

## A Lower Bathonian ammonite fauna from Erice (Western Sicily)

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(with 3 figures and 2 plates)

### Abstract

A Lower Bathonian ammonite fauna is described from the Western Sicilian classic Jurassic locality of Monte Erice. The stratigraphic evaluation of the fauna suggests that the horizon yielding the fauna, which is very similar to those mentioned by classic works of GEMMELLARO and WENDT, represents a narrow condensation limited only to the Zigzag Zone. The main importance of the assemblage is the occurrence of "*Tulites*" *tuwaiqensis* ARKELL, 1953, which is an ammonite recorded previously only from the endemic fauna of Arabia. The here described other forms (e.g. *Oxyerites*, *Oecotraustes*, *Prohcticoceras*, morphoceratids, etc.) give an exact datation for this find of palaeobiogeographic significance.

### Introduction

Monte Erice (or Monte San Giuliano in the older literature) of Western Sicily is a well-known place for Middle Jurassic ammonites. The best-known faunas are of Aalenian and Bajocian age, because Erice localities yielded the material for the classic works of GEMMELLARO (1886), DE GREGORIO (1886) and RENZ (1925). Most significant development in the Jurassic stratigraphy of the region came from the works of WENDT (1963, 1971), who recorded several Middle Jurassic faunal localities in his detailed descriptions. It is Contrada Difali, one of the Bathonian localities of WENDT, what is treated here in this paper with some more information.

The section at Contrada Difali is a series of road-cuts on the Rocce del Calderera which forms the southern slope of Monte Erice. The best exposures are along the serpentine road leading from Trapani up to the town of Erice on top of the hill. The cuts expose a sequence of well-bedded cherty limestone with marly intercalations. In 1983 a small outcrop near to the profile of WENDT (1963, pl. 6, ME 1; 1971, table 1, A) was visible, exposing the top of the siliceous, marly limestone. In this topmost part a fossiliferous horizon was discovered, possibly the same which was described in detail by WENDT (1964, pp 67-68, 1971, p.60). This locality is very near to the one what GEMMELLARO (1877) mentioned previously as Contrada Cappuccini, and where he collected a small ammonite and brachiopod fauna.

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The earlier data of GEMMELLARO and WENDT indicated the Bathonian, and our collection yielded also Bathonian forms. However this new collection made possible to restrict the age of the represented fauna. Additionally, one faunal element, the ammonite "*Tulites*" *tuwaiqensis* ARKELL, which was previously known only from the highly endemic Arabian Bathonian fauna, made possible to draw some palaeobiogeographic conclusions (GALÁČZ 1998, 1999). The aim of this paper is to document the whole fauna where this important element occurred.

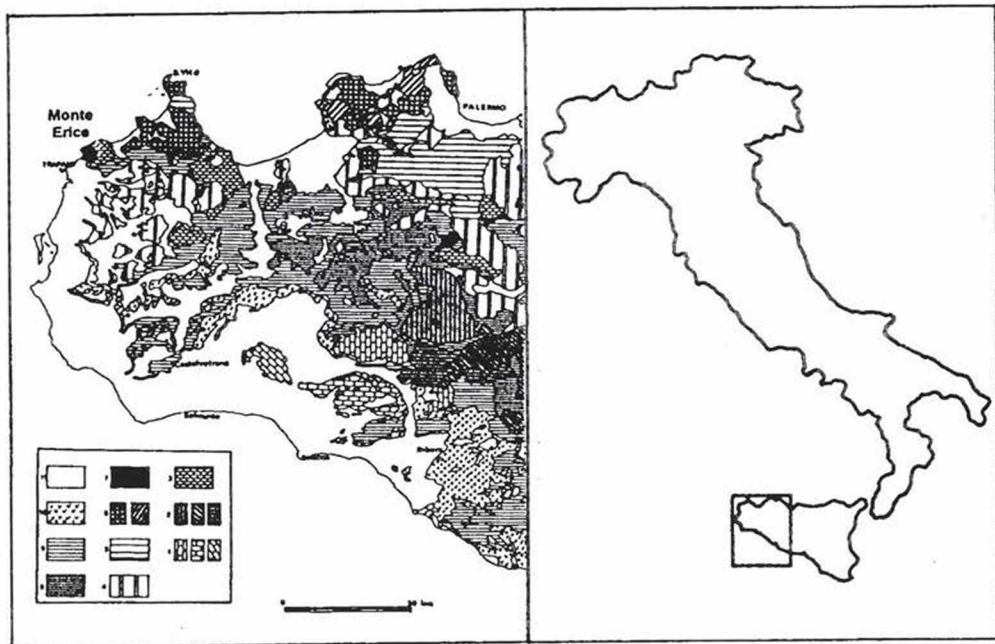


Fig. 1. Monte Erice in Western Sicily. A structural-stratigraphic map (after CATALANO & D'ARGENIO, 1981, fig. 11). Legend: 1 = Saccense s.s. units; 2 = Sicanian s.s. units; 3 = Trapanese s.s. units; 4 = Numidian Flysch; 5 = Imerese units; 6 = Panormide units; 7 = Sicillidi units; 8 = Serravallian to Lower Tortonian pelagic marls belonging to the Trapanese, Sicanian and Saccense units; 9 = Upper Tortonian - Middle Messinian sediments; 10 = Upper Messinian - Lower Pliocene sediments; 11 = Middle Pliocene - Pleistocene sediments.

### Stratigraphy

Monte Erice (Fig. 1), rising above the northwestern coast of Sicily, is one of the northwest Sicilian Trapanese carbonate-platform derived tectonic units (CATALANO 1997). Its allochthonous mass is built up of uppermost Triassic to Cretaceous carbonates: shallow-water dolomitic-calcareous rocks up to the Pliensbachian, intraplatform siliceous, marly limestones up to the Lower Cretaceous, then varied (deeper-water and reefoid) carbonates in the Upper Cretaceous (WENDT 1971). The

Middle Jurassic sequence is intermitted with apparent gaps of sedimentation, which are marked with marly, nodular condensation levels. These condensation levels yielded rich ammonite faunas, including the one at Contrada Difali.

