

filled the same drainage system. 3. "Channel" Facies - well rounded, exotic pebbles, locally with large boulders, fill a channel in rocks of the Judea Group close to Nahal Hameishar south of the main fault.

Structural Geology

Three main elements form the structural pattern of the mapped area:

1. Areif-Bature fault: This fault is part of the Negev-Sinai shear zone. It was mapped in the present work between Ma'ale Hameishar to Har Massa. It is a right lateral strike-slip fault, indicated by the direction of secondary structures and by the sense of movement on joints sub-parallel to the main fault. The amount of movement was calculated by measuring the shortening in structural cross-sections parallel to the fault which in the measured area has an en echelon pattern. The result was 250 m. Stratigraphic evidence suggests movement during the Neogene.

2. Mezaq-Neqarot Fault: This fault trends N-S to N20E; it joins the Areif fault in the south, and almost reaches the Ramon fault in the north. It is sinistral strike-slip, with 170 m movement measured from sub-horizontal slickensides. It is also Neogene.

3. Badad Anticline: The anticline has a moderately dipping northern flank, and a steep flexure to the south which parallels the Areif and Mezaq Neqarot faults.

The trends of the two main faults are not ideally oriented for a conjugate set of strike-slip faults. However, evidence for Senonian activity along parts of these faults, suggests that they are rejuvinations of one or more

lines of weakness which could explain the geometric relationship between them. Movement on two sets of joints which are parallel to the main faults, suggest that the latter are contemporaneous.

Geological History

Lower Cretaceous to Coniacian - sedimentation of all units in relatively stable conditions, with no tectonic activity.

Coniacian to Lower Eocene - this period was characterized by the formation of fold structures along the Har Gevim-Har Massa-Nahal Hadav line (proto Areif-Bature line); erosional channels at base of Menuha Formation; truncation and variation in thickness in Mishash Formation and angular unconformities between the Mishash and overlying formations.

Lower-Upper Eocene - a tectonically inactive period of sedimentation of the Avedat Group (Arava and southern Negev facies).

Neogene-Recent - red sandstones filled relief formed due to post-Eocene uplift; faulting on the two main faults accompanied by folding and formation of the Badad anticline.

References

- Benjamini, C., 1979. *The Geological History of Central and Southern Israel During the Eocene*. Unpub. Phd thesis, Hebrew Univ., Jerusalem, 2 vols., 83 p. (in Hebrew).



REGIONAL STRATIGRAPHY OF ISRAEL: A GUIDE TO GEOLOGICAL MAPPING

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The present version of the regional stratigraphy of Israel is based on the lithostratigraphic units accepted and mapped today. These units are defined, in most cases, according to the International Code of Stratigraphic Nomenclature for the establishment of Groups, Formations and Members.

In special cases, names have been retained (although not valid), because of common use. Most of the units presented herein have been published in geological maps of Israel on a scale of 1:100,000 and 1:50,000.

The chart is not intended as a correlation table but only as a compilation of the stratigraphic sequence exposed in the geographic regions mentioned, i.e., Sinai, Southern Israel, Central Israel, Northern Israel, and the Golan. However, in the setup presented, the reader will be tempted to carry out his or her own correlation. In cases where such a correlation is not obvious, the reader is advised to refer to the list of sources given below.

The color and stratigraphic symbol which will be

allotted to the various mapping units will be in accordance with international conventions.

In general, the reader should remember that such a chart as presented, is part of an ongoing process of research and recording of geological mapping and as such is open to discussion. Nevertheless, the authors feel that this chart will serve as a guide to geological mapping in Israel, and in general, assist those interested in gaining an insight into the stratigraphy of the country.

