NEW DATA ON AMMONOIDS AND BIOSTRATIGRAPHY OF THE CLASSICAL SPATHIAN KČIRA SECTIONS (LOWER TRIASSIC, ALBANIA)

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Introduction.

The present paper describes the taxonomy and stratigraphic position of a continuous (bed by bed) collection of ammonoids from the Lower/Middle Triassic Han-Bulog Limestone of Kčira, northern Albania.

Kčira is a site of primary interest as it is one of the few localities in the Western Tethys, together with Chios (Greece), that is characterized by a Lower Triassic ammonoid fauna with a high degree of biodiversity (30 genera and 59 species). In contrast, the ammonoid faunas of the other Lower Triassic localities in the Western Tethys, such as Bakony (Posenato, 1992), the Werfen’s localities in the Dolomites (Posenato, 1992), Muc in Dalmatia (Posenato, 1992) and Luda Kamicia in Bulgaria (Ganev, 1966; Entcheva, 1972) are typically endemic, with low diversity, and dominated by the genera Tiroliites and Dinorites.

Despite its richness, the only studies of the Kčira fauna date to the beginning of the century. The pioneer of geological studies in Albania was Nopcsa (1906, 1929), whose ammonoid samples from the Han-Bulog Limestone of Kčira (not collected bed-by-bed) were studied and described by G. von Arthaber (1908, 1909, 1911). This work is of primary importance for improving the taxonomy of the Lower Triassic ammonoids, particularly since many new species were introduced. However, vertical distributions of the fossils were not reported, leaving substantial uncertainties concerning the biostratigraphy of these sequences.

The first continuous sampling of ammonoids from Kčira was obtained during the summer of 1994 by a team of Italian and Albanian geologists working on a geological project, including the magnetobiostratigraphy of the Kčira sections (see Muttoni et al., 1996).

Field work, description of the stratigraphic sections, and sampling were carried out by M. Gaetani, and G. Muttoni (University of Milan) and S. Meço (University of Tirana); samples for conodonts and benthic for-
minifera were studied by A. Nicora (University of Milan) and R. Rettori (University of Perugia), respectively. Paleomagnetic studies were carried out by G. Muttoni and D.V. Kent (Lamont-Doherty Geological Observatory Laboratories).

The material studied is stored in the Paleontological Museum of the University of Milano.

Geological and stratigraphic frame.

Albania is included in the Dinarides s.l. and in particular, represents a sector of the range characterized by a tectonic nappes structure (Nopcsa, 1906). Kgira is located in northern Albania and belongs to the External Mirdita Subzone (Shallo, 1992, 1994) or to the equivalent.Qerret-Miliska Subzone (Godroli, 1992; Kellici, De Wever & Kodra, 1994) (Fig. 1b). The Mirdita Zone is equivalent to the Subpelagonian Zone in Greece. It overtrusts the Krasta Zone to the west (Pindos Zone in Greece), the Cukali Zone and part of the Albanian Alps to the north and in turn is overtrust by the Korabi Zone to the east (Pelagonian Zone in Greece) (Fig. 1b).

Both the External Mirdita and Qerret-Miliska Subzones represent a volcaniclastic and terrigenous flysch unit of Late Jurassic or Early Cretaceous age (Shallo, 1992, 1994) that embeds carbonate, volcanic and radiolarite blocks. The blocks can reach considerable dimensions, ranging in size from a few meters to a few kilometers, and can also preserve a coherent stratigraphic succession from Triassic to Jurassic (the presence of Permain units has yet to be demonstrated paleontologically).

According to Muttoni et al. (1996), the flysch may represent the accretionary wedge that follows the closure of the Mirdita ocean with subduction below the Korabi microplate, while the blocks could be the remnants of the rift shoulders that bordered the Mirdita ocean. The fossiliferous, red nodular Han-Bulog Limestone represents the Lower/Middle Triassic pelagic sedimentation on the rifted blocks with thinned crust that preceeded the opening of the oceanic basin. One block near Kgira, although disrupted tectonically, preserves the complete succession together with other Triassic and Jurassic volcanic and carbonate sediments. This block was chosen as the site for the measurements of the three stratigraphic sections described below.

Stratigraphic sections.

Three complete stratigraphic sections were measured and sampled a few meters apart in the same Han-Bulog Limestone outcrop and were named, from west to east, Kgira A (KsA), Kgira B (KsB) and Kgira G (KsG), respectively. About 250 m from this outcrop, a fossiliferous level (AK 125) was sampled at site 'E'. This level comes from the upper part of a block of Han-Bulog Limestone, but is not included in a stratigraphic section (see Fig. 1c for the location of the sections and site ‘E’, and Fig. 2 for lithology and thickness).

Section KsA is 42 m thick; made entirely of Han-Bulog Limestone arranged in weakly nodular layers of 2-8 cm thickness, extremely compacted and with locally amalgameted layers. The basal 5 meters of the section are intensely red, rich in clay and characterized by the presence of pervasive stylolites parallel to the bedding. The central portion is pink to pale-pink in colour, strongly recrystallized and contains, from 18 to 25 m, a set of calcite veins. In this same interval, the colour of the layers tends also to yellow-light brown. The upper part of the section is made mostly of pink packstones, rich in bioclasts and is more distinctly bedded.

Section KsB is only 4.5 m thick, made entirely of Han-Bulog Limestone, reddish in colour and corresponds lithologically to the basal part of section KsA.

The third section, KsG, was measured (9.45 m thick) and sampled for ammonoids. It is made entirely of Han-Bulog Limestone and the samples are generally yellow-light to brown on the surface and pale-pink inside.

Bedding attitudes are about 347°/34°E at KsA, 12°/45°E at KsB and vary from 340°/10°E at the bottom of KsG to 358°/40°E at the top.

KsA and KsB are most likely the localities described by Nopcsa in 1929.

Taxonomic approach.

All new material was compared directly with the only two known collections of ammonoids from the Lower Triassic of Albania, i.e. Arthaber's collection, preserved at the Paleontologische Institut of Wien (PIUW), and Nopcsa's collection, preserved at the Natural History Museum of London (NHM), both composed of material collected by Nopcsa.

Arthaber never went to Albania, but he received the ammonoids from Nopcsa (S. Męço, 1997, pers. comm.) and published three papers about them (1908, 1909, 1911). Unfortunately, Arthaber's collection is at present composed only of the types depicted in the 1928 and 1911 papers, while it is not known what happened to the other specimens. The missing portion of the collection may be preserved at NHM as part of Nopcsa's collection dated 1922, composed of material originally classified by Arthaber (see, e.g. Spath, 1934, p. 174, 182). However, the total number of specimens belonging to the same species in London and in Wien does not agree with the number of specimens reported by Arthaber in his papers. This could be due to the fact
Spathian Ammonoids of Kçira sections

Fig. 1 - (a) Geographic location of northern Albania in the Balkan peninsula. (b) Simplified geologic map of northern Albania. The Kçira sections are located in the External Mirdita Zone. (c) Geologic map of the Kçira area. 'A', 'B' and 'G' are sections KgA, KgB, KgG; 'E' designates a site of paleontologic findings described in the text.
that Nopcsa’s collection was restudied by Spath (1934), who changed the taxonomic attributions of several specimens. Unfortunately, the original labels with Arthaber’s classification are lost.

An exhaustive revision of this material has yet to be produced. This may be due to the fact that the original samples were not collected bed-by-bed. The lack of stratigraphic data raises questions concerning the new species erected by Arthaber using these specimens, which should be considered only as morphospecies. Moreover, the new species were often established from only a few, or even a single, specimen which makes them artificial species.

The Albanian fauna was studied also by Spath (1934) and Kummel (1969). Spath listed and described the specimens in Nopcsa’s collection, with some references to Arthaber’s collection and in most cases maintained the classification originally provided by Arthaber. Sometimes he changed the taxonomic attribution of some specimens and introduced new species or nomin nova.

Kummel made a harder effort upon Arthaber’s collection, changing the taxonomy of the Albanian fauna in a substantial way. He reduced the number of species by grouping several erected by Arthaber into few species with a high degree of intraspecific variations. However, parts of his work were criticized by Tozer (1971). When Kummel studied Arthaber’s collection, it was already reduced in number of specimens. He provided new biometric measurements of the specimens and mixed them with data from other Lower Triassic collections, in order to corroborate his idea of intraspecific variability. Such a study requires the support of biostratigraphic data to distinguish normal intraspecific variability from evolutionary changes. He also redepicted some of Arthaber’s specimens and their suture lines, not redrawing them, but only copying the original from Arthaber’s publications (see below in ‘Systematic descriptions’).

The present review of Arthaber’s and Nopcsa’s collections consists of remeasurements of the shell dimensions, redrawing of the suture lines and study of the whole sections by moulding and casting.

The new collection from Kgira does not allow a full revision of the fauna because the specimens, although sampled bed-by-bed, are often few, or not preserved well enough for biometric and ontogenetic studies. For this reason, the present study will follow Arthaber’s original taxonomy and will maintain the species erected by him, even though they are artificial.

Ammonoid distribution in the stratigraphic sections.

Ammonoid occurrence within sections KgA, KgB and KgG is shown in Fig. 2.

Most ammonoids come from section KgA, where the fossiliferous layers are concentrated in the basal 2.5 meters of thickness (levels AK 2bis and AK 5) and in the central part from 23 to 29 meters (levels AK 31, AK 36, AK 38, AK 40). Level AK 57 comes from the top of the section but belongs to a loose block.

