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THE LADINIAN AMMONOIDS FROM THE CALCARE DI ESINO OF VAL PARINA (BERGAMASC ALPS, NORTHERN ITALY). PT. 2

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Key-words: Taxonomy, Biochronology, Anisian/Ladinian, Carbonate platform, Southern Alps, Italy.

Riassunto. In questa Pt. 2 vengono illustrati gli Ammonoidea provenienti da lenti di Calcare di Esino del Medio Triassico, affioranti sempre sul versante settentrionale della Val Parina, ma più ad est rispetto a quelle esaminate nella Pt. 1. Inoltre figurano anche alcune specie provenienti dal versante meridionale. Le specie provenienti dal lato nord della valle documentano la presenza della Zona a Nevadites. E' possibile distinguere in successione due associazioni: una a *Parakellnerites costatus* e una a *Parakellnerites waageni*. E' stato identificato il nuovo genere *Esinoceras* della fam. Ceratitidae con specie-tipo *E. tozeri* sp.n. Le faune del versante meridionale, confrontabili con quelle già descritte nella Pt. 1, possono essere attribuite alla Zona a Gredleri. Per la Val Parina rimane così documentata la presenza in successione di quattre zone standard ad ammoniti: Nevadites, Curionii, Gredleri, Archelaus.

Abstract. This Part 2 completes the description of the ammonoids collected from lenses of Middle Triassic Calcare di Esino cropping out in Val Parina eastward of those described in Pt. 1, and few additional species collected from the southern slope of the same valley. The species identified from the northern slope of the valley prove the presence of the Nevadites Zone. It is possible to recognize two associations in stratigraphic succession, the lower one characterized by *Parakellnerites costatus*, and a second one by *Parakellnerites waageni*. A new genus is also described, *Esinoceras* (fam. Ceratitidae) with type species *E. tozeri* sp. n. The faunas from the southern slope are comparable with those described in Pt. 1, and can be ascribed to the Gredleri Zone. Consequently, four standard ammonoid zones are documented in Val Parina (from old to young): Nevadites, Curionii, Gredleri and Archelaus Zones.

Foreword.

This Part 2 completes the description of the Ladinian ammonoids collected from the fossiliferous lenses of the Calcare di Esino from Val Parina (Bergamo province, Northern Italy) (Fig. 1). The present paper deals with the ammonoids collected from the lenses cropping out eastward of the lenses described in Part 1 of this monograph (Fantini Sestini, 1994), along with the few specimens collected from the southern slope of Val Parina. This material was also collected and prepared by Mr.

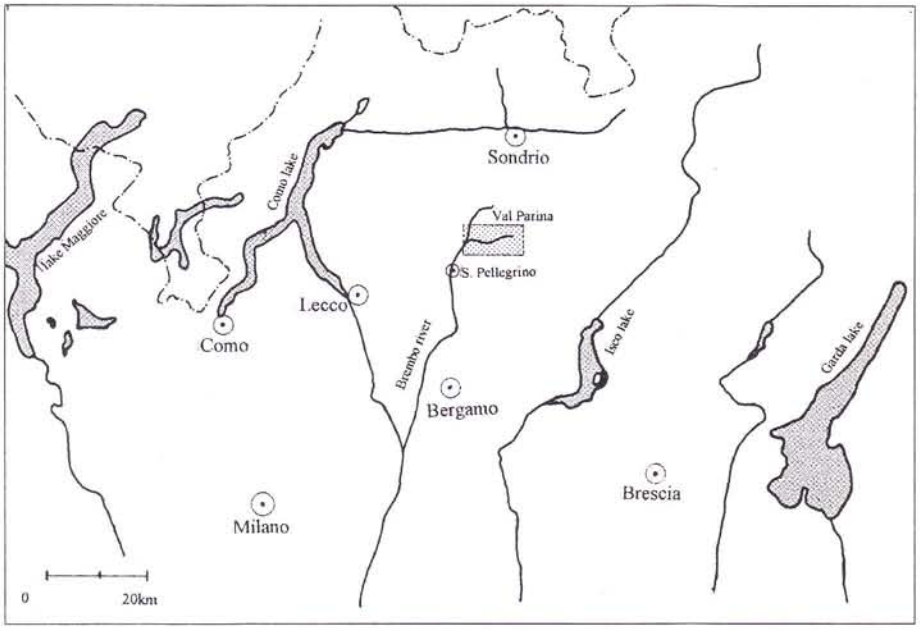

Fig. 1 - Location map of Val Parina with the studied area.

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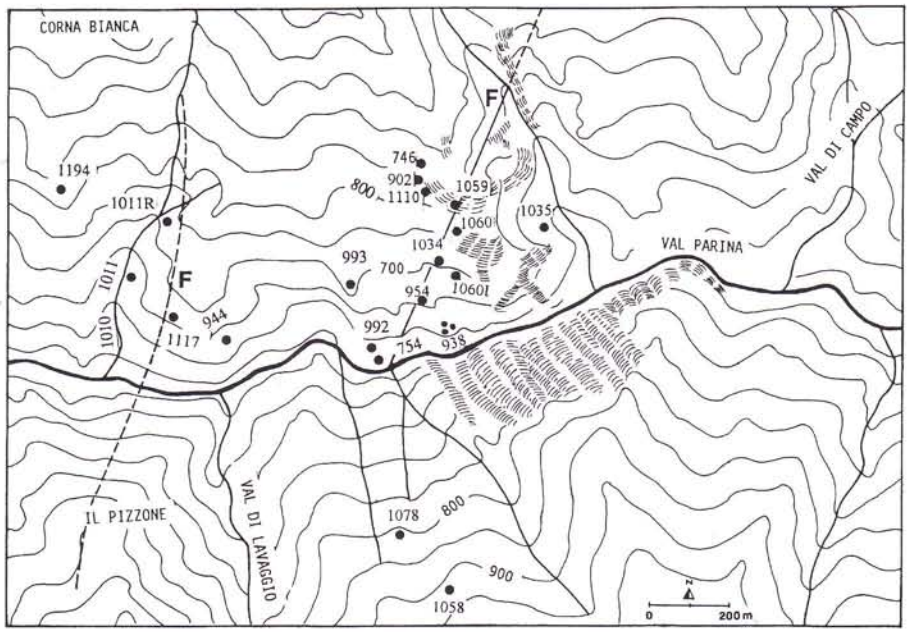


Fig. 2 - Geographic setting of the studied fossiliferous outcrops on the southern and northern slope of the Val Parina. Localities described in this paper (Part 2): S954, S1060I, S1034, S1060 (L, A, E, B, C, D, F, G and 1060), S1035. The other numbers refer to Part 1 (Fantini Sestini, 1994). F: fault or presumed fault.

M. Gervasutti. All the specimens are stored in the Museo Civico di Scienze Naturali "E. Caffi" of Bergamo (MCSNB) (Paganoni, 1985).

Fossiliferous localities.

The complex internal stratigraphy and structure of the Esino carbonate platform have been already described by Jadoul et al. (1992). All the specimens were collected from lenticular fossil accumulations cropping out between 650-840 m a.s.l., on the northern slope of the valley and at about 810 and 920 m altitude on the southern slope (Fig. 2). The fossiliferous lenses listed below were numbered by M. Gervasutti during the field work, without following the stratigraphic order. The number of the identified specimens from each lens is reported in brackets.

Northern slope.

S954 A, D, E - Lenses scattered along the west ridge of the gully S747 at about 650 m altitude.
Parakellnerites sp. (5 juv.)
A *Aplococeras orobicum* Fantini Sestini (40)
Epigymnites sp. (1)
D *Norites dieneri* Arthaber (2)
Parakellnerites sp. (1 juv.)
E *Megaphyllites* sp. (1)

S1060 I - Level located at 690 m altitude. Perhaps the oldest level of the series along with S954 A, D, E.
Norites dieneri Arthaber(11)
Megaphyllites sp. (6)
Aplococeras orobicum Fantini Sestini (5)
Esinoceras tozeri sp.n.(6)
Parakellnerites costatus sp.n. (17)
Repossia tenuis sp.n. (43)
Epigymnites sp. (11)
Flexoptychites acutus (Mojsisovics)(4)
Monophyllites wengensis (Klipstein) (1)

S1034 Lens located at 710 m altitude, over the first bifurcation of the S747 gully, near S746 (Pt. 1).
Parakellnerites waageni (Mojsisovics) (2)

S1060 L - Level located more westward of the section, at about 770 m altitude.
Parakellnerites waageni (Mojsisovics)(7)

S1060 A - Lens located near the eastern branch of the gully S747 (see Part 1), at about 775 m altitude.
Norites dieneri Arthaber (8)
Parakellnerites waageni (Mojsisovics) (9)
Repossia tenuis sp.n. (3)
Flexoptychites acutus (Mojsisovics) (2)
Monophyllites wengensis (Klipstein) (2)

S1060 E - Lens located at 775 m altitude.
Norites dieneri Arthaber (13)
Celtites(?) sp. (10)
Parakellnerites waageni (Mojsisovics) (80)
Repossia tenuis sp.n. (7)
Flexoptychites acutus (Mojsisovics) (4)
Monophyllites wengensis (Klipstein) (6)

S1060 B - Outcrop located at 780 m altitude on the ridge, eastward of S1060 A.
Norites dieneri Arthaber (21)
Megaphyllites sp. (1)
Aplococeras orobicum Fantini Sestini (16)
Parakellnerites waageni (Mojsisovics) (160)
Repossia tenuis sp.n. (3)
Epigymnites sp. (1)
Praepinacoceras airaghii sp.n. (2)
Flexoptychites acutus (Mojsisovics) (6)
Monophyllites wengensis (Klipstein) (9)

