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Lower Aptian Ammonites from the Medziholie locality (the Malá Fatra Mountains, Slovakia)

Ammoniti dell'Aptiano inferiore della località di Medziholie (Monti Malá Fatra, Slovacchia)

ZDENEK VAŠÍCEK (*) & MILOŠ RAKÚS (**)

IGCP Projects
343: Stratigraphic Correlations Basins of Peritethyan
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ABSTRACT - During the last geological mapping in the Malá Fatra Mountains in the region of Medziholie Saddle, a macrofaunistic horizon in the marly deposits of the Párnica Formation, which was reported earlier by ANDRUSOV, has been rediscovered. Except for tiny gastropods and bivalves found on the Medziholie locality, also ammonites (often with preserved suture-lines) occur here more frequently. Among ammonites we were able to identify *Phylloceras (Hypophylloceras) cypris cypris, Macroscaphites striatisulcatus, Costidiscus tenuistriatus, Melchiorites* cf. *emerici* and *Deshayesites* sp. Most probably *M. striatisulcatus* and *C. tenuistriatus* form a dimorphic pair. The determined ammonite association is richer than the assemblage cited by ANDRUSOV except for *Cheloniceras cornuelianum* which occurrence was not verified. The locality mentioned here is the unique Lower Aptian ammonite locality in the whole Central Western Carpathians.

KEY-WORDS. Slovakia, Central Western Carpathians, Fatric, Lower Aptian, ammonites, taxonomy.

RIASSUNTO - Nel corso dell'ultima campagna di cartografia geologica nelle Montagne Malá Fatra, nella regione della Sella Medkiholie, è stato riscoperto un orizzonte con macrofauna nei depositi marnosi della Formazione Párnica, precedentemente descritto da ANDRUSOV. Salvo piccoli gasteropodi e bivalvi, rinvenuti nella località Medkiholie, sono frequenti anche le ammoniti (spesso con le suture conservate). Fra le ammoniti sono state identificate le specie *Phylloceras (Hypophylloceras) cypris cypris, Macroscaphites striatisulcatus, Costidiscus tenuistriatus, Melchiorites* cf. *emerici* e *Deshayesites* sp. Molto probabilmente, *M. striatisulcatus* e *C. tenuistriatus* costituiscono una coppia dimorfica. L'associazione ad ammoniti determinata è più ricca di quella citata da ANDRUSOV, con l'eccezione di *Cheloniceras cornuelianum,* la cui presenza non è stata verificata. La località in esame è l'unica, nell'intera parte centrale dei Carpazi occidentali, dove sono presenti ammoniti dell'Aptiano inferiore.

PAROLE CHIAVE: Slovacchia, Carpazi occidentali centrali, Fatricum, Aptiano inferiore, ammoniti, tassonomia.

(*) Katedra geologie, mineralogie a geochemie, VŠB, Tr. 17. listopadu, 708 33 Ostrava-Poruba, the Czech Republic;
(**) GÚDŠ, Mlynská dolina 1, 817 04 Bratislava, the Slovak Republic

1. - INTRODUCTION

Building new forest approaches from the valley in the direction from Velká Lucivná (the north of Párnica) in the Malá Fatra Mountains (the Western Carpathians) to the burned-out chalet in the Medziholie Saddle below the Velký Rozsutec Mount, a significant nearly complete profile through the Krí□na Nappe was discovered. Predominantly Triassic and Jurassic carbonate deposits of the Krízna Nappe (belonging to the Fatric tectonic unit in the central part of Western Carpathians) around the Jurassic\Cretaceous boundary pass into marly limestone succession of strata, formerly simply designated as Neocomian. On the basis of the data available so far (VAŠÍCEK, 1991) the prevailing part of these deposits belongs to the fossiliferous Mráznica Formation. In the profile under study the Mráznica Formation ends below the Medziholie saddle in the Upper Barremian, which is proved by the occurrence of *Costidiscus recticostatus* (D'ORBIGNY) and *Barremites* sp. in the last limestone layers. The Mráznica Formation is in overlying stratum gradually replaced by a set of dark-grey deposits which are bare in numerous erosion-rills and gullies in the wider surroundings of the above mentioned chalet. These deposits correspond to the Párnica Formation (HAUER, 1872) which are very poor in macrofossil content. The succession of the whole strata in the Krízna Nappe ends in the flysch deposits belonging to the Albian.

From the Párnica Formation, however, without any precise localization under the name Medziholie ANDRUSOV (1931) mentioned the occurrence of macrofauna especially of pyritized ammonites. *Cheloniceras cornuelianum* (D'ORBIGNY), the guide species of the Lower Aptian, has the highest stratigraphical value among all ammonites cited by Andrusov (*Costidiscus recticostatus microcostatus* (SIMONOVICH, BACEVICH & SOROKIN), *Macroscaphites yvani afra* SAYN, *Desmoceras* (*Puzosia*) sp.). However, these ammonites have never been described more precisely or at least figured and that have most probably got lost during the time. SCHEIBNEROVÁ (1962) studied the benthic and planctonic foraminiferas of this locality and proposed the same age for these deposits.

Similar new occurrences of bivalves, gastropods and ammonites of small dimensions found during geological mapping in the Medziholie area are given by HAŠKO & POLÁK (1979). The layer with fossils is situated in one of the erosion-rills on the Párnica Formation, which topographical position is indicated in Fig. 1. It is

