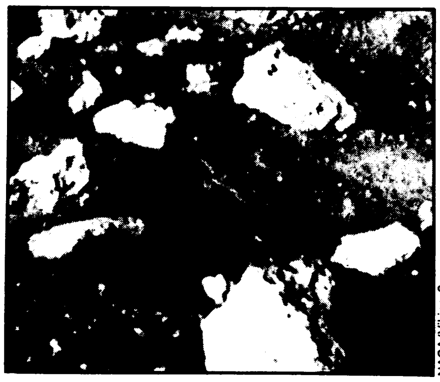

NASA/Viking 2

*Organic sample site: Crusty evaporites?*

when the craft's soil-sampling arm stuck last week, a problem since resolved, the delay amid the press of time gave rise to second thoughts. A special chemistry working group headed by GCMS team leader Klaus Biemann of the Massachusetts Institute of Technology concluded that the similar biology-instrument data from the two sites probably promised a similar lack of organics if the GCMS soil samples were taken from virtually the same places. It would mean a lot of extra work to change the mission's tightly interdependent programming so that the GCMS could get its samples from other types of terrain. But the group argued persuasively that the labor was worth it.

The first alternate site was a spot that appeared in the lander's photos to be topped with a crusty layer, possibly representing evaporite deposits formed by water migrating upward through water-soluble salts. The chance of more water, the salts and the hope that the crust might offer protection from the sun's ultraviolet radiation all contributed to the choice. The sampling operation, delayed from Sept. 13, was set for Sept. 25.

The second possibility, if all goes well with the first, is to use the sampling arm's scoop-head to push a rock out of the way and dig in the uncovered spot, in hopes that the rock would have provided long enough protection from UV to have given organics a chance to form and survive. The Martian rocks are an unknown quantity, however, and fear of damaging the lander's only arm has led to more meetings and yet another working group, dubbed "The Rolling Stones." Viking officials have even ordered some custom-made Mars-rock replicas to be made, using photographs and stereo contour diagrams for guidance, to use in practice rock-rollings. This week's plan called for moving the real rock on Oct. 8, with the dig to follow four days later; the four days' UV exposure, says Biemann, is unlikely to destroy all detectable organics, if they are there at all.

The changes involved in doing all this site-switching and rock-rolling are affecting Viking's other scientific teams as well. The rock-rolling dig, especially, could restrict lander 2's photographic plans and even the relatively nondemanding collection of weather data, since it may require most of the earth-to-Mars "instruction period" for three days running. In addition, the computers at Jet Propulsion Laboratory are so busy with data from the four craft that the photos being taken by the orbiters as they walk around the planet are hardly getting a glance when they come in. In fact, says one Viking engineer, just out of a rock-rolling meeting, if anything else delays the start of the roll-and-dig operation, "we may just leave the whole thing until after conjunction." □

# Superheavies: Neutron star origin?

Now that there is experimental evidence for the existence of superheavy elements with atomic numbers 126, 116 and 124 in nature, nuclear theorists and astrophysicists must figure out some way nature could have made them. Two communications in the Sept. 9 NATURE, one by George L. Murphy of the University of Western Australia and one by J. E. Pringle, D. S. P. Dearborn and A. C. Fabian of Cambridge University's Institute of Astronomy, present similar answers. Both blame neutron stars and black holes. (There are more things in heaven and earth, Horatio, that are being blamed on neutron stars and black holes nowadays.)

The question of elemental origins is not so simple as it might at first seem. Cosmologists tend to agree that the lightest elements, the isotopes of hydrogen, helium and lithium, could have been made before the galaxies formed in the big-bang process that began the universe. Elements of middleweight range, up to about nitrogen and oxygen, are made by nuclear fusion processes in stars. The elements in about the heaviest half of the periodic table, the long-known terrestrially present ones, that is, still present something of a mystery, although theory says they can be made in supernova explosions.

To make the ultraheavies, an environment loaded with neutrons is necessary, and that leads Pringle and company and Murphy to the outer regions of a neutron star as their birthplace. One way of scattering the superheavy elements from the neutron-star surface into the universe at large that both parties suggest is tidal disruption by an encounter between the neutron star and a black hole. Additionally, Pringle and collaborators suggest that a neutron star that has accreted too much matter from a possible binary companion may collapse into a black hole, throwing off some of its surface on the way. Another suggestion by Murphy is that during the supernova explosion that makes the neutron star, the neutron star's surface produces superheavies as quickly as it forms, and droplets of such matter evaporate into space virtually simultaneously with the supernova explosion. □

# The sex life of flowering plants

Flowering plants usually propagate by fertilizing themselves with their own pollen or by exchanging pollen with a member of their own species. Once an acceptable pollen grain (comparable to an animal sperm) reaches a flower's receptive female stigma, the grain hydrates (takes up water from the stigma), swells and produces a short pollen tube that penetrates the flower's papilla cuticle. The tube then grows down into the ovary of the flower, fertilizes an egg, and the resulting embryo (seed) is capable of becoming a new plant.

How a flowering plant recognizes its own pollen or that of its own species, and not that of another, has now been determined by R. Bruce Knox, a botanist at the University of Melbourne and his co-workers. It is through special cell membrane receptors for the pollen. These results also shed light on a largely neglected field—how plants recognize their own kind.

Knox and his co-workers studied pollen recognition in the flowering plant species *Gladiolus gandavensis*. (The *Gladiolus* genus consists of plants with sword-shaped leaves and spikes of brilliantly colored irregular flowers.) *G. gandavensis*, they found, accepts either its own pollen or that of other plants in its own species. Within 20 minutes of landing on a receptive stigma, the *G. gandavensis* pollen hydrates, swells and produces a short pollen tube that penetrates the papilla cuticle after an hour or so. Pollens from other genera in the same family, Iridaceae, can also land on the *G. gandavensis* stigma, hydrate, swell and make a pollen tube. But their tubes are not able to penetrate *G. gandavensis's* papilla cuticle. Pollens from other families do not even get to first base with the stigma of *G. gandavensis*—they don't even hydrate.

Knox et al./PNAS

*Scanning electron micrographs of Gladiolus gandavensis stigma after pollination with compatible pollen (top) and after being exposed to totally incompatible pollen.*