

the elusive killer, since it would be not only rapid and accurate but safe.

To test their hypothesis retrospectively, Broome and her team obtained sputum samples that had been collected from 21 Legionnaires' disease victims some months before and stored. They also procured sputum samples that had been taken from 47 control subjects some months before and stored in the same way. These subjects had had other kinds of bacterial pneumonia than Legionnaires' disease or other bacterial infections.

Sputum smears from both Legionnaires' disease patients and controls were then fixed with formalin, because satisfactory immunofluorescent staining of the Legionnaires' disease bacterium has been observed in formalin-fixed tissues and because formalin would ensure sterilization of the smears. Antibodies manufactured in rabbits against the Legionnaires' disease bacterium were then extracted and labeled with fluorescent dye. Each smear was then stained with the fluorescent antibodies and examined under the microscope by investigators who didn't know which smears were from Legionnaires' disease patients and which were from controls. This way complete objectivity was assured as the investigators determined whether the antibodies on each smear were reacting with bacteria structurally typical of the Legionnaires' disease bacterium.

Smears from five of the 21 Legionnaires' disease patients were found to contain Legionnaires' disease bacteria, whereas none of the smears from the 47 control subjects did, showing that immunofluorescent staining of sputum is specific; that is, it is capable of diagnosing Legionnaires' disease to the exclusion of other bacterial diseases. What's more, four of the five Legionnaires' disease patients with positive smears had died from the disease, whereas only five of the 16 Legionnaires' disease patients with negative smears had, further underscoring the staining technique's specificity for the Legionnaires' disease bacterium. Finally, both positive and negative sputum smears had been taken from Legionnaires' disease patients only one to seven days after the onset of illness, whereas immunofluorescent staining of blood samples takes three weeks to reveal Legionnaires' disease, strongly implying that immunofluorescent staining of sputum is a rapid test for the disease.

Thus, immunofluorescent staining of sputum is a safe, specific and quick method for diagnosing Legionnaires' disease, Broome and her co-workers conclude. Still to be answered, however, is how sensitive it is, since it only detected one-fourth of the cases of Legionnaires' disease in the study. Its sensitivity might well improve if sputum samples are immediately stained and examined, not first stored for months at room temperature or in a frozen state, as was the case in the study. □

JANUARY 6, 1979

## NASA '79: A busy year in space

At the beginning of 1978, the National Aeronautics and Space Administration announced plans to launch as many as 25 payloads into space during the year. As it turned out, the final total was only 20, and the 1979 list is even shorter. Yet the space agency faces one of its busiest years ever, with launchings scheduled for up to 15 satellites, studies underway or due at Venus, Mars, Jupiter and Saturn, and the long-delayed first orbital flight of the space shuttle.

Much of the work, of course, will come from the planetary spacecraft. The three operating Viking craft at Mars will finish their labors this year, and the Pioneer Venus orbiter is already on station around its own target planet. In March, Voyager 1 will fly past Jupiter and its moons, followed four months later by Voyager 2. And early in September, five and a half years after being launched on what was to have been a mission only to Jupiter, the doughty Pioneer 11 probe will become the first spacecraft to provide close-up images of Saturn.

The agency's biggest event of the year in terms of time, money, personnel, suspense and public relations will be the first trip into orbit by the space shuttle, to be crewed by veteran astronaut John Young and rookie Robert Crippen. The oft-delayed event is now officially scheduled for Sept. 28, although many NASA officials have said that it could take place as late as mid-December. Last week, one of the shuttle's main engines sustained heavy damage from a fire due to a valve failure during developmental testing, and delay is now likelier than ever. (One agency source thinks it possible from some reading between the lines that the flight may in fact be pushed as far as February of 1980.)

Out of the 15 satellites on the schedule, only four are NASA's own, with the agency serving merely as a launching service for the rest and being reimbursed for its role. Both of the scheduled weather satellites — NOAA-A and -B — are for the National Oceanic and Atmospheric Administration, and a pair of