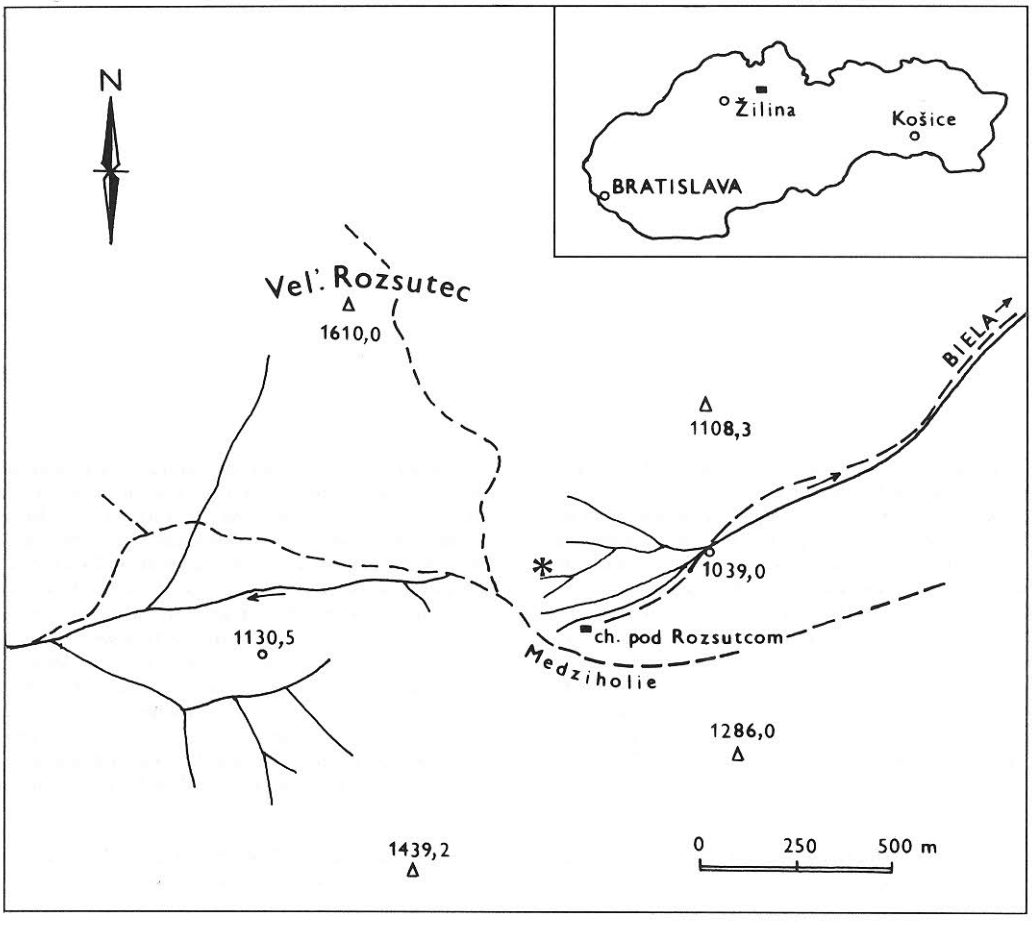

Fig. 1 - Location of the Medziholie locality. An asterisk indicates the location of the fossiliferous layer.
- *Ubicazione della località Medziholie. La posizione dello strato fossilifero è indicata dall'asterisco.*

situated approximately 850 m SE of key point 1610 (the Velký Rozsutec Mount). It is either identical or at least near to the ANDRUSOV's locality (1931). The present paper describes the ammonites of the HAŠKO & POLÁK (1979) collection, which predominantly contains fragments and often also partly deformed fine limonitized molds, frequently with preserved suture-lines.

2. - TAXONOMY

The following abbreviations are used for the dimensional parameters of the ammonite shells (measured in mm): D = diameter, H = whorl height, W = whorl width, O = umbilical diameter. The suture symbols are used according to WEDEKIND's suture terminology (see KULLMANN & WIEDMANN, 1970): E - external lobe, L - lateral lobe, U - umbilical lobe, I - internal lobe.

ORDER Phylloceratida ARKELL, 1950
SUPER FAMILY Phylloceratacеae ZITTEL, 1884
FAMILY Phylloceratidae ZITTEL, 1884

GENUS ***Phylloceras*** SUESS, 1865
TYPE SPECIES: *Ammonites heterophyllus* SOWERBY, 1820

SUBGENUS ***Hypophylloceras*** SALFELD, 1924
TYPE SPECIES: *Philloceras ononense* STANTON, 1895

Phylloceras (Hypophylloceras) cypris cypris (FALLOT & TERMIER, 1923)
Pl. 1, fig. 1-2; Fig. 2

1964 *Phylloceras (Hypophylloceras) cypris cypris* FALLOT & TERMIER; WIEDMANN, p. 215, pl. 12, fig. 8; pl. 13, fig. 3; pl. 14, fig. 1, text-fig. 50 (*cum syn.*)

DESCRIPTION - Internal whorls with bloom-out sections. The height of the whorls increases with the increase of the diameter. The last preserved whorl bears convex, relatively high flanks passing continuously into rather narrow, strongly convex ventral side. The umbilicus is narrow. Densely spaced fine and convex ribs, which are separated by narrow and shallow grooves into partial beams, are seen on the mold. The whorl fragment corresponds to the shell diameter of approximately 18 mm (H/W = 1.4). Suture-line (Fig. 2) with diphylloid saddles.

MATERIAL - Unique fragment of phragmocone with sections of younger whorls (spec. GUDŠ 1536).

REMARKS - Because of the subtrigonal cross-section of the last whorl, we identify our specimen as a typical subspecies and not as *P. (H.) cypris cytherae* WIEDMANN, 1964, which differs in bearing subparallel whorl flanks, i.e. a different whorl section. Because of the juvenile age of the shell, the suture-line lacks at this stage any tetraphylloid saddles, which are typical of adult shells of the given phylloceratid group.

OCCURRENCE - The mentioned subspecies ranges from the Aptian up to the Upper Albian.

ORDER Lytoceratida HYATT, 1889
SUBORDER Lytoceratina HYATT, 1889
SUPERFAMILY Lytoceratacеae NEUMAYR, 1875
FAMILY Macroscaphitidae HYATT, 1900

GENUS ***Macroscaphites*** MEEK, 1876
TYPE SPECIES: *Scaphites yvani* PUZOS, 1831

Macroscaphites striatisulcatus (D'ORBIGNY, 1841)
Pl. 1, fig. 3-7

1841 *Ammonites striatisulcatus* D'ORBIGNY, p. 153, pl. 49, fig. 4-7.
1976 *Macroscaphites yvani striatisulcatus* (D'ORBIGNY); AVRAM, p. 23, pl. 1, fig. 8, 9, 12 (*cum syn.*).