S1060 C - Outcrop located at 780 m altitude, eastward of S1060 B.
Norites dieneri Arthaber (13)
Aplococeras orobicum Fantini Sestini (3)
Parakellnerites waageni (Mojsisovics) (22)
Repossia tenuis sp.n. (12)
Flexoptychites acutus (Mojsisovics) (2)
Monophyllites wengensis (Klipstein) (2)

S1060 D - Lens at 785 m altitude, on the same ridge of S1060 B.
Norites dieneri Arthaber (3)
Parakellnerites waageni (Mojsisovics) (5)
Monophyllites wengensis (Klipstein) (2)

S1060 and S1060 F, G - Small scattered lenses.
Norites dieneri Arthaber (2)
Parakellnerites waageni (Mojsisovics) (2)
Repossia tenuis sp. n. (1)
Flexoptychites acutus (Mojsisovics) (1)
F *Norites dieneri* Arthaber (1)
Parakellnerites waageni (Mojsisovics) (5)
Repossia tenuis sp.n. (3)
Monophyllites wengensis (Klipstein) (1)
G *Parakellnerites waageni* (Mojsisovics) (2)
Flexoptychites acutus (Mojsisovics) (1)

S938 and S938 A-F, H-L, N, P, Q. Scattered blocks along and near the S747 gully.
Norites dieneri Arthaber (1)
Parakellnerites waageni (Mojsisovics) (7)
Flexoptychites acutus (Mojsisovics) (1)
A *Norites dieneri* Arthaber (11)
Parakellnerites waageni (Mojsisovics) (12)
Repossia tenuis sp.n. (2)
Flexoptychites acutus (Mojsisovics) (1)
B *Parakellnerites waageni* (Mojsisovics) (7)
C *Parakellnerites waageni* (Mojsisovics) (1)
Flexoptychites acutus (Mojsisovics) (1)
Monophyllites wengensis (Klipstein) (1)
D *Norites dieneri* Arthaber (2)
Parakellnerites waageni (Mojsisovics) (5)
Repossia tenuis sp.n. (3)
Flexoptychites acutus (Mojsisovics) (11)
Nevadites ambrosionii (Airaghi) (1)
E *Norites dieneri* Arthaber (1)
Parakellnerites waageni (Mojsisovics) (2)
Epigymnites sp. (1)
Flexoptychites acutus (Mojsisovics) (1)
F *Norites dieneri* Arthaber (1)
Parakellnerites waageni (Mojsisovics) (5)
Flexoptychites acutus (Mojsisovics) (3)
H *Repossia tenuis* sp.n. (1)
Flexoptychites acutus (Mojsisovics) (3)
I *Norites dieneri* Arthaber (20)
Parakellnerites waageni (Mojsisovics) (1)
L *Parakellnerites waageni* (Mojsisovics) (1)
Repossia tenuis sp.n. (1)
Flexoptychites acutus (Mojsisovics) (2)
N *Parakellnerites waageni* (Mojsisovics) (1)
P *Celtites* (?) sp. (6)
Aplococeras orobicum Fantini Sestini (1)
Parakellnerites waageni (Mojsisovics) (1)
Monophyllites wengensis (Klipstein) (1)
Q *Parakellnerites waageni* (Mojsisovics) (1)

S1035- Debris from eastern side of ridge with the other localities.
Parakellnerites waageni (Mojsisovics) (10)
Monophyllites wengensis (Klipstein) (3)

S1174 Debris.
Monophyllites wengensis (Klipstein) (1)

Southern slope.

S1078 - At about 810 m altitude, opposite to S746 of the northern slope.
Megaphyllites oenipontanus Mojsisovics (2)
Gervasuttia nodosissima Fantini Sestini (1)
Argolites celtitoides (Airaghi) (5)

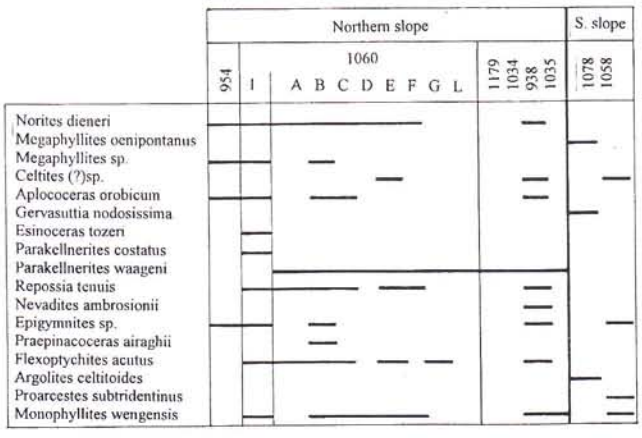
S1058 - At about 920 m altitude, eastward of Val di Lavaggio.
Celtites (?) sp. (3)
Epigymnites sp. (1)
Proarcestes subtridentinus (Mojsisovics) (3)
Monophyllites wengensis (Klipstein) (2)

Bio-chronostratigraphy.

A positive correlation may be obtained between the few species identified in the present paper from the southern slope and those from the highest levels of the northern slope, described in Part 1. The followings are common: *Megaphyllites oenipontanus* Mojsisovics, *Gervasuttia nodosissima* Fantini Sestini, *Proarcestes subtridentinus* (Mojsisovics), *Monophyllites wengensis* (Klipstein) and the genus *Argolites*. All the species occur in the Gredleri Zone, even if some of them continue up into the Archelaus Zone. Most probably these lenses belong to the Gredleri Zone, possibly to the upper Gredleri Zone (Fantini Sestini, 1994).

The northern slope assemblages include *Norites dieneri* Arthaber, *Aplococeras orobicum* Fantini Sestini and *Monophyllites wengensis* (Klipstein); these species are also recorded from the Curionii Zone (Fantini Sestini, 1994). Instead, the other species are not present between the already described species from the Gredleri and Archelaus Zones, besides the long-ranging *M. wengensis*. The major affinities are with the fauna of the Nevadites Zone (*sensu* Brack & Rieber, 1993).

We shall consider first the species originating from the lenses located between 710 and 840 m altitude, more numerous and significant (S1034, S1060, S1060 A-G, L) (Table 1). All the assemblages are characterized by the presence of *Parakellnerites waageni* (Mojsisovics), the most frequent and locally abundant species (S1060E, S1060B). This species, first described from the Marmolada northern slope, was identified also in the Ambata Fm. (Eastern Dolomites) in association with *Norites die-*



Tab. 1 - Distribution of species described in this paper (Pt. 2) from the Nevadites Zone of the Northern slope and from the Upper Gredleri Zone of the Southern slope, Val Parina.

neri and *Flexoptychites acutus* (Mojsisovics) (Fantini Sestini in Casati et. al., 1982). It was considered as belonging to the Avisianus or Polymorphus Zone (*sensu* Rieber, 1973). According to Brack & Rieber (1993) "*Hungarites waageni* appears to be younger than *P. rothpletzi* (Salomon)" of the Reitzi/Kellnerites Zone. From the same lenses it was collected *Repossia tenuis*, a new species of *Repossia* Rieber, 1973, a genus which seems to be restricted to the Nevadites Zone (Brack & Rieber, 1993). Also the small specimens of *Nevadites ambrosionii* (Airaghi), collected from an isolated block (S938D), confirms the attribution to the Nevadites Zone. *Flexoptychites acutus* is a species very frequent in the Late Anisian and ranging higher than the appearance of *Ticinites* in the Grenzbitumenzone (Rieber, 1973). *Norites dieneri* and *Aplococeras orobicum* display a larger range than the other species recorded: *N. dieneri* appears already within the Reitzi/Kellnerites Zone (Rieber, 1973; Brack & Rieber, 1993) and *A. orobicum* is probably present also in the Nevadites Zone of the Grenzbitumenzone at M. San Giorgio (levels 65-74, locality 902 of Rieber, 1973). Both these species extend up to the Curionii Zone, where, however, they are less frequent. The new species *Praepinacoceras airaghii* and *Monophyllites wengensis* have no chronological meaning.

The level stratigraphically older (650-690 m altitude, S954, S1060I)yielded the same species as those mentioned above, except for the presence of *Parakellnerites costatus* sp. n. instead of *Parakellnerites waageni.* These two species seem phyletically linked: *P. waageni* acquires an undulated keel in the respect to its ancestral form *P. costatus*. Another species occurring only in S1060I, is *Esinocers tozeri* sp. n., which is similar to *Beyrichites reuttensis* (Beyrich) as figured by Reis (1901, 1907) from the Wettersteinkalk of the Zugspitz mountain. These latter assemblages (S954, S1060I) are older, but because of their affinity with the already recorded assemblages, they could be still attributed to the Nevadites Zone.

The definition of the Nevadites Zone is still controversial as well as its position with respect to the Anisian/Ladinian boundary. In particular, Mietto & Manfrin (1995) propose to subdivide the Nevadites Zone (*sensu* Krystyn, 1983; Brack & Rieber, 1993) in three subzones (from bottom to top), the Crassus, Serpianensis and Chiesense Subzones, respectively.

