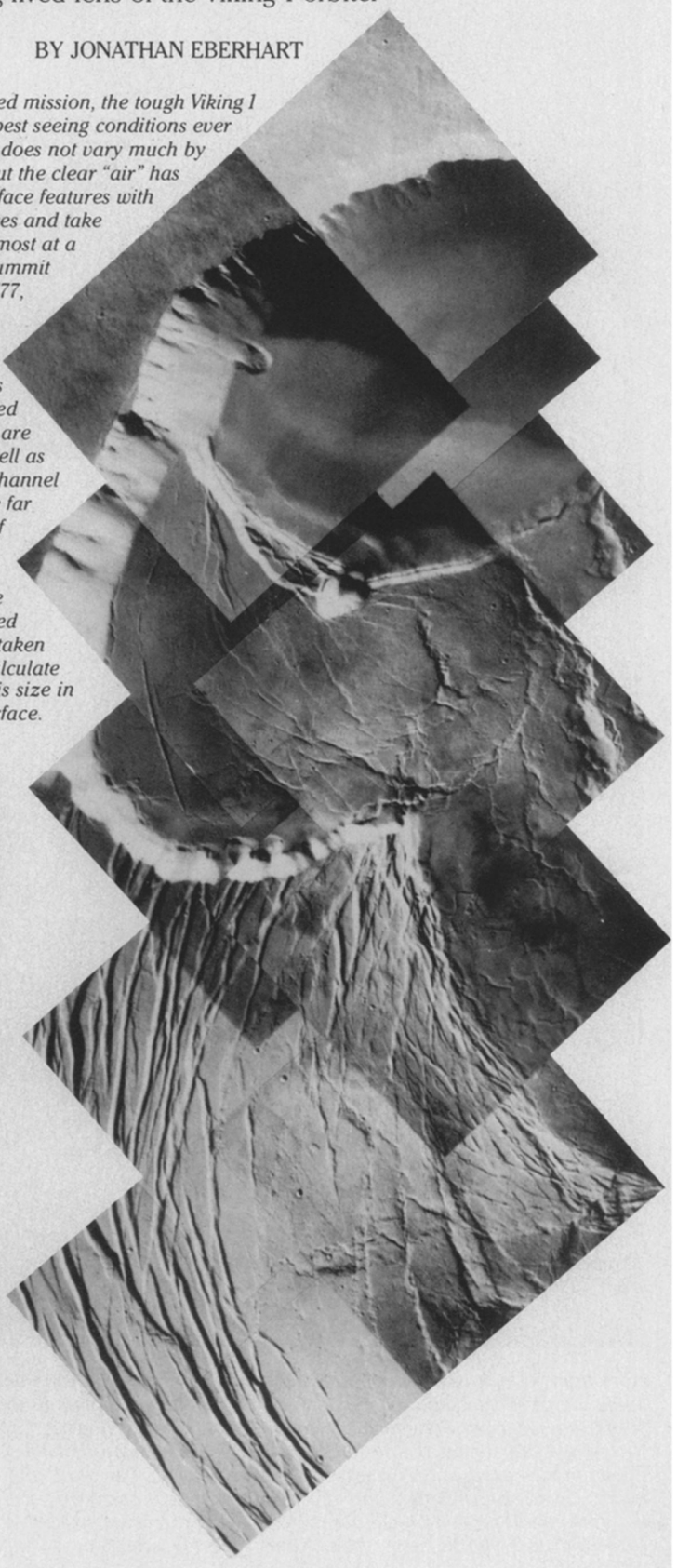
# Mars Album 9

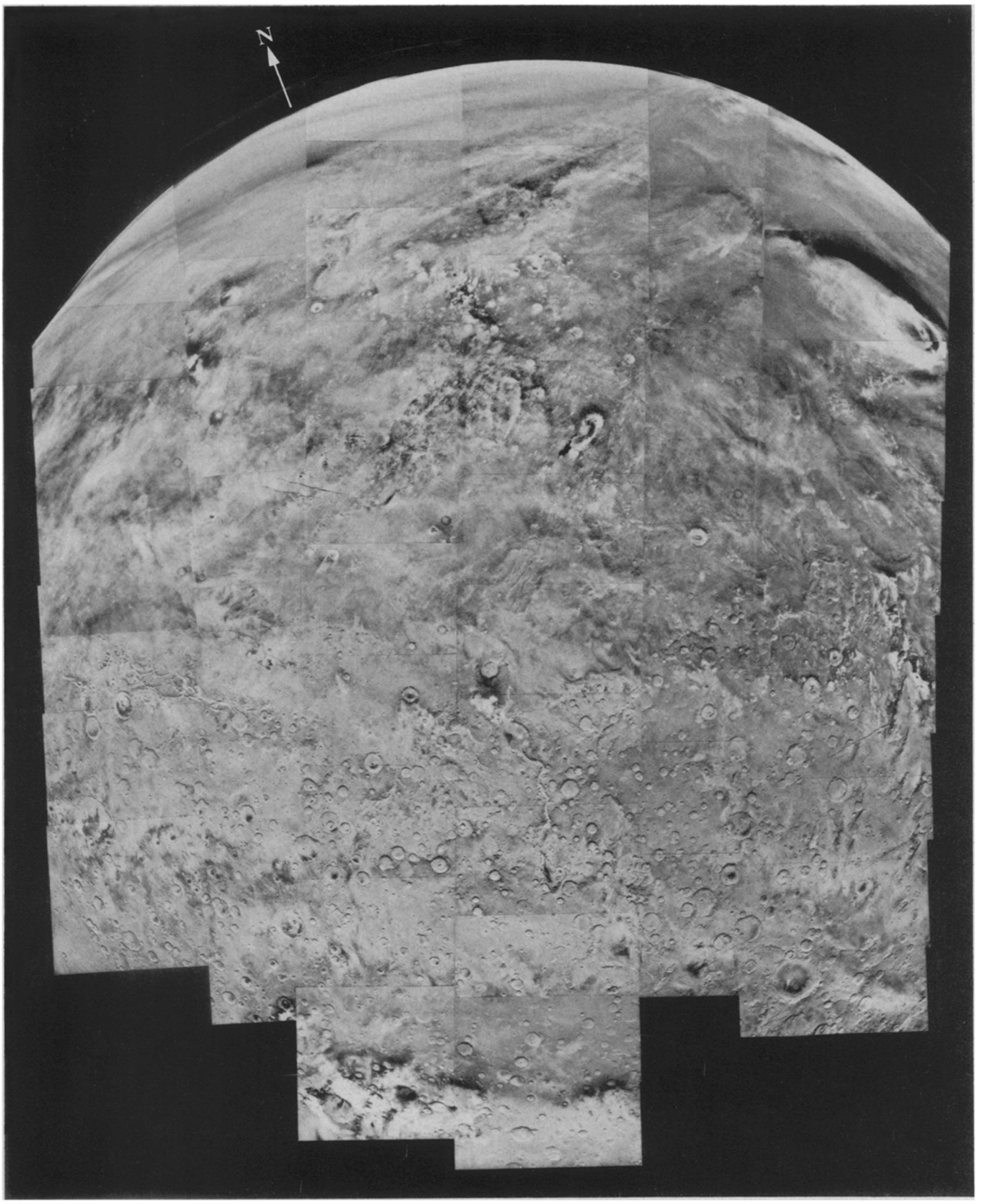
## Late looks from the long-lived lens of the Viking 1 orbiter

BY JONATHAN EBERHART

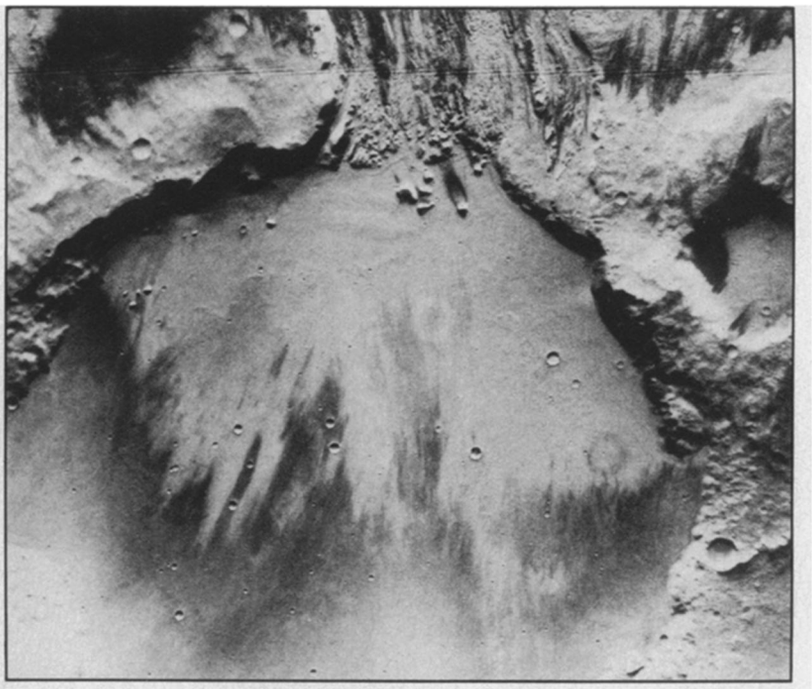
*In the latest months of its four-years-long, five-times-extended mission, the tough Viking 1 orbiter has had a chance to view Mars under some of the best seeing conditions ever afforded the craft's busy cameras. The thin atmosphere does not vary much by terrestrial standards (except for the seasonal dust storms), but the clear "air" has let the orbiter rephotograph supposedly understood surface features with exciting new detail, fill gaps in earlier mapping sequences and take striking, multi-photo mosaics of vast portions of the planet almost at a glance. Three years ago it looked straight down into the summit caldera of the gigantic volcano Olympus Mons (SN: 9/24/77, p. 205), but the photomosaic at right, taken July 13, shows details twice as small. Newly revealed on the upper crater's 25-kilometer-wide floor are small impact craters, irregular volcanic vents and other features, believed by some scientists to indicate that the volcano's last eruptive episode occurred earlier in Martian history than formerly believed. Lower down are seen irregular channels or collapsed lava tubes, as well as compressional features called wrinkle ridges. The "small" channel shown below (about 2.5 km wide), near the southern tip of the far bigger northern-hemisphere channel Mamers Valles (out of picture) reveals flow features and tributaries that bring it into the controversy about the role of liquid water on the ancient Mars. It seems to cut through the ejecta blanket of the crater at its top end, suggesting that the channel was formed later. The orbiter's long life has enabled repeat photos to be taken of such features, providing stereo images now being used to calculate the volumes of water or lava required to cut channels of this size in the planet's surface.*