DESCRIPTION - Evolute shells with whorls which are wider than their height is. Flanks of whorls are at first low, later somewhat higher and rounded. The ventral side is slightly convex, not very wide. The sculpture of the early whorls, which may be seen at the diameter of approximately 3 mm, consists of relatively sparse tubercles situated exactly at the middle part of low, strong rounded whorls. From each tubercle undistinct ribs are running to the umbilicus. The ventral side is smooth. Once the shell reaches the diameter of 7 mm, its outer part is covered with densely spaced thin ribs, while the tubercles typical of the juvenile shell, have disappeared. The sculpture of further whorls consists of densely spaced, thin, prorsiradiate ribs, while the simple and bifurcated ribs alternate regularly. The ribs are bifurcated at flanks. There are 2-3 constrictions per whorl; they are slightly developed at the inner whorls.

The outer part of not complete suture-line is strongly diverging, as in *Costidiscus tenuistriatus* (REPELIN) - Fig. 3a.

MATERIAL - Three shells of various stages of growth lacking the hook (spec. GUDŠ 1537-9) and one fragment of a whorl (spec. GUDŠ 1540). The outer part of the suture-line is preserved on this fragment.

MEASUREMENTS - The best preserved, however partly deformed specimens have the following dimensions:

Spec	D	H	W	O	H/W
1538	10.5	3.4 (0.32)	5.8 (0.55)	4.7 (0.44)	0.58
1539	23.5	6.5 (0.28)	≈.11 (0.48)	≈.11.5 (0.49)	-

REMARKS - *Macroscaphites striatisulcatus*, closely related to *M. yvani* (PUZOS), is characterized by its smaller size. The diameter of the coiled part of the former species exceeds only exceptionally 30 mm, while in the case of the latter species, it exceeds 40 mm. Comparing the similar *Costidiscus tenuistriatus* (REPELIN), which occurs together with *M. striatisulcatus*, the last one differs in the more outstanding width of whorls.

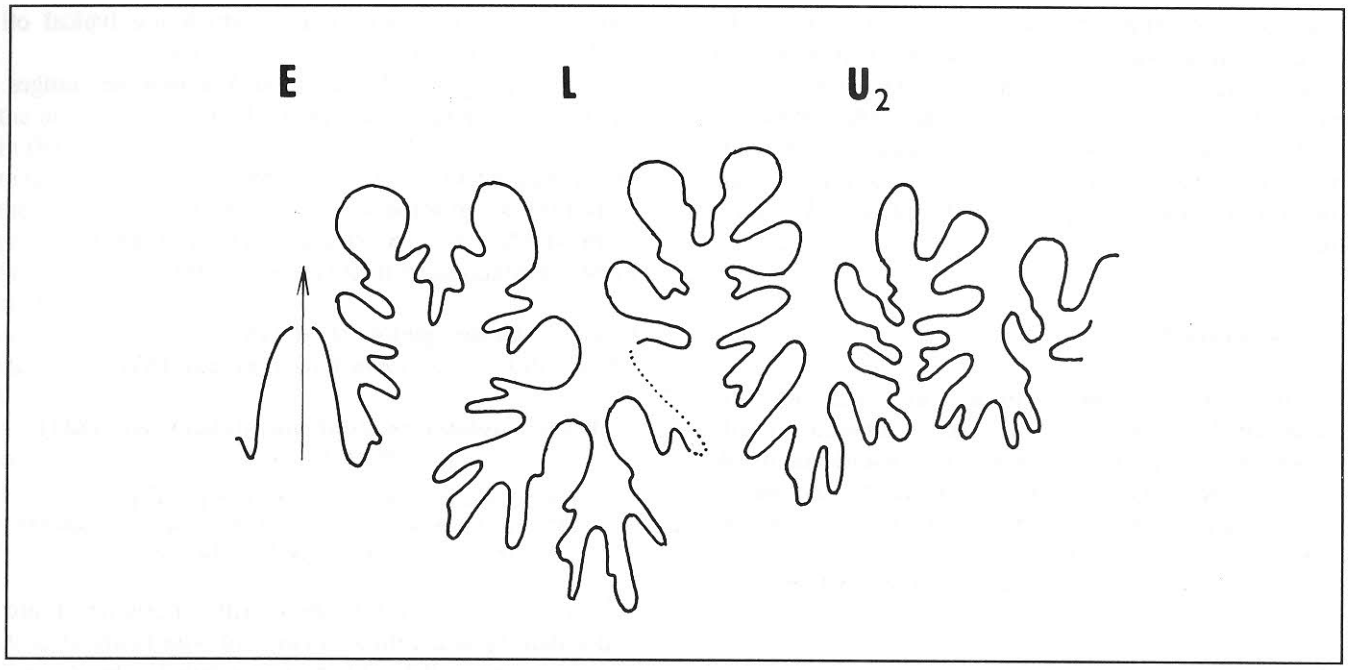

Fig. 2 - Outer part of the suture-line of *Phylloceras (Hypophylloceras) cypris cypris* (FALLOT & TERMIER) at H = 9 mm.
- *Parte esterna della linea di sutura di* Phylloceras (Hypophylloceras) cypris cypris *(FALLOT & TERMIER) H= 9mm.*

OCCURRENCE - According to AVRAM (1976), *M. striatisulcatus* is reported from the Lower Aptian in France, Rumania, Crimea and Caucasus.

GENUS ***Costidiscus*** UHLIG, 1882
TYPE SPECIES: *Ammonites recticostatus* D'ORBIGNY, 1841

Costidiscus tenuistriatus (REPELIN, 1899)
Pl. 1, fig. 8-16; Fig. 3a,b

1899 *Lytoceras tenuistriatum* n. sp., REPELIN, p. 362, pl. 7, fig. 5.

