and Saturn on Aug. 27, 1981, possibly going on to Uranus and Neptune.

Two sets of springs added to Voyager 1's science boom helped it unfold perfectly and lock in place, as did two other booms carrying a pair of magnetometers and the craft's nuclear power supplies. Four of the 11 scientific experiments were at work within hours of the launching, and two more were switched on a day later.

Voyager 2, meanwhile, with years to go before its primary mission begins, has already created considerable scientific excitement on its own. The science boom, says project manager John Casani, is probably not latched, but it seems to be only 0.2° away from its full extension and will probably stay there, thanks to stiff springs and a lubricant that will become increasingly viscous in the cold of space. And Voyager 2's instruments are already at work.

The Voyagers are the first U.S. spacecraft to carry antennas intended primarily for *planetary* radio astronomy, sent along to monitor the radio outpourings known from Jupiter and suspected for the other worlds on the target list. But Voyager 2 also has apparently added important new data on yet another source: the earth itself. Like Jupiter (and the sun itself), but to a lesser extent, earth is a known emitter of radio noise over a wide range of frequencies. Of particular importance are earth's low-frequency "kilometric" emissions, which are often associated with such phenomena as auroras. Past space probes (such as the RAE's and IMP's) have reported on the power spectra, time variations and spatial locations of the kilometrics, but the Voyagers, with their 90°-opposed dipole antennas, are the first craft equipped to provide the vital step of measuring their polarization. This is almost a necessity, says Voyager scientist Joseph K. Alexander of the NASA Goddard Space Flight Center, in figuring out how earth's kilometric emissions are born. An early look at the data suggests that the polarization data should be extractable, he says, and Voyager 1 may do even better, since Voyager 2 spent some of its early flight time in positions that were less than ideal for such measurements.

But there are other favorable omens from Voyager 2. Its plasma-wave instrument (the Voyagers carry the first of their kind) is detecting plasma variations 1,000 times finer than those in any previous data. And the craft's wide-angle camera—the *less*-sensitive of its two—has already detected type M stars of magnitude 6.9 and type K stars of magnitude 7.3, both dimmer than the instrument's mentors had predicted. Furthermore, the faint stars were recorded when the "scan platform" holding the cameras was moving six times faster than it should have been, which would have reduced the chance of recording dim sources. The planetary encounters, with such problems presumably long since resolved, should be spectacular indeed. □

Hold him underwater till he communicates

Ball-point pens that write under water are no longer advertised. Perhaps they inspired too many jokes. (Now they write on butter—which is fine if your cattle have literary ambitions.) A more useful artifact for underwater communication is a laser that works under water—one whose output is in the proper wavelength range for transmission through seawater. A laser in this range—it produces blue-green light at 502 to 505 nanometers wavelength—is reported by the Naval Oceans Systems Center at San Diego. According to its developers, Erhard J. Schmitschek, John E. Celto and John A. Trias, all of the Center's Communications Systems and Technology Department, it is the first laser to produce visible light by a technique in which the lasing material is energized by being photodissociated.

The lasing material is mercuric bromide, which is chemically dissociated by being hit with a light beam from an argon fluoride exciter laser. The energy supplied by the argon fluoride light raises the mercuric bromide molecules to an energy level where they separate into electronically excited mercurous bromide and bromine. The mercurous bromide then emits the blue-green light as it loses its excess energy. The laser has operated in the laboratory for extended periods as a sealed system, which indicates that after the mercurous bromide de-energizes itself, it recombines with the loose bromine to give back the mercuric bromide. This could lead to closed system lasers with minimal deterioration of the lasing material.

Schmitschek also believes that the success of this experiment could lead to the use of a whole generic class of dihalides (including those of zinc, cadmium and lead) in similar lasers. It also appears possible to bring about the excitation-dissociation of the mercuric bromide with pulses of energetic electrons as well as with light, and that is being worked on, too. □

Heart disease and life stress

There is ample evidence that heart disease is genetically based. There is also increasing evidence that heart disease is triggered by environmental inputs such as diet, smoking and life stress. Might any one of these environmental factors be a stronger heart disease factor than the others? Einar Kringlen of the University of Oslo in Norway has studied heart disease among identical twins who were not identical as far as heart disease was concerned. In such studies the environmental influences on heart disease can be separated from genetic influences. Kringlen reported last week at the Second International Congress of Twin Studies in Washington, that the primary environmental culprit appears to be life stress.

Kringlen and his co-workers screened 10,000 patients who had had heart attacks in Norway between 1971 and 1975 to see whether any were identical twins and whether they had living cotwins who had not had heart attacks. The researchers found 78 patients who met these criteria. They then asked the patients and their cotwins whether they would participate in a study designed to separate the influences of genes and different behaviors on heart disease. The twins were interviewed in their homes about their lives and problems. So far, half of the twins have been investigated. The most striking observation to emerge from the study so far is that most were rather hard-working people—"pillars of society." However, those twins who had heart attacks had worked more strenuously than had their cotwins who had not had heart attacks. Kringlen cited two cases to illustrate this finding.

One case history concerned a pair of male twins born to a large Norwegian farm family. Twin A went to trade school and twin B went to sea. Twin A then started his own business and twin B became a construction worker. Both worked hard, but twin A worked especially hard. For many years he commuted between two towns and worked irregular hours. The only life crisis experienced by either twin was experienced by twin A; it was a business crisis.

Both twins were happily married and extroverted. They had regular, orderly habits and drank moderate amounts of alcohol. Twin A smoked 16 cigarettes a day, twin B, 6. Twin A exercised more than twin B did. Twin A had his first heart attack at age 64 and two more at age 66. Twin B had no heart attacks. Kringlen attributes twin A's heart attacks to his considerably more stressful lifestyle.

The other case history concerned a pair of female twins who lived on two farms in Norway. Twin A's husband died at age 52 from cancer, so she had to take total responsibility for their farm and children. Twin B, in contrast, lived a quiet, protected life with her husband. He did the farming, and they had no children. Neither twin smoked. Twin A experienced several heart attacks, twin B none. Here, too, Kringlen attributes twin A's heart attacks to a more stressful life.

Exactly how a hectic life might actually trigger a heart attack has not yet been answered by this study. Both of the heart attack victims cited above had had only mildly elevated blood pressure and cholesterol levels in their blood—in fact, they had about the same levels as their cotwins who did not have heart attacks. High blood pressure and high cholesterol levels are known heart attack risk factors, which can be precipitated not only by genes but by diet and stress. □