

Sonderdruck aus

Beringeria

Würzburger geowissenschaftliche Mitteilungen

Heft 34
2004

Early Jurassic Bivalvia of northern Chile. Part II. Subclass
Anomalodesmata

MARTIN ABERHAN

117-154

Würzburg 2004

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ABERHAN, M. 2004. Early Jurassic Bivalvia of northern Chile. Part II. Subclass Anomalodesmata. - *Beringeria* 34: 117-154. 3 text-figs., 1 tab., 11 pls.; Würzburg.

Abstract. Nineteen taxa, belonging to ten genera and subgenera of the bivalve subclass Anomalodesmata are described from the Lower Jurassic to lower Middle Jurassic of northern Chile. Two species of *Goniomya* are new: *G. (Goniomya) asientosensis* and *G. (Goniomya) cachinensis*. In addition, *Pholadomya (Pholadomya) idea* D'ORBIGNY, *Pholadomya (Pholadomya) multilineata* GABB, *Osteomya dilata* (PHILLIPS), *Pleuromya galathea* AGASSIZ and *Platymyoidea? cf. longa* (BUVIGNIER) are for the first time recognized in South America. Moreover, previously described material from South America that is housed in German institutions is figured for the first time. The bivalves occur in a variety of sediments ranging from coarse-grained sandstones to siltstones, marlstones and mixed siliciclastic-carbonate sediments. Hettangian to Aalenian ammonites that are associated with the bivalves provide an excellent biostratigraphic control.

■ *Jurassic, bivalves, Anomalodesmata, taxonomy, Chile*

Zusammenfassung: 19 Muscheltaxa, die zehn Gattungen und Untergattungen der Unterklasse Anomalodesmata angehören, werden aus dem Unterjura und unteren Mitteljura von Nordchile beschrieben. Zwei Arten von *Goniomya* werden neu aufgestellt: *G. (Goniomya) asientosensis* und *G. (Goniomya) cachinensis*. Die Arten *Pholadomya (Pholadomya) idea* D'ORBIGNY, *Pholadomya (Pholadomya) multilineata* GABB, *Osteomya dilata* (PHILLIPS), *Pleuromya galathea* AGASSIZ und *Platymyoidea? cf. longa* (BUVIGNIER) werden zum ersten Mal aus Südamerika beschrieben. In älteren Arbeiten beschriebenes Material aus Südamerika, das in deutschen Museen hinterlegt ist, wird zum ersten Mal abgebildet. Die Muscheln repräsentieren ein breites Faziespektrum, das von grobkörnigen Sandsteinen über Siltsteine und Mergelsteine zu gemischt siliziklastisch-karbonatischen Sedimenten reicht. Ammoniten des Hettangium bis Aalenium, die mit der Muschelfauna vergesellschaftet sind, ermöglichen eine ausgezeichnete biostratigraphische Kontrolle.

■ *Jura, Bivalven, Anomalodesmata, Taxonomie, Chile*

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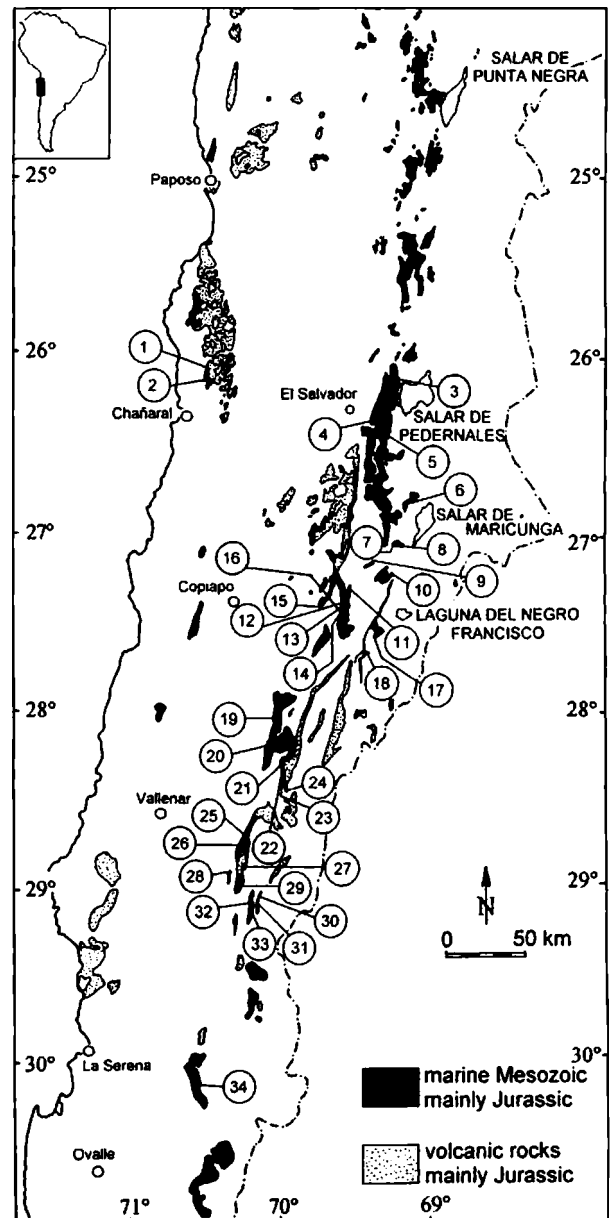
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Introduction

This paper is the second part of a monograph on the Early Jurassic bivalve fauna of northern Chile, dealing with members of the subclass Anomalodesmata. A short account of the geology of the area and the methods applied is given in part I of the monograph (ABERHAN 1994). The localities, which yielded Jurassic bivalves studied in the present paper, are shown in Text-fig. 1. These include many sections that have been sampled by A. V. HILLEBRANDT, Berlin, who has made his collections available for study. In Table 1 the localities are listed according to their geographic position from north to south, and the main references are given for each section. As most sections contain ammonites, there is generally an excellent biostratigraphic control of the studied material.

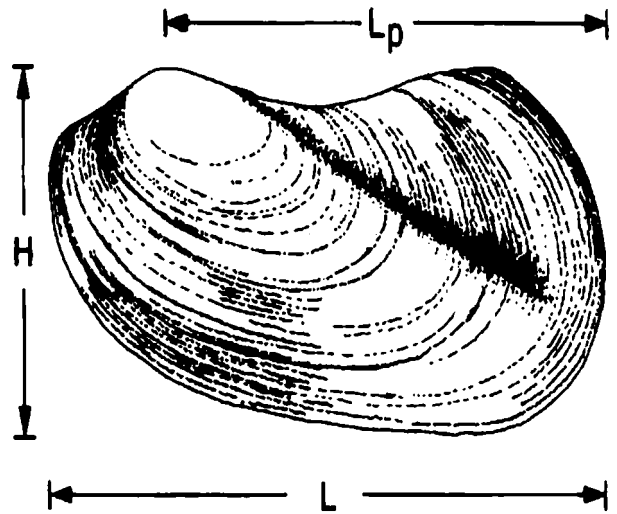
The classification of higher taxa follows the scheme of SKELTON & BENTON (1993). Wherever possible, specimens of newly erected species were measured. Text-fig. 2 provides a sketch of *Pachymya* (*Pachymya*) *rotundocaudata* (LEANZA), together with the general dimensions that were measured. Like in part I of the monograph, the synonymy lists focus on references referring to South American records with illustrations.

Figured specimens from Chile are housed in the collections of the Servicio Nacional de Geología y Minería, Santiago, Chile (SNGM). Figured material from Argentina is deposited in the Museo de Ciencias Naturales, La Plata, Argentina (MLP). The remaining material has been deposited in the collections of the



Text-fig. 1. Outcrops of marine Mesozoic sediments and Jurassic volcanics in northern Chile and location of sections (1-34). For key of sections see Tab. 1. Map based on HILLEBRANDT (1971), RICCARDI (1983) and PRINZ et al. (1994).

Institut für Paläontologie, Würzburg, Germany (PIW 2004I). For figured specimens from the HILLEBRANDT collection also original field numbers are provided in the Plate explanations. Type specimens and other materials from South America, deposited in the collections of the MLP, the SNGM, the Institut für Paläontologie, Bonn, Germany (IPB) and the Geowissenschaftliches Zentrum, Universität Göttingen, Germany (GZG), have been studied and some are figured herein for the first time. To allow the comparison with Jurassic bivalves from other parts of the world the following collections were visited: British Museum (Natural History), London, Great Britain; Estacion Regional del Noroeste, Instituto de Geología, Universidad Nacional Autónoma de México, Hermosillo, Mexico; Geological Survey of Canada, Calgary, Canada; Paläontologisches Institut der Universität, Würzburg, Germany; Paläontologisches Institut und Museum der Universität, Zürich, Switzerland; Sedgwick Museum, Cambridge, Great Britain; and Staatliches Museum für Naturkunde, Stuttgart, Germany (SMNS).