DESCRIPTION - Evolute shell with thick whorls with a coronate cross-section. The flanks of the juvenile whorls are reduced to a narrow zone of maximal convexity of the whorl. Umbilicus is deep, funnel-like; ventral side is wide, flatly convex. The sculpture of juvenile whorls consists of simple, strongly prorsiradiate ribs initiating nearby umbilicus. The ribs end in the middle part of low whorls with tubercles. The ventral area is smooth. At the diameter of about 5 mm the ribs are getting weaker and the tubercles are gradually disappearing. From each tubercle two thin ribs bifurcate in the direction to ventral side and then disappear very quickly so that the central part of venter remains smooth. At the diameter of 7 mm, the first shallow constriction appears. Behind it the coronate whorl-section becomes weak, the ribs are generally thinner and run through the whole whorl. Between the bifurcated ribs, some simple ribs begin to occur. Before passing the quarter-whorl, another weak constriction occurs. On the fragment of the more adult whorl the thin-ribbed sculpture continues, while bifurcated and simple ribs alternate more or less regularly. The biggest fragment of the adult whorl, which still belongs to the phragmocone, is more sparsely ribbed with blunt and wider ribs than in the previous stages.

SUTURE - LINE - On the spec. GUDŠ 1543 not only the outer part of suture-line but also the inner suture-line are preserved. The whole suture-line is strongly divided (Fig. 3a,b). On the broad ventral side broad lobes E and L are situated as well as two lateral saddles. The outer lobe consists of a relatively low secondary oblong saddle. The umbilical lobes (U_1, U_2) near the coiling line are only imperfectly preserved. The lobe I is relatively narrow and deep. Its basal restriction is not visible.

MATERIAL - One well preserved limonitized juvenile external mold (spec. GUDŠ 1541) and two fragments of adult whorls, both with suture-lines (spec. GUDŠ 1542-3).

MEASUREMENTS - Only on one well preserved juvenile specimen (GUDŠ 1541) of maximal diameter 8.5 mm all parameters are measurable.

Spec	D	H	W	O	H/W
1541	8.5	2.9 (0.34)	5.4 (0.64)	3.2 (0.38)	0.54
1542	-	4.7	7.5	-	0.63
1543	-	8.2	12.6		0.65

REMARKS - The above given species determined by REPELIN at the end of the last century remained rather unknown. It is typical for its thick whorls which have the same aspect also in the adult stage. We can exclude that the shell becomes uncoiled and develops a hook (which is typical for genus *Macroscaphites*). Thus we refer the material described here to the genus *Costidiscus*. As *C. tenuistriatus* occurs together with *M. striatisulcatus,* we suppose that they form a dimorphic

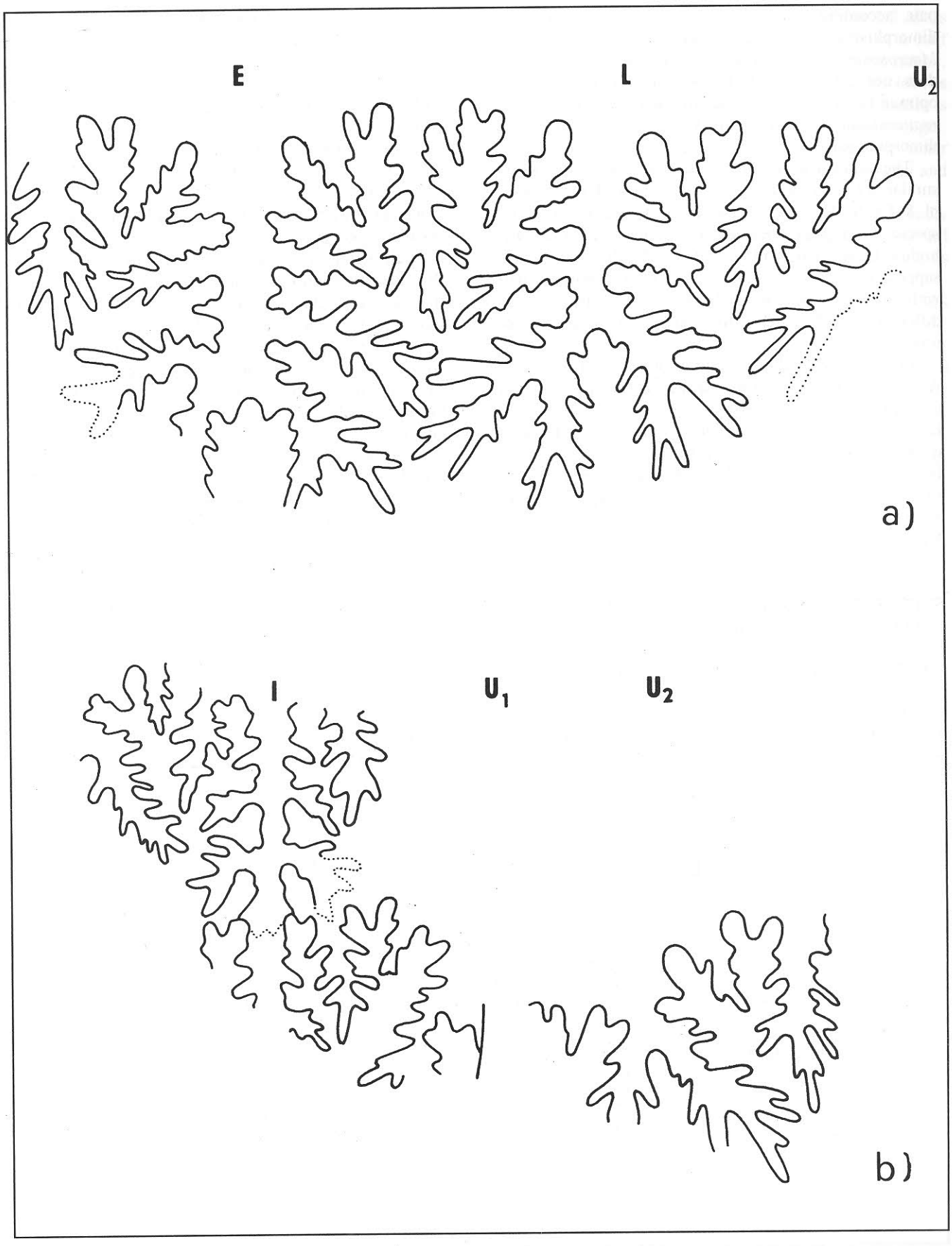

Fig. 3 - Suture-lines of *Costidiscus tenuistriatus* (REPELIN). a): outer suture at H = 8.3 mm; b): inner suture at H = 8.3 mm (spec. GUDŠ 1543).
- *Linee di sutura di* Costidiscus tenuistriatus *(REPELIN). a): sutura esterna ad H = 8.3 mm; b): sutura interna ad H = 8.3 mm (spec. GUDŠ 1543).*

