UPPER LIASSIC AMMONITES FROM ÚRKÚT, BAKONY MOUNTAINS, TRANSDANUBIA, HUNGARY

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SUMMARY

Systematic descriptions of 34 species or subspecies of ammonites from the greenish-grey marl overlying the manganese carbonate ore of Úrkút are given. Of the new forms, *Pseudogrammoceras saemanni raricostatum* n. subsp. is characterized by more widely spaced ribs and, on the last whorl, by an inflated venter; *Hildoceras bifrons tethysi* n. subsp. by a wide umbilicus and narrow, tall whorl with a well-developed ventral groove; *Hildoceras sublevisoni involutum* n. subsp. by a narrow umbilicus and thick whorls with convergent whorl-sides; *Hildoceras semipolitum subquadratum* n. subsp. by a subquadrate whorl section and coarser ribbing, passing over the lateral groove, and a poorly developed ventral groove; *Hildoceras semipolitum pannonicum* n. subsp. by broad whorls, a dense, fine ornamentation extending low on the whorl-side; *Hildaites serpentiniformis urkutensis* n. subsp. by strong, widely spaced ribbing and a sharpenig of the venter on the body chamber; *Pseudomercaticeras rotaries pinnai* n. subsp. by nearly uniform tubercles and radial ribbing on the inner whorl. *Urkutites* n. gen., belonging presumably to the subfamily *Hildoceratinae*, possesses a narrow whorl with a tricarinate venter, with tubercles low on the whorl-side which soon fade upward, and with the ribbing slightly convex backward, higher up on the whorl-side. *Urkutites boeckhi* n. sp. is characterized by narrow flat whorls; the lower part of its whorl-side is almost unornamented at first and totally smooth later on. The whorls of *Urkutites inflatus* n. sp. are inflated near the umbilicus and the ornamentation is somewhat more developed. The fauna indicates the Toarcian; of the Mediterranean zones, the *Mercaticeras mercati* Zone and its subzones *(Hildoceras sublevisoni, H. semipolitum)* are proved by the presence of the zone-forming species. *Phymatoceras* sp. aff. *erbaense* suggests the *Erbaense* Zone. The presence of the upper part of the *Erbaense* Zone (of the *Brodieia bayani* Subzone) is likely. The lowermost and uppermost Toarcian are not proved by the fauna.

Introduction

In 1950, the haulage tunnel of Shaft III of the manganese mine of Úrkút (Southern Bakony Mountains, Transdanubia) disclosed some ammonite-bearing strata directly overlying the manganese carbonate ore. The lower 3 to 4 metres of the ammonitic marl, whose total thickness ranges from 4 to 5 m, consist of a brownish-or greenish-grey ill-consolidated clay marl containing mostly small ammonites. The upper marl horizon, light or dark green in colour, 1 m in thickness, is characterized by the presence of large ammonites. An up-

to-date summary of geological knowledge concerning the Úrkút area (Cseh-Németh, 1958) indicates the manganese carbonate ore to have been considered Upper Liassic, while the ammonitic bed has been placed into the Lower Dogger.

Dr. J. Cseh-Németh was kind enough to present in 1961 to the author the ammonites of his collection for systematic treatment. In 1966, Dr. J. Noszky completed the fauna with some valuable material of his own collection. The author now takes the opportunity to extend his sincere thanks to both of these gentlemen. The upper strata bearing big ammonites of the genera *Hammatoceras* and *Erycites* indicated an Upper Toarcian rather than Lower Dogger age (Géczy, Annales 8, 1965). The lower age limit of the fauna was fixed (Géczy, 1966) by 10 species of the family *Dactyliocera-tidae:* it was recognized to be younger than the *Dactylioceras tenuicostatum* Zone of the lowermost Toarcian. The species of *Dumortieria* or *Pleydellia* indicating the uppermost Toarcian have not so far been encountered, either, although these species abound in the exposure of the Csárda Hill at Úrkút. Hence, the fauna belongs to the *Mercaticeras* mercati and *Phymatoceras erbaense* Zones of the system of Mediterranean zones proposed by Donovan (1958, p. 43). The *Mercaticeras mercati* Zone and its subzones *(Hildoceras sublevisoni* and *H. semipolitum)* are proved by the presence of the zone-forming species. The *Phymatoceras erbaense* Zone is suggested by *Phymatoceras* sp. aff. *erbaense.* The presence of the upper part of the *erbaense* Zone (*Brodieia bayani* Subzone) is likely. Beyond establishing the age limits of the fauna it is not possible to go into more detail concerning the time spans covered by the individual species, as most of the collection has been picked from the muck pile of the manganese mine rather than collected layer by layer. The ammonite-bearing bed was excavated by blasting: this resulted in a considerable abundance of fragmentary fossils. The specimens included in the host rock are in the majority of cases of excellent preservation. The Úrkút fauna, characterized by the abundance of hildoceratids, includes several new forms. Urkutites n. gen. is represented with two species. Moreover, eight subspecies of the 34 species and subspecies to be described have turned out to be novel.

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Here and in the following the dimensions of ammonites are given as follows. First, the diameter in millimetres is given. The following three numbers represent the height and width of the fossil, and the diameter of the umbilicus, in that order, in percentages of the diameter. In order to facilitate the understanding of the results, the height and width of the fossil and the diameter of the umbilicus are also given in millimetres in most of the cases.

SYSTEMATIC DESCRIPTION OF SPECIES

CALLIPHYLLOCERAS BEATRICIS (BONARELLI, 1897)

Pl. 1, f. 2.

1867–1881 *Ammonites (Phylloceras) Nilsoni* Hb. – Meneghini, p. 97 (partim) T.: 18, f.: 7 (non: 8, 9).

\+ 1897 *Phylloceras Beatricis* n. f. – Bonarelli p. 214.

? 1930 *Phylloceras Nilssoni* Héb. var. *Beatricis*, Bonarelli – Mitzopoulos p. 22, T.: 2, f.: 3.

1936 *Phylloceras Nilssoni* (Héb.) var. *Beatricis*, Bonarelli–Negri, p. 8, T.: 1, f.: 9.

? 1939 *Phylloceras Nilssoni* Héb. var. *Beatricis* Bon. – *Ramaccioni*, p. 161.

? 1952 *Phylloceras nilssoni* (Hébert) var. *beatricis* Bonar. – Nicotra, p. 72,

Dimensions: Diameter: 60 mm
56.5, 33.5, 10 (34, 20, 6 mm)

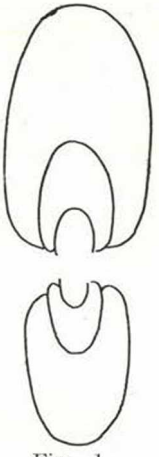

Fig. 1.

Description: Three small casts of good preservation. Umbilicus rather narrow and deep. Umbilical wall concave and slightly overhanging the umbilical seam. Umbilical margin rounded. The nearly parallel sides are slightly vaulted and grade into a narrow, tall, inflated venter without forming a shoulder. Whorl section flattened elliptical, greatest width at the middle of the whorl-side. Cast ornamented by narrow, clearly separate constrictions issuing at the umbilical seam. The constrictions are markedly prorsiradiate, bending slightly backwards below and as slightly forward above the middle of the whorlside. The constrictions pass over the venter, although they are very subdued there. The number of constrictions is 7 on the last whorl. The body chamber is not preserved.

Suture line relatively simple. *E* much shorter than short, slightly asymmetrical L. The tip of *L* reaches beyond the radius connecting the tips of the *U*'s.

Remark: The Úrkút specimens fully agree with the *beatricis* specimens from Csernye. The type of beatricis has similar dimensions (diameter 35 mm; 54, 31, 8); whorl section and ornament are likewise similar. Mitzopoulos, Negri and Nicotra consider *C. beatricis* to be a variety of *C. nilssoni* (Hébert, 1866, p. 526). However, in lack of accurate data concerning the type of *C. nilssoni* it is hard to establish the exact degree of relationship between the two taxons. On the basis of Hébert's figure, – which, by the way, seems rather schematic – the umbilicus of *nilssoni* is much wider (17.5 percent) and the constrictions on the venter are more pronounced. On *nilssoni*, there are five constrictions.

Distribution: The type of *Calliphylloceras beatricis* comes from the Toarcian of Cesi. Mitzopoulos has described the species from the region of Alta Brianza, Negri from Pian d'Erba and Bucco del Piombo, Ramaccioni from the Passo della Porraia, and Nicotra from Canto Alto. *Beatricis* is a typical fossil of the Toarcian.

LYTOCERAS SUBLINEATUM (OPPEL, 1862).

Pl, 1, f. 4.

+ 1856 *Ammonites sublineatus* n. sp. – Oppel, p. 253.
1862 *Ammonites sublineatus* Opp. – Oppel, p. 142, T.: 43, f.: 4, 5, 6.
1874 *Ammonites sublineatus* (Oppel) – Dumortier, p. 113, T.: 30, f.: 1, 2.
? 1886 *Lytoceras sublineatum* (Oppel) – Seguenza, p. 1384.
1887 *Ammonites (Lytoceras) sublineatum* Oppel – Denckmann, p. 43, T.: 1, f.: 4.
1896 *Lytoceras sublineatum* Oppel – Pompeckj, p. 124, T.: 10, f.: 1.
1905 *Thysanoceras sublineatum* (Oppel) – Buckman, p. 149.
? 1906 *Lytoceras sublineatum* Oppel sp. – Lissajous, p. 239.
? 1909 *Lytoceras cf. sublineatum* Opp. sp. – Trauth, p. 135.
? 1912 *Lytoceras sublineatum* Oppel – Roman – Gennevaux, p. 44.
? 1914 *Lytoceras sublineatum* Oppel – Schirardin, p. 369.
? 1933 *Lytoceras sublineatum* Oppel, – Corroy – Gérard, p. 213.
? 1934 *Lytoceras sublineatum* Oppel – Brun – Marcelin, p. 430.
? 1936 *Lytoceras sublineatum* Oppel – Brun – Brousse, p. 52.

Dimensions: Diameter: 74 mm
42, 55.5, 36.5
(31, 41, 27 mm)

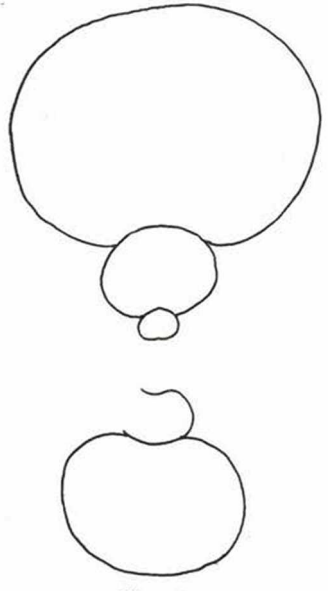

Fig. 2.

Description: Two medium-sized casts of excellent preservation. Umbilicus narrow and deep. The highly inflated sides form no ventrolateral or dorsolateral edge. Venter very broad, almost flat. Whorl section reniform, maximum width slightly above the middle of the side. Cast entirely unornamented.

Suture line richly inticate. *E* is shorter than long, sprawling, asymmetrical *L*, whose ventral lobule is particulary well-developed. *U* is situated near the umbilical suture. The suture of the larger specimen is less finelly intricate.

Remark: The shape and proportions of the smaller Úrkút specimen agree fully with those of the type of *L. sublineatum*. The type – whose plaster of Paris cast Dr. W. Barthel was kind enough to put at my disposal – is a test; from the Úrkút specimen, ornamentation is absent, as is the case with most *Lytoceras* casts. On the basis of the remaining features, however the systematic position of the specimen is considered as estab-

lished. The larger specimen has a slightly wider umbilicus and narrower whorls than the type: also, its suture line is somewhat simpler.

Distribution: According to Oppel, *Lytoceras sublineatum* occurs near Wasseralfingen, Altdorf, Milhau, Salins and Luxembourg. Further known occurences are: La Verpillière (Dumortier), Taormina (Seguenza)?, Doernten (Denckmann), Mâcon (Lissajous), Pic Saint Loup (Roman – Gennevaux), Barr-Heiligenstein (Schirardin); in the Lorraine, around Bassigny (Corroy-Gérard), Florac, (Brun-Marcelin) and around Valz (Brun-Brousse). Oppel states the species to be typical of the middle zone of the Upper Liassic *(Ammonites crassus Zone)*.

TRACHYLYTOCERAS ? SEPOSITUM (MENEGHINI, 1867–1881)

Pl 1, f. 3.

\+ 1867–1881 *Ammonites (Lytoceras) sepositus* n. sp. – Meneghini, p. 109, T.: 22, f.: 3, 4.

? 1875 *Lytoceras sepositum* – Meneghini, p. 107.

1897 *Lytoceras sepositum* Mgh. – Bonarelli, p. 217.

v. 1904 *Lytoceras sepositum* Meneg h. – Prinz, p. 57 (partim), T.: 31, f.: 2.

? 1913 *Lytoceras* cfr. *sepositum* Mgh. – Vadász. p. 65,

1913 *Lytoceras sepositum* Meneghini, – Buckmann, p. 87.

? 1919 *Lytoceras sepositum* Mgh. – Fucini, p. 180, T.: 16, f.: 13.

1930 *Lytoceras sepositum* Mgh. – Mitzopoulos, p. 34, T.: 3, f.: 5.

1931 *Lytoceras sepositum* Meneghini – Monestier, p. 8 (partim T.: 7, f.: 28, 29. T.: 9, f.: 20.

? 1939 *Lytoceras sepositum* Mgh. – Ramaccioni, p. 164.

? 1943 *Lytoceras* cfr. *sepositum* Mgh. – Maxia, p. 93.

non: 1896 *Lytoceras sepositum?* Mgh. – Fucini, p. 150, T.: 3, f.: 5.

1900 *Lytoceras sepositum* Mgh. – Dal Campana p. 585, T.: 7, f.: 40–42.

1900 *Lytoceras sepositum* Meneghinni – Bellini, p. 131, fig.: 4

Dimensions: Diameter: 31 mm
32, 37, 40
(10, 11.5, 12.5 mm)

Description. A single small, well-preserved cast. Umbilicus relatively narrow; umbilical wall inflated, hardly differentiated from the strongly inflated whorl-sides. The latter grade into a broad, low venter. Whorl section quadrate with rounded apices. Greatest width at middle of whorl-side. The septate whorls are unornamented: the body chamber, particularly its frontal part, is senn to bear a fine ribbing, nearly radial on the whorl-sides, bifurcating and bending slightly backwards on the venter. The body chamber occupies somewhat more than half a whorl. Behind the slightly flared peristome there is a narrow deep constriction.

Fig. 3.

The suture line is fairly intricate. *E* is almost as long as somewhat asymmetrically bifurcate *L*. The external *U* is near the umbilical seam.

Remark. The size of the Úrkút specimen agrees fairly well with the proportions (diameter 39 mm, 31, 36, 38). of the paratype of *Lytoceras sepositum* as described by Meneghini (pl. 22, f. 3). The type designated by Bonarelli (Pl. 22, f. 4) has slightly different proportions (diameter 50 mm; 36, 38, 38), probably owing to its larger size. The subquadrate whorl section, the fine ornamentation of the body chamber and the typical peristome agree with those of the type.