The first to record Bathonian fossils from this horizon was GEMMELLARO (1877, pp.140-142). He mentioned *Phylloceras isomorphum* GEMM., "*Stephanoceras Daubenyi*" GEMM. (= *Cadomites daubenyi*) from here, and this is the type locality of his "*Haploceras*" (= *Lissoceras*) *monachum* (figured in GEMMELLARO 1886, pl.20, figs 2-3). Additionally, he described from here "*Terebratula Erycina*", "*Terebratula Phryne*" and recorded "*Rhynchonella*" *atla* OPPEL.

WENDT (1963, pp.68-69, pl.6) gave a detailed description on the Bathonian condensation horizon and the yielded fauna. He gave a list of ammonites combined from those found in the Difali and the Cappuccini sections. In his list of ammonites (some of them described and figured in the palaeontological section of his work) there is one what he interpreted as Upper Bathonian (*Prohecticoceras retrocostatum*), and another determined as *Dimorphinites dimorphus* (WENDT 1963, pl.21, fig.3), a species which is known only from the Upper Bajocian. His conclusion was that the age of the fossil bed is Upper Bathonian, though it contains mainly Lower Bathonian forms, thus in the formation of the bed reworking played a greater role. The same list of ammonites and apparently the same conclusion on the age (i.e. "strongly condensed Bathonian") is mentioned in WENDT's subsequent (1971) paper. However, these above mentioned crucial forms can be interpreted differently: ELMI (1967, p.600) excluded WENDT's form from the synonymy of *Prohecticoceras retrocostatum*, and the *Dimorphinites dimorphus* was mentioned by WENDT himself as "questionable".

In 1983, when we visited the locality, small-scale road-construction works exposed the Bathonian faunal level. It is consisted of a single layer above a hard-ground on top of the siliceous, well-bedded greyish limestone. The layer is formed by a greyish – light-brown, yellowishly weathering marly, somewhat nodular and glauconitic limestone. Thickness is variable, but generally of 20-25 cm. Fossils are common. Most frequent are ammonites preserved as internal moulds. Most common ammonites are the phylloceratids and opeliids (*Oxycerites*, *Oecotraustes*, *Prohecticoceras*). Brachiopods are also abundant, other macrofossils are rare belemnite rostra. Above the fossil bed the grey siliceous limestone follows. In a small quarry across the road this overlying limestone gave *Euaspidoceras* sp. which indicates the Oxfordian, probably the horizon corresponding to that mentioned by CHRIST (1960, p.33).

The limited collection have yielded the following ammonites:

*Phylloceras* sp. indet.

*Calliphylloceras disputabile* (ZITTEL)

*Adabofoloceras subobtusum* (KUDERNATSCH)

*Lissoceras* (*Lissoceras*) cf. *ventriplanum* WENDT

*Oxycerites yeovilensis* (ROLLIER)

*Oxycerites* sp. indet.

*Oecotraustes* (*Oecotraustes*) *bradleyi* ARKELL

*Prohecticoceras bisculptum* (OPPEL)

*Prohecticoceras* sp. nov.?

*Cadomites* sp.

*Asphinctites pinguis* (DE GROSSOUVRE)

*Asphinctites* sp. aff. *pinguis* (DE GROSSOUVRE)

?*Asphinctites* sp. indet.

*Morphoceras macrescens* (BUCKMAN)

"*Tulites*" *tuwaiquensis* ARKELL

?*Procerites* (?*Siemiradzka*) sp. indet.

This is clearly a Lower Bathonian fauna, as shown by *O. yeovilensis*, *Oe. bradleyi*, *M. macrescens* and the *Asphinctites* spp. Undoubtedly higher Bathonian species did not occur. However, *Morphoceras* are practically unknown above the *Macrescens* Subzone, and genus *Prohecticoceras* is rare below the topmost part of the *Zigzag* Zone. The co-occurrence of these forms indicates a limited condensation, which resulted that the elements of the *Macrescens*, *Yeovilensis* and *Tenuiplicatus* Subzones are together. The Lower Bathonian age of the fauna is also supported by the occurrence of "*Tulites*" *tuwaiquensis*. This form, previously known only from Central Arabia, belongs to the so-called *Tulites* fauna (D4), which is of Early Bathonian in age (ENAY et al. 1987, ENAY & MANGOLD, 1994).

### Systematic description of the important ammonites

The here described specimens are deposited in the Collections of the Department of Palaeontology of the Eötvös L. University, Budapest. The measurements were made and listed traditionally: diameter, whorl-height, whorl-width and umbilical width, the latter three with percentages of the diameter in parantheses.

Order Ammonoidea ZITTEL, 1884

Suborder Phylloceratina ARKELL, 1950

Family Phylloceratidae ZITTEL, 1884

Genus *Calliphylloceras* SPATH, 1927

*Calliphylloceras disputabile* (ZITTEL, 1868)

Plate 1, fig. 1.

1852. *Ammonites tatricus* PUSCH - KUDERNATSCH, p.4, pl.1, figs 1-4.

\*1868. *Phylloceras disputabile* ZITT. (= *A. Tatricus* KUD. non PUSCH) - ZITTEL, p.606.

1980. *Calliphylloceras disputabile* (ZITTEL, 1868) - GALÁ CZ, p.37, pl.5, figs 3-6, text-figs 25-29 (cum syn.)

**Material:** Two better preserved and several fragmentary specimens.

**Measurements:** 56 mm; 31 mm (55.3%); 18 mm (32.1%); 4 mm (7.1%)  
83 mm; 48 mm (57.8 %); 28.5 mm (34.3%); 6.5 mm (7.8%)

58 mm; 34.5 mm (59.5%); 18.5 mm (31.9%); 4 mm (6.9%)

**Description:** The figured specimen is a medium-sized phylloceratid with narrow umbilicus, oblique umbilical wall, convex whorl-sides and rounded venter. There are 6 slightly prorsiradiate constrictions on the last preserved phragmocone whorl.

The suture-line is relatively simple, with high saddles. The first lateral saddle is triphyllid, other saddles have diphyllid endings.