pair, according to the AVRAM's (1984) data about the dimorphismus of the other species of *Costidiscus* and *Macroscaphites*. The mentioned dimorphic combination does not coincide with the previous older AVRAM's opinion (1976, p. 23). In fact this author considered *C. recticostatus* n. ssp. and *M. striatisulcatus* as a dimorphic pair.

The adult whorls of *Costidiscus tenuistriatus* are similar to the sculpture of *C. grebenianus* (TIETZE, 1872, pl. 8, fig. 8). However, the whorl-section of the TIETZE's species is opposite because the whorls are evidently higher than their width. KILIAN & REBOUL (1915) suppose that *C. grebenianus* could be a dimorphic pair with *M. striatisulcatus*. However, because of the different whorl-section this does not seem to be probable.

Because of the ribbing style of our biggest fragment, ANDRUSOV (1931) probably identified the specimens of *C. tenuistriatus* as *Macroscaphites yvani afra* (SAYN). However, this subspecies is characterized by a different whorl-section (see SAYN, 1891, pl. 1, fig. 9 b).

DISTRIBUTION - For the holotype of *C. tenuistriatus* REPELIN (1899) gives the Aptian deposits with *Aconeceras nisum* and *Dufrenoya furcata* near Marseille.

SUBORDER Ancyloceratina WIEDMANN, 1966
SUPERFAMILY Douvilleiceratacea PARONA & BONARELLI, 1897
FAMILY Deshayesitidae STOYANOW, 1949

GENUS ***Deshayesites*** KASANSKY, 1914
TYPE SPECIES: *Ammonites deshayesi* LEYMERIE in D'ORBIGNY, 1841

Deshayesites sp. ind.
Pl. 1, fig. 17-18; Fig. 4

DESCRIPTION - Semiinvolute to semievolute shell with relatively low whorl. Slightly convex whorl flanks which converge to the ventral side. The venter is relatively narrow and rounded. The fragment has distinct round ribs with interspaces corresponding to the rib thickness. The ribs are slightly sigmoidal, on the venter prorsiradiate. Both simple and bifurcated ribs are distinctly observed, the bifurcation appearing at about the half height of the whorl. At the ventrolateral margin the ribs are slightly thickened. However, behind them the ribs are feeble (but without any interruption) and pass into the venter forming a distinct bow.

SUTURE - LINE - Incomplete outer suture-line (Fig. 4) with lobes E and L of approximately the same depths. The outer lobe carries a relatively high secondary saddle; the lateral lobe is wide, only relatively slightly divided and distinctly asymmetric.

MATERIAL - One fragment of 1/8 whorl of a limonitized internal mold with undistinctly preserved suture-lines (spec. GUDŠ 1544).

MEASUREMENTS - On the specimen figured in pl. 1, fig. 17: H = 8.5 mm, W = 6.2 (W/H = 0.73).

REMARKS - In spite of the fact that the fragment is considerably incomplete, on the basis of the sculpture and the characteristic of the suture-line, we may consider that it belongs to the genus *Deshayesites*. However, it is impossible to identify the species.

DISTRIBUTION - The genus *Deshayesites* occurs in the Lower Aptian.

