Rivista Italiana di Paleontologia e Stratigrafia	volume 120	no. 3	pp. 281-286	December 2014

RASATOMARIA GENTILII GEN. N. N. SP. - A NEW MIDDLE TRIASSIC PLEUROTOMARIOID GASTROPOD GENUS AND SPECIES FROM RASA DI VARESE (SAN SALVATORE FORMATION, SOUTHERN ALPS)

VITTORIO PIERONI [1] & ALEXANDER NÜTZEL [2]

Received: August 08, 2014; accepted: October 29, 2014

Key words: Gastropoda, Pleurotomariidae, Italy, Triassic, Anisian, San Salvatore Formation.

Abstract. A new Middle Triassic (Uppermost Anisian, Illyrian) gastropod genus and species, *Rasatomaria gentilii* gen. n. n. sp., is described from the San Salvatore Formation from Rasa, an outer district of the town Varese (Lombardy, Italy). The studied specimens come from a diverse benthic marine assemblage, which is dominated by gastropods and bivalves. Based on ammonoids, this assemblage belongs to the *Nevadites secedensis* Zone. The new gastropod taxon is very low-spired, widely phaneromphalous, has a selenizone slightly above the periphery of the whorls and a dominant spiral ornament. It belongs to the superfamily Pleurotomarioidea and its knowledge improves our understanding of the Middle and Late Triassic radiation of this group.

Introduction

Diverse gastropod faunas have been described from the Middle Triassic calcareous platform carbonates of the Southern Alps (North Italy) e.g., from the Marmolada and Esino Limestone (e.g., Stoppani 1850-60; Kittl 1899).

During excavations for buildings in Rasa di Varese on the M. Campo dei Fiori foothills, a diverse late Anisian marine fossil assemblage was collected from dolomitic deposits (Pieroni 2011). This fauna comprises more than 50 benthic invertebrate species and it is largely dominated by gastropods and bivalves (Pieroni 2011). Moreover, it yielded an abundant cephalopod fauna (Pieroni 2011) and vertebrate remains (Renesto & Pieroni 2013). It also yielded specimens of a low-spired gastropod species, which was previously identified as *Kittlidiscus lottneri* Eck, 1865. This gastropod is here described as a new genus and new species *Rasatomaria gentilii* gen. n. n. sp.

Location and geological setting

The fossil bearing dolomitic Middle Triassic deposits of Rasa are located towards the East of M. Campo dei Fiori, in the Rasa village and at the confluence of Rio Sesnivi with Olona river, below the street "Provinciale della Rasa", on the right bank of river Olona (520 m a.s.l.). Detailed maps of the fossil locations were given by Pieroni (2011) and by Renesto & Pieroni (2013).

The Rasa Dolomite ("Dolomia della Rasa" according to Airaghi 1935) belongs to the San Salvatore Formation (Salvatoredolomit according to von Buch 1830, see also Zorn 1971). This formation crops out in the entire Rasa Valley. The San Salvatore Formation consists of calcareous dolomite and is widespread in the area between the Lake of Varese, the Maggiore Lake and the Lake of Lugano (known also as Lake Ceresio in Italy).

The Rasa Dolomite consists of dolomitized platform carbonates formed in tropical shallow waters. Fossils are only abundant in local accumulations of post-mortem transported shelly material. In the Rasa Valley, the Rasa Dolomite is uniform in facies (back-reef) and apparently the black shales of the Besano Formation (Grenzbitumenzone), commonly interrupting the suc-

1 Museo Scientifico Naturalistico "A. Stoppani", Seminario Arcivescovile "Pio XI", Via Papa Pio XI, 32, I-21040 Venegono Inferiore (VA), Italy.

