UPPER OLENEKIAN (SPATHIAN) AMMONOIDS FROM CHIOS (LOWER TRIASSIC, GREECE): TAXONOMY AND STRATIGRAPHIC POSITION.

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Abstract. On the Greek island of Chios, Lower Triassic sections have delivered rich ammonoid faunas from red limestones of the Hallstatt facies. Here, we present a palaeontological description of Spithidian ammonoids, which have been collected during two field campaigns by German-Italian teams (Assereto et al. 1990; Gaetani et al. 1992). The ammonoid associations are composed of Ceratitida and Phylloceratida, each order containing species of the Noritaceae, Hedenstroemiae, Xenodiscidae, Dinaritaceae, Pinacocerataeae, Phyllocerataeae, Ptychitaceae, Ussuritaceae and Megaphyllitaceae. Long-ranging genera, e.g. Procarnites and Leuophyllites, are present as well as endemic ones, e.g. Chiotites, which occurs exclusively in the Lower Triassic of Chios. The ammonoid association is indicative of the Probungarites-Subcalambites zone sensu Kummel (1973a). The Haugi zone, installed as uppermost Olenekian in North America, is not represented by ammonoids on Chios.


Introduction

Lower Triassic ammonoid faunas are very rare in the Mediterranean regions. The Chios occurrence was detected by Ktenas & Renz (1928, 1931) on Marathovouno Hill, west of the town of Chios (Figs. 1, 2). There, the fossils are included in red limestones of the Hallstatt facies (Marmarotrapeza Formation). Renz & Renz (1948) published a palaeontological description of its ammonoids in a monograph. Bender (1970) was the first to collect fossils from measured sections (CM I, II, III) in order to establish coordinated ammonoid and conodont stratigraphies. This author recognized, moreover, that the Spithian beds are overlain by lowest Anisian ones with ammonoids comparable with faunas of the so-called Hydaspian substage from the Himalayas and Timor. Furthermore, Jacobshagen & Tietze (1974) described an association of both Spithian and Lower Anisian ammonoids from a nearby section of Parthenis Hill. Based on those findings and new specimens from Bender's section CM II, Assereto (1974) proposed the Aegean as lowermost substage of the Middle Triassic and Marathovouno Hill as its type locality. In 1975, a team of Italian and German geologists conducted by R. Assereto and V. Jacobshagen worked on Marathovouno Hill, measuring 6 sections (A-G, Fig. 2) and collecting fossils bed by bed with the aim to define the Olenekian/Anisian boundary on the base of ammonoids and conodonts. Their biostratigraphical results were presented by Assereto et al. (1980). Nicora (1977) published palaeontological descriptions of the conodonts found in these sections, and the Aegean ammonoids were described by Fantini Sestini (1981). To complete these investigations, a second field campaign was performed in 1989 by M. Gaetani and A. Nicora (Milano), V. Tselipidis (Athens) and V. Jacobshagen (Berlin) together with Milano students. Re-measuring and fossil collections were confined on crucial parts of the sections A, C, D, and G. Data concerning the Anisian part of the sections were published by Gaetani et al. (1992). Furthermore, research was extended to a section of the Parthenis area.

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The present paper focuses on the taxonomy and the stratigraphic position of the Lower Triassic ammonoids collected during the two field campaigns of 1975 and 1989. Appendix 1 indicates the correlation between the section, the sample and numbering of the ammonoids. Appendix 2 quotes the ammonoids mentioned in Assereto et al. (1980) and Gaetani et al. (1992). However, due to the re-evaluation of the collection changes have been made concerning the determination of species and genera.

Geological framework

According to Besenecker et al. (1968, 1971) the island of Chios is composed of two main tectonic units (Fig. 1), which probably belong to the Pelagonian nappes (Jacobshagen 1986). The lower unit, once considered as autochthonous, shows at its base epizonal schists followed by a thick graywacke-slate sequence of Silurian–Carboniferous age (Besenecker et al. 1968; Zanchi et al. 2003). The latter is unconformably overlain by a Triassic succession, with a few occurrences of Jurassic limestones and, locally, Early Tertiary conglomerates on the top. The upper unit is preserved in some outliers, only. Its sequence starts with fossiliferous Upper Palaeozoic deposits that are covered by red clastics of Liassic age. Triassic rocks are missing in between, but a few small relics.

Our studies refer to the Triassic of the lower unit exposed in the vicinity of Chios town, Tietze (1969) mapped that area. Its sequence starts with a Basal Formation (Basale Serie, Besenecker et al. 1968) containing red conglomerates and sandstones that grade upward to bedded limestones, with late Olenekian (Spathian) bivalves and conodonts in their upper parts (Kaufmann 1978). To their top, but also laterally, the bedded limestones pass over to thick, unbedded limestones and dolomites of the Lower Carbonate Formation (Lower Carbonate Series; Tieftriadische Massenkalk und Dolomite, Besenecker et al. 1968), which have yielded some Spathian conodonts as well. It is composed of wackestones to packstones interfingering with bedded dolomites, showing ooids in places. In the surroundings of Chios town the above-mentioned Marmarotrapeza Formation (Kalk von Marmarotrapeza, Ktenas & Renz 1928) follows with a sharp contact. Red nodular limestones of the Hallstatt facies are typical, with ammonoids, filaments, rare foraminifers, and conodonts. The thickness usually does not exceed 15 m. To the west and north of Chios town it is absent or reduced in thickness. The formation straddles the Olenekian/Anisian boundary. At the Marathovouno hilllock the Anisian part is confined to 2.0–3.50 m, but in other places it is even missing (e.g. in the Parthenis section of Gaetani et al. 1992). The Marmarotrapeza Fm. is overlain by the Variegated Formation (Variegated Series; Bunte Serie, Besenecker et al. 1968), a succession of red to purple slates and sandy marls with intercalations of limestones, radiolarites, conglomerates and tuffitic horizons, dated to an Anisian-Ladinian age by few conodont findings (Tietze 1969). It contains m-thick olistoliths of red limestones with Spathian and even Middle Anisian ammonoids and conodonts (Gaetani et al. 1992, see Fig. 2). West of Chios town, the Variegated Formation continues to an alternation of limestones and cherts, which yielded Middle Triassic and Carnian fossils (Tietze 1969).

The Mesozoic sequence of the lower unit ends with the Upper Carbonate Formation with shallow-water limestones of Upper Triassic and Jurassic age, not to be considered here.
The Lower and Middle Triassic sequence reflects a Tethyan evolution which took place in an extensional regime (Fig. 3, Gaetani et al. 1992; Stampfli et al. 1991; Stampfli et al. 2002). It started with a transgressive event at its beginning and the following formation of a subtidal to peritidal carbonate platform (Lower Carbonate Formation). The Hallstatt facies of the Marmarotrapeza Fm. points to downwarping of the platform and strong subsidence. The equivalent sedimentation ended diachronously. The Variegated Formation on top, deposited in a marine...
environment deeper than the underlying carbonates, covered a palaorelief. Synsedimentary reworking occurred on its slopes as indicated by the olistoliths and conglomerates mentioned.

**The stratigraphic sections**

Marathovouno Hill is located west of the town of Chios (Fig. 2). All sections were measured at its western slope. Bender (1970) had considered only three sections (CM I - III). Later on, Assereto et al. (1980) and Gaetani et al. (1992) treated nearly the same ones, but for precision's sake they choose different labels (A-G), which are used also here. Their locations are marked in Fig. 2. The correlation between the sections of Bender and Assereto et al. is as follows: CM I of Bender corresponds to G, CM II to A+C+D, and CM III to F.

The sections A+C+D form a rather continuous and complete profile of the Marmarotrapeza Fm., although some thin horizons are not exposed. Section A had been proposed for the Olenekian/Anisian boundary by Assereto (1974) and described in Assereto et al. (1980). This section (Fig. 4) starts with thick-bedded dolomites of the Lower Carbonate Formation that are overlain by the Marmarotrapeza Formation. Mainly reddish, medium-bedded limestones occur, with pelitic-limonitic crusts either parallel to the bedding planes or in the interior of the beds. Within these limestones two layers of thin-bedded nodular limestones are intercalated, furthermore some tuffitic layers. At the top of section A pink recrystallized limestone is exposed. The sections C and D are not described here in detail, because they contain only Anisian fossils.

Section G (Fig. 4) is not complete. Nevertheless, the two thin-bedded nodular limestone horizons and the pink layer mentioned allow the lithostratigraphic correlation with A. Fissures are developed within three horizons, the lower set penetrating the underlying sequence down to about 4 m.

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**Fig. 5** - Parthenis section with sample locations.

**Fig. 6** - Sections A with ammonoid distribution.

The sections B and F are not considered here, because they did not deliver ammonoids, but only conodonts of Spathian and Anisian age together with some foraminifers (Gaetani et al. 1992).

From Parthenis Hill, Tietze (1969) already described a section of the Marmarotrapeza Fm., which is exposed in a quarry. Our ammonoid collection comes from a section (Fig. 4, 5) measured in a small creek, lying about 100 m south of that quarry (Gaetani et al. 1992). Here, the Marmarotrapeza Formation does not exceed 2 m and lies on a partly dolomitized slumped body, m-thick, of nodular limestones. It is very rich in ammonoids, especially in its uppermost 15 cm, ending with a 2 cm thick ferro-manganeseous layer. In that section folding may have caused local deformations, which might have affected the boundary to the Variegated Formation on top.
Distribution of ammonoids in the sections

Ammonoid occurrences within the sections A, G, and Parthenis are shown in Figs. 6-8. Section A contains 7 levels of ammonoids predominantly in its lower and middle part within thin- to medium-bedded limestones. The association of the lowermost level is composed of Parannites, Procarnites, Hellenites, Albanites, Palaeophyllites and Leiophyllites. The overlying samples include Pseudosageceras, Chiotes, Isclitoitides, and Eophyllites. The thick-bedded part of the Marmarotrapeza Formation is barren. In the upper part of section C and in section D Anisian ammonoids and conodonts are well-documented (Gaetani et al. 1992).