Sources

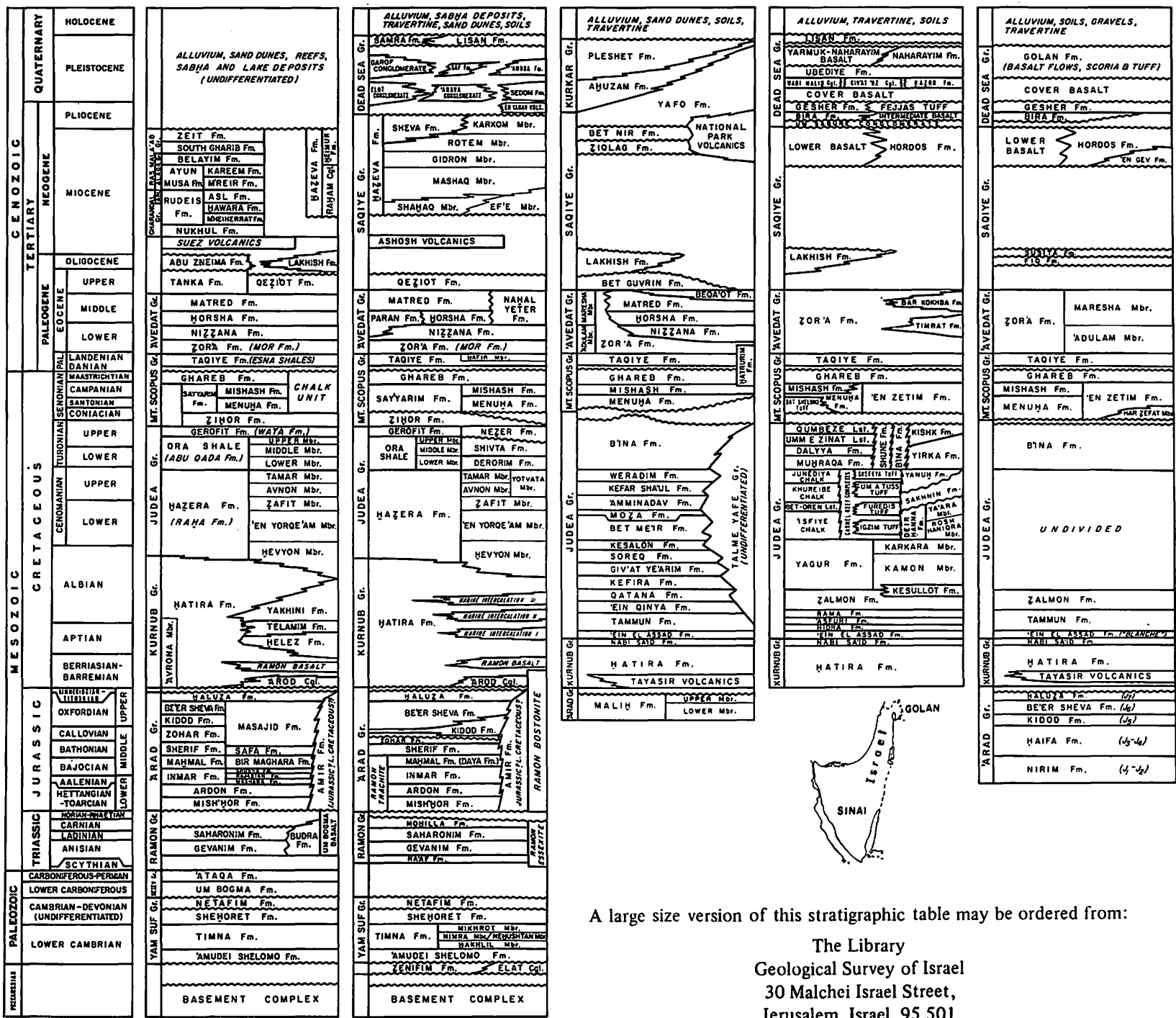
- Al-Far, D. M., 1965. Beitrage zur Geologie des Kohle-fuhrenden Gebietes von El Maghara, Nord Sinai (Agypten). *Geol. Mitt.*, vol. 4, pp. 397-429.
- Al-Far, D. M., 1966. Geology and coal deposits of Gabal El-Maghara (northern Sinai). *Egypt Geol. Surv., Pap.* 37, 59 p.
- Arkin, Y. and Braun, M., 1967. Correlation table of lithostratigraphic units of Israel. *Isr. Geol. Surv.*
- Arkin, Y. and Hamaoui, M., 1967. The Judea Group (Upper Cretaceous) in central and southern Israel. *Isr. Geol. Surv., Bull.* 42, 17 p.
- Arkin, Y., Nathan, Y. and Starinsky, A., 1972. Paleocene-early Eocene environments of deposition in the northern Negev (southern Israel). *Isr. Geol. Surv., Bull.* 56, 17 p.
- Arkin, Y., Bartov, Y. and Goldberg, M., 1975. The geology of Risan Aneiza, northern Sinai. *Isr. Geol. Surv., Rep.* MM/2/75, 19 p.
- Bartov, Y., 1974. *A Structural and Paleogeographical Study of the Central Sinai Faults and Domes.* Unpub. Phd thesis, Hebrew Univ., Jerusalem, 143 p. (in Hebrew).
- Bartov, Y., 1977. The geology of Gebel Um Hoseira-Gebel Burga, eastern Sinai. *Isr. Geol. Surv., Rep.* MM/77/2, 13 p.
- Bartov, Y., Eyal, Y., Garfunkel, Z. and Steinitz, G., 1972. Late Cretaceous and Tertiary stratigraphy and paleogeography of southern Israel. *Isr. J. Earth Sci.*, vol. 21, pp. 69-97.
- Bartov, Y. and Steinitz, G., 1977. Senonian tectonics of the Sinai and the Negev as reflected in the Sayarim Formation and equivalent units. *Isr. Geol. Soc., Ann. Meet., Abstracts*, pp. 40-41.
- Bartov, Y. and Steinitz, G., 1977. The Judea and Mount Scopus groups in the Negev and Sinai with trend surface analysis of the thickness data. *Isr. J. Earth Sci.*, vol. 26, pp. 119-148.
- Bartov, Y. and Steinitz, G., 1977. The geology of Gebel e Risha, eastern Sinai. *Isr. Geol. Surv., Rep.* MM/77/3, 11 p.
- Bartov, Y., Lewy, Z., Steinitz, G. and Zak, I., 1980. Mesozoic and Tertiary stratigraphy, paleogeography and structural history of the Gebel Areif en Naqa area, eastern Sinai. *Isr. J. Earth Sci.*, vol. 29, pp. 114-139.
- Begin, Z. B., 1975. The geology of the Jericho Sheet. *Isr. Geol. Surv., Bull.* 67, 35 p.