2 SNSB-Bayerische Staatssammlung für Paläontologie und Geologie, Department of Earth and Environmental Sciences, Palaeontology & Geobiology, GeoBio-Center LMU, Richard-Wagner-Str. 10, 80333 München, Germany. E-mail: a.nuetzel@lrz.uni-muenchen.de

cession elsewhere, do not occur. The ammonoids show that the studied fossils of the Rasa Dolomite have the same age as the Besano Formation at Monte San Giorgio in Switzerland (see Rieber 1973). The Rasa Dolomite is a thick-bedded or massive, micritic, white-rosy or hazel dolostone. It yields only locally bitumen staining the rock dark grey. Original sedimentary structures have been obliterated by dolomite growth. Microfossils are rare or poorly preserved because of the dolomitization. The dasycladacean algae *Diplopora annulata* and *Teutloporella herculea* have been reported (Pieroni 2011). The majority of the gastropod specimens was collected from the outcrop named SEZ. D (Section D and D1 according to Pieroni 2011) located in the center of the village Rasa di Varese.

In association with the benthic fauna, an abundant and diverse ammonoid assemblage has been reported by Pieroni (2011) comprising *Nevadites ambrosionii* (Airaghi, 1912), *Serpianites serpianensis* (Airaghi, 1912), "*Celtites*" sp., *Serpianites curionii* Rieber, 1973, *Parakellnerites frauenfelderi* Rieber, 1973, and *Flexoptychites acutus* (Mojsisovics, 1882).

The generic attribution of the Anisian "*Celtites*" forms is uncertain. The forms from the Rasa dolostone are placed tentatively in the group of "*Celtites evolutus*" *sensu* Salomon, 1895 (see also *Celtites* described by Airaghi 1912).

Based on the ammonoids, the "Dolomia della Rasa" exposed in the described outcrop has a late Anisian age and belongs to the *Nevadites secedensis* Zone *sensu* Brack et al. (2005).

Methods

The specimens are preserved as external moulds, partially with internal moulds. The shell itself is not preserved. The moulds are covered with fine dolomite crystals and some are covered by pseudo-shell, preserved as thin dolomitic covers. Moulds and pseudoshells may be well-preserved showing growth lines and ornaments in detail. Fragile specimens were hardened with cianoacrylate. Casts were produced from moulds.

Material and repository

All specimens are stored in the Natural History Museum "A. Stoppani", Seminario Arcivescovile of Venegono Inferiore (Varese, Italy). Casts of the specimens are housed in the Bayerische Staatssammlung für Paläontologie und Geologie in Munich (Germany) (SNSB-BSPG 2014 II).

The majority of the specimens was collected from the outcrop SEZ. D (see Pieroni 2011 for location map) located in the center of the village. Other specimens were collected from SEZ. B (close to the base of SEZ. D) and from SEZ. I (close to Rasa village, representing the same level as SEZ. D).

Besides the holotype and the paratypes, we have at hand several additional poorly preserved and fragmentary specimens from SEZ. D. A specimen from the Latemar Limestone (N Italy) representing the new genus and probably the new species, is present at the Paläontologisches Institut und Museum of Zürich (PIMUZ 31143). It derives from a collection predominantly consisting of Anisian/Ladinian ammonoids made by Hans Rieber and Peter Brack. This collection comes from the upper part of a section exposed in an outcrop called "Lastei di Valsorda". The material belongs to the *Reitzi/Kellnerites* Zone with the *Aplococeras avisianum* level sensu Brack & Rieber (1993) (upper Anisian) and is older than the Rasa Dolomite.

Systematic Paleontology

Class **Gastropoda** Cuvier, 1797

Subclass **Vetigastropoda** Salvini-Plawen, 1980

Superfamily Pleurotomarioidea Swainson, 1840

? Family Pleurotomariidae Swainson, 1840

Rasatomaria gen. n.

Type species: *Rasatomaria gentilii* gen. n. n. sp.

Derivatio nominis: After the village Rasa and the suffix –tomaria after the slit-bearing genus *Pleurotomaria*.