Text-fig. 2. General dimensions measured in this study and exemplified in *Pachymya (Pachymya) rotundocaudata* (LEANZA 1942). L: length; L_p : length of posterior part of shell; L_p/L : posterior length/length ratio; H: height; H/L : height/length ratio; I: inflation of articulated valve; I/L : inflation/length ratio.

Taxonomy

Class Bivalvia LINNÉ 1758

Subclass Anomalodesmata DALL 1889

Order Pholadomyoidea NEWELL 1965

Family Pholadomyidae GRAY 1847

Genus *Pholadomya* G. B. SOWERBY 1823

Type species. *Pholadomya candida* G. B. SOWERBY 1823; by subsequent designation (GRAY 1847).

Subgenus *Pholadomya* G. B. SOWERBY 1823

Pholadomya (Pholadomya) corrugata KOCH & DUNKER 1837

Pl. 1, Figs. 4-9

- 1837 *Pholadomya corrugata* sp. nov. - KOCH & DUNKER: 20, pl. 1, fig. 6.
- v 1874 *Pholadomya corrugata*, KOCH und DUNKER - MOESCH: 11, pl. 2, figs. 1-4, pl. 5, figs. 4-6, pl. 8, fig. 1. [see for synonymy list]
- 1894 *Pholadomya andina* sp. nov. - MÖRICHKE: 54, pl. 1, fig. 8.
- v 1926a *Pholadomya hemicardia* ROEM. - JAWORSKI: 193, pl. 1, figs. 2-3. [see Pl. 10, Figs. 1-2]
- v 1926b *Pholadomya hemicardia* F. A. ROEM. - JAWORSKI: 399. [see Pl. 10, Figs. 1-2]
- 1929 *Pholadomya corrugata* KOCH et DUNKER - LANQUINE: 83,

pl. 2, fig. 6.

- v 1931 *Pholadomya hemicardia* ROEM. - WINDHAUSEN: pl. 25, fig. 8. [copy of JAWORSKI 1926a: pl. 1, fig. 3a]
- v 1942 *Pholadomya cf. fortunata* DUM. - LEANZA: 183, pl. 15, fig. 2.
- v 1942 *Pholadomya corrugata* KOCH et DUNKER - LEANZA: 184, pl. 12, figs. 2-3.
- v 1982 *Gresslya* (?) sp. - PÉREZ: pl. 17, figs. 6-8.
- v 1982 *Pleuromya* (?) sp. - PÉREZ: pl. 19, figs. 1-2.
- v 1992 *Pholadomya (Pholadomya) corrugata* KOCH & DUNKER 1877 - ABERHAN: 20.
- v? 1992 *Pholadomya (Bucardiomya) ?* sp. - ABERHAN: 20.

Material. 2 specimens from the Upper Sinemurian of Quebrada Noria (PIW 2004I 1-2); 3 specimens from the Lower Pliensbachian north of Juntas del Tolar (PIW 2004I 3-5); 5 specimens from the Lower Pliensbachian of Portezuelo de Pedernales (PIW 2004I 6-10); 1 specimen from the Lower Pliensbachian of Quebrada El Peñon (PIW 2004I 11); 4 specimens from the Lower Pliensbachian of Quebrada El Bolito (SNGM 787, 849, PIW 2004I 12-13); 3 specimens from the Lower Pliensbachian of Quebrada Vaca Muerta (PIW 2004I 14-16); 2 specimens from the Lower Pliensbachian, 3 specimens from the Upper Pliensbachian and 1 specimen from the Pliensbachian of Rio Jorquera (PIW 2004I 17-22); 57 specimens from the Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (SNGM 788-791, PIW 2004I 23-75); 4 specimens from the Upper Pliensbachian and 2 specimens from the Pliensbachian of Rio Figueroa (PIW 2004I 76-81); 28 specimens from the Upper Pliensbachian of Quebrada Pinte (PIW 2004I 82-109); 3 specimens from the Upper Pliensbachian of Cerro Picudo (PIW 2004I 110-112); 1 specimen from the Pliensbachian of Rio Manflas (PIW 2004I 113); 1 specimen from the Pliensbachian of Quebrada La Plata (PIW 2004I 114). All specimens are bivalved and predominantly preserved as internal and composite moulds; shell preservation occurs occasionally.

Description. The shell of *Pholadomya (Pholadomya) corrugata* is of moderate to large size, obliquely-ovate, strongly inflated, and has a narrow gape at the posterior end. The well rounded umbones are situated about one-third to one-fourth of the shell length from the anterior end and protrude distinctly beyond the hinge line. The incurved beaks are slightly prosogyrous. The ventral margin is regularly curved, passing laterally into the strongly convex posterior margin and the steeper, less convex anterior margin. The posterodorsal margin is straight to slightly concave. Weak posterodorsal umbonal ridges enclose a narrow escutcheon.

All specimens exhibit distinct, rounded, commarginal growth rugae. The commarginal rugae are of about equal strength and evenly spaced in most specimens, but occasionally are more irregular in spacing and strength. Commonly, the growth rugae are fading anteriorly and posterodorsally and in some specimens become obsolete. Growth lines are well developed in specimens with shell preservation. The radial ornament is very weakly developed and barely noticeable to unrecognizable in poorly preserved steinkerns. It consists of 7-12 faint radial ribs which arise high on the beak and fade away before they reach the ventral margin.

Remarks. A substantial part of specimens of *Ph. corrugata* collected in the Andean Cordillera does not exhibit radial ribs, and for this reason may be confused with *Homomya*, a genus which lacks radial ribs except in earliest stages of growth but otherwise strongly resembles *Ph. (Pholadomya)*. This shows how important it is to study whole populations rather than single specimens, and to base identifications on well preserved material.

CAMPBELL & GRANT-MACKIE (1995) erected two new subgenera of *Pholadomya* based on material from the Jurassic of New Zealand and New Caledonia. One subgenus, *Moewakamya*, is described as exhibiting „subterminal beaks, regular concentric plicae and few very weak radials posteriorly and centrally, with escutcheon bordered by dorsal umbonal ridges, and with posterior gape very narrow or absent“ (CAMPBELL & GRANT-MACKIE 1995: 54). The presence of a narrow posterior gape, relatively regular commarginal rugae and a few weak radial ribs in *Ph. corrugata* are strongly reminiscent of *Moewakamya*. However, in *Ph. corrugata* the beak is not subterminal and the radial ribs fade both anteriorly and posteriorly rather than being strongest posterodorsally as in *Moewakamya*.

The type material of *Ph. corrugata* was searched for but could not be traced in the following institutions in Germany: Geowissenschaftliches Zentrum, Universität Göttingen; Institut für Umweltgeologie, Technische Universität Braunschweig; Institut für Geologie und

Paläontologie, Technische Universität Clausthal; Institut für Geologie und Paläontologie, Universität Hannover; Institut für Geologie und Paläontologie, Universität Marburg; Niedersächsisches Landesmuseum Hannover; and Roemer- und Pelizaeus-Museum Hildesheim. In the drawing provided by KOCH & DUNKER (1837: pl. 1, fig. 6), *Ph. corrugata* lacks radial ribs and is weakly inflated. According to MOESCH (1874: 11), this specimen is strongly deformed and very untypical of *Ph. corrugata*. A much better description and figures of *Ph. corrugata* have subsequently been provided by MOESCH (1874: pl. 2, figs. 1-4, pl. 5, figs. 4-6, pl. 8, fig. 1). To evaluate whether *Ph. corrugata* is indeed synonymous with *Ph. angustata* J. SOWERBY (1822: 29, pl. 327), as was suggested by REGINECK (1917: 33), is beyond the scope of this study and requires thorough examination of original material.

Nominal species of Liassic European *Pholadomya* which are comparable to *Ph. corrugata* in size, shape and style of ribbing and which therefore are regarded as junior synonyms include: *Ph. glabra* AGASSIZ from the Liassic of southern Germany, northern France and Luxemburg (AGASSIZ 1842: 69, pl. 3, figs. 12-14; CHAPUIS & DEWALQUE 1853: 114, pl. 16, fig. 2; QUENSTEDT 1856: 81, pl. 10, fig. 2; DUMORTIER 1864: 45, pl. 5, figs. 7-8); *Ph. arenacea* TERQUEM (1855: 284, pl. 18, fig. 9) and *Ph. heberti* TERQUEM (1855: 285, pl. 18, fig. 10) from the Hettangian of Luxemburg; *Ph. prima* QUENSTEDT (1856: 49, pl. 5, fig. 2; DUMORTIER 1864: 45, pl. 5, figs. 9-10) from the Hettangian of southern Germany; and *Ph. beyrichi* SCHLÖNBACH (1863: 537, pl. 13, fig. 1) from the Lower Pliensbachian of northern Germany. European specimens of *Ph. corrugata* usually have a greater length to height ratio than most Chilean representatives of the species. Due to the existence of transitional forms, however, both are placed within the same species.

