in use in the world; about two-thirds of those are in the United States.

Only two U.S. manufacturers, Cray Research Inc. and Control Data Corp., build these high-speed computers and account for nearly all worldwide sales. However, last year two Japanese companies, Hitachi Ltd. and Fujitsu Ltd., announced that by early 1984 they will be able to deliver machines that do as many as six times the 100 million calculations per second performed by a Cray 1 model. At the same time, the Japanese government started a national supercomputer project to develop a machine a thousand times faster than current machines.

Early this year, a National Science Foundation report on "Large Scale Computing in Science and Engineering" noted that "the capacity of today's supercomputers is several orders of magnitude too small for problems of current urgency in science, engineering and technology." In addition, "important segments of the research and defense communities lack effective access to supercomputers," the study stated.

"U.S. leadership in supercomputing is crucial for the advancement of science and technology, and therefore, for economic and national security," the report warned. "Under current conditions there is little likelihood that the U.S. will lead in the development and application of this new generation of machines."

Last week's White House initiative is a belated attempt to organize federal supercomputer efforts. One group will examine ways in which the government's own needs for supercomputers can be used to encourage their continued development by existing manufacturers. A second group is studying ways to make supercomputers more widely available to qualified U.S. researchers. Both groups are led by personnel from the Department of Energy's Office of Energy Research. A third group, under the Defense Advanced Research Projects Agency (DARPA), will lead efforts to stimulate the exchange of information on research being supported by the various agencies in supercomputer-related fields.

The White House proposal, however, is strictly organizational. The administration is not allocating additional funds for these efforts. Nevertheless, DARPA has asked for an additional $50 million for the coming fiscal year "to develop the new generation of supercomputers" with enhanced defense system capabilities.

George A. Keyworth II, presidential science adviser, said, "Our national interests require that we maintain a dependable domestic capability to meet our needs. We can't permit foreign manufacturers, whose development costs may be heavily subsidized by their governments, to jeopardize that capability." —*I. Peterson*

Denying visas to stop technology export

The State Department announced last week that it will deny or put limits on visas for foreigners suspected of wanting to visit the United States to steal sensitive technology. This new policy is part of the Reagan administration's effort to staunch the flow of advanced technology having potential military applications to Soviet bloc countries (SN: 4/2/83, p. 218).

William J. Schneider, under secretary of state for security assistance, science and technology, said the policy will cover not only Soviet and Eastern European visa applicants but also residents of allied countries who may be diverting sensitive information to the Soviet Union and its satellites. The State Department will make decisions on visas based on information, which identifies potential technology thieves, from intelligence sources and enforcement agencies like the Federal Bureau of Investigation and the U.S. Customs Service. Although the government already has the authority to deny visas, fear of technology theft is a new criterion for refusing applications.

In the case of scientists involved in scientific exchanges, State Department officials say that the new policy will affect only a fairly small range of cases involving technology that is already controlled for national security reasons under laws like the Export Administration Act. "It doesn't necessarily mean people are going to be automatically denied visas ... but it may lead to greater scrutiny of cases of this sort," says one official.

Under certain conditions, instead of denying visas, the government may grant visas with restrictions. In the past, these restrictions on a visitor's activities have been informal and "of a nonregulatory nature." The new policy expands that practice so that the restrictions on terms of entry into the United States can also be "formal and regulatory," when appropriate. A formal restriction amounts to listing specifically places like research institutions or commercial facilities where a visitor may not go or activities in which the visitor may not participate. The restrictions would be made known to the host institutions or organizations and to all of the relevant U.S. government agencies. Individuals violating their terms of entry could be detained or even deported.

Michael Marks, assistant to Schneider, says the policy decision was made after an extensive interagency review of technology export problems. "The legislation has not changed," Marks says. "There was a decision to use tools that were there that really hadn't been used that much before."

A National Science Foundation official comments that how the new policy affects science will depend on how it's implemented. The policy is already in effect. —*I. Peterson.*

Lubricating distressed lungs

A promising new treatment has been found for respiratory distress syndrome, which afflicts one out of every seven babies born prematurely in the United States and which kills some 9,000 newborns in the United States each year.