Section G contains 3 levels of ammonoids. Ariantites (Meropella) exclusively belongs to level 252. Eogymnites, Eophyllites and Subulites are present in the upper level, only, whereas Leiophyllites, Procarnites kokeni and Pseudosagecerus albicanum occur in all levels.

The Parthenis section delivered a variable fauna. Hellenites, Leiophyllites and Procarnites are widespread. The upper part is characterised by Columbites, Chioceras, Eoplicatites, and Diereroceceras. The middle part contains Pseudosagosphinctes, Albanites and Dinarites.

Stratigraphic interpretation of the assemblages

The ammonoid associations of our sections largely correspond to the faunas described by Arthaber (1908, 1911) and Germani (1997) from Albania and by Renz & Renz (1947, 1948) from Chios. They form part of the highly diverse Tethyan fauna with several cosmopolitan as well as endemic elements (Kummel 1973b; Tozer 1981a) and are attributed to the Subcollumbites - Probangarites zone sensu Kummel (1973a), in agreement with Assereto et al. (1982) and Gaetani et al. (1992).

Stratigraphic subdivision of the Lower Triassic and the definition of the Olenekian/Anisian boundary is discussed since a long time (Tozer 1967, 1971, 1978, 1993; Wang 1985; Kozur 1992; Salvador 1994; Muttoni et al. 1994, 1995). 4 major zones are differentiated by Kummel (1973a) for the Lower Triassic in order to allow wide correlation between the major marine Lower Triassic occurrences in the Tethys, the Pacific and the circumarctic Realm, namely from bottom to top the Otoceras - Opiceras zone, the Gyronites - Prionolobus zone, the Oxytites - Anasibrites zone, and the above-mentioned Subcollumbites - Probangarites zone. In northern America, the (Neopopanoceras) haugi zone on top of the latter is regarded to represent an independent zone in the latest Olenekian. It is correlated with the Siberian spiniculites zone and the subbrassius zone of e.g. British Columbia (Bucher 1989; Dagys & Weitschat 1993; Dagys 1997). Sequences of the Tethys have, till now, never delivered clear representatives of the haugi zone or possible correlative. Orchard (1995) revised the Neospathodus conodont suite attributing former Gondolella timorensis by (Nogami) to Neospathodus gondolelloides Orchard and e.g. specimens of Neospathodus holmeri (Bender) to Neospathodus symmetricus Orchard, both revisions influencing the conodont scheme of Chios. Tentatively the revised nomenclature was used in Fig. 4, but a final decision about the distribution of Neospathodus symmetricus versus holmeri and Neospathodus gondolelloides versus Chiosella timorensis has yet to be made. Orchard (1995) considered the conodont succession of the Spathian to be composed of five associations. The Subcollumbites-Probangarites beds are characterized by Neospathodus holmeri (Bender), Neospathodus triangularis (Bender), Neospathodus symmetricus Orchard, and Neospathodus brochus Orchard. Neospathodus triangularis together with specimens of Hellenites? sp., Olenekoceras? sp., and various species of Columbites are characteristic for the upper Olenekian of South Primorye as well (Zakharov et al. 2002). Ammonoids of the Neopopanoceras haugi zone of Nevada are associated with N. symmetricus, few Neogondolella and uncommon N. brochus. Specimens of Neogondolella together with Chiosella timor-
ensis (Nogami) become common in the Lower Anisian; then *Neospathodus* is absent. Following Orchard (1995) the conodont succession in Chios is marked by a further horizon containing *Neospathodus gondolelloides* (Bender) below the Anisian assemblages. Therefore regarding the faunal succession in the Tethys, the *Subcolumbites – Prohungarites zone* cannot be considered as the latest Spathian zone. The topmost part of the section A does not contain ammonoids, whereas only conodonts of the *Neospathodus* suite are indicative of the Spathian (Muttoni et al. 1994, 1995; Orchard 1995). Almost the same situation is reported from Albania (Germani 1997). The appearance of *Chiosella timorensis* below *Neospathodus gondolelloides* and the overlap of both forms in section A, C and D as well as in section G has to be re-evaluated. The ammonoid assemblage in the condensed horizon (CH 258n) consists of long ranging forms, Gaetani et al. (1992) have already pointed out that the first appearance date of *Chiosella timorensis* (Nogami) and *Gladigondolella tethydis* (Huckriede) are distinctly below the first Aegian ammonoids, whereas *Neogondolella regale* (Moshier) was, on the contrary, found even about 2.50 m above the first Aegian ammonoids in Chios section A. For the Chios section A, Gaetani et al. (1992) correlated the thick-bedded part of the Marmarotrapeza Formation with the *huangi* zone, on the base of conodonts. Furthermore, they considered the possibility that the *Subcolumbites – Prohungarites zone* could be in parts correlative with the *subrobustus* zone in the Canadian Arctic and British Columbia. However, that can not be decided at the moment. Higher up, in the sections C and D, the base of the Anisian is preferentially defined with the first appearances of *Paradananubites*, *Japonites*, *Aegiceras* and *Paraerchovorticeras* which are correlative with the welteri beds of Nevada (Bucher 1989). Similar associations were found in Oman (Tozer & Calon 1990) and Romania (Gradinaru 1991) at the base of the Anisian.

**Systematic Palaeontology**

In the following palaeontological descriptions the taxonomy from order to genus level was adopted from Tozer (1981b). The Treatise (Arkell et al. 1957) and Shvyev (1986) proposals were consulted. The description of specimens was made using the following abbreviations: 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 involute in D.

Grinding exposed the suture lines, in most cases not complete. They are drawn from the venter to the perumbilical margin. The elements identified are the ventral lobes, the first lateral saddle, the first lateral lobe, and the second lateral saddle and so on to the umbilicus lobe. Our ammonoid material is stored in the collection of the Naturhistorisches Forschungsinstitut, Museum für Naturkunde der Humboldt Universität zu Berlin, Invalidenstr. 43, D-10099 Berlin, Germany. The total number of each specimen is indicated, followed by the new inventory numbers of the specimens (5001-5230) together with the abbreviation "MB-C", used for Museum für Naturkunde der Humboldt Universität zu Berlin, Cephalopoden. Appendix A contains the cross-correlation between inventory numbers of ammonoids, sections, samples and the primary ammonoid numbers.

**Described ammonoids:**

1. Sulcotretas sp.
2. Pararanmites sp.
3. *Pseudopropthongites ali* (Arthaber, 1911)
4. *Chioceras mitzopoulis* Renz and Renz, 1947
5. *Chioceras* sp.
6. *Iscelionites origius* (Arthaber, 1911)
7. *Chiotea globularis* Renz and Renz, 1947
8. *Albaniites triangularis* (Arthaber, 1911)
9. *Pseudopropthongites alblium* (Arthaber, 1911)
10. *Pseudopropthongites* sp.
11. *Dinoaceras et Iscaloni* Renz and Renz, 1947
12. *Dagoceras* sp.
13. *Columbites* sp.
14. *Hellenites praematurus* (Arthaber, 1911)
15. *Hellenites radiatus* Renz and Renz, 1947
16. *Hellenites* sp.
17. *Epicielites gentii* Arthaber, 1911
18. *Proaramites kokiset* (Arthaber, 1928)
Lower Triassic ammonoids from Chios

19. Procarinates cf. kokeni
20. Procarinates sp.
21. Eogoniites cf. arthaberi (Diener, 1915)
22. Eophylites dieneri (Arthaber, 1928)
23. Eophylites sp.
24. Palaeophylites cf. steinmanni Welter, 1922
25. Arianites (Meropella) plejanae Renz and Renz, 1947
26. Leioophylites variabilis (Spath, 1934)
27. Leioophylites sp.

Doubtful attributions are:
28. ?Dieneroceras sp.
29. ?Metahedenstroemia sp.

Class Cephalopoda Cuvier, 1797
Subclass Ammonoidea Zittel, 1884
Order Ceratitida Hyatt, 1884
Superfamily Xenodiscaceae Frech, 1902
Family Xenoceltitidae Spath, 1930
Genus Sulioticeras Tozer, 1994
Type species: Xenodiscus sulioticus Arthaber, 1911

Sulioticeras sp.
Pl. 1, figs. 2, 4; Fig. 9

Material. 1 specimen; MB-C 5109.

Description. The evolute form has a rounded venter. Ribbing may have been present, but is not clearly preserved on the inner part. The suture line is not completely exposed. Two relatively broad lateral lobes are present. The first lateral lobe is internally curved.

Dimensions.

<table>
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<th>No.</th>
<th>D</th>
<th>H</th>
<th>h</th>
<th>W</th>
<th>w</th>
<th>U</th>
<th>H/W</th>
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<td>2.09</td>
<td>1.55</td>
<td>1.69</td>
<td>1.04</td>
<td>1.58</td>
<td>1.23</td>
<td>0.30</td>
</tr>
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</table>

Discussion. Due to the bad preservation of this specimen, the characteristic sculpture with ribbing on the internal part and a smooth body chamber can not be detected. Therefore a species attribution is not possible. The specimen differs from Preflorianites garbinus (Renz and Renz, 1947) by the form of its venter. It clearly resembles the morphology of Sulioticeras. The preserved part of the suture line resembles the one Preflorianites sulioticus (Arthaber, 1911) depicted by Kumme (1969). Tozer (1994) attributed it to the species Sulioticeras sulioticum Arthaber, 1911.

