



# The mollusk type-material of Gaetano Rovereto in the “BTP Collection” (Museo di Paleontologia - DISTAV - Università di Genova): the Oligocene types from Mioglia area

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**KEY WORDS** - BTP Collection, Gaetano Rovereto, gastropod, bivalve and cephalopod type materials, Oligocene, NW Italy.

**ABSTRACT** - The present paper examines the types of the gastropod, cephalopod, and bivalve new taxa described by Gaetano Rovereto in the years 1897-1914 from the Oligocene rocks of Mioglia area (Molare Formation and Rocchetta-Monesiglio Formation, Tertiary Piedmont Basin, Southern Piedmont - Central Liguria, NW Italy). These taxa are part of the “Collezione BTP” (BTP Collection) housed at the Dipartimento di Scienze della Terra, dell’Ambiente e della Vita - DISTAV - of the Università di Genova. The Mioglia area collecting sites reported on in Rovereto’s papers have been verified on field. In the Mioglia area, Rovereto identified six new species of gastropods (preserved in the BTP Collection), one of cephalopods (preserved) and 17 new taxa of bivalves (16 preserved, one lost). This paper focuses on six gastropod, one cephalopod and 14 bivalve taxa originally described by Rovereto and presently included in the BTP Collection. As a result of this revision some taxa were confirmed, others were put into synonymy and others have undergone a change of genus attribution.

**RIASSUNTO** - [I Tipi di molluschi di Gaetano Rovereto nella Collezione BTP (Museo di Paleontologia - DISTAV - Università di Genova): i tipi provenienti dall’area di Mioglia] - Questo lavoro è il secondo di una serie che prende in esame i tipi dei nuovi taxa di molluschi descritti da Gaetano Rovereto (1897-1914), raccolti nei siti fossiliferi oligo-miocenici del Bacino Terziario del Piemonte e conservati nella “Collezione BTP” del Dipartimento di Scienze della Terra, dell’Ambiente e della Vita dell’Università di Genova. In questa sede vengono presentati i risultati della revisione dei tipi di molluschi di Rovereto provenienti dalle successioni oligoceniche dell’area di Mioglia (Piemonte meridionale - Liguria centrale) e specificatamente dalla Formazione di Molare e dalla Formazione di Rocchetta-Monesiglio (Bacino Terziario del Piemonte). Sulla base delle indicazioni contenute nei lavori, al fine di dare informazioni sul contesto lito- e biostratigrafico, sono state ricercate e verificate sul terreno le “località tipo”, delle quali viene qui data sintetica descrizione. Rovereto descrisse sei nuove specie di gasteropodi (tutte conservate nella Collezione BTP), una nuova specie di cefalopodi (conservato) e 17 nuovi taxa di bivalvi (16 conservati, uno andato perduto) aventi come località-tipo “Mioglia”. In questo lavoro vengono presi in esame sei taxa di gasteropodi, uno di cefalopodi e 14 di bivalvi provenienti dall’area di Mioglia, descritti da Rovereto e attualmente conservati nella Collezione BTP. La revisione di questi tipi ha portato in alcuni casi a variazioni di attribuzione generica, in altri alla conferma ed in altri ancora alla messa in sinonimia con altri taxa.

## INTRODUCTION

This paper, as the previous one (Bonci et al., 2014), is part of a project of revision of Oligocene Mollusca new taxa erected by Gaetano Rovereto in the years 1897-1914. Future contributions will deal with Rovereto’s original material having the type-locality in the Sassello, Santa Giustina, Carcare, Dego, Squaneto and Tagliolo areas, and the definition of the current taxonomic status for the taxa whose specimens are no longer available in the Collection. Rovereto’s new taxa are part of the “BTP Collection” housed at the Museo di Paleontologia, Dipartimento di Scienze della Terra, dell’Ambiente e della Vita (DISTAV), Università di Genova. The name of the collection (BTP) is the acronym of “Bacino Terziario del Piemonte” (Tertiary Piedmont Basin, the geological unit in which the specimens were collected). Information about history and composition of the collection were provided by Bonci et al. (2014).

In the Mioglia area, Rovereto (1897, 1898, 1900, 1914) identified six new species of gastropods, one of cephalopods and 17 new taxa of bivalves. All gastropod and cephalopod taxa are preserved in the BTP Collection

and are here considered (Tab. 1). As regards the bivalve taxa it should be noted that: 1) the specimens of *Ostrea (Gryphaea) brongniarti* Bronn var. *planulata* Rovereto, 1900 have been lost; 2) *Ostrea (Alectryonia) apenninica* Rovereto, 1897 was changed to *Ostrea (Alectryonia) apenninica* Rovereto by Rovereto (1900), and subsequently Rovereto (1914) recognised that this species is a younger synonym of “*Ostrea (Ostreola?) martinsi* d’Archiac, 1848” (the specimen is preserved in the BTP Collection); 3) *Ostrea (Ostrea) isseli* n. denom. Rovereto var. *elongata* Rovereto, 1897 is preserved but not here revised because it will be considered in a forthcoming paper dedicated to the species to which it relates. Therefore, 14 bivalve taxa (preserved) are here considered (Tab. 1).

## GEOLOGICAL SETTING

The specimens of G. Rovereto forming the BTP Collection come from several localities located in the central and southern part of the Tertiary Piedmont Basin: Carcare, Cassinelle, Dego, Mioglia, Pareto, Rocchetta

Original name in Rovereto (1897, 1898, 1900, 1914)	New name (this paper)	Catalog number
<b>Gastropoda</b>		
<i>Cassisoma semielegans</i> Rovereto, 1900	<i>Echinophoria semielegans</i> Rovereto, 1900	1896/M-III-M 10
<i>Cerithium? indelimum</i> Rovereto, 1914	<i>Cerithium indelimum</i> Rovereto, 1914	1903/M-III-M 17
<i>Clavilithes? felixrenata</i> Rovereto, 1914	<i>Clavilithes felixrenata</i> Rovereto, 1914	2972/M-III-M 226
<i>Murex (Haustellum) exstatus</i> Rovereto, 1914	<i>Murex exstatus</i> Rovereto, 1914	2979/M-III-M 233
<i>Ocenebra (Ocenebrina) obba</i> Rovereto, 1914	<i>Ocenebrina obba</i> Rovereto, 1914	2980/M-III-M 234
<i>Potamides (Terebralia) pinoides</i> Rovereto, 1900	<i>Terebralia pinoides</i> Rovereto, 1900	1902/M-III-M 16
<b>Cephalopoda</b>		
<i>Aturia Paronai</i> Rovereto, 1900	<i>Aturia paronai</i> Rovereto, 1900	3086/M-III-M 325
<b>Bivalvia</b>		
<i>Arca (Barbatia) ex barbata</i> Rovereto, 1898	<i>Barbatia ex barbata</i> (Rovereto, 1898)	1921/M-III-M 35
<i>Cardita (Cardita) Arduini</i> Brongn. var. <i>corbuloides</i> Rovereto, 1898	<i>Cardita arduini</i> Brongniart, 1823	2876/M-III-M 114
<i>Cardita (Cardita) Arduini</i> Brongn. var. <i>truncata</i> Rovereto, 1898	<i>Cardita arduini</i> Brongniart, 1823	1914/M-III-M 28
<i>Chlamys (Lyropecten) callifera</i> Rovereto, 1898	<i>Nodipecten calliferus</i> (Rovereto, 1898)	1907/M-III-M 21
<i>Dreissensia (Prodreissensia) Perrandoi</i> Rovereto, 1898 = <i>Mytilus (Hormomya) Perrandoi</i> Rovereto, 1914	<i>Prodreissensia perrandoi</i> Rovereto, 1898	1913/M-III-M 27
<i>Modiola aphaea</i> Rovereto, 1898	<i>Modiolus aphaeus</i> (Rovereto, 1898)	1915/M-III-M 29
<i>Mytilus halycinus</i> Rovereto, 1898	<i>Mytilus halycinus</i> Rovereto, 1898	1905/M-III-M 19
<i>Ostrea (Gryphaea) clypeata</i> Rovereto, 1897	<i>Pycnodonte clypeata</i> (Rovereto, 1897)	1918/M-III-M 32
<i>Ostrea (Ostrea) gibbosula</i> Rovereto, 1897	<i>Crassostrea gibbosula</i> (Rovereto, 1897)	2838/M-III-M 78
<i>Pectunculus incognitus</i> Rovereto, 1898	<i>Glycymeris incognita</i> (Rovereto, 1898)	1916/M-III-M 30
<i>Pectunculus rabadotus</i> Rovereto, 1898	<i>Glycymeris rabadota</i> (Rovereto, 1898)	1910/M-III-M 24
<i>Pinna ventilabrum</i> Rovereto, 1898	<i>Pinna (Pinna) ventilabrum</i> Rovereto, 1898	1917/M-III-M 31
<i>Spondylus vaginatus</i> Rovereto, 1897 = <i>Spondylus bifrons</i> Münst. var. <i>vaginata</i> Rovereto, 1914	<i>Spondylus podopsideus</i> Lamarck, 1819	1920/M-III-M 34
<i>Thracia Canavarii</i> Rovereto, 1898	<i>Thracia maninensis</i> (De Gregorio, 1894)	2888/M-III-M 125

Tab. 1 - List of the mollusk taxa described by Rovereto (1897, 1898, 1900, 1914) considered in this paper and preserved in the BTP Collection.