Distribution: Meneghini's paratype, which resembles the Úrkút specimen, comes from the Val d'Urbia region, the type from the environs of Cesi. The Csernye locality has yielded a form identical with the Úrkút specimen.

Furthermore, the species is known from Valle Varea (Mitzopoulos) and Guilhomard (Monestier). It probably occurs in Asia Minor (Vadász, Türkünal: 1959, p. 69), Taormina (Fucini), Passo della Porraia (Ramaccioni), San Paolo dei Cavalieri and Fontana Lungarino (Maxia). According to Monestier, Mitzopoulos, Ramaccioni and Maxia, *sepositum* is typical of the *bifrons* Zone.

GRAMMOCERAS DOERNTENSE (DENCKMANN, 1887)

Pl. 1, f. 5.

Dimensions: Diameter: 30 mm
36.5, 33.5, 40
(11, 10, 12 mm)

Description: A single small, well-preserved cast. Umbilicus wide. Umbilical wall of inner whorl steep, inflated; that of the last whorl is perpendicular. Umbilical margin rounded. Whorl-sides very gently vaulted. Shoulder rounded; venter narrow, low, with a low narrow sharp keel bounded by very shallow furrows. Whorl section a somewhat angular oval; greatest width at dorsal third of whorl. Ornament well-developed. The strongly prorsiradiate ribs starting at the umbilical seam bend slightly backwards and bifurcate after having passed the umbilical margin. To 10 primary ribs there correspond 20 ribs on the venter. At the shoulder, the ribs bend forward and fade out near the furrow. The preserved part of the body chamber occupies more than half a whorl. Peristome unknown.

Suture-line simple; gradually tapering *L* has a broad base. The retracted umbilical elements are very underdeveloped.

Remark. Denckmann (1887, p. 50, Pl. 2, f. 4. Pl. 8, f. 1 to 6, 8?, Pl. 10, f. 9) has figured by the name *Ammonites (Harpoceras) Doerntensis* specimens of various size and ornamentation, of which the form of Pl. 8, f. 2, which differs from the rest of the small-sized specimens of the paratype, most closely resembles the Úrkút specimen. Schirardin (1914, p. 412) has distinguished the specimen on Pl. 8, f. 2 from the *doerntense* species. According to

Théobald–Cheviet, all the forms figured by Denckmann belong to one and the same species. On these grounds, the inclusion with a question mark of the Úrkút species into *doerntense* appears justified.

Distribution. Denckmann's form which most closely resembles the Úrkút specimen has turned up in the environs of Dörnten. *Doerntense* is typical of the lower part of the Upper Toarcian, of the *striatulum* Subzone.

PSEUDOGRAMMOCERAS SAEMANNI RARICOSTATUM N. SUBSP.
Pl. 4, f. 1.

Type: Specimen No. 94.
Derivatio nominis: from the widely-spaced ribbing.
Dimensions: Diameter: 62 mm (about 92 mm for the full whorl)
35.5, 36, 42
(22, 16, 26 mm)

Diagnosis: Fairly widely-spaced ribs; rounded venter on last whorl.

Description: A single well-preserved cast, part of whose last whorl is missing. Umbilicus very wide. Umbilical wall steep, vaulted; umbilical margin very rounded. The slightly vaulted whorl-sides become more and more convergent towards the venter. Shoulder rounded. Venter of penultimate whorl broad, low; that of the last whorl, inflated. On the penultimate whorl, a low broad keel base is bounded by broad, shallow furrows. The keel base bears a tall (1,5 mm), narrow keel, preserved on a small section of the cast only. On the last whorl, the furrows along the keel are subdued. The section of the penultimate whorl is a rectangular oblong with rounded apices; that of the last whorl is trapezoidal. Ornament very well-developed. The ribs starting at the umbilical seam are radial, bending almost imperceptibly forward on the lower third and very slightly backward on the upper part of the whorl-side. At the shoulder the ribs bend forward and die out on the margin of the furrow. The ribs of the penultimate whorl are much narrower than rib spacing. On the last whorl, the sausage-like, swollen ribs are wider than the rib spacing. The penultimate whorl bears 40 ribs. Only the hindmost part of the body chamber is preserved.

Fig. 4.

Suture line fairly simple. *E* is much shorter than broad-based *L* which ends in three almost symmetrical lobules. External *U* almost as marked as *E*. *ES* broad, highly asymmetrical. Umbilical saddle retracted.

Remark. The whorl section and very slightly sinuous ribs of the Úrkút specimen resemble the type of *Pseudogrammoceras saemanni* as described by Dumortier (1874, p. 61, Pl. 13, f. 4, 5, 6). The type figured by Dumortier is likewise a fragment: its exact proportions are unknown. The venter of *saemanni* is lower in spite of a greater diameter; the whorl section more closely resembles a rectangular oblong; also, the ribs are denser. *Pseudogrammoceras quadratum* (Haug, 1885, p. 638) has a lower whorl section and the ribbing is more sinuous. *P.*

muelleri (Denckmann, 1887, p. 70, Pl. 3, f. 3, Pl. 4, f. 2, Pl. 10, f. 8) has a narrower venter. The width of *P. latescens* (Simpson, 1843, p. 54) exceeds its height. *P. pachu* Buckman, 1904 (p. 151, Pl. 34, f. 1, 2) has a different whorl section and irregularly sinuous ribs.

Distribution. The type of the nominate subgenus has been described by Dumortier from the Saint–Romain region. The genus itself is, after Dean, Donovan and Howarth (1961, p. 486), typical of the upper part of the *thouarsense* Zone (*struckmanni* Subzone).

POLYPLECTUS CF. SUBEXARATUS (BONARELLI, 1897)
Pl. 1, f. 6; Pl. 2. f. 2,

Dimensions: cannot be established owing to poor preservation.

Description: Two incomplete casts, one small, one of medium size. Umbilicus deep and narrow. The inflated umbilical wall, overhanging the umbilical seam, grades into the slightly vaulted whorl-side without forming an umbilical edge. Shoulder somewhat rounded, venter low, roof-shaped, relatively broad. Keel base broad; it is bounded by very shallow furrows. Whorl section lanceolate; greatest width at lower third of whorl-side. The small specimen carries stronger and more widely-spaced ribs than the larger one. Issuing at the umbilical seam, the ribs are straight and markedly prorsiradiate on the lower part of the whorl-side: on its upper part, they bend slightly backwards. They bend again strongly forward and die out at the shoulder. On one-fourth of a whorl, there are 25 ribs on the larger specimen, 13 on the smaller one. On the lower part of the whorl-side of the small specimen, the ribs cluster in sheaves. The body chamber of the large specimen occupies almost half a whorl. The small specimen is septate in its full length.

Fig. 5.

Suture line fairly simple. *E* somewhat shorter than *L* which bears three almost symmetrical lobules. External *U* much better developed than the small *U*'s near the umbilicus.

Remark. Shape and ornament of the Úrkút specimens agree with those of the form on f. 1 figured by the name *Ammonites complanatus* Brug. (Pl. 4, f. 1–3) by Meneghini (1876–1881, p. 16). Bonarelli considered the form on Meneghini's f. 1 and 2 a new species and named it *Harpoceras subexaratum*. The separation of *subexaratus* from the *Harpoceras* forms is warranted by the absence of an umbilical edge.

Distribution. The type of *P. subexaratum* (Meneghini, Pl. 4, f. 1) comes from the Toarcian layers of Porcarella. The species has been described by Schirardin (1914, p. 389) from the Barr – Heiligenstein area from the *Lillia* Zone, and by Brun – Marcelin (1934, p. 435, Pl. 2, f. 6) from the Florac area, *jurense* Zone. According to Principi (1921, p. 22) *subexaratus* also occurs at Monte Catria and according to Mitzopoulos (1930, p. 77, Pl. 7, f. 1), presumably also in Alta Brianza. According to Wendt, (1962, p. 346) the *Hecticoceras* figured by Christ (1960, pl. 3, f. 4, 5) from Rocca Busamba also belongs to *subexaratus*.

POLYPLECTUS SUBPLANATUS (OPPEL, 1856)?
Pl. 2, f. 4.

Dimensions: Diameter 134 mm (reconstructed: 200 mm)
49, 19.5, 20
(66, 26, 27 mm)

Description. A single, very large but incomplete cast. Umbilicus very narrow. Low, plane umbilical wall overhanging the umbilical seam. Umbilical margin rounded. Whorl sides almost parallel and plane, but slightly convergent above the middle. Shoulder very rounded; venter tall, inflated, very narrow. The keel base hardly emerges. Whorl section lanceolate; greatest width at middle of whorl-side. Ornament fine. Dense, broad, hardly bullate ribs alternate with very narrow intracostal spaces. Strating at the umbilical margin, the prorsiradiate ribs bend slightly forward about half-way up the whorl-side. On the upper part of the whorl-side, the ribs bend suddenly backward, then forward again at the shoulder where they die out. The body chamber is not preserved.

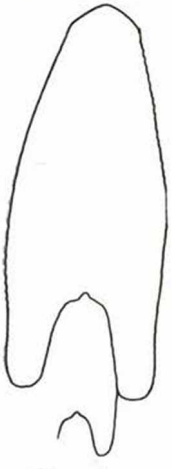

Fig. 6.

Suture line richly intricate. Narrow *E* is somewhat smaller than narrow-based *L*. There are three *U*'s gradually decreasing in size. The ventral saddle is interrupted by an asymmetrically developed median incision.

Remark. The overhanging umbilical wall, the large, disc-shaped test and the fasciculate (?) ribbing agree with the features of *Polyplectus subplanatus*. This species has been established by Oppel (1856, p. 244) on the basis of forms described by d'Orbigny (1845, p. 353) by the name *Ammonites complanatus* Bruguière (Pl. 114, f. 1, 2, 4, non 3.) The proportions of one of the species figured by d'Orbigny (diameter 180 mm, 51, 23, 16) differ somewhat from those of the Úrkút specimen. However, a variation statistic performed by Boujout (1950) on abundant material proves the proportions of the Úrkút specimen to be well within the range of variations of *subplanatus*. The suture line also agrees with that of *subplanatus*. The only difference from *subplanatus* is the smoothness of the venter. Namely, Dumortier, who grave an excellent description of the species, emphasised that the ribs reach up to the keel (1874, p. 51), and this is confirmed by Boujout. The smoothness of the venter of the Úrkút specimen may be due to fact that the specimen is a cast: Dumortier has described a test. In any case, as long as the ventral ornament of the cast will not be checked on a specimen of the original material, it is indicated to consider the taxonomic position of the Úrkút specimen as not definitive. The absence of a keel is undoubtedly due to the state of preservation.

Distribution. According to Haug, (1885, p. 619), *subplanatus* is most abundant in the Rhône basin, being typical of the *jurense* Zone. For further localities see Bayle (1878, T.: 87. f.: 1; T.: 88, f: 3, 4, 6 ?); Gemmellaro (1886. p. 193); Möricke (1894, p. 19, T.: 2, f.: 4); Seguenza (1886, p. 1378); Bonarelli (1897. p. 201); Janensch (1902, p. 60. T.:

4, f.: 1); Burckhardt (1903, p. 7. T.: 1, f.: 3); Renz (1906, p. 223, 1906, p. 272. T.: 13, f.: 1); Lissajous (1906, p. 251); Rassmuss (1912, p. 82); Roman – Gennevaux (1912, p. 46); Schirardin (1914, p. 368); Fucini (1919, p. 185); Riche – Roman (1921, p. 81); Dubar (1925, p. 281); Jaworski (1925, p. 248); Schröder (1927, p. 82); Lanquine (1929, p. 186); Mitzopoulos (1930, p. 77); Corroy – Gérard (1933, p. 213); Termier (1936, p. 1304); Stchepinsky (1937, p. 603); Gardet – Gérard (1946, p. 19); Deleau (1948, p. 107. T.: 2, f.: 24) Spath (1956, p. 141); Donovan (1959, p. 49).

URKUTITES N. GEN.

Type specimen: *Urkutites boeckhi* n. sp.

Derivatio nominis; the name refers to its occurence at Úrkút.

Diagnosis: Narrow, tricarinate venter; on the lower part of the whorl-side, vague tubercles; on the upper part of the whorl-side, ribs slightly concave backwards.

Remark. The new genus, placed into the family *Hildoceratidae* Hyatt 1867, and provisionally into the subfamily *Hildoceratinae*, differs

from *Hildoceras* in the tubercles around the umbilicus and the absence of a lateral spiral groove, and particularly in the narrowness of the venter;

from *Hildaites* in the smoothness of the middle of the whorl-side and in the whorl section,

from the subfamily *Harpoceratinae* in its hildoceratid ventral ribbing and in the underdeveloped median incision of the ventral saddle,

from the subfamily *Phymatoceratinae* in the fine ornament, which is soon resticted to the ventral part of the whorl-side, and in the narrow tricarinate venter.

So far, there are two species to the new genus. The whorls of *Urkutites boeckhi* are flat; those of *U. inflatus* are inflated about the shoulder.

URKUTITES BOECKHI N. SP.

Pl. 2, f. 1.

Type: Specimen No. 95.

Derivatio nominis: after J. Böckh, first monographer of the Southern Bakony Mountains.

Dimensions: diameter 30 mm
33.5, 16.5, 40
(10, 5, 12 mm)

Diagnosis: Narrow flat whorls; the lower part of the whorl-side bears a very subdued ornament at first and none later.

Description. A single small well-preserved cast. Umbilicus wide. Umbilical wall almost perpendicular, slightly vaulted, very low; very rounded umbilical margin. Flat, almost parallel whorl-sides. Slightly rounded shoulder; narrow, low venter with very low keel and shallow furrows. Whorl section almost rectangular, narrow trapezoidal, widest at lower third of whorl-side. Or-

nament very subdued. Under a suitable illumination, vague tubercles are observed near the umbilicus about the beginning of the last whorl. These tubercles wholly disappear towards the end of the last whorl. High on the whorl-side there are very slightly rursiradiate short ribs, as narrow as the rib spacing, which die out at the shoulder without bending very much forward. Half a whorl of body chamber is preserved. Peristome unknown.

Fig. 7.

Suture line very simple. *E*, situated in the ventral furrow, is very narrow and somewhat shorter than *L* which has parallel sides and ends in minute lobules. The two *U*'s are very small.

Remark. The new species differs from *Urkutites inflatus* in its flatter whorl section and straighter ribbing.

URKUTITES INFLATUS N. SP.
Pl. 2, f. 3.

Type: Specimen No. 96.
Derivatio nominis: from the inflated whorl-sides.
Dimensions: Diameter 40 mm
33.5, 27.5, 40
(13.5, 11, 16 mm)

Diagnosis: Whorl section inflated on lower part of whorl-side; better-developed ornament.