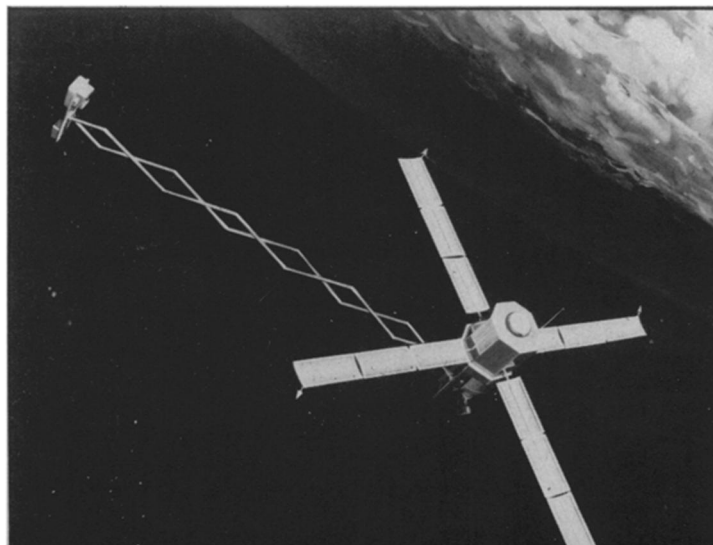
### 1979 NASA Schedule

Date	Mission	Description
Jan. 25	SCATHA	Spacecraft Charging At High Altitudes (DOD)
Jan. 25	SAGE-A	Stratospheric Aerosol and Gas Experiment
Mar. 5	Voyager 1	Jupiter encounter (launched 9/1/77)
April	NOAA-A	weather satellite (NOAA)
April	Transit*	navigation (DOD)
May	FLETSATCOM-B	communications (USN/USAF)
June	UK-6	scientific satellite (UK)
July 9	Voyager 2	Jupiter encounter (launched 8/20/77)
July	Westar C*	communications (Western Union)
August	Intelsat V-A	communications (Intelsat)
Sept. 1	Pioneer 11	Saturn encounter (launched 4/5/73)
Sept.	HEAO-C	High Energy Astronomy Observatory
Sept.	Magsat A	geomagnetic field measurements
Sept. 28	shuttle	first orbital flight
Oct.	SM-M-A	Solar Maximum Mission
Oct.	Transit	navigation (DOD)
Nov.	Intelsat V-B	communications (Intelsat)
Dec.	NOAA-B	weather satellite (NOAA)
Dec.	RCA-C	communications (RCA)

\*Optional if needed

Transit navigational satellites (one a backup if necessary for a previously launched edition) are to be flown for the U.S. Navy. There are five communications satellites on the calendar, and all are for non-NASA customers: The Navy/USAF FleetSatCom-B, Westar-C (again only if needed) for Western Union, RCA-C for RCA Corp., and the first and second of the new-generation Intelsat V's for the International Telecommunications Satellite Consortium.

NASA's own probes all have science in mind. The third and final High Energy Astronomy Observatory will survey gamma-ray and cosmic-ray sources in the sky, while the Stratospheric Aerosol and Gas Experiment will look down on pollutant problems in earth's upper atmosphere. Magsat-A will study the planet's magnetic field in detail, while the Solar Maximum Mission will monitor the sun from earth orbit during the upcoming high-activity portion of the solar cycle. Great Britain's science-oriented UK-6 is also on the schedule (held over from last year), as is SCATHA, a Defense Department satellite instrumented to study



Magsat A will study earth's magnetic field.

NASA

ways of combatting the problem of electrical charges built up on spacecraft surfaces and components at high altitudes.

A key factor for the future, of course, is the success of the space shuttle's orbital trials, since the growing numbers of "space users" — including NASA itself — will have to depend on it for years to come. □

## DSDP shifts gears

As it enters its second decade, the Deep Sea Drilling Project is shifting its objectives. The *Challenger's* most recent voyage, Leg 63, completed the transition, begun by Leg 62 (SN: 11/4/78, p. 309), from hard rock geophysics and tectonics to paleoenvironment — studies of changes in ocean ecology with time as reflected in the sediments.

Microfossils in Leg 63's 330 cores — the largest number of cores yet taken on one DSDP leg — will reconstruct the history of the boundary current — a surface ocean current that stretches along the California coast south to the equator and has a major effect on the southern California climate. Led by Bilal U. Haq of Woods Hole Oceanographic Institution and Robert S. Yeats of Oregon State University, the *Challenger* drilled at seven sites along the Pacific coast from Long Beach, Calif., to Mazatlan, Mexico.

Because different organisms require different climatic conditions for survival, the types and abundance of fossils in the sediments will help researchers map ancient ocean circulation and temperatures. However, according to Dick Poore of the U.S. Geological Survey in Menlo Park, Calif., who accompanied Leg 63, the fossil record is more fragmentary than expected. *Foraminifera*, fossils commonly used for paleoenvironmental studies, are poorly represented, he said, and analysis will depend on other fossils such as diatoms and radiolaria.

Despite its best intentions, the DSDP can't entirely avoid tectonics. Leg 63 also unearthed a little more about the history of the California continental margin.