**Remarks:** On the basis of the present material there is nothing to add to previous discussions on the species. The only difference what these specimens shows is in the whorl-width: this is somewhat narrower in the Contrada Difali forms than in specimens described from other Mediterranean localities.

**Distribution:** According to WENDT (1963, p.115) *C. disputabile* is the most common ammonite species in higher Middle Jurassic faunas of Sicily. It is true for several other Mediterranean faunas, too. The stratigraphic range of the species is wide, covering most of the Bajocian, Bathonian and Callovian (GALÁ CZ 1980, p.41).

Suborder Ammonitina HYATT, 1889

Superfamily Haplocerataceae ZITTEL, 1884

Family Lissoceratidae DOUVILLÉ, 1885

Genus *Lissoceras* BAYLE, 1879

*Lissoceras* (*Lissoceras*) cf. *ventriplanum* WENDT, 1963

Plate 1, fig. 2.

cf. \*1963. *Lissoceras ventriplanum* n.sp. - WENDT, p.120, pl.17, fig.4, pl.23, fig.2.

cf. 1986. *Lissoceras ventriplanum* WENDT - SANDOVAL, p.442, pl.1, fig.11, pl.2, figs 1-3, text-figs 5a-d.

**Material:** Three incomplete, fragmentary specimens.

**Description:** Macroconchiate *Lissoceras* with medium-wide umbilicus, rounded umbilical margin, flattened whorl-sides and nearly tabulate venter. It probably attains big sizes, because the biggest specimen (pl.I, fig.2) is wholly septate at ca. 55 mm diameter. There is no sculpture.

The suture-line (Fig. 2) is dominated by the high, well-divided lateral saddle.

**Remarks:** The main distinguishing feature of the species is the flattened venter, which is bordered, especially in adults, with angular ventrolateral margins (see STURANI 1964, text-fig 9, SANDOVAL 1986, pl.1, fig.11). However, the here available material of fragmentary specimens are not enough to well-based species identification. Additional material may prove that this species belongs to "*Haploceras*" *monachum* GEMMELLARO, 1877, which was based on a specimen from the nearby and stratigraphically comparable Cappuccini locality.

**Distribution:** WENDT (1963, p.121) mentioned Contrada Difali as one of the localities his type material came from. The few subsequent records of the species (see SANDOVAL 1986) are of Lower Bathonian.

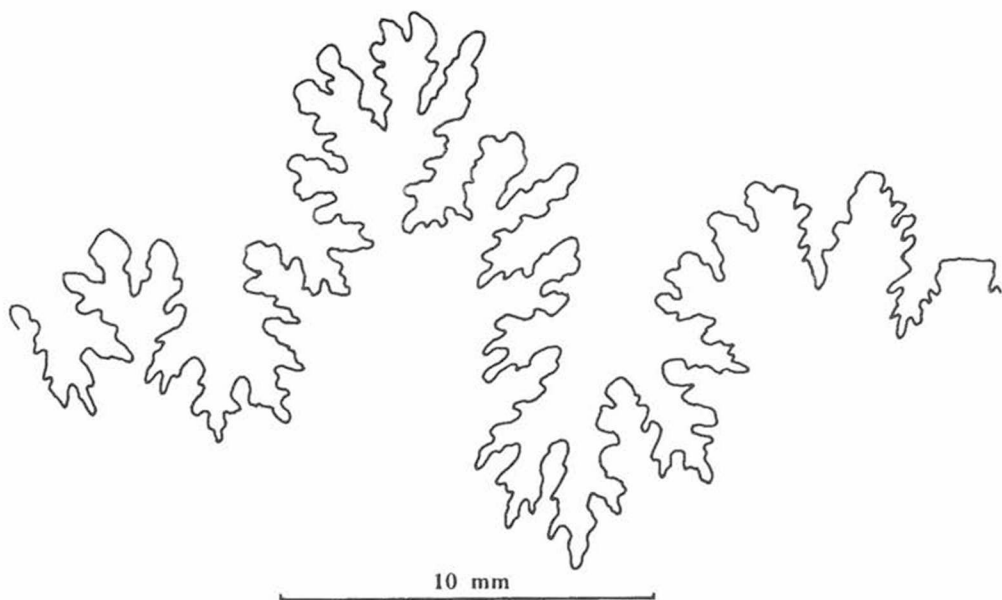


Fig. 2. Suture-line of *Lissoceras (Lissoceras) cf. ventriplanum* WENDT, 1962. ÖT 1999/41.

Family Oppeliidae BONARELLI, 1894

Subfamily Oppeliinae BONARELLI, 1894

Genus *Oxycerites* ROLLIER, 1909

*Oxycerites yeovilensis* (ROLLIER, 1911)

Plate 1, fig. 5.

1869. *Oppelia fusca* QUENST. sp. (var.) - WAAGEN, p.199, pl.16, fig.6.

\*1911. *Oppelia yeovilensis* n. sp. - ROLLIER, p.305.

1968. *Oxycerites yeovilensis* ROLLIER - HAHN, p.29, pl.2, figs 1-4, text-fig.7 (cum syn.)

1987. *Oxycerites yeovilensis* ROLLIER - TORRENS, p.95, pl.1, figs 4,5,8, pl.3, fig.8.

1989. *Oxycerites yeovilensis* ROLLIER - TSERETHELY, p.36, pl.3, figs 1-10, pl.4, figs 1-4, pl.5, figs 1-7.

**Material:** Two better-preserved and several fragmentary specimens.

**Measurements:** 65 mm; 33.5 mm (51.5%); 13 mm (20%); 7.5 mm (11.5%)

**Description:** Large, discoidal, narrowly-umbilicated oppeliid with sharp umbilical margin and almost flat whorl-sides which converge into a sharp, keeled venter. There is a distinct raised spiral zone at mid-flanks. The ribbing on the available big specimens is developed only out of the spiral band, on the outer third of the whorls. It consists of regular, rare and low lunulate outer ribs.

The suture-line is only partially visible; it shows the high, well-differentiated 1st lateral saddle and the numerous auxiliary elements.

