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The mollusk type material of Gaetano Rovereto in the "BTP Collection" (Museo di Paleontologia - DISTAV - Università di Genova): history of the Collection and the Oligocene bivalve types from the Pareto area

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KEY WORDS - BTP Collection, Gaetano Rovereto, bivalve type material, Oligocene, NW Italy.

ABSTRACT - The present paper examines the types of the new bivalve taxa described by Gaetano Rovereto in the years 1897-1914 from the Oligocene of the Pareto area (Molare 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 - Università di Genova), the troubled history of which is here reconstructed. The complete list of the mollusk taxa described by Rovereto, in which taxa so far recovered are emphasized, is given. The Pareto area collecting sites reported in Rovereto's papers and/or recorded on the maps realised in the frame of the project "Palaeontological Map of Liguria" have been verified in the field. The taxa described by Rovereto herein considered are the following: Arca *(*Parallelepipedum*)* Isseli *Rovereto, 1898 (new name =* Trisidos isseli *[Rovereto, 1898]),* Chlamys *(sect.* Aequipecten*)* Adelinae *Rovereto, 1900 (=* Aequipecten adelinae *[Rovereto, 1900]),* Chlamys *(*Aequipecten*)* apenninica *Rovereto, 1898 (=* Aequipecten apenninicus *[Rovereto, 1898]),* Chlamys *(sect.* Chlamys *s. strict.)* bormidiana *Rovereto, 1898 (=* Chlamys bormidiana *Rovereto, 1898),* Cyprina*?* Paretoi *Rovereto, 1898 (=* Glossus paretoi *[Rovereto, 1898]),* Diplodonta aliena *Rovereto, 1898,* Ixartia subpraesterga *Rovereto, 1914 (=* Tapes subpraesterga *[Rovereto, 1914]),* Modiola incompta *Rovereto, 1898 (=* Modiolus incomptus *[Rovereto, 1898]),* Ostrea *(sub gen.* Gryphaea*) (sect.* Pycnodonta*)* Brongniarti *var.* bisimpressa *Rovereto, 1900 (=* Pycnodonte brongniarti *[Bronn, 1831]),* Ostrea *(sub gen.* Gryphaea*) (sect.* Pycnodonta*)* Brongniarti *var.* rostrata *Rovereto, 1900 (=* Pycnodonte brongniarti *[Bronn, 1831]),* Ostrea paretoi *Rovereto, 1914 (=* Crassostrea paretoi *[Rovereto, 1914]),* Spondylus ligustinus *Rovereto, 1900.*

RIASSUNTO - [I Tipi di molluschi di Gaetano Rovereto nella Collezione BTP (Museo di Paleontologia - DISTAV - Università di Genova): storia della Collezione e i tipi di bivalvi oligocenici provenienti dall'area di Pareto] *- Il presente contributo vuole essere il primo di una serie che prenda in esame i tipi dei nuovi taxa di molluschi descritti da Gaetano Rovereto negli anni 1897-1914, provenienti da siti fossiliferi oligo-miocenici del Bacino Terziario del Piemonte e attualmente conservati nella "Collezione BTP" di proprietà del Dipartimento di Scienze della Terra, dell'Ambiente e della Vita dell'Università di Genova. In questo primo lavoro viene ricostruita la travagliata storia della Collezione, dalla sua costituzione sino all'attuale collocazione, caratterizzata da ripetuti danneggiamenti a causa di violenti eventi alluvionali e viene fornita la lista completa dei nuovi taxa descritti e di ciò che è attualmente ancora disponibile, ottenuta attraverso l'analisi e la catalogazione del materiale originale su cui lavorò Rovereto. Vengono, inoltre, presentati i risultati della revisione dei tipi di bivalvi descritti da Rovereto, provenienti dalle successioni oligoceniche dell'area di Pareto (Piemonte meridionale - Liguria centrale) e facenti parte della successione della Formazione di Molare (Bacino Terziario del Piemonte). Rovereto nei suoi contributi scientifici indicò in modo molto generico, salvo che in rari casi, i siti di raccolta dei tipi. Sulla base delle indicazioni contenute nei suoi lavori e di quanto riportato sulle carte del "Progetto Carta Paleontologica della Liguria" (iniziato negli anni '60, mai completato e mai pubblicato), con l'intento di fornire informazioni sul contesto lito- e biostratigrafico, sono state ricercate e verificate sul terreno le probabili "località tipo" che qui vengono sinteticamente riportate. Va notato che Rovereto descrisse ben 19 nuovi taxa di bivalvi aventi come Località-tipo "Pareto", ma che attualmente di questi ne sono rimasti in Collezione solamente 12. Questi tipi sono stati oggetto di una revisione che ha portato, in alcuni casi, a variazioni di attribuzione generica, in altri a piena conferma ed in altri ancora alla messa in sinonimia con altri taxa. Nel dettaglio i tipi considerati sono quelli relativi alle seguenti specie o varietà:* Arca *(*Parallelepipedum*)* Isseli *Rovereto, 1898 (nuovo nome =* Trisidos isseli *[Rovereto, 1898]),* Chlamys *(sect.* Aequipecten*)* Adelinae *Rovereto, 1900 (=* Aequipecten adelinae *[Rovereto, 1900]),* Chlamys *(*Aequipecten*)* apenninica *Rovereto, 1898 (=* Aequipecten apenninicus *[Rovereto, 1898]),* Chlamys *(sect.* Chlamys *s. strict.)* bormidiana *Rovereto, 1898 (=* Chlamys bormidiana *Rovereto, 1898),* Cyprina*?* Paretoi *Rovereto, 1898 (=* Glossus paretoi *[Rovereto, 1898]),* Diplodonta aliena *Rovereto, 1898,* Ixartia subpraesterga *Rovereto, 1914 (=* Tapes subpraestergus *[Rovereto, 1914]),* Modiola incompta *Rovereto, 1898 (=* Modiolus incomptus *[Rovereto, 1898]),* Ostrea *(sub gen.* Gryphaea*) (sect.* Pycnodonta*)* Brongniarti *var.* bisimpressa *Rovereto, 1900 (=* Pycnodonte brongniarti *[Bronn, 1831]),* Ostrea *(sub gen.* Gryphaea*) (sect.* Pycnodonta*)* Brongniarti *var.* rostrata *Rovereto, 1900 (=* Pycnodonte brongniarti *[Bronn, 1831]),* Ostrea paretoi *Rovereto, 1914 (=* Crassostrea paretoi *[Rovereto, 1914]),* Spondylus ligustinus *Rovereto, 1900.*

INTRODUCTION

This paper is the first of a series of contributions that examine the types of Oligocene Mollusca described by Gaetano Rovereto, a geologist and paleontologist of the Genoa University, in the years 1897-1914, that form 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 is the acronym of "Bacino Terziario del Piemonte" (Tertiary Piedmont Basin), the Cenozoic geological unit from where the fossils of this collection come.

Rovereto (1897, 1898, 1900, 1914) analysed a large number of fossil mollusks coming from the Oligocene - lower Miocene rocks pertaining to the Tertiary Piedmont

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Basin (NW Italy), and identified 118 new taxa (Species and Variety) on the basis of the preservation of the fossils (the complete list of these taxa is given in Tab. 1). Rovereto (1900, 1914), revising its 1897-1898 new taxa, stated that five of them were younger synonyms of already known species (Tab. 1). Therefore, a total of 113 new taxa can be considered, among which 66 (49 bivalves, 16 gastropods, one cephalopod) were recovered and considered for a re-examination (Tab. 1). The original material on which the other taxa were established was lost during the troubled history of the Collection.

As was characteristic for that time, the descriptions of the new taxa do not contain the designation of the holotype and were not accompanied by adequate illustrations. This led to confusion and difficulties in subsequent taxonomy and species identification.

The identification of the holotypes among the available fossil material has been possible by a critical analysis of the papers and original handwritten labels by Rovereto. In fact, the following cases are possible: 1) Rovereto collected a single specimen, on which he based the description of the new species: obviously the Holotype is the specimen described (monotypy); 2) Rovereto collected more than one specimen, often in different localities, but described the new species on the basis of the characters of only one specimen, that is always the specimen coming from the locality firstly listed in the description: this is the Holotype.