It consists of giving human lung surfactant — a lubricant naturally present in the lungs — in conjunction with delivery of oxygen and air under pressure into the windpipe, the conventional treatment for the syndrome. The new combination therapy appears to counter the syndrome better than the conventional one alone does and also appears to lessen the dangers of lung damage.

The treatment has been developed by T. Allen Merritt, Mikko Hallman and Louis Gluck of the University of California Medical Center in San Diego and by Charles G. Cochrane of the Scripps Medical Research Institute in La Jolla, Calif. They presented their findings last week at a meeting of the Society of Pediatric Research in Washington, D.C.

Normally a fetus's lungs start making human surfactant during the last several weeks it is in the womb. Then, after birth, the surfactant helps keep the tiny air sacs in the lungs from sticking together after each breath. But when a baby is born prematurely, it often has not yet produced enough of this substance, and respiratory distress syndrome can develop. Merritt and his team thought that if they could provide respiratory distress patients with supplements of human lung surfactant along with conventional therapy it might counter the disease even more than conventional therapy.

They knew that fetuses born at full term have already made not just enough of the material for their lungs but an excess, which is excreted into the amniotic fluid — the bag of waters surrounding the fetus in the womb. They reasoned that they might be able to extract enough human lung surfactant from the amniotic fluid of full-term newborns to treat newborns with respiratory distress.

They were able to harvest ample supplies of human lung surfactant from the amniotic fluid of full-term infants born by Caesarian section. They passed the harvested surfactant, along with oxygen and air, into the windpipes of nine newborns with respiratory distress and compared their outcome with that of 17 newborns with respiratory distress who got only oxygen and air. X-ray and blood analyses showed that within minutes after getting surfactant, treated infants breathed much better than control patients did. What's more, because treated patients breathed better, their need for oxygen therapy was considerably reduced, and thereby the danger of a side effect of oxy-

gen therapy — lung damage — was lessened.

These findings are of "great importance," attests Sumner J. Yaffe, director of the Center for Research for Mothers and Children within the National Institute of Child Health and Human Development in Bethesda, Md. He cautions, though, that the therapy will have to be studied in more patients before it can truly be said to be more effective and safer than conventional treatment alone. —*J. A. Treichel*

Joggers' fever may be immune response

During the past few years, several researchers have noted that people who jog regularly also exhibit symptoms similar to the "acute phase" immune response — a physiological reaction to infection that occurs in humans and other vertebrates and is characterized by fever, an increase in white blood cells, lowered blood plasma levels of zinc and iron, and heightened plasma levels of certain proteins. The perpetrator of the immune response is believed to be an "endogenous pyrogen," which is released by certain white blood cells in response to invading microorganisms. Researchers at the University of Michigan in Ann Arbor have now induced an immune response in rats by injecting them with blood from humans who had just exercised, indicating that this response can be caused by a substance produced during exercise.

According to their report in the May 6 SCIENCE, physiologists Joseph G. Cannon and Matthew J. Kluger injected rats with human plasma taken from subjects before and after exercise. The rats that received post-exercise plasma developed fever, depressed blood levels of iron and zinc, and other signs of the acute-phase immune response. Those rats receiving pre-exercise plasma showed no physiological changes. More specifically, only a certain fraction of the plasma — that containing mononuclear leukocytes, a type of white blood cell — caused the physiological changes associated with the immune response.

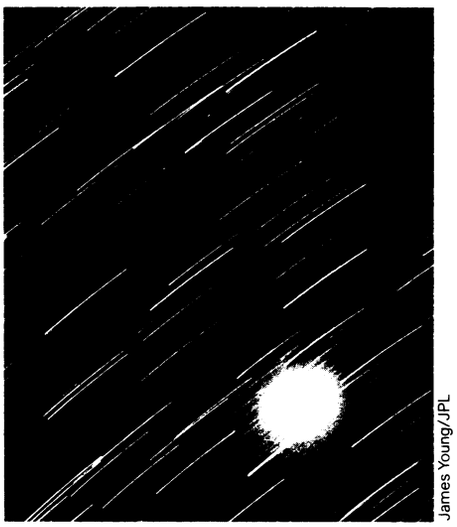
Although scientists are fairly certain that endogenous pyrogen causes the response, Cannon says, "nobody knows exactly what endogenous pyrogen is." Cannon and Kluger believe it is a small protein produced by the mononuclear leukocytes. But attempts to purify the substance have failed because, as Cannon explained, it takes only a "very tiny amount to cause a biological response," and isolation of such small quantities from blood serum is extremely difficult.