Diagnosis: Widely phaneromphalous, very low-spired shell with somewhat elevated and step-like spire; sutures deep; axial cross section of whorls approximately as high as wide, subcircular, and somewhat angulated at distinct spiral cords (polygonal); whorls ornamented with strong spiral cords and strengthened, sharp, thread-like, regularly spaced growth lines; narrow selenizone at or somewhat above periphery; selenizone bordered by distinct spiral threads; base of the whorls with distinct spiral cords; growth lines prosocline and prosocyrt above selenizone and prosocyrt below it.

Discussion. *Rasatomaria* gen. n. resembles the planispiral slit-bearing genus *Kokenella* Kittl, 1891. However, *Kokenella* is entirely planispiral (the spire is not elevated) and has axial (radial) ribs and a fine reticulate ornament. *Rasatomaria gentilii* gen. n. n. sp. type species of *Rasatomaria*, resembles *Euomphalus lottneri* Eck, 1865 from the Muschelkalk of Silesia (Poland) (see Assmann 1923, 1937; Schmidt 1928). However, *E. lottneri* lacks a selenizone and has opisthocline growth lines. Pieroni (2011) identified *Rasatomaria gentilii* gen. n. n. sp. as *Kittlidiscus lottneri* (Eck, 1865). However, the Late Triassic genus *Kittlidiscus* has a narrower umbilicus, its whorls are much wider than high and it has a concave or straight periphery, which is bordered by two keels. According to Knight et al. (1960), the periphery bears a wide selenizone. However, Bandel (2009) reported that it lacks a selenizone and placed the family Kittlidiscidae Cox, 1960 (in Knight et al.) in Caenogastropoda. *Pleurotomaria debuchii* J.A. Eudes-Deslongchamps, 1849 as illustrated by Fischer & Weber (1997), Schubert et al. (2008) and Szabó (2009) is a similar pleurotomariid from the Early Jurassic. However, *Pleurotomaria debuchii* has a narrower umbilicus and lacks strong spiral cords. *Rasatomaria* gen. n. resembles *Cyclostomaria* Szabó, 1980 from the Lower Jurassic (Pliensbachian) of Hungary and Austria (Szabó 2008, 2009). However, *Cyclostomaria* has the selenizone