This paper focuses on the revision and re-documentation of the bivalve taxa originally described by Rovereto (1897, 1898, 1900, 1914), included in the BTP Collection, and collected in the Pareto area. These taxa are the following (arranged in alphabetical order): 1) *Anomia Saccoi* Rovereto, 1897; 2) *Arca (Parallelepipedum) Isseli* Rovereto, 1898; 3) *Arca simmetrica* Rovereto, 1898; 4) *Chlamys (*sect. *Aequipecten) Adelinae* Rovereto, 1900; 5) *Chlamys (Aequipecten) apenninica* Rovereto, 1898; 6) *Chlamys (*sect. *Chlamys* s. strict*.) bormidiana* Rovereto, 1898; 7) *Cultellus clavatus* Rovereto, 1898; 8) *Cyprina? Paretoi* Rovereto, 1898; 9) *Diplodonta aliena* Rovereto, 1898; 10) *Dosinia tongriana* Rovereto, 1898; 11) *Ixartia subpraesterga* Rovereto, 1914; 12) *Lucina (Divaricella) ornata* Agassiz var. *intersecta* Rovereto, 1900; 13) *Meretrix conoidea* Rovereto, 1898; 14) *Modiola incompta* Rovereto, 1898; 15) *Ostrea (*sub gen. *Gryphaea) (*sect. *Pycnodonta) Brongniarti* var. *bisimpressa* Rovereto, 1900; 16) *Ostrea (*sub gen. *Gryphaea) (*sect. *Pycnodonta) Brongniarti* var. *rostrata* Rovereto, 1900; 17) *Ostrea paretoi* Rovereto, 1914; 18) *Spondylus ligustinus* Rovereto, 1900; 19) *Venus (Omphaloclathrum) perdelira* Rovereto, 1914.

The type material of taxa 1, 3, 7, 10, 12, 13, and 19 has been lost, the others were revised.

Therefore, the taxa here considered are: *Arca (Parallelepipedum) Isseli* Rovereto, 1898 (new name = *Trisidos isseli* [Rovereto, 1898]), *Chlamys (*sect. *Aequipecten) Adelinae* Rovereto, 1900 (= *Aequipecten adelinae* [Rovereto, 1900]), *Chlamys (Aequipecten) apenninica* Rovereto, 1898 (= *Aequipecten apenninicus* [Rovereto, 1898]), *Chlamys (*sect. *Chlamys* s. strict*.) bormidiana* Rovereto, 1898 (= *Chlamys bormidiana* Rovereto, 1898), *Cyprina? Paretoi* Rovereto, 1898 (= *Glossus paretoi* [Rovereto, 1898]), *Diplodonta aliena* Rovereto, 1898, *Ixartia subpraesterga* Rovereto, 1914 (= *Tapes subpraestergus* [Rovereto, 1914]), *Modiola incompta* Rovereto, 1898 (= *Modiolus incomptus* [Rovereto, 1898]), *Ostrea (*sub gen. *Gryphaea) (*sect. *Pycnodonta) Brongniarti* var. *bisimpressa* Rovereto, 1900 (= *Pycnodonte brongniarti* [Bronn, 1831]), *Ostrea (*sub gen. *Gryphaea) (*sect. *Pycnodonta) Brongniarti* var. *rostrata* Rovereto, 1900 (= *Pycnodonte brongniarti* [Bronn, 1831]), *Ostrea paretoi* Rovereto, 1914 (= *Crassostrea paretoi* [Rovereto, 1914]), *Spondylus ligustinus* Rovereto, 1900.

THE BTP COLLECTION

The past history of the Collection was very troubled. Most of the forming samples are derived from the historical Perrando Collection, that was the result of the researches performed by Don Deo Gratias Perrando, parish priest of Santa Giustina. This material was bought in 1886 for the "Gabinetto di Geologia" of the Università di Genova, by a consortium comprising the Government, the Provincia di Genova and the Comune di Genova. The Collection was enriched in the following years by donations from the heirs of Don Perrando and the researches of Gaetano Rovereto and Arturo Issel, and it was housed at the Museo Geologico dell'Università, located in Villetta Di Negro, Genoa.

In the years between 1926 and 1932 the material of the Museo Geologico was transferred to the Museo di Storia Naturale G. Doria of Genoa. This material was not exposed, but remained in the basement of the Museo, where it suffered repeated damage because rooms there were periodically inundated by phreatic waters supplied by the River Bisagno. The greatest damage was not suffered by the samples, relatively protected in boxes and wrapped in the straw, but by their labels, resulting in the first loss of valuable information about the collecting sites, the taxonomic identification and the name of the collector.

In the 60s, the Istituto di Geologia of the Università di Genova started the project "Palaeontological Map of Liguria" with the purpose of achieving a mapping of all the Liguria (but also southern Piedmont) fossiliferous sites, including the historical ones, accompanied by a list of the fossils found in each site. This project, neither completed nor published, requiring the indication of fossiliferous sites and the classification of fossils, imposed the revision of those materials, until then abandoned. The work continued for nearly a decade, with the aim of setting up the new Museo di Paleontologia e Geologia dell'Università, but on 7-9 October 1970, the devastating flood that hit Genoa damaged, once again, the Collection, at that time placed in the basement of the Museo G. Doria. Samples were affected by the flooding of the River Bisagno and scattered in the mud and debris. They were recovered only through the good will of some insiders; the revision of the Collection had to start over. Finally, the Collection was moved into the new building of the Istituto di Geologia in Genoa, but on 1 January 1977 a new flood hit Genoa and the waters of the Rio Noce flooded the premises where the fossils were housed. Samples that were not lost, were recovered and placed in bulk, waiting for a later review.

Original name in Rovereto (1897, 1898, 1900, 1914)	Catalogue number	Type locality
Bivalvia		
Anomia Saccoi Rovereto, 1897	lost	Pareto
Arca (Barbatia) exbarbata Rovereto, 1898	1921/M-III-M 35	Mioglia
Arca (Parallelepipedum) Isseli Rovereto, 1898	1367/SM-VI-P 24	Pareto
Arca simmetrica Rovereto, 1898	lost	Pareto
Basterotia (Anisodonta) bipartita Rovereto, 1898	lost	Santa Giustina
Cardita (Actinobulus) globolaevis Rovereto, 1914	531/DE-VIII-CL 63	Dego
Cardita (Actinobulus) seclusa Rovereto, 1914	lost	Dego
Cardita (Cardita) Arduini Brongn. var. *corbuloides* Rovereto, 1898	2876/M-III-M 114	Mioglia
Cardita (Cardita) Arduini Brongn. var. *truncata* Rovereto, 1898	1914/M-III-M 28	Mioglia
Cardium (Laevicardium) peracutum Rovereto, 1914	lost	Varazze
Cardium rugiferum Rovereto, 1898	lost	Sassello
Chama tongriana Rovereto, 1898	lost	Santa Giustina
Chama vicentina Fuchs var. *carcarensis* Rovereto, 1898	2190/CM-VII-C 101	Carcare, Colletta
Chlamys (Aequipecten) callifera Rovereto var. *degensis* Rovereto, 1914	528/DE-VIII-CL 60	Dego
Chlamys Adelinae Rovereto, 1900	1316/SM-VI-P(5) 1	Pareto
Chlamys apenninica Rovereto, 1898 = *Chlamys appenninica* Rovereto, 1900	1332/SM-VI-P(5) 17	Pareto
Chlamys bormidiana Rovereto, 1898	1330/SM-VI-P(5) 15	Pareto
Chlamys callifera Rovereto, 1898	1907/M-III-M 21	Mioglia
Chlamys crostacea Rovereto, 1898	lost	Rocchetta Cairo, Monte Burgio
Chlamys deleta Michelotti var. *compressiuscola* Rovereto, 1898	lost	Santa Giustina
Chlamys deleta Michelotti var. *ornatissima* Rovereto 1898 = *Chlamys deleta* Michelotti var. *intercosticillatina* Sacco in Rovereto, 1900	lost	Pareto
Chlamys prenimia Rovereto, 1898	2179/CM-VII-C 89	Carcare
Chlamys tauroperstriata Sacco var. *antiquata* Rovereto, 1898	3085/M-I-S 2	Squaneto
Chlamys ventilabrum Goldf. var. *oligocenica* Rovereto, 1898	1169/SA-II-S 6	Sassello
Chlamys virgulata Rovereto, 1898	lost	Santa Giustina
Crassatella gigantea Rovereto, 1898	1098/SA-V-SG 29	Santa Giustina
Crassatella Ighinai Rovereto, 1898	2194/CM-VII-C 107	Carcare
Crassatella subtumida Bell. var. *oligocenica* Rovereto, 1898	2195/CM-VII-C 108	Carcare
Cultellus clavatus Rovereto, 1898	lost	Pareto
Cuspidaria lutulenta Rovereto, 1914	lost	Cassinelle, San Defendente
Cyprina (?) *Paretoi* Rovereto, 1898 = *Isocardia Paretoi* Rovereto, 1900	1324/SM-VI-P(5) 9	Pareto
Cyprina oncodes Rovereto, 1898 = *Cypriniadea oncodes* Rovereto, 1900	lost	Santa Giustina
Cyrena strangulata Rovereto, 1898	lost	Sassello
Diplodonta alepis Rovereto, 1898	1181/SA-II-S 18	Sassello
Diplodonta aliena Rovereto, 1898	1329/SM-VI-P(5) 14	Pareto
Dosinia preexoleta Rovereto, 1898 = *Dosinia prexoleta* Rovereto, 1898 in Rovereto, 1900 = *Venus (Ventricola) prae-exoleta* Rovereto, 1914	lost	Carcare, Colletta
Dosinia tongriana Rovereto, 1898	lost	Pareto
Dreissensia Perrandoi Rovereto, 1898 = *Mytilus (Hormomya) Perrandoi* Rovereto, 1914	1913/M-III-M 27	Mioglia
Glycymeris ligusticus Rovereto, 1898 = *Glycymeris (Panomya) ligusticus* Rovereto, 1898 in Rovereto, 1914	lost	Sassello