- Bein, A., 1974. *Reef Development in the Judea Group from the Carmel and the Coastal Plain, Israel.* Unpub. Phd thesis, Hebrew Univ., Jerusalem, 154 p. (in Hebrew).
- Benjamini, C., 1973. *The Stratigraphy and Structural Geology of the Sartaba Area.* Unpub. MSc thesis, Hebrew Univ., Jerusalem, 100 p.
- Benjamini, C., 1979. *The Geological History of Central and Southern Israel During the Eocene.* Unpub. Phd thesis, Hebrew Univ., Jerusalem, 83 p. (in Hebrew).
- Buchbinder, B., 1969. Geological map and explanatory notes of the Hashephela region, Israel. *Inst. Petrol. Res. Geophys., Rep.*
- Buchbinder, B., 1975. Stratigraphic significance of the alga Amphiroa in Neogene-Quaternary bioclastic sediments from Israel. *Isr. J. Earth Sci.*, vol. 24, pp. 44-48.
- Cook, P. J., Roth, I. and Mimran, Y., 1970. The geology of the Shechem syncline. *Isr. Geol. Surv., Rep.* MM/2/70, 20 p.
- Derin, B., 1974. *The Jurassic of Central and Northern Israel.* Unpub. Phd thesis, Hebrew Univ., Jerusalem, 152 p. (in Hebrew).
- Druckman, Y., 1974. The stratigraphy of the Triassic sequence in southern Israel. *Isr. Geol. Surv., Bull.* 64, 92 p.
- Garfunkel, Z., 1970. The Judea Group in the southern Negev. *Isr. Geol. Soc., Ann. Meet., Abstracts* pp. 26-28. (in Hebrew).
- Garfunkel, Z., Bartov, Y., Eyal, Y. and Steinitz, G., 1974. Raham conglomerate – new evidence for Neogene tectonism in the southern part of the Dead Sea Rift. *Geol. Mag.*, vol. 111, pp. 55-64.
- Garfunkel, Z. and Bartov, Y., 1977. The tectonics of the Suez Rift. *Isr. Geol. Surv., Bull.* 71, 44 p.
- Ghorab, M. A., 1960. Geologic observations on the surface and subsurface petroleum indications in the United Arab Republic. *2nd Arab Petroleum Cong.*, Beirut, vol. 2, pp. 25-38.
- Ghorab, M. A., 1961. Abnormal stratigraphic features in Ras Gharib oilfield. *3rd Arab Petroleum Cong.*, Alexandria, 11 p.
- Gilat, A., 1977. The geology of the Har Betah area, Judean Desert. *Isr. Geol. Surv., Rep.*, MM/4/77, 7 p.
- Goldberg, M., 1970. *The Lithostratigraphy of the Arad Group.* Unpub. Phd thesis, Hebrew Univ., Jerusalem, 137 p. (in Hebrew).
- Goldberg, M., 1971. The Jurassic section in Gebel