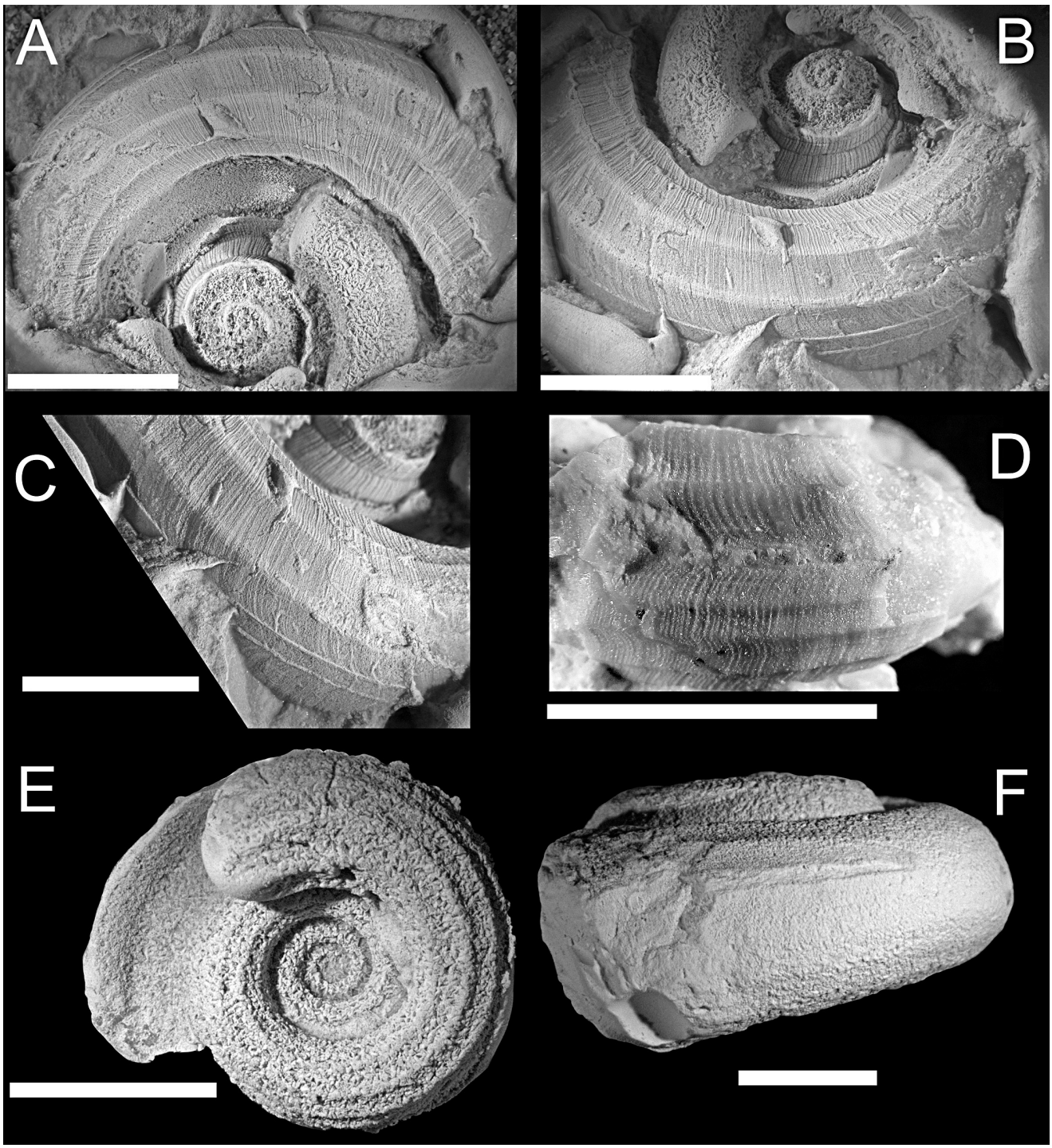

Fig. 1 - *Rasatomaria gentilii* gen. n. n. sp. A-C) Holotype, D 21-St166169 (cast at SNSB-BSPG 2014 II 8). D) Paratype, D 61-St166305 (cast at SNSB-BSPG 2014 II 4). E) Paratype, D 72-St172300 (cast at SNSB-BSPG 2014 II 7). F) Paratype, I 03-St166189 (cast at SNSB-BSPG 2014 II 6). All scales represent 1 cm.

higher on the whorls so that the selenizone is fully visible on spire whorls, while it is only visible on the last whorl in *Rasatomaria* gen. n. while the selenizone of the earlier whorls is covered by the following whorl. The whorls are evenly rounded in *Cyclostomaria* but polygonal in *Rasatomaria* gen. n.

We place the new genus tentatively in Pleurotomariidae. A placement near *Kokenella* is also possible but the higher assignment of *Rasatomaria* gen. n. needs more study.

Rasatomaria gentilii gen. n. n. sp.

Figs 1-2

2011 *Kittlidiscus lottneri* Eck, 1865 - Pieroni, p. 41, pl. 4 gasteropodi, text-fig. p. 153-154.

2013 *Kittlidiscus lottneri* Eck, 1865 - Renesto & Pieroni, p. 485.