Description: A single small cast of mediocre preservation. Umbilicus wide. Steep, inflated umbilical wall, very rounded umbilical margin. The vaulted sides become plane and convergent above the middle of the whorl-side. Shoulder somewhat rounded; venter low and narrow. Broad, low keel flanked by narrow, shallow furrows. Whorl section lanceolate; greatest width at lower third of side. Ornament relatively well-developed: the beginning of the last whorl carries short, prorsiradiate bullae starting at the umbilical seam and reaching as high as one quarter of the whorl-side. The ribs, appearing about the middle of the whorl-side, are divergent and grow stronger towards the venter. High up on the whorl-side, the ribs bend backward and then forward again to die out at the shoulder. The last whorl carries 43 ribs. A quarter-whorl of body chamber is preserved: the peristome is unknown.

Fig. 8.

Suture-line simple. *E*, situated in the ventral furrow, is somewhat shorter than long, narrow, nearly symmetrical *L*. There are two small *U*'s. Umbilical saddle retacted.

Remark. *Inflatus* differs from *boeckhi* in its broader whorls, more inflated lower whorl-side, stronger and more markedly sinuous ribs.

HILDOCERAS BIFRONS TETHYSI N. SUBSP.
Pl. 4, f. 6.

Type: Specimen No. 33.
Derivatio nominis: the name refers to the Tethyan occurrence.
Dimension: Diameter 100 mm
30, 20.5, 50
(30, 20.5, 50 mm)

Diagnosis: Wide umbilicus; narrow, tall whorl with well-developed ventral furrows.

Description. 32 small or medium-sized casts of excellent preservation. The type has a very wide and shallow umbilicus, with a gently sloping, slightly concave, low umbilical wall, and very rounded, slightly inflated umbilical margin. The whorl-side is slightly depressed about its lower third, which results in a broad, shallow lateral spiral groove. Venter relatively narrow with two deep furrows and a narrow keel, which latter surpasses the shoulder in height. Whorl section approximately rectangular, with, however the greatest width at the umbilical margin. Ornament well-developed. Issuing at about the middle of the whorl-side, the ribs almost touch at the upper margin of the lateral groove: they are somewhat rursiradiate and intensely convex backwards. The ribbing dies out at the shoulder. The ribs are much narrower than the rib spacing. The last whorls bears 46 ribs. Only the hindmost part of the body chamber is preserved.

Fig. 9.

Suture line fairly simple. *E* is shorter than long and relatively narrow-based *L*. External U is at the umbilical margin.

Remark, It has been pointed out by Donovan (1958, p. 507) that the forms described by the name *Hildoceras bifrons* from the Mediterranea realm cannot be identified with the type of *Hildoceras bifrons* (Bruguière 1789) as re-figured by Buckman (1918, p. 114.) The proportions of the type are 32, 27, 45 for a diameter of 74 mm; its whorl section differs from that of the new subspecies in a more vaulted umbilical margin and broader, flatter venter. The new subspecies resembles the form described by Mitzopoulos (1930, p. 50., Pl. 5, f. 1) by the name *Hildoceras sublevisoni* var. *sulcosa*, but the ribs of *sulcosa* reach farther down, getting closer to the umbilicus, and the lateral spiral groove is hardly developed.

Distribution. The type of the nominate subspecies of *H. bifrons* derives from the Whitby area, from the hemera of *subcarinatum (bifrons)*. It is probably fairly frequent in the Mediterranean realm under the name "*Hildoceras bifrons*".

HILDOCERAS SUBLEVISONI FUCINI, 1919
Pl. 2, f. 5; Pl. 3, f. 4.

1874 *Ammonites levisoni* (Simpson) – Dumortier, p. 49, T.: 9, f.: 3, 4.
v. 1904 *Hildoceras bifrons*, Brug. – Prinz, p. 124 (partim), T.: 6, f.: 1, 2.
v. 1904 *Hildoceras levisoni* Simps. – Prinz, p. 127.
1905 *Hildoceras bifrons* Brug. – Fucini, p. 113 (partim) T.: 5, f. 13, 15 (non:14).
1905 *Hildoceras levisoni* Simp. – Fucini, p. 113, T.: 6, f.: 3.
? 1908 *Harpoceras (Hildoceras) levisoni* Simp. – Toula, p. 219.
1916 *Hildoceras bifrons* Brug. – Saxl, p. 285, Textf, 2.
+ 1919 *Hildoceras sublevisoni* n. sp. – Fucini, p. 182.
? 1923 *Hildoceras levisoni* Simps. – Siemiradzki, p. 16, T.: 8, f.: 4.
1925 *Hildoceras bifrons* Brug. – Renz, p. 191, T.: 3, f.: 3.
1927 *Hildoceras levisoni* Simp. – Daguin, p. 167, T.: 30, f.: 1, (2, 3, 4?).
? 1929 *Hildoceras sublevisoni* Fucini – Desio, p. 146.
1930 *Hildoceras sublevisoni* Fucini, – Mitzopoulos, p. 48, T.: 4, f.: 8.
1930 *Hildoceras sublevisoni* Merla, p. 51, T.: 7, f.: 1, 10.
1939 *Hildoceras sublevisoni* Fucini – Ramaccioni, p. 173, T.: 11, f.: 20.
? 1940 *Hildoceras sub-Levisoni* Fucini – Verlet – Roch, p. 76.
? 1947 *Hildoceras sublevisoni* Fucini, – Lippi – Boncambi, p. 183.
1956 *Hildoceras bifrons* Brug. – Radoicic, p. 104, T.: 5, f.: 1.
? 1958 *Hildoceras sublevisoni* Fucini – Donovan, p. 50.
? 1959 *Hildoceras levisoni* (Simpson) – Sapunov – Nachev, p. 56.
1959 *Hildoceras sublevisoni* Fucini – Sapunov, p. 29, T.: 2, f.: 7, 8.

Dimensions: Specimen 28: Diameter 47 mm
32, 24.5, 42.5
(15, 11.5, 20 mm).
Specimen 29: Diameter 74 mm
27.5, 20, 51.5
(20.5, 15, 38 mm).

Description: 10 casts, most of them of excellent preservation. Largest and most typical is Specimen No. 29. Its umbilicus is very wide. Umbilical wall sloping, somewhat concave, umbilical margin rounded. Whorl-sides almost parallel, very slightly convergent upwards. Shoulder somewhat rounded. Venter relatively narrow, nearly plane. Keel narrow, tall, furrows hardly visible. Whorl section a rectangular oblong with rounded apices; greatest width at umbilical margin. Ornament well-developed. The very narrow ribs of concave flanks which issue about the umbilical edge and reach up to the shoulder

are rectiradiate and somewhat convex backwards. Ribs number 19 on half a whorl. Only a quarter-whorl of body chamber is preserved.

Suture line very simple. *E* almost as long as squat *L* which ends in minute teeth. External *U* is at the umbilical edge.

Fig. 10.

R e m a r k. The Urkut specimens fully agree with the type of *sublevisoni*. This is particulatly true of Specimen No. 29. The proportions of the type are 27, 18, 50 for a diameter of 102 mm. The umbilicus of Specimen 28 is somewhat narrower. However, as the variability of the species has already been pointed out by D o n o v a n (1958, o. 50), it seems justified to place also this specimen into sublevisoni.

D i s t r i b u t i o n. According to D o n o v a n, *sublevisoni* defines a subzone within the zone of *Mercaticeras mercati*. For its geographical distribution see the list of synonyms.

HILDOCERAS SUBLEVISONI RARICOSTATUM MITZOPOULOS, 1930
Pl. 3, F. 3.

1910 *Hildoceras Levisoni* S i m p s o n – R e n z, p. 565, T.: 21, f.: 5.
\+ 1930 *Hildoceras sublevisoni* F u c i n i var. *raricostata* M i t z o p o u l o s (nov. var.) – M i t z o p o u l o s, p. 49, T.: 4, f.: 9 a, b, c.
? 1932 *Hildoceras sublevisoni* F u c. var. *raricostata* M i t z o p. – M e r l a, p. 51, T.: 7, f.: 4.
1939 *Hildoceras sublevisoni* F u c. var. *raricostata* M i t z o p. – R a m a c c i o n i, p. 173, T.: 11, f.: 21.
1942 *Hildoceras sublevisoni* F u c. var. *raricostata* M i t z. – M a g n a n i, p. 109, Textf.: 2.
? 1943 *Hildoceras sublevisoni* F u c. var. *raricostata* M i t z o p o u l o s – M a x i a, p. 107, T.: 2, f.: 5.
1947 *Hildoceras sublevisoni* F u c. var. *raricostata* M i t z o p. – L i p p i - B o n c a m b i, p. 139, T.: 2, f.: 15, 16, 17.
? 1948 *Hildoceras sublevisoni* F u c i n i, var. *raricostata* M i t z o p o u l o s – D e l e a u, p. 107, T.: 2, f.: 21.

D i m e n s i o n s: Diameter 81 mm,
31, 24.5, 47.5
(25, 20, 38.5 mm)

D e s c r i p t i o n. A single cast of medium size and excellent preservation. The gradually deepenning umbilicus is narrow and wide. Umbilical wall gently sloping, broad, almost imperceptibly concave, umbilical margin very rounded. Slightly vaulted whorl-sides almost parallel; shoulder rounded, venter broad, low. Narrow keel prominent, bounded by two slightly concave surfaces forming very shallow furrows. Whorl section a rectangular oblong with rounded apices: maximum width at middle of whorl-side. Ornament well-developed. Issuing near the umbilical seam, the ribs are strongly prominent at the umbilical margin, fade near the shoulder and die out before reaching the ventral furrow. Ribbing slightly sigmoidal, convex backwards at the umbilical margin, for-

wards at the shoulder, and strongest at mid-height. On the penultimate whorl, the ribs are slightly rursiradiate; on the early part of the last whorl, they bend forward near the shoulder. Ribs very widely spaced; the last whorl bears 26 ribs. Body chamber occupies half a whorl; peristome unknown.

Suture line: *E* almost as long as remarkably slender *L* which ends in three asymetrical lobules. *U*'s very small; *ES* very broad.

Remark. The proportions of the Urkut specimen hardly differ from those of the type of *raricostatum* (31, 24, 46 for a diameter of 61 mm). The ornament fully agrees with that of the type. Donovan (1958, p. 50) who compares *raricostatum* with the type of *sublevisoni*, does not accept *raricostatum* as a separate subspecies. In reality, however, similarity is restricted to the wide spacing of the ribs. *Sublevisoni* has a narrower whorl and wider umbilicus with much shorter ribs which are convex backwards. Gabilly (1961, p. 353) has considered whether *raricostatum* does not merit specific rank. According to the view generally accepted at present, *raricostatum* is a subspecies. On the penultimate whorl of the form described by Merla as „*raricostatum*", ribs stand denser than on the Urkut specimen.

Distribution. *H. sublevisoni raricostatum* comes from the Upper Liassic of the Alta Brianza region. It occurs further at Passo della Porraia (Ramaccioni), Gomsiqe (Magnani); M. Subasio and M-ti Martini (Lippi-Boncambi) and Anavrysada (Renz). *Raricostatum* has been signalled from Fontana Lungarino by Maxia, from the Djebel Nador by Deleau and from Vrines by Gabilly.

Fig. 11.

HILDOCERAS SUBLEVISONI INVOLUTUM N. SUBSP.
Pl. 3, f. 1.

Type: Specimen No. 21.
Derivatio nominis: from the narrow umbilicus.
Dimensions: Diameter 88 mm
33, 25, 43
(29, 22, 38 mm)

Diagnosis: thick whorls with a narrow umbilicus; convergent whorl-sides.

Description. A single well-preserved cast of medium size. Umbilicus relatively narrow and shallow. Umbilical wall gently sloping, slightly concave; umbilical margin very rounded. Very slightly vaulted whorl-sides, convergent particularly near the venter. Shoulder somewhat rounded; venter rather nar-

Fig. 12.

row, with a well-developed broad keel bounded by two fairly shallow furrows. Whorl section trapezoidal; greatest width at umbilical edge. Ornament fine. Widely-spaced narrow ribs, extending from the lower third of the whorl- side to the shoulder, with concave flanks, are nearly rectiradiate and convex back wards. The last whorl carries 45 ribs. More than half a whorl of body chamber is preserved. Peristome unknown.

Suture line simple. *E* shorter than relatively slender, long *L*. There are two small *U*'s.

Remark. The new subspecies and the nominate subspecies agree in the absence of a lateral groove. Proportions and whorl section are, however, different. The section of the form published by Mitzopoulos (1930, p. 45, Pl. 4, f. 7) as *Hildoceras bifrons* var. *crassa* is similar, but it has an overhanging umbilical wall and, according to the description, it possesses a shallow lateral groove. Ornament and whorl section of *Hildoceras semicosta* Buckman, 1926 (Pl. 685) is similar, but this species also has a lateral groove. The ribs of *Hildoceras levisoni* (Simpson, 1843) reach down to the umbilical seam.

Distribution. A form described by Mitzopoulos and closely related to the new subspecies has been found in the Toarcian of Alta Brianza.

HILDOCERAS SEMIPOLITUM BUCKMAN, 1902
Pl. 3. f. 2.

1846 *Ammonites bifrons* Bruguière – Catullo, p. 130. (partim), T.: 5, f.: 3 c, d, (non: a, b,)

1867–1881 *Ammonites bifrons* Brug. – Meneghini, p. 9. (partim), T.: 1, f.: 5.

1889 *Hildoceras bifrons* (Bruguière) var. – Buckman, 1. 112, T.: 22, f.: 30, 31, A.: f.: 28.

– 1902 *Hildoceras semipolitum* n. – Buckman, p. 4.

1904 *Hildoceras bifrons* mut. nov. *angustisiphonata* (Buckman) – Prinz, p. 126.

1923 *Hildoceras semipolitum* Buckman – Siemiradzki, p. 16, T.: 8, f.: 5.

1930 *Hildoceras bifrons* Brug. var. *angustisiphonata* Prinz. – Mitzopoulos, p. 41, T.: 4, f.: 2, a, b.

1932 *Hildoceras semipolitum* Buckman – Merla, p. 52., T.: 7, f.: 3, 6, 7.

1934 *Hildoceras semipolitum* Buckman – Brun – Marcelin, p. 451, T.: 4, f.: 4.

1939 *Hildoceras semipolitum* Buckman – Ramaccioni, p. 172, T.: 11, f.: 19.

? 1943 *Hildoceras semipolitum* Buckman – Maxia, p. 106.
1947 *Hildoceras semipolitum* Buckman – Lippi – Boncambi, p. 138, T.: 1, f.: 12.
? 1952 *Hildoceras bifrons* (Brug.) var. *angustisiphonatum* Prinz – Nicotra, p. 72, T.: 3, f.: 4 a, b.
? 1952 *Hildoceras semipolitum* Buck – Venzo, p. 118, T.: 8, f.: 13.
? 1956 *Hildoceras* cf. *semipolitum* S. S. Buckman – Spath, p. 141, T.: 9, f.: 1.
? 1958 *Hildoceras semipolitum* Buckman – Donovan, p. 50.