The Chilean specimens are certainly conspecific with *Ph. corrugata* from the upper Lower Jurassic of Piedra Pintada, west-central Argentina (LEANZA 1942: 184, pl. 12, figs. 2-3). *Pholadomya* cf. *hemicardia* ROEM. (LEANZA 1942: 184, pl. 16, fig. 1) from the same locality is a strongly deformed specimen, lacking the umbonal part and exhibiting five narrow ribs in the right valve. The poor preservational state renders an unquestionable identification impossible. The same is true of *Pholadomya* sp. (BEHRENDSEN 1891: 385, 1922: 170, GZG Gö Orig K 497-26) from the Lower Jurassic of Río Salado, Mendoza Province, Argentina. The articulated specimen lacks the anterior, posteroventral and umbonal part, but presence of commarginal growth rugae and a few faint radial ribs are reminiscent of the ornamentation of *Ph. corrugata*. In contrast, *Pholadomya hemicardia* ROEM. (JAWORSKI 1926a: 193, pl. 1, figs. 2-3; Pl. 10, Figs. 1-2) from Río Atuel and *Pholadomya* cf.

fortunata DUM. (LEANZA 1942: 183, pl. 15, fig. 2) from Piedra Pintada can be assigned to *Ph. corrugata* with confidence. *Pholadomya* (*Bucardiomya*?) sp. from the Upper Pliensbachian of Quebrada Asientos (ABERHAN 1992: 20) is represented by a single specimen and most likely is a strongly deformed juvenile of *Ph. corrugata*. *Pholadomya undina* MÖRICKÉ (1894: 54, pl. 1, fig. 8), described from the upper Lower Jurassic of Peñon in the Quebrada de Maricunga, northern Chile, corresponds well to *Ph. corrugata*, in particular with regard to number and nature of the commarginal and radial ornament. Although the illustrated specimen is relatively small and has a comparatively well developed anterior end, it is considered to fall within the morphological range of *Ph. corrugata* and is therefore grouped here with the latter. MÖRICKÉ's locality probably corresponds to the section described by HILLEBRANDT & SCHMIDT-EFFING (1981) near El Peñon in the Quebrada El Peñon. *Ph. corrugata* occurs in the lower part of the section in arenaceous bioclastic limestones which, according to HILLEBRANDT & SCHMIDT-EFFING (1981: 12), are of Early Pliensbachian age. The known stratigraphical range of the species in South America is Late Sinemurian to Middle Toarcian.

Pholadomya (*Pholadomya*) *fidicula*

J. DE C. SOWERBY 1826

Pl. 2, Figs. 1-6

- 1819 *Lutraria lirata* sp. nov. - J. SOWERBY: 47, pl. 225, figs. 1-2.
 1826 *Pholadomya fidicula* nom. nov. - J. DE C. SOWERBY: 86.
 1851 *Pholadomya acostae* sp. nov. - BAYLE & COQUAND: 21, pl. 7, figs. 5-6.
 1851 *Pholadomya zietenii*, AGASS. - BAYLE & COQUAND: 26, pl. 7, fig. 8.
 1851 *Pholadomya fidicula*, Sow. - BAYLE & COQUAND: 27, pl. 7, fig. 7.
 1854 *Pholadomya attenuata* sp. nov. - HUPÉ: 376, pl. C6, fig. 5.
 1854 *Pholadomya abbreviata* sp. nov. - HUPÉ: 377, pl. C6, fig. 4.
 v 1874 *Pholadomya fidicula*, Sow. - MOESCH: 25, pl. 8, figs. 4-7, pl. 9, figs. 6-8. [see for synonymy list]
 1878 *Pholadomya fidicula* Sow. - GOTTSCHÉ: 33, pl. 7, fig. 1.
 1878 *Pholadomya abbreviata* HUPÉ - GOTTSCHÉ: 33, pl. 7, fig. 2.
 v 1891 *Pholadomya Acostae* BAYLE et COQU. - BEHRENDSEN: 384. [see Pl. 10, Fig. 3]
 v 1892 *Pholadomya conf. fidicula* Sow. - BEHRENDSEN: 12. [see Pl. 10, Fig. 4]
 v 1898 *Pholadomya fidicula* SOWERBY. - TORNQUIST: 190. [see Pl. 10, Fig. 5]
 v 1922 *Pholadomya Acostae* BAYLE et COQU. - BEHRENDSEN: 170. [see Pl. 10, Fig. 3]
 v 1922 *Pholadomya cf. fidicula* Sow. - BEHRENDSEN: 207. [see Pl. 10, Fig. 4]
 1925 *Pholadomya fidicula* Sow. - GOTTSCHÉ: 266, pl. 7, fig. 1. [copy of GOTTSCHÉ 1878: pl. 7, fig. 1].

- 1925 *Pholadomya abbreviata* HUPÉ - GOTTSCHÉ: 266, pl. 7, fig. 2. [copy of GOTTSCHÉ 1878: pl. 7, fig. 2]
 1931 *Pholadomya fidicula* (SOWERBY) - WEAVER: 309, pl. 36, fig. 204.
 1965 *Pholadomya fidicula* SOWERBY - ALENCASTER & BUITRON: 36, pl. 9, figs. 1-4.
 v 1992 *Pholadomya* (*Pholadomya*) *fidicula* (SOWERBY 1821) - ABERHAN: 20.
 v 1998 *Pholadomya* cf. *P. fidicula* (J. SOWERBY, 1819) - DAMBORENA & GONZÁLEZ-LEÓN: 195, fig. 9.3.

Material. 1 specimen from the Upper Sinemurian, 10 specimens from the Upper Pliensbachian, 29 specimens from the Middle Toarcian, 2 specimens from the Upper Toarcian, 1 specimen from the Lower Aalenian and 1 specimen from the Aalenian of Quebrada Pinte (SNGM 792, 797, PIW 2004I 115-156); 9 specimens from the Pliensbachian (*Fanninoceras fannini* Zone) and 4 specimens from the Lower Aalenian of Quebrada Asientos (SNGM 794, PIW 2004I 157-168); 3 specimens from the Lower Pliensbachian, 5 specimens from the Middle Toarcian and 3 specimens from the Lower Aalenian of Quebrada Chancoquin (SNGM 793, 796, PIW 2004I 169-177); 4 specimens from the Pliensbachian of Portezuelo de Pedernales (SNGM 795, PIW 2004I 178-180); 1 specimen from the Lower Pliensbachian of Salar de Pedernales (PIW 2004I 181); 1 specimen from the Lower Pliensbachian of Quebrada Vaca Muerta (PIW 2004I 182); 1 specimen from the Middle Toarcian of Quebrada El Patón (PIW 2004I 183); 2 specimens from the Middle Toarcian of Río Jorquera (PIW 2004I 184-185); 2 specimens from the Middle Toarcian, 3 specimens from the Upper Toarcian and 3 specimens from the Lower Aalenian of Río Manflas (PIW 2004I 186-193); 1 specimen from the Middle Toarcian of Quebrada El Peñon (PIW 2004I 194); 43 specimens from the Middle Toarcian and 8 specimens from the Lower Aalenian of Quebrada La Totorá (PIW 2004I 195-245); 1 specimen from the Middle Toarcian of Quebrada La Plata (PIW 2004I 246); 1 specimen from The Middle Toarcian and 1 specimen from the Upper Toarcian of Quebrada Plaza (PIW 2004I 247-248); 2 specimens from the Upper Toarcian and 1 specimen from the Lower Aalenian of Manflas (PIW 2004I 249-251); 1 specimen from the Upper Toarcian of Quebrada La Papa (PIW 2004I 252); 1 specimen from the Upper Toarcian of Río Plata (PIW 2004I 253); 1 specimen from the Upper Toarcian of Río del Toro (PIW 2004I 254); 1 poorly preserved specimen from the Aalenian of Quebrada San Miguel (PIW 2004I 255); 1 specimen from the Lower Aalenian of Quebrada San Pedrito (PIW 2004I 256); 1 specimen from the Aalenian of Cerro Tatul (PIW 2004I 257); 1 specimen from the Lower Aalenian of Quebrada Yervas Buenas (PIW 2004I 258). All specimens are articulated and are commonly preserved as composite moulds. Very rarely shell preservation occurs.