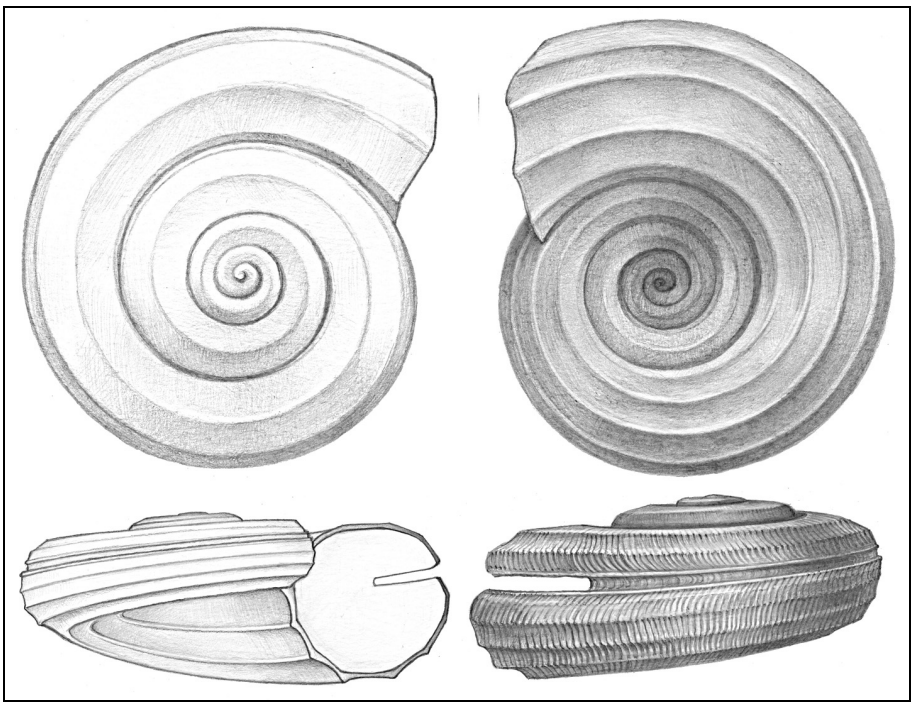

Fig. 2 - Reconstruction of *Rasatomaria gentilii* gen. n. n. sp. Regularly spaced strengthened, sharp growth lines only shown on lower right.

Derivatio nominis: After Dr. Elio Gentili who discovered the outcrop.

Holotype: D 21-St166169 (max measurement: 30.5 mm; estimated diameter: 36.50 mm); pseudo-shell of inner whorls (incomplete) and mould of the last whorl (incomplete, with preserved part of selenizone), from SEZ. D.

Paratypes: Three specimens from SEZ. D: D 72-St172300 (diameter: 20 mm; umbilicus: 8 mm); cast of dolostone nearly complete with preserved part of teleoconch and base; D 61-St166305 (diameter: 19 mm); part of pseudo-shell (with preserved slit and growth lines) and part of crystallized deformed cast; D 62-St166306 (diameter: 44 mm; height: 26 mm; pleural angle: 125°), poorly preserved cast consisting of dolostone of a nearly complete, relatively large specimen. One specimen from SEZ. I: I 03-St166189 (diameter: 34 mm; umbilicus: 17 mm; height: 15.0 mm; pleural angle: 130°); cast of dolostone, nearly complete. One specimen from SEZ. B: B 58 (diameter: 23 mm; height: 10 mm; pleural angle: 130°); cast of dolostone nearly complete with first whorl and part of external mould.

Locus typicus: SEZ. D (see Pieroni 2011), Rasa village (Municipality of Varese), Lombardy, Northern Italy.

Stratum typicum: Outcrop SEZ. D, a stratigraphic section of Rasa Dolomite (= Salvatore Dolomite) with *Nevadites ambrosionii* (Airaghi, 1912) and *Serpianites serpianensis* (Airaghi, 1912) indicating a stratigraphical position probably corresponding to the *Nevadites secedensis* Zone (uppermost Anisian) as defined by Brack et al. (2005).

Description. The shell is low-spired and widely phaneromphalous. The holotype, a fragment of a mould, has a diameter of 30.5 mm. The largest specimen has a diameter of 46 mm and a height of 23 mm. The spire is somewhat elevated and step-like. The suture is deep. The axial cross section of the whorls is approximately as high as wide, subcircular and somewhat angulated at distinct spiral cords (polygonal). The whorls are ornamented with strong, widely spaced spiral cords and strengthened thread-like, sharp, regularly spaced growth lines. The whorls bear a narrow selenizone somewhat above the periphery. The selenizone is bordered by distinct spiral threads. There are three spiral cords between adapical suture and selenizone. The adapical spiral cord is relatively weak. The two other spiral cords are stronger and have the same strength. The base is widely phaneromphalous so that all whorls are visible from below. The base bears up to six distinct spiral cords. The growth lines are distinct. They are prosocline and prosocyrt above the selenizone and prosocyrt below it. They curve strongly backward towards the selenizone.

