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A Late Albian *Hypengonoceras* (Ammonoidea) from the "Bentonite-Bed" at Makhtesh Ramon, Southern Israel

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Project: MID-CRETACEOUS EVENTS

Abstract

***Hypengonoceras* (Ammonoidea; Hoplitaceae) of Late Albian age was found in the "Bentonite-Bed" at the lower part of the Hazera Formation (Hevyon Member) at Makhtesh Ramon, southern Israel. It is poorly preserved due to shell dissolution and lateral compression. However, its outline and a few sutures enable its generic identification. A calcareous concentration at the dorso-posterior part of the living-chamber seems to represent the stomach content.**

Introduction

During an excursion of the Department of Geology of Ben Gurion University of the Negev in Beer Sheva, a student, Yoram Nachmani, found an ammonite in the "Bentonite-Bed" in the lower part of the Hazera Formation (Hevyon Member) at the northern escarpment of Makhtesh Ramon, southern Israel (Fig. 1). This part of the Cretaceous sequence was attributed to the Lower Cenomanian on the basis of foraminifera and ostracods (Hamaoui and Gerry, 1965; Rosenfeld and Raab, 1974). Gerry (in Hamaoui and Gerry, 1965, p. 23) recorded from the lower part of this formation species of the "*Neocythere*" group, known from the late Lower Cretaceous in Israel. Recently, Lewy and Raab (1976) suggested a Late Albian age for almost the whole Hevyon Member due to the occurrence of the lowermost Cenomanian ammonites at its very top (base 'En-Yorqeam Member). This dating is now supported by the incidental finding of *Hypengonoceras* some 27 m above base of the Hazera Formation (base Hevyon Member, Fig. 2). This level occurs 100 m above the single Albian marine intercalation which reached this southern part of Israel. More to the north, at Makhtesh Hatira (Fig. 1), at least three calcareous marine units may be recognized in between the sandstones, the upper one of which (assumed to be the lithostratigraphic equivalent of the single Albian marine intercalation of Makhtesh Ramon) contains *Knemiceras* of (Early to Middle?) Albian age (Greenberg, 1968).

The state of preservation of the *Hypengonoceras* is poor due to the dissolution of the shell and the

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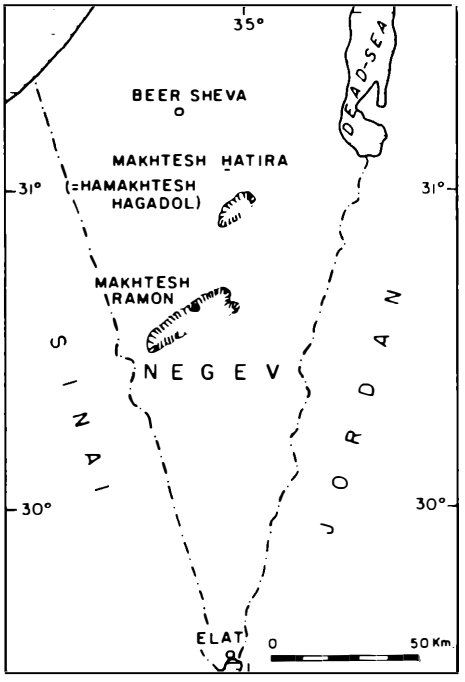

Fig. 1. Southern Israel. Location of section (Fig. 2).

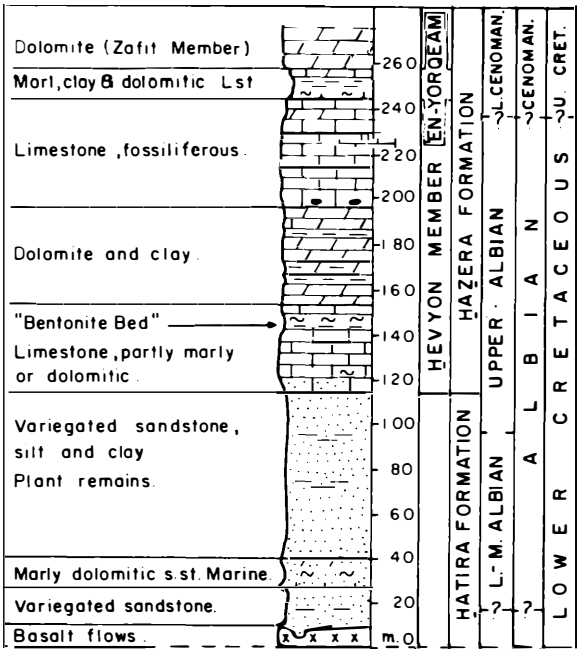

Fig. 2. Albian-Lower Cenomanian sequence at the northern escarpment of Makhtesh Ramon (coord.: 1331/0048; after Zilbermann, 1977).