Dimensions. Diameter: 49 mm
40, 23.5, 32.5
(19.5, 11.5, 16 mm)

Description: Six small well-preserved casts. Umbilicus moderately wide, shallow. Umbilical wall low, steep, slightly vaulted, umbilical margin very rounded. Sides hardly vaulted. Shoulder somewhat rounded, venter low, narrow, with a prominent narrow keel and very shallow furrows. Whorl section oblong, rounded. Greatest width at umbilical edge. There is a narrow and relatively deep lateral spiral groove slightly below the middle of the whorl-side. The area between the umbilical seam and the groove is unornamented. The upper part of the whorl-side carries fine, dense ribs, slightly convex backwards, which are much narrower than the rib spacing. The last whorl of the figured specimen bears some 50 ribs: there are, however, less well-preserved specimens which carry a much denser ribbing. The body chamber occupies more than half a whorl. Peristome unknown.

Suture line simple, with widely spaced, small lobes. *E* is shorter than nearly symmetrical *L*. The *U*'s are very small.

Remark. The proportions of the Urkut specimens agree with those of the type described by Buckman. Ribbing is somewhat denser on the type.

Distribution. The type of *semipolitum* comes from the Cotswolds, from the *lilli* Hemera. It is known from Val d'Urbia (Meneghini), Montagna della Rossa, Mte dei Fiori, Cesi, Porcarella (Merla); M. Cucco (Ramaccioni); Fontana Lungarino? (Maxia): M. Subasio (Lippi – Boncambi); Canto Altro? (Nicotra), Alta Brianza (Mitzopoulos); Valdorbia? (Donovan), Escino D' Ase (Brun-Marcelin), in the Klippen zone of the Carpathians (Siemiradzki) and probably from the Stowell Park Borehole (Spath). At Csernye, *semipolitum* has likewise been encountered. According to Donovan, *Hildoceras semipolitum* defines a subzone in the *Mercaticeras mercati* Zone.

Fig. 13.

HILDOCERAS SEMIPOLITUM SUBQUADRATUM N. SUBSP.
Pl. 4, f. 4.

Type: Specimen No. 19.

Derivatio nominis: The name refers to the subquadrate whorl section.

Dimensions: Diameter: 37 mm
38, 29.5, 35
(14, 11, 13 mm)

Diagnosis: Subquadrate whorl section, coarser ribbing extending onto the lateral spiral groove; underdeveloped ventral furrows.

Description. Three well-preserved small casts. Umbilicus wide; umbilical wall steep, slightly vaulted; umbilical margin slightly rounded. Situated at the lower third of the whorl-side, the lateral spiral groove is narrow and deep. Whorl-sides subparallel, shoulder rounded, venter relatively broad, low. Keel tall, narrow, bounded by two almost imperceptible shallow furrows. Whorl section subquadrate; greatest width at middle of side. Ornament relatively well-developed. Near the umbilicus, the ribbing is ill-defined, but in the lateral groove it is already well visible. Higher up on the whorl-side, the ribs are rursiradiate and slightly convex backwards. Bending suddenly forward, they die out at the shoulder. Half a whorl bears 27 narrow, prominent ribs separated by wide intercostal fields. More than half a whorl of body chamber is preserved. Peristome unknown.

Suture-line simple. *E* slightly shorter than broad, short *L*. The small *U* is at the umbilical margin.

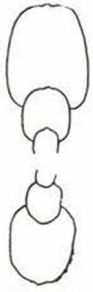

Fig. 14.

Remark. The new subspecies differs from the nominate subspecies in its squat, subquadrate whorl section and coarser ornament which extends onto the lateral groove, as well as in the underdeveloped ventral furrows. *H. semipolitum pannonicum* has similar proportions but a much finer ornament, with a narrower and shallower lateral groove. *H. sublevisoni* differs from the new subspecies in that it has no lateral groove.

Distribution. On the basis of the spread of related forms, the new subspecies belongs to the Toarcian.

HILDOCERAS SEMIPOLITUM PANNONICUM N. SUBSP.
Pl. 4, f. 2.

Type: Specimen No. 19.

Derivatio nominis: the name refers to the occurrence in the Pannonian region.

Dimensions. Diameter: 30 mm
43.5, 30, 30
(13, 9, 9 mm)

Diagnosis: Broad whorls; dense, fine ornament extending below the lateral spiral groove.

Description: A single small well-preserved cast. Umbilicus moderately wide. Umbilical wall low, steep, vaulted; umbilical edge very rounded. Whorl-sides slightly vaulted. Shoulder very rounded. Venter narrow, inflated, with a very narrow, slightly prominent keel and hardly perceptible furrows. Whorl section oblong, rounded, greatest width slightly below the middle. Ornament remarkably fine: issuing at the umbilical seam and reaching up to

the narrow, shallow lateral groove at the lower third of the whorl-side, the prorsicostate ribs are very underdeveloped. Beyond the lateral groove, the ribs bend backwards, then forwards and reach up to the ventral furrows. The ribs are especially narrow and dense: there are 38 on half a whorl. The body chamber occupies half a whorl; the peristome presumably follows the outline of the ribs.

Suture-line does not lend itself well to examination, but the hildoceratid features are apparent.

Fig. 15.

Remark. The new subspecies differs from the nominate subspecies of *semipolitum* in its whorl section, and particularly in its ornament. The lateral spiral groove is nearer to the umbilicus; the ribs, passing over the groove, extend onto the lower part of the whorl-side. Ribbing is denser than in the nominate subspecies. A form similar to the new subspecies has been described by Mitzopoulos (1930, p. 42, Pl. 4, f. 3) by the name Hildoceras bifrons var. graeca Renz. The type of „*H. bifrons graeca*" Renz (1912, p. 165) (*Hildoceras bifrons* var. Renz, 1911, p. 283, Fig. 3 of the text) has, however, a much more widely spaced ribbing (20 ribs on half a whorl); *pannonicum* cannot therefore be identified with *graeca*.

Distribution. A specimen close to the type of the new subspecies has been described by Mitzopoulos from the Upper Liassic of Alta Brianza.

HILDOCERAS LOMBARDICUM (MITZOPOULOS, 1930)
Pl. 4, f. 3, 5.

\+ 1930 *Hildoceras bifrons* Brug. var. *lombardica* Mitzopoulos (nov. var.) – Mitzopoulos, p. 44, T.: 4, f.: 6

Dimensions:

Specimen No. 28:	Specimen No. 43:
Diameter: 32 mm	Diameter: 28 mm
40.5, 34.5?, 34.5	43, 44, 32
(13, 11?, 11 mm)	(12, 9.5, 9 mm)

Description. Five small casts of good preservation. Umbilicus relatively narrow; umbilical wall medium steep, slightly vaulted; umbilical margin very rounded. Almost parallel whorl-sides, hardly vaulted. Shoulder rounded; venter broad, slightly narrower in specimen No. 28. Keel narrow, slightly prominent; furrows broad and very shallow. Whorl section subquadrate; greatest width at lower third of whorl-side. Ornament well-developed. Issuing at the umbilical seam, the ribs are prorsicostate, bending slightly backwards near the umbilical margin. On the lower third of the whorl-side, the ribs bend strongly forward, then back again, to end in a forward bend near the shoulder. The ribs grow thicker upward, but remain throughout thinner than the rib spacing. There are 17 ribs on half a whorl. There is half a whorl of body chamber.

Suture line simple: *E* almost as long as broad, relatively long *L*. External *U* is long and slender.

Fig. 16.

Remark. The proportions of the Urkut specimens differ from those of the type of *lombardicum* (Mitzopoulos, Pl. 4, f. 5; diameter 39 mm, 37, 34, 36) in that the umbilicus is somewhat narrower. The distinction of *lombardicum* from *Hildoceras bifrons* is warranted by the slight development of the lateral spiral groove. Mitzopoulos considers as a synonym of *lombardicum* the form published as *Hildoceras bifrons* var. by Renz in 1909 (Pl. 4, f. 5), which differs from *lombardicum* in its wider umbilicus.

Distribution: The type of *H. lombardicum* comes from the Toarcian of Alta Brianza.

HILDAITES SERPENTINIFORMIS URKUTENSIS N. SUBSP.
Pl. 5.

Type: Specimen No. 402.
Derivatio nominis: the name refers to the occurrence at Urkut.
Dimensions. Diameter: 140 mm
28, 17, 50.5
(39, 24, 71 mm)

Diagnosis: Strong, widely spaced ribbing; on the body chamber, the venter sharpens into a keel.

Description: A single large, well-preserved cast. Wide, stepwise deeping umbilicus. Umbilical wall steep, almost plane; umbilical margin slightly rounded. Slightly convergent, plane whorl-sides; shoulder rounded. Venter gradually decreasing in breadth towards the greater diameters; in the septate whorl it is low and broad, with a hardly prominent keel and broad, very shallow furrows; on the body chamber it forms a rooflike emergence not bounded by furrows. The whorl section is first a rectangular oblong, then a trapezium, both with rounded apices. Greatest width is at the umbilical margin. Ornament highly developed. The inner whorls bear sausage-like swollen ribs issuing on the umbilical wall, thickening at the umbilical margin, strongly prorsiradiate, then suddenly bending backwards on the whorl-side. The ribs are narrower than the space between them. In some instances, pairs of ribs converge in the neighbourhood of the umbilicus, but it would be unjustified to call them biplicate. The ribs die out at the shoulder. They become subdued on the last whorl. On the umbilical margin, the traces of the ribs appear under a good illumination as a series of bulla-like prominences. The lower whorl-side is completely smooth. The upper third bears short ribs convex backwards. The last whorl bears 61, the penultimate whorl about 47 ribs. Three-quarter whorl body chamber; peristome unknown.

Fig. 17.

Suture line simple. *E* much shorter than broadbased *L* which ends in three short lobules. External *U* is very small.

Remark. On the basis of its uninterrupted ribs, this new subspecies, placed into the *Hildaites* genus, differs from the nominate suspecies (Buckman, 1923, Pl. 267) in its shorter, thicker

ribs, and in the tall, narrow keel on the body chamber. The proportions of *Hildoceras serpentiniformis* (diameter 127 mm; 25, 17, 52) agree essentially with those of the new subspecies.

Distribution. The type of the nominate subspecies comes from Somerset, from the *Hildaites* Hemera of the Harpoceratan.

HILDAITES SP.

Pl. 6.

Dimensions: cannot be established owing to poor preservation.

Description: Two large casts of incomplete preservation. Umbilicus very wide. Umbilical wall high, vaulted, almost perpendicular. Umbilical margin very rounded. Whorl-sides nearly parallel, slightly convergent upward. The venter and, consequently, the whorl section cannot be studied. Ornament coarser on the penultimate whorl than on the last one. Issuing at the umbilical seam, the ribs are almost rectiradiate up to the lower quarter of the whorl-side; there they bend slightly forward, to thicken and bend suddenly backward again. They bend forward again at the shoulder. The length of the body chamber and the suture line cannot be established.

Remark. By shape and ornament, the Urkut specimens belong to the genus *Hildaites*, Buckman 1921. The ornament of the species of *Hildaites* described by the name "*Hildoceratoides proserpentinus*" Buckman, 1921 is particularly similar, but in lack of knowledge concerning suture-line and whorl-section it would be unjustified to attempt an identification.

Distribution. According to Arkell (1957), *Hildaites* is characteristic of the lower Toarcian.

MERCATICERAS MERCATI (HAUER, 1856)

Pl. 9, f. 1, 4.

– 1856 *Ammonites Mercati*–Hauer, p. 43 (partim), T: 6, 7, (non: 4, 5, 8, 9).
1874 *Ammonites Mercati* (V. Hauer)–Dumortier, p. 68, T.: 15, f.: 3, 4.
? 1880 *Harpoceras Mercati* Hauer – Taramelli, p. 76, T.: 5, f.: 8, 9.
1885 *Hildoceras Mercati* Hau.– Haug, p. 637
? 1886 *Harpoceras (Hildoceras) Mercati* Hauer – Gemmellaro, p. 191.
? 1893 *Lillia Mercati* Hau. – Bonarelli, p. 197
? 1889 *Hildoceras Mercati* v. Hauer – Kilian, p. 616
? 1900 *Lillia Mercati* Hauer – Bellini, p. 147
1905 *Hildoceras Mercati* Hauer – Fucini, p. 114, T.: 6, f.: 4, 5.
1906 *Hildoceras Mercati* Hauer – Renz, p. 262.
? 1906 *Hildoceras Mercati* Hauer – Renz, p. 220.
? 1908 *Hildoceras Mercati* Hauer– Principi, p. 215
1910 *Hildoceras Mercati* Hauer – Renz, p. 571, Textf. 26, T.: 21, f.: 2

1911 *Hildoceras Mercati* Hauer – Renz, p. 468, T.: 12, f.: 3.
? 1912 *Lillia Mercati* Hau. – Rassmuss, p. 80.
1913 *Mercaticeras mercati* von Hauer – Buckman, p. 7.
1915 *Hildoceras Mercati* Hauer – Principi, p. 457, T.: 16, f.: 5.
? 1919 *Mercaticeras Mercati* Hauer – Fucini, p. 183
? 1927 *Hildoceras Mercati* v. Hau. – Daguin, p. 167.
? 1929 *Hildoceras mercati* Hauer– Lanquine, p. 185.
? 1929 *Hildoceras (Mercaticeras) Mercati* Hauer– Desio, p. 146.
1930 *Hildoceras (Lillia) Mercati* Hauer–Mitzopoulos, p. 69, T.: 6, f.: 2, 3.
1931 *Hildoceras Mercati* Hauer – Monestier, p. 15, T.: 5, f.: 2, 4 (3 ?), T.: 9, f.: 7.
? 1934 *Hildoceras Mercati* Hauer – Lacoste, p. 170.
? 1936 *Hildoceras Mercati* Hauer – Termier, p. 1305.
? 1939 *Mercaticeras Mercati* (Hauer) – Ramaccioni, p. 170.
1940 *Lillia Mercati* Hauer – Maviglia p. 6, Textf. 3.
? 1941 *Hildoceras Mercati* Hauer – Mandev, p. 41.
? 1942 *Hildoceras Mercati* (Hauer) – Otkun, p. 36.
? 1943 *Mercaticeras Mercati* Hauer – Merla p. 103.
? 1946 *Hildoceras mercati* von Hauer – Gardet – Gérard, p. 19.
1948 *Mercaticeras (Hildoceras) Mercati* Hauer – Deleau, p. 109, T.: 2, f.: 28, 29.
1952 *Mercaticeras Mercati* (Hauer) – Venzo, p. 119, T.: B, f.: 2.
1952 *Mercaticeras mercati* (Hauer) – Nicotra, p. 77, T.: 3, f.: 6.
? 1958 *Mercaticeras mercati* (Hauer) – Donovan, p. 51.
1959 ~~*Hildoceras (Mercaticeras)*~~ *mercati* (Hauer) – Sapunov, p. 29.
1963 *Mercaticeras mercati* (Hauer) – Pinna, p. 77, T.: 10, f.: 8, 9, 11, 12.

non: 1867 –1881 *Ammonites Mercati* Hauer – Meneghini, p. 32, T.: 8, f.: 1, 2.
1897 *Hildoceras (Lillia) Mercati* (Hauer) – Bonarelli, p. 203.
1904 *Hildoceras Mercati* Hau. – Prinz, p. 122, T.: 24, f.: 3.
1932 *Mercaticeras mercati* Hauer – Merla, p. 45, T.: 6, f.: 4, 5, 6, 7.
1947 *Mercaticeras Mercati* Hauer – Lippi-Boncambi, p. 134, T.: 1, f.: 8.