Description. *Pholadomya fidicula* is of medium to large size, elongated-ovate and moderately to well inflated. The posterior gape is moderately wide. The broad umbones are situated about one-fifth to nearly one-third of the shell length from the anterior end. The curvature of the ventral margin varies from evenly curved to almost straight. It passes into the slightly truncated posterior margin and the evenly convex anterior margin. The posterodorsal margin is variably concave and roughly parallel to the ventral margin. Escutcheon ridges are missing.

The number of radial ribs varies from 18-30. They appear very high on the beak, extend all the way to the

ventral margin and occupy the whole surface of the shell except the posterodorsal region and the anterior end. The most anteriorly placed ribs, up to 4 in number, are commonly wider spaced than the following ribs. The ribs are of variable strength, coarser in specimens from coarse-grained sediments and finer in specimens from fine-grained sediments, triangular and sharp-crested in specimens with shell preservation, and more rounded in steinkerns. They tend to be almost straight anteriorly, becoming increasingly arched in a posterior direction. In a few specimens the ribs are slightly sinuous. The commarginal ornament consists of fine growth lines and relatively weak growth rugae at irregular intervals.

Remarks. This common and long ranging species was originally described as *Lutraria lirata* by J. SOWERBY (1819: 47, pl. 225, figs. 1-2). Recognizing that the name was preoccupied by *Cardita ? lirata* J. SOWERBY (1818: 220, pl. 197, fig. 3), also a *Pholadomya*, its name was later changed to *fidicula* by J. DE C. SOWERBY (1826: 86). The Chilean specimens show considerable variation in size, shape and in the number and character of the ribs. Besides an evolutionary increase in adult size from the Pliensbachian to the Aalenian, specimens also tend to become more elongate during this time period with more anteriorly placed umbones. Altogether they correspond well in overall variability to representatives of *Pholadomya fidicula* from the Middle Jurassic of Europe as described and figured e.g. by J. SOWERBY (1819: 47, pl. 225, figs. 1-2), VON ZIETEN (1833: 86, pl. 65, fig. 2), GOLDFUSS (1841: 270, pl. 157, fig. 2), AGASSIZ (1842: 60, pl. 3c, figs. 10-13), QUENSTEDT (1857: 382, pl. 52, fig. 7) and MOESCH (1874: 25, pl. 8, figs. 4-7, pl. 9, figs. 6-8). Upper Liassic specimens have been reported by CHOFFAT (1893: 28, pl. 4, figs. 13-16), BENECKE (1905: 280, pl. 25, figs. 1-2) and GAHR (2002: pl. 5, fig. 5).

Pholadomya fidicula has been mentioned and described repeatedly from the Jurassic of South America (e.g. HUPÉ 1854: 376; MÖRCKE 1894: 55; BEHRENDSEN

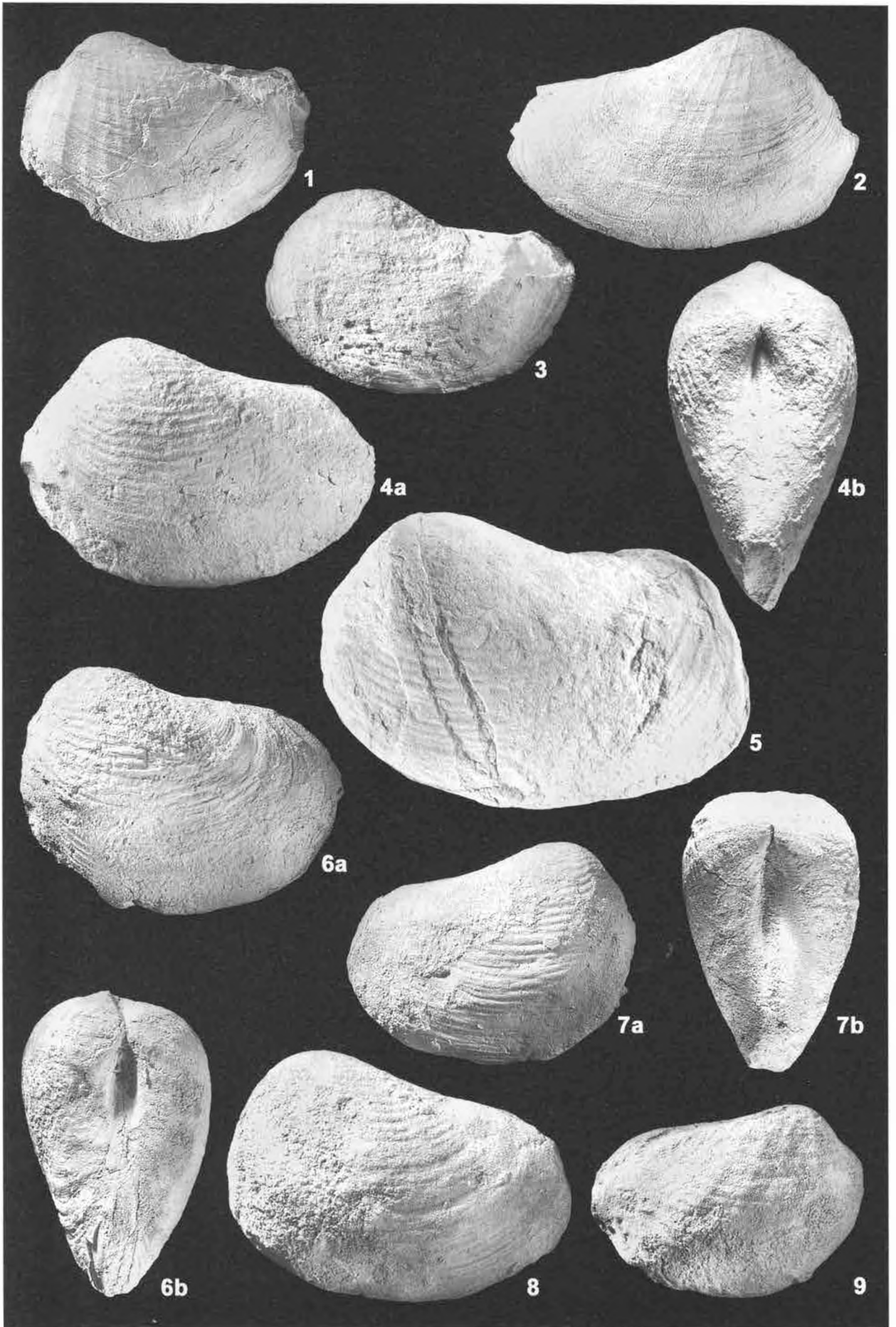
1892: 12, 1922: 207, see Pl. 10, Fig. 4; TORNQUIST 1898: 190, see Pl. 10, Fig. 5; JAWORSKI 1926a: 192). Illustrations of South American *Ph. fidicula*, which demonstrate that the specimens clearly lie within the morphological variability of their European counterparts, were provided by BAYLE & COQUAND (1851: 27, pl. 7, fig. 7), GOTTSCHÉ (1878: 33, pl. 7, fig. 1) and WEAVER (1931: 309, pl. 36, fig. 204). BAYLE & COQUAND'S figure represents the typical elongate shape of early Middle Jurassic specimens from northern Chile. *Ph. acostae* BAYLE & COQUAND (1851: 21, pl. 7, figs. 5-6) is obviously based on a specimen which was distorted by sediment compaction. Compactional flattening of the anterior part of the shell, as displayed by *Ph. acostae*, is commonly found in specimens that were embedded in life position, that is with the antero-posterior axis roughly normal to bedding. It is often accompanied by a shortening of the hinge line, exaggeration of the radial sculpture and increased inflation. Following other authors (MOESCH 1874: 25; JAWORSKI 1926: 192), I consider *Ph. acostae* and *Ph. zietenii* AGASSIZ (1842: 54, pl. 3, figs. 13-15; BAYLE & COQUAND 1851: 26, pl. 7, fig. 8) as junior synonyms of *Ph. fidicula*. Also BEHRENDSEN'S (1891: 384, 1922: 170; see Pl. 10, Fig. 3) incomplete and distorted specimens of *Ph. acostae* from the Lower Jurassic of Portezuelo Ancho, Argentina, belong here.

Likewise, *Pholadomya abbreviata* HUPÉ from the Aalenian to Early Bajocian of Argentina and Chile (HUPÉ 1854: 377, pl. C6, fig. 4; GOTTSCHÉ 1878: 33, pl. 7, fig. 2), agrees well with *Ph. fidicula* from Europe (e.g. compare HUPÉ 1854: pl. C6, fig. 4 to BENECKE 1905: pl. 25, fig. 1, and GOTTSCHÉ 1878: pl. 7, fig. 2 to QUENSTEDT 1857: pl. 52, fig. 7). Finally, *Pholadomya attenuata* HUPÉ (1854: 376, pl. C6, fig. 5), which occurs together with *Ph. abbreviata* in the Inferior Oolite of Coquimbo, is regarded as a variety of *Ph. fidicula* and is comparable, for example, to the specimen figured by MOESCH (1874: 25, pl. 8, fig. 7) and specimens of *Ph. fidicula* from northern Chile (e.g. Pl. 2, Fig. 2).