**Remarks:** The species is well-known and thoroughly studied (see ARKELL 1951-58, ELMÍ & MANGOLD 1966 as *O. fallax*, and HAHN 1968). The variability of sculpture on the inner and middle whorls is well documented in TSERETHELY (1989).

**Distribution:** *O. yeovilensis* is a common species in almost everywhere in Lower Bathonian faunas from Europe, North Africa, the Middle East and the Caucasus. Most data suggest that it ranges through the whole Zigzag Zone, with appearance in the topmost Bajocian and last representatives in the Tenuicostatus Subzone (see STURANI 1967, p. 25).

Genus *Oecotraustes* WAAGEN, 1869

*Oecotraustes (Oecotraustes) bradleyi* ARKELL, 1951.

Plate 1, fig. 6.

- \* 1951. *Oecotraustes (Oecotraustes) bradleyi* sp.nov. - ARKELL, p.68, pl.7, figs 1,2,9.
- 1963. *Oecotraustes (Oecotraustes) bradleyi* ARKELL - WENDT, p.125, pl.18, fig.5.
- 1966. *Oecotraustes (Oecotraustes) bradleyi* ARKELL - STEPHANOV, p.43, pl.2, figs 1,2.
- 1968. *Oecotraustes (Oecotraustes) bradleyi* ARKELL - HAHN, p.43, pl.4, figs 5,6,16, text-fig.8.
- ? 1968. *Oecotraustes (Oecotraustes) bradleyi* ARKELL - TSERETHELY, p.59, pl.5, fig.1.
- non 1968. *Oecotraustes (Oecotraustes) aff. bradleyi* ARKELL - TSERETHELY, p.61, pl.5, fig.2.
- 1972. *Oecotraustes (Oecotraustes) bradleyi* ARKELL - KRYSZYN, p.228, pl.2, fig.5.

**Material:** Two incomplete specimens.

**Measurements:** 36 mm; 18 mm (50%); 9.5 mm (26.4%); 9.5 mm (26.5%)

**Description:** A small ammonite with incomplete body-chamber. Coiling is regular, without excentricity. The whorls are narrow and high, with low umbilical wall, sharp umbilical margin, gently convex flanks and narrow, acute venter. The inner half of the flanks are smooth, the outer part is sculptured with short, slightly arched rectiradiate ribs. Rib density changes with growth: on the body chamber the ribs become more distant.

The specimen is septate up to 32 mm diameter, the last sutures are crowded. Entire suture-line cannot be discerned.

**Remarks:** According to ARKELL's description and figures, this species is distinguished by body-chamber constriction very late, near the aperture, and by regular, distant ribs on the outer part of the narrow whorls. The Erice specimens show these features and are closest to the paratype figured by ARKELL on his pl.7, fig.2. They are very close to the specimens of HAHN (1968, pl.4, figs 5-6, 16). There are morphotypes with denser ribs (TSERETHELY 1968, pl.5, fig.1; KRYSZYN 1972, pl.2, fig.5). WENDT's specimen (1963, pl.18, fig.5) from the Bathonian of Contrada Miliada (northern side of Mount Erice) is smaller, but otherwise matches well the type and the here described forms as well.

**Distribution:** *Oe. (Oe.) bradleyi* is a not too common element in Lower Bathonian faunas. MANGOLD et al. (1974, p.108), HAHN (1968, p.45) and ELMÍ et al. (1971, p.444) gave the Yeovilensis Subzone as the characteristic level of the species.

## Subfamily Hecticoceratinae SPATH, 1928

Genus *Prohecticoceras* SPATH, 1928*Prohecticoceras bisculptum* (OPPEL, 1862)

## Plate 1, fig. 7.

1852. *Ammonites Henrici* D'ORB. - KUDERNATSCH, p.11, pl.2, figs.9-13.  
 \* 1862. *Ammonites bisculptus* OPP. - OPPEL, p.149.  
 1930. *Hecticoceras retrocostatum* DE GROSSOUVRE - ROMAN, p.24, pl.8, fig.8.  
 1959. *Hecticoceras?* (*Chanasia?*) *bisculptum* (A.OPPEL, 1862) - ZEISS, p.13.  
 1967. *Hecticoceras* (*Prohecticoceras*) *crassum* nov.sp. - ELMÍ, p.583, pl.4, figs 12-13, text-fig.126.  
 1967. *Oecotraustes subfuscus* WAAGEN - STURANI, p.26, pl.3, fig.15.  
 1969. *Strigoceras septecarinatum* (BUCKMAN) - MIHAJLOVIC, p.61, pl.2, fig.6. pl.3, fig.1.  
 p.1969. *Hecticoceras* (*Lunuloceras*) *paulowi* TSYTOWITCH - MIHAJLOVIC, p.64, pl.4, fig.2 (only)  
 1971. *Hecticoceras* (*Prohecticoceras*) *crassum* ELMÍ - ELMÍ, p.256, pl.20, figs 5,7,9.  
 1987. *Prohecticoceras bisculptum* (OPPEL) (= *P. crassum* ELMÍ) - TORRENS, p.97, pl.4, fig.2.  
 1994. *Prohecticoceras bisculptum* (OPPEL) - GALÁ CZ, p.172, pl.1, fig.1, pl.2, fig.1.  
 1997. *Prohecticoceras bisculptum* (OPPEL) - DIETZE et al., p.7, pl.1, fig.4.

**Material:** One well-preserved specimen and a few fragments.

**Measurements:** 46.5 mm; 23 mm (49.5%); 15.5 mm (33.3%); 11 mm (23.6%)  
 64 mm; 32 mm (50%); 20 mm (31.3%); 18 mm (28.1%)

**Description:** A wholly septate specimen with medium-wide umbilicus. The smooth, vertical umbilical wall meets the slightly convex flanks in a sharp margin. The venter is wide, tectiform, with low, blunt keel. Ribbing consists of straight, prorsiradiate inner ribs and rectiradiate secondaries. There are some tubercle-like strengthenings at the bifurcation points on the inner half of the last preserved whorl. The secondaries have swollen endings on the ventrolateral margin. There are 47 secondary ribs for the 22 primaries on the last whorl.

Entire suture-line cannot be studied.