On the contrary, Brack & Rieber, 1995, proposed the species *Nevadites secedensis* Brack & Rieber, as a marker for the former Nevadites Zone. The Secedensis Zone, however, does not apparently include the basal strata with *Ticinites*, which according to Brack & Rieber (1995) characterize the top of the underlying Reitzi Zone. In this paper a conservative approach is preferred, thus the Nevadites Zone will be used awaiting for the final decision. The fauna here described seems to be attributable to the lower part of this Nevadites Zone on the presence of *Parakellnerites waageni* (Mojsisovics), *Celtites* ?, and *Flexoptychites.*

Moreover, the position of the Anisian/Ladinian boundary is still under discussion. According to Brack & Rieber (1993, 1994, 1995), the Anisian/Ladinian boundary should be drawn between the Secedensis Zone and the following Curionii Zone, whilst Mietto & Manfrin (1995), Manfrin & Mietto (1995) suggest to place the boundary at the base of the underlying Nevadites Zone, at the first appearance of *Nevadites* and *Ticinites*. The discussion of this problem is beyond the purpose of this paper, because this boundary is missing in the studied area.

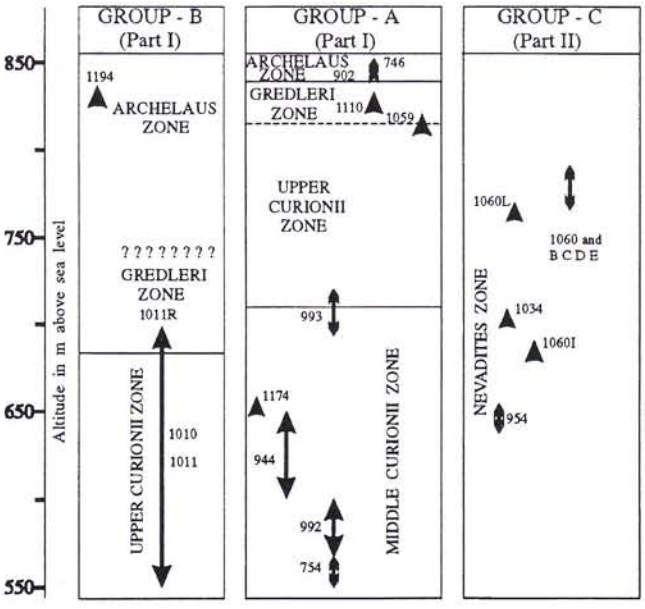
In Val Parina four standard ammonoid zones are documented; they span most of the Ladinian or the latest Anisian and part of the Ladinian, according to the different interpretations. They are in ascending order: Nevadites, Curionii, Gredleri, and Archelaus Zones. It is worth mentioning that the lenses around 700 m a.s.l. yield progressively younger faunas from east to west: the lenses S1060I-S1034 are attributed to the Nevadites Zone; S993 to the Curionii Zone (see Pt. 1); and S1011R to the Gredleri Zone (see Pt. 1). This pattern may be related to an extensional fault system with blocks drowned westwards (Jadoul et al., 1992), the bedding being only gently dipping westward. However in the homogeneous carbonate platform rocks these faults are not always easy to detect.

This hypothesis is confirmed by the recent finding of a fossiliferous lens S519 located more to the west near the junction of the Val Parina with the Val Brembana, at about 550 m altitude on the northern slope. There *Arpadites arpadis* Mojsisovics (MCSNB 9491), *Arpadites szaboi* (Boeckh)(MCSNB 9492), *Arpadites* sp. (MCSNB 9493) of the Archelaus Zone were identified.

The Esino limestone outcrops west of the Val Parina in the Grigne Group, where several localities yielded ammonoid faunas. The results of the paleontological studies from this area are summarized by Rossi Ronchetti (1960). Although the detail stratigraphic analysis of the area is still in progress, the Esino carbonate platform from the Grigna Settentrionale (Northern Grigna) was recently subdivided in two buildups (Gaetani et al., 1992; Gaetani, 1996, pers. comm.). Most, if not all, the localities described by Rossi Ronchetti (1960) belong to the upper edifice. Recently, Gaetani found a new horizon near Cime Guzzi at 1980 m altitude yielding a few ammonoids such as *Iberites* sp., *Epigymnites frequens* Fantini Sestini, *Proarcestes* spp., *Johannites deschmanni* Mojsisovics, *Protrachyceras steinmanni* (Mojsisovics), an association correlatable with that from the classical locality of Cima dei Cicc (= Pizzo di Cainallo or Sass di Lumach). All these localities belong to the transgressive system tract of the upper edifice.

The Grigna's localities share several ammonoid species with the Val Parina from the Archelaus Zone [e. g. *Proarcestes marcheanus* (Mojsisovics), *Protrachyceras ladinum* (Mojsisovics), *P. longobardicum* (Mojsisovics), *P. pseudoarchelaus* (Boeckh), *P. steinmanni* (Mojsisovics), *Arpadites cinensis* Mojsisovics, *A. telleri* Mojsisovics] documenting the presence of this zone in the Grigne area. On the contrary the underlying Gredleri, Curionii and Nevadites Zones, well documented in Val Parina (see Table 2), are apparently missing in the Grigne area. In fact, the record of *Protrachyceras* cf. *gredleri* (Mojsisovics)(Rossi Ronchetti, 1960), *Ammonites eichwaldi* Keyserling (Stoppani, 1858)= ? *Chieseiceras pemphix* (Merian), *Pinacoceras philopater* (Laube) (Airaghi 1902)= ?*Praepinacoceras airaghii* Fantini Sestini, *Arpadites celtitoides* Airaghi (1902)= *Argolites celtitoides* Airaghi, in Val Ontragno (= Val del Monte), possibly belonging to older assemblages, could not be confirmed. Most of these fossils (Stoppani 1858; Airaghi 1902) were unfortunately lost or, if still available, are so poorly preserved that their identification remains uncertain (Rossi Ronchetti, 1960).

The results presented in this paper will be inserted in the chronostratigraphic framework of the entire carbonate platform already preliminary studied by Jadoul (Jadoul et al., 1992). As already mentioned in Part 1 (see also Jadoul et al., 1992, tab. 1), the fauna from the Val Parina is outstanding for the high diversity, abundance and state of preservation of specimens. However, it is worth mentioning that these ammonoids are accumulated in lenses and/or pockets, then not homogeneously distributed, that suggests an accumulation mechanism driven by storm-induced bottom currents. Consequently, the single thanatocoenosis, in the absence of condensation features, resulted from a probable mixing of species characteristic of open marine conditions [e. g., *Chieseiceras perticaense* Brack & Rieber, *Eoprotrachyceras rieberi* Fantini Sestini, *Protrachyceras pseudoarchelaus* (Boeckh), *P. steinmanni* (Mojsisovics), *P. longobardicum* (Mojsisovics), *Arpadites arpadis* Mojsisovics, *A. cinensis* Mojsisovics, *A. telleri* Mojsisovics] and species as well as genera which are presently considered as endemic of the carbonate platform (e. g., *Gervasuttia* Fantini Sestini, *Rossiceras* Fantini Sestini). The percent abundance of endemic species increases progressively from the Nevadites Zone to the Archelaus Zone except for the Gredleri Zone. The faunas from the later Zone are poorly known and they might comprise endemic species of basinal settings, not recorded yet.



Tab. 2 - Biostratigraphy of the studied ammonoid fauna. The outcrops are plotted according to their altitude above the sea level, instead the horizontal scale is not proportional.

The bio-chronostratigraphy of the Val Parina faunas is summarized in Table 2. The studied outcrops are grouped in three synthetic columns: A and B columns concern the outcrops described in Part 1, while column C concerns the outcrops described in this paper (Part 2). In Table 2, the various outcrops are plotted according to their altitude. In fact, the differences in altitude reflect with a good approximation the real thickness of strata, being the bedding planes only slightly deeping to the west. Moreover, the program Biograph 2.0 (Savary & Guex, 1991) was applied to the studied faunas in order to establish the affinities between the various localities. The analysis showed that Groups A and B cannot be correlated, whereas a strong affinity was discovered between S994 and S1117. Consequently, the last outcrop with a stratigraphic position intermediate between Groups A and B was attributed to Group A. From this reconstruction (see Table 2) it appears that the Esino platform is very thick in the Late Anisian-Early Ladinian Nevadites and Curionii Zone, but the platform is markedly reduced in the upper Gredleri and lower Archelaus Zones (Ladinian).

Paleontological descriptions

Tozer (1994) in his recent paper on the "Canadian Triassic Ammonoid Faunas" announces that the classification of Triassic Ammonoidea will be published in a companion report. This classification will be included in the new edition of the "Treatise on Invertebrate Paleontology". Tozer, however, in his 1994 paper already adopted the new classification (modified from his 1981 paper), which includes new families and subfamilies. The classification adopted here follows that proposed by Tozer in 1994.

In this paper we describe and illustrate only the new taxa and the species previously poorly described.

Numeration and repository. The ammonoids from the Val Parina are deposited at the Museo Civico di Scienze Naturali " E. Caffi ", Bergamo, Italy (MCSNB). The first number (i.e., 9353) refers to register number of this Museum. S numbers in brackets correspond to M. Gervasutti sampling.

Standard abbreviations. D: diameter; H: whorl height; W: whorl width; U: umbilical width; E: external lobe; L: lateral lobe; U: umbilical lobe; I: internal lobe.

Ammonoidea

Order Ceratitida Hyatt, 1884

Superfamily *Noritaceae* Karpinsky, 1889

Family *Noritidae* Karpinsky, 1889

Genus *Norites* Mojsisovics, 1879

Type species: *Ammonites gondola* Mojsisovics, 1869

Norites dieneri Arthaber, 1903

Pl. 1, fig. 10 a, b

The genus *Norites* is represented only by *N. dieneri* Arthaber, 1903 occurring with 90 specimens from almost all lenses of the northern slope of the Val Parina. This species, already recorded in the Reitzi/Kellnerites Zone (Rieber, 1973; Brack & Rieber, 1993), is still present in the Curionii Zone of the Val Parina, though represented by fewer specimens (Fantini Sestini, 1994, p. 237, text-fig. 4 m).