Section KgA provided a total of 83 ammonoids, belonging to 11 genera and 13 species listed below:

AK 5: Leioplryllites sp. cf. L. pitamaha (Dieners, 1895), Procarinutes kohni (Arthaber, 1938), Alkaitites sp., Subcolumbatis sp., Costellites sp. aff. C. angulatus Hyatt & Smith, 1905, Paleoplryllites osteomalius Welser, 1922, Pterurites (?) sp.
AK 31: Eoplryllites sp., Leioplryllites sp. cf. L. pitamaha (Dieners, 1895), Leioplryllites sp., Procarinutes sp.
AK 36: Leioplryllites sp. cf. L. pitamaha (Dieners, 1895), AK 38: Procarinutes kohni (Arthaber, 1938), AK 40: Leioplryllites sp.
AK 57: Procarinutes brunnus Mojsisovics, 1882, Suturra sp.

Some orthoceratids were found in levels AK 2bis, AK 5 and AK 31.

The specimens are rather poorly preserved, are hardly separable from the matrix, and in most cases one side is partly dissolved, as often occurs in red ammonite limestones. This makes the finding of complete cones uncommon.

In the lower part of the section the fossils are mostly reddish. The phragmocones are almost always full of calcite that often hinder the preservation of the suture lines. In the central part of the section there are only small specimens with smooth shells, generally yellow/light-brown in colour.

Section KgB provided only one fossiliferous layer, level AK 62, with a total of 18 ammonoids classified as follows:

AK 62: Subcolumbatis sp., Eoplryllites domini (Arthaber, 1908), Subcolumbatis sp. cf. S. subterminus (Arthaber, 1911). Some orthoceratids were found as well.

The preservation of the specimens is exactly the same as described above for the basal portion of section KgA.

The assemblage is very similar to that of level AK 2bis of section KgA, as the acme of the genus Subcolumbatis is recognizable also in level AK 62. Section KgB can be correlated palaeoecologically and lithologically to the basal part of section KgA.

In the lower and middle part of section KgG, ammonoids belonging to four genera were found in, levels G 2609, G 2610 and G 2611.


The material has a rather good preservation. It is yellow-brown in colour and presents a slightly crushed surface in levels G 2609 and G 2610, while it is reddish in level G 2611. Not all specimens are completely preserved.

Finally, level AK 125 from the top of a block at site ‘E’ (see Fig. 1c) provided specimens belonging to Suturra saxoniana Mojsisovics, 1882, Procarinutes sp., Monophyllites sp. Some orthoceratids were recognized as well.

The new collection is composed of 128 specimens belonging to 16 genera and 15 species, with 7 genera reported from Kgira for the first time (Paleoplryllites Welser, 1922, Costellites Hyatt & Smith, 1905, Procarinutes Mojsisovics, 1882, Suturra Mojsisovics, 1882, Procarinutes Mojsisovics, 1882 and Monophyllites Mojsisovics, 1879; Pernamuria Spath, 1934 not surely).

The fauna from Kgira shows the highest similarity with the fauna described from Chios (Greece). Chios was firstly studied by Renz & Renz (1947, 1948), who gathered a collection of about 2000
Fig. 2 - Ammonoid and conodont biostratigraphy of sections KcA, KcB and KcG. Conodonts from Mutoni et al., 1996.
Age of the assemblages.

The associations contained in the basal portion of section KgA and in sections KgB and KgC largely correspond to the fauna described by Arthaber in 1908 and 1911 from the same locality and may be referred to the Subcolubmites-Prohungarites zone sensu Kummel (1973a, b).

The Subcolubmites-Prohungarites zone was defined first by Kummel in 1973. In order to simplify the Triassic zonal schemes and to allow worldwide correlations, he designated only four major zones for the Lower Triassic, each named after two of its characteristic genera. They were, from oldest to youngest, the Otoceras-Ophioceras zone, the Gyronites-Prionolobus zone, the Acanthites-Anasibiteres zone and the Prohungarites-Subcolubmites zone.

Kummel’s Prohungarites-Subcolubmites zone included all the faunas of the latest Lower Triassic under a single name, instead of the great number of local zones. It could be recognized in the Tethys (64 genera), in the Western Pacific (15 genera), in the Eastern Pacific (30 genera) and in the circum-Artic region (22 genera). The most diversified fauna was yielded by the Tethys, with 26 genera known only from this province, 19 of which were endemic (such as Tirolites and Dinarites in the Werfen Formation, Protogroupes in Albania). Some species were extremely widespread, occurring throughout the Tethys, e.g. Albianites triadicus (Arthaber, 1908), Procarnites kokheni Arthaber, 1908, some species of Arnautoceltites, Leiocephylites and Subcolubmites. Kummel stated also that the Subcolubmites-Prohungarites zone was generally isolated in the Western Tethys, without other Lower Triassic faunas above or below.

This zone has not been discussed definitively since 1973. Kummel did not provide a clear definition of the kind of biozone it was based on, but we may assume that it was close to an Oppel zone, no longer accepted as valid by the ISG (Salvador, 1994). As a consequence, the Subcolubmites-Prohungarites zone should be revised.

The original meaning of the Subcolubmites-Prohungarites zone as a ‘global’ zone has been practically ignored; the name has been used occasionally for some localities in the Western Tethys such as Chios (Assereto et al., 1980; Gaetani et al., 1992; Muttoni et al., 1994) and in China (Wang, 1985) or in North America with only an informal meaning (Prohungarites-Subcolubmites beds of Nevada, Bucher, 1989). In the Humboldt Range, Nevada, the Subcolubmites-Prohungarites beds do not represent the last assemblage of the Spathian, but are overlaid by the Haugi zone, correlated with the Siberian Spinitaplicatus Zone and the Subrobustus Zone of British Columbia (Bucher, 1989).

The Haugi zone is currently strongly advocated as the latest Lower Triassic (Tozer, 1967; Silberling & Tozer, 1968; Silberling & Wallace, 1969; Guex, 1978; Wang, 1985; Dagys & Tozer, 1989; Tozer, 1972, Tozer, 1994b). According to Tozer (1994b), this zone cannot be regarded as a subzone of the Subcolubmites-Prohungarites zone (Wang, 1985), but must rank as an independent zone.

Sequences in the Western Tethys are not really complete when compared with those from North America, because they are often condensed. For this reason, clear evidence of another assemblage overlying the Subcolubmites-Prohungarites zone and its correlative has not been found yet in the Western Tethys; nevertheless, the Subcolubmites-Prohungarites zone cannot be regarded as latest Spathian any longer.

As mentioned previously, the assemblages of the basal part of section KgA and of sections KgB and KgC may be referred to the Subcolubmites-Prohungarites zone because they include genera which are typical of this zone (Kummel, 1973b, p. 229) and are characterized by the presence of the genus Subcolubmites. Since the Subcolubmites-Prohungarites zone may be considered an Oppel zone and consequently should be revised, the possibility of interpreting the layers containing the genus Subcolubmites as a taxon range zone and referring them to the Albanian ‘Subcolubmites beds’ is suggested.

The fauna of the middle part of section KgA is composed totally of long-ranging Spathian (Procarnites and Eophyllites) or Spathian to Anisian forms (Leiocephylites), while the latest Lower Triassic (correlative of the Haugi zone) is not clearly represented. Procladiatites brancoi Mojsisovics and Sturia sp. were found in the higher part of the same section. These species are regarded generally as Middle Triassic.

The assemblage of level AK125 (Sturia, Proarcestes, Monophyllites) from the upper part of a block at site ‘E’ is Anisian in age. The long range of these genera in the Middle Triassic does not allow a more accurate age determination.

Data on the conodont assemblages from sections KgA and KgB (already published in Muttoni et al., 1996) are also reported in Fig. 2. They provide a more
continuous record than the ammonoid's and allow the recognition of the O/A boundary. The boundary was located in the middle part of section KcA, 1 meter below the appearance of the assemblage with the long-ranging ammonoids. The first occurrence of Chiosella timorenensis (Gondolella timorenensis in Gaetani et al., 1992; Muttoni et al., 1995) was used to approximate the base of the Anisan stage. On the base of the conodont assemblages, the lobe portion of KcA and section KcB were dated Middle Spathian.

**Systematic descriptions.**

**Taxonomical hierarchy.**

The taxonomy from order to genus level was taken from Tozer 1981, except for the genus Sulstonia that was based on Tozer 1994, Identification of specimens and repository. All specimens are accompanied by the inventory number and the original number (in brackets, bed initials and number of the specimen).

The material is stored in the Paleontological Museum of the University of Milano; inventory numbers: 813-8169. Acronym: MPUM.

**Dimensions.**

The following abbreviations were used: D (mm) = diameter; H (mm) = maximum height in D; H (mm) = minimum height in D; W (mm) = width in H; W (mm) = width in H; U (mm) = umbilical width in D; H/W = degree of compression in H; U/D = degree of involution in D; SGR = spiral growth rate = [(H-h)/h] x100.

**Suture line.**

Suture lines are drawn from venter to perumbilical margin, using a dotted line when parts are not well preserved. Suture elements are described from the venter towards the umbilicus and they are called in this order: ventral lobe, first lateral saddle, first lateral lobe, second lateral saddle and so on till the umbilical lobe. Auxiliary elements indicate the further subdivisions of the umbilical lobe. Adventitious lobes indicate accessory lobes between the ventral and the lateral ones. Progressive numbers increase from venter towards umbilicus.

In most cases suture lines are not complete, especially in case of the ventral and umbilical lobes. Ontogenetic studies were not possible. Suture lines, when preserved, were always exposed by grinding.

**Acronyms.**

PILUW = Paläontologische Institut, University of Vienna; NHM = Natural History Museum, London; GIBU = Geological Institute, Bonn University.

The following abbreviations were used in the text:

- mm = millimeter; Hm = Holotype by monotypy; Hjd = Holotype by designation; L = Lectotype; P = Paratype; S = Synotype. 'V' before the year in synonymy indicates specimens personally seen by the author.