Occurrence. Olenekian forms are known from the Subcolonibites fauna of Albania and Chios.

Superfamily Noritaceae Karpinski, 1889
Family Paranannitidae Spath, 1930
Genus Paranannites Hyatt and Smith, 1905
Type species: Paranannites aspenensis Hyatt and Smith, 1905

Paranannites sp.
Pl. 1, figs. 2, 4; Fig. 10


Description. Conchs are involute. The umbilicus is deep. Whorl sections are globular to subglobular, compressed with occasional constrictions. The ventral shoulders are rounded. The suture lines are simple, consisting of two rounded saddles, and a main lobe. MB-C 5056 shows a serrated lobe, which may be typical and may allow a comparison with Paranannites mediterraneus or Paranannites mediterraneus var. media.

Dimensions.

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<th>H</th>
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<td>0.61</td>
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<td>1.04</td>
<td>0.55</td>
<td>1.07</td>
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<td>0.46</td>
<td>0.59</td>
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Fig. 9 - Whorl section of Sulioticeras sp. (MB-C 5109).
Discussion. The morphology and the suture lines are characteristic for the genus Paranannites. Constrictions are present in MB-C 5147. Species of Paranannites are distinguished according to their whorl section, width of umbilicus, and sculpture. According to Kummel & Erben (1968), Paranannites aspenensis Hyatt and Smith marks a gradational complex including Paranannites columbianus, Paranannites compressus, Paranannites petens, Paranannites cottoani, Paranannites pyeboidea and Paranannites aspenensis. Even the suture lines were regarded to be conspecific by these authors. Arthaber (1911) established Paranannites mediterraneus for the European area, which shows constrictions and a slightly different suture line. Renz & Renz (1948) found the Chios fauna with Paranannites mediterraneus, its variation var. media, Paranannites chionensis, Paranannites aspenensis var. europea and Paranannites compressus. Kummel (1969) included all these species into Armatocelites mediterraneus (Arthaber) with Paranannites mediterraneus Arthaber, 1911, as type species.

Occurrence. Paranannites is known almost worldwide: Nevada and Idaho in U.S. (Hyatt & Smith 1905; Kummel & Steel 1962), Kwangsi (Chao 1959), Afghanistan (Kummel & Erben 1968), Subcolubrites faunas of Albania and Chios (Arthaber 1911; Renz & Renz 1947, 1948; Assereto et al. 1980; Gaetani et al. 1992, Germani 1997), Siberia, Madagascar (Kummel 1973b) and Japan (Bando 1964a, b). The genus is confined to the Probusgarites zone.

Description. A very small specimen, smooth, involute with a globular conch. The suture line is four-lobate with regularly rounded saddles. The first ventral lobe is deep, simple acute. The other ones show few internal truncations.

Discussion. The species attribution is based on the characteristic appearance of the suture line. The ones figured by Arthaber (1911) and Kummel (1969) allow a direct comparison. The suture line differs from Zenoites heleneae Renz and Renz, 1948, showing a dentilicated third saddle amongst four. The truncations of the lobes are more pronounced than in Zenoites heleneae sensu Kummel (1969). Other species of Pseudoprosphingites show much more irregularities along the basal parts of the lobes, and a flattening of the suture line.

Occurrence. Specimens of P. ali were described from the Subcolubrites fauna of Kërra, Albania. The genus Pseudoprosphingites is known also from the Caucasus (Shevyrev 1995), Primorye region (Kiparisova 1961) and China (Chao 1959).

Genus Chioceras Renz and Renz, 1947

Type species: Chioceras mitzopouloi Renz and Renz, 1947

Chioceras mitzopouloi Renz and Renz, 1947

Pl. 1, fig. 1

1947 Chioceras mitzopouloi var. meridionalis Renz and Renz, p. 10.
1948 Chioceras mitzopouloi Renz and Renz, p. 37, pl. 12, figs. 3-3b, 6-6a, 9-9a, 15.
1947 Chioceras mitzopouloi var. meridionalis Renz and Renz, p. 38, pl. 12, figs. 8-8b.
1992 Chioceras mitzopouloi - Gaetani et al., p. 187, text fig. 4.

Material: 1 specimen; MB-C 5232

Description: The evolute specimen is well preserved. It is smooth and shows a pronounced keel. Accompanying furrows are not present. The umbilical and ventral shoulders are rounded. A suture line is not exposed.

Discussion: The keel and whorl section allows an attribution to the species Chioceras mitzopouloi. Moreover the specimen closely resembles Chioceras mitzopouloi var. meridionalis as depicted by Renz and Renz (1948).

Genus Pseudoprosphingites Shevyrev, 1995

Type species: Prospingites globosus Kiparisova, 1947

Pseudoprosphingites ali (Arthaber, 111)

Fig. 11

1911 Prospingites ali - Arthaber, p. 252, pl. 22, figs. 6, 7.
1915 Prospingites ali - Diener, p. 233.
1934 Prospingites ali - Spoth, p. 189, fig. 59g.
1969 Prospingites ali - Kummel, p. 428, pl. 20, figs. 12, 13, text fig. 16.
1992 Prospingites ali - Gaetani et al., p. 192.

Material: 1 specimen; MB-C 5180 (not measurable).
Occurrence: *Chioceras mitzopouloi* was described from Chios (Renz and Renz, 1947, 1948; Assereto et al., 1980; Gaetani et al. 1992).

**Isculites** sp.

**Material.** 1 specimen; MB-C 5022 (not measurable).

**Description.** The fragmentary, probably evolved specimen shows a keel. The whorl section is depressed, cadicone. The umbilical shoulder is rounded.

**Discussion.** The whorl section and the presence of the keel support an attribution to the genus *Chioceras*.

**Occurrence.** The genus is known only from the *Subcolumbites* fauna of Chios.

*Subcolumbites* fauna

**Fig. cadicone.** Specimen shows subglobose grinding the outer surface. The whorl section is slightly higher than the other two. Due to the presence of small whorls, the outer surface is not preserved.

Genus *Isculitoides* Spath, 1930

**Type species:** *Isculites globularis* Arthaber, 1911

**Isculitoides globularis** (Arthaber, 1911)

Pl. 1, figs. 5, 7, 10; Fig. 12

1911 *Isculites globularis* Arthaber, p. 259, pl. 23, figs. 1-10.
1928 *Isculites globularis* - C. Renz, p. 155.
1934 *Isculitoides originis* - Spath, p. 196, pl. 14, figs. 2a-d, text figs. 59b, c.
1947 *Isculites antiquoglobulus* - Renz and Renz, p. 60, p. 74.
1947 *Isculites globularis-originis* - Renz and Renz, p. 60.
1948 *Isculites globularis* - Renz and Renz, p. 34, pl. 14, figs. 10-15x, 4a, 4b, 5, 5a, 8.4b, 11-11b.
1948 *Isculites antiquoglobulus* - Renz and Renz, p. 35, pl. 13, figs. 1-1a, 1-10a, 2-2a, 3-3a, 5-5a, 8-8a.
1948 *Isculites globularis-originis* - Renz and Renz, p. 33, figs. 7-7a, 9-9a, 11-11b, 12-12b, pl. 14, figs. 6-6a, 9-9a.
1948 *Isculites globularis-antiglobulus* - Renz and Renz, p. 35, pl. 13, figs. 4-4a, 4-4b, 7-7a.
1948 *Isculites globularis-originis* - Renz and Renz, p. 35, pl. 13, figs. 6-6a, pl. 14, figs. 1-1a, 2-2a, 3-3a.
1969 *Isculites globularis* - Kummel, p. 413, pl. 5, figs. 1-10, pl. 6, figs. 1-6, text figs. 18-20.
1992 *Isculitoides globularis* - Gaetani et al., p. 187, text fig. 4.

**Material.** 3 specimens; MB-C 5021, MB-C 5025, MB-C 5031.

**Description.** Specimens are involute, globose to subglobose with rounded venters. The whorl section of MB-C 5021 is slightly higher than the other two. Due to the presence of small whorls, the outer surface is not preserved.

Dimensions.

<table>
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**Discussion.** Arthaber (1911) showed a variety of *Isculites originis*. Kummel (1969) documented the gradational transitions between species and "Formationen", then differentiated by Renz and Renz (1947, 1948). The higher whorl section of MB-C 5021 resembles *Isculites globularis-originis* Renz and Renz, the other two *Isculites globulus* Renz and Renz. The conchs are closely comparable to *Chioceras*.

**Occurrence.** Species of *Isculitoides* are generally recognized in Chios, Albania, Timor, British Columbia, Nevada, southeastern Idaho, Kwangsi/China, and Primorsky region of Siberia. *Isculitoides originis* was described from the *Subcolumbites* fauna of Chios and Albania as well as from the *Probungarites* fauna of Timor.

Genus *Chioceras* Renz and Renz, 1947

**Type species:** *Prosphingites (Chioceras) globularis* Renz and Renz, 1947

**Chioceras globularis** Renz and Renz, 1947

Pl. 1, figs. 6, 8, 9; Fig. 13

1947 *Prosphingites (Chioceras) superglobosus* - Renz and Renz, p. 60, p. 74.
1948 *Chioceras globularis* - Renz and Renz, p. 40, pl. 15, figs. 9-9c.
1948 *Prosphingites (Chioceras) superglobosus* - Renz and Renz, p. 41, pl. 15, figs. 7-7c.
1969 *Chioceras globularis* - Kummel, p. 420, text fig. 10.
1980 *Chioceras globularis* - Assereto et al., p. 725.
1992 *Chioceras globularis* - Gaetani et al., p. 187, text fig. 4.