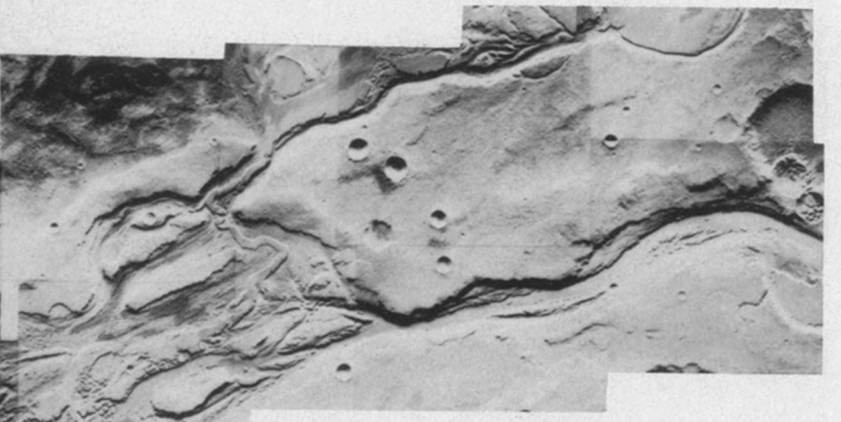

*More than 50 high-resolution photos make up each of the mosaics on these facing pages and the cover, centered at widely spaced longitudes so that together they show nearly all of Mars except for its southernmost regions. For the above mosaic, taken March 6 from 32,400 kilometers up, the spacecraft was directly above longitude 303.22°, latitude -12.61°, just inside the northern rim of the large crater Huygens slightly below the mosaic's center. Frosty Hellas basin, 1,800 km across, dominates the lower right. The eyeball-like feature about an inch north of Huygens is the crater Schroeter. The dark, sinuous feature* NNE *of Schroeter lies at the western edge of Syrtis Major, a wind-streaked plain named for its approximate correlation with a dark region noted from earth by early astronomers. Neither the dark streaks at bottom left nor the curved, light-colored streaks at the bottom of the mosaic's third column of photos are due to camera distortions: Both are cloud or atmospheric features, part of Viking's growing file of Martian meteorological oddities.*




*This composite was assembled from photos taken on Feb. 11, when the spacecraft was at an altitude of 32,350 km, about a third of the way around the planet to the east from the mosaic at left. The sub-spacecraft point—straight down—is at longitude 179.79°, latitude -8.44°, just east of the dark-skirted crater Apollinaris Patera slightly below mid-picture. Just below Apollinaris is the crater Gusev, with the large channel Ma'adim Vallis winding southward from it for nearly 700 km like the tail of a gigantic tadpole. The ear-shaped feature just right of center about a third of the way from the top is a trick of surface variations around the crater Petit. The most prominent feature in the whole mosaic, the bright area at upper right, is the huge volcano Olympus Mons atop the western portion of the Tharsis rise. Its brightness may simply be sunlight on the volcano's flanks, or it may include the effect of clouds around the lofty peak. Continuing eastward around Mars reveals the rest of Tharsis (with its three other super-volcanoes) and more, in the mosaic shown on cover.*



*About 500 kilometers long, bizarre Mangala Valles (left) is a veritable feast for geologists hungry to study surface-altering processes on Mars. Photographed over a three-day span that began June 19 (fourth anniversary of the Viking 1 orbiter's arrival at Mars), it is seen by some researchers as a water-carved channel, but with a rich history that also included lava flows, meteorite impacts, wind-borne dust deposits, wind erosion, "mass wasting" (downhill slumping of surface material, here perhaps due to water percolating out from beneath it) and more. In the portion of the mosaic below, additional channels show parts of their apparently original floors to be higher than their surroundings, such as if the softer surrounding material was eroded by wind or water. The photo above is an enlargement of the seventh frame down on the mosaic's far left. Big as it is, not even this large, 27.5-kilometer-diameter crater could have held enough water at a given time (if it was a source) to cut the portion of Mangala Valles extending northward from it.*



*These fluffy clouds, photographed Feb. 22 in the southern hemisphere (see lowest frame of cover mosaic), seem hardly dramatic — except that they are on Mars, where most airborne condensates are vague hazes and mists. The unusually distinct shadows suggest the clouds to be nearly 28 km up. The largest is about 32 km long.*