About 20 million years ago, a deep-sea trench, like the Mariana trench that marks the subduction of the Pacific plate, lay off the California coast. Volcanic rocks recovered in earlier dredge samples were thought to have come from the volcanoes that should form near such a trench. However, the *Challenger* recovered similar volcanic rocks on this voyage and showed that the rocks are too young and lie too near the trench to have resulted from subduction-related volcanic activity. According to Jim Crouch of Scripps Institution of Oceanography, a geophysicist aboard Leg 63, these findings support previous theories that the rocks were formed when the mid-ocean spreading center called the East Pacific Rise, now far to the south, once lay near California. □

## Alcohol metabolism: All in the family

There is growing evidence that alcoholism may "run in the family." Recent studies have shown as much as a fourfold increase in alcoholism among children of alcoholics over children of nonalcoholics. Other studies indicate a 25 to 50 percent lifetime risk for alcoholism in the sons and brothers of severely alcoholic men, and twins of alcoholics have about twice the chance of becoming alcoholics as do two non-twin brothers or sisters.

Such retrospective, epidemiological studies, however, are open to criticism because they deal with statistical probabilities which — no matter how accurate — frequently lack *physical* evidence that should underlie their conclusions. For example, how does one show a physical susceptibility to alcoholism? The answer may be found in the Jan. 5 SCIENCE.

University of Washington researchers report some of the most convincing evidence yet of a metabolic factor in alcoholism among the offspring or siblings of alcoholics. The study indicates that such persons react more intensely to alcohol — apparently by becoming more intoxicated — than do peers with similar backgrounds but from nonalcoholic families.

Marc A. Schuckit and Vidamantas Rayeses of the Alcoholism and Drug Abuse Institute at the University of Washington in Seattle were inspired by indications from several other studies of a genetic factor in alcoholism. They speculated that susceptible individuals might undergo "a possible unique reaction to a single dose of alcohol." They decided to measure the level of blood acetaldehyde produced through metabolism after drinking.

The researchers matched 20 young men (mean age 23) who had an alcoholic parent or sibling against a control group of males of similar age, race (all Caucasian), marital status and drinking history — most of the subjects in both groups reported drinking on one to four occasions per week, with an average intake of two to four drinks.

After fasting overnight, each man was seated in a quiet, temperature-controlled room where his vital signs were monitored and blood drawn. Each participant was given a comparable quantity of liquor (0.5 milliliter per kilogram of body weight) mixed with sugar-free 7-Up and drunk over a five-minute period. Blood samples were taken before drinking, at 15 and 30 minutes after, and every subsequent half hour for the following three hours.

The analyses show that "blood acetaldehyde concentrations were significantly elevated after a moderate ethanol dose" in the 20 men with family histories of alcoholism. The blood alcohol concentrations of the controls were considerably lower, Schuckit (now at the San Diego V.A. Hospital) and Rayeses report. Similar results had been found with recovered alcoholics,

"but our results indicate that young, healthy men with family histories of alcoholism who might be predisposed to alcoholism themselves also demonstrate increased acetaldehyde levels," say the researchers.

The findings — which the scientists say must be replicated in order to be conclusive — may mean that genetically predisposed persons are more easily intoxicated; more vulnerable to organ damage from alcohol metabolism; and more likely to produce morphine-like substances when the alcohol metabolites interact with those of monoamine chemicals in the central nervous system. "These possibilities, as well as others, can now be studied prospectively in healthy relatives of alcoholics and control groups," say the researchers. □

## Feds should push 'passive' solar more

An "unacceptably large number of problems" with solar space- and water-heating systems has convinced a powerful congressional subcommittee that consumers need protection "with all practical speed." The subcommittee backs that assertion with a report that comes down strongly behind advocates of passive solar-energy systems as the least-costly, most cost-effective approach to use of solar energy in the home.

During the recent spurt of solar development, a handful of solar researchers have maintained that passive systems — those that require no mechanical devices to deliver collected heat — have a commercial edge: active systems, which use pumps or fans to deliver heat, require an energy input and maintenance. The subcommittee on oversight and investigations of the House of Representatives Committee on Interstate and Foreign Commerce concludes that "government programs have seriously underemphasized passive and lower cost active solar applications, which are the most cost-effective and least mechanically troublesome of existing, commercially available solar technologies," according to its report.

Under retiring Rep. John E. Moss (D-Calif.), the subcommittee pursued a wide range of investigations, including the one over alleged defects in Firestone tires that ultimately led to their recall. Although not a matter of human safety, as in the tire case, the subcommittee believes the government's imbalanced support favoring active systems threatens to "significantly distort American solar development." And if "problems with solar systems are not sharply reduced, the popularization of solar energy could be set back for years."