Superfamily *Megaphyllitaceae* Mojsisovics, 1896

Family *Megaphyllitidae* Mojsisovics, 1896

Genus *Megaphyllites* Mojsisovics, 1879

Type species: *Ammonites jarbas* Muenster, 1841

This genus is represented by few, small-sized and poorly preserved specimens (S1060B, S1060I, S954E). Only two specimens attributable to *M. oenipontanus* Mojsisovics, 1882 were collected in S1078 from the southern slope. This species is also present in the Gredleri and Archelaus Zone from the northern slope (Fantini Sestini, 1994).

Superfamily *Ceratitaceae* Mojsisovics, 1879

Family *Danubitidae* Spath, 1951

Celtites (?) sp.

Pl. 1, fig. 13a, b

Material. 19 specimens: MCSNB 9392 (S1060E); MCSNB 9393 (S938P); MCSNB 9394 (S1058) (Pl. 1, fig. 13a, b).

Numerous small specimens were collected from both sides of the Val Parina: the largest individual is 25 mm in diameter. It is characterized by slow growth pattern and wide umbilicus. The venter wide, smooth, very slightly convex is marked by a very low and wide keel. The whorl section is depressed, subrectangular. The ribs, slightly prominent near the umbilical suture, increase in size abruptly making a sort of node, then disappear near the ventrolateral shoulder. The suture line is unknown. The specimens here considered are closely related to the specimens figured by Salomon (1895, p. 186, pl. 6, fig. 18) as *Celtites* (?) nov. sp. ind. A. Numerous species of *Celtites* described by Airaghi (1912) from the Grenzbitumenzone at M. San Giorgio show compressed or isodiametric section and smooth venter.

Also the generic attribution is uncertain. In fact in *Celtites* Mojsisovics, 1882 (type species: *Trachyceras epolense* Moisjsovics, 1879) the venter is rounded without trace of keel, the ribs are thin and prorsiradiate. In the Carnian *Orthoceltites* Spath, 1951, the coiling of the whorls is more rapid. The Upper Anisian *Tozerites* Silberling & Nichols, 1982, has a venter rounded or weakly fastigate, whereas the ribs are similar.

It is possible that the specimens from the Val Parina belong to a new genus and a new species, however the absence of the suture line prevents a certain identification as already suggested by Salomon. This implies that the systematic position of this taxon remains uncertain. For the time being we place the studied taxon within the Family Danubitidae which according to Tozer (1981) includes the genus *Celtites* Mojsisovics, 1882 and *Orthoceltites* Spath, 1951, even if Tozer (1994) places the latter genus in the Family Badiotitidae.

Age. Nevadites and Gredleri Zone.

Family *Aplococeratidae* Spath, 1951

Genus *Aplococeras* Hyatt, 1900

Type species: *Trachyceras avisianum* Mojsisovics, 1882

Aplococeras orobicum Fantini Sestini, 1994

Pl.1, fig. 9

1994 *Aplococeras orobicum* Fantini Sestini, p. 251, pl. 8, fig. 6-8; text-fig. 4l.

Material. 65 specimens: MCSNB 9379 (S1060B); 9377 (S1060C) (Pl.1, fig. 9); 9378 (S1060I); 9380 (938P); 9381 (S954A).

This species can be distinguished from the closely related *A. misanii* (Mojsisovics) because of higher whorls and less large umbilicus. However, it is worth mentioning that these differences are well visible only in adult specimens. The individuals here examined are generally small and appear intermediate between *A. orobicum* and *A. misanii*. Specimens of *A. orobicum* are also present in the fauna from Grenzbitumenzone level 69, Punkt 902 (see Rieber, 1973, pl. 17, fig. 2, 3) in association with

Repossia acutenodosa Rieber. Consequently, the distribution of *A. orobicum* can be extended from the Nevadites Zone to the Curionii Zone.

The attribution of the species *orobicum* to the genus *Aplococeras* remains uncertain, because the suture line is goniatitic, whereas in the type species *A. avisianum* (Mojsisovics) the lobes are denticulated (Brack & Rieber, 1993). At present knowledge, it appears that the genus *Pseudoaplococeras* Spath, 1951, with *Lecanites vodgesi* Hyatt & Smith as the type species, could be taxonomically more appropriate than *Aplococeras*. In *L. vodgesi* as in the species *orobicum* and *parvus* Smith, the suture line is goniatitic with "L exaggerated in size" (Silberling & Nichols, 1982). In fact the large saddle E/L is followed by L very deep and wide and by U present only with one or two shallow lobes. In *Lecanites*, e. i. *L. glaucus* (Muenster) and *L. loczyi* Frech, L is not very larger than U lobes. The study of better preserved specimens of this group and the comparison with the suture line of *A. misanii* (Mojsisovics) will clarify the systematic position of these species.

Genus *Gervasuttia* Fantini Sestini, 1994

Type species: *Gervasuttia shevyrevi* Fantini Sestini, 1994

Only one incomplete specimen attributable to *G. nodosissima* Fantini Sestini, 1994 was found in S1078 from the Gredleri Zone.

Family *Ceratitidae* Mojsisovics, 1879

Subfamily *Beyrichitinae* Spath, 1934

Esinoceras gen. n.

Type species. *Esinoceras tozeri* sp. n.

Name derivation. The genus has been named after the Calcare di Esino Formation.

Diagnosis. Shell involute, compressed with a narrow and tabulate venter. Deep umbilicus with high umbilical wall. Ribs falcoid, well visible only on the outer part of the flanks. In the inner whorls riblets sinuous or almost straight. Suture line subammonitic with lobes and saddles frilled.

Discussion. The venter is tabulate from the inner whorls to the living chamber. The shell is devoid of tuberculation; the ribs change from almost straight to falcoid during the ontogeny. In the suture line the saddles are wide and the lobes tend to be slim as in ceratitic suture, but all the elements are frilled. This new genus is very similar to *Parinaia* Fantini Sestini, 1994, from which it differs in the suture line: *Parinaia* possesses a typical ceratitic suture line instead of subammonitic as in *Esinoceras*. Moreover, the venter is feebly convex. *Turchodiceras* Tozer, 1994 differs from the new genus *Esinoceras* in having bitubercolate inner whorls with branched ribs and more numerous and thinner saddles in the suture line. *Kokaelia* Fantini Sestini, 1990 possesses a tabulate venter only in the inner whorls and more subdivided suture line. *Semibeyrichites* Krystyn & Tatzreiter, 1991 shows a similar general shape, but its suture line is more complex.

Age. Nevadites Zone.

Esinoceras tozeri sp. n.

Pl. 1, fig. 17-19; Text-fig. 3 a, b.

Types. Holotype MCSNB 9401 (S1060I) (Pl.1, fig.18a,b; Text-fig. 3b). 5 Paratypes: 9402 (S1060I) (Pl. 1, fig. 19; Text-fig. 3a); 9403 (S1060I) (Pl.1, fig. 17); 9404 (S1060I).

Repository. Museo Civico di Scienze Naturali "E. Caffi", Bergamo, Italy.

Derivation of name. From E. T. Tozer.

Horizon and locality. Nevadites Zone, Val Parina, Bergamo.

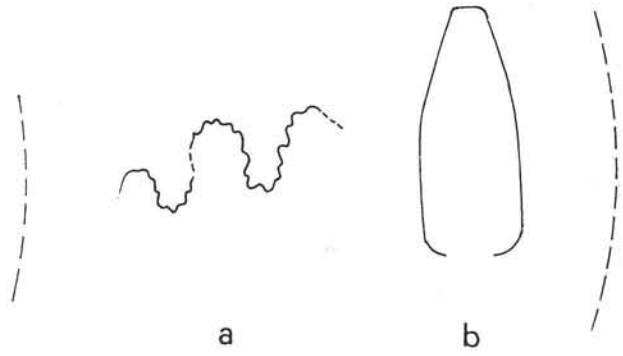


Fig. 3 - *Esinoceras tozeri* sp. n. a) Suture line, MCSNB 9402 (S1060I), paratype (Pl. 1, fig. 19), H=32 mm; b) whorl section, MCSNB 9401 (S1060I), holotype (Pl. 1, fig. 18); x 2.

Diagnosis. Medium-sized shell, involute, compressed with tabulate section. Umbilicus deep without umbilical egression. Ribs from almost straigth to falcoid. Suture line subammonitic with lobes and saddles frilled.

Description. The venter is always narrow and flat, from the inner whorls to the body chamber. The flanks are weakly convex with the whorl maximum width at the inner third of the height and ventrolateral shoulders prominent. A high umbilical wall surrounds the deep umbilicus. The ribs are almost straight, then sinuous on the outer whorls. On the body chamber the ribs are falcoid, retroverse. Only the outer adorally concave part is prominent and well visible. Thin riblets run between the primary falcoid ribs. The suture line is partially visible: the saddles are wide and lobes rather narrow, but the denticulation are well visible.

Discussion. It is impossible to measure the real size of this species, because complete specimens are missing. The specimens figured by Reis (1901, pl. 7, fig. 33; 1907, pl. 2, fig. 9; pl. 3, fig. 1; text-fig. 11) as *Beyrichites*

reuttensis (Beyrich), type species of *Beyrichites*, from the Wettersteinkalk appear similar to *E. tozeri* sp. n.