**Material.** 7 specimens; MB-C 5020, MB-C 5022, MB-C 5023, MB-C 5027, MB-C 5028, MB-C 5029, MB-C 5032.

**Description.** Typical globose conchs, relatively small and very involute. Whorls with rounded shoulders and broad venters. Umbilicus is deep.

Dimensions.

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<td>0.05</td>
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</table>

Lower Triassic ammonoids from Chios 425

...
**Discussion.** Two species were assigned to *Chiotites* by Renz and Renz (1947): *Chiotites globalaris* and *Chiotites superglobosus*. The latter differs by an increase in thickness, only. Kummel (1969) stated a gradational transition in whorl-dimensions between both groups and combined them into the species *Chiotites globalaris* Renz and Renz, 1947. Our material does not allow a differentiation either.

**Occurrence.** The genus and species derived from the *Subcolumbites* fauna of Chios.

---

**Family Noritidae Karpinsky, 1889**  
**Genus Albanites Arthaber, 1908**

**Type species:** *Pronorites triadicus* Arthaber, 1908

**Albanites triadicus** (Arthaber, 1906)  
Pl. 1, figs. 11, 12; Pl. 2, fig. 1; figs. 14, 15

- 1928 *Pronorites triadicus* Arthaber, p. 204, pl. 11, figs. 4a-c.
- 1911 *Anassortites c. dichotomus* - Arthaber, p. 238.
- 1911 *Apostites basserti* - Arthaber, p. 249, pl. 21, fig. 16.
- 1911 *Dagnoeras komonius* - Arthaber, p. 242, pl. 21, fig. 11.
- 1911 *Pronorites triadicus* - Arthaber, p. 204, pl. 17, figs. 8, 9.
- 1911 *Pseudoassortites cfr. dichotomus* - Arthaber, p. 254, pl. 22, fig. 8.
- 1915 *Dagnoeras komonius* - Diener, p. 115.
- 1915 *Meekoceras (Korinckites) basserti* - Diener, p. 198.
- 1915 *Pronorites triadicus* - Diener, p. 231.
- 1928 *Pronorites triadicus* - C. Renz, p. 155.
- 1934 *Albanites triadicus* - Späth, p. 273, fig. 95.
- 1934 *Dagnoeras komonius* - Späth, p. 269, p. 275.
- 1947 *Pronorites triadicus* - Renz and Renz, p. 61.
- 1948 *Pronorites reichenb. - Renz and Renz, p. 88, pl. 15, figs. 1-1c.
- 1948 *Pronorites triadicus* - Renz and Renz, p. 84, pl. 14, figs. 14-14b.
- 1968 *Albanites gracilis* - Shevcev, p. 119, pl. 6, fig. 7, pl. 7, fig. 1.
- 1969 *Albanites triadicus* - Kummel, p. 477, pl. 17, figs. 1, 2.
- 1982 *Albanites cfr. triadicus* - Asseroet al., p. 725.
- 1992 *Albanites cfr. triadicus* - Gaetani et al., p. 187, text fig. 4.
- 1992 *Albanites triadicus* - Gaetani et al., p. 192, pl. 15, fig. 3.

**Material.** 5 specimens: MB-C 5005, MB-C 5012, MB-C 5056, MB-C 5172, MB-C 5228.

**Description.** Specimen MB-C 5012 and MB-C 5056 are involute, the latter with an apparently flatter venter. The ventral and the umbilical shoulders are rounded. MB-C 5005 and MB-C 5228 are more evolute, MB-C 5228 with a rounded venter, and a deep umbilicus with subvertical wall. MB-C 5005 shows a sharper ventral shoulder and a flatter venter than the other. The ornamentation is not preserved. Suture lines are well preserved in specimen MB-C 5228. Saddles are rounded, the middle one is generally inclined towards the umbilicus. Lobes are incised at the bottom. The middle one is the deepest. Lobe bases climb up again towards the umbilicus.

**Dimensions.**

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<td>1.19</td>
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**Discussion.** Several species were differentiated originally, according to differences in ornamentation, the degree of compression, and small differences in suture lines. Arthaber (1911) showed an involute specimen with flat venter as *Albanites triadicus* and a more evolute one with a flat venter as *Albanites arbusus* with minor differences in the suture line, only. Renz and Renz (1948), however, depicted a more evolute specimen of *Albanites triadicus* with a flat venter. The *A. arbusus* specimens and allies are characterized by a higher whorl section in comparison with *A. osmani cus* and *A. triadicus*. Kummel (1969) assorted them all together into the gradational complex of *Albanites triadicus*. The morphological variability of our specimens is obvious. Germani (1997) separated *A. arbusus* on behalf of his subrectangular shape from *A. osmani cus* with a more subquadract shape.

**Occurrence.** The species is known from the *Subcolumbites* faunas of Afghanistan (Kummel, 1968a), Albania, and Chios (Renz & Renz 1947, 1948), and the *Prohungarites* fauna of Timor. The genus is also known from Guizhou province, China (Wang 1978). Balini et al. (2000) reviewed the ammonoids and conodonts of the Lower Triassic of Dolnaya section, Manysylyak, West Kazakhstan. *Albanites* occurs together with *Titolites*, *Procolubmites*, and rare *Columbites*. They characterize the *Procolubmites* beds. The Early Triassic age is also indicated by various species of *Neopathodius* (i.e. *N. homeri*) and *Neogondolella*. 

---

![Fig. 13 - Whorl section *Chiotites globalaris* Renz and Renz (MB-C 5022).](natural_size)
**Superfamily Sagecerataceae Hyatt, 1884**

**Family Sageceraeidae Hyatt, 1900**

**Genus Pseudosageceras Diener, 1895**

**Type species:** *Pseudosageceras multilobatum* Noetling, 1925

**Pseudosageceras albanicum** (Arthaber, 1908)

Pl. 2, figs. 2, 3; Figs. 16, 17

- 1908 Sageceras albanicum Arthaber, p. 281, pl. 13, figs. 1a-1c.
- 1911 Sageceras albanicum - Arthaber, p. 203, pl. 17, figs. 4, 5.
- 1915 Sageceras albanicum - Diener, p. 249.
- 1928 Sageceras albanicum - C. Renz, p. 155.
- 1934 Pseudosageceras albanicum - Spath, p. 56, fig. 6b.
- 1948 Sageceras albanicum - Renz and Renz, p. 94, pl. 16, figs. 5-5a, 10-11a.
- 1969 Pseudosageceras albanicum - Kummel, p. 363, pl. 21, figs. 5, 6.
- 1992 Pseudosageceras albanicum - Gaetani et al., p. 187, text fig. 4, p. 192.

**Material.** 6 specimens, MB-C 5060, MB-C 5070, MB-C 5130, MB-C 5138, MB-C 5144, MB-C 5149, MB-C 5151.

**Description.** The lanceolate conchs show a flat, angular venter and a small to closed umbilicus. Suture lines are characterized by several lobes and rounded saddles. The main lobe is threefold with a middle higher part. The connecting line of the lobe endings seems to be variable.

**Dimensions.**

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<td>MB-C 5130</td>
<td>2.86</td>
<td>1.71</td>
<td>0.91</td>
<td>0.5</td>
<td>0.38</td>
<td>0.24</td>
<td>3.42</td>
<td>0.08</td>
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</table>

**Discussion.** Species differ from *P. drinense* by a usually flat venter, from *P. pasquaii* and *P. multilobatum* by the relatively regular suture line.

**Occurrence.** *Subcolubrites* fauna of Albania and Chios.

**Pseudosageceras sp.**

Pl. 2, fig. 4; Fig. 18

**Material.** 7 specimens; MB-C 5085, MB-C 5124, MB-C 5135, MB-C 5148, MB-C 5170, MB-C 5189.

**Description.** The specimens are not well preserved. They are characterized by involute and lanceolate conchs. MB-C 5124 and MB-C 5135 show a closed umbilicus and an acute center. MB-C 5170 and MB-C 5189 has a closed umbilicus as well, but the venter is narrow and flat at its top. Incomplete suture lines show several adventitious and auxiliary lobes.

**Dimensions.**

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<td>0.23</td>
<td>0.19</td>
<td>2.66</td>
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**Discussion.** The preservation of the specimens does not allow a distinct species attribution. Out of the
five *Pseudosageceras* species, *P. drinense* is characterised by an acute venter, so that MB-C 5124 and MB-C 5135 might be comparable with it. The others show affinities to *P. albanicum*.

**Superfamily Dinaritaceae Mojsisovics, 1882**

**Family Dinaritidae Mojsisovics, 1882**

**Genus Dinarites Mojsisovics, 1882**

**Type species**: *Ceratites dalmatinus* Hauer, 1865

**Dinarites cf. liatsikasi** Renz and Renz, 1947

*Pl. 2, fig. 5; Fig. 19*

1947 *Dinarites liatsikasi* Renz and Renz, p. 60, p. 75.
1948 *Dinarites liatsikasi* - Renz and Renz, p. 49, pl. 1, fig. 3.
1969 *Dinarites liatsikasi* - Kummel, p. 510, text fig. 40.
1990 *Dinarites cf. liatsikasi* - Gaetani et al., p. 192.

**Material.** 1 specimen; MB-C 5178 (not measurable).

**Description.** The fragmentary specimen shows a rectangular whorl section with rounded ventral shoulders and a relatively flat top. Primary ribs, slightly prorsiradiate with a forward turn crossing the ventral shoulder, then crossing the venter. A suture line is not visible.

**Discussion.** Renz and Renz (1947, 1948) described *Dinarites liatsikasi* and figured a specimen quite similar to ours. It differs clearly from *Dinarites dalmatinus* (Hauer, 1865) by the ornamentation.