**Remarks:** There is nothing to add to the detailed discussion of the species by TORRENS (1987, pp.97-98) and to the revision of type material from Swinitza (GALÁ CZ 1994). The here described form is closer to the strongly-ribbed morphotype described by ELMÍ (1967) as *P. crassum*.

**Distribution:** The type specimens (KUDERNATSCH 1852, pl.2, figs 9-13) came from the basal Middle Bathonian, but TORRENS (1987) demonstrated that the earliest representatives of the species appear in the Yeovilensis Subzone.

*Prohecticoceras* sp. nov.?

## Plate 1, fig. 4.

**Material:** A single, incomplete, wholly septate specimen and an additional fragmentary example.

**Measurements:** 30.3 mm; 15 mm (49.2%); 8 mm (26.2%); 7 mm (23%)  
 66 mm; 36 mm (54.5%); 21 mm (31.8%); 11 mm (16.6%)



**Description and remarks:** A relatively big form, the available specimen being septate at 66 mm diameter. The inner whorls show wider umbilicus, narrow whorls with flattened flanks and tabulate venter with a low keel. On the last half whorl of the phragmocone the umbilicus becomes narrower, its wall is high, and the slightly convex whorl-sides become convergent. This results in a high-triangular cross-section, with tectiform venter. The sculpture consists of short, strong primaries and rectiradiate, arched secondaries on the inner whorls. The wedge-shaped outer ribs terminate abruptly, with tubercle-like endings at the ventrolateral margin. On the preserved last half whorl of the phragmocone the inner ribs and the inner parts of the secondaries fade out, only the outer quarter of the secondary ribs remain, terminating in rounded endings on the ventrolateral edge.

The suture-line (Fig.3) is typical of *Prohecticoceras*: with asymmetric saddles becoming evenly shorter toward the umbilical seam.

The characteristic feature of this form is the profound change in sculpture on the phragmocone. The ribbing of the inner whorls are very similar to that on *Prohecticoceras* sp. nov. B. of ELM I (1971, pl.20, fig.2). In this form the bigger specimen (pl.20, fig.8 in ELM I 1971) also shows the fading of the primaries at bigger size.

The here described form cannot be served as basis to designate a new species properly. However, it shows that better and richer material from the Zigzag Zone may elucidate the origin and the earliest forms of *Prohecticoceras*, this much important Bathonian genus.

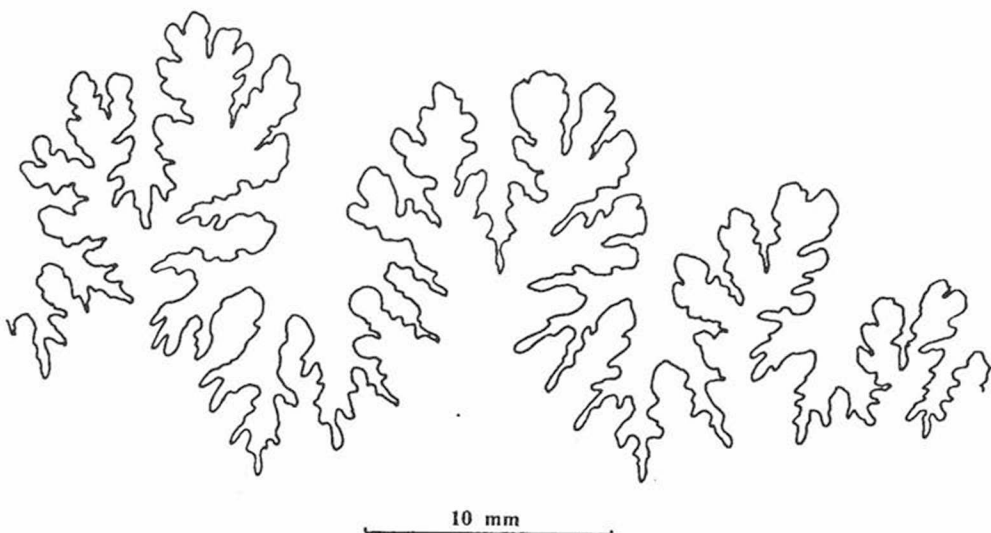


Fig. 3. Suture-line of *Prohecticoceras* sp. nov.? ÖT 1999/31.

Superfamily Stephanocerataceae NEUMAYR, 1875

Family Stephanoceratidae NEUMAYR, 1875

Subfamily Cadomitinae WESTERMANN, 1956

Genus *Cadomites* MUNIER-CHALMAS, 1892

*Cadomites* sp.

Plate 1, fig. 3.

Material: A single internal mould.

Measurements: 14.5 mm; 4.7 mm (32%); 7.5 mm (51%); 6.5 mm (45%).

Description: A small cadomitid with wide umbilicus, depressed whorl-section, low flanks and widely-arched venter. The primary ribs are projected forward, end in small tubercles and branch into radial secondaries. There are 14 primary and 35 secondary ribs on the last preserved half-whorl.

Suture-line cannot be seen.

Remarks: This is an inner whorls of a bigger specimen, thus cannot be determined closer. Even the subgeneric status is doubtful, but the general habit (wide umbilicus, slender whorls, slight excentricity) may suggest microconch *Polyplectites*. WENDT (1963, 1971) recorded more than one *Cadomites* species from the locality - the here described form could be inner whorls or microconch of one of them.

Superfamily Perisphinctaceae STEINMANN, 1890

Family Morphoceratidae HYATT, 1900

Genus *Morphoceras* DOUVILLÉ, H., 1880

*Morphoceras macrescens* (BUCKMAN, 1923)

Plate 2, fig. 2.

\* 1923. *Patemorphoceras macrescens* nov. - BUCKMAN, pl.376.

1963. *Ebrayiceras jactatum* BUCKMAN - WENDT, p.135, pl.21, fig.6.

1970. *Morphoceras macrescens macrescens* (BUCKMAN) - MANGOLD, p.69, pl.5, figs 11-13, pl.6, figs 1-7, text-figs 5-6, 810, 12-14, 34. (*cum syn.*)

1970. *Morphoceras macrescens* (S.BUCKMAN) - HAHN, p.35, pl.5, figs 10-15, text-fig.7c.