Cairo, Rossiglione, Santa Giustina, Sassello, Squaneto, Tagliolo, Varazze.

The Tertiary Piedmont Basin (NW Italy) is a syn-tectonic Neoalpine-Apennine basin filled by a non-marine to marine late Eocene - late Miocene sedimentary succession; it unconformably overlies the collisional stack of tectonic units resulting from the main alpine orogenic deformation phases, but its depositional history is also controlled by eustatic events (Gelati & Gnaccolini, 1988; Mutti et al., 1995; Giglia et al., 1996; Capponi et al., 2001; Capponi et al., 2009; Federico et al., 2015 and references therein).

Late Eocene - early Miocene, pre-transgressive to transgressive very coarse to very fine siliciclastic deposits and minor reef limestones represent the first sedimentation stage of Tertiary Piedmont Basin (Lorenz, 1969; Gelati & Gnaccolini, 1988; Turco et al., 1994; Mutti et al., 1995; Quaranta et al., 2009; Gelati et al., 2010; Bonci et al., 2011; Capponi et al., 2013; Bonci et al., 2014; Federico et al., 2015 and references therein). These rocks are grouped into

different formations, among which the Molare Formation (Oligocene) and the Rocchetta-Monesiglio Formation (late Oligocene - early Miocene) (Gelati et al., 2010; Capponi et al., 2013; and references therein) are found to be the source of the fossils forming the BTP Collection.

#### THE COLLECTING SITES IN THE MIOGLIA AREA

According to Rovereto's papers (1897, 1898, 1900, 1914), the mollusk types of the Mioglia area were collected from two collecting sites, with a clearly defined topographic position (Fig. 1): Cimitero di Mioglia (A, Cemetery of Mioglia) and Castello di Mioglia (B, Mioglia Castle).

The survey performed by the present authors in the Mioglia area allowed to identify the areas in which are located the sampling sites. The two areas are characterized by the occurrence of fossiliferous beds (see the following short stratigraphic description) showing lithological

and paleontological features consistent with those of the samples collected by Rovereto. However, in these outcrops we have not found specimens of the taxa described by Rovereto, therefore, we cannot link each of the Rovereto taxa to one of the two identified sites.

A) Cemetery of Mioglia (GPS: 32T UTM 0453592 4926525, 364 m a.s.l.; site A in Fig. 1, Fig. 2). The 17 m-thick stratigraphic section is composed of (bottom to top):

1. thin bedded, burrowed, very fine sandstones and claystones (10 m);

2. irregular alternation of matrix-supported, very poorly to poorly sorted conglomerates and grain-supported, very coarse to fine sandstones (5.25 m);

3. fossiliferous, burrowed, poorly sorted sandstones with carbonate cement (1.75 m), the fossil content includes bivalves (*Pecten arcuatus* Brocchi, 1814, Ostreoida, Lucinidae, Glycymerididae), gastropods (*Haustator confasciatus* [Sacco, 1895], cf. *Tornatella simulata* [Solander in Brander, 1766], Naticidae), solitary corals, worm tubes and foraminifers (Miliolidae, *Amphistegina* sp., *Neorotalia* sp., *Nummulites fichteli* Michelotti, 1841 and *Operculina complanata* [Defrance, 1822]).

The fossiliferous sandstones have yielded a large number of specimens of *O. complanata* and few *N. fichteli*, but no other fossils with biostratigraphic value; this evidence points to a SB21 Zone assignment, i.e. an

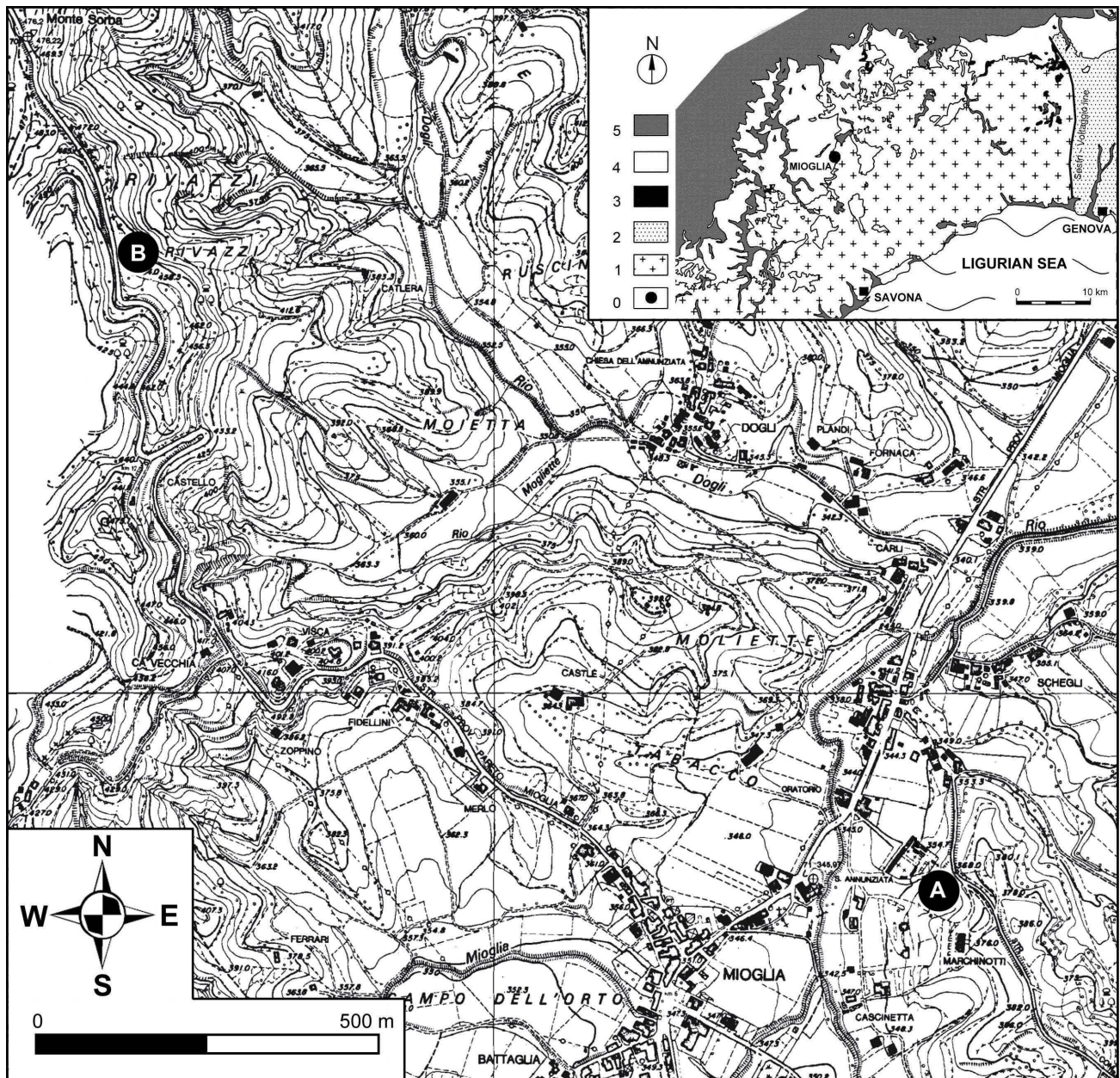


Fig. 1 - Geographic location of the collecting sites in the Mioglia area: A = site A, Cemetery of Mioglia (GPS: 32 T UTM 0453592 4926525, 373 m a.s.l.); B = site B, Mioglia Castle (GPS: 32 T UTM 0449937 4930171, 419 m a.s.l.). In the upper right corner the geological sketch map and the location of the Mioglia area: 0 = Mioglia area, 1 = Ligurian Alps, 2 = Ligurian units, 3 = Tertiary Piedmont Basin nonmarine pre-transgression deposits (late Eocene - early Oligocene), 4 = Tertiary Piedmont Basin transgressive deposits (early Oligocene - Aquitanian), 5 = Tertiary Piedmont Basin post-transgression deposits (Miocene) and Pliocene to Holocene deposits.