**Occurrence.** *Dinarites liatsikasi* occurs only in the *Subcolwmbites* fauna of Chios.

---

**Genus Dagnoceras Arthaber, 1911**

**Type species**: *Dagnoceras nopesanum* Arthaber, 1911

**Dagnoceras sp.**

*Fig. 20*

**Material.** 1 specimen; MB-C 5210 (not measurable).

**Description.** An involute specimen. Only one flank is preserved, the other one is worn. The grinded flank is flat, the ventral shoulders are angular, and the narrow venter itself seems to be arched. The suture line consists of a deep lateral lobe, which shows deep denticulations at its base. The ventral side of the lobe is still denticulate and ends in a narrow irregular first lateral saddle.

**Discussion.** The genus is characterized by the prominent denticulated first lateral lobe. The suture line resembles the one of *Dagnoceras ellipticum* Chao, 1959. But a narrow first lateral saddle is present as well. Kummel (1969) expressed his opinion that due to grinding the suture lines of *Dagnoceras* may appear simple. For that reason sutural differences between *Dagnoceras* and *Meta dagnoceras* may be not that important. Morphology of the conch is comparable.

**Occurrence.** In addition to Albania, *Dagnoceras* is known from Timor, China, and Pakistan (Kummel 1966, Guex 1978), and from Iran (Tozer 1972).

---

**Family Columbitidae Spath, 1934**

**Genus Columbites Spath, 1930**

**Type species**: *Columbites parisianus* Hyatt and Smith, 1905

**Columbites sp.**

*Pl. 2, fig. 6; Fig. 21*

**Material.** 2 specimens; MB-C 5223, MB-C 5222 (both not measurable).

**Description.** These two fragments show a subquadrate compressed whorl section. They are moderately evo-
lute. A keel is missing. The ventral shoulders are rounded, the umbilicus is deep, its shoulder rounded as well. Ribs turn forward crossing the ventral shoulder and the venter. Ornamentation is missing on MB-C 5225. Relics of a suture line are present. The outline of the lobe is almost without denticulation. The saddles are well rounded. The umbilical saddle is less high than the ventral one.

**Discussion.** The whorl section, the venter without keel, and the ribbing are comparable to both *Columbites* and *Subcolumbites* type ammonoids. The latter displaying a regular fine ribbing in the types of the *Subcolumbites* perrinismithi-group and rib bundling along with coarser ribs in the *Subcolumbites* dusmani-group. Both share an intense denticulation of the lobe bases. As rib bundling is not displayed, ornamentation is accentuated and lobe bases are almost not denticulated. An attribution to the *Columbites* suite is preferred herein.

**Occurrence.** The genus is known from Idaho, U.S. (Kummel 1969; Hyatt and Smith 1905), Mangyshlak, West Kazakhstan (Astakhova 1960a, b; Kiparisova 1961, Balini et al. 2000), and Primorye, Far East (Astakhova 1960a, b; Kiparisova 1961). Kummel (1969) questioned further descriptions from Sibibia. From the Chibia and Albania sites only *Subcolumbites* is recorded frequently (Arthaber 1911; Renz and Renz 1947, 1948; Germani 1997).

![Fig. 21 - Suture line (A) and whorl sections (B) of *Columbites* sp. (a MB-C 5203, b MB-C 5220).](image)

**Genus Hellenites Renz and Renz, 1947**

**Type species** *Tropicelites praematurus* Arthaber, 1911

**Hellenites praematurus** (Arthaber, 1911)

Pl. 2, figs. 7, 8, 10; Fig. 22

1911 *Tropicelites praematurus* Arthaber, p. 268, pl. 24, figs. 9a-b
1911 *Tropicelites praematurus* Arthaber, p. 269, pl. 24, figs. 10a-b
1915 *Tropicelites praematurus* - Diener, p. 330, nn.
1928 *Tropicelites praematurus* - C. Renz, p. 155, nn.
1947 *Hellenites praematurus* - Renz and Renz, p. 60, p. 75, nn.
1947 *Hellenites praematurus* var. aegeica - Renz and Renz, p. 60, nn.
1947 *Hellenites praematurus* var. gurzea - Renz and Renz, p. 60, nn.
1948 *Hellenites praematurus* - Renz and Renz, p. 44, pl. 2, figs. 3-3a, 7-7a
1948 *Hellenites praematurus* var. aegeica - Renz and Renz, p. 45, pl. 2, figs. 6-6b, 8-8b, 9-9a
1948 *Hellenites praematurus* - Renz and Renz, p. 46, pl. 2, figs. 1-1a, 2-2b, 4-4b

1948 *Hellenites trikhalinos* var. gurzea - Renz and Renz, p. 46, pl. 2, figs. 5-5b
1959 *Hellenites cf. praematurus* - Chao, p. 145, pl. 41, figs. 1, 2
1969 *Hellenites praematurus* - Kummel, p. 512, pl. 7, figs. 1-4, text fig. 43
1980 *Hellenites praematurus* - Assereto et al., p. 725, nn.
1992 *Hellenites praematurus* - Gaetani et al., p. 192, pl. 15, fig. 1, nn.


**Description.** The specimens are evolve with parallel flanks. The umbilical shoulder is rounded, but not accentuated. The ventral shoulder is rounded to arched. A central keel is associated with two furrows. The ribs are radiate till they reach the ventral shoulder. The ornamentation varies between extremely fine to coarse ribbing. The ribs curve forward significantly on the venter. The suture is composed of broad rounded saddles and relatively flat banded, denticulated lobes.

**Dimensions.**

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<td>MB-C 5179</td>
<td>2.61</td>
<td>0.84</td>
<td>0.6</td>
<td>1.07</td>
<td>1.44</td>
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<tr>
<td>MB-C 5195</td>
<td>2.03</td>
<td>0.65</td>
<td>0.57</td>
<td>0.64</td>
<td>0.59</td>
<td>0.81</td>
<td>1.01</td>
<td>0.39</td>
</tr>
<tr>
<td>MB-C 5224</td>
<td>2.39</td>
<td>0.75</td>
<td>0.61</td>
<td>1.03</td>
<td>0.43</td>
<td></td>
<td></td>
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</tbody>
</table>

**Discussion.** The distinguishing feature between *Hellenites praematurus* and *Hellenites radiatus* is the character of the ribbing: rursirradiate in the first and radial in the latter species. Sutures are basically the same.

**Occurrence.** *Hellenites praematurus* occurs in the *Subcolumbites* faunas of Albania and Chios (Kummel 1969) as well as in Kwangsi, China (Chao 1959).

![Fig. 22 - Whorl sections of *Hellenites* sp. (A MB-C 5162), *Hellenites praematurus* (Arthaber) (B MB-C 5179, C MB-C 5216, D MB-C 5192), and *Hellenites radiatus* Renz & Renz (E MB-C 5177).](image)

**Hellenites radiatus** Renz and Renz, 1947

Pl. 2, figs. 12, 13; Fig. 22

1947 *Hellenites* (Pallasites) radiatus Renz and Renz, p. 66, p. 75.
1947 *Hellenites (Pallasites) striatus* Renz and Renz, p. 60, p. 75.

1947 *Hellenites (Pallasites) striatus var. denticostata* Renz and Renz, p. 60, p. 75.

1948 *Hellenites (Pallasites) radiatus* - Renz and Renz, p. 47, pl. 2, figs. 12-12b, 13-13b.

1948 *Hellenites (Pallasites) striatus* - Renz and Renz, p. 47, pl. 2, figs. 11-11a.

1948 *Hellenites (Pallasites) striatus var. denticostata* - Renz and Renz, p. 48, pl. 2, figs. 10-10b.

1959 *Hellenites cf. praenatura* - Chao, p. 145, pl. 41, figs. 3, 4.

1969 *Hellenites radiatus* - Kummel, p. 514, text fig. 43.

1992 *Hellenites radiatus* - Gaetani et al., p. 192, pl. 15, fig. 6.

**Material.** 3 specimens; MB-C 5177, MB-C 5213, MB-CS229.

**Description.** Evolute specimens with wide umbilici and rounded umbilical shoulders. Flanks are parallel. The venter is arched. A keel with two associated shallow furrows is typical. Regularly spaced ribs are radial on the flanks and turn forward on the venter.

**Dimensions.**

<table>
<thead>
<tr>
<th>No.</th>
<th>D</th>
<th>H</th>
<th>h</th>
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<tr>
<td>MB-C 5177</td>
<td>1.99</td>
<td>0.69</td>
<td>0.56</td>
<td>0.69</td>
<td>0.74</td>
<td>1</td>
<td>0.37</td>
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</table>

**Discussion.** The typical radial ribbing, here preserved, is the distinguishing feature from *Hellenites praenatura*.

**Occurrence.** *Hellenites radiatus* is known from the Tobin Formation of Nevada, from Kwangsi, China, and from the *Subcolumbites* fauna of Chios.

---

**Hellenites sp.**

Pl. 2, fig. 11; Fig. 22


**Description.** Fragmentary specimens, all evolute, with a keeled venter and ribbing.

**Dimensions.**

<table>
<thead>
<tr>
<th>No.</th>
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<th>W</th>
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<td>0.57</td>
<td>0.4</td>
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<td>MB-C 5199</td>
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<tr>
<td>MB-C 5218</td>
<td>3.36</td>
<td>1.1</td>
<td>0.82</td>
<td>2.26</td>
<td>0.67</td>
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<td></td>
</tr>
</tbody>
</table>

---

**Genus Epiceltites Arthaber, 1911**

**Type species:** *Epiceltites gentii* Arthaber, 1911

**Epiceltites gentii** Arthaber, 1911

Pl. 2, fig. 14; Fig. 23

---

1911 *Epiceltites gentii* Arthaber, p. 268, pl. 24, fig. 8.