Tab. 1 - List of the mollusk taxa described by Rovereto (1897, 1898, 1900, 1914) included in the BTP Collection.

Ixartia subpraesterga Rovereto, 1914	1326/SM-VI-P(5) 11	Pareto
Jouannetia avellanaria Rovereto, 1914	2089bis/SA-II-S 185	Sassello
Limopsis turgida Rovereto, 1898	1167/SA-II-S 4	Sassello, Battella
Lucina (Dentilucina) tenuistria Hébert var. *insincera* Rovereto, 1900 = *Lucina (Dentilucina) insincera* Rovereto in Rovereto, 1914	3084/OV-III-C 1	Tagliolo
Lucina (Divaricella) ornata Agassiz var. *intersecta* Rovereto, 1900	lost	Pareto
Lucina apenninica Rovereto, 1898 = *Lucina seclusa* Rovereto, 1900	2188/CM-VII-C 99	Carcare
Lucina celata Rovereto, 1898	lost	Santa Giustina
Mactra aulax Rovereto, 1898	lost	Santa Giustina, Madonnina
Meretrix? *dapatica* Rovereto, 1914	lost	Santa Giustina, Madonnina
Meretrix conoidea Rovereto, 1898	lost	Pareto
Meretrix limata Rovereto, 1898 = *Meretrix (Callista) limata* Rovereto, 1898 in Rovereto, 1914	lost	Santa Giustina
Meretrix prechione Rovereto, 1898 = *Meretrix (Callista) prechione* Rovereto, 1898 in Rovereto, 1914	lost	Sassello
Meretrix Statiellorum Rovereto, 1898	lost	Santa Giustina, Bric Chiappe
Meretrix stilpnax Rovereto, 1898 = *Meretrix (Callista) stilpnax* Rovereto, 1898 in Rovereto, 1914	lost	Santa Giustina, Bric Chiappe
Modiola aphanea Rovereto, 1898	1915/M-III-M 29	Mioglia
Modiola deprehensa Rovereto, 1914	lost	Squaneto
Modiola incompta Rovereto, 1898	1327/SM-VI-P(5) 12	Pareto
Mytilus halycinus Rovereto, 1898	1905/M-III-M 19	Mioglia
Ostrea (Alectryonia) apenninica Rovereto, 1897 = *Ostrea (Alectryonia) appenninica* Rovereto in Rovereto, 1900 = *Ostrea (Ostreola*?*) Martinsi* d'Arch. in Rovereto, 1914	1909/M-III-M 23	Mioglia
Ostrea (Alectryonia) obliquata Rovereto, 1897 = *Ostrea (Ostreola*?*) Martinsi* d'Arch. in Rovereto, 1914	1323/SM-VI-P(5) 8	Pareto
Ostrea (Alectryonia) paucicostata Rovereto, 1897 = *Ostrea proplicatula* (Sacco, 1897) in Rovereto, 1900	lost	Pareto
Ostrea (Alectryonia) prestentina Rovereto, 1897	2067/SA-II-S 163	Sassello
Ostrea (Alectryonia) prestentina var. *ondulata* Rovereto, 1897 = *Ostrea (Ostreola*?*) Martinsi* d'Arch. in Rovereto, 1914	lost	Giusvalla
Ostrea (Gryphaea) Brongniarti Bronn var. *bisimpressa* Rovereto, 1900	1319/SM-VI-P(5) 4	Pareto
Ostrea (Gryphaea) Brongniarti Bronn var. *planulata* Rovereto, 1900	lost	Mioglia
Ostrea (Gryphaea) Brongniarti Bronn var. *rostrata* Rovereto, 1900	1320/SM-VI-P(5) 5	Pareto
Ostrea (Gryphaea) callifera Lamarck var. *Koenenii* Rovereto, 1897	lost	Sassello
Ostrea (Gryphaea) clypeata Rovereto, 1897	1918/M-III-M 32	Mioglia
Ostrea (Ostrea) caudata Münst. var. *meridionalis* Rovereto, 1897 = *Ostrea (Ostrea) meridionalis* Rovereto, 1900	1086/SA-V-SG 17	Santa Giustina, Madonnina
Ostrea (Ostrea) gibbosula Rovereto, 1897	2838/M-III-M 78	Mioglia
Ostrea (Ostrea) Isseli Michelotti var. *elongata* Rovereto, 1897	1904/M-III-M 18	Mioglia
Ostrea (Ostrea) Isseli Michelotti var. *lamellata* Rovereto, 1897	lost	Sassello
Ostrea (Ostrea) statiellorum Rovereto, 1897	1088/SA-V-SG 19	Santa Giustina
Ostrea (Ostrea) ventilabrum Goldf. var. *crebricosta* Rovereto, 1897	1089/SA-V-SG 20	Santa Giustina
Ostrea Paretoi Rovereto, 1914	1710/SM-VI-P 47	Pareto
Pecten arcuatus Brocchi var. *stricta* Rovereto, 1898	1077/SA-V-SG 8	Santa Giustina
Pectunculus incognitus Rovereto, 1898	1916/M-III-M 30	Mioglia
Pectunculus rabdotus Rovereto, 1898	1910/M-III-M 24	Mioglia
Pinna carcarensis Rovereto, 1900	2171/CM-VII-C 81	Carcare

Tab. 1 - Continuation.