Discussion

In contrast to the rich gastropod faunas reported from the Ladinian and Carnian of the Southern Alps (Marmolada, Esino, S. Cassiano), much fewer Anisian gastropods have been reported from this region. In so far, the finding of the gastropod fauna of Rasa di Varese including the new taxon *Rasatomaria gentilii* gen. n. n. sp. represents crucial new information. Widely phaneromphalous slit-bearing gastropods are rare in the Palaeozoic and unknown in the Early Triassic. Thus, the Anisian occurrence of *Rasatomaria* gen. n. represents further evidence for the ongoing recovery of gastropods from the end-Permian mass extinction including evolution of new shell architectures. Pleurotomarioid gastropods were hit hard by the extinction, but rebounded strongly during the Middle and Late Triassic (Hickman 1984; Nützel 2005).

Acknowledgements: We would like thank very much Dr. Elio Gentili, director of the "A. Stoppani" Natural History Museum (Seminario di Venegono Inferiore), and his team. We would like to thank the reviewers Dr. Stefano Monari (Padova) and Dr. Andrzej Kaim (Warszawa) for their thoughtful reviews.

REFERENCES

Airaghi C. (1912) - I molluschi degli Scisti Bituminosi di Besano in Lombardia. *Atti Soc. Ital. Sc. Nat.*, 51: 1-30.

Airaghi C. (1935) - I fossili della Dolomia Triasica della Rasa (Varese). *Rend. R. Ist. Lomb. Sc. Lett. ser. II*, 68: 191-196.

Assmann P. (1923) - Die Gastropoden der oberschlesischen Trias. *Jb. Preuss. Geol. L.-A.*, 44: 1-50.

Assmann P. (1937) - Revision der Fauna der Wirbellosen der oberschlesischen Trias. *Abh. Preuss. Geol. L.-A., N. F.,* 170: 1-134.

Bandel K. (2009) - The slit bearing nacreous Archaeogastropoda of the Triassic tropical reefs in the St. Cassian Formation with evaluation of the taxonomic value of the selenizone. *Berliner paläobiol. Abh.*, 10: 5-47.

Brack P. & Rieber H. (1993) - Towards a better definition of the Anisian/Ladinian boundary: new biostratigraphical data and correlations of boundary sections from the Southern Alps. *Eclogae Geol. Helv.*, 86: 415-527.

Brack P., Rieber H., Nicora A. & Mundil R. (2005) - The Global boundary Stratotype Section and Point (GSSP) of the Ladinian Stage (Middle Triassic) at Bagolino (Southern Alps, Northern Italy) and its implications for the Triassic time scale. *Episodes*, 28: 233-244.

Buch L. von (1830) - Ueber einige geognostische Erscheinungen in der Umgebung des Luganer Sees in der Schweiz. *Abh. physik. Kl. Kgl.-Preuss. Akad. Wissensch.*, 1827: 193-204.

Eck H. (1865) - Ueber der Formationen des bunten Sandsteins und des Muschelkalks in Oberschlesien und ihre Versteinerungen. Starcke, Berlin, 158 pp.

Eudes–Deslongchamps J.A. (1849) - Mémoire sur les Pleurotomaires des terrains secondaires du Calvados. *Mém. Soc. Linn. Normandie*, 8: 1-157.

Fischer J.-C. & Weber C. (1997) - Révision critique de la Paléontologie Française d'Alcide d'Orbigny (incluant la réédition de l'original). Volume II, Gastropodes Jurassiques. Muséum National d'Histoire Naturelle and Masson, Paris, 300 pp.