1977. *Morphoceras macrescens* (S.BUCKMAN) - DIETL, p.37, pl.5, fig.4.

1982. *Morphoceras macrescens* (BUCKMAN) - AZARIAN, p.142, pl.31, figs 5-6.

1983. *Morphoceras (Morphoceras) macrescens* (BUCKMAN) - SANDOVAL, p.335, pl.28, figs 1,4,7, text-figs 112E-G, 113B.

1985. *Morphoceras macrescens* (BUCKMAN,1923) - SEYED-EMAMI, p.68, pl.4, figs 3-4.

1989. *Morphoceras macrescens* (BUCKMAN) - SEYED-EMAMI et al., p.84, pl.1, fig.7.

1993. *Morphoceras macrescens* (BUCKMAN), 1923 - BESNOSOV & MITTA, p.235, pl.53, fig.5.

Material: The single specimen is a partially crushed internal mould.

Measurements: 60 mm; 24 mm (40.0%); 17 mm (28.3%); 17 mm (28.3%)

75 mm; 22 mm (29.3%); 19 mm (25.3%); 28 mm (37.3%)

Description: A medium-size ammonite with excentrically coiled body-chamber, where the umbilicus becomes shallower and wider, and the whorl-height decreases

significantly. The whorls are compressed with flattened sides and narrow, rounded venter. Inner ribs are short, strengthened costae which branch into straight, prorsiradiate, rounded secondaries interrupted on the venter. A single constriction is visible on the penultimate whorl.

The specimen is septate up to about 50 mm diameter, but entire suture-line cannot be seen clearly.

**Remarks:** *M. macrescens* is a well-distinguished form which is characterised by the narrow, laterally flattened outer whorls, wide umbilicus of the long body-chamber and the few secondary ribs. MANGOLD (1970) gave a detailed discussion, thus only recently figured forms are mentioned here in the synonymy.

**Distribution:** *Morphoceras macrescens* occurs commonly in Lower Bathonian faunas in Europe and in the Middle East and North Africa - this is why STURANI (1967, p.13) suggested it as a subzonal index. The species was recorded also from Sicily (e.g. WARMAN & ARKELL 1954, p.). WENDT (1963, p.135, pl.21, fig.6) figured a *M. macrescens* from Monte Inici as *Ebrayiceras jactatum*. Stratigraphically the species is restricted to the nominate subzone (see TORRENS 1974, p.585).

Genus *Asphinctites* BUCKMAN, 1924

*Asphinctites pinguis* (DE GROSSOUVRE, 1919)

Plate 2, fig. 4.

- \* 1919. *Morphoceras pingue* n.sp. - DE GROSSOUVRE, p.391, pl.14, fig.7.
- 1956. *Morphoceras pingue* DE GROSSOUVRE - ARKELL, p.135, text-fig.49.
- 1967. *Morphoceras* (or *Asphinctites*) *pingue* DE GROSSOUVRE - STURANI, p.37, text-fig.3.
- 1970. *Asphinctites pinguis* (DE GROSSOUVRE) - MANGOLD, p.111, pl.3, figs 13-14.
- 1972. *Asphinctites* (*Asphinctites*) *pinguis* (DE GROSSOUVRE) - KRYSZYN, p.264, pl.8, fig.3.
- 1977. *Asphinctites pinguis* (DE GROSSOUVRE) - LINARES et al., p.259, pl.1, fig.2.
- 1983. *Asphinctites* (*Asphinctites*) *pinguis* (DE GROSSOUVRE) - SANDOVAL, p.258, pl.28, figs 3,5, text-figs 112U,V, 113.
- ? 1985. *Morphoceras pingue* GROSSOUVRE - ROSTOVTSSEV, p.161, pl.44, figs 5-6.
- 1987. *Asphinctites pinguis* (DE GROSSOUVRE) - TORRENS, p.98, pl.2, figs 1-4.

**Material:** A single, incomplete specimen.

**Measurements:** 29.5 mm; 12 mm (40.6%); 14 mm (47.5%); 10 mm (33.9%)  
42 mm; 12 mm (28.5%); 16 mm (38%); 15.5 mm (36.9%)

**Description:** A small ammonite with narrower umbilicus on the inner whorls and strongly contracted body chamber. The contraction develops as a significant decrease in the whorl-height and width, resulting in the opening of the umbilicus, while the whorl-section remains rounded. There are seemingly few constrictions of which one is visible on the penultimate whorl; this is a deep, narrow groove arching forward. The dense ribbing is built up of primaries bifurcating shortly above the umbilical seam, and slightly prorsiradiate secondaries arising mainly as intercalatories in different heights on the flanks. The secondaries cross the venter without interruption.

Suture-line cannot be seen.

**Remarks:** The figures of adult *A. pinguis* (e.g. in SANDOVAL 1983, pl.28, fig.3 = LINARES et al. 1977, pl.1, fig.2; TORRENS 1987, pl.2, fig.4 = STURANI 1967, text-fig.3)

indicate that one specific character of the species is the narrowing body-chamber. Another feature is the "twinning" of primary ribs (see ARKELL 1951-58, p.135). Otherwise the ribbing is finer than in the *A. tenuiplicatus* group.

Distribution: The species is recorded from several localities in Europe, including Western Sicily (Monte Inici: WARMAN & ARKELL 1954). In most places it belongs to the group of stratigraphically older *Asphinctites*, occurring in the Yeovilensis Subzone (TORRENS 1987, p.98).

\* \* \*

There is a small, incomplete specimen in the material which shows features close to *A. pinguis*: dense ribbing with non-tuberculate branchings at different heights, and constrictions. However, the ribs are denser and sharper than in typical *Asphinctites*, and the whorl-section is more depressed. The specimen is shown here as *Asphinctites* sp. aff. *pinguis* (Pl.II, fig.5)

? *Asphinctites* sp. indet.

Plate 2, fig. 3.

Description and remarks: A body-chamber fragment of a medium-size ammonite. The umbilicus is narrow, the whorl-section is high-oval with flattened flanks. The body-chamber shows a slight contraction. The ribbing consists of short primaries with stronger, tubercle-like portion on the umbilical margin, and slightly prorsiradiate, dense, weak secondaries which cross the venter without interruption.