Order Ceratitida Hyatt, 1884

Superfamily Dinariacea Mojsisovics, 1882

Family Columbitiidae Spath, 1934

Genus Subcolumbites Spath, 1930

Type species: Columbites perrinismiti Arthaber, 1908

**Preliminary remarks.** The genus Subcolumbites was established by Spath in 1930 based on Columbites Perrinismiti Arthaber. In 1934 Spath clearly included in this genus also the Albanian species S. europaeus (Arthaber, 1908), S. dasmani (Arthaber, 1911) and S. mindtenis (Arthaber, 1911).

Subsequently, several species were added to the composition of the genus from Chios (as S. europaeus-perinissmiti [Renz & Renz, 1948], an intermediate form between S. europaeus and S. perrinismiti), from China (as S. robustus [Chao, 1952], S. kwangianus Chao, 1959), from the Primorye Region (as S. multiformis Kiparisova, 1947, S. solitus Kiparisova, 1961, S. anomalous Kiparisova, 1961) and from Nevada (as S. americanus Kummel, 1969). Not all of these species have been accepted unanimously as valid.

Kummel (1969, p. 427) asserts the existence of only five species that can be separated in three groups: the S. perrinismiti group, the S. dasmani group and the S. multiformis, S. robustus, S. americanus group. S. perrinismiti, the group we are interested in, should include all four Albanian species erected by Arthaber, the Chios species and S. kwangianus from China. Kummel states that the differences between these species outlined in the literature are limited to the degree of compression of the whorl section and the consequent presence of more or less rounded umbilical shoulders; however, he considers these characters an expression of intraspecific variation, because they are completely gradational. According to him, the pattern and strength of the ornamentation also are not suitable for distinctions as they are extremely variable. So the Albanian Subcolumbites species are, as a matter of fact, only one species, Subcolumbites perrinismiti, characterized only by carination of the venter.

At present, no new data are available for biometric comparisons, as few Subcolumbites in the new collection from Kcira are preserved well enough to be classified at specific level and even fewer can be measured.

As discussed in the introduction, the original Arthaber's taxonomy is followed in this paper.

**Subcolumbites perrinismiti** (Arthaber, 1908)

Pl. 1, fig. 1 a-b; Fig. 3

v1908 Columbites Perein-Smithi Arthaber, p. 277, pl. 12, fig. 1 a-c
v1911 Columbites Perein-Smithi - Arthaber, p. 262, pl. 21, fig. 19, 20
1915a Columbites perrinismiti - Dien, p. 112, nn.
1928 Columbites Perein-Smithi - Renz, p. 155, nn.
1934 Subcolumbites perrinismiti - Spath, p. 203, pl. 12, fig. 5 a, b
1948 Subcolumbites perrinismiti - Renz & Renz, p. 20, pl. 11, fig. 7, 7a.
1957 Subcolumbites perrinismiti - Kummel, in Arkell et al., p. 1, 40, fig. 172, 15 a, b.
1964a Subcolumbites cf. perrinismiti - Bandó, p. 99, pl. 3, fig. 18, 19, pl. 4, fig. 3.
1968a Subcolumbites perrinismiti - Kummel, 485, nn.
1968b Subcolumbites perrinismiti - Kummel, p. 495, pl. 1, fig. 1, 2, 3.
1969 Subcolumbites perrinismiti - Kummel, p. 427 partim, pl. 3, fig. 1, 2, 3, 6, 7.
Holotype. *Subcolumbites Perrini-Smithi* Arthaber, 1908, pl. 12, fig. 1; PIUW IV-63, Hm.

Material. 3 specimens: MPUM 8134 (AK 2bis-13), MPUM 8135 (AK 2bis-9), & 12; Han-Bulog Limestone, Kçira (Albania). Section KgA; level AK 2bis.

Description. Evolute and compressed *Subcolumbites* with each whorl covering 2/3 of the previous one. The venter is rounded with a manifest keel, flattened and not separated from the flanks as it passes gradually to convex flanks. Umbral rim rounded, passing to a relatively low and subvertical umbral wall.

The ornamentation covers also the venter and the umbral wall and consists of thin, projected primary ribs that strongly bend at 1/3 of the whorl height.

Suture line not preserved.

Dimensions of the types (in mm):

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<th>PIUW IV-64 (P)</th>
<th>PIUW IV-63 (Hm)</th>
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<td>41.25</td>
<td>53.35</td>
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<tr>
<td>H</td>
<td>12.6</td>
<td>17.35</td>
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<td>h</td>
<td>8.95</td>
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<td>W</td>
<td>9.5</td>
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<td>w</td>
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<td>U</td>
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<td>0.433</td>
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<tr>
<td>WD</td>
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Discussion. The specimens were attributed to *S. persorimisihi* (Arthaber, 1908) because they bear exact morphological resemblance with Arthaber's type material. In the holotype it is possible to see that the keel is missing during the first stage of growth, while subsequently the venter sharpens and tends to become "roof shaped" (Fig. 3).

Compared with the other *Subcolumbites* of nearly the same dimensions in the new Albanian collection, they show a greater degree of compression of the whorl section, a greater degree of evolution, a more pronounced keel and the typical ornamentation of *S. persorimisihi* as described by Arthaber in 1908.

The morphological characters described refer to an adult specimen; small specimens could not be easily discriminated at specific level because of the change of some features during growth (see, for example, the modification of the venter of *S. persorimisihi* in the description above).

Occurrence. The species was reported first by Arthaber from Albania (1908, 1911). *S. persorimisihi* is known also from Japan (Bando, 1964a) and Afghanistan (Kummel, 1968a). Its occurrence in Timor (Kummel, 1966b) and in Chios (Renz & Renz, 1948) is not certain.

Kummel considered *S. persorimisihi* as belonging to the Prohungarites zone (1969) and later (1973a, b) to the Subcolumbites-Prohungarites zone.

*Subcolumbites europaeus* (Arthaber, 1908)

Pl. 1, fig. 2 a-b.

v1908 *Columbites europaeus* Arthaber, p. 278, pl. 12, fig. 2 a-d.
v1911 *Columbites europaeus* - Arthaber, p. 261, pl. 23, fig. 13-18.
v1915 *Columbites europaeus* - Diener, p. 112, nn.
v1928 *Columbites europaeus* - Renz, p. 155, nn.
v1934 *Subcolumbites europaeus* - Spath, p. 12, fig. 6 a,b, text-fig. 62 c.
v1947 *Columbites europaeus* - Renz & Renz, p. 59, nn.
v1948 *Columbites europaeus* - Renz & Renz, pl. 11, fig. 3-3, 4-4, 5-5, 6-6, a.
v1969 *Subcolumbites persorimisihi* - Kummel, p. 427 partim, pl. 1, fig. 1-9, pl. 2, fig. 5, 6, pl. 4, fig. 3, 4.
v1972 *Subcolumbites persorimisihi* - Tozer, pl. 2, fig. 5 a,b, 6 a,b.

Holotype(?). *Columbites europaeus* Arthaber, 1908, pl.12, fig.2 a-d; PIUW IV-61. This specimen is reported as holotype by Spath (1934, p. 204) and by Kummel (1969, p. 433, pl. 4, fig. 3-4), but Arthaber does not clearly select it as holotype.

Material. 1 specimen: MPUM 8135 (AK 2bis-8). Han-Bulog Limestone, Kçira (Albania). Section KgA; level AK 2bis.

Description. Evolute *Subcolumbites* with a whorl section slightly depressed and maximum width at the umbral shoulders. The venter is rounded with a tendency to fastigation or to a low carination that gradually passes to convex flanks.

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**PLATE 1**

Fig. 1 a, b - *Subcolumbites persorimisihi* (Arthaber). KgA, MPUM 8134 (AK 2bis-13). a) Lateral view; b) venter view; x 1.
Fig. 2 a, b - *Subcolumbites europaeus* (Arthaber). KgA, MPUM 8135 (AK 2bis-8). a) Lateral view; b) venter view; x 1.
Fig. 3 a - *Proparmites holobres* (Arthaber). KgG, MPUM 8137 (G 2610-2). a) Lateral view; b) venter view; x 1.
Fig. 4 a-c - *Albainates sp. aff. A. omanicus* (Arthaber). KgA, MPUM 8140 (AK 2bis-7). a) Lateral view; b) venter view; c) oral view; x 1.
Fig. 5 a - *Propischitoides* sp. KgG, MPUM 8143 (G 2610-1). a) Lateral view; b) section; x 1.
Fig. 6 a, b - *Conchispirites sp. aff. C. angulusi* Hyatt & Smith. KgA, MPUM 8144 (AK 5-6). a) Lateral view; b) venter view; x 1.
Fig. 7 a, b - *Pseudorsogeceras* sp. KgA, MPUM 8146 (AK 2bis-22). a) Lateral view; b) venter view; x 1.
Fig. 8 - *Eophyllites dieneri* (Arthaber). KgB, MPUM 8147 (AK 62-10). Lateral view; x 1.
Pl. 1
Spathian Ammonoids of Křína sections
The umbilical rim is relatively high, rounded and passes to a sloped and quite high umbilical wall. Umbilicus wide and deep, with a kind of "funnel shape".

The ornamentation consists of weak, projected primary ribs that bend decidedly towards the opening at the umbilical rim, where the flanks change inclination. The radial ribs cross the venter with a convexity. Very weak spiral striae, more pronounced in the upper half of the whorl.

Suture line not preserved.