1915 *Epiceltites gentii* - Diener, p. 131.

1928 *Epiceltites gentii* - C. Renz, p. 155.

1934 *Epiceltites gentii* - Spath, p. 210, pl. 13, figs. 5a-d.


1948 *Epiceltites gentii* - Renz and Renz, p. 43, pl. 1, figs. 9a-d.

1969 *Epiceltites gentii* - Kummel, p. 447, pl. 3, figs. 10, 11, pl. 35, figs. 6, 7, text fig. 26.

1992 *Epiceltites gentii* - Gaetani et al., p. 192, pl. 15, fig. 4.

**Material.** 2 specimens, MB-C 5211, MB-C 5222.

**Description.** The conch is evolute and shows an arched venter. Marked ribs are widely spaced, prorsiradiate and falcoid, crossing the venter. A suture is missing.

**Dimensions.**

<table>
<thead>
<tr>
<th>No.</th>
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<th>h</th>
<th>W</th>
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<th>U</th>
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<th>U/D</th>
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<tr>
<td>MB-C 5222</td>
<td>3.5</td>
<td>1.35</td>
<td>1.03</td>
<td>1.01</td>
<td>0.95</td>
<td>1.12</td>
<td>1.33</td>
<td>0.32</td>
</tr>
</tbody>
</table>

**Discussion.** The specimen closely resembles the ones described by Renz and Renz (1948) and Renz (1928) with widely spaced ribs.

**Occurrence.** *Epiceltites gentii* is known from the Olenekian strata of Chios, Albania, and also from Idaho (Kummel 1969).

---

**Fig. 23** - Whorl section of *Epiceltites gentii* Arthaber (MB-C 5222).

---

**Superfamily Megaphyllitaceae Mojsisivics, 1896**

**Family Procarnitidae Chao, 1959**

**Genus Procarnites Arthaber, 1911**

**Type species:** *Parapopanoacerites kokeni* Arthaber, 1908

**Procarnites kokeni** (Arthaber, 1908)

Pl. 3, figs. 1, 2, 3, 4, 5; Figs. 24, 25

1908 *Parapopanoacerites kokeni* Arthaber, p. 259, pl. 11, figs. 1a-c, 2a-b.

1911 *Procarnites kokeni* - Arthaber, p. 213, pl. 17, figs. 16, 17, pl. 18, figs. 1-5.

1915 *Procarnites kokeni* - Diener, p. 228.

1917 *Procarnites kokeni* - Diener, p. 167, pl. 1, figs. 4, 5.

1928 *Procarnites kokeni* - C. Renz, p. 155.

1934 *Procarnites kokeni* - Spath, p. 181, pl. 3, fig. 1.

1947 *Procarnites kokeni* - Renz and Renz, p. 61.

1947 *Procarnites kokeni* var. evoluta - Renz and Renz, p. 61.

1947 *Procarnites kokeni* var. paralekotomosis - Renz and Renz, p. 61, p. 78.

1948 *Procarnites kokeni* - Renz and Renz, p. 81, pl. 8, figs. 5, 6-6a, 7-7a, 8-8a, 9-9a, pl. 9, figs. 2-2a.

Description. Involute forms, compressed with elliptical whorl section. The degree of compression and shape of the venter vary with the dimensions of the specimen. Smaller ones are usually less compressed with a rounded venter, than larger ones, which are more compressed with a narrowly rounded to acute venter. The flanks are always convex. The umbilicus is small with a subvertical wall. The suture line consists of several lobes and saddles, with an irregular denticulation reaching high up onto the flanks.

Dimensions.

<table>
<thead>
<tr>
<th>No.</th>
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<th>h</th>
<th>W</th>
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<th>U</th>
<th>H/W</th>
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<tr>
<td>MB-C 5029</td>
<td>4.38</td>
<td>2.25</td>
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<td>0.31</td>
<td>0.7</td>
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<tr>
<td>MB-C 5046</td>
<td>1.84</td>
<td>0.96</td>
<td>0.59</td>
<td>0.58</td>
<td>0.43</td>
<td>0.42</td>
<td>1.65</td>
<td>0.15</td>
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<tr>
<td>MB-C 5047</td>
<td>2.39</td>
<td>1.12</td>
<td>1.07</td>
<td>0.59</td>
<td>0.44</td>
<td>0.2</td>
<td>1.88</td>
<td>0.08</td>
</tr>
<tr>
<td>MB-C 5062</td>
<td>1.77</td>
<td>0.93</td>
<td>0.65</td>
<td>0.61</td>
<td>0.47</td>
<td>0.32</td>
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<tr>
<td>MB-C 5069</td>
<td>1.61</td>
<td>0.85</td>
<td>0.41</td>
<td>0.76</td>
<td>2.07</td>
<td>0.47</td>
<td></td>
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<tr>
<td>MB-C 5072</td>
<td>3.36</td>
<td>1.79</td>
<td>1.22</td>
<td>0.95</td>
<td>0.62</td>
<td>0.35</td>
<td>1.88</td>
<td>0.10</td>
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<tr>
<td>MB-C 5074</td>
<td>1.72</td>
<td>0.85</td>
<td>0.67</td>
<td>0.59</td>
<td>0.4</td>
<td>0.2</td>
<td>1.44</td>
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<tr>
<td>MB-C 5075</td>
<td>2.17</td>
<td>1.04</td>
<td>0.91</td>
<td>0.22</td>
<td>0.10</td>
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<td>MB-C 5076</td>
<td>3.33</td>
<td>1.88</td>
<td>1.32</td>
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<td>MB-C 5079</td>
<td>1.48</td>
<td>0.58</td>
<td>0.35</td>
<td>0.9</td>
<td>0.60</td>
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<tr>
<td>MB-C 5081</td>
<td>1.54</td>
<td>0.81</td>
<td>0.55</td>
<td>0.6</td>
<td>0.36</td>
<td>0.18</td>
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<td>0.11</td>
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<td>MB-C 5087</td>
<td>2.19</td>
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<td>0.78</td>
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<td>0.13</td>
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<tr>
<td>MB-C 5088</td>
<td>1.85</td>
<td>1.02</td>
<td>0.65</td>
<td>0.64</td>
<td>0.43</td>
<td>0.18</td>
<td>1.59</td>
<td>0.09</td>
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<tr>
<td>MB-C 5117</td>
<td>2.04</td>
<td>1.15</td>
<td>0.72</td>
<td>0.69</td>
<td>0.51</td>
<td>0.17</td>
<td>1.66</td>
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<td>1.7</td>
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<td>0.07</td>
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<tr>
<td>MB-C 5127</td>
<td>5.22</td>
<td>2.75</td>
<td>1.11</td>
<td>1.73</td>
<td>1.15</td>
<td>1.36</td>
<td>1.58</td>
<td>0.26</td>
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</table>

Discussion. The specimens show minor morphological differences, only. They differ from *Procarnites acutus* Spath, 1930, in missing a sharp, narrow venter. *Procarnites skanderbegii* Arthaber, 1911, is described to be more compressed and inflated. However Germani (1997) took into consideration that it might be conspecific to *Procarnites kokeni*. Kummel (1969) included both into the species *Procarnites kokeni*. Occurrence. *Procarnites kokeni* is a common element of the Subcolumbites-Prohlangarites zone (Kummel 1973a, b) of Albania and Chios (Renz & Renz 1947, 1948; Assereto et al. 1980; Gaetani et al. 1992; Germani 1997). It is also known from the Subcolumbites faunas of Afghanistan (Kummel 1968a), from southern URSS (Shevyrev 1968), from Oman (Tózer & Calon 1990), from the Prohlangarites fauna of Timor (Kummel 1968b) and from the Procarnites-Leiophyllites zone of China (Wang 1978). Balini et al. (2000) reported it from the Dolnaya section of Mangyshlak, West Kazakhstan.
Procarnites cf. kokeni (Arthaber, 1908)

Material. 2 specimens; MB-C 5017, MB-C 5057.

Description. MB-C 5017 is a juvenile small specimen. The other one shows the typical morphology of the species. The suture is not well preserved, due to grinding.

Dimensions.

<table>
<thead>
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<tr>
<td>MB-C</td>
<td>1.51</td>
<td>0.86</td>
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<td>0.41</td>
<td>0.08</td>
<td>1.56</td>
<td>0.05</td>
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<tr>
<td>MB-C</td>
<td>2.72</td>
<td>1.26</td>
<td>0.91</td>
<td>0.57</td>
<td>0.55</td>
<td>2.21</td>
<td>0.20</td>
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</tbody>
</table>

Procarnites sp.

Fig. 26


Description. Specimens attributed to Procarnites sp. are preserved only fragmentary or deformed. It is still obvious that conchs are involute with convex flanks, and rounded to acute venters. Suture lines are partly preserved and exhibit the typical denticulated multi-element shape of the genus. MB-C 5104 show denticulation higher up onto the flanks than the others.

Dimensions.

<table>
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<tr>
<td>MB-C</td>
<td>1.91</td>
<td>1</td>
<td>0.7</td>
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<td></td>
<td>0.21</td>
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<td>MB-C</td>
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<td>1.22</td>
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<td>5.73</td>
<td>4.62</td>
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<td>5.5</td>
<td>3.4</td>
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</table>

Fig. 26 - Suture line of Procarnites sp. (MB-C 5169).

Eogymnites cf. arthaberi (Diener, 1915)

Pl. 3, fig. 6, 7; Fig. 27

1911 Japonites sugiuon Diener var. Arthaber, p. 231, pl. 25, fig. 4.
1915 Japonites arthaberi - Diener, p. 158.
1969 Eogymnites arthaberi-Kummel, p. 517, pl. 21, figs. 1, 2, text fig. 45.