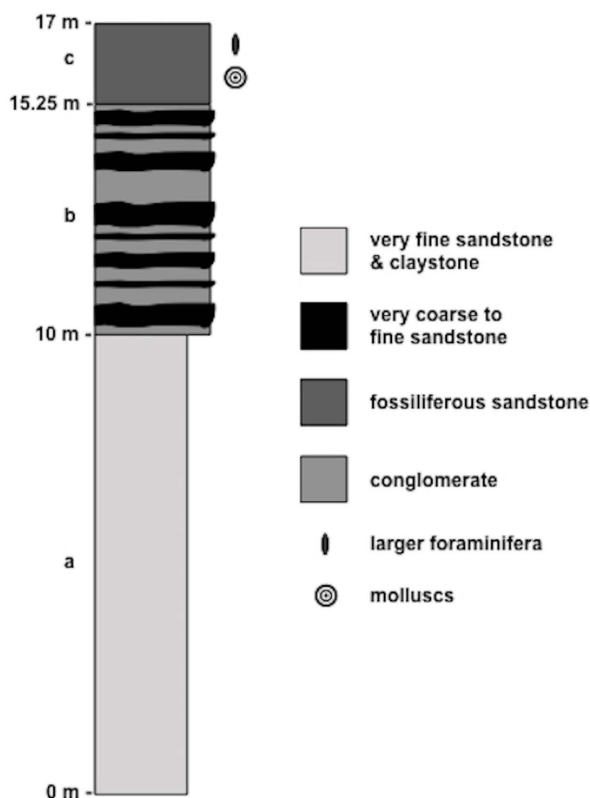


Fig. 2 – Stratigraphic section exposed at Cemetery of Mioglia sampling site.

early-middle Rupelian age (according to Cahuzac & Poignant, 1997).

Lithostratigraphic evidence suggests that this section is part of the Molare Formation (Oligocene).

B) Mioglia Castle (GPS: 32T UTM 0452371 4927447, 442 m a.s.l.; site B in Fig. 1, Fig. 3). The 10-meters thick stratigraphic section consists of (bottom to top):

1. marly siltstone (1.0 m);
2. irregular alternation of cement-supported, well sorted, medium sandstones and matrix-supported, poorly sorted conglomerates (1.8 m);
3. fossiliferous, matrix-supported, poorly sorted conglomerates with sandy matrix and carbonate cement, in which well sorted, fine sandstone very thin lenses are interbedded (3.2 m); the fossil content includes bivalves (cf. *Callista dubia* [Michelotti, 1861], Pectinidae, among which *Aequipeecten* cf. *miocenicus* [Michelotti, 1861], Glycymerididae, Ostreoida), gastropods (among which *Scaphander* cf. *oligoturritus* Sacco, 1897), branching (*Stylophora* sp.) and solitary coral fragments, serpulids, and foraminifers (among which few specimens of *Eulepidina*).

The distinction of the species of *Eulepidina* and their biostratigraphic value are still debated (Schiavinotto & Verrubi, 1996; Cahuzac & Poignant, 1997; Özcan & Less, 2009; Özcan et al., 2010, with references therein). Moreover, the few biometric data obtained from the equatorial sections of the rare *Eulepidina* specimens collected are inadequate for a statistical analysis. Therefore, focusing on the occurrence of the *Eulepidina*

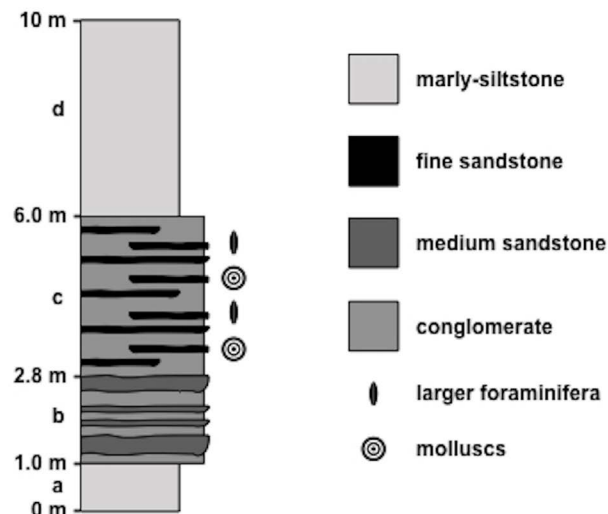


Fig. 3 - Stratigraphic section exposed at Mioglia Castle sampling site.

genus, that is confined to the Oligocene in the European basins (Cahuzac & Poignant, 1997; Özcan & Less, 2009), and the absence of *Nummulites fichteli* (a species very common in the Tertiary Piedmont Basin), the fossiliferous bed may be reliably assigned to the SB23 Zone of Cahuzac & Poignant (1997), i.e. middle-upper Chatian.

Lithostratigraphic evidence suggests that this section is part of the Rocchetta-Monesiglio Formation (late Oligocene - early Miocene).

#### ROVERETO'S MOLLUSK TYPES FROM THE MIOGLIA AREA

The classification scheme here adopted is that proposed by Kummel (1964), Check List of European Marine Mollusca (CLEMAM, 2009, 2013 - <http://www.somali.asso.fr/clemam/index,clemam.html>). Additional sources provide useful taxonomic and nomenclatural information: Cox (1960), The Treatise on Invertebrate Paleontology (Part N Mollusca 6 - Bivalvia: v. 1-2, 1969, and v. 3, 1971), Harry (1985), Houbriek (1992), Fossilworks: Gateway to the Paleobiology Database (<http://fossilworks.org>) and WoRMS (World Register of Marine Species, <http://www.marinespecies.org>).

The consultation of some ancient books and papers was carried out through <https://archive.org>, <http://jubilotheque.upmc.fr>, and <http://gallica.bnf.fr>.

All taxa here considered were preliminarily compared with the faunas of the Tertiary Piedmont Basin described and discussed by Bellardi & Sacco (1872-1904), although this last reference is quoted (in the "Remarks" section) only if some similarity has been detected.

Measurements on gastropod shells are in accordance with Pedriali & Robba (2005): H = shell height, D = maximum diameter, SH = spire height, AH = aperture height, AW = aperture width, SA = spire angle. Measurements on bivalve shells are: L = valve length, H = valve height, C = valve convexity, EE = elongation extent (= H/L), CE = convexity extent (= C/H), A = apical angle.

*The gastropod types**Echinophoria semielegans* Rovereto, 1900  
(Pl. 1, figs 5a-b)

1900 *Cassidoma (Echinophoria) semielegans* ROVERETO, p. 163, Pl. IX, fig. 1.

1904 *Cassis (Echinophoria) semielegans* Rovereto - SACCO, p. 98, Pl. XXI, fig. 1.

*Type material* - One shell. The original label states: "Cassis *semielegans* n. sp., Mioglia, 456". Holotype (by monotypy) 1896/M-III-M 10.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One, locally abraded globose-fusiform, dextral shell, lacking protoconch, part of the siphon and of the outer lip; short, stocky, three whorls counting spire (H = 27.80 mm; D = 23.80 mm; SH = 2.40 mm; AH = 24.50 mm; AW = 17.50 mm; SA = 119°). Body whorl covering 4/5 of the entire shell, very swollen in the upper part and slender in the lower part. Sculpture: nine spiral rows of small nodules, that become smaller towards the base, on the body whorl; only two spiral rows of nodules are observable on the spire. Suture linear, strongly impressed. Aperture elongate-ovate. Siphonal canal short, deep, abapically recurved. Outer lip thickened, broadly convex, prosocline in profile. Parietal callus adherent, thin, expanded.

*Remarks* - The species exhibits a general similarity with the Eocene *Cassis elegans* Grateloup, 1827 and *Cassis rondoleti* Basterot, 1825, but, as already pointed out by Rovereto (1900), differs in having a more swollen spire (in particular the body whorl) and a more impressed suture; moreover, the outer lip of Rovereto's species is more expanded and less rounded than that of *C. rondoleti* and less expanded and more rounded than that of *C. elegans*.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Cerithium indelimatatum* Rovereto, 1914  
(Pl. 1, figs 1a-b)

1914 *Cerithium? indelimatatum* ROVERETO, p.139, Pl. III, fig. 2.

*Type material* - One shell. The original label has been lost. Holotype (by monotypy) 1903/M-III-M 17.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One partly dissolved shell lacking apical whorls and part of the body whorl. Fusiform-turreted, stocky, dextral shell (H = 36.10 mm; D = 21.40 mm; SH = 14.00 mm; AH = unmeasurable; AW = unmeasurable; SA = 39°). Inflated, angulated whorls with broad sloping subsutural ramp. Aperture probably ovate but largely destroyed. Spiral sculpture: alternation of primary granular small cordlets and secondary very small ones. Axial

sculpture: couple of short stocky spines widely spaced (the upper one of each pair a bit larger than the lower one), clearly distanced on the body whorl and adult teleoconch.