Subfamily *Paraceratitinae* Silberling, 1962

Genus *Parakellnerites* Rieber, 1973

Type species: *Parakellnerites frauenfelderi* Rieber, 1973

Representatives of this genus are frequent and are the major component of the studied assemblages. According to Brack & Rieber (1993) this genus occurs in the upper Reitzi/Kellnerites Zone and in the lower Nevadites Zone.

Parakellnerites waageni (Mojsisovics, 1882)

Pl. 2, fig. 1-8; Text-fig. 4

1882 *Balatonites waageni* Mojsisovics, p. 82, pl. 16, fig. 3-5.
1895 *Balatonites waageni* - Salomon, p. 181, pl. 6, fig. 8, 10.
1895 *Balatonites waageni* var. *anguste-umbelicata* Salomon, p. 181, pl. 6, fig. 9.
1982 *Parakellnerites waageni* - Casati et al., p. 430, pl. 32, fig. 3.
1993 *Parakellnerites ? waageni* - Brack & Rieber, p. 467, pl. 4, fig. 19.

Material. 368 specimens: MCSNB 9421 (S938I) (Pl. 2, fig. 1); 9429 (S1060B) (Pl. 2, fig. 2); 9422 (S1060B) (Pl. 2, fig. 5); 9428 (S1060E) (Pl. 2, fig. 4); 9426 (S1035) (Pl. 2, fig. 3); 9425 (S938N) (Pl. 2, fig. 8); 9423 (S1060B) (Pl. 2, fig. 6); 9427 (S938D) (Fig. 4); 9424 (1060E) (Pl. 2, fig. 7); 9314 (S1060); 9310 (S1060A); 9297-9307 (S1060B); 9311-9312 (S1060C); 9309 (S1060D); 9327-29 (S1060E); 9332-33 (S1060E); 9308 (S1060F); 9313 (S1060G); 9315 (S1060L); 9316 (S938); 9325 (S938A); 9318 (S938B); 9319 (S938C); 9320 (S938D); 9321 (S938E); 9322 (S938F); 9323 (S938I); 9324 (S938L); 9317 (S938P); 9430 (S938Q); 9331 (S1179); 9330 (S1034); 9334 (S1035).

Description. The numerous specimens display a large variability. The umbilicus is narrow with a high and steep wall, but sometimes may be slightly wider without reaching the size observed in the specimens figured by Mojsisovics (1882). The section is compressed with almost flat flanks and roof-shaped venter side. In adult individuals the ventrolateral shoulder become rounded. Three rows of nodes are present: 1) umbilical large, 2) lateral at a third of whorl height, and 3) marginal obliquely elongated. A clearly undulated keel runs between the two flat or slightly concave bands of the ventral side. The keel becomes entire in the body chamber as well as in the last whorl of the phragmocone. The ribs start at the umbilical edge, subdivided in thin riblets, ventrally vanishing. Very projected riblets may be visible on the venter. In adult specimens the ribs become very thin and closely spaced or disappear, but the nodes persist. The suture line is ceratitic: E short with a large median saddle; four rounded saddles are visible between the ventrolateral shoulder and the umbilical rim.

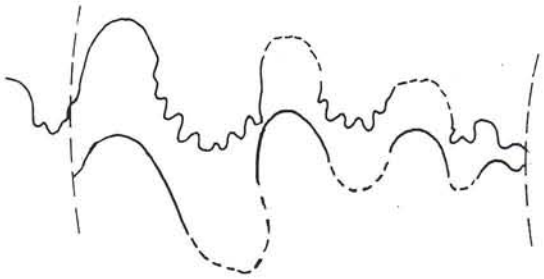
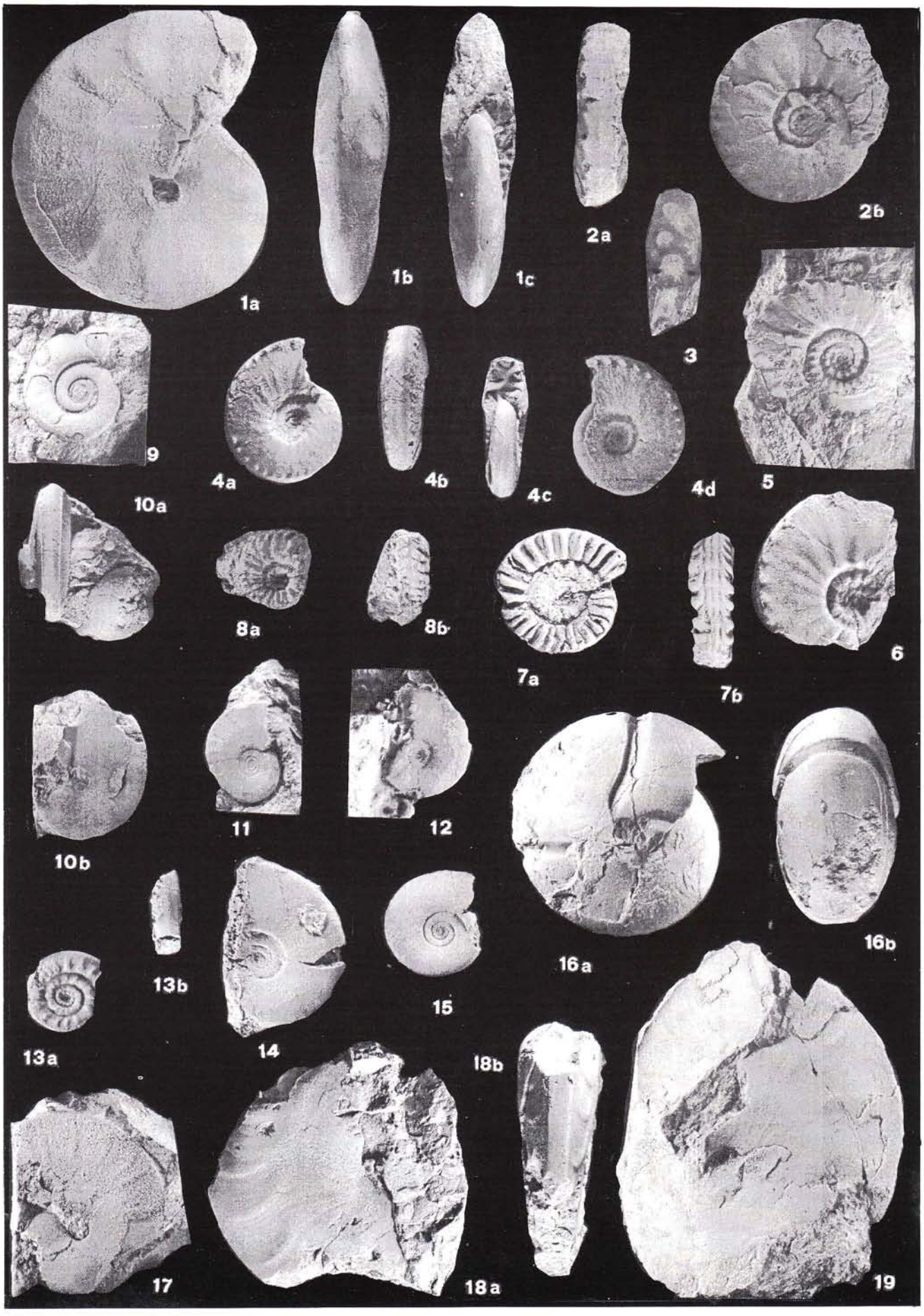


Fig. 4 - *Parakellnerites waageni* (Mojsisovics). MCSNB 9427 (S938D), suture line, H=11.5 mm.

Remarks. In *P. waageni* the keel is strongly undulated, whereas in other species of the genus *Parakellnerites* Rieber, 1973 it is entire, sharp to slightly rounded. However, the general shape, the ornaments and the suture line are similar to those of the Rieber's genus. Consequently the species *P. waageni* may be reliably attributed to the genus *Parakellnerites*.

PLATE 1

Fig. 1 a-c - *Flexoptychites acutus* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9357 (S938). Respectively lateral, ventral and oral views; x 1.
Fig. 2 a, b - *Repossia tenuis* sp. n., Val Parina, Nevadites Zone. Holotype, MCSNB 9413 (S1060E). Respectively venter and side; x 1.
Fig. 3 - *Repossia tenuis* sp. n., Val Parina, Nevadites Zone. Paratype, MCSNB 9415 (S1060E). Section; x 1.
Fig. 4 a-d - *Repossia tenuis* sp. n. Val Parina, Nevadites Zone. Paratype, MCSNB 9416 (S1060B). Respectively lateral left, ventral, oral, lateral right views, x 1.
Fig. 5 - *Repossia tenuis* sp. n. Val Parina, Nevadites Zone. Paratype MCSNB 9417 (S938D). Side; x 1.
Fig. 6 - *Repossia tenuis* sp. n. Val Parina, Nevadites Zone. Paratype, MCSNB 9414 (S938L). Side; x 1.
Fig. 7 a, b - *Argolites celtitoides* (Airaghi). Val Parina, Gredleri Zone. MCSNB 8955 (S1078). Respectively side and venter; x 1.
Fig. 8 a, b - *Nevadites ambrosionii* (Airaghi).Val Parina, Nevadites Zone. MCSNB 9412 (S938D). Respectively side and venter;x 1.
Fig. 9 - *Aplococeras orobicum* Fantini Sestini. Val Parina, Nevadites Zone. MCSNB 9377 (S1060C). Side; x 1.
Fig. 10 a, b - *Norites dieneri* Arthaber. Val Parina, Nevadites Zone. MCSNB 9405 (S1060C). Respectively venter and side; x 1.
Fig. 11 - *Praepinacoceras airaghii* sp. n. Val Parina, Nevadites Zone. Holotype, MCSNB 9010 (S1060B). Side; x 1.
Fig. 12 - *Praepinacoceras airaghii* sp. n. Val Parina, Nevadites Zone. Paratype, MCSNB 9011 (S1060B). Side; x 1.
Fig. 13 a, b - *Celtites* (?) sp. Val Parina, Gredleri Zone. MCSNB 9394 (S1058). Respectively side and venter; x 1 .
Fig. 14 - *Epigymnites* sp. Val Parina, Nevadites Zone. MCSNB 9407 (S1060B). Side; x 1.
Fig. 15 - *Epigymnites* sp. Val Parina, Nevadites Zone. MCSNB 9408 (S938E). Side; x 1.
Fig. 16 a, b - *Proarcestes subtridentinus* (Mojsisovics).Val Parina, Gredleri Zone. MCSNB 9389 (S1058). Respectively side and venter; x 1.
Fig. 17 - *Esinoceras tozeri* sp. n. Val Parina, Nevadites Zone. Paratype. MCSNB 9403 (S1060I). Side; x 1.
Fig. 18 a, b - *Esinoceras tozeri* sp. n. Val Parina, Nevadites Zone. Holotype. MCSNB 9401 (S1060I). Respectively side and venter; x 1.
Fig. 19 - *Esinoceras tozeri* sp. n. Val Parina, Nevadites Zone. Paratype. MCSNB 9402 (S1060I). Side; x 1.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19