Dimensions:

Specimen No. 12	Specimen No. 18
Diameter: 12 mm	Diameter: 30 mm
41, 45.5, 32	40, 43.5, 38
(9, 10, 7 mm)	(12, 13, 11.5 mm)

Description: Four small casts of mediocre preservation. Umbilicus narrow. Umbilical wall almost perpendicular; umbilical margin very rounded. Whorl-sides vaulted, venter very broad. The narrow keel is intensely prominent, with a narrow, deep furrow on each side. Whorl section broadly subquadrate; greatest width at middle of whorl-side. Ornament highly developed. Rectiradiate ribs, issuing at the umbilical edge, bend forward suddenly at the shoulder and die out on the margin of the furrow. The ribs are much narrower than the

rib spacing. There are 14 ribs on half a whorl. The preserved part of the body chamber occupies half a whorl.

Suture line very simple. *E* almost as long as short, squat *L*. *U* very small.

Fig. 18.

R e m a r k. The proportions of the Urkut specimens hardly differ from those of the type of *Mercaticeras mercati* (diameter 32 mm; 36, 42, 34). Whorl section and ornament are alike. Of the forms published by the name *M. mercati*, those described by M e n e g h i n i, M e r l a, L i p p i - B o n c a m b i belong to *Mercaticeras umbilicatum*, the specimen on P r i n z's Fig. 3. to *M. rursicostatum*.

D i s t r i b u t i o n. The occurrences of *Mercaticeras mercati* in the Mediterranean region are enumerated by P i n n a. Further remarkable localities are Northern Africa (D e l e a u) and Asia Minor (O t k u n). In spite of its small size, the easily recognized species possesses a chronostratigraphic significance in the Mediterranean region: according to D o n o v a n, it defines a zone in the Toarcian.

MERCATICERAS UMBILICATUM BUCKMAN 1913

Pl. 9., f. 7, 8.

1856 *Ammonites Mercati* H a u e r – H a u e r, p. 43, (partim) T.: 23, f.: 4, 5 (non: 6–10).

1867–1881 *Ammonites Mercati* H a u e r – M e n e g h i n i, p. 32, T.: 8, f.: 1, 2.

1913 *Mercaticeras umbilicatum* B u c k m a n – B u c k m a n, p. 7.

? 1930 *Hildoceras (Lillia) Skuphoi* M i t z o p o u l o s – M i t z o p o u l o s, p. 54, T.: 5, f.: 3.

1930 *Lillia Mercati* H a u e r, var. *umbilicata* B u c k m a n, p. M i t z o p o u l o s, p. 70, T.: 6, f.: 4.

1932 *Mercaticeras Mercati* (H a u e r) – M e r l a, p. 45, T.: 6, f.: 4–7.

1932 *Mercaticeras humeralis* n. sp. – M e r l a, p. 45, T.: 6, f.: 1–3.

1947 *Mercaticeras mercati* H a u e r – L i p p i - B o n c a m b i, p. 134, T.: 1, f.: 8.

1947 *Mercaticeras humeralis* M e r l a – L i p p i - B o n c a m b i, p. 135, T.: 1, f.: 10.

? 1958 *Mercaticeras umbilicatum* B u c k m a n – D o n o v a n, p. 51.

1963 *Mercaticeras umbilicatum* B u c k m a n – P i n n a, p. 76, T.: 1–7 10.

D i m e n s i o n s.

Specimen No. 14	Specimen No. 15
Diameter: 36 mm	Diameter: 26 mm
33.5, 34.5, 39	34.5, ?. 38.5
(12, 12.5, 14 mm)	(9, ?, 10 mm)

D e s c r i p t i o n. Four small specimens of good preservation. Umbilicus wide, deepening stepwise. Umbilical wall steep, high, hardly vaulted; umbili-

cal margin rounded. Venter broad, very low. Tall, sharp keel bounded by broad, deep furrows. Whorl section quadrate; greatest width at umbilical margin. Ornament highly developed. Issuing at the umbilical edge, the coarse, slightly sinuous ribs swell and bend forward at the shoulder. The ribs are somewhat narrower than the rib spacing. The last half-whorl of specimen No. 14 bears 13 ribs. Only the hindmost part of the body chamber is preserved.

Fig. 19.

Suture line very simple. *L* small and squat.

Remark. The type of *Mercaticeras umbilicatum* has a somewhat wider umbilicus (diameter 37 mm; 30, 34, 44); its whorl section is broadest at the middle of the whorl-side. The ornament of the Urkut specimens agrees with that of the type. As regards whorl section, the Urkut specimens can be most closely identified with Pinna's figure (p. 95, f. 1.)

Distribution. The type of *Mercaticeras umbilicatum* is known from the Pian d'Erba region. Further localities are: Entratico (Hauer); Porcarella (Meneghini); Alta Brianza (Mitzopoulos); Pian di Giugoli, Cagli, Mte dei Fiori (Merla), Mti Martani (Lippi-Boncambi); Valdorbia (Donovan); Alpe Turati (Pinna).

MERCATICERAS INVOLUTUM BUCKMAN, 1913
Pl. 9, f. 3, 9.

1856 *Ammonites Mercati* – Hauer p. 43 (partim), T.: 23, f.: 8–9 (non: 4–7).

– 1913 *Mercaticeras involutum* Buckman – Buckman, p. 7.

1930 *Lillia Mercati* Hauer var. *involuta* Buckman – Mitzopoulos, p. 70, T.: 6, f.: 5.

Dimensions.

Specimen No. 11:	Specimen No. 13
Diameter: 20 mm	Diameter 18 mm
45, 50, 27.5	44.5, 47, 22
(9, 10, 5.5 mm)	(8, 8.5, 4 mm)

Description: Two small casts of good preservation. Umbilicus very narrow, deepening stepwise. Umbilical wall steep; umbilical margin slightly rounded. Parallel whorl-sides, very slightly vaulted. Shoulder rounded; venter

very broad and very low. The slightly prominent broad-based keel is bounded by broad deep furrows. Whorl section rounded quadrate. Greatest width at lower third of whorl-side. Ornament well-developed. Issuing at the umbilical edge, the ribs are almost straight, rectiradiate, thickening somewhat and bending slightly forward on the upper part of the whorl-side. The last whorl bears 27 ribs on Specimen No. 11 and 30 on Specimen No 13. Only the hindmost part of the body chamber is preserved.

Suture line simple. *E* somewhat longer than broad-based, gradually tapering *L*. *U* is small.

Remark. The proportions of the Urkut specimens hardly differ from those of the type of *involutum* (25 mm diameter; 46, 52, 22); see Hauer, Pl. 23, f. 8–9). Whorl section and ornament agree. Pinna (1963, p. 80) subsumes *Mercaticeras involutum* under the species *Mercaticeras dilatum* established by Meneghini (1883, p. 368, Pl. 21, f. 1) by the name "*Hildoceras (Lillia) dilatum*". However, the whorl-section of the type of *dilatum* is trapezoidal, and the ribbing is denser and much more sinuous.

Fig. 20.

Distribution. The type of *M. involutum* comes from the Pian d'Erba area. The species has been described by Mitzopoulos from Alta Brianza.

MERCATICERAS TYRRHENICUM (FUCINI, 1905)?

Pl. 9, f. 2.

Dimensions. Diameter: 28 mm
42.5, 32, 32
(11.5, 9, 9 mm)

Description. A single small cast of excellent preservation. Umbilicus narrow, deepening stepwise. The high, vaulted umbilical wall slightly overhangs the umbilical seam; it has an undulated surface with 9 mounds on the last whorl. (These features are not apparent in the section shown as Fig. 21). Umbilical edge slightly rounded. Whorl-sides nearly parallel and almost plane. Shoulder rounded; venter broad, low, with a very narrow, rather prominent keel and shallow furrows. Whorl section subquadrate; greatest width at lower third of whorl-side. Ornament well-developed. Issuing on the umbilical wall, the prorsicostate ribs turn rectiradiate before attaining the lower third of the whorl- side. At the shoulder, they bend forward and die out at the ventral furrow. The ribs, although convergent in the neighbourhood of the mounds on the umbilical margin, coalesce but very seldom. The last whorl bears 35 ribs, much narrower than the rib spacing. The body chamber occupies half a whorl; peristome unknown.

Suture line simple. *E* somewhat shorter than narrow, slender-based *L* which has three nearly symmetrical lobules. Small external *U* is situated near the umbilical edge.

Fig. 21.

Remark. The Urkut specimen differs from the type of the specimen published by Fucini (1905, p. 111, Pl. 6, f. 1) by the

name *Hildoceras tyrrhenicum* (diameter 31 mm, 40, 39, 36) in its different proportions and narrower venter. The convergency of the ribs near the mounds on the umbilical margin is apparent on the photo of the type. In his revision of *tyrrhenicum*, Pinna (1963, p. 80, Pl. 10, f. 17, 22, 23, 26, 28), too, emphasizes the concentration of the ribs about the mounds. As the proportions of the specimen described by Pinna (diameter 36 mm; 39, 30.5, 33) are very close to those of the Urkut specimen, it is not excluded that the Urkut form falls within the range of variability of *tyrrhenicum*.

Distribution: The type of *tyrrhenicum* is known from the Monte di Cetona region, from the Middle Liassic according to Fucini. Forms close to the Urkut specimen have been described by Pinna from the Alpe Turati. The species has been signalled also from Mte Faito, Cesi and Cagli by Merla (1932, p. 48, Pl. 6, f. 12–16, 18) and from the Mti Martani by Lippi-Boncambi (1947, p. 134, Pl. 1, f. 9.)

BRODIEIA BAYANI (DUMORTIER, 1847)?

Pl. 9, f. 6.

Dimensions. Diameter: 24 mm
41.5, 37.5, 29
(10, 9, 7 mm)

Description: A single small cast of good preservation. Umbilicus narrow, deepening stepwise. The high, somewhat vaulted umbilical wall slightly overhangs the umbilical seam. Umbilical margin rounded. The slightly convergent whorl-sides are almost plane, the shoulder is rounded. Venter broad, with a tall narrow keel and very shallow furrows. Whorl section a rectangular oblong with rounded apices. Greatest width at umbilical margin. Ornament well-developed. The umbilical wall bears undulating mounds, in the vicinity of which the ribs are convergent. On the last whorl there are eight such mounds. The ribs are prorsicostate near the umbilicus, almost rectiradiate on the whorl-side and bend forward on the venter: they die out on the margin of the furrow. The ribs are much narrower than the rib spacing. The last whorl bears 33 ribs. The preserved part of the body chamber occupies more than half a whorl. Peristome unknown.

Suture line simple. *E* as long as tapering, long *L*. External *U* very small.

Remark. The proportions of the Urkut specimen hardly differ from those of the type of *Ammonites bayanus* (diameter 45 mm; 42, 37, 27) as described by Dumortier (1874, p. 69, Pl. 16, f. 7–9.) The mounds of the umbilical wall are somewhat better developed on the type, although the underdevelopment of this feature on the Urkut specimen may be due to its small size. The ornament of the Urkut specimen seems denser than that of the type.

Distribution: The species *bayani* has been described from the *bifrons* Zone of Saint Romain – Saint Julien by Dumortier. According to Donovan (1958, p. 43) *Brodieia bayani* is typical of the upper part (*bayani* Subzone) of the *Phymatoceras erbaense* Zone. An up-to-date review of the distribution of the species has been given by Pinna (1963, p. 85).

PSEUDOMERCATICERAS ROTARIES PINNAI N. SUBSP.
Pl. 9, f. 12

Type: Specimen No. 18.

Derivatio nominis: after Prof. G. Pinna, author of a revision of *Pseudomercaticeras*.

Dimensions. Diameter: 42 mm
35.5, 33.5, 39.5
(15, 14, 16.5 mm)

Diagnosis: Unequally swollen, widely spaced ribs.

Description: A single medium-sized cast of mediocre preservation. Umbilicus wide, deepening stepwise. Umbilical wall low, moderately steep, vaulted. Umbilical margin very rounded. Slightly vaulted, almost parallel whorl-sides. Venter broad, very low. Tall broad-based keel bounded by broad deep furrows. Ornament highly developed. The penultimate whorl bears narrow, widely spaced ribs which bend slightly backward on the lower and forward on the upper part of the whorl-side. Near the umbilicus, the ribs often converge without actually coalescing. On the last whorl, the ribs grow coarser on the upper part of the whorl-side while fading on its lower part. Some of the ribs issue on the umbilical margin, others near the middle of the whorl-side. Low on the whorl-side, some ribs almost coalesce, without, however, forming any trace of a node. The last whorl bears 30 ribs. Only the hindmost part of the body chamber is preserved.

Suture line very simple. *E* longer than slightly asymmetric L. *U* very underdeveloped.

Remark. The new subspecies resembles the species *M. rotaries* described by Merla (1932, p. 40. Pl. 4, f. 2, 4, 6, Pl. 8,f. 21) in whorl section and proportions. The proportions of the type of *rotaries*, described by Meneghini (1867–1881, p. 30, Pl. 8, f. 3) by the name *Amm. comensis*, are: diameter 48 mm; 32, 29, 40. The type of *rotaries* is more densely ribbed and its ribs are almost uniform. According to Pinna, the number of ribs per whorl ranges from 33 to 36 in *rotaries*. (There are 36 on the type). The inequal ribs of the new subspecies recall *Mercaticeras parvilobum* as described by Merla (1932, p. 41, Pl. 5, f. 13), but the ribs of *parvilobum* are narrower and stand denser.

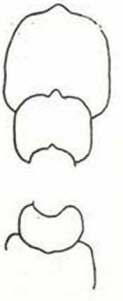

Fig. 22.

Distribution: According to Pinna, the nominate subspecies is known from the environs of the Alpe Turati, Monte Cucco, Monte dei Fiori and Catria; *parvilobum* is known from Porcarella.

PHYMATOCERAS TIROLENSE (HAUER, 1857)
Pl. 8.

\+ 1856 *Ammonites Tirolensis* Hau. – Hauer, p. 41, T.: 7, f.: 1–3.
? 1931 *Lillia tirolensis* Hauer – Lacoste, p. 171.
? 1931 *Lillia tirolensis* Hauer – Monestier, p. 22, T.: 4, f.: 3, 5, 6.