*Remarks* - Rovereto (1914) compares his species with *Cerithium vandenheckei* Bellardi, 1852 (Bartonian of Palarea, France), but Bellardi's species has a narrower spire angle and the spines of the axial sculpture are not in pairs.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Clavilithes felixrenata* Rovereto, 1914  
(Pl. 1, figs 4a-b)

1914 *Clavilithes? felixrenata* ROVERETO, p.128, Pl. III, fig. 6.

*Type material* - One shell. The original label has been lost. Holotype (by monotypy) 2972/M-III-M 226.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One, locally abraded, shell lacking apical whorls, neck, and peristome. Fusiform dextral shell, roughly squared and rapidly expanding body whorl, subsutural ramp concave (more evident in the last whorl), suture line impressed and undulated by tubercles of the preceding whorl (H = 51.20 mm; D = 33.60 mm; SH = 15.30 mm; AH = 22.00 mm; AW = 13.50 mm; SA = 47°). A faint of columellar callus is observable close to the neck. Spiral sculpture: tubercles along the lower part of the whorls decreasing in dimensions from the apical to the abapical whorls, absent on the body whorl; regular, fine threads (abraded in the middle part of the body whorl).

*Remarks* - The general characters of the specimen in hand, even if not very well preserved, fit with the description of the genus *Clavilithes* reported by Swainson (1840). As already pointed out by Rovereto (1914), the spire angle of this species is wider than those of the *Clavella* (= *Clavilithes*) considered by Bellardi (1872) e Sacco (1904). Moreover, Rovereto's species exhibits a more squared spire and a sculpture without nodes on the body whorl.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Murex exstatus* Rovereto, 1914  
(Pl. 1, figs 6a-b)

1914 *Murex (Haustellum) exstatus* ROVERETO, p. 134-135, Pl. II, fig. 3.

*Type material* - One shell. The damaged original label states: "R. Museo Geologico - Genova, *Murex exstatus* n. sp., Mioglia". Holotype (by monotypy) 2979/M-III-M 233.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One shell lacking apical whorls and part of the neck and of the body whorl. Fusiform shell, with shouldered teleoconch whorls and adpressed, undulated suture (H = 44.55 mm; D = 38.25 mm; SH = 11.90 mm; AH = unmeasurable; AW = unmeasurable; SA = 83°). Body whorl inflated; subsutural ramp wide and flat. Spiral sculpture: two cordlets on the subsutural ramp and four prominent cords, one of which visible only as sharp angle at shoulder and the others just below the shoulder. Axial sculpture: nine stout cords bearing a short and strong spine at shoulder.

*Remarks* - The visible features of the holotype point to the assignment to the genus *Murex*, according to the descriptions given by Ponder & Vokes (1988). This species is clearly different from any and all other *Murex* described from the Eocene - early Miocene European basins, because of its shape, in particular that of the body whorl, and its sculpture.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Ocenebrina obba* Rovereto, 1914  
(Pl. 1, figs 2a-b)

1914 *Ocenebra (Ocenebrina) obba* ROVERETO, p. 134, Pl. II, fig. 4.

*Type material* - One shell. The damaged original label states: "Regio Museo Geologico ..., ...urex (*Ocenebrina) obba* n. sp., Mioglia". Holotype (by monotypy) 2980/M-III-M 234.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One shell lacking apical whorls, siphon and part of the body whorl. Fusiform, strongly inflated, dextral shell with shouldered body whorls and adpressed, undulated suture (H = 37.60 mm; D = 27.40 mm; SH = 9.10 mm; AH = 21.60 mm; AW = 14.05 mm; SA = 79°). Subsutural ramp wider on the body whorl than on the spire. Spiral sculpture: about five regular cords on the spire, at least ten cords on the body whorl (increasing in dimension moving to the base). Axial sculpture: nine evenly spaced, rounded, prominent cords.

*Remarks* - The general characters of the holotype, even if not very well preserved, fit with those reported by Vermeij (1998) for the genus *Ocenebrina* Jousseume, 1880. *Ocenebrina* Cossmann 1903 is an unjustified emendation of *Ocenebrina* Jousseume, 1880. The species in hand clearly differs from any and all other *Ocenebrina* described from the Eocene - lower Miocene European basins, because of its strongly inflated spire and its sculpture.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Terebralia pinoides* Rovereto, 1900  
(Pl. 1, fig. 3)

1900 *Potamides (Terebralia) pinoides* ROVERETO, p. 151, Pl. VIII, fig. 4.

1904 *Clava? pinoides* Rovereto - SACCO, p. 122, Pl. XXV, fig. 3.

*Type material* - One shell. The original label states: "Collezione Perrando, *Potamides pinoides* n. sp., Mioglia, N. 650". Holotype (by monotypy) 1902/M-III-M 16.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One shell, partially embedded in the sediment, lacking apical whorls and part of the body whorl. Turreted-conic dextral shell with flat-sided whorls and impressed suture (H = 47.00 mm; D = 23.80 mm; SH = 21.50 mm; AH = 16.20 mm; AW = unmeasurable; SA = 38°). Spiral sculpture: at least two flattened spiral cords on the base. Axial sculpture: orthocone, regular, closely spaced, smooth cords grading to nodulose cords that evolve into a pair of elongated nodules (the basal one is more prominent).

*Remarks* - The general characters of the specimen fit with those reported by Houbriek (1991) for *Terebralia* Swainson, 1840. The species has a strongly conical shape and a sculpture that allow to separate it from all Eocene - early Miocene species of the European basins, including *Cerithium ovoideum* Fuchs, 1870, to which it was compared by Rovereto (1900).

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

EXPLANATION OF PLATE 1

Rovereto's gastropods and cephalopod from Mioglia.

Fig. 1 - *Cerithium indelimatatum* Rovereto, 1914 - DISTAV BTP Collection, holotype 1903/M-III-M 17.

Fig. 2 - *Ocenebrina obba* Rovereto, 1914 - DISTAV BTP Collection, holotype 2980/M-III-M 234.

Fig. 3 - *Terebralia pinoides* Rovereto, 1900 - DISTAV BTP Collection, holotype 1902/M-III-M 16.

Fig. 4 - *Clavilithes felixrenata* Rovereto, 1914 - DISTAV BTP Collection, holotype 2972/M-III-M 226.

Fig. 5 - *Echinophoria semielegans* Rovereto, 1900 - DISTAV BTP Collection, holotype 1896/M-III-M 10.

Fig. 6 - *Murex exstans* Rovereto, 1914 - DISTAV BTP Collection, holotype 2979/M-III-M 233.

Fig. 7 - a) *Aturia paronai* Rovereto, 1900; b) suture line - DISTAV BTP Collection, holotype 3086/M-III-M 325.

Scale bars = 1 cm.



*The cephalopod type**Aturia paronai* Rovereto, 1900  
(Pl. 1, figs 7a-b)

- 1900 *Aturia Paronai* ROVERETO, p. 186-187, Pl. IX, fig. 16.  
 1904 *Aturia Paronae* Rovereto - SACCO, p. 11, Pl. II, fig. 8.  
 1958 *Aturia paronai* Rovereto - STURANI, p. 366.  
 1967 *Aturia aturi* (Basterot) - GIAMMARINO, p. 131-134, Fig. 1, Pl. I.  
 1967 *Aturia paronai* Rovereto - GIAMMARINO, p. 132-134, Fig. 2.

*Type material* - One internal mould. The original label states: "Coll. Perrando, *Aturia Paronai* n.sp. (tipo), Mioglia". Holotype (by monotypy) 3086/M-III-M 325.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One fragment of internal mould of phragmocone (four chambers) lacking inner whorls and bearing few fragments of the test. Discoidal, large (width 80 mm, inferred height 230 mm), involute, compressed (width/height = 0.35), flattened laterally, rounded ventrally. Septal suture with broad, flattened ventral saddle; narrow pointed lateral lobe; broadened rounded asymmetric lateral saddle (Pl. 1, Fig 7b). Sub-dorsal, funnel-like, large siphuncle.

*Remarks* - The suture line of *A. paronai* figured by Giammarino (1967) is incorrect in some parts. The reexamination of the specimen described as *A. aturi* by Giammarino (1967) and the critical analysis of the description given by the Author, suggest the assignment to *A. paronai*, because the suture line and morpho-dimensional features are consistent with *A. paronai*. *A. paronai* is not very close to the other species recovered in the Tertiary Piedmont Basin, for an overview of the reports refer to Sturani (1958), Jung (1966), Chirat (2000), Tomida et al. (2002). *Aturia aturi* (Basterot, 1825), *Aturia formae* Parona, 1898, and *Aturia complanata* Sturani, 1958 differ from *A. paronai* in having a suture line with symmetric saddles and very different dimensions. The species in hand exhibits the same asymmetric saddles of *Aturia rovasendiana* Parona, 1898, but differs from the species of Parona because of the shape of the lobes (not sickle shaped), the wider infundibular cavity, and the lack of ventral transversal prominence of the septum in the infundibular cavity. The latter character allows to

separate this species of Rovereto from *Aturia cubaensis* (Lea, 1841).