Few specimens exhibit ribs and nodes similar to those sometimes present on the body chamber also in the inner whorls (Pl. 2, fig. 7, 8). In our opinion they may represent a morphotype with thin and closely spaced ribs within the *P. waageni* population. These specimens are found in the same levels along with the typical representatives of *P. waageni*.

Age. Nevadites Zone of the Southern Alps.

Parakellnerites costatus sp. n.

Pl. 2, fig. 9-12; Text-fig. 5

Types. Holotype MCSNB 9382 (S1060I) (Pl. 2, fig. 10 a, b). Paratypes: MCSNB 9385 (S1060I) (Pl. 2, fig. 9); 9386 (S1060I) (Pl. 2, fig. 11); 9388 (S1060I) (Pl. 2, fig. 12); 9387 (S1060I) (Fig. 5) and other 12 paratypes 9389/9390 (S1060I).

Repository. Museo Civico di Scienze Naturali "E. Caffi", Bergamo, Italy.

Derivation of name. From latin adjective *costatus-a-um*.

Horizon and locality. Nevadites Zone, Val Parina, Bergamo.

Diagnosis. Shell involute, compressed with tabulate venter. Strong ribs starting from prominent umbilical nodes, slightly sinuous. Weak lateral nodes, numerous and small marginal nodes. Suture line ceratitic.

Description. The small umbilicus is surrounded by high umbilical wall. The venter wide and roof-shaped bears an entire, narrow keel. The distinct ventrolateral shoulders separate the venter from the flanks. The primary ribs start at the umbilical edge from radially elongated nodes. Bifurcations are present near the umbilical or lateral nodes. The secondary ribs are thin and irregularly distributed. The lateral nodes are small, radially elongated, and occasionally absent. The closely arranged, small marginal nodes divide the flanks from the smooth ventral side. The suture line is ceratitic with large saddles entire only at the top and wide lobes.

Discussion. The new species can be distinguished from *P. waageni* (Mojsisovics) by possessing a keel entire, not denticulated, the ventrolateral shoulders not rounded, and weaker lateral nodes. The representatives of *Parakellnerites* described by Rieber (1973) from the Grenzbitumenzone at M. San Giorgio show a different ornamentation: the ribs are thicker and less dense and the lateral nodes are more prominent. Also the older *P. rothplezi* (Salomon, 1895) and *P. zoniaensis* Brack & Rieber, 1993 show a different rib patterns. In *P. arthaberi* (Diener, 1899) the umbilicus is somewhat narrower and the less prominent ribs reach the keel.

Genus *Repossia* Rieber, 1973

Type species: *Repossia acutenodosa* Rieber, 1973

The genus *Repossia* Rieber, 1973 occurs on the northern slope of the Val Parina with only one species: *R. tenuis* sp. n. According to Brack & Rieber (1993), the distribution of this genus is confined to the Nevadites Zone.

Repossia tenuis sp. n.

Pl. 1, fig. 2-6; Text-fig. 6

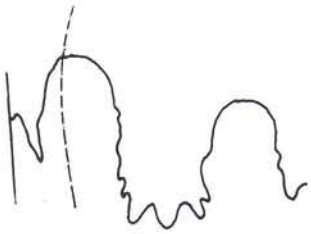


Fig. 5 - *Parakellnerites costatus* sp. n. MCSNB 9387 (S1060I), paratype, suture line, H= 19 (?) mm.

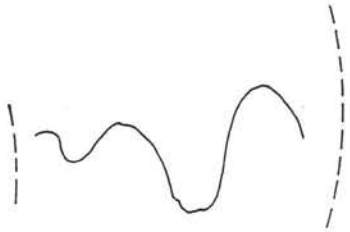
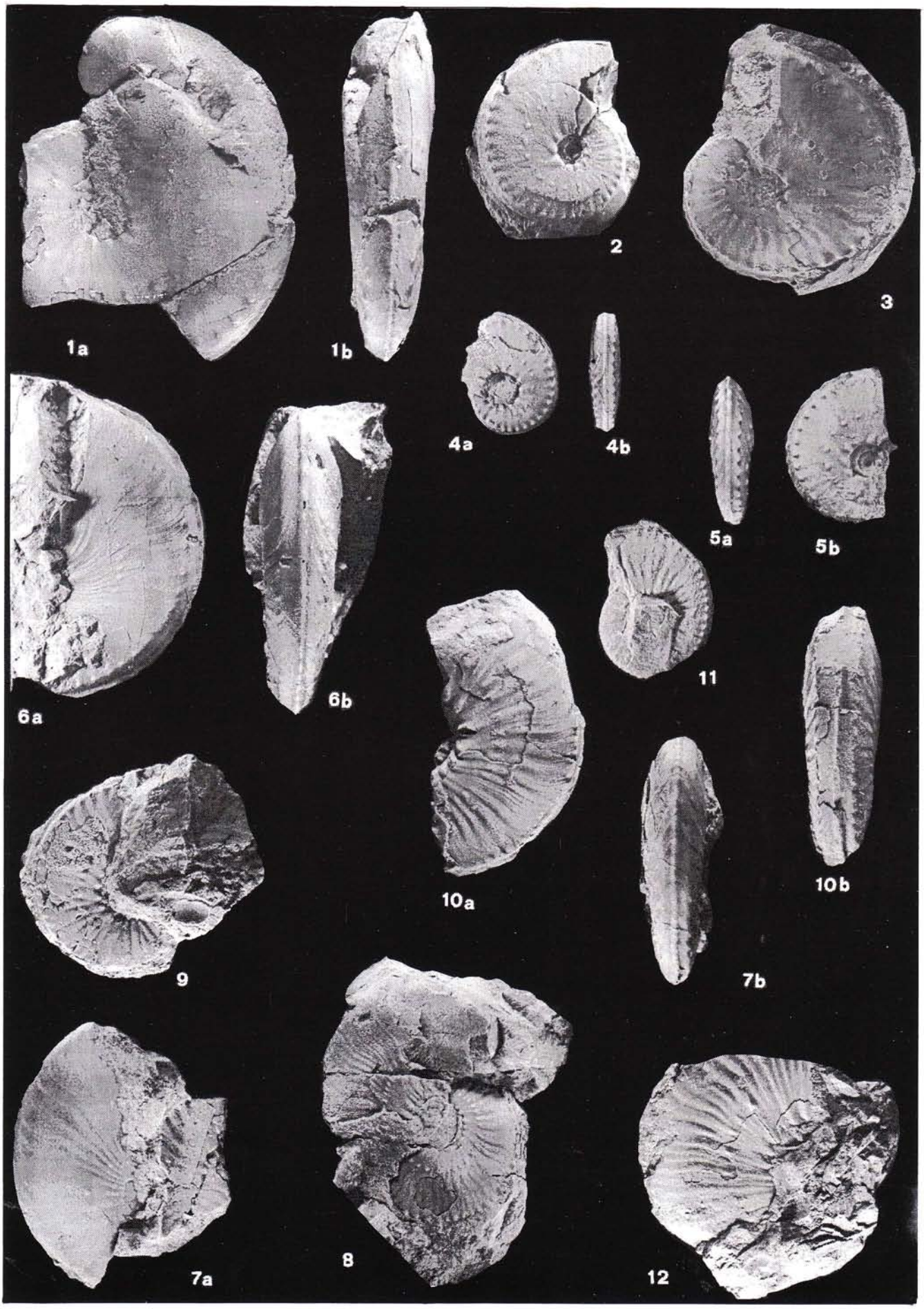


Fig. 6 - *Repossia tenuis* sp. n. MCSNB 9414 (S938L). Poorly preserved suture line, H=11.9, paratype (Pl. 1, fig. 6).