Pinna ventilabrum Rovereto, 1898	1917/M-III-M 31	Mioglia
Pisidium elegantiusculum Rovereto, 1898	lost	Sassello
Sphaerium? *nympharum* Rovereto, 1898	lost	Sassello
Spondylus? *hastatus* Rovereto, 1897 = *Spondylus hastatus* Rovereto, 1900	1170/SA-II-S 7	Sassello
Spondylus insignitus Rovereto, 1897 = *Spondylus bifrons* Münst. var. *insignita* Rovereto, 1914	lost	Rossiglione, Monte Colma
Spondylus ligustinus Rovereto, 1898	1328/SM-VI-P(5) 13	Pareto
Spondylus vaginatus Rovereto, 1897 = *Spondylus bifrons* Münst. var. *vaginata* Rovereto, 1914	2830/M-III-M 70	Mioglia
Syndesmya intermedia Rovereto, 1898	1172/SA-II-S 9	Sassello
Tapes catagraphosus Rovereto, 1914	lost	Tagliolo, Bric Cochera
Tapes tapinus Rovereto, 1898	lost	Carcare
Thracia (Sub.Gen.?) *renuntiata* Rovereto, 1914	lost	Sassello
Thracia Canavarii Rovereto, 1898	2888/M-III-M 125	Mioglia
Thracia stenochora Rovereto, 1898	lost	Sassello
Venus (Omphaloclathrum) perdelira Rovereto, 1914	lost	Pareto
Gastropoda		
Amphiperas (Amphiperas) bullaeformis Rovereto, 1900	lost	Sassello
Auricula (Phythiopsis) bormidiana Rovereto, 1900	lost	Sassello
Cassisoma semielegans Rovereto, 1900	1896/M-III-M 10	Mioglia
Cerithium? indelimatum Rovereto, 1914	1903/M-III-M 17	Mioglia
Clavilithes? felixrenata Rovereto, 1914	2972/M-III-M 226	Mioglia
Conorbis protensus Michtt. var. *jucunda* Rovereto, 1914	lost	Dego
Fusus (Aptyxis) nimbatus Rovereto, 1914	lost	Sassello
Jopas (Taurasia)? *belliata* Rovereto, 1914	lost	Sassello
Melongena (Myristica) basilica Bell. var. *Justinensis* Rovereto, 1900 = *Melongena basilica* Bell. var. *justinensis* Rovereto, 1914	lost	Santa Giustina
Melongena laxecarinata Michtt. var. *depromta* Rovereto, 1914	1158/SA-V-SG 89	Santa Giustina
Melongena laxecarinata Michtt. var. *praepilata* Rovereto, 1914	1178/SA-II-S 15	Sassello
Mitra comperta Rovereto, 1900	2153/CM-VII-C 60	Carcare
Murex (Haustellum) exstatus Rovereto, 1914	2979/M-III-M 233	Mioglia
Ocenebra (Ocenebrina) obba Rovereto, 1914	2980/M-III-M 234	Mioglia
Olivella elegantula Rovereto, 1900	lost	Sassello
Pleurotoma Perrandoi Rovereto, 1900	lost	Sassello
Pleurotoma thalassina Rovereto, 1914	1176/SA-II-S 13	Sassello
Pleurotomaria Isseli Rovereto, 1900	509/DE-VIII-CL 39	Dego
Potamides (Terebralia?*) fucilis* Rovereto, 1914	477/DE-VIII-CL 3	Dego
Potamides (Terebralia) pinoides Rovereto, 1900	1902/M-III-M 16	Mioglia
Protoma ferruminata Rovereto, 1914	lost	Sassello
Scalaria (Cirsotrema) descobinata Rovereto, 1914	2140/CM-VII-C 42	Carcare
Scalaria (Sthenorytis) subpyrenaica Tourn. var. *depexa* Rovereto, 1914	2142/CM-VII-C 44	Carcare
Tritonium (Ranularia) semifucosum Rovereto, 1914	1175/SA-II-S 12	Sassello
Turbo (Ninella?*) desidiosus* Rovereto, 1914	476/DE-VIII-CL 2	Dego
Cephalopoda		
Aturia Paronai Rovereto, 1900	3086/M-III-M 325	Mioglia

Tab. 1 - Continuation.

GEOLOGIC FRAMEWORK

The specimens of the BTP Collection were collected in several localities (e.g., Sassello, Santa Giustina, Carcare, Dego, Mioglia, Pareto) located in the central and southern part of the Tertiary Piedmont Basin.

The Tertiary Piedmont Basin is a sedimentary basin that stretches along the Piedmont-Liguria border (NW Italy), and is regarded to be a late- to post-orogenic basin that evolved in a piggy-back position on the Monferrato thrust belt. Its depositional history is strongly controlled by tectonic and eustatic events (Gelati & Gnaccolini, 1988; Mutti et al., 1995; Giglia et al., 1996; Capponi et al., 2001; Capponi et al., 2009). This basin was filled with non-marine to marine sediments (upper Eocene-upper Miocene), which unconformably overlie the Ligurian Alps, Sestri-Voltaggio Zone, and Northwestern sector of the Northern Apennine. The early stage of sedimentation of the Tertiary Piedmont Basin (upper Eocene-lower Miocene) are mainly represented by very coarse to very fine siliciclastic deposits and subordinately by reef limestones, that record pre-transgressive to transgressive conditions (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 and references therein). These rocks are grouped into different formations, among which the Molare Formation (Oligocene) and the Rocchetta-Monesiglio Formation (upper Oligocene - lower Miocene) (Gelati et al., 2010; Capponi et al., 2013 and references therein), from which are the fossils forming the Collection.

THE COLLECTING SITES IN THE PARETO AREA

The location of the Pareto collecting sites has been and, in part, remains problematic because the indications are generic (simply "Pareto") or the topographic positions are not clearly defined, i.e., "*qua e là fra Grossi e Bissi*" ("here and there between Grossi and Bissi", Rovereto, 1914, p. 32 - Grossi and Bissi are two hamlets in the neighbourhood of Pareto), except for a site which, instead, is clearly indicated as "beyond the pass that lies on the road Pareto - Case Miazzola" ("*al di là della colletta che si trova sulla strada portante da Pareto alla C. Miazzola*", Rovereto, 1914, p. 32). Some indications are available on the Paleontological Map of Liguria (unpublished) that reports five fossiliferous sites in the Pareto area, one of which is clearly indicated by Rovereto (1914). The field trips performed by the present authors in the Pareto area allowed to identify four of the five sites indicated on the Paleontological Map, from where, probably, the fossil material here considered comes. The sites identified are the following:

1. Along the road Pareto - Grossi (GPS: 32 T 0450201 UTM 4930124, 423 m a.s.l.; site A in Fig. 1). Fine sandstone with interbedding of decimetric-pluridecimetric fossiliferous, bioturbated conglomerate lenses. The fossil content seems to be present only in the conglomeratic lenses and includes mollusks (among which pectinids and oysters) and worm tubes. No age diagnostic fossils are present. Lithostratigraphic evidence suggests that this outcrop is part of the Molare Formation (Oligocene).

2. Just north of Grossi (GPS: 32 T 0449937 UTM 4930171, 419 m a.s.l.; site B in Fig. 1). Silty marls with interbedding of pluridecimetric fossiliferous sandstone lenses, few conglomeratic thin beds also occur. The fossil content of sandstones includes mollusks (among which pectinids, oysters, and venerids) and fragments of branching corals. No age diagnostic fossils are present. Lithostratigraphic evidence points to an assignment to the upper part of the Molare Formation (Oligocene).

3. Along the road Pareto - Grossi (GPS: 32 T 0450428 UTM 4930105, 484 m a.s.l.; site C in Fig. 1). Medium sandstone and fine conglomerate fossiliferous, bioturbated, decimetric-pluridecimetric lenticular beds interbedded in bioturbated silty marls. Mollusks (among which pectinids and oysters), worm tubes, and larger foraminifers (*Nummulites* sp. and *Operculina* cf. *complanata*) forms the fossil content of coarse grained rocks. The lithostratigraphic evidence allows to assign this outcrop to the Molare Formation (Oligocene) and the occurrence of *Nummulites* corroborates the age attribution.

4. Along the road Pareto - Bissi (GPS: 32 T 0450909 UTM 4930418, 490 m a.s.l.; site D in Fig. 1), this site corresponds to what recorded by Rovereto (1914). Medium to fine sandstone with interbedding of decimetric-pluridecimetric fossiliferous, bioturbated coarse sandstone and conglomerate lenses. The fossil content includes mollusks (among which pectinids and oysters), coral colonies, solitary corals, echinoids, worm tubes, bryozoans, larger foraminifers (*Nummulites fichteli* Michelotti, 1841 and *Operculina complanata* [Defrance in de Blainville, 1822]) and red calcareous algae. These rocks have yielded a large number of specimens of *Nummulites fichteli*, but no other fossils with biostratigraphic value; these evidence points toward a SB21 Zone assignment, i.e. an early-middle Rupelian age (according to Cahuzac & Poignant, 1997). Lithostratigraphic evidence suggests that this outcrop is part of the Molare Formation (Oligocene).

THE TYPES FROM THE PARETO AREA

The classification scheme here adopted is that proposed by the Check List of European Marine Mollusca (CLEMAM, 2013, http://www.somali.asso.fr/clemam/index.clemam. html); additional sources were The Treatise on Invertebrate Paleontology (Part N Mollusca 6 - Bivalvia: v. 1-2, 1969, and v. 3, 1971), Harry (1985), Fossilworks: Gateway to the Paleobiology Database (http://paleodb.org, http://fossilworks.org), and WoRMS (World Register of Marine Species, http://www.marinespecies.org).