Hickman C.S. (1984) - *Pleurotomaria*: Pedigreed perseverance? In: Eldredge N. & Stanley S.M. (Ed.) - Living Fossils: 225-231, Springer, New York, Berlin, Heidelberg, Tokyo.

Kittl E. (1891) - Die Gastropoden der Schichten von St. Cassian der Südalpinen Trias. *Ann. K. K. Naturhist. Hofmus.*, 6: 166-277.

Kittl E. (1899) - Die Gastropoden der Esinokalke, nebst einer Revision der Gastropoden der Marmolatakalke. *Ann. K. K. Naturhist. Hofmus.*, 14: 1-237.

Knight J.B., Cox L.R., Keen A.M., Batten R.L., Yochelson E.L. & Robertson R. (1960) - Systematic descriptions. In: Moore R.C. (Ed.) - Treatise on Invertebrate Paleontology, Part I, Mollusca 1: I169-I310. Geol. Soc. Amer. Univ. Kansas Press, Lawrence.

Mojsisovics E. von (1882) - Die Cephalopoden der Mediterranen Trias-Provinz. *Abh. K. K. Geol. Reichsanst.*, 10: 1-322.

Nützel A. (2005) - Recovery of gastropods in the Early Triassic. *CR Palevol*, 4: 501-515.

Pieroni V. (2011) - La Rasa di Varese e i suoi fossili. Pietro Macchione, Varese, 157 pp.

Renesto S. & Pieroni V. (2013) - Middle Triassic vertebrate remains from Rasa village (Varese, Northern Italy). *New Mexico Mus. Nat. Hist. Sci. Bull.,* 1: 485-488.

Rieber H. (1973) - Die Triasfauna der Tessiner Kalkalpen. XXII, Cephalopoden aus der Grenzbitumenzone der mittleren Trias des Monte San Giorgio (Kt. Tessin, Schweiz). *Schweiz. Paläont. Abh.*, 93: 1-96.

Salomon W. (1895) - Geologische und palaeontologische Studien über die Marmolata mit Ausschluss der Gastropoden. *Palaeontographica*, 42: 1-210.

Salvini-Plawén L. von (1980) - A reconsideration of systematics in the Mollusca (phylogeny and higher classification). *Malacologia*, 19: 249-278.

Schmidt M. (1928) - Die Lebewelt unserer Trias. Hohenlohe'sche Buchhandlung. Ferdinand Rau, Öhringen, 461 pp.

Schubert S., Gründel J. & Nützel A. (2008) - Early Jurassic (Upper Pliensbachian) gastropods from the Herforder Liasmulde (Bielefeld, Northwest Germany*). Paläont. Z.*, 82: 17-30.

Stoppani A. (1858-60) - Paléontologie Lombarde ou description des fossiles de Lombardie. Les pétrifactions d'Esino. Les gasteropodes, les acéphales, les brachiopodes, les cépahlopodes, les crinoides, les zoophytes, et les amorphozoaires. Joseph Bernardoni, Milano, 153 pp.

Swainson W. (1840) - A treatise on malacology or shells and shell fish. Longman, London, 419 pp.

Szabó J. (1980) - Lower and Middle Jurassic Gastropods from the Bakony Mountains (Hungary). Part 2. Pleurotomariacea and Fissurellacea (Archaeogastropoda). *Ann. Hist.-Nat. Mus. Nat. Hung.*, 72: 49-71.

Szabó J. (2008) - A nomenclatorial revision of *Pleurotomaria suessii* and *Cyclostomaria*. *Neues. Jb. Geol. Paläont. Abh.*, 250(2): 167-176.

Szabó J. (2009) - Gastropods of the Early Jurassic Hierlatz Limestone Formation; part 1: a revision of the type collections from Austrian and Hungarian localities. *Fragmenta Palaeontologica Hungarica*, 26: 1-108.

Zorn H. (1971) - Paläontologische, stratigraphische und sedimentologische Untersuchungen des Salvatoredolomits (Mitteltrias) der Tessiner Kalkalpen. *Schweiz. Paläont. Abh.*, 91: 1-90.