EXPLANATION OF PLATE I

Figs. 1-3. *Pholadomya (Pholadomya) voltzi* AGASSIZ 1842. 1. Articulated specimen, left valve view; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 841112/2); x 1. - SNGM 784. 2. Articulated specimen, right valve view; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 861119/12); x 1. - SNGM 785. 3. Articulated specimen, left valve view; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 860319/2); x 1. - SNGM 786.

Figs. 4-9. *Pholadomya (Pholadomya) corrugata* KOCH & DUNKER 1837. 4. Articulated specimen; a: left valve view; b: dorsal view; Lower Pliensbachian of Quebrada El Bolito (HILLEBRANDT 670222/4); x 1. - SNGM 787. 5. Articulated specimen, left valve view; Lower Pliensbachian of Quebrada El Bolito (HILLEBRANDT 670222/4); x 1. - SNGM 849. 6. Articulated specimen; a: left valve view; b: dorsal view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I + III, hor. 2-81 B3); x 1. - SNGM 788. 7. Articulated specimen; a: right valve view; b: dorsal view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I + III, hor. 2-61); x 1. - SNGM 789. 8. Articulated specimen, left valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (HILLEBRANDT 660708/8); x 1. - SNGM 790. 9. Articulated specimen, right valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I, float between hor. 2-60 and 2-61); x 1. - SNGM 791.



Pholadomya (Pholadomya) idea D'ORBIGNY 1850

Pl. 3, Figs. 4, 6; Pl. 4, Fig. 1

- 1833 *Pholadomya ambigua* SOWERBY - VON ZIETEN: 86, pl. 65, fig. 1.
 1850 *Pholadomya idea*, D'ORB., 1847 - D'ORBIGNY: 7^e étage, p. 216.
 v 1915 *Pholadomya ambigua* SOW. - JAWORSKI: 423. [see Pl. 10, Fig. 6]
 v 1991 *Pholadomya idea* D'ORBIGNY - POULTON: 32, pl. 4, figs. 4-12, 14-15.
 v 1992 *Pholadomya (Pholadomya) hemicardia* ROEMER 1836 - ABERHAN: 20.
 v ? 1998 *Pholadomya* cf. *P. ambigua* (J. SOWERBY, 1819) - DAMBORENEA & GONZÁLEZ-LEÓN: 195, fig. 9.4.

Material. 1 articulated specimen from the Upper Sinemurian of Quebrada Chancoquin (SNGM 804); 16 specimens from the Upper Sinemurian of Quebrada Pinte (SNGM 802-803, PIW 20041 259-272); 3 specimens from the Upper Sinemurian north of Juntas del Tolar (PIW 20041 273-275); 2 specimens from the Upper Sinemurian of Quebrada Vaca Muerta (PIW 20041 276-277); 3 specimens from the Upper Sinemurian of Quebrada Yerbas Buenas (PIW 20041 278-280). Most specimens are preserved as composite or internal moulds, few are preserved with their shell.

Description. *Pholadomya idea* is medium-sized, obliquely-ovate, moderately inflated with the maximum inflation located between about one-third to one-half of the shell length from the anterior end. The posterior gape is moderately wide. The relatively narrow umbones are situated about one-fourth of the shell length from the anterior end. The concave posterodorsal margin is running roughly parallel to the weakly convex ventral margin, which in turn is grading smoothly into the regularly curved posterior margin. The anterior margin is weakly truncated and protrudes most strongly in the dorsal half of the shell. The escutcheon is bordered by narrow posterodorsal ridges which become broader and more rounded towards the posterior end until they finally fade away.

Pholadomya idea exhibits 9 to 12 sharply triangular to slightly round-crested radial ribs that extend to the ventral margin. The most anteriorly and the most posteriorly placed rib are weak to barely noticeable and may disappear before they reach the ventral margin. All

other ribs are of about equal strength and regularly spaced with concave interspaces. The anterior part and the posterodorsal region are devoid of ribs. The commarginal ornament consists of fine growth lines. A weakly developed irregularity of the radial ribbing is due to the inference of slightly more prominent growth lines.

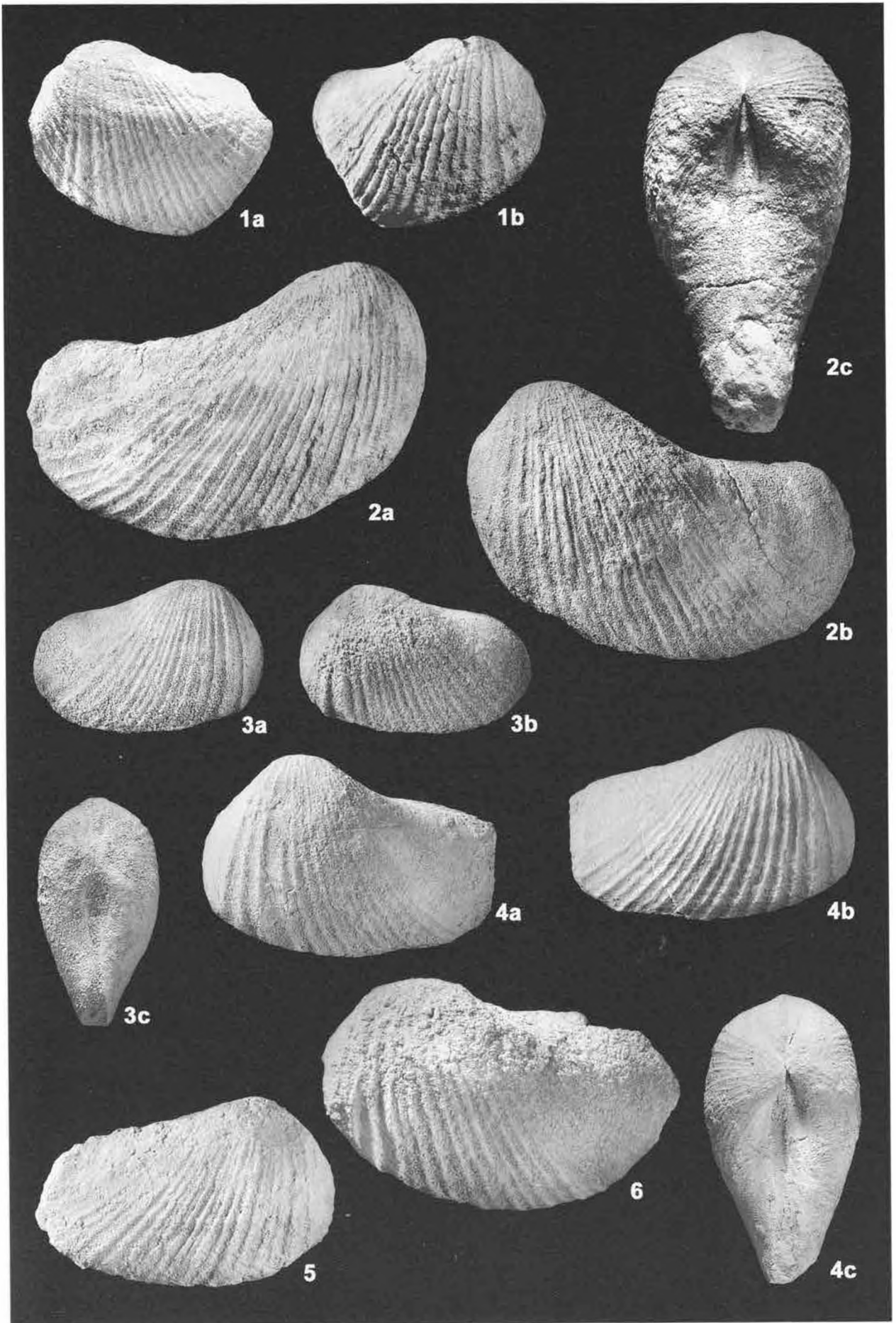
Remarks. D'ORBIGNY (1850) designated as type specimen of *Ph. (Pholadomya) idea* *Pholadomya ambigua* SOWERBY of VON ZIETEN (1833: 86, pl. 65, fig. 1). *Ph. idea* is a common element in the Liassic of Europe and its considerable variability has led to the erection of several subspecies (e.g. MOESCH 1874: 15, pl. 3, figs. 3-4, pl. 4, figs. 1, 2, 4, non 3, pl. 5, fig. 1, see also for synonymy list). The Chilean material is closest to *Ph. idea* 'typus' in the sense of MOESCH (1874: 16, pl. 3, figs. 3-4, pl. 4, fig. 1). *Ph. idea* var. *fraasi* (OPPEL) (MOESCH 1874: 17, pl. 4, figs. 2, 4) and *Ph. idea* var. *deshayesi* (CHAPUIS & DEWALQUE) (MOESCH 1874: 18, pl. 5, fig. 1) have more broadly rounded and stronger radial ribs which bear well developed tubercles where they cross the prominent commarginal growth rugae.

