the beam) or to solid rock. Then they sought areas with a high smoothness factor, and again Solis Lacus is on the map — except that its visible surface is pockmarked, cratered and in general anything but smooth, suggesting, says Zisk, a possible subsurface ice layer that has partially melted to provide the water. The final step was possible because the radar data included scans of Solis Lacus during different Martian seasons: Measured in mid-spring, late spring and early summer, the region's reflectivity was different, which it was not for most of the planet's other smooth, bright areas. This points further toward liquid water, the researchers maintain, since a seasonally variable solid rock surface seems highly unlikely compared to a water layer that changes as part of it is turned from ice to liquid by the sun's growing heat.

Zisk and Mouginis-Mark, like Huguenin, discount the likelihood of an extensive, liquid-water surface. If there were one, it would show a much higher radar reflectivity than the maximum 16 percent that was seen. More likely alternatives, they told the recent Lunar and Planetary Science Conference in Houston, would include a thin layer of damp soil or a liquid layer that is visible only in patches, either because it is in fact patchy or because parts of it lie farther below the rock and dust of Mars.

The authors hope that others among the small community of planetary radar specialists will try their hand at interpreting the data, but there is more to the issue. Earth-based radar can "see" Mars only very poorly during the Martian winter (due to orbital positions), and Huguenin has speculated that salts may depress the freezing point of water on Mars to where Solis Lacus may be an "oasis" all year round. □

Mars: Another Viking gone

The Viking 2 landing craft, which reached Mars on Sept. 3, 1976, has made its last scientific report. Officials at Jet Propulsion Laboratory in Pasadena believe that an unexpected current drain caused the craft's batteries to weaken past the point at which they automatically shut down the scientific instruments. Radioed instructions from earth could possibly reactivate some of the systems, but the lander must relay its earthward messages through the Viking 1 orbiter (the other orbiter ran out of control gas in July 1978), which will soon be sent to complete some high-resolution mapping out of the lander's view. The orbiter will not be back in range until September, and it is expected to run out of gas itself in June or July. After that, only Lander 1 will remain, programed to take minimal but automatic readings and photos. It could run a decade or more. Lander 2, designed for a 90-day mission, lasted more than three and a half years. □

Yin and yang of lobster posture

Whether a lobster tucks its tail or stretches it full length is both a matter of chemistry and of complex nerve cell connections. Scientists interested in how animals control their normal, precisely coordinated behaviors, such as walking and mating, have examined less subtle muscle interactions, such as stereotyped postures. They have learned that stimulation of a single nerve fiber can command an intricate pattern of muscle contraction and relaxation that adds up to a flexed or extended pose. In the April 4 NATURE scientists report that two related chemicals, naturally found in lobster, also trigger, and freeze, opposing postures.

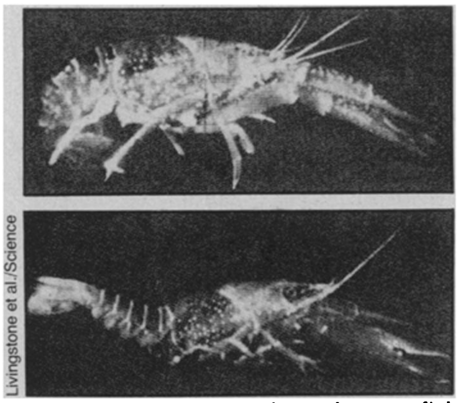
Injections of the compound octopamine into their circulating fluid make lobsters and crayfish assume a rigid, hyperextended posture, say Margaret S. Livingstone, Ronald M. Harris-Warrick and Edward A. Kravitz of Harvard Medical School. The large claws are fully extended pointing forward and the tail is raised and extended to the back. This posture can last several hours, but if the animal is startled, it relaxes for several seconds and then again assumes its pose.

A quite different position results from an injection of a related chemical, serotonin. The lobster or crayfish opens its claws, stands high off the aquarium floor and tucks under its tail, loosely flexed.

The scientists have traced the opposing action of the chemicals to the lobster central nervous system. They find that octopamine and serotonin have opposite effects on the activity of nerve cells that control muscle activity as well as on the cells controlling opposing muscles — flexors and extensors.

The extreme postures the chemicals provoke are strikingly similar to the postures seen when special nerve fibers, called command fibers, are stimulated. Livingstone and co-workers suggest that the chemicals and command fiber system interact. Serotonin and octopamine might activate or modulate the command nerve cell. Each chemical might also serve as a signal throughout, so that the injected chemical floods a posture-controlling system, turning on all the cells.

The researchers caution, however, that they used large amounts of the chemicals, probably more than the animal's entire store. They suggest that normally the chemicals are active near the site where they are released, so a small amount of chemical could produce a strong effect. Alternatively, the postures might be an exaggerated manifestation of far more subtle posture control. Serotonin and octopamine have been detected in the circulating fluid of normal lobsters, so the researchers say it is likely that the chemicals function, at least in part, through release into that fluid.



Livingstone et al./Science

Injections of chemicals make crayfish adopt rigid flexed (top) or extended poses.

In a variety of animals, amines — serotonin and related chemicals — appear somehow to moderate complex movements. When brain input is interrupted, for instance, one amine makes rats flex and another makes them hyperextend. The chemicals also have been implicated in the stereotyped walking behavior seen in cats lacking brain cortex. Livingstone and colleagues are intrigued by the possibility that throughout the animal kingdom pairs of amines regulate the activity of nerves going to opposing sets of muscles. □

Brown fat and the fight against obesity

Most people overeat at one time or another, but the effect of the indulgence is not the same in all cases. Some overeaters gain weight rapidly; others never put on a pound although they take in the same number of calories. One explanation for this difference in weight gain may be a fat called BAT (brown adipose tissue). At a recent Endocrine Society seminar in New York George A. Bray of the University of California School of Medicine at Los Angeles described current research on the role of BAT in obesity.

To coax normal laboratory rats into gluttony, British researchers offered them four new foods every day, in a "cafeteria" feeding scheme. The animals, as they chose among such delicacies as cookies, bologna, ham, potato chips and chocolates, lost their natural ability to control caloric intake and rapidly put on weight. When the cafeteria was discontinued and the stock laboratory diet resumed, the rats, no doubt disappointed, returned to normal weight.

The weight gain of the rats could have been far worse. Nancy J. Rothwell and Michael J. Stock of St. George's Hospital Medical School in London reported in NATURE (vol. 281, p. 31) that animals fed cafeteria style gain 27 percent more weight than do control animals, but the cafeteria patrons consume 80 percent more calories. As the rats overeat, their