*Distribution* - Oligocene: Mioglia and Poggio di Grogna (NW Italy), Tertiary Piedmont Basin.

*The bivalve valid types**Barbatia exbarbata* (Rovereto, 1898)  
(Pl. 2, fig. 1)

- 1898 *Arca (Barbatia) exbarbata* ROVERETO, part III, p. 39.  
 1900 *Arca (Barbatia) exbarbata* Rovereto - ROVERETO, p. 77-78, Pl. IV, fig. 6.  
 1904 *Barbatia exbarbata* Rovereto - SACCO, p. 153, Pl. XXIX, fig. 13.

*Type material* - One right valve. The original label states: "Collezione Perrando *Arca prebarbata* n. sp., Rov. det., Mioglia, 1197". Holotype (by monotypy) 1921/M-III-M 35.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Fairly preserved, inequilateral, right valve (L = about 27.00 mm, H = 14.90 mm, C = about 7.70 mm, EE = about 0.55, CE = 0.52), subrectangular and elongated in shape with a little, bold prosogyrous umbo. Posterior margin broken, anterior margin rounded, cardinal margin straight, ventral margin medially slightly sinuate. Sculpture: fine, evenly distributed, radiating ribs, less evident in the middle part of the valve.

*Remarks* - This species is similar to *Barbatia barbata* (Linnæus, 1758) from which it differs in the absence of beading on the radial ribs.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Nodipecten calliferus* (Rovereto, 1898)  
(Pl. 2, fig. 4)

- 1898 *Chlamys (Lyropecten) callifera* ROVERETO, part II, p. 18, 34.  
 1900 *Chlamys callifera* Rovereto - ROVERETO, p. 66, Pl. III, fig. 12.

## EXPLANATION OF PLATE 2

Rovereto's bivalves from Mioglia.

Fig. 1 - *Barbatia exbarbata* (Rovereto, 1898) - DISTAV BTP Collection, holotype 1921/M-III-M 35.

Fig. 2 - *Pinna (Pinna) ventilabrum* Rovereto, 1898. a) right valve; b) left valve - DISTAV BTP Collection, holotype 1917/M-III-M 31.

Fig. 3 - *Prodreissensia perrandoi* Rovereto, 1898 - DISTAV BTP Collection, holotype 1913/M-III-M 27.

Fig. 4 - *Nodipecten calliferus* (Rovereto, 1898) - DISTAV BTP Collection, holotype 1907/M-III-M 21.

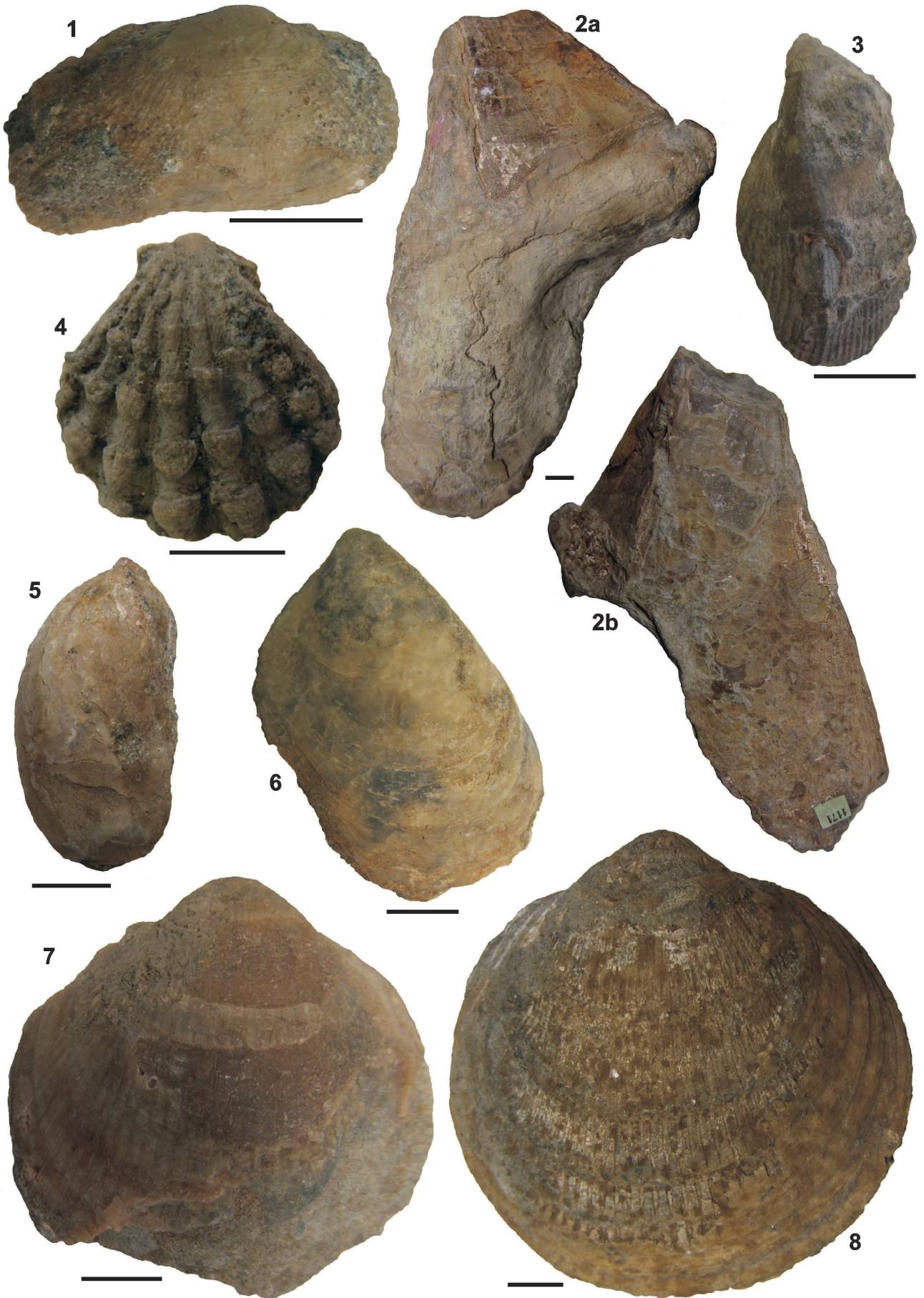
Fig. 5 - *Modiolus aphanus* (Rovereto, 1898) - DISTAV BTP Collection, holotype 1915/M-III-M 29.

Fig. 6 - *Mytilus halycinus* Rovereto, 1898 - DISTAV BTP Collection, holotype 1905/M-III-M 19.

Fig. 7 - *Glycymeris rabdota* (Rovereto, 1898) - DISTAV BTP Collection, holotype 1910/M-III-M 24.

Fig. 8 - *Glycymeris incognita* (Rovereto, 1898) - DISTAV BTP Collection, lectotype 1916/M-III-M 30.

Scale bars = 1 cm.



- 1904 *Nodipecten calliferus* (Rovereto) - SACCO, p. 144, Pl. XXVIII, fig. 12.  
 non 1914 *Chlamys callifera* Rovereto - ROVERETO, p. 147-148, Pl. VI, fig. 13.  
 non 1914 *Chlamys callifera* var. *degensis* Rovereto - ROVERETO, p. 147-148, Pl. VI, fig. 14.  
 non 1967 *Chlamys callifera* Rovereto - LORENZ, p. A20, Pl. XXVI, fig. 5.  
 non 1986 *Chlamys callifera* Rovereto - BAGLIONI MAVROS ET AL., p. 143, pl. I, fig. 20.  
 non 1991 *Chlamys callifera* Rovereto - BONCI ET AL., p. 156, Pl. II, fig. 6.

*Type material* - One left valve. The original label has been lost. Holotype (by monotypy) 1907/M-III-M 21.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Well preserved left valve (L = 24.00 mm, H = 26.00 mm, C = 6.00 mm, EE = 1.08, CE = 0.23, A = 83°), fan shaped, slightly inequilateral, quite flat, auricles partly preserved, dysodont hinge. Pointed umbo projecting beyond the hinge line. Sculpture: seven bold radiating ribs with three/four, regularly spaced, large, flattened nodes; narrow intervening furrows; five riblets on the posterior margin.