Dimensions of the types (in mm):

<table>
<thead>
<tr>
<th>D</th>
<th>H</th>
<th>h</th>
<th>W</th>
<th>w</th>
<th>U</th>
<th>V/D</th>
<th>H/W</th>
<th>SG%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIUW IV-50 (P)</td>
<td>48.65</td>
<td>17.0</td>
<td>10.0</td>
<td>-</td>
<td>21.55</td>
<td>0.445</td>
<td>-</td>
<td>70</td>
</tr>
</tbody>
</table>

Discussion. The medium size specimens could be close to S. dusmani (Arthaber, 1911), but they lack a vertical umbilical wall (the umbilicus has no "step shape"), and the spiral ornamentation is not pronounced enough to give a reticulated look to the shell. The venter shows a tendency to fastigation or carination, while in S, dusmani (Arthaber, 1911, p. 263, pl. 24, fig. 1a-d) it is absolutely rounded. Moreover, direct comparison with Arthaber's types shows that specimens of S. dusmani (Arthaber) of the same size, are more involuted.

Medium size specimens of S. midriensis (Arthaber, 1911) have a more "roof-shaped" venter and a higher and more acute umbilical shoulder (1911 Arthaber, p. 263, pl. 24, fig. 2, 3, 4). Larger specimens of S. europaeus are preserved in Arthaber's collection at PIUW. They show a more pronounced carination and a greater similarity with specimens of the same size of S. midriensis (Arthaber) as they have a perumbilical margin with a "cord" shape (high and rounded) and an almost vertical umbilical wall. Moreover, the whorl section is less depressed.

Occurrence. The species is known from Albania (Arthaber, 1908, 1911) and Chios (Renz & Renz, 1928, 1947, 1948). It was placed by Kummel in the Prohungrites zone (1969), but later (1973) the same author considered this species as belonging to the Subcolumbites-Prohungrites zone. Tozer (1972) indicated the presence of some specimens classified as S. permisnsmithii (but reported as similar to Columbites europaeus Arthaber) from the Albanites beds of Iran.

Superfamily Megaphyllitaceae Mojsisovics, 1896
Family Procarinidae Zhao, 1959
Genus Procarinites Arthaber, 1911

Type species: Parapopanoceras kokeni Arthaber, 1908

Procarinites kokeni (Arthaber, 1908)
Pl. 1, fig. 3 a-b; Fig. 4 a-c.

v1908 Parapopanoceras kokeni Arthaber, p. 259, pl. 11, fig. 1ac, 2a, b.

v1911 Procarinites kokeni - Arthaber, p. 215, pl. 17, fig. 16, 17, pl. 18, fig. 1-5.

1915 Procarinites kokeni - Diener, p. 228, nn.

1917 Procarinites kokeni - Diener, p. 167, pl. 1, fig. 4, 5.

1928 Procarinites kokeni - Renz, p. 155, nn.

1933 Procarinites kokeni - Kutaszy, p. 622, mn.

1924 Procarinites kokeni - Spath, p. 181, pl. 3, fig. 1.

1947 Procarinites kokeni - Renz & Renz, p. 61, nn.

1948 Procarinites kokeni - Renz & Renz, p. 81, pl. 5, fig. 5, 6-6a, 7-7a, 8-8a, 9-9a, pl. 9, fig. 2-2a.


1968 Procarinides aff. kokeni - Nakazawa & Bando, p. 101, pl. 6, fig. 3a, b, text-fig. 7, 8.


1968b Procarinides kokeni - Kummel, p. 493 partim, pl. 1, fig. 16.

1968 Procarinides kokeni - Shvyrev, p. 192 partim, pl. 15, fig. 6.

1976 Procarinides kokeni - Kummel, p. 391 partim, pl. 12, fig. 1, 2, pl. 13, fig. 1-8.

1976 Procarinides cf. kokeni - Wang & He, p. 317-318 partim, pl. 17, fig. 1, text fig. 26 c.


1979 Procarinides kokeni - Assereto et al., p. 724, 725, nn.

1992 Procarinides kokeni - Gaetani et al., p. 183, mn.

Lectotype. Parapopanoceras kokeni Arthaber, 1908, pl. 11, fig. 1ac; PIUW IV-13. This specimen r eported as holotype by Spath (1934, p. 181) and as lectotype by Kummel (1969, p. 392, 396). Arthaber does not clearly select a holotype.

Material. 14 specimens: MPUM 8138 (G 2610-2); MPUM 8137 (G 2609-1; AK 2hias-2; -3, -11; -20, -24, -25, -36, AK 5, 71, 10, -11; AK 38-2, -2); Han-Bulog Limestone, Giens (Albania). Section Ks, levels G 2609, G 2610; section KsA, levels AK 2hias, AK 5, AK 38.

Description. Involute and compressed forms with elliptical whorl section. The degree of compression and the shape of the venter vary with the dimensions of the specimen. Small specimens are usually less compressed, with a more rounded venter while larger specimens are more compressed, with a narrowly rounded or almost acute venter (Fig. 4 d,e). The flanks are always convex, with a tendency to become flat in more compressed specimens.

Umbilicus small with subvertical umbilical wall. Shell smooth.

Because of poor preservation, the suture line is partly visible only in specimens of small dimensions.

Dimensions of the types (in mm):

<table>
<thead>
<tr>
<th>D</th>
<th>H</th>
<th>h</th>
<th>W</th>
<th>w</th>
<th>U</th>
<th>V/D</th>
<th>H/W</th>
<th>SG%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIUW IV-11 (P)</td>
<td>80.8</td>
<td>43.5</td>
<td>28.45</td>
<td>-</td>
<td>8.85</td>
<td>0.109</td>
<td>-</td>
<td>52.90</td>
</tr>
</tbody>
</table>

Discussion. There are no morphological differences at all between the specimens of this new collection and the three P. kokeni of nearly the same dimensions preserved in Arthaber's collection (PIUW). The two smaller specimens in the collection (one of them is the lectotype) are, on the contrary, more depressed, with a rounded and wider venter. The larger one is more compressed with a narrowed venter.
A redrawing of the suture line of the lectotype is here provided (Fig. 4a). It is notably different from Arthaber's drawing (1908, pl. 11, fig. 1c) and from Kummel's rededication (1969, p. 392, text-fig. 12 A). It is also incomplete as the specimen is broken, with only one side preserved.

The suture line of the bigger paralectotype (Arthaber, 1911, pl. 18, fig. 5a-b) is represented here for the first time (Fig. 4c). Twenty five additional specimens of *P. kokeni* are preserved at NHIM (2 of which were received from Arthaber with the name *Propytychites kraftii* Arthaber; Spath, 1934, p. 182), together with 2 specimens classified under the name of *Procarinates acutus* Spath.

This species was established by Spath in 1934 and was based on *P. kokeni* var., recognized by Arthaber in 1911 (= *Hedestoemia* sp. in Arthaber, 1908). It was characterized by an oxinote venter and some differences in the suture line. Unfortunately, the specimen *P. kokeni* var. is no longer preserved in Arthaber's collection.

The holotype of *P. acutus* depicted by Spath (1934, pl. 5, fig. 4a-b) has a sharp venter, as personally checked at NHIM, but has not been properly drawn by Spath. The whorl section he represents (1934; pl. 5, fig. 4b) is exactly the same as the one of *P. kokeni* drawn by Arthaber in 1911 (pl. 18, fig. 5b) and does not show at all an oxinote venter. In 1969 Kummel asserted that *P. kokeni* is a fictitious species because the width of the venter is a completely gradational character.

*P. acutus* was not considered in the synonymy of the species *P. kokeni*, because, according to the specimens in Arthaber's collection, the adult forms have a strictly narrow, but not oxinote, venter. Moreover, Arthaber himself classified the specimen with the oxinote venter as a separate variety.

*P. skanderbergis* Arthaber, 1911, the only specimen preserved at PIUW, is clearly more inflated than *P. kokeni*, of the same dimensions, but some reservations remain on the six specimens stored at NHIM and classified as *P. skanderbergis*. They are not so different in features from *P. kokeni* and a check of the suture lines was not possible. At the moment, it is not clear whether or not they are conspecific with *P. kokeni*.

Occurrence. *P. kokeni* is a common element of the *Subcolumnites-Protychites* zone (sensu Kummel, 1973a, b) of Albania (Arthaber, 1908, 1909, 1911) and Chios (Renz & Renz, 1947, 1948; Assereto et al. 1979; Gaetani et al. 1992), but it is also known from the *Subcolumnites* fauna of Afghanistan (Kummel, 1968a), from southern URSS (Shevirev, 1968), from Oman (Tozer & Calon, 1990), from the *Protychites* zone of Timor (Bando, 1968; Kummel, 1968) and from the *Procarinates-Leiostichites* zone of China (Wang, 1978).

Superfamily *Noritaceae* Karpinsky, 1889

Family *Noritidae* Karpinsky, 1889

Genus *Albanites* Arthaber, 1909

Type species: *Pronorites triadicus* Arthaber, 1908

*Albanites* sp. aff. *A. osmanicus* (Arthaber, 1911)

Pl. 1, fig. 4 a-c; Fig. 5.

Material. 1 specimen: MPUM 8140 (AK 2bis-1), Han-Bulog lime-mine, Këira (Albania); Section KëA, level AK 2bis.

Description. Slightly involute *Albanites* with flattened sides and subquadrado whorl section. The venter is
tabulate and wide with angular lateroventral shoulders (Fig. 5).

Umbilical margin narrowly rounded; umbilical wall moderately high and vertical in the inner whorls, with a great increase in height and reduction of inclination in the outer whorls. The conch shows umbilical regression that starts at a whorl height of 14.8 mm and is extremely pronounced in the outer whorl.

The ornamentation consists of primary radial ribs that involve the venter and the upper half of the flanks. Ribs on the venter are straight, strong and relatively close in the inner whorls, then they become more spaced with two or three very weak ribs interposed. They weaken on the flanks, becoming all of the same strength and disappear in the lower half of the whorl height. They are close and rectiradiate on the flanks and form a kind of very weak knottiness on the lateroventral shoulders. This kind of ornamentation of the whorl sides could be smoothed as it probably lays on the body chamber.