lateral compression of the internal cast. Only some of the sutures are preserved as well as a tongue-shaped calcareous concentration at the postero-dorsal part

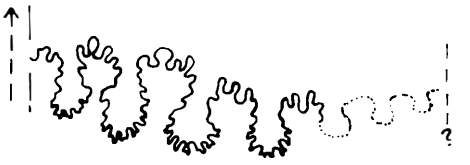

Fig. 3. Suture-line of *Hypengonoceras* sp. (x 1).

of the body-chamber. This is assumed to be the crop content, and this assumption is based on a comparison with certain, rare findings in European Jurassic ammonites (Lehmann, 1971; Lehmann and Weitschat, 1973).

Superfamily HOPLITACEAE H. Douvillé, 1890
Family PLACENTICERATIDAE Hyatt, 1900
Genus ***Hypengonoceras*** Spath, 1922
Type-species: *Placenticeras warthi* Kossmat, 1895.

Hypengonoceras sp.
Figs. 3 & 4

Description: The preserved conch has a diameter of 12 cm at the end of the phragmocone. It was laterally compressed during the compaction of the sediment so that only the outline of the shell occurs, whereas any ornament that may have been present, such as ribbing and umbilical tubercles, are now missing. The ventral margins show the ventro-lateral clavi (Fig. 4). The conch is involutely coiled with an umbilical ratio of approximately 0.15 (U/D = 20/130). Most of the outer shell material was dissolved, but part of the sutures and the inner volutions (young ontogenetic stages) of the conch are preserved in the form of a thin, chalky film. The sutures are typically placenticeratid (Fig. 3) with a broad first lateral saddle divided into three branches. These, as well as the umbilical auxiliary saddles tend to have a "phylloid" pattern of rounded tips in contrast to the "ammonitic" pattern of the lobes. Both the lobes and the saddles are tree-shaped with rather narrow necks. Because of the poor preservation the umbilical part of the suture it is only tentatively drawn as is the breadth of the ventral region and the position of the siphonal line (dashed arrow in Fig. 3).

Discussion: This poorly preserved specimen is attributed to the placenticeratid genus *Hypengonoceras* on the basis of the clavate ventro-lateral margins and the phylloid pattern of the saddles. Many *Hypengonoceras* species tend to simple bifid phylloid saddle tips (e.g. *H. warthi* Kossmat, in Moore, 1957, L-391;