ORDER Ammonitida HYATT, 1889
SUPERFAMILY Desmoceratacea ZITTEL, 1895

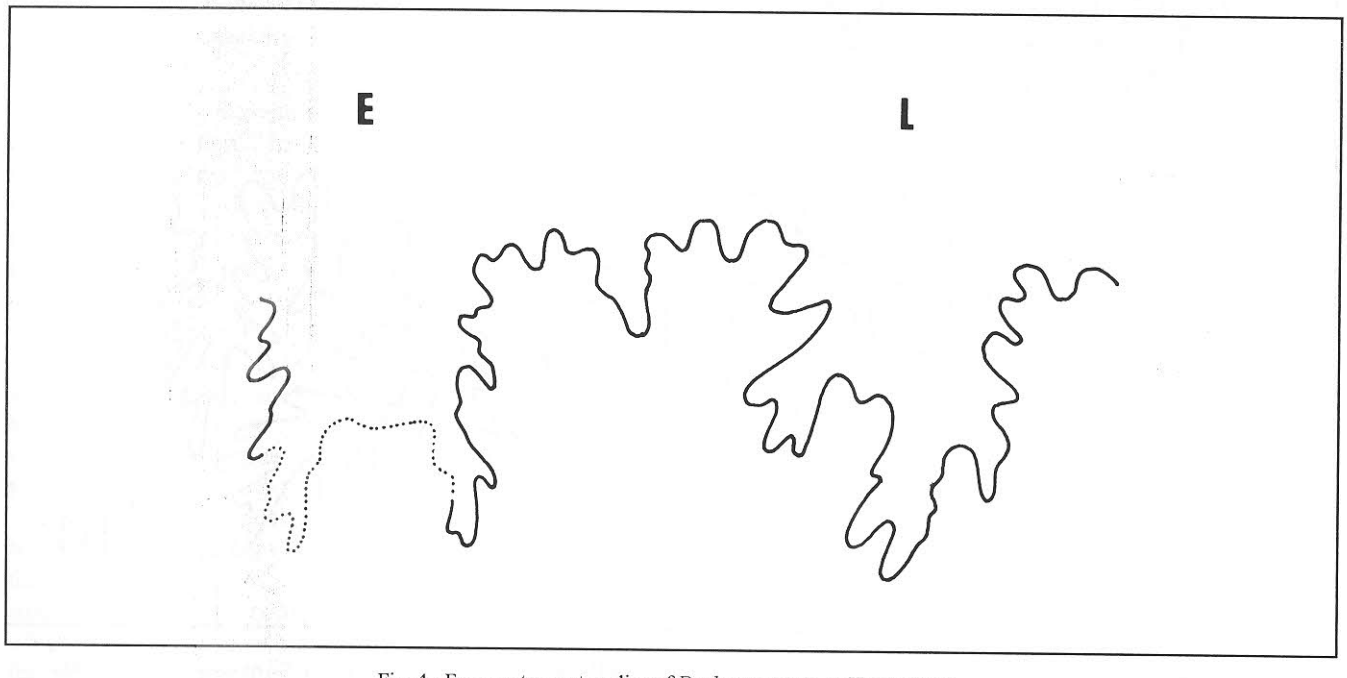

Fig. 4 - Fragmentary suture-line of *Deshayesites* sp. at H = 8.5 mm.
- *Linea di sutura incompleta di* Deshayesites *sp. ad H = 8.5 mm.*

FAMILY Desmoceratidae ZITTEL, 1895
SUBFAMILY Puzosiinae SPATH, 1922

GENUS ***Melchiorites*** SPATH, 1923
TYPE SPECIES: *Ammonites melchioris* TIETZE, 1872

Melchiorites cf. ***emerici*** (RASPAIL, 1831)
Pl. 1, fig. 19-20; Fig. 5

1841 *Ammonites Emerici* RASPAIL; D'ORBIGNY, p. 160, pl. 51, fig. 1-3
1968 *Melchiorites emerici* (RASPAIL); WIEDMANN & DIENI, p. 109, pl. 10, fig. 5 (*cum syn.*)

DESCRIPTION - Semiinvolute shells with relatively wide whorls of medium height. The flanks are rounded, their maximum width being approximately at the lower third of the whorl height. The umbilical area is not preserved. Towards the venter, which is relatively narrow and rounded, the whorl gradually becomes narrow. The whorls have relatively sparse S-shaped ribs accompanying shallow constrictions making the ribs more prominent. Both ribs and constrictions are sloped forward on the ventral side; they cross it forming a bow. There are 3-4 constrictions on a quarter of whorl.

SUTURE - LINE - The nearly complete outer suture-line (Fig. 5) has the lobe E of approximately the same depth as L. E carries median saddle reaching about 1/3 of its height, L is trifid, rather asymmetric. U_2 is of a half depth if compared with L and is distinctly asymmetric, slightly trifid. Axis U_3 is obliquely sloped. This lobe is trifid and only slightly divided. The first lateral saddle is bipartit, asymmetric, the outer branch being stronger, the second one is similar but with a stronger inner branch. The third saddle is the smallest one, bipartit and nearly symmetrical.

MATERIAL - Two whorl fragments. The first is badly preserved as internal mold with partially preserved suture-lines (spec. GUDŠ 1545) and the second as external mold.

MEASUREMENTS - The diameter of the spec. GUDŠ 1945 may be estimated to 20 mm. By H = 7.5, W = 6.5 (W/H = 0.86).

REMARKS - According to the whorl-section and constrictions as well as the suture-lines, we may suppose that the specimens belong to *Melchiorites*. As the shells are incomplete, the species cannot be unambiguously determined. However, because of the relatively wide whorls, it is much more probable they belong to *M. emerici* as *M. melchioris* (TIETZE).

DISTRIBUTION - Typical representatives of *M. emerici* are mainly reported from the Lower Aptian in France, Spain, Sardinia and Balearic Islands.