*Remarks* - The specimens identified as *Chlamys callifera* Rovereto by Rovereto (1914), Lorenz (1967), Baglioni Mavros et al. (1986), and Bonci et al. (1991) as well as the var. *degensis* Rovereto (1914) are similar in outline, but differ in having at least eight ribs that are clearly without nodes, therefore they are considered to pertain to a different species (Bonci, unpublished data). The species *Pecten venetorum* Oppenheim (1896, p. 43, pl. II, figs 15-16, not fig. 14), reported in the synonymy list of Rovereto (1914), is similar in outline, but it is a distinct species because of the absence of the distinctive nodes and in having more ribs (not less than ten).

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Prodreissensia perrandoi* Rovereto, 1898  
(Pl. 2, fig. 3)

- 1898 *Dreissensia (Prodreissensia) perrandoi* ROVERETO, part II, p. 38.  
 1900 *Dreissensia (Prodreissensia) perrandoi* Rovereto - ROVERETO, p. 75, Pl. IV, fig. 14.  
 1904 *Prodreissensia perrandoi* Rovereto - SACCO, p. 152, Pl. XXIX, fig. 12.  
 1914 *Mytilus (Hormomya) perrandoi* Rovereto - ROVERETO, p. 149.

*Type material* - One left valve. The original label states: “*Dreissensia (Prodreissensia) perrandoi* n. sp., tipo, Rov ..., Mioglia, 1166”. Holotype (by monotypy) 1913/M-III-M 27.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Well preserved left valve, posterior margin partially lacking (L = about 16.40 mm, H = 31.15 mm, C = about 11.90 mm, EE = about 1.9, CE = 0.38), mytiliform, sharply angulated, anteriorly compressed,

posteriorly inflated and wide, markedly inequilateral; prosogyrous, pointed, prominent and incurved umbo. Sculpture: fine, regular, evenly spaced but nearest stepped posteriorly; very fine growth lines.

*Remarks* - This specimen is the type of the type-species of the genus *Prodreissensia* Rovereto, 1898; it has been treated in detail by Cox et al. (1969a, p. N644) and Nuttall (1990, p. 727) and does not need further comments.

*Distribution* - Oligocene: Mioglia and Sassello (NW Italy), Tertiary Piedmont Basin.

*Modiolus aphanus* (Rovereto, 1898)  
(Pl. 2, fig. 5)

- 1898 *Modiola aphanus* ROVERETO, part II, p. 37.  
 1900 *Modiola aphanus* Rovereto - ROVERETO, p. 72, Pl. IV, fig. 11.  
 1904 *Modiola aphanus* Rovereto - SACCO, p. 150, Pl. XXIX, fig. 5.

*Type material* - One right valve. The original label states: “Collezione Perrando *Modiola aphanus* n. sp., tipo figurato, Rov. det., Mioglia, 1162”. Holotype (by monotypy) 1915/M-III-M 29.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Fairly preserved right valve (L = about 17.30 mm, H = about 33.10 mm, C = 8.00 mm, EE = about 1.91, CE = 0.24), modioliform, slightly arched, gibbous, inflated, smooth; obtuse central umbo; straight posterior margin, gently rounded anterior margin, markedly rounded ventral margin.

*Remarks* - As regard the genus assignment, it is of note that *Modiola* is a younger synonym of *Modiolus* (Cox et al., 1969b, p. N278). The shell morphology and the position of the umbo allow to separate this species from all Eocene - early Miocene species of the European basins.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Mytilus halycinus* Rovereto, 1898  
(Pl. 2, fig. 6)

- 1898 *Mytilus halycinus* ROVERETO, part II, p. 36.  
 1898 *Mytilus incertus* Michelotti in schedis SACCO, p. 34, Pl. X, fig. 6.  
 1900 *Mytilus halycinus* Rovereto - ROVERETO, p. 71-72, Pl. IV, fig. 9.  
 1904 *Mytilus incertus* Michelotti var. *halycinus* Rovereto - SACCO, p. 34, Pl. XXIX, fig. 4.

*Type material* - One right valve. The original label states: “Collezione Perrando *Myt... halycinus* n. sp., Mioglia”. Holotype (by monotypy) 1905/M-III-M 19.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Well preserved right valve (L = about 29.80 mm, H = about 46.40 mm, C = about 11.20 mm, EE = about 1.56, CE = about 0.24) inequilateral, mytiliform, quite flattened; dysodont; little, prosogyrous,

pointed umbo. Rounded ventral margin, concave anterior margin, posterior margin gently rounded and flattened and expanded close to the umbo. Smooth with growth lines visible close to the ventral margin.

*Remarks* - As regard the name here proposed for this species, it is to be noted that 1) the species was established by Rovereto (1898); 2) Sacco (1898, p. 34) established *Mytilus incertus*, an “in schedis” species of Michelotti, specifying that better specimens were needed to characterize it; 3) Sacco (1898) was aware of the paper of Rovereto (1898) since he cited the species *M. halycinus* in the introduction to the description of *Mytilus* (p. 23); 4) Rovereto (1900) redescribed and figured *M. halycinus* (the specific epithet *halycinus* is an orthographic variant of *halycinus*) assessing that *Mytilus incertus* described by Sacco (1898) is a younger synonym of his species; 5) Sacco (1904, p. 150, pl. XXIX, fig. 4) included the Rovereto’s species in the list of synonyms of *M. incertus*, but the species erected by him in the 1898 is not in this list, and reproducing the same image published by Rovereto (1900), the caption of which reports “*Mytilus incertus* Micht. var. *halycinus* Rovr. (ripr. fig. orig.)”; 6) it is reasonable to suppose that Sacco (1904) wanted to consider only the species of Rovereto to reduce it to the rank of variety and that the name of the taxon reported on p. 150 is incomplete lacking of the words “var. *halycinus*”. Therefore, we maintain the name originally given by Rovereto (1898) which is the first valid available name for the taxon. This species clearly differs from other species of the Eocene - early Miocene of the European basins because of its particular morphology, characterized by a flat enlargement along the posterior margin close to the umbo.

*Distribution* - Oligocene: Mioglia and Deگو (NW Italy), Tertiary Piedmont Basin.

*Pycnodonte clypeata* (Rovereto, 1897)  
(Pl. 3, fig. 6)

- 1897 *Ostrea (Gryphaea) clypeata* ROVERETO, part I, p. 11-12.  
1900 *Ostrea (Gryphaea) clypeata* ROVERETO - ROVERETO, p.44-45, Pl. I, figs 3a-b.  
1904 *Pycnodonta clypeata* ROVERETO - SACCO, p.138, Pl. XXVII, figs 14a-b.  
1937 *Gryphaea (Pycnodonte) clypeata* ROVERETO - VENZO, p. 166 (cum syn.)  
1967 *Pycnodonta clypeata* ROVERETO - LORENZ, p. A33 (cum syn.).

*Type material* - Two lower valves. The original label states: “Collezione Perrando *Ostrea clypeata* Rov, Mioglia”. Lectotype (here designated) 1918/M-III-M 32. Paralectotype 2844/M-III-M 83.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Lectotype - Fairly preserved and filled with sediments, strongly uniformly convex, sub-rounded, lower (left) valve (L = 77.45 mm, H = 80.90 mm, C = 39.80 mm, EE = 1.05, CE = 0.49) with a small umbo and a round, slightly concave, attachment area and inner shell vesicular layer. Triangular ligamental area. Chomata not observables.

*Paralectotype* - One poorly preserved lower (left) valve filled with sediments. Dimensions: L=101.23 mm, H = 86.53 mm, C = 47.60 mm, EE = 0.86, CE = 0.55.

*Remarks* - The vesicular shell structure points toward the Pycnodontinae and the morphological features confirm the allocation within the genus *Pycnodonte* Fischer de Waldheim 1835, proposed by Rovereto (1900).

The original description deals with one lower valve (Rovereto, 1897) and the same text is reported in the subsequent description (Rovereto, 1900), but Rovereto, in the same paper, also provides a comment in which he describes the features of the inner part of the lower valve and of the upper valve. Rovereto (1897) collected some specimens from both Mioglia and Sassello; he based the new species description (Rovereto, 1897) on a specimen from Mioglia (figured by Rovereto, 1900 and here designated as lectotype). One of the other specimens from Mioglia (a lower valve filled with sediment) is still present in Collection (the paralectotype here designated), other specimens (at least one upper valve and one empty lower valve) quoted by Rovereto (1900) have been lost. The species exhibits only a generic resemblance with *Pycnodonte brongniarti* (Bronn, 1831), from which clearly differs because of the regularly rounded outline, the small umbo, and the uniform convexity.

*Distribution* - Oligocene: Mioglia, Cassinelle and Sassello (NW Italy), Tertiary Piedmont Basin. Late Oligocene: Bellunese (NE Italy), Arenaria glauconitica di Belluno; Trevigiano (NE Italy).