Of all specimens of *Pholadomya* illustrated from the Jurassic of South America, *Ph. idea* has strongest resemblance to *Ph. (Pholadomya) plagemanni* MÖRNICKE (1894: 55, pl. 6, fig. 2; WEAVER 1931: 311, pl. 36, figs. 207-208) from the Bajocian of northern Chile (Pl. 10, Fig. 7) and the Callovian of Neuquén, Argentina. In contrast to the Upper Sinemurian specimens from Chile, *Ph. plagemanni* carries slightly more ribs, 13-14 according to MÖRNICKE (1894) and 14-15 according to WEAVER (1931), the ribs are more prominent, the umbones broader, and the anterior part of the shell is more evenly rounded. The poorly preserved Early Jurassic specimen described and figured as *Pholadomya* cf. *plagemanni* MÖRNICKE by LEANZA (1942: 185, pl. 16, fig. 3) was not found during my visit to the La Plata Museum, and its affinities to other South American species of *Pholadomya* remain unresolved at present.

ABERHAN (1992) identified *Pholadomya hemicardia* ROEMER from the Lower Jurassic of Quebrada Pinte, northern Chile (figured herein on Pl. 3, Fig. 4). Analysis of additional material from the same locality, made

EXPLANATION OF PLATE 2

Figs. 1-6. *Pholadomya (Pholadomya) fidicula* J. DE C. SOWERBY 1826. 1. Articulated specimen; a: left valve view; b: right valve view; Upper Sinemurian of Quebrada Pinte (HILLEBRANDT 670910/6); x 1. - SNGM 792. 2. Articulated specimen; a: right valve view; b: left valve view; c: dorsal view; Lower Aalenian of Quebrada Chancoquin (HILLEBRANDT 671009/7); x 1. - SNGM 793. 3. Articulated specimen; a: right valve view; b: left valve view; c: dorsal view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (section 2 in ABERHAN 1992, float); x 1. - SNGM 794. 4. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Pliensbachian (*Fanninoceras fannini* Zone) of Portezuelo de Pedernales (HILLEBRANDT 660710/1); x 1. - SNGM 795. 5. Articulated specimen, right valve view; Middle Toarcian of Quebrada Chancoquin (HILLEBRANDT 671009/5); x 1. - SNGM 796. 6. Articulated specimen, left valve view; Upper Pliensbachian of Quebrada Pinte (ABERHAN 1992: app. I + III, hor. 3-14); x 1. - SNGM 797.



available by A. VON HILLEBRANDT, shows that ABERHAN's specimens commonly have been shortened in the antero-posterior direction as a result of sediment compaction in such a way that they resemble *Ph. hemiscardia*. The above mentioned specimens clearly are distorted forms of *Ph. idea*. This species is also present in the middle Early Jurassic of Río Atuel, Argentina, from where it was described as *Pholadomya ambigua* SOW. by JAWORSKI (1915: 423; see Pl. 10, Fig. 6). A different species from the Lower Jurassic of the Atuel region, and apparently absent from Chile, is *Pholadomya* cf. *decorata* HARTMANN (BEHRENDSEN 1891: 384, 1922: 170, see Pl. 10, Fig. 8; JAWORSKI 1915: 447, see Pl. 10, Fig. 9; DAMBORENEA et al. 1992: pl. 116, fig. 15). Its distinct ornamentation is characterised by regularly arranged radial ribs, which develop small knobs at the intersections with commarginal growth rugae.

The Chilean specimens show strong similarities to *Pholadomya idea* D'ORBIGNY described by POULTON (1991: 32, pl. 4, figs. 4-12, 14-15) from northwestern Canada, from the same stratigraphic level (Upper Sinemurian) as *Ph. idea* in Chile, and to *Pholadomya* cf. *ambigua* (J. SOWERBY) described by DAMBORENEA & GONZÁLEZ-LEÓN (1998: 195, fig. 9.4) from the Pliensbachian? of Sonora, Mexico.

Ph. (Pholadomya) oretiensis CAMPBELL & GRANT-MACKIE (1995: 49, figs. 2A-H) from the Hettangian-Sinemurian of New Zealand exhibits a comparable ornament, but has a more rectangular shape. This is also true of *Ph. (Pholadomya) anterumbonis* QUILTY (1983: 410, figs. 42-44) from the Bajocian of Ellsworth Land, Antarctica, which has its umbones very close to the anterior end of the hinge line.

Pholadomya (Pholadomya) multilineata GABB 1869

Pl. 3. Figs. 1-3, 5

1869 *Pholadomya multilineata* sp. nov. - GABB: 10, pl. 5, fig. 6. [figure label missing on plate]

v 1982 *Pholadomya* aff. *favrina* AGASSIZ - PÉREZ: pl. 14, fig. 15.

v 1992 *Pholadomya (Pholadomya)* aff. *favrina* AGASSIZ 1842 - ABERHAN: 20.

Material. 1 specimen from the Lower Pliensbachian of Quebrada El Peñon (PIW 20041 281); 3 specimens from the Pliensbachian (*Fanninoceras fannini* Zone) of Portezuelo de Pedernales (SNGM 801, PIW 20041 282-283); 1 specimen from the Lower Pliensbachian of Quebrada El Bolito (PIW 20041 284); 1 specimen from the Lower Pliensbachian of Quebrada Vaca Muerta (PIW 20041 285); 16 specimens from the Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (SNGM 798-800, PIW 20041 286-298); 1 specimen from the Upper Pliensbachian and 1 specimen from the Lower Toarcian of Quebrada Chancoquin (PIW 20041 299-300); 8 specimens from the Upper Pliensbachian of Quebrada Pinte (PIW 20041 301-308); 1 specimen from the Pliensbachian of Río Figueroa (PIW 20041 309); 1 specimen from the Pliensbachian of Quebrada La Plata (PIW 20041 310); 1 specimen from the Toarcian? of Quebrada Amolanas (PIW 20041 311). All specimens are articulated and mostly preserved as composite moulds. Occasionally shell material is preserved.

Description. *Pholadomya multilineata* is of medium to large size, obliquely ovate, and strongly inflated with the maximum inflation occurring about half way between the anterior and posterior ends. The prominent umbones are placed between one-fourth and one-third of the shell length from the anterior end. The posterodorsal margin is strongly concave, rapidly sloping at first and nearly straight towards the posterior end. The dorsal part of the posterior margin coincides with the position of the posterior gape and is slightly truncated. The short anterior margin passes almost imperceptibly into the moderately to strongly convex ventral margin, which is sloping towards the posterior end.