Material. 2 specimens; MB-C 5146, MB-C 5156.

Description. The specimen are evolute. The ventral and umbilical shoulders are rounded. The umbilical wall is deep and subvertical. The flanks are convex with the greatest width at the umbilical shoulder. The suture lines of the outer whorls are not preserved. On the inner part they exhibit denticulated lobes and saddles, but the suture lines are not complete.

Dimensions.

<table>
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<td>MB-C</td>
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<td>0.89</td>
<td>0.68</td>
<td>1.2</td>
<td>0.43</td>
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</tbody>
</table>

Discussion. The complicated suture line with denticulated lobes and saddles is characteristic, and favors an attribution to Eogymnites arthaberi.


Fig. 27 - Suture lines of Eogymnites arthaberi (Diener) (A MB-C 5155, B MB-C 5156).

Order Phylloceratida

Superfamily Phyllocerataceae Zittel, 1884
Family Ussuritidae Hyatt, 1900
Genus Eophyllites Spath, 1930

Type species: Monophyllites dieneri Arthaber, 1908

Eophyllites dieneri (Arthaber, 1908)

(Pl. 3, figs. 8, 9)

Superfamily Pinacocerataceae Mojsisovics, 1879
Family Japonitidae Tozer, 1971
Genus Eophyllites Spath

Type species: Japonites arthaberi Diener, 1915
Eophyllites sp.

Fig. 28

Material. 1 specimen; MB-C 5198 (not measurable).

Description. A fragmentary specimen, evolute, with a broadly arched venter, and rounded ventral shoulders. The umbilicus is wide. The suture line consists of shallow wide denticulated lobes, divided by rounded saddles.
1983 *Palaeophyllites cf. steinmanni* – Assereto et al., p. 725.
1980 *Palaeophyllites cf. steinmanni* – Gaetani et al., p. 187 (text fig. 4).
1997 *Palaeophyllites steinmanni* – Germani, p. 283, pl. 2, figs. 2a-b, 9b.

**Material.** 1 specimen; MB-C 5038.

**Description.** The conch is compressed and evolute. The whorl section is rectangular with rounded ventral shoulders and parallel flanks. The venter is relatively wide and rounded. Umbilicus is deep with nearly vertical walls. Ornamentation consists of badly preserved, closely spaced, concave ribs. A suture line is not preserved.

### Dimensions

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<th>U/D</th>
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</thead>
<tbody>
<tr>
<td>MB-C</td>
<td>1.61</td>
<td>0.68</td>
<td>0.4</td>
<td>0.44</td>
<td>0.34</td>
<td>0.53</td>
<td>1.54</td>
<td>0.32</td>
</tr>
</tbody>
</table>

**Discussion.** The species attribution is tentative due to the rather small conch.

**Occurrence.** *Palaeophyllites steinmanni* is known from the *Subcolombites* faunas of Albania and Chios, and from the *Probroinagrites* zone of Timor (Kummel 1968b, Kummel 1969).

**Genus Leiophyllites** Diener, 1915

**Type species:** *Monophyllites moesi* Mojsisovics, 1882

**Leiophyllites variabilis** (Spath, 1934)

Pl. 4, figs. 1, 2, 3, 4, 5, 6, 8, 9, 15, 11, 12, 14, 15, 16; Figs. 30, 31, 32.

1911 *Monophyllites pitaama* – Arthaber (non Diener), p. 234, pl. 20, figs. 9-11.
1934 *Eopliyllites variabilis* Spath, p. 296, pl. 2, fig. 3, pl. 6, fig. 1, pl. 7, fig. 1.
1934 *Eopliyllites variabilis* var. *evoleta* Spath, p. 296.
1934 *Eopliyllites variabilis* var. *involuta* Spath, p. 296, pl. 4, fig. 1.
1947 *Monophyllites (Leiophyllites) gorgori* – Renz and Renz, p. 61, pl. 77.
1947 *Monophyllites (Leiophyllites) palaeotriaticus* – Renz and Renz, p. 61, pl. 78.
1947 *Monophyllites (Leiophyllites) praeconfusi* – Renz and Renz, p. 61, pl. 77.
1948 *Monophyllites (Leiophyllites) georgolai* – Renz and Renz, p. 74, pl. 4, figs. 3-35.
1948 *Monophyllites (Leiophyllites) palaeotriaticus* – Renz and Renz, p. 75, pl. 4, figs. 4-42.
1948 *Monophyllites (Leiophyllites) aff. pitaama* – Renz and Renz, p. 76, pl. 3, figs. 9-9a, pl. 4, figs. 7-7b.
1948 *Monophyllites (Leiophyllites) praeconfusi* – Renz and Renz, p. 73, pl. 4, figs. 1-1b, 2-2a.

1958 *Leiophyllites praeconfusi* – Kiparisova, pl. 7, fig. 13, text fig. 17.
1961 *Leiophyllites praecornatus* – Kiparisova, p. 134, pl. 28, figs. 5, 6.
1969 *Leiophyllites variabilis* – Kummel, p. 531, pl. 22, figs. 5-10, text figs. 49, 50.
1980 *Leiophyllites variabilis* – Assereto et al., p. 724, p. 725.
1992 *Leiophyllites variabilis* – Gaetani et al., p. 187, text fig. 4.


**Description.** A great number of specimens is attributed to *Leiophyllites variabilis*. They all have very evolute, serpentine conchs without ornamentation. Whorl section shows a relatively high rectangular shape with rounded shoulders and a rounded venter. The flanks are parallel. The umbilical shoulder is rounded. Up to one half of the previous turn is covered. Some show compressed whorl sections, its width higher than height. The suture lines consist of three major lobes deeply serrated. Denticulation reaches high up on to the flanks. Outline of the saddles is rounded. Fig. 32 shows the wide range of dimensions between specimens.

### Dimensions

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Fig. 29 - Whorl section of *Palaeophyllites cf. steinmanni* (MB-C 5038).

Fig. 30 - Whorl sections of *Leiophyllites variabilis* (Spath) (A MB-C 5067, B MB-C 5035, C MB-C 5061, D MB-C 5077, E MB-C 5094, F MB-C 5080).
Discussion. Renz & Renz (1948) distinguished four species: Leiophyllites pitamaha, Leiophyllites praecuncti, Leiophyllites palaeotrichicus, Leiophyllites georgalasii. Differences are expressed in whorl dimensions and ornamentation. E.g., Leiophyllites georgalasii is more compressed than Leiophyllites praecuncti. Leiophyllites pitamaha shows a fine striation, and Leiophyllites palaeotrichicus may have a sinuous striation on its external parts. Kummel (1969) regarded these differences as intraspecific variations and established Leiophyllites variabilis, which includes the mentioned forms as well as Leiophyllites praematurus, originally described by Kiparisova et al. (1958). He stated that even the suture lines have the same general pattern with minor differences only. Assereto et al. (1980) and Gaetani et al. (1992) mentioned Leiophyllites variabilis in the sense of Kummel.

Occurrence. Leiophyllites variabilis is described from Albania (Kummel 1969; Germani 1997), Chios (Renz & Renz 1948; Gaetani et al. 1992) and Primorye region (Kiparisova 1961).

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</table>
Leiophyllites sp.  
Pl. 4, fig. 7; Fig. 33


Description. Leiophyllites is characterized by generally very evolute, serpenticone conchs. The venter is rounded, the ventral shoulders and the umbilical shoulders are rounded as well. The umbilical wall is low.

![Fig. 33 - Suture lines of Leiophyllites sp. (A MB-C 5168, B MB-C 5175).](image)

### Dimensions.

<table>
<thead>
<tr>
<th>No.</th>
<th>D</th>
<th>H</th>
<th>h</th>
<th>W</th>
<th>w</th>
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</table>

![Fig. 34 - Suture line (A) and whorl section (B) of Dieneroceras sp. (MB-C 5207; partly restored – dashed line).](image)

?Dieneroceras sp.  
Pl. 3, fig. 13; Fig. 34

Material. 1 specimen; MB-C 5207 (not measurable).

Description. Preservation of the specimen is not fine. The conch is moderately evolute. The venter is

![Fig. 31 - Suture lines of Leiophyllites variabilis (Spath) (A MB-C 5066, B MB-C 5071, C MB-C 5126, D MB-C 5152).](image)
Fig. 32 - Graphs showing the variations in conch dimensions of *Leiophyllites variabilis* (Spath). Subdivision into previously described species of *Leiophyllites* seems to be impossible. Abbreviations compare to page xx.
rounded, the visible flank is convex. The umbilical shoulder seems to be rounded. Growth lines and ornamentation are not visible. The suture line is composed of two lateral lobes and a serrated lobe on the umbilical shoulder.

Discussion. The attribution is enigmatic. The specimen resembles the original figures of Renz & Renz (1948) of Celtites keirensis (Arthaber, 1908). This was included in Dieneroceras mediterranea (Arthaber) by Kummel (1969). Later Dagys & Ermakova (1988) established Boreoceras. Its synonymy includes Dieneroceras of Kummel (1969). However Dagys & Weitschat (1993) and Dagys (1997) mentioned that, together with Nordophiceras and Bajarinuc, also Boreoceras seems to be a restricted element of the boreal or eastern boreal basin.

Occurrence. Specimens of Dieneroceras were described from Albania and Chios (Renz & Renz 1948). Boreoceras is known from the Spathian of Siberia and the Colombites beds of the western U.S.A. (Dagys & Weitschat 1993).

**?Metahedenstroemia** sp.

(Plate 3, fig. 12; Fig. 35)

Material: 1 specimen; MB-C 5221.