The valid types

Trisidos isseli (Rovereto, 1898)
(Pl. 1, fig. 9)

1898 *Arca (Parallelepipedum) Isseli* Rovereto, part III, p. 39.
1920 *Arca (Parallelepipedum) Isseli* Rovereto - Lombardini, p. 24, Pl. 1, figs 1-4 (cum syn.).

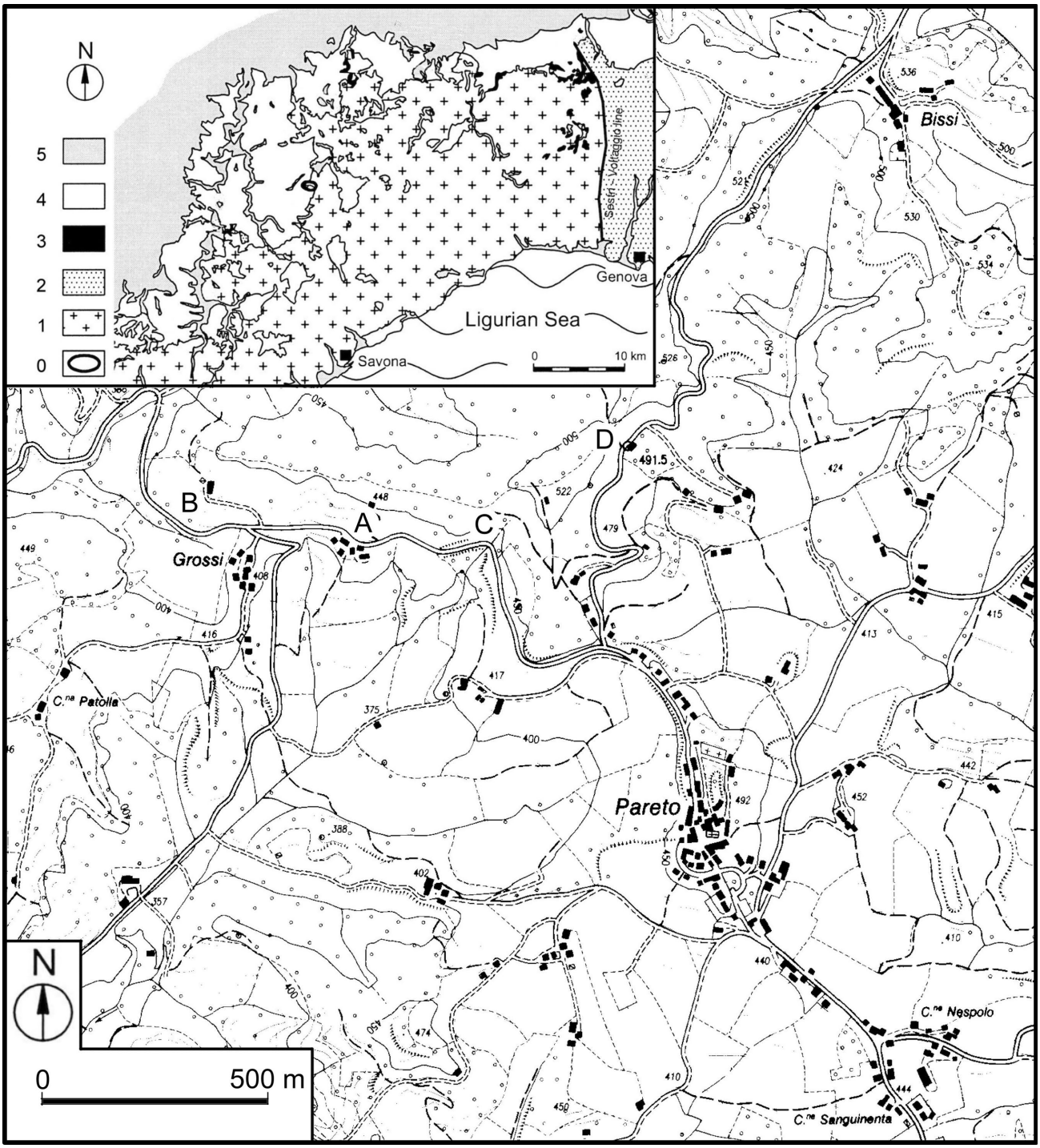


Fig. 1 - Geographic location of the collecting sites in the Pareto area: A = site A, along the road Pareto - Grossi (GPS: 32 T 0450201 UTM 4930124, 423 m a.s.l.); B = site B, just north of Grossi (GPS: 32 T 0449937 UTM 4930171, 419 m a.s.l.); C = site C, along the road Pareto - Grossi (GPS: 32 T 0450428 UTM 4930105, 484 m a.s.l.); D = site D, along the road Pareto - Bissi (GPS: 32 T 0450909 UTM 4930418, 490 m a.s.l.). In the upper left corner the geological sketch map and the location of the Pareto area: 0= Pareto area, 1= Ligurian Alps, 2= Ligurian units, 3= TPB nonmarine pre-transgression deposits (upper Eocene - lower Oligocene), 4= TPB transgressive deposits (lower Oligocene - Aquitanian), 5= TPB post-transgression deposits (Miocene) and Pliocene to Holocene deposits.

Type material - One right valve. The original label states: Collezione Perrando *Arca rustica* Mayer? *Arca Isseli* n. sp. tipo, Pareto, 1207. Holotype 1367/SM-VI-P 24.

Type locality - Pareto (AL), Molare Formation, Tertiary Piedmont Basin.

Distribution - Early Oligocene: Pareto and Sassello (NW Italy), Molare Formation (Tertiary Piedmont Basin). Oligocene: Peonis and Osoppo (Friuli, NE Italy).

Description - This Holotype was figured for the first time by Rovereto (1900, pl. IV, fig. 5) and the same image

is reported in Sacco (1904, pl. XXIX, fig. 14). It is of note that the photos were retouched (part of the sediment was removed). Fairly preserved right valve filled with sediment (size: length 39.90 mm, height 18.60 mm), subtrapezoidal in shape and exhibiting a torsion around the hinge axis, markedly inequilateral, with prosogyrous and incurved umbo. Valve with a raised ridge running from the umbo to posterior-ventral margin intersection, where it flattens. Sculpture: fine, evenly distributed, radiating ribs.

Remarks - The characters point to an assignment to the Genus *Trisidos* Röding, 1798 (cf. Cox et al., 1969b, p. N254). As regards, it is of note that Cahuzac et al. (1992, p. 94) cited this Rovereto's species as *Trisidos isseli*, and that the names *Parallelepipedum*, *Parallelipipedum*, *Parallellipipedum* used by several Authors seem to be incorrect spellings of *Parallelopipedum* Mörch, 1850, which is an objective synonym of *Trisidos* Röding, 1798 (Cox et al., 1969b, p. N254).

Aequipecten adelinae (Rovereto, 1900)
(Pl. 1, fig. 1a-b)

1900 *Chlamys (*sect. *Aequipecten) Adelinae* Rovereto, p. 64-65, Pl. III, fig. 13.
1986 *Chlamys adelinae* Rovereto - Baglioni Mavros et al., p. 141, Pl. I, fig. 7 (cum syn.).

Type material - One double-valved shell. The original label states: Collezione Perrando *Chlamys Adelinae* n. sp., 1111, Pareto. Holotype 1316/SM-VI-P(5) 1.

Type locality - Pareto (AL), Molare Formation, Tertiary Piedmont Basin.

Distribution - Early Oligocene: Pareto (AL), Molare Formation (Tertiary Piedmont Basin). Oligocene: M. Brione (Trento, NE Italy).

Description - Sacco (1904, Pl. XXVIII, fig. 10) reported the same image published by Rovereto (1900). Well preserved whole shell (size: length 46.20 mm, height 49.80 mm; width - two valves - 18.80 mm); anterior auricles and right valve slightly damaged. Valves fan shaped in outline, with small beaks, pointed, slightly projecting beyond the hinge line. Sculpture: 12/13, irregularly spaced, bold, rounded ribs more pronounced in the central part (less evident close to the anterior and posterior margins) and flattened close to the margins, and finer radiating secondary riblets on intervening grooves (more evident on the left valve).

Aequipecten apenninicus (Rovereto, 1898)
(Pl. 1, fig. 3)

1898 *Chlamys (Aequipecten) apenninica* n. sp. (*an varietas Ch. Haueri* Michelotti) Rovereto, part II, p. 33.
1937 *Chlamys (Aequipecten) praescabriuscula* var. *appenninica* Rovereto - Venzo, p. 158, Pl. 11, fig. 13 (*cum syn*.).
1939 *Pecten apenninicus* Rovereto - Roger, p. 223.
2011 *Chlamys (Aequipecten) appenninica* Rovereto, 1900 - Boschele et al., p. 236, Pl. XIV, figs 1-5.