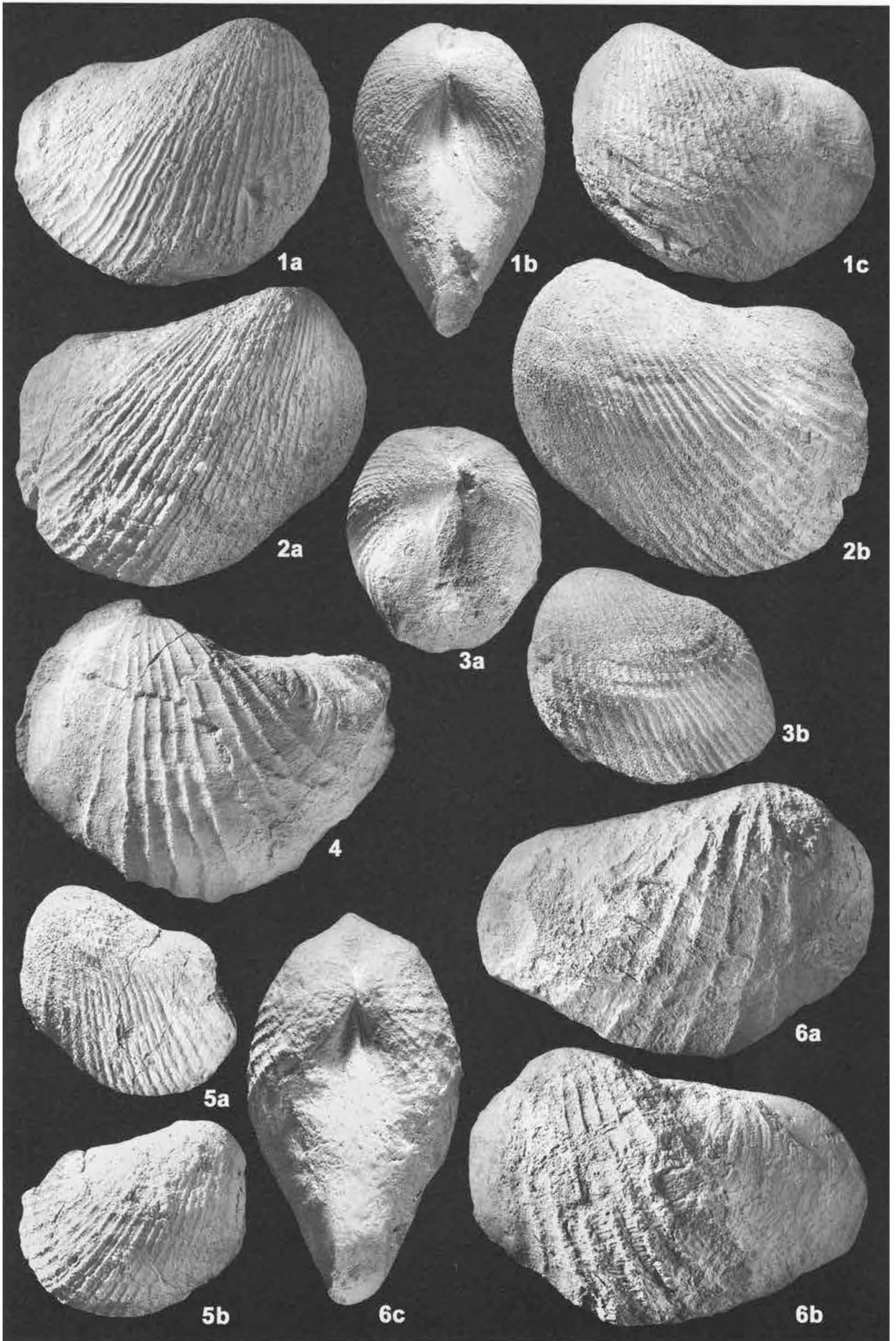
The surface bears numerous narrow, rounded, slightly undulating ribs of variable strength. Their number increases by intercalation of new ribs, and in adult specimens more than 20 and up to 34 radial ribs are present.

Remarks. A strongly inflated shell, sloping dorsal and ventral margins, and the relatively large number of rounded, somewhat sinuous ribs make this form a very characteristic element of the benthic fauna of northern Chile during Pliensbachian times. It shows such a great similarity in outline, inflation, and style of ribbing to *Ph. multilineata* that it is grouped here with the latter. *Ph. multilineata* is a poorly known species first described

EXPLANATION OF PLATE 3

Figs. 1-3, 5. *Pholadomya (Pholadomya) multilineata* GABB 1869. 1. Articulated specimen; a: right valve view; b: dorsal view; c: left valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I, section 3); x 1. - SNGM 798. 2. Articulated specimen; a: right valve view; b: left valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (HILLEBRANDT 660708/8); x 1. - SNGM 799. 3. Articulated specimen; a: dorsal view; b: left valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (HILLEBRANDT 660708/8); x 1. - SNGM 800. 5. Articulated specimen; a: left valve view; b: right valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Portezuelo de Pedernales (HILLEBRANDT 660709/2); x 1. - SNGM 801.

Figs. 4, 6. *Pholadomya (Pholadomya) idea* D'ORBIGNY 1850. 4. Articulated specimen, left valve view; Upper Sinemurian of Quebrada Pinte (ABERHAN 1992: app. I + III, hor. 4-31 B2); x 1. - SNGM 802. 6. Articulated specimen; a: right valve view; b: left valve view; c: dorsal view; Upper Sinemurian of Quebrada Pinte (HILLEBRANDT 720123/2); x 1. - SNGM 803.



from the Lower Jurassic of Volcano near Walkers Lake, Nevada by GABB (1869: 10, pl. 5, fig. 6). *Ph. multilineata* was also mentioned by HYATT (1894: 419) from the upper Lower Jurassic of the Blue Mountains, Oregon, but unfortunately without illustrations.

A very closely related species is *Ph. (Pholadomya) inaequiplicata* STANTON (1899: 625, pl. 74, fig. 4; IMRAY 1964: 36, pl. 4, figs. 37-38, 1967: 86, pl. 5, figs. 24-26) from the Bajocian of the Western Interior Seaway. It has been distinguished from *Ph. multilineata* by its smaller size, fewer costae, a more rounded posterior end and small differences in shell outline (STANTON 1899).

A striking similarity also exists to *Ph. (Pholadomya) favrina* AGASSIZ (1842: 59, pl. 2¹, figs. 1-2) from the Cretaceous of France. Judging from AGASSIZ'S figures, this species seems to be more evenly rounded at the posterior end than *Ph. multilineata*, and, in dorsal view, appears subrectangular rather than heart-shaped in outline.

Pholadomya (Pholadomya) voltzi AGASSIZ 1842

Pl. 1, Figs. 1-3

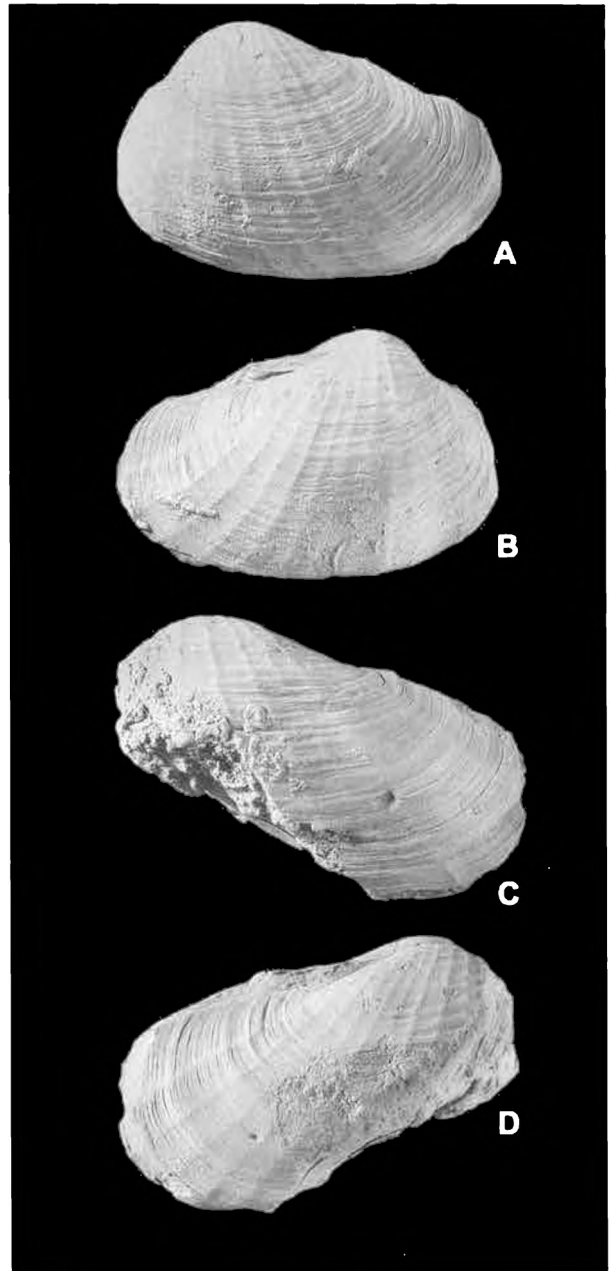
1842 *Pholadomya Voltzii* sp. nov. - AGASSIZ: 122, pl. 3c, figs. 1-6. [non figs. 8-9]

v. 1874 *Pholadomya Voltzi*, Ag. - MOUSCH: 20, pl. 6, figs. 2-3, pl. 9, figs. 1, 3. [see for short synonymy list]

Material. 6 internal moulds from the Upper Hettangian of Quebrada Cachina (SNGM 784-786, PIW 2004I 312-314).

Remarks. Of all Early Jurassic species of *Pholadomya* known from South America, *Ph. voltzi* has strongest affinities to *Ph. corrugata*, which is described above. Compared to the latter, *Ph. voltzi* is less inflated and the radial ribs are more distinct in relation to the commarginal ornamentation. Typical specimens of *Ph. voltzi* from Europe, where it ranges from the Early Pliensbachian to the Aalenian, are figured in Text-fig. 3, demonstrating that they are indistinguishable from the Late Hettangian material of Chile.

An unfigured record of *Ph. cf. voltzi* Ag. from the middle Early Jurassic of Chile was provided by MORICKI (1894: 55). Since MORICKI'S original material could not be tracked down, however, its taxonomic affinities remain unresolved at present.

