubation with blood from a convalescent hepatitis A patient.

Using the stool filtrates derived from one of the acute phase specimens that had detectable particles, the scientists examined several groups of blood for an antibody to this virus-like antigen. They found an antibody to the antigen in all blood from six volunteer study patients. None of the volunteers showed evidence of an antibody prior to infection. In addition, the researchers found blood evidence of infection with the virus-like particle in six patients who had naturally acquired infectious hepatitis.

(In other experiments, the investigators were not able to detect a relationship between the hepatitis A virus and the hepatitis B virus.)

So the NIAID investigators conclude that their data strongly suggest that the observed small virus-like particle is the causative agent of hepatitis A. Electron microscopic identification of the virus should aid in attempts to isolate the virus in cell culture. More immediately, it should provide a means of detecting antibodies to the virus, and thus of diagnosing hepatitis A. □

## A giant step for robotkind

Soviet scientists at the Leningrad Institute of Aviation Instrument-Making have produced a remote-controlled, six-legged robot with a laser eye for use on the moon. The flexible legs enable the robot to travel up to four miles an hour over lunar surfaces and the laser eye enables directional information to be sent back to the robot's control device on earth.

Tass news agency reports that the "spider" can travel "across hollows, over stones and fallen trees and can also climb slopes as well as walk along narrow corridors and stairways with frequent sharp turns. In the opinion of the designers," the report adds, "such a robot can carry small loads inside a building and can be used in geological expeditions, even walking on the seabed and the surface of other planets."

This is not the first remote-controlled machine the Soviets have used for planetary exploration. In the past, they have landed three Lunokhods (robots on eight wheels) on the moon. The "spider's" advantages over past Soviet robots are improved mobility and communications with earth.

The Soviets did not indicate whether they intend to land their new invention on the moon in the near future. □

## Correction: wood vs oil

As several readers pointed out, the figures *SCIENCE NEWS* received from the Environmental Protection Agency concerning the relative heating worth of wood and oil were incorrect (SN: 11/3/73, p. 285). The correct figures are: One thousand gallons of oil contains roughly 147.5 million BTU's while a cord of wood has only 26.3 million BTU's. Comparing prices on a heat unit basis, then (at Washington, D. C., prices of \$257 per 1,000 gallons of oil; \$50 per cord of wood) the cost of a million BTU's from oil is \$1.75 while from wood it is \$1.90. On this same basis, the pollution figures give wood the edge only in sulfur oxides: Two percent sulfur oil gives up 192 pounds of SO<sub>2</sub> per hundred million BTU's while wood gives up a maximum of 19 pounds. Wood gives off 7.7 times the nitrogen oxide as a quantity of oil with the same heat value, and 23 times the weight of particulates. But, as other readers mentioned, burning conditions can change those results either way.

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