Description. The small specimen is highly involute. The venter is flat, the shoulders are angular. The suture line is composed of several lobes and saddles. Basis of the lobes are slightly undulated. Height of the suture line is diminishing towards the umbilicus. However, due to grinding, the suture line is conspicuous.

Dimensions.

<table>
<thead>
<tr>
<th>No.</th>
<th>D</th>
<th>H</th>
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<td>0.4</td>
<td>0.1</td>
<td>1.87</td>
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Discussion. The specimen is tentatively assigned to *Metahedenstroemia* sp. due to its characteristic flat venter and angular shoulders. The suture line differs from examples figured by Renz & Renz (1948) in having less serrated lobes. Based on the appearance of the suture line alone, a comparison with *Beatites berthae* seems to be possible, the latter depicted by Kummel (1969). But its conch exhibits an arched venter.

Occurrence. The genus is known only from the *Subcolumbites* faunas of Albania and Chios (Kummel 1969).

![Fig. 35 - Suture line (A) and whorl section (B) of ?Metahedenstroemia sp. (MB-C 5221).](image)

Acknowledgements. The authors feel very indebted to the members of the joint research groups of the University of Milano and of the Freie Universität Berlin, who thoroughly sampled the limestones and collected the ammonoids during their field campaigns of 1975 and 1989. Thanks are due to the Institute of Geology and Mining Exploration (IGME), Athens, and especially to professor Ilias Mariolakos, former chairman of its board, who had effected the permissions for field work on Chios from the Greek government. Our work benefited essentially from discussions with professors M. Gaetani and A. Nicora, University of Milano. Thanks, furthermore to our reviewers, Dr. A.A. Shevyrev and Dr. M. Balini, who helped improving the manuscript.
phyllites Praematurus variabilis kokeni
Fig. MB-C /ls
Hellenites dosageceras Fig.1 5221,1.5:1. - Palaeophyllites cf. Renz, 1934), 5109,1.5:1. - Procarnites leokeni 1.5:1. - Paranannites sp., MB-C 6 - Chiotites globularis Renz and Renz, 1947, MB-C 5022, 2:1. - Chiotites globularis Renz and Renz, 1947, MB-C 5229, 1:1. - Leiophyllites radiatus Renz and Renz, 1947, MB-C 5229, 1:1. - Epiceltites gentii Renz and Renz, 1947, MB-C 5222, 1:1

Plate 1
Fig. 1 - Chioceras nitzschoi Renz and Renz, 1947, MB-C 5230, 1.5:1. Fig. 2 - Paranannites sp., MB-C 5098, 2:1. Fig. 3 - Sulciceras sp., MB-C 5109,1:1. Fig. 4 - Paranannites sp., MB-C 5007/5008, 1:1. Fig. 5 - Iscitoitoides originis (Arthaber, 1911), MB-C 5225, 1:1. Fig. 6 - Chiotites globularis Renz and Renz, 1947, MB-C 5222, 2:1. Fig. 7 - Iscitoitoides originis (Arthaber, 1911), MB-C 5021, 2:1. Fig. 8 - Chiotites globularis Renz and Renz, 1947, MB-C 5225, 2:1. Fig. 9 - Chiotites globularis Renz and Renz, 1947, MB-C 5028, 2:1. Fig. 10 - Iscitoitoides originis (Arthaber, 1911), MB-C 5031, 1.5:1. Fig. 11 - Albianites triadicus (Arthaber, 1908), MB-C 5055, 1:1. Fig. 12 - Albianites triadicus (Arthaber, 1928), MB-C 5228, 1:1

Plate 2
Fig. 1 - Albianites triadicus (Arthaber, 1926), MB-C 5096, 1:1. Fig. 2 - Pseudosageceras albanicum (Arthaber, 1934), MB-C 5062, 1:1. Fig. 3 - Pseudosageceras albanicum (Arthaber, 1908), MB-C 5130, 1:1. Fig. 4 - Pseudosageceras sp., MB-C 5135, 1:1. Fig. 5 - Dimarites cf. lastikiani Renz and Renz, 1947, MB-C 5178, 1:1. Fig. 6 - Colomodies sp., MB-C 5203, 1:1. Fig. 7 - Hellenites praematurus (Arthaber, 1911), MB-C 5215, 1:1. Fig. 8 - Hellenites praematurus (Arthaber, 1911), MB-C 5195, 1:1. Fig. 9 - Hellenites praematurus (Arthaber, 1911), MB-C 5195, 1:1. Fig. 10 - Hellenites praematurus (Arthaber, 1911), MB-C 5212, 1:1. Fig. 11 - Hellenites sp., MB-C 5216, 1:1. Fig. 12 - Hellenites radiatus Renz and Renz, 1947, MB-C 5177, 1.5:1. Fig. 13 - Hellenites radiatus Renz and Renz, 1947, MB-C 5229, 1:1. Fig. 14 - Epiceltites gentii Renz and Renz, 1947, MB-C 5222, 1:1

Plate 3
Fig. 1 - Procarnites kokeni (Arthaber, 1908), MB-C 5047, 1.5:1. Fig. 2 - Procarnites kokeni (Arthaber, 1908), MB-C 5068, 1.5:1. Fig. 3 - Procarnites kokeni (Arthaber, 1908), MB-C 5117, 1.5:1. Fig. 4 - Procarnites kokeni (Arthaber, 1908), MB-C 5072, 1:1. Fig. 5 - Procarnites kokeni (Arthaber, 1908), MB-C 5076, 1:1. Fig. 6 - Eogymnites cf. arthaberi (Diener, 1915), MB-C 5155, 1:1. Fig. 7 - Eogymnites cf. arthaberi (Diener, 1915), MB-C 5216, 1:1. Fig. 8 - Eophyllites dieneri (Arthaber, 1908); MB-C 5111, 1:1. Fig. 9 - Eophyllites dieneri (Arthaber, 1908); MB-C 5145, 2:1. Fig. 10 - Palaeophyllites cf. steinmannii Welser, 1922, MB-C 5008, 2:1. Fig. 14 - Eophyllites sp., MB-C 5175, 1:1. Fig. 12 - Metabedestoennia sp., MB-C 5221, 1.5:1. Fig. 13 - Eophyllites sp., MB-C 5207, 1.5:1. Fig. 14 - Procarnites kokeni (Arthaber, 1908), MB-C 5165, 1:1

Plate 4
Fig. 1 - Leioophyllites variabilis (Spath, 1934), MB-C 5077, 1:1. Fig. 2 - Leioophyllites variabilis (Spath, 1934), MB-C 5077, 1:1. Fig. 3 - Leioophyllites variabilis (Spath, 1934), MB-C 5077, 1:1. Fig. 4 - Leioophyllites variabilis (Spath, 1934), MB-C 5077, 1:1. Fig. 5 - Leioophyllites variabilis (Spath, 1934), MB-C 5077, 1:1. Fig. 6 - Leioophyllites variabilis (Spath, 1934), MB-C 5077, 1:1. Fig. 7 - Leioophyllites sp., MB-C 5146, 1.5:1. Fig. 8 - Leioophyllites variabilis (Spath, 1934), MB-C 5136, 1.5:1. Fig. 9 - Leioophyllites variabilis (Spath, 1934), MB-C 5131, 1.5:1. Fig. 11 - Leioophyllites variabilis (Spath, 1934), MB-C 5011, 1:1. Fig. 12 - Leioophyllites variabilis (Spath, 1934), MB-C 5311, 1.5:1. Fig. 13 - Leioophyllites variabilis (Spath, 1934), MB-C 5304, 1.5:1. Fig. 14 - Leioophyllites variabilis (Spath, 1934), MB-C 5407, 1:1. Fig. 15 - Leioophyllites variabilis (Spath, 1934), MB-C 5092, 1.5:1. Fig. 16 - Leioophyllites variabilis (Spath, 1934), MB-C 5141, 1.5:1
Lower Triassic ammonoids from Chios

1-14: Various ammonoid fossils shown in different views.
## Appendix 1

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**Appendix 2**

Ammonoids quoted in Assereto et al. (1980, signed *), and/or Gaetani et al. (1992)

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<td><em>Isculitoides origenis</em></td>
<td><em>Metraceras plejaniae</em></td>
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<td><em>Chioceras mitzopouli</em></td>
<td><em>Procarnites kokeni</em></td>
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<tr>
<td><em>Chiottites globularis</em></td>
<td><em>Procarnites sp.</em></td>
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<tr>
<td><em>Paranannitis asparagensis</em></td>
<td><em>Eophyllites dieneri</em></td>
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<tr>
<td><em>Albanites cf. triadicus</em></td>
<td><em>Pseudorhapanites sp.</em></td>
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<tr>
<td><em>Hellenites sp.</em></td>
<td><em>Leiophyllites variabilis</em></td>
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<td><em>Pseudorhapanites cf. steinmanni</em></td>
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<td><em>Leiophyllites variabilis</em></td>
<td><em>Eophyllites arthaberi</em></td>
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<td><em>Hellenites praematurus</em></td>
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<td><em>Tunglanites alexi</em></td>
<td><em>Procarnites sp.</em></td>
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<td><em>Eophyllites sp.</em></td>
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<td><em>Prospingites sp.</em></td>
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<td><em>Columbites sp.</em></td>
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<td><em>Metadagnoceras terbunicum</em></td>
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<td><em>Nordophiceras sp.</em></td>
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<td><em>Leiophyllites cf. variabilis</em></td>
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**REFERENCES**


Diner C. (1915) - Cephalopoda triadica. Fossilium Catalogus, 1, Animalia, pt. 8 B., 369 pp., Berlin.


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447