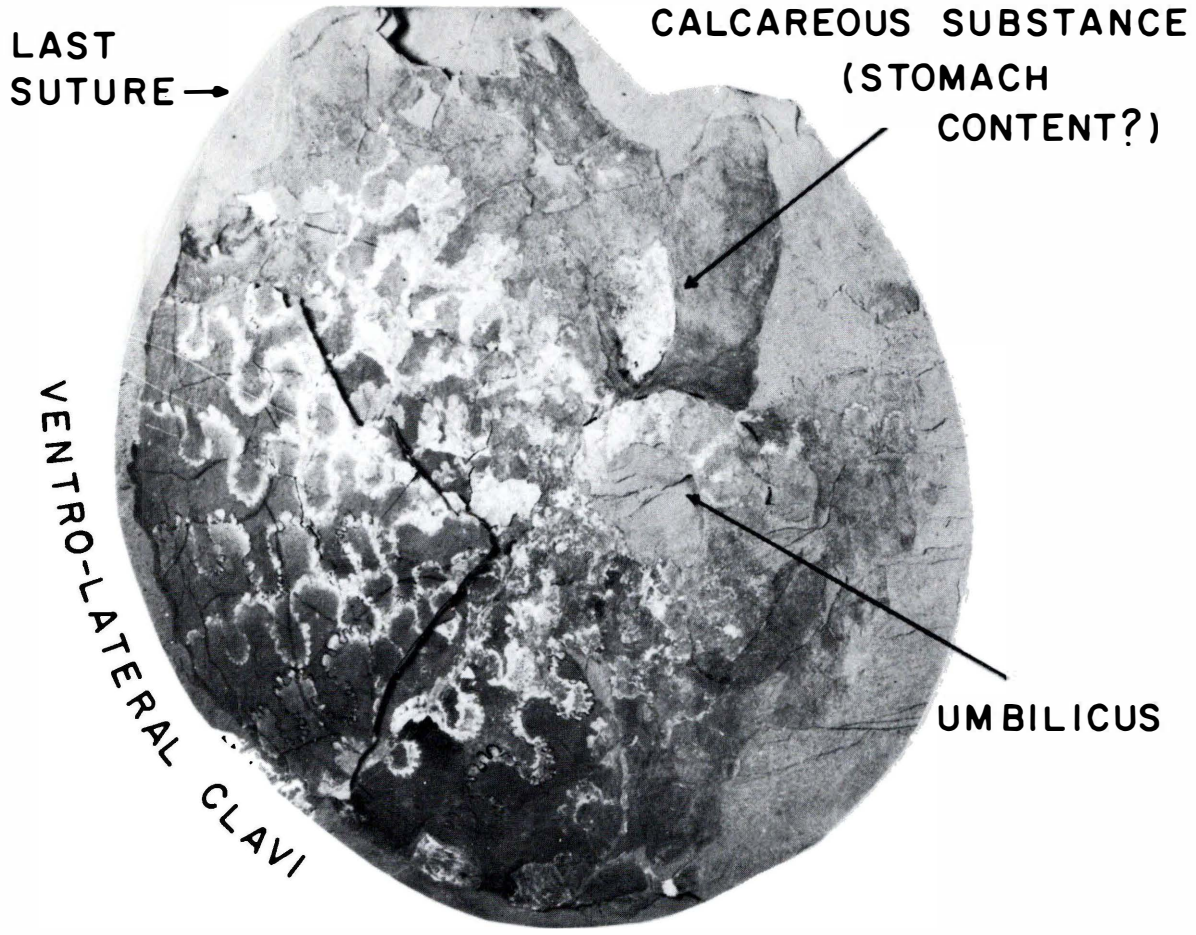

Fig. 4. ***Hypengonoceras*** sp. (M-7865), xl; embedded in clay, Late Albian, Hevyon Member of Hazera Formation at Makhtesh Ramon, southern Israel. White areas are calcareous concentrations such as septa and stomach content (?).

H. decaryi Collignon, 1963, pl. 291, fig. 1269). However some species have a more complex pattern (e.g. *H. chouberti* Collignon, 1966, pl. 5). The same is true in our specimen.

Proplacenticeras may obtain a similar shape as *Hypengonoceras*. This genus is known from the Late Albian (Collignon, 1963, p. 126) together with *Hypengonoceras* and continued to exist during the Cenomanian to the Coniacian (Moore, 1957, L-390). By identifying the denticulated "ammonitic" saddles of *Proplacenticeras* it may be distinguished from quite similar *Hypengonoceras*.

Adult specimens of the Lower Cenomanian placenticeratid *Turkmenites* Iljin (1975) may resemble our specimen. However *Turkmenites* has a simple ammonitic sutures with phylloid elements in the lobes and not in the saddles (Iljin, 1975, pl. 33, figs. 1–2) thus differing from our *Hypengonoceras*.

Albian and Lower Cenomanian *Engonoceras* species (e.g., *E. bravoense* Böse, 1928, *E. uddeni* Cragin in Hyatt, 1903, and *E. retardum* Hyatt, 1903, all from the Lower Cenomanian of Texas (Young, 1978, p. 19)) tend to have entire saddles in contrast to the denticulated ones in our specimen. It seems that inspite of the poor state of preservation our specimen may be regarded as a *Hypengonoceras* of Late Albian age, whereas an undoubted specific identification is impossible. This is in agreement with the occurrence of lowermost Cenomanian ammonites above it, and the Middle (?) Albian marine intercalation below.

The "Bentonite-Bed" contains complete and fragmentary crustaceans besides a few concentrations of small oysters. It is a homogeneous clay layer (therefore being mined) except for small pyrite crystals. The environment of deposition of this bed seems to

have been of a very low-energy water and oxygen-depleted (reducing) bottom conditions, perhaps without any bottom currents.

Hypengonoceras occurs along the southern margins of the Tethys from southern India (Kossmat, 1895) in the east, through Madagascar (Collignon, 1963), Israel (herein), southeast Spain (Arias and Wiedmann, 1977), to west Morocco (Tarfaya, Collignon, 1966) in the west. It is attributed in all these regions to the Upper Albian.

Relics of Internal Features?