- Maghara, northern Sinai. *Isr. Geol. Soc., Ann. Meet., Abstracts*, pp. 9-12 (in Hebrew).
- Gvirtzman, G., 1970. *The Saqiye Group (Late Eocene to Early Pleistocene) in the Coastal Plain of Israel*. Unpub. Phd thesis, Hebrew Univ., Jerusalem, 170 p. (in Hebrew).
- Gvirtzman, G. and Buchbinder, B., 1969. Outcrops of Neogene formations in the central and southern coastal plain, Hashephela and Beer Sheba regions, Israel. *Isr. Geol. Surv., Bull.* 50, 72 p.
- Gvirtzman, G. and Buchbinder, B., 1976. The Late Tertiary of the coastal plain and continental shelf of Israel and its bearing on the history of the eastern Mediterranean. *Isr. Geol. Surv., Rep. OD/2/76*, 70 p.
- Hirsch, F., 1979. Jurassic bivalves and gastropods from northern Sinai and southern Israel. *Isr. J. Earth Sci.*, vol. 28, pp. 128-163.
- Horowitz, A., 1974. *The Late Cenozoic Stratigraphy and Paleogeography of Israel*. Tel Aviv Univ., 174 p.
- Kafri, U., 1969. *Geology and Groundwater of the Cenomanian Formations in Galilee, West of the Watershed*. Unpub. Phd thesis, Hebrew Univ., Jerusalem, 188 p. (in Hebrew).
- Kafri, U., 1972. Lithostratigraphy and environment of deposition, Judea Group, western and central Galilee, Israel. *Isr. Geol. Surv., Bull.* 54, 56 p.
- Lewy, Z., 1975. The geological history of southern Israel and Sinai during the Coniacian. *Isr. J. Earth Sci.*, vol. 24, pp. 19-43.
- Lewy, Z. and Raab, M., 1976. Mid-Cretaceous stratigraphy of the Middle East. *Museum d'Hist. Nat., Nice, Ann.*, vol. 4, pp. 32.1-32.20.
- Michelson, H., 1972. The hydrogeology of southern Golan Heights. *TAHAL Rep.*, 89 p. (in Hebrew).
- Michelson, H., 1979. *The Geology and Paleogeography of the Golan Heights*. Unpub. Phd thesis, Tel Aviv Univ., 163 p. (in Hebrew).
- Mimran, Y., 1972. The Tayasir volcanics: a Lower Cretaceous formation in the Shomeron, central Israel. *Isr. Geol. Surv., Bull.* 52, 9 p.
- Mor, D., 1973. *The Volcanism of the Central Golan Heights*. Unpub. MSc thesis, Hebrew Univ., Jerusalem, 179 p. (in Hebrew).
- Raab, M., Begin, Z. B. and Kafri, U., 1973. Paleogene lithostratigraphic units. *Isr. Geol. Surv., Strat. Comm., Rep.* 20.
- Roth, I., 1969. The geology of the northern Judean Desert. *Teva Va'aretz*, vol. 11, pp. 111-114, (in Hebrew).
- Said, R., 1962. *The Geology of Egypt*. Amsterdam, Elsevier, 377 p.
- Sass, E., Bein, A., Arkin, Y. and Bartov, Y., 1977. Geological photomap (1:10,000) — Zikhron Ya'akov. *Isr. Geol. Surv.*
- Schulman, N., 1966. The Qiryat Shemona (northern Jordan Valley) basalt ridge: a tilted fault block. *Isr. J. Earth Sci.*, vol. 15, pp. 161-164.
- Schulman, N., 1967. Remarks on the Quaternary in the northern Jordan Valley. *Isr. J. Earth Sci.*, vol. 16, pp. 104-106.
- Schulman, N. and Rosenthal, E., 1968. Neogene and Quaternary of the Marma Feiyad area, south of Beit Shean. *Isr. Geol. Surv. Rep. Hydro/2/68*, 18 p.
- Schulman, N. and Bartov, Y., 1978. Tectonics and sedimentation along the Rift Valley. *10th Int. Cong. Sedimen., Jerusalem, Guidebook*, part 2, pp. 35-94.
- Shahar, Y., 1973. The Hazeva Formation in the Oron-Efe syncline, Israel. *Isr. J. Earth Sci.*, vol. 22, pp. 31-49.
- Sneh, A., 1967. The Hazeva Formation. *Isr. Geol. Surv., Rep. OD/6/67*, pp. 7-10.
- Steinitz, G., Bartov, Y. and Hunziker, J. C., 1978. K-Ar age determinations of some Miocene-Pliocene basalts in Israel: their significance to the tectonics of the Rift Valley. *Geol. Mag.*, vol. 115, pp. 329-340.
- Weissbrod, T., 1969. The Paleozoic of Israel and adjacent countries: Parts 1 and 2. *Isr. Geol. Surv., Bull.* 47, 35 p. and *Bull.* 48, 32 p.
- Weissbrod, T., 1976. The Permian in the Near East. *The Continental Permian in Central, West and South Europe*, H. Falke (ed.), Holland, Reidel, pp. 200-214.



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A large size version of this stratigraphic table may be ordered from:

The Library
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