PLATE 2

Fig. 1 a, b - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9421 (S938I). Respectively side and venter; x 1.
Fig. 2 - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9429 (S1060B). Side; x 1.
Fig. 3 - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9426 (S1035). Side; x 1.
Fig. 4 a, b - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9428 (S1060E). Respectively side and venter; x 1.
Fig. 5 a, b - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9422 (S1060B). Respectively venter and side; x 1.
Fig. 6 a, b - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9423 (S1060B). Respectively side and venter; x 1 .
Fig. 7 a, b - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9424 (S1060E). Respectively side and venter; x 1.
Fig. 8 - *Parakellnerites waageni* (Mojsisovics). Val Parina, Nevadites Zone. MCSNB 9425 (S938N). Side; x 1.
Fig. 9 - *Parakellnerites costatus* sp.n. Val Parina, Nevadites Zone. Paratype, MCSNB 9385 (S1060I). Side; x 1.
Fig. 10 a, b - *Parakellnerites costatus* sp.n. Val Parina, Nevadites Zone. Holotype, MCSNB 9382 (S1060I). Respectively side and venter; x 1.
Fig. 11 - *Parakellnerites costatus* sp.n. Val Parina, Nevadites Zone. Paratype, MCSNB 9386 (S1060I). Side; x 1.
Fig. 12 - *Parakellnerites costatus* sp. n. Val Parina, Nevadites Zone. Paratype, MCSNB 9388 (S1060I). Side; x 1.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Types. Holotype MCSNB 9413 (S1060E) (Pl. 1, fig. 2 a, b). 68 Paratypes: MCSNB 9417 (S938D) (Pl. 1, fig. 5); 9414 (S938L) (Pl. 1, fig. 6; Fig. 6); 9415 (S1060E) (Pl. 1, fig. 3); 9416 (S1060B) (Pl. 1, fig. 4 a-d); 9349 (S1060); 9350 (S1060A); 9418 (S1060B); 9351 (S1060C); 9353 (S1060E); 9354 (S1060F); 9352 (S1060I); 9419 (S1060I); 9346 (S938A); 9347 (S938D); 9348 (S938H).

Repository. Museo Civico di Scienze Naturali "E. Caffi", Bergamo, Italy.

Derivation of name. From latin adjective *tenuis-e.*

Horizon and locality. Nevadites Zone, Val Parina, Bergamo.

Diagnosis. Slightly involute shell with subrectangular section. Venter wide, almost flat; flanks flat. Two rows of nodes: umbilical and marginal. Ribs wide, few prominent, straight, swelling near the umbilical rim, ending with a marginal node. Keel wide, rounded and low. Suture line ceratitic.

Description. The slightly involute shell shows a rather deep umbilicus with high umbilical wall. The flanks are almost flat, gently convex near the umbilicus because of the swelling ribs. The venter is wide and flat with a very rounded keel. In the inner whorls the venter and the ventrolateral shoulders are slightly rounded. The ribs start from the umbilical nodes with a swelling, then they flatten and end projectate. The marginal nodes, spirally elongate become thin adorally. Intercalatory and bifurcate ribs may be present, sometimes they end with a marginal node. The suture line is poorly preserved: three entire saddles are visible between the ventrolateral shoulders and the umbilical rim. L is large and feebly frilled.

Dimensions (in mm):

	D	H		W		U	
9413	36.2	13.8	38%	10.5	29%	2.2	34%
9416	27	10.7	40%	8.7	32%	9.2	34%
9353	26.7	10.6	40%	7.7	29%	9.4	35%

Remarks. The height of the whorl increases slowly in the adult specimens, which consequently are less involute than in *R. acutenodosa* Rieber (1973, pl. 11, fig. 1-28, 30-32). They differ from the latter species also in lacking lateral nodes and for having a lower and rounded keel.

Subfamily *Nevaditinae* Tozer, 1994

Genus *Nevadites* Smith, 1914

Type species: *Nevadites merriami* Smith, 1914

Only one small specimen was found in the isolated block S938D along with representatives of the genera *Parakellnerites* and *Repossia*. It has been attributed to *N. ambrosionii* (Airaghi).

Nevadites ambrosionii (Airaghi, 1912)

Pl. 1, fig. 8 a, b

1912 *Balatonites ambrosionii* Airaghi, p. 27, pl. 4, fig. 10.
1973 *Protrachyceras ambrosionii* - Rieber, p. 68, pl. 15, fig. 10-12, 16-19; text-fig. 9 t-z.
1993 *Nevadites ambrosionii* - Brack & Rieber, p. 479.

Material.1 specimen: MCSNB 9412 (S938D).

Description. The shell is involute and depressed with a diameter of about 16 mm. The umbilicus is surrounded by high wall with rounded umbilical rim; the flanks are convex and the venter is wide but with a narrow median sulcus. The ribs are strong, rarely bifurcated at the lateral nodes. Four rows of nodes: umbilical and lateral slightly elongate, marginal and ventral rounded.

According to Brack & Rieber (1993), this species belongs now to the genus *Nevadites* Smith, 1914.

Occurrence. Nevadites Zone of the Grenzbitumenzone at M. San Giorgio, Ticino, Switzerland.

Superfamily *Pinacocerataceae* Mojsisovics, 1879

Family *Gymnitidae* Waagen, 1895

Subfamily *Gymnitinae* Waagen, 1895

Genus *Epigymnites* Diener, 1916

Type species: *Gymnites ecki* Mojsisovics, 1882

Epigymnites sp.

Pl. 1, fig. 14, 15

Material. 15 specimens: MCSNB 9410 (S954A); 9409 (S1060I); 9407 (S1060B) (Pl. 1, fig. 14); 9408 (S938E) (Pl. 1, fig. 15); 9411 (S1058).

This genus is represented by very small specimens: the largest are figured in Pl. 1, fig. 14, 15. They are very similar to those figured by Salomon (1895, pl. 7, fig. 10-12) as *Gymnites ecki* Mojsisovics. In the absence of individuals with the typical row of spirally elongate nodes, the identification at specific level of the specimens from Val Parina remains uncertain; moreover, *G.ecki*, although frequent in the area, appears only in the Archelaus Zone (Fantini Sestini, 1994, p. 247).

Family *Pinacoceratidae* Mojsisovics, 1879

Genus *Praepinacoceras* Fantini Sestini, 1992

Type species: *Pinacoceras damesi* Mojsisovics, 1882

The genus *Praepinacoceras* (Fantini Sestini, 1992), ranging from Upper Anisian to Ladinian, is represented only by one species: *P. airaghii* sp. n., present in S1060B from the northern slope of the Val Parina.

Praepinacoceras airaghii sp. n.

Pl. 1, fig. 11, 12

? 1902 *Pinacoceras philopater* - Airaghi, p. 35, pl. 4, fig. 12.

Types. Holotype MCSNB 9010 (S1060B) (Pl. 1, fig. 11). Paratype MCSNB 9011 (S1060B) (Pl. 1, fig. 12).

Repository. Museo Civico di Scienze Naturali "E. Caffi", Bergamo, Italy.

Derivation of name. This new species is dedicated to C. Airaghi, who studied the Middle Triassic Ammonoids from Northern Italy.

Horizon and locality. Nevadites Zone, Val Parina, Bergamo.

Diagnosis. Shell involute, very compressed; flanks almost flat; venter very narrow, but rounded; umbilicus medium sized and shallow. Weak, rounded ribs, evident only ventrally with small nodes at half height of the whorl, making a spiral ridge. Suture line ammonitic with numerous auxiliary and adventitious elements.

Description. The small sized shell is moderately involute: some internal whorls are visible in the shallow umbilicus. The very compressed section is diamond shaped with maximum width at a half height. The weak ornaments are visible only in well preserved specimens. The ribs are poorly visible in the inner half of the whorls and become wide, but not prominent from the spiral ridge consisting of a row of small nodes. In the suture line four small adventitious lobes are followed by L and U1 large and by small auxiliary elements badly preserved, adapically shifted.

Dimensions (in mm):

	D	H	W	U
9010	19.3	9 47%	-	5 26%
9011	21.5	9.8 46%	-	5.5 26%

Remarks. Based on the moderately involute shell, the weak ornaments and the adorally convex suture line with only four adventitious lobes, this new species is assigned to the genus *Praepinacoceras* Fantini Sestini, 1992. The specimens figured by Airaghi (1902, pl. 4, fig. 12) as *P. philopater* (Laube) may be attributable to *P. airaghii* sp. n., but an exhaustive comparison is prevented, because the original material is now lost.

Superfamily *Ptychitaceae* Mojsisovics, 1882
Family *Ptychitidae* Mojsisovics, 1882
Genus *Flexoptychites* Spath, 1951
Type species: *Ptychites flexuosus* Mojsisovics, 1882

Flexoptychites acutus (Mojsisovics, 1882)
Pl. 1, fig. 1 a-c

The genus *Flexoptychites* is represented by only one species: *Flexoptychites acutus* (Mojsisovics, 1882), which occurs with 43 specimens in numerous lenses (S1060-S1060C, S1060E, S1060G, S1060I, S938, S938A, S938C-S938F, S938H, S938L). This very frequent species has been recorded from Reitzi/Kellnerites Zone and Lower Nevadites Zone (Rieber, 1973; Brack & Rieber, 1993).

Superfamily *Clydonitaceae* Hyatt, 1877
Family *Trachyceratidae* Haug, 1894
Subfamily *Arpaditinae* Hyatt, 1900
Genus *Argolites* Renz, 1939
Type species: *Arpadites mojsisovicsi* De Lorenzo, 1896

Argolites celtitoides (Airaghi, 1902)
Pl. 1, fig. 7 a, b

1902 *Arpadites celtitoides* Airaghi, p. 32, pl. 40, fig. 10.
?1967 *Arpadites (Argolites) celtitoides* - Jacobshagen, p. 25, pl. 1, fig. 2 a,b.
1992 *Argolites celtitoides* - Jadoul, Gervasutti & Fantini Sestini, pl. 23, fig. 1.

Material. 2 specimens: MCSNB 8955 (S1078), 8956 (S1078).