? 1933 *Lillia tirolensis* v. Hauer – Corroy et Gérard. p. 217.
? 1936 *Lillia tirolensis* Hauer – Termier, p. 1303.
Dimensions. Diameter: 107 mm
27, 21.5, 54
(29, 23, 58 mm)

Description. A single large cast bearing parts of the test, part of whose inner whorl is missing. The stepwise deepening umbilicus is very wide. Umbilical wall steep, vaulted, umbilical margin very rounded. Whorl-sides very slightly vaulted; shoulder rounded; venter broad, low, with shallow furrows and a broad, low, vaulted keel. Whorl section subquadrate, greatest width at lower third of side. Ornament highly developed. On the penultimate whorl, nearly rectiradiate ribs issue mostly in groups of three from bullae situated at the umbilical margin. On the last whorl, the ribs are single, straight and bend strongly forward at the shoulder. All ribs issue on the umbilical margin; they are markedly rursiradiate and grow thicker outwards. The sausage-shaped ribs die out at the ventral furrow. The last whorl bears 56 ribs. The body chamber is not preserved.


Fig. 23.

Suture line fairly simple. *E* somewhat shorter than relatively narrow-based, slender *L* which ends in three nearly equal lobules. External *U* well-developed, slender-based. The rest of the umbilical elements are deeply retracted.

Remark. The Urkut specimen differs from the type of *tirolense* in that it has a slightly narrower whorl. The type has a diameter of 102 (?) mm, with 27, 25, 53. It is likewise septate in its full length. The broad, low keel and particularly the strongly rursiradiate ribs, which become single early on the whorl, agree with the type. E is somewhat shorter on the type. – The form published by Dumortier under the name "*tirolense*" is a different species *(Phymatoceras robustum)*.

Distribution. The type of *tirolense* has been described by Hauer from the area of Waidring, from the red Adnethian beads.

PHYMATOCERAS NARBONENSE AEQUALE N. SUBSP.
Pl. 7, fig. 1.

Type: Specimen No. 35.
Derivatio nominis: the name refers to its uniform ornament.
Dimensions. Diameter: 102 mm
30.5, 24.5, 46
(31, 25, 47 mm)

Diagnosis: Nearly uniform nodes and rectiradiate ribs on the penultimate whorl.

Description: A single medium-sized cast, part of which is missing. Umbilicus wide. The sloping, high umbilical wall is slightly concave. Umbilical margin gently rounded. Sides of penultimate whorl slightly, those of last whorl somewhat more markedly convergent. Shoulder slightly rounded on penultimate whorl, somewhat more so on last whorl. Venter of penultimate whorl

broad and slightly vaulted, that of last whorl narrow, tall, roof-like, granding into a narrow well-developed keel. Section of penultimate whorl oblong, that of last whorl subtriangular. Greatest width at umbilical margin. Ornament well-developed. The penultimate whorl bears bullae issuing at the umbilical seam, swelling at the umbilical margin, and drawn out in a radial direction. These nearly uniform nodes bifurcate slightly above the umbilical margin. The thin sausage-shaped ribs issuing from them are rectiradiate on the whorl-side; bending strongly forwards at the shoulder and passing onto the venter, they die out near the keel. Half a whorl bears 13 nodes and 26 ribs. On the last whorl, the nodes gradually lose relief; the ribs become scarcer and shorter. The swollen ribs die out at the shoulder. The body chamber occupies slightly more than half a whorl.

Suture line moderately complex. *E* slightly shorter than long, slender *L* which ends in three almost symmetrical lobules. The tip of external *U* points obliquely towards *L*; internal *U* is near the umbilical seam. Umbilical saddle deeply retracted.

Remark. Proportions and whorl section of the new subspecies hardly differ from those (diameter 262 mm; 25, 21, 54) of the type (*Ammonites Lilli*, [v. Hauer] *in* Dumortier, 1874, p. 82, Pl. 21, f. 1, 2) of *Phymatoceras narbonensis* (Buckman 1898, Suppl p. 14). At a diameter of 102 mm, however (equalling that of the Urkut specimen), the ornament of the inner whorl is irregular on the nominate subspecies, which bears shorter and coarser ribs. The whorl section of *P. chelussii* (Parisch et Viale 1906) is different. The ribs of *P. venustula* (Merla, 1932) are intensely rursiradiate. – The suture line of the new subspecies is hammatoceratid as regards the arrangement of the umbilical elements.

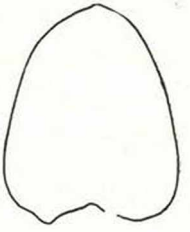

Fig. 24.

Distribution. The type of *Phymatoceras narbonense* comes from the environs of La Verpillière. As to further details of its spread see Renz (1906, p. 270), Schirardin (1914, p. 376), Monestier (1931, p. 21, Pl. 4. f. 1, 2, 4, 10, 12), Merla (1933, p. 14), Corroy et Gérard (1933, p. 217) and Sapunov – Nachev (1959, p. 57, Pl. 5, f. 1, 2).

PHYMATOCERAS CF. ELEGANS (MERLA, 1932)

Pl. 9, f. 10.

Dimensions. Diameter: 35 mm
24, ?, 51,5
(9, ?, 18 mm)

Description: A single small cast of mediocre preservation. Umbilicus very wide and very shallow. Umbilical wall steep, low, vaulted; umbilical margin very rounded. Whorl-sides parallel, hardly vaulted; shoulder somewhat rounded, venter broad, low, with a hardly prominent keel. Whorl section subquadrate, greatest width at middle. Ornament relatively fine. Issuing at the umbilical seam, the ribs bend strongly backwards at the umbilical margin.

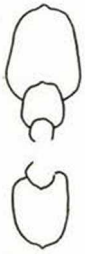

Fig. 25.

Thickening at the shoulder and passing on to the venter, they die out near the keel. They are thin and dense. At the umbilical margin the ribs are seen to converge pairwise. Sometimes the rib pair becomes stronger and slight swollen at the umbilical edge, without, however, actually forming a node. The last whorl carries about 50 ribs. The body chamber is not preserved.

Suture line simple. *E* invisible. *L* ends in three very asymmetrical lobules. *U* very small; umbilical saddle retracted.

Remark. The species resembles the one published by Merla (1932, p. 17, Pl, 1, f. 3, 5, 12) by the name *Denckmannia elegans*. *Phymatoceras iserensis* (Oppel, 1856) has a coarser ornament. Monestier (1931, p. 24, Pl. 5, f. 16) has described besides the typical specimens of *iserensis* also a form with finer ribbing, which can be distinguished from elegans by the development of the nodes.

Distribution. *Phymatoceras elegans* is known according to Merla from the Mte Gemmo, Mitola, Gagli and Porcarella regions, from the *lilli* Zone. Donovan (1959, p. 55) has demonstrated *elegans* from around Valdorbia.

PHYMATOCERAS SP. AFF. ERBAENSE (HAUER, 1856)
Pl. 9, f. 5.

Dimensions: Cannot be established owing to poor preservation.

Description. A single incomplete cast. Umbilicus wide, umbilical wall high, steep, slightly vaulted; umbilical edge very rounded. Whorl-sides nearly parallel and very slightly vaulted; shoulder very rounded. Venter broad, almost plane, with a very narrow, low keel and hardly perceptible narrow, shallow furrows. Whorl section subquadrate; greatest width at middle. Ornament highly developed. Issuing near the umbilical seam, the ribs are straight and, particularly about the umbilical edge where most of them bifurcate, very prominent. On the venter, the ribs bend forward and die out right on the edge of the ventral furrow. The last whorl bears 30 ribs. About half a whorl of body chamber is preserved. Peristome unknown.

Suture line simple. *E* somewhat shorter than broad, nearly symmetrical *L*.

Remark. The Urkut specimen, whose taxonomic position cannot, owing to its incompleteness, be determined with certainty, differs from the species *Ammonites erbaensis* described by Hauer (1856, p. 42, Pl. 11, f. 10–14) in its more abundant bifurcating ribs. The suture line of the type is somewhat better developed.

Distribution. The type of *Phymatoceras erbaense* has been described by Hauer from the Pian d'Erba region and from the Alpe Baldovane. According to Donovan, (1958, p. 43) *erbaense* defines a zone in Southern Switzerland and Italy.

PHYMATOCERAS N. SP.

Dimensions: Cannot be established owing to poor preservation.

Description. Fragment of a single, fairly large cast of mediocre preservation. Umbilicus wide. Umbilical wall high, almost perpendicular, hardly vaulted. Umbilical edge rounded. Somewhat convergent whorl-sides,

very slightly vaulted. Shoulder slightly rounded, venter in the shape of a broad, low roof, with a high keel having concave flanks. Whorl section a rectangular oblong with rounded apices; greatest width at umbilical margin. Ornament of inner whorl well-developed, that of the last whorl, subdued. The almost straight, slightly rursiradiate ribs issue from node-like bullae at the umbilical edge; bending forward, they die out near the shoulder. The swollen ribs are as broad as rib spacing. The preserved part of the body chamber takes up a quarter-whorl.

Suture line simple. *E* invisible. L is long and ends in three nearly symmetrical lobules.

Remark. The inner whorl of the new species which, owing to its state of preservation, is published for the time being without a name, recalls *Phymatoceras chelussii* (Parisch – Viale, 1906), but the tall concave-flanked keel on the last whorl is a feature alien from *chelussii*. The subdueed ornament resembles that of the form described by Buckman (1921, Pl. 234) by the name *Pelecoceras obliquatum*, which has a narrower whorl and more rectiradiate ribs.

Distribution. The type *chelussii*, close to the new species, comes from the Toarcian of the Monti del Furlo. The type of *Pelecoceras obliquatum* comes from the *variabilis* Hemera of Whitby.

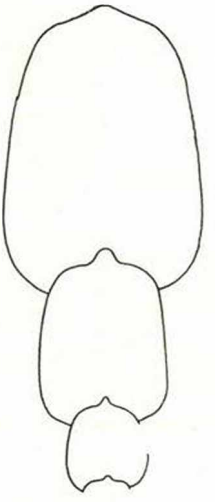

Fig. 26.

FRECHIELLA ACHILLEI LONGOBARDICA RENZ, 1927

Pl. 9, f. 13.

1925 *Frechiella Achillei* Renz – Renz, p. 391, T.: 16, f.: 3.

+ 1927 *Frechiella Achillei* var. *longobardica* nov. var. – Renz, p. 427.

Dimensions: Cannot be established owing to poor preservation.

Description: A single incomplete cast. Umbilicus very narrow and deep. The high, nearly plane umbilical wall strongly overhangs the umbilical seam. Umbilical margin somewhat rounded. Whorl-sides vaulted and convergent. Venter broad, low, with narrow shallow furrows and a low keel. Whorl section subcircular; greatest width at umbilical margin. The cast bears no ornament. Under a very good illumination, the venter reveals low, broad, vague prominences between the septa which may be the results of a subsequent dissolution of parts of the cast. Only the hindmost part of the body chamber is preserved.

Fig. 27.

Suture line relatively well-developed. *E* almost as long as tapering *L*. *ES* very broad, with a small median incision. Broad *LS* finely serrate. The septa stand very dense, particularly near the body chamber.

Remark. Apart from the prominences on the venter, the Urkut specimen fully agrees with the type.

Distribution. The type of *Frechiella achillei longobardica* comes from Val Moluna, from the *bifrons* Zone.

FRECHIELLA ACHILLEI EGERIAE RENZ, 1925
Pl. 9, f. 15

\+ 1925 *Frechiella Achillei* var. *Egeriae* Renz (nov. var.) – Renz, p. 392, T.: 16, f.: 2.

Dimensions. Diameter: 48 mm
52, 46, 16,5
(25, 22, 8 mm)

Description. A single small cast of mediocre preservation. Umbilicus very narrow and deep. The high umbilical wall, which somewhat overhangs the umbilical seam, is but slightly vaulted. Umbilical edge rounded. Whorl-sides vaulted, convergent. Venter broad, low, with very shallow furrows and a slightly prominent keel. Whorl section subelliptic. Greatest width near lower quarter of whorl-side. Ornament very slightly developed: only near the umbilical edge are there a few short, nearly rectiradiate, very vague rib traces. The preserved part of the body-chamber occupies half a whorl. Peristome unknown.

Suture line simple. *E* poorly visible, *L* broad and deep. *LS* well-developed, with a marked median incision.

Fig. 28.

Remark. Proportions, shape and suture line of the Urkut specimen agree with those of the type of *egeriae:* however, according to the description, the ornament is better visible on the type.

Distribution. *Frechiella achillei egeriae* has been described by Renz from Val Ceppelline and the environs of Salzburg, from the *bifrons* Zone.

FRECHIELLA SP. AFF. VENANTII (CATULLO, 1846)
Pl. 9, f. 14.

Dimensions: Diameter: 27 mm.
48, 44.5, 18.5
(13, 12?, 5 mm)

Description. A single small cast of poor preservation. Umbilicus narrow and deep. Umbilical wall vaulted, overhanging the umbilical seam. Umbilical margin very rounded. Venter broad, low, with a well-defined keel. The narrow, shallow ventral furrows become visible under very good illumination only. Whorl section oval, greatest width near umbilical margin. Ornament well-developed on the lower, poorly developed on the upper part of the whorl-side. Issuing at the umbilical edge, the broad, swollen, slightly rursiradiate ribs fade above the middle of the whorl-side. Half a whorl bears five ribs. Body chamber and peristome unknown.

Suture line very simple. *E* poorly visible, *L* short, broad-based, with a very finely serrate margin. *U* is situated at the umbilical margin. The median incision dividing *ES* in two is small.

Remark. The specimen from Urkut belongs, with its ornamentation restricted to the lower part of the body chamber, to the relationship os *Frechi-*

ella venantii (Catullo, 1846, p. 22, Pl. 13, f. 3.). However, a more precise determination than this is impossible owing to the poor preservation of the specimen.

Distribution. The type of *Frechiella venantii* comes from the red ammonite beds of Entratico. Renz (1925, p. 394–398) has established, on the basis of the Upper Liassic ammonite faune of the Ticino, several subspecies within the species *venantii*. *Venantii* has been figured by Brun – Marcelin (1934, p. 450, Pl. 2, f. 13–14) from the Florac area.

FRECHIELLA KAMMERKARENSIS N. SUBSP. AFF. HELVETICA RENZ 1922

Pl. 9, f. 11.

Dimensions: Diameter: 65 mm
49, 46 ?, 23
(32, 30 ? 15 mm)
(32, 30 ? 15 mm)

Description: Single fragment of well-preserved cast. Umbilicus narrow and deep. Umbilical wall high, almost perpendicular, somewhat vaulted; umbilical edge rounded. Whorl-sides vaulted, slightly convergent. Shoulder rounded, venter broad, plane, with broad and very shallow furrows and a likewise broad, low keel. Whorl section rounded trapezoidal, greatest width near the umbilical margin. Ornament poorly developed. The almost rectiradiate, vague, broad ribs are invisible except under very good illumination. At the shoulder, the ribs become swollen, forming a row of obtuse bullae. Between each pair of bullae, the keel and both furrows become more pronounced. This results in a sinuous outline of the venter. Body chamber and peristome unknown.