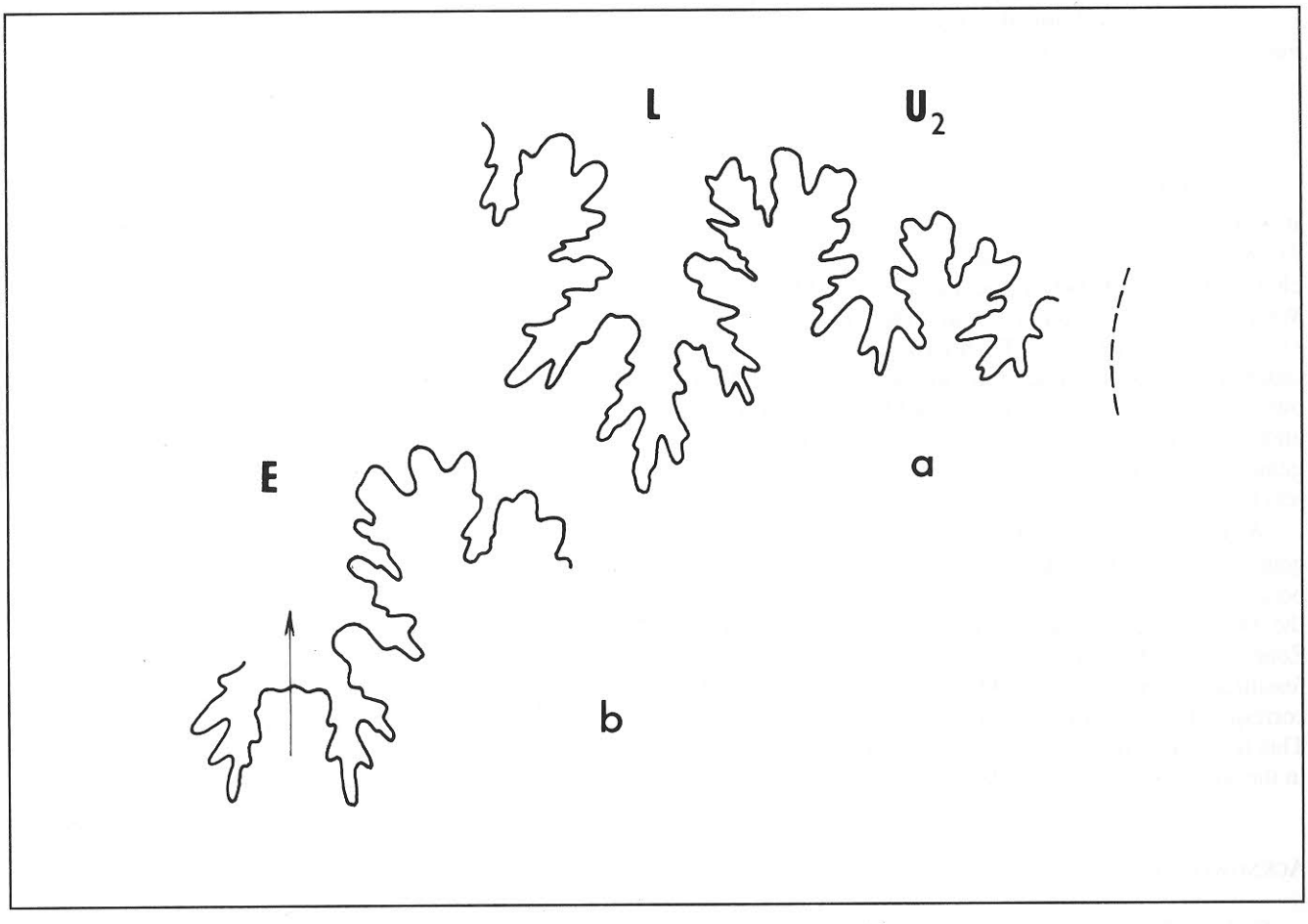

Fig. 5 - Outer suture-line of *Melchiorites* cf. *emerici* (RASPAIL). a): suture at H = 7.2 mm; b): at H = 6.7 mm (spec. GUDŠ 1545).
- *Linea di sutura esterna di* Melchiorites *cf.* emerici *(RASPAIL): a): ad H = 7.2 mm; b): ad H = 6.7. mm (spec. GUDŠ 1545).*

3. - CONCLUSIONS

In a relatively small collection containing predominantly only fragments of ammonite shells, but often with preserved suture-lines, we were able to determine the following ammonites: *Phylloceras (Hypophylloceras) cypris cypris* FALLOT & TERMIER, *Macroscaphites striatisulcatus* (D'ORBIGNY), *Costidiscus tenuistriatus* (REPELIN), *Melchiorites* cf. *emerici* (RASPAIL), *Deshayesites* sp. ind. Also a tiny and precisely undeterminable fragment of heteromorph shell belong to this collection; it may be regarded as a representative of the group *Toxoceratoides* SPATH, 1924. According to ANDRUSOV's data (1931), also *Cheloniceras (C.) cornuelianum* (D'ORBIGNY) is grouped to his ammonite collection.

From the given ammonite assemblage *Deshayesites* sp. and *C. cornuelianum* have the highest stratigraphic value (however, in case of *C. cornuelianum* we must suppose that Andrusov's determination was correct). Considering the general characteristic of the Lower Cretaceous in the Mediterranean area (NIKOLOV, 1987) and respecting the zonal scheme proposed for the Aptian in the Mediterranean region (HOEDEMAEKER & BULOT, 1990; Company, HOEDEMAEKER *et alii*, 1993), the limonitized (originally pyritized) ammonites from the Medziholie belong unambiguously to the Lower Aptian.

To the proposal for the Lower Aptian ammonite zones (from top to bottom):

Dufrenoya furcata
Deshayesites deshayesi
Deshayesites weissi
Deshayesites tuarkyricus

it is suitable to note that the first occurrences of genera *Prodeshayesites* CASEY and *Procheloniceras* SPATH characterize much better the base of the Middle and West European Aptian than the occurrence of *Deshayesites tuarkyricus* Tovbina proposed as a zonal index which is only imperfectly known in Europe. As to our opinion this suggestion should be replaced by another more suitable zonal species, preferably of the genus *Prodeshayesites* (as *Procheloniceras* seems to be less frequent).

With respect to our data, because representantives of genus *Dufrenoya* BURCKHARDT are absent and especially because of the *Cheloniceras cornuelianum* occurrence in the Deshayesites deshayesi and Tropaeum bowerbanki Zones- according to CASEY (1961, p. 208), the fossiliferous deposits on the Medziholie locality probably correspond to the range around the *D. deshayesi* Zone. This is, in fact, the only Lower Aptian ammonite locality in the whole Slovak Central Western Carpathians.