Type material - One right (?) valve. The original label states: Collezione Perrando "*Chlamys appenninica* an var. *Chl. Haueri* Rov. Pareto, 1134". Holotype 1332/ SM-VI-P(5) 17.

Type locality - Pareto (AL), Molare Formation, Tertiary Piedmont Basin.

Distribution - Late Eocene: Colle San Pietro (Valsugana, NE Italy). Early Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin). Late Oligocene: Hungary. Oligocene: Algeria. Early Miocene: N Sardinia.

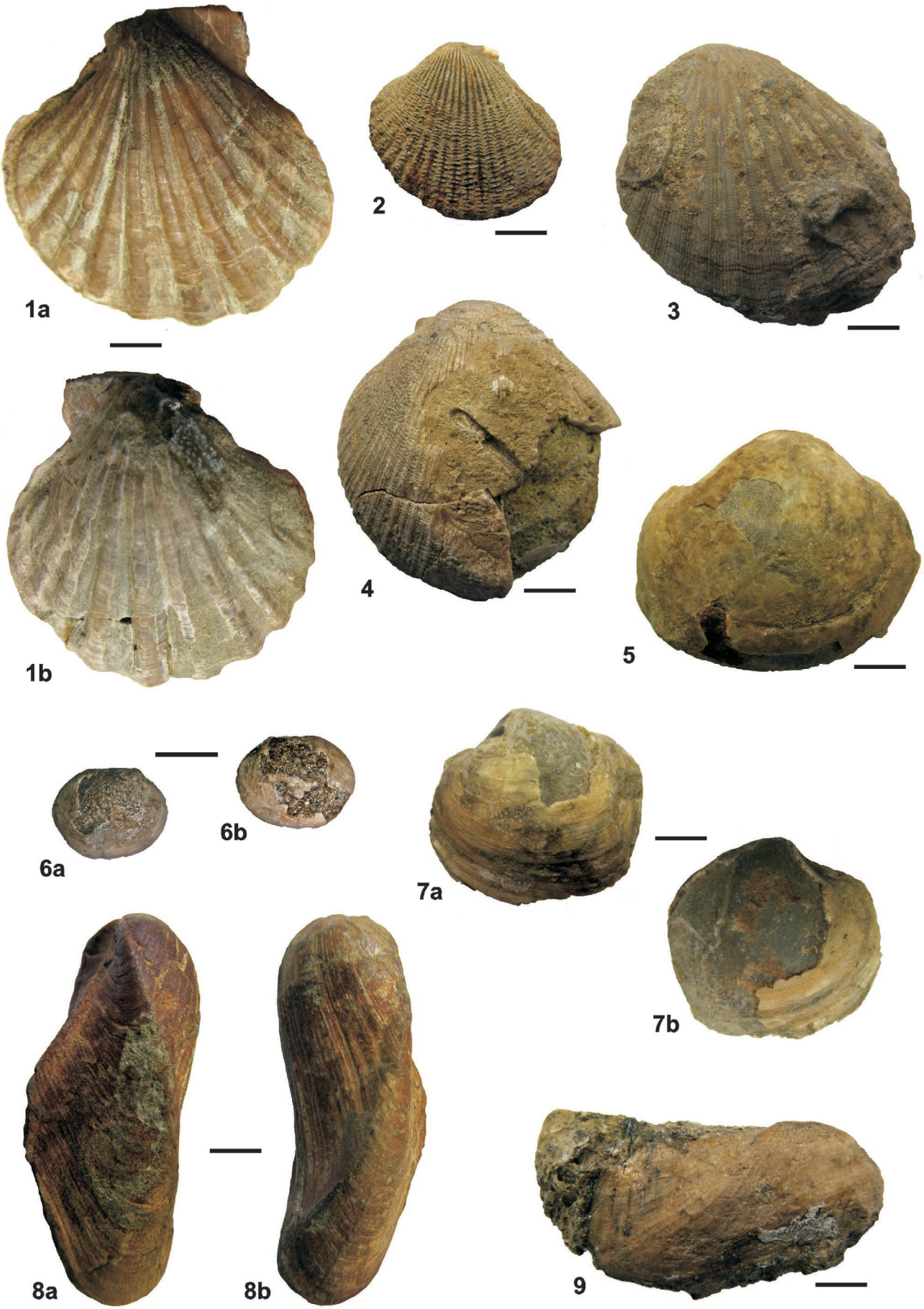
Description - The Holotype, figured by Rovereto (1900, Pl. III, fig. 10) and Sacco (1904, Pl. XXVIII, fig. 4). Fairly preserved right (?) valve (size: length 39.50 mm, height 42.00 mm; width about 7.00 mm) partially embedded in the sediment. Auricles and umbo lacking. Valve oblique, fan shaped in outline, and slightly tumid. Sculpture: 18, evenly spaced, bold, rounded, smooth to finely scaly ribs and of finer radiating secondary riblets on

EXPLANATION OF PLATE 1

Rovereto bivalve types from Pareto.

Fig. 1 - *Aequipecten adelinae* (Rovereto), a: left valve, b: right valve - DISTAV BTP Collection, 1316/SM-VI-P(5) 1.
Fig. 2 - *Chlamys bormidiana* Rovereto - DISTAV BTP Collection, 1330/SM-VI-P(5) 15.
Fig. 3 - *Aequipecten apenninicus* (Rovereto) - DISTAV BTP Collection, 1332/SM-VI-P(5) 17.
Fig. 4 - *Spondylus ligustinus* Rovereto - DISTAV BTP Collection, 1328/SM-VI-P(5) 13.
Fig. 5 - *Glossus paretoi* (Rovereto) - DISTAV BTP Collection, 1324/SM-VI-P(5) 9.
Fig. 6 - *Tapes subpraestergus* (Rovereto), a: right valve, b: left valve - DISTAV BTP Collection, 1326/SM-VI-P(5) 11.
Fig. 7 - *Diplodonta aliena* Rovereto, a: left valve, b: right valve - DISTAV BTP Collection, 1329/SM-VI-P(5) 14.
Fig. 8 - *Modiolus incomptus* (Rovereto), a: right valve, b: left valve - DISTAV BTP Collection, 1327/SM-VI-P(5) 12.
Fig. 9 - *Trisidos isseli* (Rovereto) - DISTAV BTP Collection, 1367/SM-VI-P 24.

Scale bars: 1 cm.


1a
2
3
1b
4
5
6a
6b
7a
7b
8a
8b
9

intervening grooves, that become more abundant close to the margins, occurring there also on the ribs.

Remarks - Roger (1939) considered doubtful the systematic position of this species.

Chlamys bormidiana Rovereto, 1898
(Pl. 1, fig. 2)

1898 *Chlamys (*sect. *Chlamys* s.strict*.) bormidiana* Rovereto, part II, p. 18, 32.
1900 *Chlamys (*sect. *Chlamys* s. strict*.) bormidiana* Rovereto - Rovereto, p. 59, Pl. III, fig. 1.
1904 *Chlamys bormidiana* Rovereto - Sacco, p. 140, part XXX, Pl. XXVIII, fig. 1.
1917 *Chlamys Bormidiana* Rovereto - Dalloni, p. 110.

Type material - One left valve. The original label states: Collezione Perrando *Chlamys bormidiana* n. sp., Pareto, 1106. Holotype 1330/SM-VI-P(5) 15.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Early Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin). Oligocene: W Algeria.

Description - Rovereto (1900, Pl. III, fig. 1) figured the Holotype for the first time, the same photograph is reported in Sacco (1904, Pl. XXVIII, fig. 1). Fairly preserved left valve (size: length 31.20 mm, height 30.50 mm, valve width 5.30 mm). Fan-shaped, inequilateral valve, with crenulate ventral margin and pointed umbo, not projecting beyond the hinge line; auricles damaged. Sculpture: 23 radiating, subtriangular, fine ribs and of concentric lines of prominent spatulate spines along ribs and intervening furrows, that seem to be lacking in the more convex area close to the umbo. Dysodont, with triangular, wide and deep ligamental groove.