*Crassostrea gibbosula* (Rovereto, 1897)  
(Pl. 3, fig. 5)

- 1897 *Ostrea (Ostrea) gibbosula* ROVERETO, part I, p. 13  
1900 *Ostrea gibbosula* ROVERETO - ROVERETO, p. 50, Pl. II, figs 4-4a.  
1904 *Ostrea gibbosula* ROVERETO - SACCO, p. 136, Pl. XXVII, fig. 5.

*Type material* - One lower valve. The original label has been lost. Lectotype (here designated) 2838/M-III-M 78.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Whole, fairly preserved, strongly gibbous, lower (left) valve (L = 24.40 mm, H = 47.60 mm, C = 31.50 mm, EE = 1.95, CE = 0.66) filled with sediments. Elongated with subparallel anterior and posterior margins; ligamental area more extended in height than in length, with subparallel limits; prominent umbo. Growth lines visible close to the margins.

*Remarks* - The shell morphology and the features of ligamental area suggest an allocation within *Crassostrea* Sacco, 1897. Rovereto (1897) collected some specimens from both Mioglia and Santa Giustina; he based the new species description (Rovereto, 1897) on a specimen from Mioglia that he figured in his subsequent paper (Rovereto, 1900), this is here designated as lectotype. Rovereto (1900) figured also another specimen, of unknown provenance, that has been lost. The elongated outline with subparallel anterior and posterior margins and the strong gibbosity

allow to separate this species from any and all Eocene - early Miocene *Crassostrea* of the European basins.

*Distribution* - Oligocene: Mioglia and Santa Giustina (NW Italy), Tertiary Piedmont Basin.

*Glycymeris incognita* (Rovereto, 1898)  
(Pl. 2, fig. 8)

- 1898 *Pectunculus incognitus* ROVERETO, part II, p. 40.  
1900 *Pectunculus* (sect. *Axinoderma*) *incognitus* Rovereto - ROVERETO, p. 80-81, Pl. V, fig. 2.  
1904 *Axinaea?* *incognita* Rovereto (an *A. bormidiana* var. *magnobliterata* Sacco) - SACCO, p. 154, Pl. XXIX, fig. 19 (cum syn.).

*Type material* - Two double-valved shell. The original label states: "Coll. Perrando *Axinea incognita* n. sp., Rov. det., Mioglia, 1180". Lectotype (here designated) 1916/M-III-M 30. Paralectotype 2812/M-III-M 52.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - Lectotype - One double-valved shell, with one valve largely damaged, only one third preserved (L = 72.90 mm, H = 70.20 mm, C = 18.47 mm, EE = 0.96, CE = 0.26). Subcircular, equilateral, with orthogyrous, small umbones. Sculpture: smooth surface with packed fine and few strong evenly spaced growth lines, very faint radial ribs.

Paralectotype - One fairly preserved double-valved shell. Dimensions: L = 34.34 mm, H = 32.96 mm, C = 10.26 mm, EE = 0.96, CE = 0.31.

*Remarks* - *Axinaea* and *Pectunculus* are synonyms of *Glycymeris* (Cox et al., 1969a, p. N267). Rovereto (1897) collected two specimens from Mioglia and he based the new species description on one of which, that has been figured in Rovereto (1900) and here designated as lectotype. This species is close to *Glycymeris bormidiana* (Mayer, 1868), but differs in terms of radial sculpture, consisting of barely visible ribs.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Glycymeris rabdota* (Rovereto, 1898)  
(Pl. 2, fig. 7)

- 1898 *Pectunculus rabdotus* ROVERETO, part II, p. 40.  
1900 *Pectunculus* (sect. *Axinoderma*) *rabdotus* Rovereto - ROVERETO, p. 81, Pl. V, fig. 4.  
1904 *Axinaea rabdota* Rovereto - SACCO, p. 155, Pl. XXIX, fig. 20 (cum syn.).

*Type material* - One right valve. The original label has been lost. Holotype (by monotypy) 1910/M-III-M 24.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One fairly preserved valve (L = 47.80 mm, H = 46.10 mm, C = 25.00 mm, EE = 0.96, CE = 0.54), filled with sediments, ventral margin lacking. Subcircular, equilateral, convex, with almost orthogyrous, small umbo. Sculpture: regular, flat, radial ribs bearing very fine costellae.

*Remarks* - *Axinaea* and *Pectunculus* are synonyms of *Glycymeris* (Cox et al., 1969a, p. N267). *Glycymeris dispar* (Defrance, 1826) is a close species, but it clearly differs in having a latticed sculpture.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Pinna (Pinna) ventilabrum* Rovereto, 1898  
(Pl. 2, figs 2a-b)

- 1898 *Pinna ventilabrum* ROVERETO, part II, p. 36.  
1900 *Pinna ventilabrum* Rovereto - ROVERETO, p. 70, Pl. IV, fig. 3.  
1904 *Pinna ventilabrum* Rovereto - SACCO, p. 149, Pl. XXIX, fig. 1.

*Type material* - One internal mould. The original label states: "Collezione Perrando *Pinna ventilabrum* n. sp., tipo, Mioglia, 1171". Holotype (by monotypy) 1917/M-III-M 31.

*Type area* - Mioglia (SV), Tertiary Piedmont Basin.

*Description* - One flattened, damaged internal mould bearing few shell fragments (L = about 130.00 mm, H

EXPLANATION OF PLATE 3

Rovereto's bivalves from Mioglia.

Fig. 1 - *Thracia maninensis* (De Gregorio, 1894) ex *Thracia Canavarii* Rovereto, 1898, a: right valve, b: left valve - DISTAV BTP Collection, original specimen 2888/M-III-M 125.

Fig. 2 - *Cardita arduini* Brongniart, 1823 ex *Cardita (Cardita) Arduini* Brongn. var. *truncata* Rovereto, 1898, a: right valve, b: left valve - DISTAV BTP Collection, original specimen 1914/M-III-M 284.

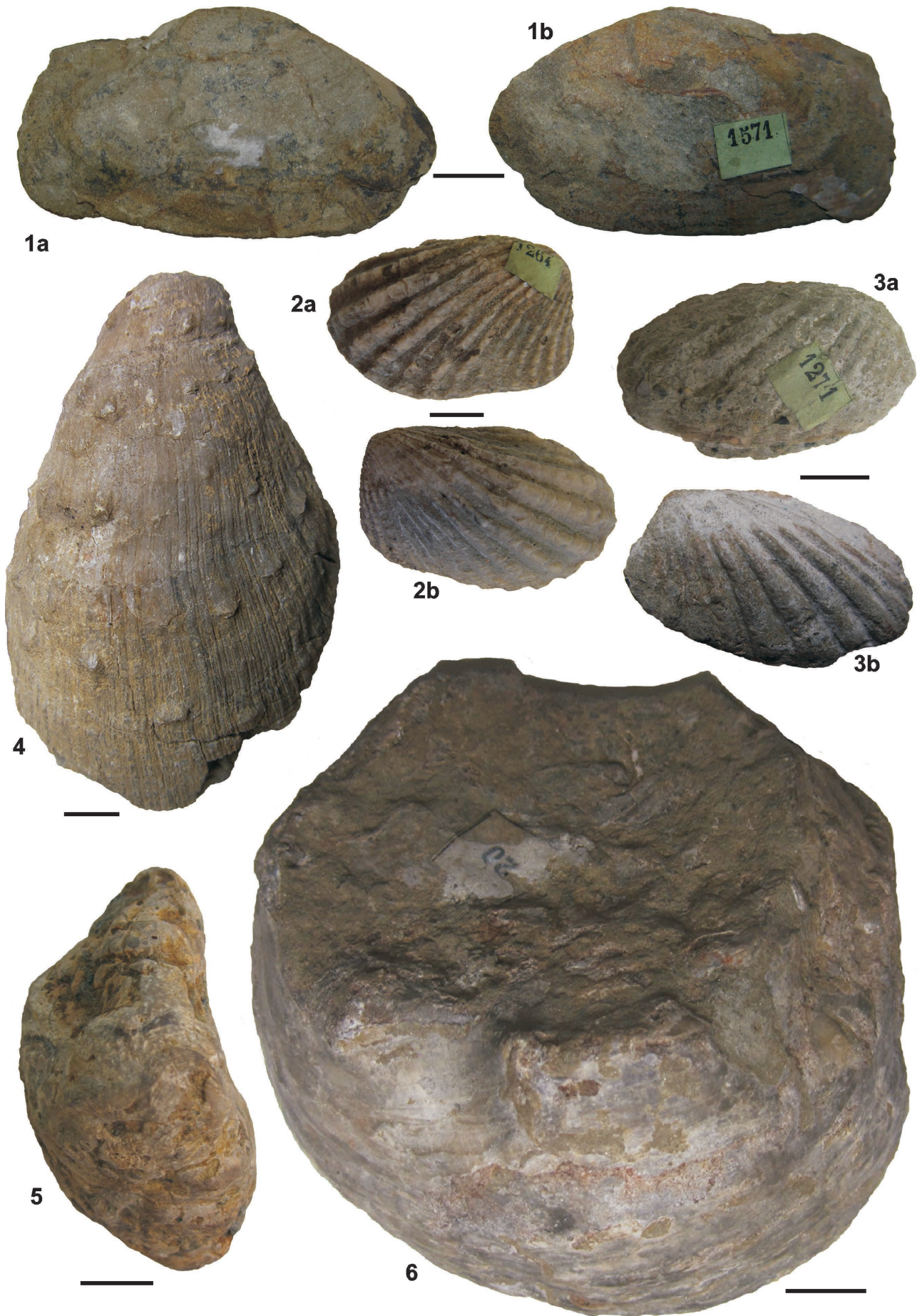
Fig. 3 - *Cardita arduini* Brongniart, 1823 ex *Cardita (Cardita) Arduini* Brongn. var. *corbuloides* Rovereto, 1898, a: left valve, b: right valve - DISTAV BTP Collection, original specimen 2876/M-III-M 114.