Suture line not visible.

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**Albanites arbanus** (Arthaber, 1911)

v1911 Pronorites arbanus Arthaber, p. 205, pl. 17, fig. 11, 12.
1915a Pronorites arbanus - Diener, p. 230, nn.
1922 Pronorites arbanus - Welter, p. 94, pl. 155, fig. 10-14.
1922 Pronorites spec. ind. ex aff. arbanus - Welter, p. 95, pl. 155, fig. 9.
1928 Pronorites arbanus - Renz, p. 155, nn.
1933 Pronorites arbanus - Kutasy, p. 624, nn.
1934 Albanites arbanus - Spath, p. 277.
1934 Albanites wettlfordi Spath, p. 278.
1945 Pronorites arbanus - Renz, p. 351, nn.
1947 Pronorites arbanus - Renz & Renz, p. 61, nn.
1948 Pronorites arbanus - Renz & Renz, p. 85, pl. 14, fig. 15-15b.
1948 Pronorites arbanus var. orientalis Renz & Renz, p. 85, pl. 13, fig. 5-8c.
1949 Pronorites arbanus var. imbricata Renz & Renz, p. 85.
1948 Pronorites shaubi - Renz & Renz, p. 87, pl. 15, fig. 5-3a.
1949 Pronorites shaubi var. imbricata - Renz & Renz, p. 87.
1948 Pronorites orientalis Renz & Renz, p. 86, pl. 15, fig. 2, 2a.
1960a Albanites danispansensis - Astakhova, p. 143, pl. 34, fig. 4, 5.
1960b Albanites danispansensis - Astakhova, p. 150.
1968 Albanites arbanus - Sheryv, p. 118 partum, pl. 6, fig. 5, 6.
1969 Albanites itadticus - Kummel, p. 477 partim, pl. 17, fig. 1, 2.

Lectotype. Pronorites arbanus Arthaber, 1911, pl. 17, fig. 11a-d; PIUW IV-7; selected by Spath, 1934, p. 278.

Material. 1 specimen: MPUM 8141 (AK 5-3). Han-Bulog Limestone, Kyra (Albania). Section KsA, level AK 5.

Description. Involute and compressed *Albanites* with a subrectangular whorl section. The venter and the flanks are almost flat and linked by subangular ventral shoulders.

The ornamentation consists of primary ribs that cross the venter, where they are straight, prominent and relatively close. Very weak falcoid growth lines cover the flanks.

Suture line not visible.

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**Albanites arbanus** (Arthaber, 1911) was established on two specimens and the very small lectotype is surely a juvenile form. It shows smooth flanks and a venter with strong ribs, while the other specimen (1911, Arthaber, pl. 17, fig. 12) shows falcoid primary ribs on the lateral sides.
The difference was noted by Renz & Renz (1948, p. 87) who separated the lectotype as a new species (sic!) \( (Pronorites shaubi) \) (Renz & Renz, 1948) characterized by a smooth shell.

Occurrence. The species is known from the Subco-lumbites-Prohungarites zone (sensu Kummel, 1973) of Albania (Arthaber, 1928, 1911) and Chios (Renz & Renz, 1947, 1948) and from southern URSS (Shevyrev, 1968). The occurrence of \( A. \) arcanus in Mangyshlak is not certain (Astakhova, 1960a, b).

Family \( Ussuriidae \) Spath, 1930
Genus \( Parussuria \) Spath, 1934

Type species: \( Ussurina compressa \) Hyatt & Smith, 1925

\( Parussuria \) (?) sp.
Pl. 3, fig. 1 a-b; Fig. 6 a-b.


Description. The specimen is only a phragmocone with shell of a compressed involute form, with narrow rounded venter and a subtriangular whorl section (Fig. 6b). The flanks are convex, keeping the same maximal width from the middle of the height to the umbilical margin. The upper half of the height regularly narrows towards the venter. The umbilicus and the umbilical wall are not easily assessable. Nevertheless, the umbilicus seems to be small, but it is not possible to see if it is also closed. Shell smooth.

Suture line subammonitic with at least five saddles. Lobes and saddles irregularly digitated with a triangular shape. The ventral and the first and second lateral lobes are deep and frilled by several deep and long digitations; the first and second lateral saddles have a more acute top (with a subdivision in two of the first ones), while the other saddles tend to have a flattened top (Fig. 6a).

Fig. 7 - Suture lines of species of \( Proptychitoides \).
(a) \( Proptychitoides \) sp. Specimen MPUM 8143 (G 2615-1) at \( H = 31.2 \) mm. (b) \( Proptychitoides krafti \) (Arthaber); redrawing of the suture line of PIUW IV. 19, holotype (1911: pl. 19, fig. 4a-e) at \( H = 32.7 \) mm. (c) \( Proptychitoides trigonalis \) (Arthaber); redrawing of the suture line of PIUW IV. 18, holotype (1911: pl. 19, fig. 4 c) at \( H = 33.7 \) mm. (d) \( Proptychitoides hoffi \) (Arthaber); redrawing of the suture line of PIUW IV. 17, syntype (1911: pl. 19, fig. 3 c) at \( H = 36.5 \) mm. (e) \( Proptychitoides decipiens \) Spath; redrawing of the suture line of PIUW IV. 16, holotype (\( - Proptychitoides latisimbricatus \) non De Koninck, (Arthaber, 1911: pl. 19, fig. 2) at \( H = 40.9 \) mm. Bar scale is 5.5 cm.
Discussion. This kind of suture line makes it difficult to place the specimen into a genus with a similar external feature. The closest genus is *Parussuria* Spath, 1934, mostly for the lobes deeply frilled and with a triangular shape; however, *Parussuria* has a more irregular suture line characterized by fewer elements.

**Family Meekoceratidae** Waagen, 1895  
**Subfamily Proptychitinae** Waagen, 1895  
**Genus Proptychitoides** Spath, 1930  

*Type species: Proptychitoides decisionis* Spath (=Proptychites latifimbriatus Arthaber, 1911-nom De Konineck).

**Proptychitoides** sp.  
Pl. 1, fig. 5a-b; Fig. 7 a-e.

**Material.** 1 specimen; MPUM 8143 (G 2610-1). Han-Bulog Limestone, Kqira (Albania). Section KqG, level G 2610.

**Description.** Only half of the outer whorl is preserved, partly distorted. Involute, deep embracing, compressed shell with a subtrigonal whorl section. Maximum width at the umbilical margin as a kind of swelling. The venter is rounded and rather wide, gradually passing to convex flanks. Rounded umbilical shoulders that pass to vertical umbilical wall. The umbilicus is deep and rather wide. Shell smooth.

Suture line subammonitic with monophyllic saddles; at least three lateral saddles are visible (Fig. 7a). The first lateral saddle is the highest, followed by the second only slightly lower. They both have a rounded top. The third saddle is characterized by a more "squared" shape, with a still rounded top which tends to flatten. First lateral lobe deep and highly digitated. The digitations of the lobes start more or less at the same height on both sides of the saddles.

Discussion. Making a direct comparison with the specimens in Arthaber's and Nopcsa's collections, MPUM 8143 (G 2610-1) shows the greatest morphologic similarity with *P. bertisci* (Arthaber, 1911), but there is a remarkable difference in the suture line because in *P. bertisci* the saddles are more slender and thinner (Fig. 7b, holotype, Arthaber, 1911, pl. 19, fig. 4c; redrawing). Nevertheless, the poor preservation of MPUM 8143 (G 2610-1) does not allow a specific attribution.

No comparison were possible with *Meekoceras habbi* Arthaber, 1911. Its suture line fits with genus *Proptychitoides*, but only one big specimen is preserved and the relationship between this specimen and the species of *Proptychitoides* with smaller individuals is not clear. It is possible that one of the species with smaller specimens represents the internal whorls of the larger.

A redrawing of the suture lines of the holotypes and of a drawn shtype of four species belonging to the genus *Proptychitoides* erected by Arthaber is here provided (Fig. 7b-e). They were not carefully drawn by the author and they were only copied by Kummel (1969, p. 386, text-fig. 11 A, B, I, J). Moreover, I found the specimens with the ink that Arthaber used to point out the sutures still preserved.

**Superfamily Sagacerataceae** Hyatt, 1884  
**Family Hedenostraemiidae** Waagen, 1895  
**Genus Cordillerites** Hyatt & Smith, 1905  

*Type species: Cordillerites angulatus* Hyatt & Smith, 1905

**Cordillerites** sp. aff *C. angulatus* Hyatt & Smith, 1905  
Pl. 1, fig. 6 a-b; Fig. 8 a-b.

**Material.** 1 specimen; MPUM 8144 (AK 5-6). Han-Bulog Limestone, Kqira (Albania). Section KqA, level AK 5.

**Description.** Compressed involute conch, deeply embracing the lateral sides, slightly convex with maximum width at the umbilical shoulders. The venter is tabulate and relatively wide (Fig. 8b) with angular ventral shoulders. On the first third of the outer whorl there are very weak keels on the ventral shoulders, which disappear on the body chamber. Umbilicus very narrow. Shell smooth.

Suture line with an external lobe subdivided in two adventitious bifid lobes; the second already shows a further subdivision of both digitations. The first lateral lobe is very deep and wide, with four subdivisions.
Its width corresponds approximatively to the sum of the widths of the previous saddle and lobe. The second lateral lobe is about half the width and length of the first and is trifid. Four auxiliary elements are preserved. The saddles are slender, narrower at the base and with a rounded top (Fig. 8a).