All visible characters suggest the genus *Asphinctites*, however the specific arrangement is uncertain. The size and the style of ribbing suggests *A. tenuiplicatus*, but this species is usually more evolute and more coarsely ribbed in this stage, while other *Asphinctites* show lower whorls at this size.

? Family Tulitidae BUCKMAN, 1921

? Genus *Tulites* BUCKMAN, 1921

"*Tulites*" *tuwaiqensis* ARKELL, 1952.

Plate 2, fig. 1.

\* 1952. *Tulites tuwaiqensis* n.sp. - ARKELL, p.284, pl.25, fig.3.

1999. "*Tulites*" *tuwaiqensis* Arkell - GALÁČZ, text-fig.2.

Material: A single, incomplete specimen.

Measurements: 65 mm; 23 mm (35.5 %); 30 mm (46.1 %); 21 mm (32.3 %)

Description: Because of the imperfect preservation, only the last half whorl, i.e. the body-chamber can be studied. Here the relatively small specimen shows a medium-wide umbilicus which becomes even wider as the body-chamber contracts toward the aperture. The umbilical margin is widely rounded, the flanks merge into the venter without ventrolateral margin. The whorl-section is depressed with wider venter at the

end of the phragmocone, suggesting cadicone inner and middle whorls. As the body-chamber contracts, the venter becomes higher and narrower, resulting in a subtriangular cross-section near the aperture which is broken off. The sculpture is consisted of blunt, short inner ribs which appear at the umbilical margin, leaving the umbilical wall smooth. Rounded, low, slightly prorsiradiate secondary ribs appear as bifurcations or intercalations high on the flanks, and they cross the venter without interruption. The ribs persist all along the body-chamber, only the inner ribs become somewhat weaker towards the aperture. There are 13 primary and 29 secondary ribs on the last third of the preserved body-chamber.

Entire suture-line cannot be seen; only some portions of the last sutures are visible. These indicate well-differentiated, intricate suture with high saddles and thick-based lobes.

**Remarks:** This most interesting element of the here described fauna can be best matched with ARKELL's *Tulites tuwaiqensis*, what he described with two other congeneric species from the Central Arabian fauna. *T. tuwaiqensis* is distinguished from *T. arabicus* ARKELL by its non-tuberculate ribbing which persists on the body chamber, and from *T. erymnoides* ARKELL by its weaker ribs with furcations higher on the whorl-sides.

The generic status of the Arabian "*Tulites*" is uncertain. ARKELL (1952, p.283) relied on the ontogenetic development (i.e. strongly ribbed, cadicone inner whorls) and on the suture-line (with thick-based, two-pronged second lateral lobe, see ARKELL 1951-58, p.82) of the Arabian forms, when palced them into *Tulites*. However, he himself stressed the differences from the European species. These differences were also pointed out by French authors (ENAY & MANGOLD 1985, 1994) who studied new material from ARKELL's localities. However, most recently MANGOLD (in MANGOLD & GYGI 1997, p.506) stated, that the Arabian species are genuine *Tulites*, not homoeomorphs.

The original material of ARKELL, housed in the Sedgwick Museum, Cambridge, shows that these ammonites are significantly different from the European s.str. *Tulites* species, which are all big, never or only slightly contracted in adult stage, and their style of ribbing is also dissimilar. The differences of the Arabian "*Tulites*" are within the range of distinctions shown by many other forms described from Jebel Tuwaiq under European generic names (e.g. "*Teloceras*" and "*Stephanoceras*" in ARKELL 1952). Until detailed revision, the best approach to these forms is to regard them as a specialized branch of erymnoceratids, which - with the loss of the ventral groove - shows homoeomorphic similarity to European tulitids.

**Distribution:** "*Tulites*" were hitherto known only from Jebel Tuwaiq, however ENAY & MANGOLD (1994, p.162) mentioned the *Tulites* fauna as one of those of wider distribution within Central Arabia.

ARKELL (1952, p.297), and later IMLAY (1970, p.D5) correlated the Arabian *Tulites* fauna with the European Middle Bathonian. ENAY & MANGOLD (1985, p.645) suggested a correlation with the European Lower Bathonian. Later ENAY et al. (1987, fig.2) restricted the correlation of the D4 unit (yielding the *Tulites* fauna) to a part of the Lower Bathonian Zigzag Zone, and recently (ENAY & MANGOLD 1994) designated a zone (i.e. *Tulites tuwaiqensis* Zone) for the interval which they compared to the middle part of the Lower Bathonian. This correlation is now supported by the Sicilian record, because the here described "*T.*" *tuwaiqensis* came from a fauna containing elements from the middle to upper parts of the Zigzag Zone.

Family Perisphinctidae STEINMANN, 1890  
 Subfamily Zigzagiceratinae SCHINDEWOLF, 1923  
 Genus *Procerites* SIEMIRADZKI, 1898

*?Procerites (?Siemiradzka) sp. indet.*  
 Plate 2, fig. 6.

**Material:** A single, incomplete, distorted and worn specimen. Because of distortion, correct measurements cannot be made.

**Description and remarks:** This is the only *Procerites*-like perisphinctid in the fauna, but its incomplete preservation makes its determination rather uncertain. A widely-umbilicated form with slightly high-oval whorl-section and dense ribbing. The ribs are radial and somewhat irregular in strength. The inner ribs bifurcate high on the flanks. There are indications of constrictions, two per whorls.

The suture-line is relatively simple, with short lobes and strongly retracted umbilical elements.

The specimen belongs into a species of comparatively big size, because it is wholly septate at about 60 mm diameter. The sculpture and especially the suture-line suggest *Siemiradzka*, of which Lower Bathonian species usually have wide umbilicus, just as this poorly-preserved specimen.