Description. The type of Airaghi, now lost, is a small internal mould, 16 mm in diameter: the ribs are strong, regular without nodes. The suture line, although not well figured, is different from the typical ceratitic suture. The few specimens from the Val Parina are larger in size with well preserved test. Very rare thin, intercalatory ribs start from about 20 mm of diameter. The venter is wide with rib endings very prominent. On the outer whorls two nodes placed side by side appear on the rounded keels; their number is about equal to the number of the primary ribs.

The large specimen figured by Jacobshagen (1967, pl. 1, fig. 2) does not appear conspecific, because the ribs are less numerous with strong nodes.

Dimensions (in mm) :

	D	H	W	U
8955	26.5	6.8 26%	9 34%	14 53%

Occurrence. *A. celtitoides* (Airaghi) has been found in the Calcare di Esino from the Grigne (Lombardy).

Superfamily *Arcestaceae* Mojsisovics, 1875
Family *Arcestidae* Mojsisovics, 1875
Genus *Proarcestes* Mojsisovics, 1893
Type species: *Arcestes bramantei* Mojsisovics, 1879

The genus *Proarcestes* is the only representative of the Arcestidae in the Calcare di Esino from Val Parina. A statistical study is in progress in order to define the variability of the numerous species described by Mojsisovics (1875, 1882), Tommasi (1899), Diener (1908), etc. Three rather large specimens from S1058 are confidently attributable to *Proarcestes subtridentinus* (Mojsisovics, 1882) (Pl. 1, fig. 16 a, b).

Order Phylloceratida Arkell, 1950

Superfamily *Ussuritaceae* Hyatt, 1900

Family *Ussuritidae* Hyatt, 1900

Genus *Monophyllites* Mojsisovics, 1879

Type species: *Ammonites sphaerophyllus* Hauer, 1850

The only representative is *Monophyllites wengensis* (Klipstein, 1850) occurring from all the levels S1060 and S938 of the northern slope and S1058 of the southern slope. However, this species is generally represented only by few specimens.

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REFERENCES

Airaghi C. (1902) - Nuovi Cefalopodi del Calcare di Esino. *Palaeont. Ital.*, v. 8, pp. 21-41, Pisa.

Airaghi C. (1912) - I Molluschi degli scisti bituminosi di Besano in Lombardia. *Atti Soc. It. Sc. Nat.*, v. 51, 38 pp., Pavia.

Brack P. & Rieber H. (1993) - Towards a better definition of the Anisian/Ladinian boundary: New stratigraphic data and correlations of boundary sections from the Southern Alps. *Ecl. Geol. Helv.*, v. 86, pp. 415-527, Basel.

Brack P. & Rieber H. (1994) - The Anisian/Ladinian boundary: Retrospective and new constraints. *Albertiana*, n. 13, pp. 25-36, Utrecht.

Brack P. & Rieber H. (1995) - The Anisian/Ladinian boundary interval at Bagolino (Southern Alps, Italy): I. Summary and new results on ammonoid horizons and radiometric age dating. *Albertiana*, n. 15, pp. 45-56, Utrecht.

Casati P., Jadoul F., Nicora A., Marinelli M., Fantini Sestini N. & Fois E. (1982) - Geologia della Valle dell'Ansiei e dei Gruppi M. Popera-Tre Cime di Lavaredo (Dolomiti Orientali). *Riv. It. Paleont. Strat.*, v. 87 (1981), n. 3, pp. 371-510, Milano.

Diener C. (1908) - Ladinic, Carnic and Noric faunae of Spiti, Himalayan fossils. *Palaeont. Indica*, v. 5, 157 pp., Calcutta.

Fantini Sestini N. (1990) - *Kokaelia* gen. n. (family Beyrichitidae) from Middle Anisian. *Riv. It. Paleont. Strat.*, v. 95 (1989), n. 4, pp. 343-350, Milano.

Fantini Sestini N. (1992) - The Middle Triassic new genus *Praepinacoceras* (Family Pinacoceratidae). *Riv. It. Paleont. Strat.*, v. 97 (1991), n. 3-4, pp. 269-274, Milano.

Fantini Sestini N. (1994) - The Ladinian ammonoids from Calcare di Esino of Val Parina (Bergamasc Alps, Northern Italy). Pt. 1. *Riv. It. Paleont. Strat.*, v. 100, n. 2, pp. 227-284, Milano.

Gaetani M., Gnaccolini M., Poliani G., Grignani M., Gorza M. & Martellini L. (1992) - An anoxic intraplatform basin in the Middle Triassic of Lombardy (Southern Alps, Italy): anatomy of a hydrocarbon source. *Riv. It. Paleont. Strat.*, v. 97 (1991), n. 3-4, pp. 329-354, Milano.

Jacobshagen V. (1967) - Cephalopoden-Stratigraphie der Hallstaetter Kalke am Asclepieion von Epidauros (Argolis, Griechenland). *Geol. Palaeont.*, v. 1, pp. 13-33, Marburg.

Jadoul F., Gervasutti M. & Fantini Sestini N. (1992) - The Middle Triassic of the Brembana Valley: preliminary study of the Esino Platform (Bergamasc Alps). *Riv. It. Paleont. Strat.*, v. 98, n. 3, pp. 299-324, Milano.

Krystyn L. (1983) - Das Epidaurus-Profil (Griechenland) - Ein Beitrag zur Conodonten-Standardzonierung des tethyalen Ladin und Unterkarn. In Zapfe H. (Ed.) - Neue Beiträge zur Biostratigraphie des Tethys-Trias. *Schriften. Erdwiss. Komm. Österr. Akad. Wiss.*, v. 5, pp. 231-258, Wien.

Krystyn L. & Tatzreiter F. (1991) - Middle Triassic Ammonoids from Aghdarband (NE-Iran) and their Palaeobiogeographical Significance. *Abh. Geol. B.-A*, v. 38, pp. 139-163, Wien.

Manfrin S. & Mietto P. (1995) - The Anisian/Ladinian boundary: A contribution. *Albertiana*, n. 15, pp. 26-36, Utrecht.

Mietto P. & Manfrin S. (1995) - A high resolution Middle Triassic Ammonoid Standard Scale in the Tethys Realm. A preliminary report. *Bull. Soc. Géol. France*, v. 166, n. 5, pp. 539-563, Paris.

Mojsisovics E. (1873-1902) - Das Gebirge um Hallstatt. Abt. 1. Die Cephalopoden der Halstaetter Kalke. *Abhandl. K.K. Geol. Reichsanst.*, v. 6, 835 pp., Wien.

Mojsisovic E. (1882) - Die Cephalopoden der mediterranen Triasprovinz. *Abhandl. K. K. Geol. Reichsanst.*, v. 10, 322 pp., Wien.

Paganoni A. (1985) - Una importante donazione di fossili: la Collezione Gervasutti. *Riv. Mus. Sc. Nat. Bergamo*, v. 9, pp. 147-148, Bergamo.

Reis O.M. (1901) - Eine fauna des Wettersteinkalkes. I Teil: Cephalopoden. *Geogn. Jahresh.*, v. 13, pp. 71-105, Muenchen.

Reis O.M.(1907) - Eine Fauna des Wettersteinkalkes. II Teil: Nachtrag zu den Cephalopoden. *Geogn. Jahresh.*, v. 18, pp. 113-152, Muenchen.

Rieber H. (1973) - Cephalopoden aus der Grenzbitumenzone (Mittlere Trias) des Monte San Giorgio (Kt.Tessin, Schweiz). *Mem. Schweiz. Palaeont.*, v. 93, 96 pp., Basel.

Rossi Ronchetti C. (1960) - Il Trias in Lombardia (Studi geologici e paleontologici). Cefalopodi del Gruppo delle Grigne. *Riv. It. Paleont. Strat.*, v. 66, n. 1, 64 pp., Milano.

Salomon C. (1895) - Geologische und palaeontologische Studien ueber Marmolada. *Palaeontographica*, v. 42, 210 pp., Stuttgart.

Savary J. & Guex J. (1991) - Biograph: un nouveau programme de construction des corrélations biochronologiques basées sur les associations unitaires. *Bull. Soc. Vaud. Sc. Nat.*, v. 80, n. 3, pp. 317-340, Lausanne.

Silberling N.J. & Nichols K.M.(1982) - Middle Triassic Molluskan fossils of biostratigraphic significance from Humboldt Range, northwestern Nevada. *U.S. Geol. Survey, Prof. Paper* n. 1207, 77 pp., Washington.

Spath L.T. (1951) - The Ammonoidea of the Trias. (II). *Catal. Foss. Cephalopoda Brit. Mus. (Nat. Hist.)*, pt. 5, 228 pp., London.

Stoppani A. (1858) - Les pétrifications d'Esino ou description des fossiles appartenants au dépôt triasique supérieur des environs d' Esino en Lombardie. *Paléont. Lomb.*, ser. 1, 151 pp., Milano.

Tommasi A. (1899) - La fauna dei calcari rossi e grigi del M.Clapsavon nella Carnia occ. *Palaeont. Ital.*, v. 5, 54 pp., Pisa.

Tozer E.T. (1981) - Triassic Ammonoidea: Classification, Evolution and Relationships with Permian and Jurassic forms. In House M. R. & Senior J. R. (Eds.) - The Ammonoidea. *The Syst. Ass.*, sp. vol., v. 18, pp. 66-100, Acad. Press, London.

Tozer E.T. (1994) - Canadian Triassic Ammonoid Faunas. *Geol. Survey Canada*, Bull. 467, 663 pp., Ottawa.

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