The next step, Cannon told SCIENCE NEWS, is to investigate why the body would have this type of response to exercise. "I don't know if it is important to anybody who runs," he says, "at least not yet." —*P. Taulbee*

Satellite and earthlings discover a comet

The first observer to see it coming was not a human being at all, but a device—the U.S./Dutch/British Infrared Astronomy Satellite (IRAS), in orbit around the earth. At first, in fact, the satellite's human mentors did not even realize what their device had found. It was a comet, which on May 11 passed closer to the earth than all but one other comet ever known before.

On April 25, while scanning the sky, IRAS detected something that it was able to identify only as a fast-moving object, a category in which most entries are asteroids. Two days later, observers in Kvistaberg, Sweden, alerted to the find, photographed it through earth-based telescopes and concluded from its fuzzy appearance that it was indeed a comet, the fourth to be discovered this year. On May 3, two very human observers—Genichi Araki of Japan and G. E. D. Alcock of Great Britain, both amateur astronomers and both unaware of the IRAS finding — independently made the same discovery, and reported it to the Central Bureau for Astronomical Telegrams in Cambridge, Mass. (which the IRAS team had neglected to do). As a result, all three discoverers are commemorated in the comet's name: IRAS-Araki-Alcock.



James Young/JPL

Newly discovered comet IRAS-Araki-Alcock shows tail, as photographed May 9 from Table Mountain Observatory in California.

On May 11, it passed within about 2.9 million miles of earth, a proximity bettered only by comet Lexell in 1770. Researchers this week were trying to take advantage of the close visit by attempting what might be only the second successful observation by radar of a cometary nucleus. —*J. Eberhart*

Genetic engineering yields prenatal test

Researchers at the Johns Hopkins University School of Medicine in Baltimore have developed a prenatal diagnostic test that utilizes genetic engineering techniques to detect hemoglobin abnormalities. The test, used to pinpoint diseases such as sickle cell anemia and beta thalassemia in developing fetuses, was 100 percent accurate and proved safer than most existing tests. It may someday be used to uncover other genetically transmitted diseases. The technique, developed by Corinne D. Boehm and colleagues, was reported in the May 5 NEW ENGLAND JOURNAL OF MEDICINE.

At present, the most useful application of this test is in the detection of beta-thalassemia — a recessive disease that causes severe anemia in 1,200 to 1,800 newborns each year. Using current methods, blood must be extracted directly from the fetus. This technique is risky, with complications leading to fetal death in three percent of those tested. And only a few medical centers perform the procedure. The new test, however, uses fetal cells taken through amniocentesis — a routine procedure in which the fluid that cushions the fetus in the womb is extracted. This procedure carries only a 0.5 percent risk to the fetus.

Restriction endonucleases, bacterial enzymes that cut DNA at specific sequences, are the probes used in this technique to locate certain genes—called DNA polymorphisms — that lie near the genes for hemoglobin. Except in extremely rare instances, the polymorphism and hemoglobin genes are inherited together. DNA polymorphisms occur when different, but normal, gene sequences are able to exist at a particular site on the chromosome. Fetuses from parents who possess a different gene sequence on each chromosome, and are thus heterozygous for the polymorphism, can be diagnosed in all cases.

The researchers use family studies to determine which polymorphisms are inherited along with the defective hemoglobin gene. By analyzing cells from the parents and comparing these to the fetal cells, they identify the fetal polymorphism type. If the fetal polymorphism type is the one inherited along with the defective hemoglobin gene, the child will be affected by the disease.

Although this indirect test can be used to detect sickle cell anemia, this disease can be detected directly by a similar method (SN: 7/10/82, p. 23). These methods hold promise for early detection of diseases such as phenylketonuria and Duchenne's muscular dystrophy. In order to develop these tests, Boehm says, "we'll need a probe that is specific for the defective gene, or located very close to the gene on that chromosome." —*P. Taulbee*