Glossus paretoi (Rovereto, 1898)
(Pl. 1, fig. 5)

1898 *Cyprina? Paretoi* Rovereto, part II, p. 46.
1900 *Isocardia (*sect. *Isocardia* s. str.) *Paretoi* Rovereto - Rovereto, p. 97-98, Pl. VII, fig. 2.
1900 *Cyprina? Paretoi* Rovereto - Sacco, part XXVIII, p. 11.
1904 *Isocardia Pareti* Rovereto - Sacco, part XXX, p. 161, Pl. XXXI, fig. 1.
1920 *Isocardia Paretoi* Rovereto - Lombardini, p. 27.
1990 *Glossus paretoi* (Rovereto) - Baglioni Mavros, p. 257.

Type material - One left valve. The original label states: *Isocardia Paretoi* n. sp. Pareto, 1343 Collezione Perrando. Holotype 1324/SM-VI-P(5) 9.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Early Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin). Oligocene: Osoppo (Friuli, NE Italy). Paleogene: NE Italy.

Description - The Holotype is figured for the first time by Rovereto (1900; Pl. VII, fig. 2) and later by Sacco (1904, Pl. XXXI, fig. 1) and is represented by a fairly preserved left valve (size: length 52.80 mm, height 44.15 mm, width 15.80 mm). Valve convex, subcircular, with bold and tumid prosogyrous umbo. Surface smooth, growth lines visible only close to the anterior and ventral margins. Opisthodetic parivincular ligamental area fairly preserved.

Remarks - Rovereto (1989), describing the species in hand on the basis of a single specimen, questioned the Genus attribution, which in effect has later changed over time. Sacco, not having available specimens to study, suggested that the numerous *Cyprina* recovered in the Oligocene rocks of the Tertiary Piedmont Basin ("Tongriano ligure"), among which the present species originally determined by Rovereto as *Cyprina? Paretoi*, should be reduced to a smaller number of species, or moved into Veneridae, changing Genus and Family (Sacco, 1900). This species is referred to the Genus *Glossus* Poli, 1795 because, according to Cox et al. (1969a, p. N657) *Isocardia* Lamarck, 1799 is an objective synonym of *Glossus* Poli, 1795, and this statement is accepted by the more recent classification schemes.

Diplodonta aliena Rovereto, 1898
(Pl. 1, fig. 7a-b)

1898 *Diplodonta aliena* Rovereto, part III, p. 59-60.
1900 *Diplodonta aliena* Rovereto - Rovereto, p. 111, Pl. VII, fig. 11.
non 1901 *Lucina aliena* (Rovereto) - Sacco, part XXIX, p. 69, Pl. XVI, fig. 8.

EXPLANATION OF PLATE 2

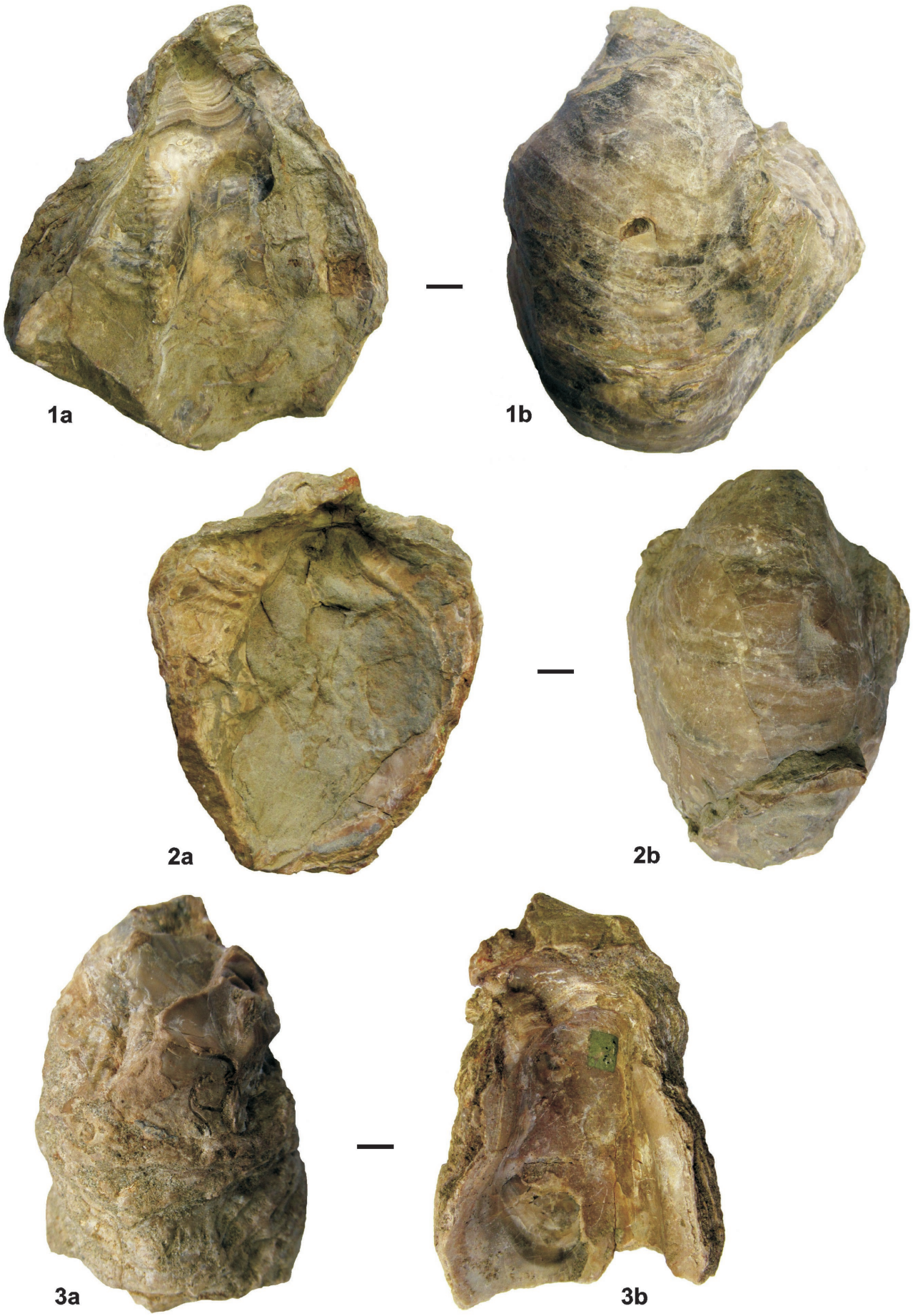
Rovereto bivalve types from Pareto.

Fig. 1 - *Pycnodonte brongniarti* (Bronn) ex *Ostrea* (sub gen. *Gryphaea*) (sect. *Pycnodonta*) *Brongniarti* var. *rostrata* Rovereto, a: internal view, b: external view - DISTAV BTP Collection, 1320/SM-VI-P(5) 5.

Fig. 2 - *Pycnodonte brongniarti* (Bronn) ex *Ostrea* (sub gen. *Gryphaea*) (sect. *Pycnodonta*) *Brongniarti* var. *bisimpressa* Rovereto, a: internal view, b: external view - DISTAV BTP Collection, 1319/SM-VI-P(5) 4.

Fig. 3 - *Crassostrea paretoi* (Rovereto), a: external view, b: internal view - DISTAV BTP Collection, 1710/SM-VI-P 47.

Scale bars: 1 cm.


1a
1b
2a
2b
3a
3b

Type material - One double-valved shell. The original label states: Collezione Perrando *Diplodonta aliena* n. sp., Rov. det., Pareto, N. 1499. Holotype 1329/SM-VI-P(5) 14.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Early Oligocene: Pareto and Sassello (NW Italy), Molare Formation (Tertiary Piedmont Basin).

Description - Rovereto (1900, Pl. VII, fig. 11) figured the Holotype for the first time. Double-valved, damaged shell (size: length 33.30 mm, height 31.50 mm, width - two valves - 17.60 mm), subcircular in shape, with prosogyrous and rather pointed umbos. Sculpture: fine, narrow, concentric lines, some of which more raised than others.

Remarks - Sacco, on the basis of the cardinal area of his specimens, stated that this species belongs to the Genus *Lucina* (Sacco, 1901). No observations are possible on the cardinal area of the Holotype in hand and the specimens described and figured in Sacco (1901) do not perfectly match Rovereto's type, therefore we prefer to maintain the original Genus attribution.

