

Remarks on the Geomorphogeny of the Yarmuk Valley, Jordan

Synopsis

Twenty years ago, a geological study of the Yarmuk area—carried out as a basis for dam-site planning—was completed by Dr A. A. Abdullatif and the author, both then members of the German Geological Mission to Jordan. The River Yarmuk, part of Jordan's northern border, is a very important tributary of the River Jordan, joining it from the northeast, 6 km. south of Lake Tiberias.

During uplift of the Jordanian block and downfaulting of the Jordan Valley, erosion led to the progressive downcutting of the present Wadi El Arab, south of the River Yarmuk and the Um Qeis plateau. Connected with these tectonic movements, several phases of outpouring of basalts took place in the area near and east of the Jordan Valley and Lake Tiberias (Jebel Druse, Hauran, Golan) between Miocene and Holocene times.

Some of the Pleistocene basalts ('cover basalt') originating in the Golan flowed roughly southwards over a peneplained surface. They crossed the location of the present Yarmuk Valley and reached the Um Qeis plateau. From here the basalt poured, as lava cascades, 200 m. down the side of the Wadi El Arab, and basalts spilled down over the western edge of the Um Qeis plateau infilling the channels of at least three mountain torrents, some lava tongues reaching the Jordan Valley below. This 'cover basalt' must have completely changed the plateau's drainage system.

The present location of the Yarmuk Valley was caused by two geological structures: The NE-trending Yarmuk-Raqqad line and the location of the outliers of the 'cover basalt' with their ground-water runoff. The situation of the Yarmuk is somewhat analogous to an 'urstromtal', a large glacial outwash valley parallel to the front margin of a continental ice sheet.

After establishing its course, the Yarmuk River underwent

several phases of strong incision, as shown by terrace remnants. Erosion was accelerated by seven landslides, altogether covering an area of 10.5 Km.² on the southern slope of the Yarmuk Valley and in its tributary Wadi Sidiin. They were caused by the northerly to northwesterly dip of the strata, the lithology, and by undercutting—the landslides may have been triggered by earthquakes.

During these processes, further outpouring of basalts took place. The basalts flowed down the Yarmuk Valley and finally reached the Jordan Valley and the confluence of the Yarmuk and Jordan. The lavas form a very important marker horizon and have led to the preservation of earlier stages of evolution of the Yarmuk Valley. These younger basalts possibly reached the Yarmuk through the Wadi Raqqad, through the upper reaches of the Yarmuk proper, and/or spilled down the northern side of the Yarmuk Valley in the east. The basalt has the same altitude and thickness both west and east of the confluence of the Yarmuk and Wadi Raqqad, thus it is unlikely that the lava reached the Yarmuk solely by way of Wadi Raqqad.

Some of the landslides in the lower reaches of the Yarmuk were covered by these younger basalts. The latter display dislocations caused by local response of the underlying landslide material to the weight of the basalts combined with abnormally high infiltration of water. The Yarmuk landslides serve to demonstrate what might happen in addition to natural erosion processes and natural landslides, where hydraulic engineering structures such as reservoirs do not make allowance for possible remobilization of old landslides or creation of new ones.

Note

Full text will be published in the *Geologisches Jahrbuch* (Geological Yearbook), Hannover 1985.

