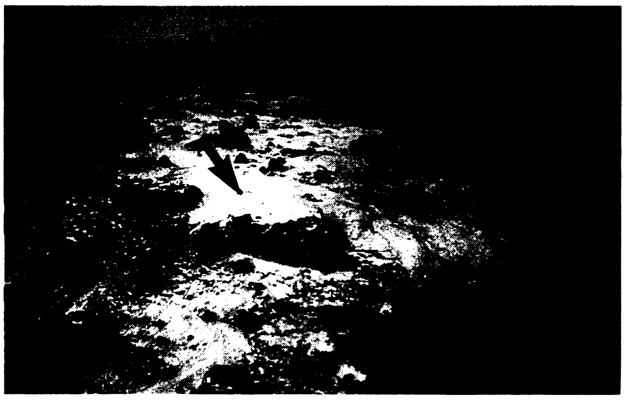
Martian Rocks Offer a Windy Tale

It's not the rosy sunrises or pinkish sunsets that thrill geologists Michael Malin and Ronald Greeley when they view the latest images of Ares Vallis, the Martian valley where Pathfinder landed on July 4. It's close-up pictures of rocks suggesting that huge gusts of wind once screamed across the undulating terrain. Such winds, more than 10 times the speed of the gentle, 20-kilometer-per-hour late summer breeze that now blows through the valley, would have driven sand into rocks with enough force to carve new shapes.

Pictures taken by Sojourner, Pathfinder's tiny rover, provide the first clear evidence that Martian rocks have been chipped away by windblown sand. While researchers had already seen rocks that appear sandblasted, stripped of a veneer of dust and debris, they had never seen material gouged from rock, says Malin, a Pathfinder investigator at Malin Space Science Systems in San Diego.

If the rocks were eaten away by storms similar to those Malin has studied in Antarctica and Iceland, the erosion could have occurred in just tens of seconds. More generally, the finding may force scientists to rethink how the Martian surface has been altered over time, adds Greeley, a mission scientist at Arizona State University in Tempe.



Malin/JPL

Sojourner's view of the region leading to Mermaid, the bar-shaped sand dune near the horizon, reveals two rocks in the foreground (arrows) with depressions that are aligned with the prevailing wind.

Examining images taken by Sojourner 5 meters from the landing site, as it faced a sand dune dubbed Mermaid, Malin spotted two centimeter-size rocks marked with grooves. These streamlined depressions are aligned with the direction in which prevailing winds elsewhere on Mars have blown drifts of soil and scrubbed the faces of boulders, he told SCIENCE NEWS.

Before 1976, when the Viking landers and orbiters arrived at Mars, researchers assumed that fierce winds had scalloped the Martian surface, Greeley notes. The Viking craft turned that idea around when it revealed only heavily cratered terrain that seemed untouched by wind erosion. Now, with Sojourner taking a closer look at rocks, wind-sculpted features are evident, reversing once again the thinking about the importance of wind and sand in shaping the planet.

Wind erosion requires a copious supply of sand. The source of Martian sand is unknown, although on Earth sand typically comes from granite, Greeley notes. No one has found granite, a rock that forms as a result of repeated cycles of heating and cooling, on Mars. Indeed, before the current mission, scientists felt certain that the geological processes within the Red Planet did not produce granite.

However, the rover's study of a Martian rock called Barnacle Bill indicates that it resembles andesite, a volcanic rock often formed by several cycles of heating and cooling, although not as many as granite. Although the data are extremely preliminary, researchers are now speculating that Mars "may have a much more complicated generation of magma and [surface] evolution than we suspected," says Greeley.

Tying in with that suggestion, the latest analysis of another rock, Yogi, indicates that it, too, may contain andesite, says Harry Y. McSween Jr. of the University of Tennessee in Knoxville. Scientists had initially classified Yogi as basalt (SN: 7/19/97, p. 39), but they hadn't accounted for the dust that coats the rock, he says. —*R. Cowen*

Two proteins may help transplants

Doctors who perform organ transplants get used to rejection. The recipient's natural defenses identify new tissues and attack them as they would any other foreign body. Several drugs help counteract this onslaught, but they must be taken indefinitely by most patients, and often produce side effects. The body's defenses are suppressed, exposing patients to opportunistic infection by harmful invaders.

Now, a preliminary study in rhesus monkeys highlights two proteins that together can block rejection, even after medication stops, without locking up the whole immune system in the process.

In a dozen monkeys that had undergone kidney transplants from unrelated rhesus monkeys, the two proteins—CTLA4-Ig and 5C8—even reversed organ rejection once it had started, a team led by researchers at the University of Wisconsin-Madison reports in the Aug. 5 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. The proteins are genetically engineered antibodies.

Researchers gave eight of the monkeys one or both of the proteins. The four monkeys that received no drugs rejected their transplants within 8 days.

Two monkeys that received equal doses of the two proteins for 4 weeks after surgery remained healthy beyond 150 days. Of two monkeys that received the same amount of the drugs in just 2 weeks, one died of unrelated diseases and the other rejected the transplanted kidney after roughly 100 days.

The two that received only CTLA4-Ig rejected the new organ within a month. The other two, which got only 5C8, rejected it after about 100 days.

After rejecting the transplant, the two monkeys that had received only 5C8 and the survivor that had been given the short course of both drugs received a second round of their respective drug regimens—and they recovered.

"The ability to reverse acute rejection was an unexpected finding," says Stuart J. Knechtle, a University of Wisconsin immunologist who worked on the study. The researchers were also surprised that 5C8 worked alone. Knechtle suspects that a second wave of immune system cells attacks the new tissue after the first month, making an extended regimen more effective.

The researchers don't know how the two proteins work to limit rejection. John J. Fung, who has used them in rodent studies at the University of Pittsburgh, says they may create an environment in which the immune system's T cells cannot become activated.

The monkeys that survived remained free of opportunistic infection. To mimic potential use in humans, the researchers now plan to give the proteins to monkeys that have already taken standard antirejection drugs, Knechtle says. —*N. Seppa*