Tapes subpraestergus (Rovereto, 1914)
(Pl. 1, fig. 6a-b)

1914 *Ixartia subpraesterga* Rovereto, p. 163, Pl. V, fig. 4.

Type material - One double-valved shell. The original label states: Collezione Perrando *Diplodonta subpraesterga* n. sp., Pareto, 1546. Holotype 1326/SM-VI-P(5) 11.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin).

Description - Fairly preserved, suboval with rounded margins, posteriorly angulated, convex, double-valved shell with small, pointed and convex damaged umbos (size: length 16.55 mm, height 14.80 mm; width - two valves - 8.65 mm). Shell not rostrate and with almost smooth surface, probably only fine growth lines were present.

Remarks - The observable characters are not consistent with an assignment neither to the Genus *Thracia* nor to the Subgenus *Ixartia*, but appear to be consistent with those of the Genus *Tapes* von Mühlfeldt, 1811 (cfr. Cox et al., 1969a, p. N682-683). *T. subpraestergus* is similar to the species reported by Venzo (1937, 1938) and Sacco (1900, 1904) for the NE Italy Oligocene and NW Italy Miocene respectively.

Modiolus incomptus (Rovereto, 1898)
(Pl. 1, fig. 8a-b)

1898 *Modiola (*sect. *Amigdalum) incompta* Rovereto part II, p. 37.
1904 *Modiola (Amygdalum) incomptum* (Rovereto) - Sacco, part XXX, p. 151, Pl. XXIX, figs 7-7b.
1934 *Modiolus incomptus* (Rovereto) - Cox, p. 344, Pl. XVIII, fig. 5 (cum syn).
1967 *Modiola incompta* Rovereto - Vergneau, p. 207.

Type material - One double-valved shell. The original label states: *Modiola (Amygdalum) incompta* n. sp., tipo, Rov. det., loc. ? 11...5. Later, "Ligurian Apennines" was added on the original label. "Pareto" is recorded as type-locality on a new label. Holotype 1327/SM-VI-P(5) 12.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Late Eocene: Haute-Provence (SE France), "Nummulitique". Oligocene: Pareto and Mioglia (NW Italy), Molare Formation (Tertiary Piedmont Basin); Aquitaine basins (France); Ramle, Israel.

Description - The Holotype is figured for the first time by Rovereto (1900, Pl. IV, figs 10-10a) and later by Sacco (1904, Pl. XXIX, figs 7-7b). Double-valved shell, strongly inequilateral with small and low beaks very close to the anterior margin (size: length 21.30 mm, height 49.30 mm; width - two valves - 17.90 mm). A raised, angular ridge runs from umbos to posterior margin. Posterior and anterior margins rounded, ligament margin straight and gently sloping to posterior dorsal margin, ventral margin sinuous. Sculpture: very fine growth lines and rare, barely visible, fine radiating ribs.

Remarks - Rovereto (1900) reports that the shell of this species is very thin and the relative fossils are often represented by molds, and he states that this is the first fossil *Amigdalum* reported from the Cenozoic of Europe. In his opinion, among living species, none is so sinuous and irregular. He compares his species with the Pacific *Lithophaga (Labis) attenuata* (Deshayes) (*Modiola attenuata* Deshayes in the Rovereto's paper), stating, however, that the resemblance is more apparent than real. As regard the Genus assignment, it is of note that *Modiola* is a younger synonym of *Modiolus* (Cox et al., 1969b, p. N278).

Crassostrea paretoi (Rovereto, 1914)
(Pl. 2, fig. 3a-b)

1914 *Ostrea paretoi* Rovereto, p. 145-146, fig. 20.

Type material - One lower valve. The original label has been lost. Holotype 1710/SM-VI-P 47.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin).

Description - Thick, heavy, convex lower valve, well preserved; ventral margin lacking (size: length 60.00 mm,

height 92.75 mm; width 45.50 mm). Valve with elongate oval outline, spatulate shape, height much greater than length. No chomata. Umbo bold, large, pointed, strongly curved to the right. Well-developed umbonal cavity. Circular adductor muscle imprint close to postero-ventral margin. Triangular (with rounded base), curved ligament area. Sculpture absent, but surface not smooth, unevenly distributed growth lamellae are present.

Remarks - The species exhibits the diagnostic characters of the Genus *Crassostrea* Sacco, 1897, e.g.: large umbonal cavity, absence of chomata, spatulate shape, height greater than 90 mm (Stenzel, 1971).

Rovereto (1914) states that no Oligocene species are comparable to his species and suggests that this species might be the ancestor of *Crassostrea gingensis* (= *C. gryphoides*) (Schlotheim, 1813) as well as of the other Miocene elongated and gryphoid oysters.

Spondylus ligustinus Rovereto, 1900
(Pl. 1, fig. 4)

1897 *Spondylus Deshayesi* non Michelotti - Rovereto, part I, p. 16.
1900 *Spondylus ligustinus* Rovereto, p. 56-57, Pl. II, fig. 12.
1904 *Spondylus ligustinus* Rovereto - Sacco, part XXX, p. 146, Pl. XXVIII, fig. 2.

Type material - One right valve. The original label has been lost. Holotype 1328/SM-VI-P(5) 13.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Early Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin).

Description - The Holotype is figured for the first time by Rovereto (1900, Pl. II, fig. 12) and later by Sacco (1904, Pl. XXVIII, fig. 2). Damaged right valve filled with sediment (size: length 45.15 mm, height 48.50 mm, width 19.55 mm). Inflated, sub-oval, with small posterior ears (the anterior is lost) and slightly prosogyrous, pointed, projecting few millimeters beyond the hinge line umbo. Radial sculpture (from the margins close to the beak) of regular, fine, narrow, slightly raised, scaly costellae; very fine riblets in the interspaces; no spines. Sculpture more scaly close to the margins. Large tooth in the posterior hinge area.

Remarks - Rovereto (1898) identified this specimens as *Spondylus Deshayesi* Michelotti, 1847; later he revised this attribution, stating that it is wrong because based on the incomplete description reported by Michelotti, and established a new species (Rovereto, 1900).

According to Rovereto (1900), this species is similar in shape to *Spondylus geniculatus* d'Archiac, but differs in having very fine riblets in the interspaces, and it can be distinguished from the finely imbricated juvenile forms of *Spondylus bifrons* (*Spondylus bifrons* Münster var. *asperulata* Sacco, 1898) on the basis of the regular and lower raising of ribs.

The invalid types

Ostrea (sub gen. *Gryphaea*)
(sect. *Pycnodonta*) *Brongniarti* var. *bisimpressa* Rovereto, 1900 = *Pycnodonte brongniarti* (Bronn, 1831)
(Pl. 2, fig. 2a-b)

Type material - One well preserved lower valve. The original label states: *Ostrea Brongniarti* Bronn var. *bisimpressa* (figurata), Pareto, 944. Holotype 1319/SM-VI-P(5) 4.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin).

Remarks - This specimen (size: length 74.40 mm, height 95.70 mm, width 38.50 mm) is figured by Rovereto (1900, Pl. I, fig. 1b) and Sacco (1904, Pl. XXVII, fig. 15). Rovereto (1900) introduced this variety on the basis of the "wings" formed by the outer lamellae and connected with the attachment area, but this character, in our opinion, is not sufficient for a separation from *Pycnodonte brongniarti* (Bronn, 1831).

Ostrea (sub gen. *Gryphaea*)
(sect. *Pycnodonta*) *Brongniarti* var. *rostrata* Rovereto, 1900 = *Pycnodonte brongniarti* (Bronn, 1831)
(Pl. 2, fig. 1a-b)

Type material - One well preserved lower valve. The original label has been lost. Holotype 1320/SM-VI-P(5) 5.

Type locality - Pareto, Molare Formation, Tertiary Piedmont Basin.

Distribution - Oligocene: Pareto, Molare Formation (Tertiary Piedmont Basin).

Remarks - The specimen (size: length 90.10 mm, height 98.50 mm; width 38.80 mm) is figured by Rovereto (1900, Pl. I, fig 1a) and Sacco (1904, Pl. XXVII, fig. 16). Rovereto (1900) proposed this variety of *Pycnodonte brongniarti* (Bronn, 1831) on the basis of trifling difference (i.e.: less inflated and less gryphoid shell). The examination of the specimen allows to state that these characters do not justify any separation from *P. brongniarti*.

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