A notable calcareous concentration occurs at the dorsal posterior part of the body-chamber (Fig. 4). It is tongue-shaped and forms a depression, indicating that once it was occupied by a volume of solid matter. The shell in this part is completely absent and the living-chamber is preserved as a brownish coloured shallow imprint in the grey clay. Also part of the shell of the inner volution within the living-chamber is missing too. It seems that these parts of the shell, which were in contact with the ambient bottom (or interstitial) water were rapidly dissolved whereas the inner volutions and the septa were somewhat protected by the outer volution and later by the clay. The calcareous concentration within the living-chamber was not dissolved as was the case in the aragonitic shell of the ammonite, probably because it partly consisted of calcite. It does not seem to be an incidental accumulation of carbonate during shell diagenesis. It is more likely an original concentration of calcareous material. This calcareous substance may be compared to stomach contents of a few Jurassic European ammonites as described and illustrated by Lehmann (1971) and Lehmann and Weitschat (1973) in the form of shell fragments concentrated in the dorsal apical part of the living-chamber. In our *Hypengonoceras* this calcareous substance is structureless and lies in place of the ventro-lateral part of the inner (dissolved) volution. It seems possible that the solid stomach content of the decomposing soft body slipped down and dorsally along the inner surface of the body-chamber to its present dorsal position. Similarly there exists the possibility that the aptychi (hitherto not recorded from this group) may have been moved adapically during the decomposition of the soft tissues. Both interpretations are impossible to prove. However, the position of the calcareous concentration and the calm marine environment of deposition deduced for the "Bentonite-Bed" are in favor of the first interpretation, namely the stomach content of this *Hypengonoceras*.

Acknowledgements

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References

Arias, C. and J. Wiedmann. 1977. Ammoniten und Alter der Utrillas-Schichten (Mittelkreide) in der östlichen Provinz Albacete, SE Spanien. Neues Jahrb. Geol. Paläont. Monatsh. 1: 1–14, 5 figs.

Böse, E. 1928. Cretaceous ammonites from Texas and northern Mexico. Univ. Texas Bull. 2748: 143–312, pls. 1–18.

Collignon, M. 1963. Atlas des fossiles caractéristiques de Madagascar (Ammonites), Fasc. 10 (Albien). Serv. Géol. Tananarive. 15, et 1–184 p., pls. 241–317.

Collignon, M. 1966. Les céphalopodes crétacés du bassin côtier de Tarfaya. Notes et Mém. Serv. Géol. Maroc, 175: 148 p., 35 pls.

Greenberg, M. 1968. Type section of the Lower Cretaceous Hatira Formation in Hamakhtesh Hagadol, northern Negev. Geol. Surv. Israel. Strat. Sec. 5: 6 p.

Hamaoui, M. and E. Gerry. 1965. Biostratigraphy of the Cenomanian type Hazera Formation. Geol. Surv. Israel. Strat. Sec. 2b: 27 p.

Hyatt, A. 1903. Pseudoceratites of the Cretaceous. U.S. Geol. Surv. Monogr., 44: 351 p., 47 pls.

Iljin, V.D. 1975. Ammonites of the family Placenticeratidae Hyatt from Upper Cretaceous sediments of Central Asia. In: Besnosov, N.V., ed. New data on the stratigraphy of Mesozoic sediments of the oil-gas regions of south U.S.S.R. Vnigni 171: 154–174, 196–200, pls. 27–35.

Kossmat, F. 1895. Untersuchungen über die südindische Kreideformation (1 Teil). Beitr. Paläont. Geol. Österr.-Ung. u.d. Orients 9: 97–203 (1–107), pls. 15–25 (1–11).

Lehmann, U. 1971. Jaws, radula and crop of *Arnioceras* (Ammonoidea). Palaeontology 14: 338–341, pl. 61.

Lehmann, U and W. Weitschat. 1973. Zur Anatomie und Ökologie von Ammoniten: Funde von Kropf und Kiemen. Paläont. Z. 47: 69–76, pl. 11, 1 fig.

Lewy, Z. and M. Raab. 1976. Mid-Cretaceous stratigraphy of the Middle East. Ann. Mus. Hist. Nat. Nice IV: (XXXII) 1–20, 2 pls., 3 figs.

Moore, R.C. ed. 1957. Treatise on Invertebrate Paleontology, Part L, Mollusca 4, Cephalopoda, Ammonoidea. Geol. Soc. Am. & Univ. Kansas. 490 pp., 558 figs.

Rosenfeld, A. and M. Raab. 1974. Cenomanian-Turonian ostracodes from the Judea Group in Israel. Geol. Surv. Isr. Bull. No. 62: 64 p., 36 figs., 6 pls.

Young, K. 1978. Lower Cenomanian and Late Albian (Cretaceous) Ammonites, Especially Lyelliceratidae, of Texas and Mexico. Texas Mem. Mus. Bull. 26: 99 p., 9 pls., 24 figs.

Zilbermann, E. 1977. The Geology of Sa'ad-Nafha Lineament, Avedat Plateau. Geol. Surv. Israel Rep. MM/6/77, 70 p., 22 sec., 28 figs.