### Conclusions

The above descriptions suggest that the Bathonian fauna from the Contrada Difali locality belongs into a limited time interval representing only the higher part of the Early Bathonian. The importance of the assemblage is that it yielded the specimen of "*Tulites*" *tuwaiquensis* ARKELL, which was known previously only from Central Arabia, but also from the Early Bathonian. The occurrence of this species in Western Sicily indicates that this unit palaeobiogeographically belonged or laid close to the migration route of Arabian ammonites along the southern margin of the Jurassic Tethys.

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### Plate 1

- Fig. 1. *Calliphylloceras disputabile* (ZITTEL, 1868). ÖT 1999/2. Lateral view.  
Fig. 2. *Lissoceras* (*Lissoceras*) cf. *ventriplanum* WENDT, 1963. ÖT 1999/42. Lateral view.  
Fig. 3. *Cadomites* sp. ÖT 1999/28. Lateral view.  
Fig. 4. *Prohecticoceras* sp. nov.? ÖT 1999/31. 4a: ventral view; 4b: lateral view.  
Fig. 5. *Oxycerites yeovilensis* (ROLLIER, 1911). ÖT 1999/16. Lateral view.  
Fig. 6. *Oecotraustes bradleyi* ARKELL, 1951. ÖT 1999/20. Lateral view.  
Fig. 7. *Prohecticoceras bisculptum* (OPPEL, 1862). ÖT 1999/29. 7a: ventral view; 7b: lateral view.

All figures natural size

### Plate 2

- Fig. 1. "*Tulites*" *tuwaiqensis* ARKELL, 1952. ÖT 1999/29. 1a and 1c: lateral views; 1b: ventral view.  
Fig. 2. *Morphoceras macrescens* (BUCKMAN, 1923). ÖT 1999/33. Lateral view.  
Fig. 3. ?*Asphinctites* sp. indet. ÖT 1999/32. 3a: lateral view; 3b: ventral view.  
Fig. 4. *Asphinctites pinguis* (DE GROSSOUVRE, 1919). ÖT 1999/34. 4a: ventral view; 4b: lateral view.  
Fig. 5. *Asphinctites* sp. aff. *A. pinguis* (DE GROSSOUVRE, 1919). ÖT 1999/38. 5a: lateral view; 5b: ventral view.  
Fig. 6. ?*Procerites* (?*Siemiradzka*) sp. indet. ÖT 1999/37. Lateral view.

All figures natural size

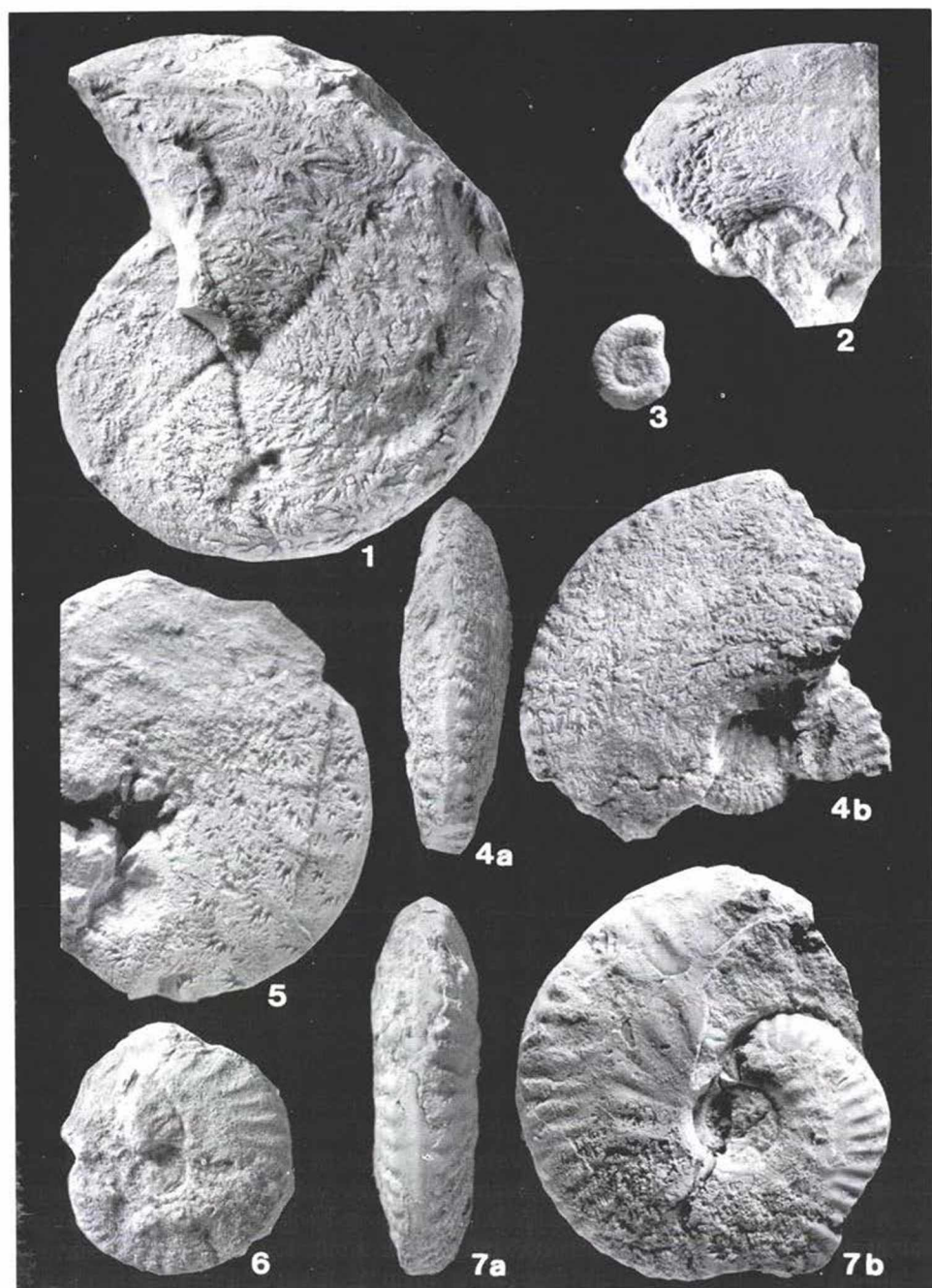


Plate 2