Lobe relatively intricate. *E* almost as long as broad *L*, the middle one of whose three lobules is much prolonged and bifid, forming two small teeth. External *U* is outside umbilical margin. *ES* is divided into two unequal parts by the median incision.

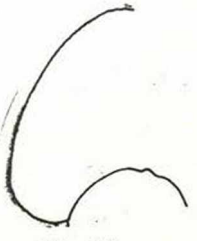

Fig. 29.

Remark. On the basis of its dorsolateral nodes, the Urkut specimen belongs to the species *Frechiella kammerkarensis* (Stolley, 1903). Within that species, the poorly developed ornament recalls the subspecies *F. kammerkarensis helvetica* (cf. Renz, 1922, p. 158, Pl. 7, f. 13, 11). As regards whorl section, the forms of *helvetica* figured by Renz in 1925 (p. 402, Pl. 15, f. 3 and Pl. 18, f. 4) are particularly similar. The specimen figured as Fig. 4 on Pl. 18 as cfr. *helvetica* is almost exactly like ours also as to size. The difference from *helvetica* is in the suture line, particularly as regards the development of the middle lobule of *L*. *F. kammerkarensis salisburgensis* Renz, 1925/p. 213, Pl. 5, f. 3) possesses a better-developed ornament, and broader whorls, but its suture line recalls that of the Urkut specimen. On the whorl of *F. pannonica* Prinz, 1906 (p. 55. text-fig. 3, 4) the width is larger than the height. Orna-

ment is also better developed, and *L* ends in two short, divergent teeth. It is therefore probable that the Urkut specimen takes an intermediate position between *F. kammerkarensis helvetica* and *F. kammerkarensis salisburgensis*. To name the new subspecies would be premature considering its poor state of preservation.

Distribution. Of the subspecies of *F. kammerkarensis*, the type *helvetica*, which stands closest to the subspecies from Urkut, comes from the red clayey doggery beds (*bifrons* Zone) of the Breggiaschlucht. Besides, *helvetica* occurs also in the environment of Varea and Bruciati (Renz, 1925, p. 402) and in the Mti Martani (Lippi-Boncambi, 1947, p. 148).

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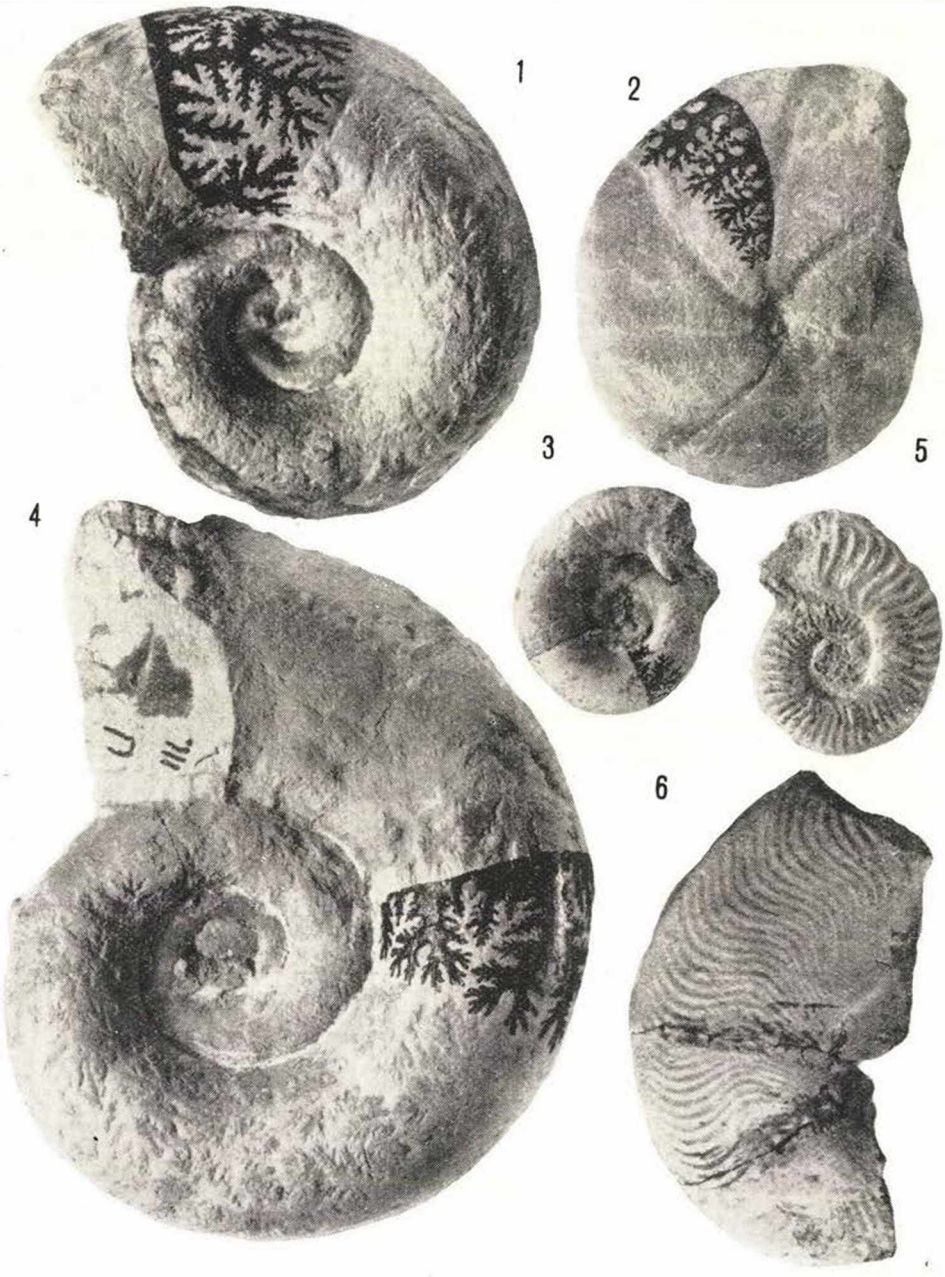

Plate 1.
Fig. 1. Lytoceras sublineatum (Oppel, 1862)
Fig. 2. Calliphylloceras beatricis (Bonarelli, 1897)
Fig. 3. Trachylytoceras ? sepositum (Meneghini, 1867 – 1881)
Fig. 4. Lytoceras sublineatum (Oppel, 1862)
Fig. 5. Grammoceras doerntense (Denckmann, 1887) ?
Fig. 6. Polyplectus cf. subexaratus (Bonarelli, 1897)

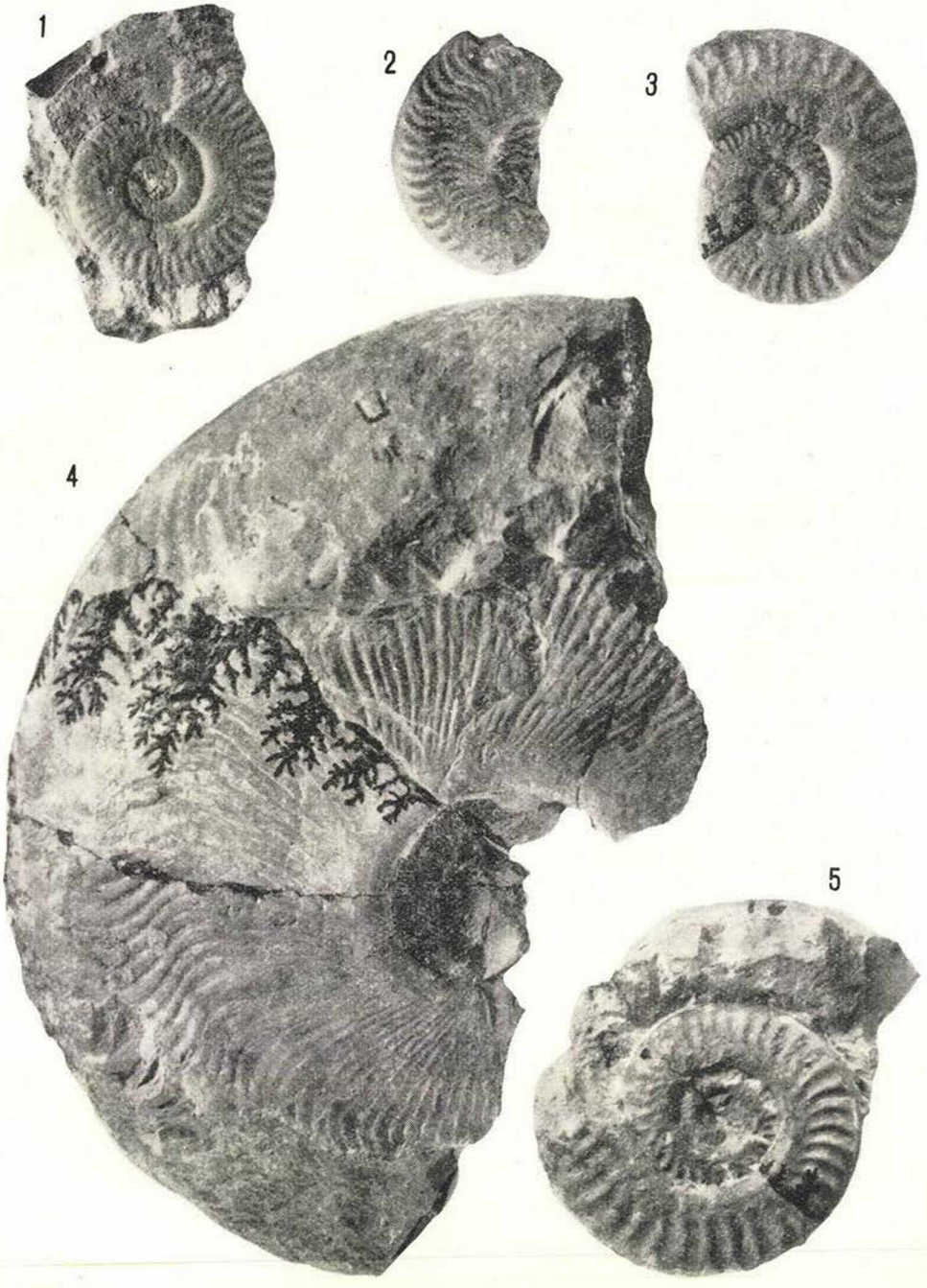

Plate 2.
Fig. 1. Urkutites boeckhi n. sp. Typus. Fig. 2. Polyplectus cf. subexaratus (Bonarelli, 1897)
Fig. 3. Urkutites inflatus n. sp. Typus. Fig. 4. Polyplectus subplanatus (Oppel, 1856) ?
Fig. 5. Hildoceras sublevisoni Fucini, 1919.

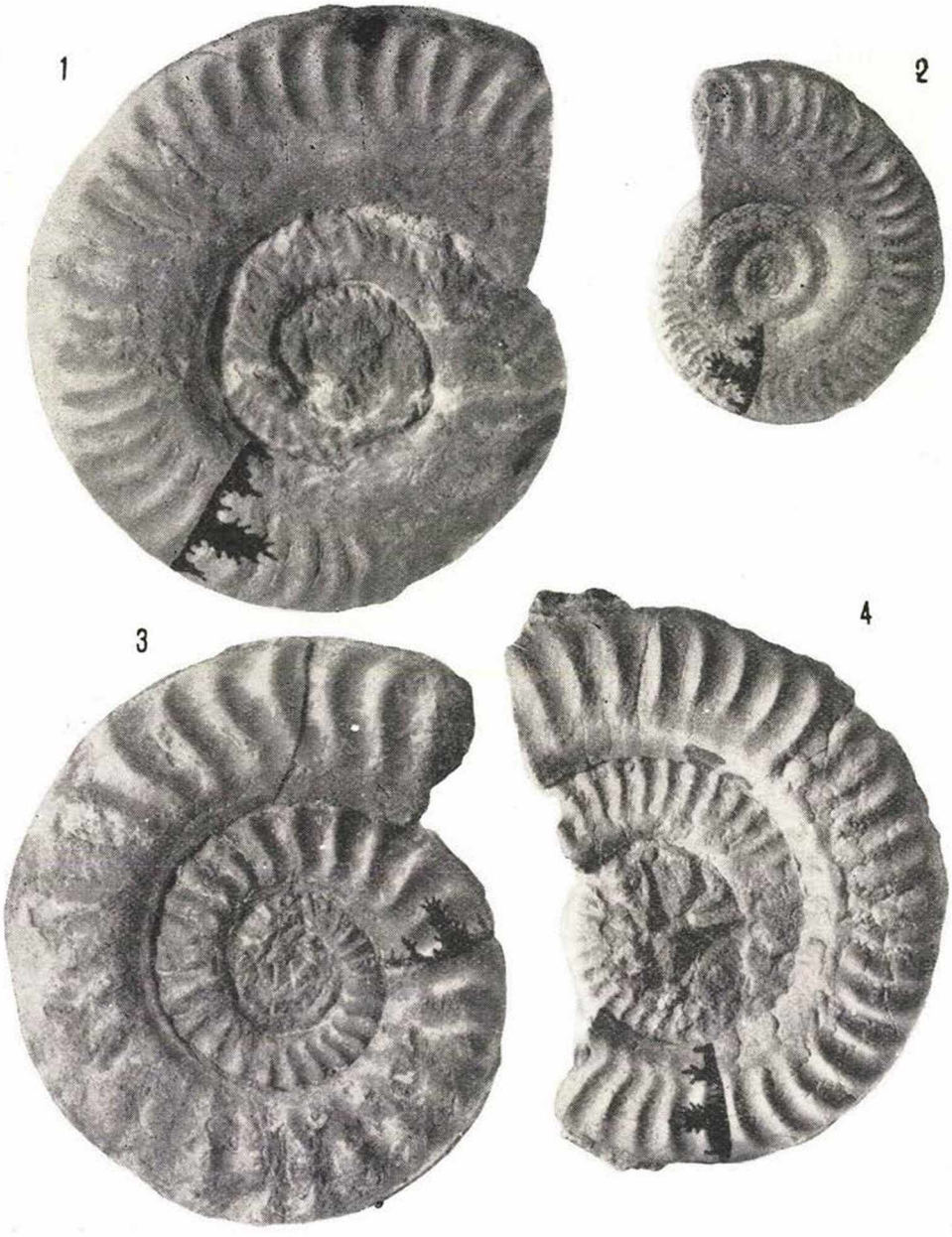

Plate 3.

Fig. 1. Hildoceras sublevisoni involutum n. subsp. Typus
Fig. 2. Hildoceras semipolitum Buckman, 1902.
Fig. 3. Hildoceras sublevisoni raricostatum Mitzopoulos, 1930.
Fig. 4. Hildoceras sublevisoni Fucini, 1919.

