Foreword by the Guest Editors

This special issue of the *Israel Journal of Earth Sciences* "Round and About the Hula Valley" contains a selection of original papers on the geology, geophysics, geomorphology, geohydrology, geobiology, and geoarcheology of this area. The area of interest is admirably described by the 19th century traveler John MacGregor, who stood at the top of the Castle of Subeibeh (Mezudat Nimrod) and wrote (MacGregor, 1870, p. 234) "From this lonely perch, about 1500 feet above the plain, the panorama is superb. The hills of Bashan are cleft in front, and they frame the wide-spread picture. To the left, and farthest off, are the gleaming waters of Merom (marsh of Hooleh). In front is the Galilean chain, and on the right is Hermon". MacGregor came to this lookout point "to scan from hence how the Rob Roy could paddle through the marsh of Hooleh; to get, if possible, some little inkling of where the Jordan spreads its lost waters, and how they are gathered again into one before the last long leap of 'the Descender' ". He was one of the first to scientifically study the Hula Valley and its surrounding area. From that time on, many researchers took advantage of the fact that this region is exceptional in its variegated geological, geomorphological, biological, and archeological features, which are observed in a concentrated well-exposed area. Marine and continental sequences from the Jurassic to the Holocene, intrusive and extrusive magmatics, complex patterns of faults and folds partly related to the segmentation of the Dead Sea Fault, and geomorphological features related to later stages of evolution have been the focus of intensive research. This volume presents the recent achievements of this research. A new 1:50,000 geological map of the Metulla quadrangle by *Sneh* and *Weinberger* is attached as a supplement to this special issue.

The subsurface shape of the Hula basin is not well constrained. *Ryabakov¨ Fleischer* and *ten Brink* use a 3-D gravity inversion technique to model the shape of this basin. Their model shows a rhomb-shaped graben filled with approximately 4 km of young sediments in the deepest part of the basin. Curvature attributes of the gravity field depict the main fault pattern, suggesting that the Hula basin is bordered by steep-sided, deep basement faults on the western and eastern sides and by gradual, en echelon step faults on the southern and northern margins of the basin.

The area east of the Hula Valley is part of the Arabian plate while the area west of it is part of the African plate. In light of the new mapping of the Metulla quadrangle, *Sneh* and *Weinberger* present the updated tectonic framework of this area and the stratigraphy on both sides of the Dead Sea Fault. Their stratigraphic analysis of Jurassic to Eocene rock units provides ample evidence for the left-lateral offset along the Dead Sea Fault.

The Plio-Pleistocene basalts that cover the Golan heights serve as a regional aquifer that is exploited by both Israel and Syria. *Dafny*, *Gvirtzman*, *Burg*, and *Fleischer* define the boundaries of the aquifer and divide it into sub-basins and quantify the flow field in each. They show that the flow direction in both sub-basins is westward to the Jordan Valley.

Gur, *Bar-Matthews*, and *Sass* monitored three springs in the northern Hula Valley—the Dan, Banias, and Kezinim, during 1996–2000. This monitoring revealed distinct hydrological and chemical characteristics of these springs. They report that the Kezinim spring is the warmest and most saline relative to the other springs and suggest that it is fed by diffusive flow. The Dan spring, the largest and the most diluted, is related to a large and distant

reservoir, mostly of conduit (karstic) flow pattern. The Banyas spring is the most variable of the three, with both a karstic source dominating the winter and spring discharge, and a diffusive source which is clearly evident as an end member in the fall.

Prior to the study of *Weinberger, Harlavan,* and *Sneh,* Lower Basalt volcanics were not found in the area between the southern Golan heights and Mount Hermon. It was unclear if this was because younger (Plio-Pleistocene) volcanics obscure the Miocene volcanism or the lack of Miocene outcrops represents a spatial gap in the volcanic activity in that area. Recent dating of a basaltic dike intruding the southeastern flank of Mount Hermon yielded an age of 13.4 ± 0.2 Ma. These findings are discussed in light of the uncertainty related to the amount of left-lateral offset achieved by the end of the Middle Miocene along the Dead Sea Fault.

Traditionally, it was generally agreed that the Hula Valley was drained to the south at all times. *Kafri* and *Horowitz* challenge this by reassessing the clastic sequence along a south-north transect from Korazim to the Lebanese border and further north to Zahle'. They argue that the Pliocene drainage crossing the present-day Hula region flowed northward, reaching the Mediterranean through the Beqa'a Valley and Tripoli graben.

The geomorphic response to tectonic activity of the western edge of the Hula Valley (Naftali Mountains) was examined by *Shtober Zisu, Greenbaum, Inbar,* and *Flexer.* They show that the area between Nahal Qadesh and Qiryat Shemona, facing deeper parts of the Hula depression, is characterized by morphometric indices typical of area with high tectonic activity. Morphometric indices obtained for the Kefar Gil'adi region reflect a different geologic setting, apparently with relatively small vertical tectonic movements.

The intensity and direction of the geomagnetic field have changed over time. One major difficulty is to determine the precise age of these changes. *Segal, Marco,* and *Ellenblum* reveal the properties of the geomagnetic field on 24 August 1179, when the construction of the Crusader Fortress Vadum Iacob was terminated by the Arab conquest on that date. They also show how the paleomagnetic study helps to resolve the precise function of the archaeological installations in that site.

The Enan archaeological site in the southwestern Hula Valley is one of the most representative Natufian sites. *Itkis, Khesin, Eppelbaum,* and *Khalaily* carried out magnetic prospecting southeast of the excavated part of the site, which revealed a number of circular magnetic anomalies that may indicate fireplaces, ash spots or a whole dwelling. Their results demonstrate how high resolution magnetic prospecting helps to determine the borders of Natufian villages and other similar sites.

Grossowicz, Sivan, and *Heller* report on an overall continuity of the *Melanopsis* fauna in the Jordan Valley throughout the Pleistocene. The fossil hybrids of the Jordan Valley, revealed also in this study, offer the earliest direct evidence of hybridization among mollusks. Correlations with lithology suggest that some of the *Melanopsis* species were lake dwellers, while others were associated with springs or river/lake banks.

We hope that the present collection of papers will inspire more earth science research in northern Israel. We thank the editors of the *Israel Journal of Earth Sciences,* Ahuva Almogi-Labin and Alan Matthews for encouraging us to gather and edit original contributions for this special issue on the Hula Valley. Generous financial support from the Geological Survey of Israel made it possible to add the 1:50,000 geological map of the Metulla quadrangle as a supplement to this special issue. We are indebted to the twenty-five partly anonymous colleagues, who assisted in reviewing and selecting the papers presented in this volume.

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REFERENCE

MacGregor, M.A., J., 1870. The Rob Roy on the Jordan, Nile, Red Sea, and Gennesareth. A canoe cruise in Palestine and Egypt, and the water of Damascus, John Murray, London, 474 p.