Fig. 4 - *Spondylus podopsideus* Lamarck, 1819 ex *Spondylus vaginatus* Rovereto, 1897 - DISTAV BTP Collection, original specimen 1920/M-III-M 34.

Fig. 5 - *Crassostrea gibbosula* (Rovereto, 1897) - DISTAV BTP Collection, lectotype 2838/M-III-M 78.

Fig. 6 - *Pycnodonte chlypeata* (Rovereto, 1897) - DISTAV BTP Collection, lectotype 1918/M-III-M 32.

Scale bars = 1 cm.



= about 143.10 mm, C = about 21.00 mm, EE = about 1.10, CE = about 0.15, A = 62°), lacking of the umbonal and ventral areas. Wedge shaped, with medial carina and straight margins. Squared from the apex to the middle part of the shell and flattened and expanded in the ventral part. Sculpture: evenly spaced, slightly prominent radial ribs.

*Remarks* - *Pinna tetragona* (Brocchi, 1814) exhibits the same squared section of the Rovereto's species, but it differs from them because of the narrower apical angle. *Pinna transversa* d'Archiac, 1846 is similar in outline but different in having a wider apical angle.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

#### *The bivalve invalid taxa*

*Cardita (Cardita) Arduini* Brongn. var. *corbuloides* Rovereto, 1898 = *Cardita arduini* Brongniart, 1823 (Pl. 3, figs 3a-b)

*Material* - One double-valved shell. The original label states: "*Cardita Arduini* Brogn. var. *corbuloides* (tipo), Mioglia, 1271". Specimen 2876/M-III-M 114.

*Collecting area* - Mioglia (SV), Tertiary Piedmont Basin.

*Remarks* - The specimen (L = 30.40 mm, H = 28.60 mm; C = 18.60 mm) was figured by Rovereto (1900, pl. V, fig. 6a) and Sacco (1904, pl. XXX, fig. 3b). Rovereto (1898) erected this variety on the basis of a more inflated shell and a shortened posterior margin, but the examination of the iconography and descriptions available in literature (e.g., Cox, 1934), allows to consider these aspects insignificant for the distinction from the species s.s. It should be noted that the species *C. arduini* was included in *Megacardita* by Sacco (1899) and Baldi (1973), but according to La Perna et al. (2017) the Brongniart's species is to be excluded from *Megacardita* and have a possible position in the subfamily Carditinae.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Cardita (Cardita) Arduini* Brongn. var. *truncata* Rovereto, 1898 = *Cardita arduini* Brongniart, 1823 (Pl. 3, figs 2a-b)

*Material* - One double-valved shell. The damaged original label states: "Collezione Perrando, *Cardi... Arduini* Brogn. var. *tr...ata* (tipo), Mioglia, 1264". Specimen 1914/M-III-M 28.

*Collecting area* - Mioglia (SV), Tertiary Piedmont Basin.

*Remarks* - The specimen (L = 34.00 mm, H = 36.45 mm; C = 16.40 mm) was figured by Rovereto (1900, pl. V, fig. 6b) and Sacco (1904, pl. XXX, fig. 4). Rovereto

(1898) identified this variety just on the base of the straight anterior margin of the studied specimen, but the examination of the iconography and descriptions available in literature (e.g., Cox, 1934), allows to consider this feature not sufficient for a distinction from the species s.s. Brongniart's species is here included in the genus *Cardita* in accordance with La Perna et al. (2017).

*Distribution* - Oligocene: Mioglia, Tertiary Piedmont Basin.

*Spondylus vaginatus* Rovereto, 1897 =  
*Spondylus podopsideus* Lamarck, 1819  
(Pl. 3, fig. 4)

*Material* - One double-valved shell. The original label has been lost. Specimen 1920/M-III-M 34.

*Collecting area* - Mioglia (SV), Tertiary Piedmont Basin.

*Remarks* - The specimen (L = about 49.80 mm, H = about 76.30 mm; C two valves = about 36.20 mm) is figured by Rovereto (1900, pl. II, fig. 9) and Sacco (1904, pl. XXVIII, fig. 23). Rovereto (1897) erected the species *Spondylus vaginatus* and in 1900 he stated that this species differs from *Spondylus bifrons* Münster in Goldfuss, 1829 in having an elongated outline and packed riblets. Sacco (1904) suggested that the species *S. vaginatus* might be a variety of *Spondylus bifrons* (p. 147, "an *S. bifrons* var."). Rovereto (1914) accepted the suggestion of Sacco (1904). In our opinion, after the examination of the iconography and the descriptions available in literature, the differences with *S. bifrons* are insignificant for a distinction of Rovereto's specimen from the nominal species. Finally, according to Clerc & Favre (1918) and Piccoli & Mocellin (1962) *Spondylus bifrons* Münster is a younger synonym of *Spondylus podopsideus* Lamarck, 1819.

*Distribution* - Oligocene: Mioglia (NW Italy), Tertiary Piedmont Basin.

*Thracia Canavarii* Rovereto, 1898 =  
*Thracia maninensis* (De Gregorio, 1894)  
(Pl. 3, figs 1a-b)

*Material* - One double-valved mould. The original label states: "Collezione Perrando *Thracia Canavarii* n.sp., Mioglia, 1971". Specimen 2888/M-III-M 125.

*Collecting area* - Mioglia (SV), Tertiary Piedmont Basin.

*Remarks* - The specimen (L = 55.85 mm, H = 31.85 mm; C = 11.70 mm) is figured by Rovereto (1900, pl. VII, fig. 20) and by Sacco (1901, pl. XXVII, fig. 16 as *Thracia bellardii* var. *Canavarii* Rov.). Sacco (1901) reduced the species to a variety of *Thracia bellardii* Pictet, 1855, but, in the following years, this suggestion was rejected by the paleontologists that studied this taxon (e.g., Boussac, 1911; Stchepinsky, 1943). According to Canestrelli

(1908), *Thracia Canavarii* Rovereto, 1898 is a younger synonym of *Thracia maninesis* (De Gregorio, 1894).

*Distribution* - Oligocene: Mioglia and Cassinelle (NW Italy), Tertiary Piedmont Basin; Castalgomberto, Laverda, Lavacile, Val Manin (Veneto, NE Italy); Tartonne (SE France); Syrian Plateau (S Turkey).

## CONCLUSIONS

The Oligocene fossil mollusks of the Tertiary Piedmont Basin were object of detailed studies in the late 1800s and in the first years of the past century, but in more recent times they have received a little attention, therefore these faunas are scarcely known if not forgotten and their systematic position needs for a complete review. This paper deals with the re-description of 21 taxa (six gastropods, one cephalopod, and 14 bivalves) described by Rovereto (1897, 1898, 1900, 1914). These fossils were collected in the Mioglia area and are part of the BTP Collection housed at the Museo di Paleontologia, Dipartimento di Scienze della Terra, dell'Ambiente e della Vita (DISTAV), Università di Genova.

This study allowed:

1. the identification of the collecting areas (Cemetery of Mioglia and Mioglia Castle) but not the rediscovery of the bed (or beds) sampled by Rovereto, so it is not possible to link with certainty each fossil to one of the identified sites;

2. the designation of 14 holotypes (by monotypy) and three lectotypes;

3. to recognize that four Rovereto's bivalve taxa are younger synonyms of other species;

4. to stress that all valid taxa are restricted to Oligocene;

5. to point up that the bulk of valid taxa have a paleogeographic distribution restricted to the Tertiary Piedmont Basin, only *Pycnodonte clypeata* has been also recovered in the Bellunese and Trevigiano basins.

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