igneous rocks and meteorites often show such low trace concentrations, but so do, notably, some weathering products. Thus the trace elements are one more bit of evidence suggesting that the Viking landers are not studying material peculiar to their disparate locales so much as a homogeneous mixture that tells of a rugged evolution perhaps representing conditions over much of the planet's surface.

The search for organic materials continued in vain early this week, with negative results from the first of two runs at 500° C by lander 2's gas chromatograph/mass spectrometer, following similar findings in runs at 200° and 350°. In what is likely to be a last-ditch effort for the lander 2 site, Viking engineers were also working to collect a sample from beneath a rock, in hopes that the rock might have lain where it is long enough to have blocked possibly damaging solar ultraviolet radiation since the time when a thicker Martian atmosphere might have done so on its own. Though it sounds like a simple task, the rock-rolling plan involved the efforts of more than a dozen people, plus consultations with numerous others, for more than three weeks. The lander has but one digging arm, and no one was about to risk it in a hasty or ill-conceived maneuver.

The first attempt was a failure. The selected rock was ironically the same one that had blocked the way to lander 2's originally chosen digging site, and when the arm was sent back to it for the rock-rolling effort, it "struck back," says one engineer, by refusing to budge. There were passing suggestions that the rock might have been cold-welded or evaporite-glued to the surface, but others concluded that a large piece of the rock was probably buried and holding it in place. "It seems to me pretty clear," says Toulmin, "that the tip-of-the-iceberg theory is overwhelmingly the most likely explanation for its intransigence."

The second choice was a rock known as "Mr. Badger," one of four dubbed by Henry J. Moore II of the USGS with names from *Wind in the Willows*. (The others are Mr. Mole, Mr. Rat and Mr. Toad.) When Mr. Badger obligingly sidled aside, engineers were elated. "We were even popping the cork a little," says Leonard V. Clark of the NASA Langley Research Center, head of the team responsible for the fragile but capable sampling arm. Even as the soil was being sampled from beneath the rock, plans were already being made to carry out a similar roll-and-dig maneuver to obtain a sample for the lander's biology instruments.

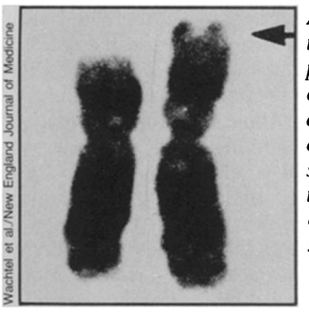
The landers are only part of the Viking fleet, however. The mission's geologists have just begun looking at the spectacular photographs taken by the two orbiters during their respective "walks" around the planet. Yet even an early look at the orbiter 1 photos has revealed:

- Stunningly sharp images of the huge volcano known as Ascraeus Mons, whose primary crater is flanked by a pair of distinctive "side-lobes." The resulting formation, peeking through the global dust storm photographed by Mariner 9 in 1971, was one of the first clues that such volcanoes existed on Mars at all. The Viking photos, however, says Harold Masursky of the USGS, are about 50 times sharper than Mariner 9's due to a combination of refined engineering and, more important, cleaner air.
- A virtual chronology of the dramatic geologic evolution of the vast bulge known as the Tharsis uplift, highlighted by a broad lava flow that apparently flooded all but a craggy central portion of the region's original cratered terrain.
- A photomosaic showing pronounced signs of ice-related flow features (see cover), at a latitude more than 45° away from the north pole. "They resemble earth features where near-surface materials flow *en masse* very slowly, aided by the freeze-thaw of interstitial ice," says an orbiter team member. Another Viking geologist goes even further: "This," he says, "is the best photographic evidence we've ever had of real, large-scale glacial flow on Mars."

The images from orbiter 2's circumplanetary sojourn were just getting their first perusal early this week, but hopes were high at Viking headquarters for clear photos of the Martian north polar region, most of which was seen only poorly by Mariner 9.

The genetic basis of hermaphroditism

Scientists have long been puzzled by the genetic basis of hermaphroditism, a condition in which a person has both male and female organs or some lesser mingling of both male and female traits. As far as they have been able to determine, hermaphrodites carry two X chromosomes, the sex determinant of a female, but rarely a Y chromosome, the male sex determinant. So how does the hermaphrodite end up with male as well as female characteristics?



Arrow indicates a piece of Y chromosome attached to one of a subject's two X chromosomes.

An answer may have been found by Stephen S. Wachtel of the Memorial Sloan-Kettering Cancer Center in New York City and his colleagues and is reported in the Sept. 30 NEW ENGLAND JOURNAL OF MEDICINE. Although hermaphrodites may not carry a complete Y chromosome or even a sizable piece of one, they still possess the tiny gene from the Y chromosome that determines the male sex. This gene may have become erroneously attached to one of the X chromosomes or one of the nonsex chromosomes, before conception, that is, in the father's sperm.

In the past, researchers have used rather unrefined techniques to look for the presence of a Y chromosome in hermaphrodites. But chromosome identification techniques have improved considerably during the past three years. Advanced immunological tests have also allowed Wachtel and his colleagues to identify the gene on the Y chromosome that is responsible for conferring male traits (SN: 12/6/75, p. 357). So they decided to use improved chromosomal identification techniques to look for a Y chromosome in hermaphrodites, and to use the latest immunological methods for identifying genes to see whether hermaphrodites carry the Y chromosome sex determinant gene.

They studied seven subjects from ages 2 to 46, all with XX chromosomes. Three were true hermaphrodites in that they had ambiguous genitalia. The other four had masculine genitalia but certain female sex traits, such as lack of facial hair, a high-pitched voice, small testes or sterility. The Y chromosome sex determinant gene was identified in all seven of them. Specifically, the protein that is encoded by this gene, the so-called H-Y antigen, was present in cells from all the subjects. Two of the subjects also had a Y chromosome or at least a sizeable piece of a Y chromosome in their cells. A piece of the Y chromosome could actually be seen translocated onto an X chromosome in one of these two subjects.

In view of the minuscule size of this Y segment and of the even smaller probable size of the sex determinant gene itself, the investigators say it is reasonable to suppose that in some XX males or XX true hermaphrodites, Y-X chromosome translocation or translocation of the Y chromosome to a nonsex chromosome would not be detectable even with the latest, most refined chromosome banding techniques. So in these cases, Wachtel and his co-workers believe, H-Y antigen expression is probably the best clue to the presence of a Y chromosome or its particular sex determinant gene.

Only further studies, they admit, will show whether the Y sex determinant gene identified by Wachtel and his colleagues is always the basis of hermaphroditism. It is possible, for example, that an environmental factor might alter the genes on the X chromosomes so that they express male rather than female characteristics. □