**Dimensions (in mm):**

<table>
<thead>
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<th>MPUM 8144 (AK 5-6)</th>
<th>D</th>
<th>H</th>
<th>h</th>
<th>W</th>
<th>U</th>
<th>U/D</th>
<th>H/W</th>
<th>SGR%</th>
</tr>
</thead>
<tbody>
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<td>29.7</td>
<td>18.1</td>
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<td>7.5</td>
<td>2.4</td>
<td>0.081</td>
<td>1.749</td>
<td>98.739</td>
</tr>
</tbody>
</table>

**Discussion.** The suture line of the specimen is generally simpler and with fewer elements than the one of *Pseudosageceras* Diener, 1895.

Compared with the suture lines of *Cordillerites angulatus* drawn by Hyatt & Smith, there is the unusual subdivision of the first lateral lobe in four parts instead of the three present in the type-species and in the other species belonging to the genus. Nevertheless, the suture line of specimen MPUM 8144 (AK 5-6) is close to that of the genus *Cordillerites* rather than to *Pseudosageceras*, because of the fewer elements and the width of the deepest lateral lobe. The attribution to the genus *Cordillerites* is also justified by the venter, which is wider than in *Pseudosageceras*.

In Nopcsa's collection some specimens with an unusual wide venter are classified as *Pseudosageceras*. A check on their suture lines is necessary to be sure about their taxonomic attribution.

Specimen MPUM 8144 (AK 5-6) is considered only as *affinis* to the species *C. angulatus* Hyatt & Smith, 1905, because it has a slightly keeled venter in the first third of the outer whorl, a character not included by Hyatt & Smith in the definition of the species. According to the evolution of the sutural lines in *Cordillerites angulatus* reported by Hyatt & Smith (1905, p. 109-110), the specimen MPUM 8144 (AK 5-6) should be an adult.

*Cordillerites bicarinatus* (Tozer, 1965a) has a different kind of venter; the outer whorl is characterized by rounded ventral shoulders in the first third and a tabulate venter with distinctly raised keels in the last third.

*Cordillerites concinnus* (Kiparisova, 1961) shows a different suture line without a very deep and wide ventral lobe, with fewer adventitious lobes and a different shape of the saddles. The depicted specimen (Kiparisova, 1961, pl. 7, fig. 1a-b) has conspicuous dimensions for a *Cordillerites*.

**Genus Pseudosageceras** Diener, 1895

*Type species:* *Pseudosageceras* sp. indet. Diener, 1895 (= *Pseudosageceras multitubatum* Noetling, 1905)

**Pseudosageceras drinense** (Arthaber, 1911)

*Holotype:* *Pseudosageceras multitubatum* Arthaber, 1908, p. 279, pl. 12, fig. 3a,b; PlUw: 1908, pl. 12, fig. 3a,b; PIUW 13, p. 3.

*Material:* 1 specimen: MPUM 8145 (AK 2a-2b). Han-Bulog Limestone, Kčira (Albania). Section KčA, level AK 2a-b.

**Description.** The specimen is a phragmocone and probably part of the body chamber. The conch is compressed and involute, with an extremely narrow sulcated venter. Lateral sides slightly convex and smooth, passing to an umbilicus reduced to a point.

The suture line is only partly exposed and very poorly preserved. Three saddles and four incomplete lobes are visible, but it is possible to recognize the shape of the deepest lateral lobe which is trifid, while the others are bifid. The saddles are elongated and get narrower at the top.

**Discussion.** The attribution of specimen MPUM 8145 to *P. drinense* (Arthaber) is due to the pattern of the suture line.

*P. albanicum* (Arthaber, 1908) is extremely similar in morphologic features, but has a different suture line. First, the deepest lateral lobe is bifid with a small subdivision; secondly, the saddles have a uniform width at the base and at the top, instead of a "lanceolate" shape.

*P. multitubatum* Noetling, 1905 has a different morphology of the venter, that is tabulate. The suture line is quite similar to that of *P. drinense* (Arthaber).

**Occurrence.** The species is known from the *Subcolubrites-Probungarites* zone (sensu Kummel, 1973) of Albania (Arthaber, 1908, 1911) and Chios (Renz & Renz, 1947, 1948).

**Pseudosageceras sp.**

Pl. 1, fig. 7a-b.

*Material:* 1 specimen: MPUM 8146 (AK 2a-2b). Han-Bulog Limestone, Kčira (Albania). Section KčA, level AK 2a-b.

**Description.** This specimen is faulted and distorted. The conch is entirely filled with calcite that compromises the preservation of the suture line.

The external shape is identical to that of *P. drinense* (Arthaber, 1911), but the specific attribution is not possible because the suture line is lacking.
Order Phylloceratida Arkell, 1950
Superfamily Phyllocerataceae Zittel, 1884
Family Ussuritidae Hyatt, 1900
Genus Eophyllites Spath, 1930

Type species: Monoplryllites dieneri Arthaber, 1908

Preliminary remarks. The genus Eophyllites was established by Spath in 1930, but was not accepted unanimously. Renz & Renz (1948) considered it only a subgenus of Monoplryllites, Mojsisovics, 1879, such as Leirophyllites Diener, 1915. Some species originally belonging to Monoplryllites were distributed within these two genera, but they changed their generic position several times.


According to Kummel (1969) E. refractus Spath, 1934, E. nicipes (Arthaber, 1908) and E. rosea (Renz & Renz, 1948) should be considered synonyms of E. dieneri (Arthaber), because the main difference between these species is the degree of evolute or involute of the shell and this is nothing more than intraspecific variability.


Eophyllites dieneri (Arthaber, 1908)

Pl. 1, fig. 8.

1908 Monoplryllites dieneri Arthaber, p. 288, pl. 13, fig. 3-a.
1908 Monoplryllites dieneri var. Arthaber, p. 288, pl. 13, fig. 4-a-c.
1911 Monoplryllites dieneri - Arthaber, p. 234, pl. 20, fig. 5-8.
1915a Monoplryllites dieneri - Diener, p. 203, nn.
1930 Eophyllites dieneri - Spath, p. 89, nn.
1934 Eophyllites dieneri - Spath, p. 294.
1948 Monoplryllites (Eophyllites) dieneri var. involuta Renz & Renz, p. 75, pl. 5, fig. 1-1b.
1948 Monoplryllites (Schizoplryllites) beioli Renz & Renz, p.76, pl. 4, fig. 8-b.
1948 Monoplryllites (Schizoplryllites) beioli, var. evoluta Renz & Renz, p. 76, pl. 4, fig. 6-6a; pl. 5, fig. 2-2a, 4-4a, 6-6a.
1960 Eophyllites dieneri - Kummel, p. 524 partim, pl. 23, fig. 1-5.
1974 Eophyllites dieneri - Wang & He, p. 426 partim, pl. 47, fig. 3-4.
1985 Eophyllites dieneri - Asseron et al., p. 735, nn.

Lectotype. Monoplryllites dieneri Arthaber, 1908, p. 288, pl.13, fig.3-a; selected by Spath, 1930, p. 294, the lectotype is lost.

Material. 1 specimen: MPUM 8147 (AK 62-10). Han-Balog Limestone, Kitara (Albania). Section KgB, level AK 62.

Description. The specimen consists of a phragmocone (full of calcite) and body chamber (full of sediments), and is slightly deformed. The whorl section shows a conical involute with rounded venter and weakly convex sides. Rounded umbilical shoulders that pass to a low and subvertical umbilical wall.

Shell smooth except for weak growth lines. Suture line not visible.

Dimensions (in mm):

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<th>D</th>
<th>H</th>
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<tr>
<td>MPUM 8147</td>
<td>52.15</td>
<td>25.15</td>
<td>13.3</td>
<td>-</td>
<td>13.7</td>
<td>0.263</td>
<td>89.068</td>
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Discussion. The attribution to the species E. dieneri is justified by the strict resemblance with the drawing of the lectotype. Unfortunately, the lectotype is not available in the collection of PIUW, but three paralectotypes are still preserved there and eleven types are in Nopcsa’s collection at NHM. One of the paralectotypes in Wien is a variety recognized by Arthaber (1908 Arthaber, pl. 13, fig. 4a-c) with more flattened flanks, higher umbilical wall and some differences in the suture line.

Eophyllites refractus Spath, 1934 (non nomen novum for Monoplryllites bauri, Arthaber, 1908, 1911, non Diener, 1895) is a species very close to E. dieneri. Young specimens of the two species are extremely alike, while adult
individuals of *Eophyllites refractus* have a wider ventral area and a suture line with less slender saddles.

*Eophyllites nopcaei* (Arthaber, 1908) is clearly more involute while, given the same dimensions, *Usurrites (?) decipiens* Spalth, 1934 (= *Monophyllites kingi* Arthaber, 1911, non Diener, 1895) is more evolute. Its ventral shoulders are rounded with the umbilical wall low and sloped.

Occurrence. *E. dieneri* (Arthaber) is known from the *Subcolommites-Probingyrites* zone (sensu Kummel, 1973) of Albania (Arthaber, 1908, 1911) and Chios (Renz & Renz, 1947, 1948; Assereto et al., 1980; Gaetani et al., 1992). The occurrence in China is not certain (Wang & He, 1976).

**Eophyllites** sp. aff. *E. refractus* (Spalth, 1934)

Pl. 2, fig. 1a-b; Fig. 9a.

Material. 1 specimen: MPUM 8148 (AK 2bis-I). Han-Bulog Limestone, Kıra (Albania). Section K5a, level AK 2bis.

**Description.** The specimen is made of a phragmocone and body chamber filled with sediments, with shell, broken and faulted. The conch is compressed and involute, with subparallel flanks, venter wide and rounded; the whorl section is subrectangular with rounded interventral shoulders (Fig. 9a). Great increase of the whorl height in the outer whorl. The umbilical shoulders are rounded and pass to a subvertical and smooth umbilical wall. The outer whorl shows an umbilical regression with great increase in umbilical width in the last half.