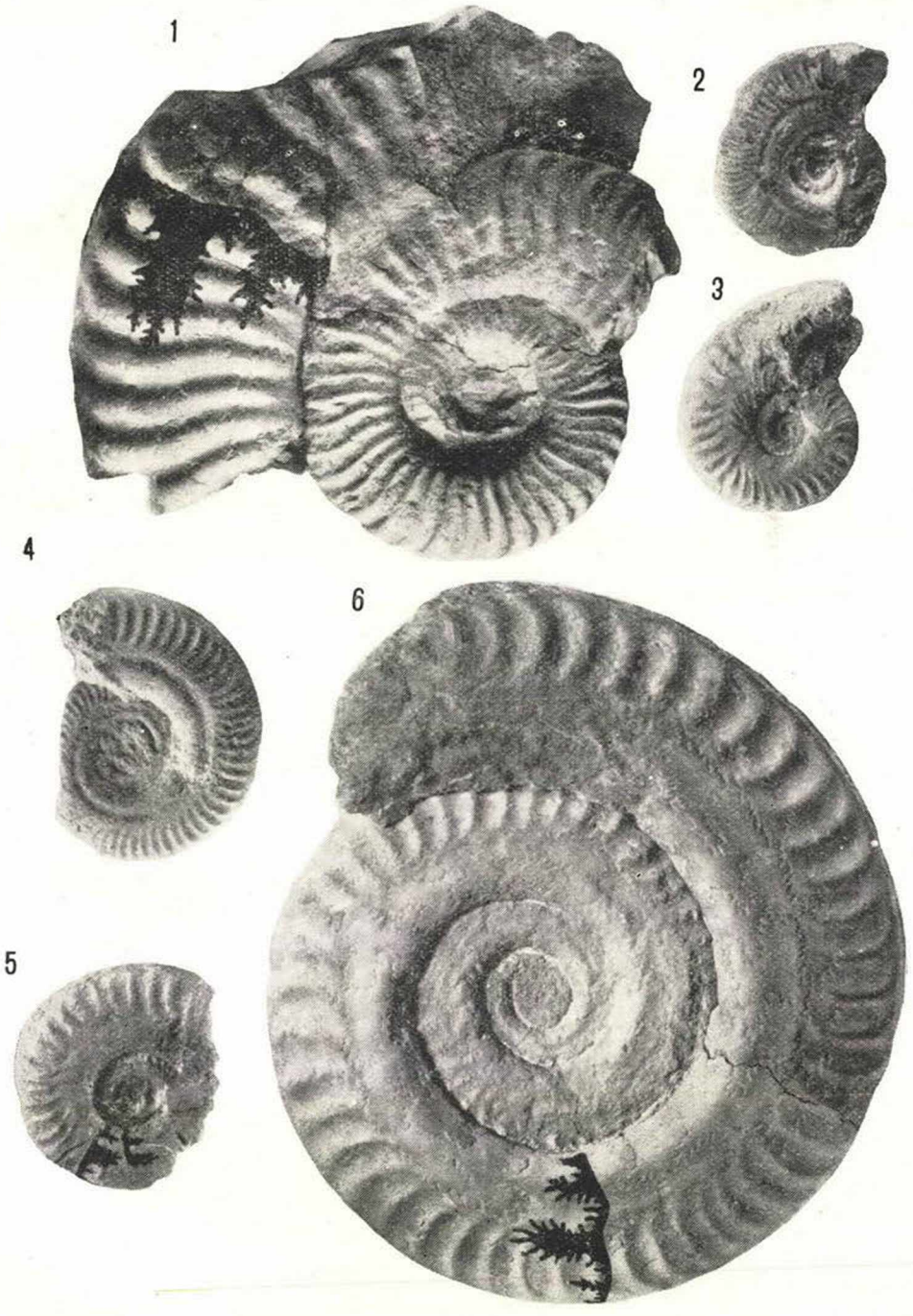

Plate 4.

Fig. 1. Pseudogrammoceras saemanni raricostatum n. subsp. Typus. Fig. 2. Hildoceras semipolitum pannonicum n. subsp. Typus. Fig. 3. Hildoceras lombardicum (Mitzopoulos, 1930). Fig. 4. Hildoceras semipolitum subquadratum n. subsp. Typus. Fig. 5. Hildoceras lombardicum (Mitzopoulos, 1930). Fig. 6. Hildoceras bifrons tethysi n. subsp. Typus.

Plate. 5.
Hildaites serpentiniformis urkutensis n. subsp. Typus.

Plate. 6.
Hildaites sp.

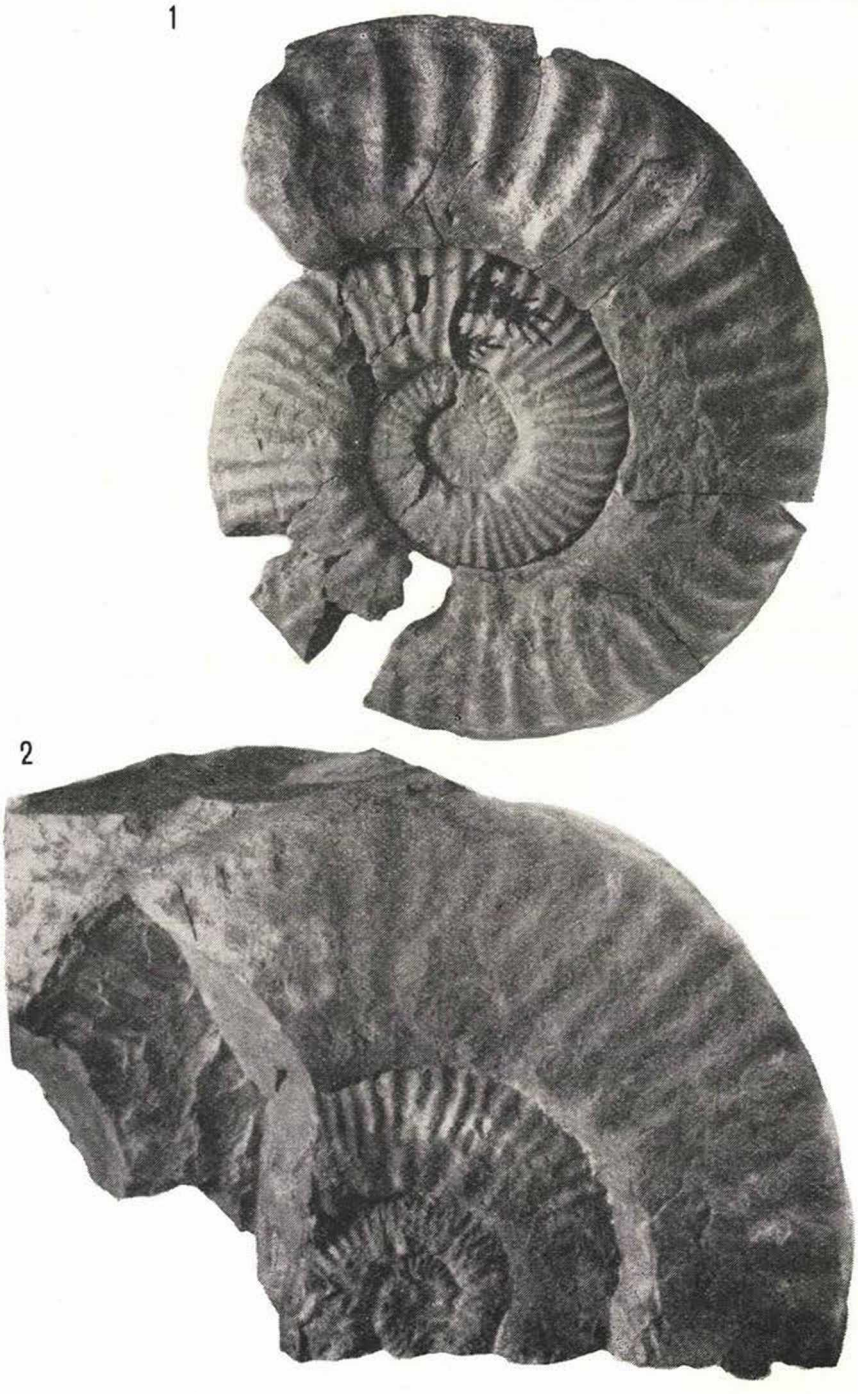

Plate 7.
Fig. 1. Phymatoceras narbonense aequale n. subsp. Typus
Fig. 2. Phymatoceras n. sp.

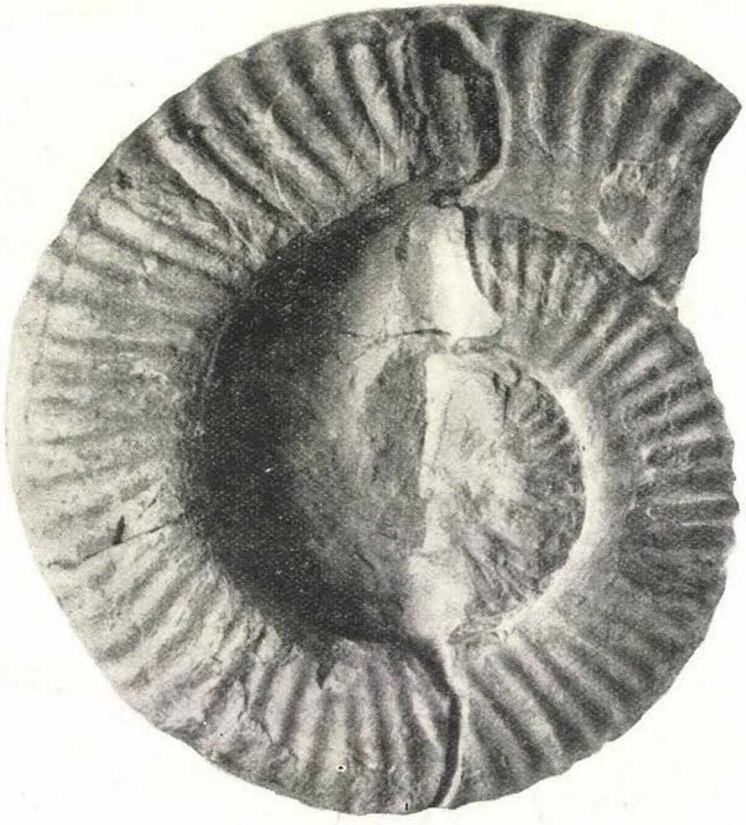

Plate. 8.
Phymatoceras tirolense (Hauer, 1856)

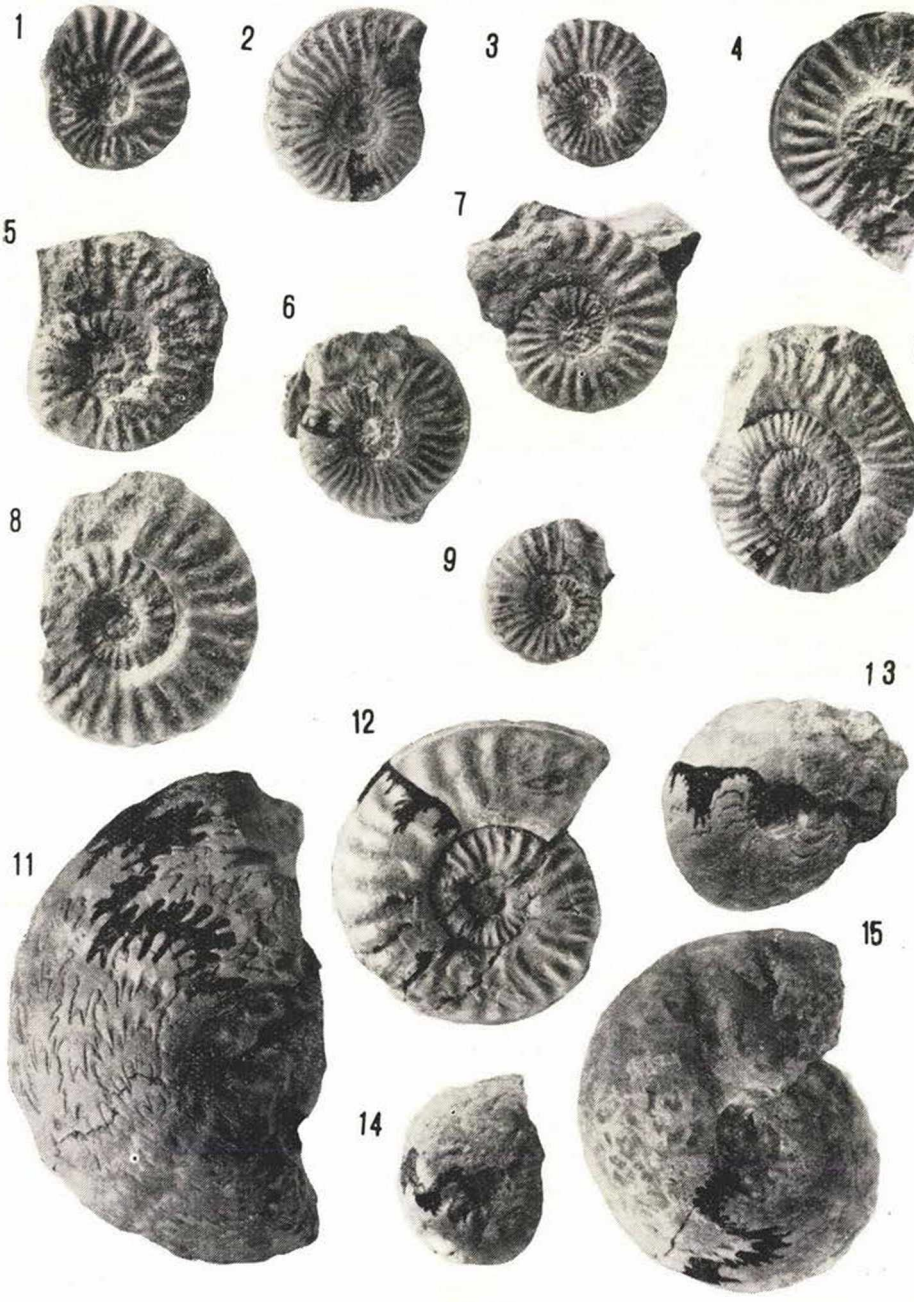

Plate. 9.

Fig. 1. Mercaticeras mercati (Hauer, 1856). Fig. 2. Mercaticeras thyrrenicum (Fucini, 1905) ?
Fig. 3. Mercaticeras involutum Buckman, 1913. Fig. 4. Mercaticeras mercati (Hauer, 1856)
Fig. 5. Phymatoceras sp. aff. erbaense (Hauer, 1856). Fig. 6. Brodieia bayani (Dumortier, 1874) ?
Fig. 7. Mercaticeras umbilicatum Buckman, 1913. Fig. 8. Mercaticeras umbilicatum Buckman, 1913
Fig. 9. Mercaticeras involutum Buckman, 1913. Fig. 10. Phymatoceras cf. elegans (Merla, 1932)
Fig. 11. Frechiella kammerkarensis n. subsp. aff. helvetica Renz, 1922. Fig. 12. Pseudomercaticeras rotaries pinnai n. subsp. Typus Fig. 13. Frechiella achillei longobardica Renz, 1927.
Fig. 14. Frechiella sp. aff. venantii (Catullo, 1846). Fig. 15. Frechiella achillei egeriae Renz, 1925