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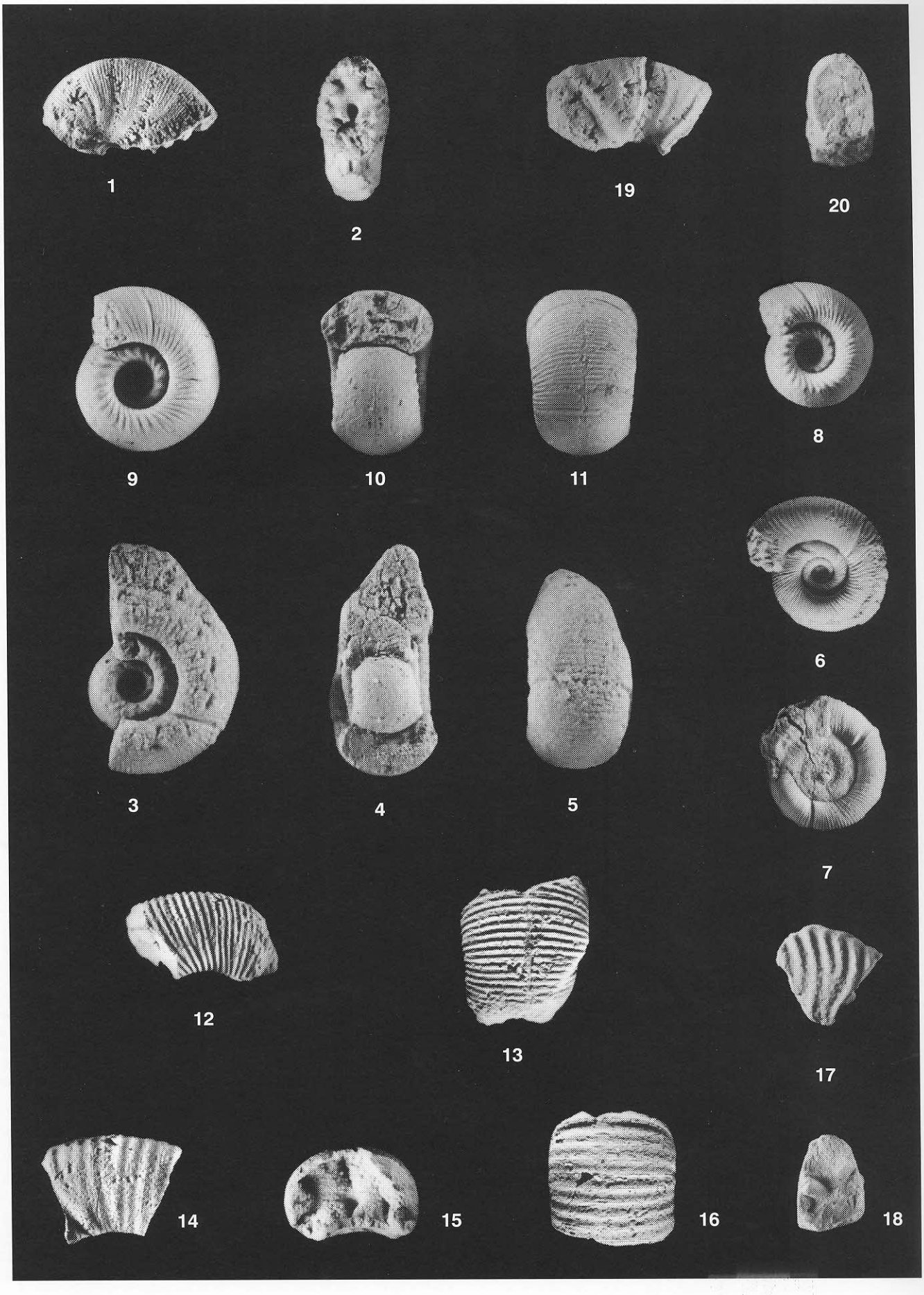
PLATE 1

Fig. 1, 2 - *Phylloceras (Hypophylloceras) cypris cypris* (FALLOT & TERMIER), x 2. 1, lateral view; 2, whorl-section (spec. GUDŠ 1536).
Fig. 3-7 - *Macroscaphites striatisulcatus* (D'ORBIGNY). 3-5, lateral view, whorl-section, view of the ventral area - all x 4 (spec. GUDŠ 1537); 6, lateral view, x 2 (spec. GUDŠ 1538); 7, lateral view, x 1 (spec. GUDŠ 1539).
Fig. 8-16 - *Costidiscus tenuistriatus* (REPELIN). 8-9, lateral view (fig. 8 x 3 - fig. 9 x 4); 10, whorl-section, x 4; 11, view of the ventral area, x 4 (spec. GUDŠ 1541); 12-13, lateral view and view of the ventral area, x 3 (spec. GUDŠ 1542); 14, lateral view, x 2; 15, whorl-section, x 2; 16, view of the ventral area, x 2 (spec. GUDŠ 1543).
Fig. 17-18 - *Deshayesites* sp., x 2. 17, lateral view; 18, whorl-section (spec. GUDŠ 1544).
Fig. 19-20 - *Melchiorites* cf. *emerici* (RASPAIL), x 2. 19, lateral view; 20, whorl-section (spec. GUDŠ 1545).
All specimens were bleched with ammonium chlorides and photographed by K. MEZIHORÁKOVÁ (University of Ostrava) and D. KORN - Fig. 3-5 and 9-11 (University of Tübingen). The specimens are deposited at the D. ŠTÚR Institute of Geology in Bratislava under the given numbers.

TAVOLA 1

Fig. 1-2 - Phylloceras (Hypophylloceras) cypris cypris *(FALLOT & TERMIER), x 2. 1, norma laterale; 2, sezione della spira (spec. GUDŠ 1536).*
Fig. 3-7 - Macroscaphites striatisulcatus *(D'ORBIGNY). 3-5, norma laterale, sezione della spira, norma ventrale - tutto x 4 (spec. GUDŠ 1537); 6, norma laterale, x 2 (spec. GUDŠ 1538); 7, norma laterale, x 1 (spec. GUDŠ 1539).*
Fig. 8-16 - Costidiscus tenuistriatus *(REPELIN). 8-9, norma laterale (fig. 8 x3 - fig. 9 x 4); 10, sezione della spira, x 4, 11, norma ventrale, x 4 (spec. GUDŠ 1541); 12-13, norma laterale e norma ventrale, x 3 (spec. GUDŠ 1542); 14, norma laterale, x 2; 15, sezione della spira, x 2; 16, norma ventrale, x 2 (spec. GUDŠ 1543).*
Fig. 17-18 - Deshayesites *sp., x 2. 17, norma laterale; 18, sezione della spira (spec. GUDŠ 1544).*
Fig. 19-20 - Melchiorites *cf.* emerici *(RASPAIL), x2. 19, norma laterale, 20, sezione della spira (spec. GUDŠ 1545).*
Tutti gli esemplari sono stati cosparsi con sublimato di cloruro d'ammonio e fotografati da K. MEZIHORÁKOVÁ (Università di Ostrava), e D. KORN - Fig. 3-5 e 9.11 (Univesrità di Tübingen). Gli esemplari sono depositati all'Istituto D. ŠTÚR di Geologia a Bratislava con i numeri di inventario indicati.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