Ornamentation consisting only of weak growth lines. The suture line is only partly visible, showing a portion of the ventral lobe and the first and second lateral ones. They are entirely frilled, with many denticulations going up the flanks of the saddles. Lobes deep and u-shaped.

**Discussion.** The species *E. refractus* was erected by Spalth in 1934 as *nomen nudum* for *Monophyllites hana* Arthaber, 1908, 1911 (non Diener, 1895). Spalth stated that the specimen in Arthaber's collection with the name *M. hana* (1908 Arthaber, p. 216, pl. 12, fig. 4) did not have the morphologic patterns and the suture line of Diener's species. *E. refractus* is characterized by a wide rounded venter and growth lines bent back on the ventral shoulders. The suture line has less slender saddles than *E. dieneri* (Arthaber, 1908). This species was considered conspecific with *E. dieneri* (Arthaber) by Kummel (1969) as he thought that the width of the venter could be variable within a species.

*Monophyllites hana* Arthaber (non Diener, 1895) (1908, p. 216, pl. 12, fig. 4) is still preserved at PIUW and several paratypes are in Nopcsa's collection at NHM. A satisfactory distinction is not possible because the specimens are small and several *Eophyllites* species look alike at small size.

The specimen MPUM 8148 (AK 2bis-I) is a phragmocone and body chamber of a big *Eophyllites*. It is close to *E. refractus* in the width of the venter, the shape of the whorl section and the suture line. Moreover, it shows umbilical egression in the last whorl, it is more involute and the flanks are parallel. It is also bigger than the specimens in Arthaber's and Nopcsa's collections, so a morphologic comparison is extremely difficult.

The attribution to *E. dieneri* (Arthaber) was not taken into consideration because *E. dieneri* has an oval whorl section with a narrower venter. Moreover the only specimen in Arthaber's collection of nearly the same size does not show umbilical egression, while the whorl section and the venter cannot be evaluated because of the incompleteness of the shell.

**Eophyllites** sp.

Material. 2 specimens: MPUM 8149 (AK 2bis-23, AK 31-2). Han-Bulog Limestone, Kıra (Albania). Sections K5a, AK 2bis and AK 31.

**Description.** Specimen MPUM 8149 (AK 2bis-23) consists of half of the phragmocone with only a small part of the last whorl. The venter is broken and not assessable, except for the last whorl where it is wide and rounded. The ventral shoulders are rounded and the flanks are slightly convex with tendency to become parallel. The specimen is compressed and slightly evolute, with a wide umbilicus and low, vertical umbilical wall.

On the outer whorl the suture line is partly exposed. The second and third lateral saddles and the top of the first lateral one are visible. They are monophyllic (entire, not frilled). A lateral lobe between the second and third saddle is relatively wide and entirely indented.

**Discussion.** The suture line of specimen MPUM 8149 (AK 2bis-23) is incomplete and it is very difficult to give a specific attribution on the base of the visible parts. Nevertheless, the exposed lateral lobe is closer to those of the genus *Eophyllites* Spalth, 1930, than to those of *Leiophyllites* Diener, 1895. Specimens belonging to *Eophyllites* have deeper and wider lobes, with more digitations involving the lateral sides of the saddles as well. Generally, the genus *Leiophyllites* has wider, more shallow lobes, with fewer digitations and a flat bottom.

The specimen appears close to *Usurrites (?) decipiens* Spalth, 1934 (= *Monophyllites kingi* Arthaber, 1911) for the degree of evolution of the shell. Nevertheless, this species has no vertical umbilical wall. The most similar species is *E. dieneri* (Arthaber, 1908), but it is clearly more involute. Because of the poor preservation of the specimen, a specific determination was not possible.
Specimen MPUM 8149 (AK 31-2) is a representative of level AK 31, that is characterized by a fauna of small specimens. Its attribution to the genus *Eophyllites* is justified by the kind of coiling, that tends towards involution. Specimens belonging to the genus *Leiophyllites* are already more evolute at small size.

![Fig. 9](image-url)

**Family Usuritidae:** (a) *Eophyllites* sp. aff. *E. refractus* (Spath). Whorl section of specimen MPUM 8148 (AK 23-1) at H = 23.7 mm x 1. (b) *Paleophilites* steinmanni Welter. Whorl section of specimen MPUM 8150 (AK 5-2) at H = 19.4 mm x 1. (c-e) *Leiophyllites* sp. cf. *L. pitamaha* (Diener). Whorl sections (c) Specimen MPUM 8152 (AK 5-1) at H = 13.3 mm; (d) Specimen MPUM 8154 (AK 5-2) at H = 13.1 mm; (e) Specimen MPUM 8153 (AK 36-1) at H = 8.7 mm. All x 1.

**Fig. 5-7; GIBU, 162, 1948b Paleophilites* (sensu Kummel, 1973) of Chios (Renz & Renz, 1947, 1948) and from the family Prohangerites zone of Timor (Welter, 1922; Kummel, 1968b).

**Genus Melophyllites** Mojsisovics, 1879

Type species: *Ammonites spherocephalus* Hauer, 1850

**Monophyllites** sp.

Pl. 2, fig. 3a-b.

**Material.** 1 specimen: MPUM 8151 (AK 125-5). Han-Bulog Limestone, Kqira (Albania). From the level AK 125 at the top of the block at site E.

**Description.** The specimen consists of more or less half of the conch. Involute and compressed form with subrectangular whorl section. Venter wide and slightly arched, with rounded lateroventral shoulders. Sides flattened with whorl's height rapidly increasing. Umbilicus wide and deep with subvertical wall and umbilical shoulders rounded.

The shell is covered by thick growth lines that bend towards the opening at 2/3 of the whorl's height and cross the venter with a convexity.

Suture line only partly preserved. A lateral saddle (probably the second lateral) is visible; it shows the typical asymmetrical shape of the genus *Monophyllites*, with rounded top and the internal side deeply indented.

Remark. The specimen is poorly preserved. The generic attribution is based both on the morphologic shape and the suture line.

**Superfamily Usuritacea** Hyatt, 1900

**Family Leiophyllitidae** Popov, 1958

**Genus Leiophyllites** Diener, 1915

Type species: *Monophyllites suevi* Mojsisovics, 1882

**Leiophyllites** sp. cf. *L. pitamaha* (Diener, 1895)

Pl. 2, fig. 7, 8; Fig. 9c-e.
Material: 4 specimens: MPUM 8152 (AK 5-1); MPUM 8153 (AK 3-1); MPUM 8154 (AK 5-2, AK 31-1). Han-Balog Limestone, Kjira (Albania). Section KgA; levels AK 5, AK 31, AK 36.

Description. The specimens are only partly preserved and sometimes crushed on one side. The phragmocones are filled with calcite that hinders the preservation of the suture line. Evolute and compressed 

Leiophyllites, with a regular and slow growth. Outer whorl covers slightly less than half of the previous one. Whorl section is oval with a ventral area rounded and moderately wide, gradually passing to convex lateral sides (Fig. 9c-e). Umbilical shoulders are rounded and pass to a low and sloped umbilical wall.

Shell smooth. Suture line not preserved.

Discussion. The species L. pitamaba was erected by Diener (1895) on material from the Himalayas; Arthaber in 1911 classified some specimens from Kjira (Albania) as M. pitamaba. Subsequently, in 1934 Spath stated that Arthaber's material was different from Diener's types, so he chose a new name for them, i.e. Eophyllites variabilis. He considered the specimens closer to Eophyllites because of the suture line with a deep and frilled first lateral lobe. Nevertheless, the general appearance of the forms was closer to the genus Leiophyllites. The specimen depicted by Arthaber (1911, pl. 20, fig. 11) was selected as lectotype (Spath, 1934) of Eophyllites variabilis, but unfortunately it is now lost.

The new species differs from L. pitamaba mainly in the whorl section, that is almost subrectangular, with a wide rounded venter and lateral sides almost flat. The whorl section of L. pitamaba is more compressed, with a narrowly rounded venter, and maximal width at half of the whorl height. Nevertheless, the main problem in distinguishing these two species is that the lectotypes are extremely similar at small size; a satisfactory distinction between them could be possible only if the suture line were preserved.

The new specimens from Kjira show an oval whorl section, without a subrectangular shape and flat flanks. Moreover, a direct comparison of this material with some large specimens of L. pitamaba from Chios (Fantini, 1981), allowed the recognition of a morphologic similarity between the new specimens from Kjira and Diener's species.

Leiophyllites sp.

Material: 5 specimens: MPUM 8155 (AK 2bis-14; AK 31-3, 8, 11, AK 42-1). Han-Balog Limestone, Kjira (Albania). Section KgA, levels AK 2bis, AK 31, AK 40.

Description. Evolute and compressed juvenile specimens, consisting of a phragmococone and part of the body chamber. In the outer whorl the whorl section outline changes from subcircular to oval. Venter widely rounded that passes gradually to convex flanks. Umbilical margin rounded; umbilical wall low.

The suture line is ceraritic with three lateral saddles; the second is the highest, asymmetrical, with a subangular top, while the third is very small. The first lateral lobe is the deepest and widest, with several small denticulations; the second is more or less half of the first in height and width and it is trifid (Fig. 10).

Discussion. The suture line and the general features of the specimen make it closer to the genus Leiophyllites, but it is clearly a juvenile form. Several species belonging to this genus are extremely similar during the juvenile stage, and neither the whorl section nor the suture line are definitively significant at that stage.

Superfamily Xenodiscacea Frech, 1902
Family Xenoceltitidae Spath, 1930
Genus Sulioticeras Tower, 1994

Type species: Xenodiscus sulioticus Arthaber, 1911

Sulioticeras sp. cf. S. sulioticum (Arthaber, 1911)


Description. The specimen is a complete phragmococone with body chamber, evolute and slightly compressed, with rounded venter. Whorl section with subcircular outline. Umbilicus wide with umbilical wall low and umbilical shoulders rounded.

Characteristic sculpture consisting of primary radial ribs that cover only the lower third of the whorl height, very weak at the beginning of the outer whorl, then absent on the body chamber.

Suture line ceraritic with three visible lateral saddles. The first lateral lobe is bifid, divided by a short saddle, then each digitation in turn subdivided in two or three parts. The second lateral lobe is trifid and it is

Fig. 10 - Leiophyllites sp. Suture line of specimen MPUM 8155 (AK 2bis-14) at H = 8.6 mm. Bar scale is 0.5 cm.
Fig. 1 a, b - *Parnaunzia* (?) sp. KcA, MPUM 8163 (AK 5-15). a) Lateral view; b) ventral view; x 1.
Fig. 2 a, b - *Precladiscites brunoi* Mojsisovics, KcA, MPUM 8157 (AK 57-3). a) Lateral view; b) ventral view; x 1.
wide as half of the first one. The saddles are entire, with a rounded top.

Discussion. Sulioticeras is a new genus established by Tozer in 1994a on the basis of just two species: Preflorianites sulioticus (Arthaber, 1911) and Preflorianites intermedius Tozer, 1995. The genus is distinguished from Preflorianites Spath, 1930 based on a smoother body chamber.

The generic attribution of specimen MPUM 8156 (AK 62-18) is justified by the presence of a regular ribbing on the phragmocone and the smoothness of the body chamber. Although poorly preserved, it is closer to S. sulioticum because S. intermedius is less evolute.

Superfamily Arcestacea Mojsisovics, 1875
Family Cladisitidae Zittel, 1884
Genus Procladisites Mojsisovics, 1882
Type species: Procladisites brancoi Mojsisovics, 1882

Procladisites brancoi Mojsisovics, 1882
Pl. 3, fig. 2a-b; Fig. 11.

1882 Procladisites brancoi Mojsisovics, p. 171, pl. 48, fig. 1, 2a-c.
1892 Procladisites brancoi - Hauer, p. 31.
1896 Procladisites brancoi - Arthaber, p. 85.
1910 Procladisites brancoi - Renz, p. 22.
1911 Procladisites brancoi var. - Salopek, p. 24, pl. 2, fig. 3.
1914 Procladisites brancoi - Arthaber, p. 175.

Holotype. A holotype was not selected by Mojsisovics. Syntypes are preserved at the Geologischen Bundesanstalt (Wien).

Material. 1 specimen: MPUM 8157 (AK 57-1). Han-Bulog Limestone, Kcjra (Albania). Loose block from the upper part of section RQA.

Description. Involute, compressed form with oval whorl section. The venter is rounded, wide and gradually passes to convex flanks (Fig. 11). The width of the whorl is more or less the same in the lower half of the flank, but is maximum near the umbilical shoulders. Umbilicus extremely narrow, with rounded shoulders. Umbilical wall vertical and increasing in height during the growth.

The surface of the shell shows a regular and continuous spiral striation that covers both the umbilicus and the venter. The striae are regularly spaced and uniformly strong.

The suture line is not completely preserved. A small part of the bifid first lateral lobe and the second lateral saddle are visible. The top is not deeply subdivided, with a general rounded shape; just below the top phylloid digitations start.

Discussion. The wide rounded venter and the suture line allow the attribution of the specimen to the genus Procladisites. The genus Cladiscites Mojsisovics, 1879 has generally a more depressed whorl section and a suture line with flattened top. The genus Sturia Mojsisovics, 1882 has a different whorl section, with an oval shape, but with a narrowly rounded venter and maximum width at half of the whorl height.

The greatest similarity in morphologic features and suture line is with the species P brancoi Mojsisovics, 1882. P yasoda Diener, 1895 has close resemblance too, but has a wider, open umbilicus that exposes the inner whorls. The same thing can be said about P elegans Shevirev, 1995 (= P. cf. yasoda Welter, 1915 and P brancoi He & al., 1986).

Occurrence. The species was reported first from the Trinodosus Zone of the Schreyer Alpe (Mojsisovics, 1882), then from the same Zone of Bosnia (Hauer, 1892), of Gross-Reiling, Austria (Arthaber, 1896), of Hallstatt, Austria (Diener, 1901) and from south Dalmatia (Salopek, 1911).

Family Arcestidae Mojsisovics, 1875
Genus Proarcestes Mojsisovics, 1893

Type species: Arcestes bramantaei Mojsisovics, 1869

Proarcestes sp.

Material. 1 specimen: MPUM 8158 (AK 125-2). Han-Bulog Limestone, Kcjra (Albania). From level AK 125 at the top of the block at site E.

Description. The specimen is part of the phragmocone of an involute spheroidal form, with some shell and small pieces of the suture line exposed. Smooth shell. Suture line ammonitic with lobes and saddles of triangular shape. The poor preservation does not allow a specific attribution.

Superfamily Ptychitacea Mojsisovics, 1879
Family Sturiidae Kiparisoiva, 1958
Genus Sturia Mojsisovics, 1882

Type species: Acanthides japonicu Mojsisovics, 1869

Fig. 11 - Procladisites brancoi Mojsisovics. Whorl section of specimen MPUM 8157 (AK 57-1) at H = 34.7 mm. x 1.
Sturia sansvinii (Mojsisovics, 1869)

Pl. 2, fig. 5a-b; Fig. 12a-b.

1869 Amaltheus sansvinii Mojsisovics, p. 580, pl. 18, fig. 1, 2.
1882 Sturia sansvinii - Mojsisovics, p. 241, fig. 5-7; pl. 50, fig. 1.
1892 Sturia sansvinii - Hauer, p. 283, pl. 10, fig. 7.
1895 Sturia sansvinii - Salomon, p. 192, pl. 8, fig. 4.
1906 Sturia sansvinii - Dienen, p. 61, pl. 13.
1904 Sturia sansvinii - Martelli, p. 102, pl. 6, fig. 5.
1925 Sturia sansvinii - Nöelting, pl. 14, fig. 4.
1966 Sturia sansvinii - Artobar, pl. 36, fig. 3.
1967 Sturia sansvinii - Frech, p. 273, fig. 5, 6.
1968 Sturia sansvinii - Kindl, p. 525.
1912 Sturia sansvinii - Turina, p. 678.
1913 Sturia sansvinii - Simionescu, p. 338, pl. 7, fig. 8, text-fig. 69.
1914 Sturia sansvinii - de Toni, p. 167, pl. 13, fig. 1, 2.
1915a Sturia sansvinii - Dienen, p. 269, un.
1915b Sturia cf. sansvinii - Weltner, p. 99, text-fig. 7.
1925 Sturia sansvinii - Dienen, p. 71, pl. 13, fig. 4.
1933 Sturia sansvinii - Kutassy, p. 666, un.
1946 Sturia sp. - Kindl, p. 21.
1957 Sturia sansvinii - Kummel, p. 182, text-fig. 211-3.
1958 Sturia sansvinii - Kiparisova et al., p. 51, pl. 16, fig. 3, text-fig. 43.
1959 Sturia cf. sansvinii - Ondul & Bando, p. 101, pl. 8, fig. 3, 4.
1962b Sturia sansvinii - Kummel, p. 5, pl. 1, fig. 2.
1968 Sturia sansvinii - Shevyrev, p. 79, text-fig. 8, 9.
1967 Sturia sp. - McLeam, p. 8, pl. 12, fig. 2a-b.
1970 Sturia sansvinii - Kullmann, Wiedmann, text-fig. 14e.
1981 Sturia sansvinii - Wiedmann, Kullmann, text-fig. 15e.
1986 Sturia sansvinii - Tagteichert, p. 133.
1986 Sturia sansvinii - Shevyrev, text-fig. 42.
1994 Sturia sansvinii - Tozer, p. 132, pl. 46, fig. 11 a, b, 33a.
1995 Sturia sansvinii - Shevyrev, p. 57, pl. 7, fig. 8, 9.

Lectotype. Amaltheus sansvinii Mojsisovics, 1869, p. 580, pl. 18, fig. 1, 2.

Material. 1 specimen: MPUM 8159 (AK 125-1). Han-Bulog Limestone, Kërra (Albania). From level AK 125 at the top of the block at site 'E'.

Description. The specimen is a phragmocone and part of the body chamber of an involute and compressed juvenile form. The inner whorls have wider rounded venters and flanks tending to be parallel. The outer whorl has a narrower venter and convex flanks with maximal width at 1/3 of the height of the whorl. Umbilicus narrow and deep. Umbilical wall vertical, except for the outer whorl where it is sloped inwards (Fig. 12b).

Ornamentation restricted to the ventral area, consisting of weak and regularly spaced spiral striae. Suture line ammonitic, with deeply frilled lobes and saddles. The saddles have generally trifid round tops; the second lateral is the highest (Fig. 12a).

Discussion. Both whorl section and suture line are typical; the striation restricted to the venter is a juvenile character (Balini, 1997, pers. comm.). The specimen could be close to S. semiarata Mojsisovics, 1882 as well, but this species has a wider venter and subparallel flanks in specimens of the same size as MPUM 8159 (AK 125-1).

Occurrence. The type locality is in the Schreyer Alps, Austria (Triadians Zone), but the species is known worldwide. It ranges from Lower Anisian into younger Anisian strata.

Sturia sp.

Pl. 2, fig. 6.

Material. 1 specimen: MPUM 8160 (AK 57-2). Han-Bulog Limestone, Kërra (Albania). Level AK 57 from the upper part of section KÇA.

Description. Poorly preserved, involute, compressed specimen with a rounded venter and convex flanks. The ornamentation is restricted to the ventral area with a spiral striation, while the flanks are smooth. The absence of visible suture lines and the incomplete whorl sections do not allow a specific attribution.

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