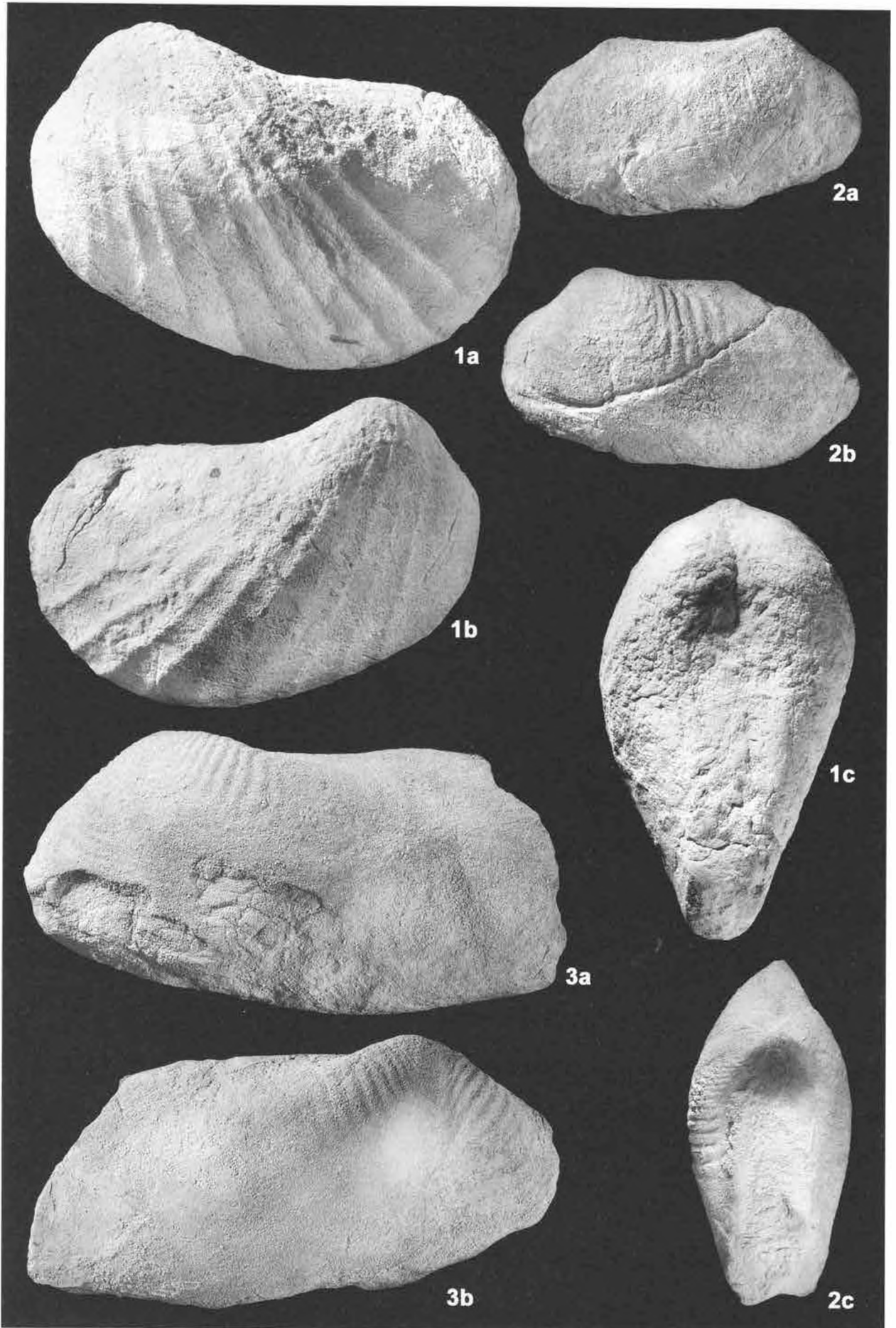


Text-fig. 3. *Pholadomya (Pholadomya) voltzi* AGASSIZ 1842. A-B. Articulated specimen: A: left valve view; B: right valve view; Aalenian of Gundershofen, France; x 1. - SMNS 4159. C-D. Articulated specimen: C: left valve view; D: right valve view; Aalenian of Wasseralfingen, Germany; x 1. - SMNS 29929 (original material of *Pholadomya Voltzi*, Ag. in MOUSCH 1874: 20, pl. 9, fig. 1).

EXPLANATION OF PLATE 4

Fig. 1. *Pholadomya (Pholadomya) idea* D'ORBIGNY 1850. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Upper Sinemurian of Quebrada Chancoquin (HILFBRANDT 670108/1); x 1. - SNGM 804.

Figs. 2-3. *Goniomya (Goniomya) asientosensis* sp. nov. 2. Articulated specimen, holotype; a: right valve view; b: left valve view; c: dorsal view; Pliensbachian (*Faminioceras famini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I - III, hor. 2-81 B3); x 1. - SNGM 805. 3. Articulated specimen, paratype; a: left valve view; b: right valve view; Pliensbachian (*Faminioceras famini* Zone) of Quebrada Asientos (HILFBRANDT 660708/8); x 1. - SNGM 806.



Genus *Goniomya* AGASSIZ 1841

Type species. *Mya angulifera* J. SOWERBY 1819; by subsequent designation (HERRMANNSEN 1847).

Subgenus *Goniomya* AGASSIZ 1841*Goniomya (Goniomya) asientosensis* sp. nov.

Pl. 4, Figs. 2-3; Pl. 6, Fig. 3

v. 1992 *Goniomya (Goniomya)* sp. nov. - ABERHAN: 20.

Derivation of name. After Quebrada Asientos, the type locality of the species.

Type material. Holotype: Articulated specimen SNGM 805 (Pl. 4, Fig. 2) from the Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (section 2, horizon 2-81 B3 in ABERHAN 1992). Paratypes: Articulated specimen SNGM 806 (Pl. 4, Fig. 3) from the Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (horizon 1 in HILLEBRANDT & SCHMIDT-EFFING 1981; fig. 3); articulated specimen SNGM 816 (Pl. 6, Fig. 3) from the Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (section 3 in ABERHAN 1992, float).

Additional material. 1 specimen from the Lower Pliensbachian of Quebrada El Bolito (PIW 20041 315); 1 specimen from the Upper Pliensbachian of Quebrada Chancoquin (PIW 20041 316); 1 specimen from the Upper Pliensbachian of Río Jorquera (PIW 20041 317); 13 specimens from the Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (PIW 20041 318-330). All material, including the type material, is preserved as internal or composite moulds.

Measurements (in mm).

Specimen	L	L _p	L _p /L	H	H/L	I	I/L
SNGM 805	69	49	0.71	39	0.57	32	0.46
SNGM 806	-	-	-	60	-	51	-
SNGM 816	141	114	0.81	69	0.49	54	0.38
PIW 20041 322	119	95	0.80	72	0.61	47	0.39
PIW 20041 326	154	118	0.77	72	0.47	60	0.39
PIW 20041 327	127	100	0.79	65	0.51	50	0.39

Diagnosis. Very large, strongly elongate and strongly inequilateral *Goniomya* with a broadly rounded ridge running from the umbo to the posteroventral margin. Ornament restricted to anterior and dorsal part of the shell, consisting of oblique anterior and posterior ribs separated by transverse bars. Shallow, narrow sulcus

developed where anterior ribs meet transverse bars and extending to the ventral margin in a slightly posterior direction. Posterodorsal margin concave, posterior end slightly flared and obliquely truncated.

Description. The strongly elongate and well inflated shells of *Goniomya asientosensis* reach up to 16 cm in length and thus are the largest known representatives of the genus. The umbones are placed between one-fifth and one-fourth of the shell length from the anterior end. The anterior part is short, with a narrow gape at the anterior end. The anterior margin projects forwards and at the anterior end forms an acute curve which merges into the slightly convex to almost straight ventral margin. The posterior end is obliquely truncated and strongly gaping. The posterodorsal margin is slightly concave to straight and curved upward posteriorly. A broadly rounded, diagonal ridge extends from the umbo to the posteroventral margin. The bordering ridges of the lanceolate escutcheon are distinct near the umbo, getting increasingly ill-defined in a posterior direction.

The surface of the shell is sculptured partly with slightly curved, oblique ribs inclined toward one another. These ribs do not meet, but are separated by short, straight, transverse bars, which are running roughly parallel to the growth lines. The anterior series of ribs and the transverse ribs are separated by a narrow, shallow sulcus, which extends all the way to the ventral margin in a slightly posterior direction. The posterior series of ribs is restricted to the proximal (dorsal) part of the diagonal ridge. Similarly, the intervening ribs are limited to and fade away in the dorsal half of the shell. The anterior ribs may almost reach the ventral margin and, towards the anteroventral margin, increasingly tend to run parallel to the growth lines. Occasionally they are deflected when approaching the sulcus.

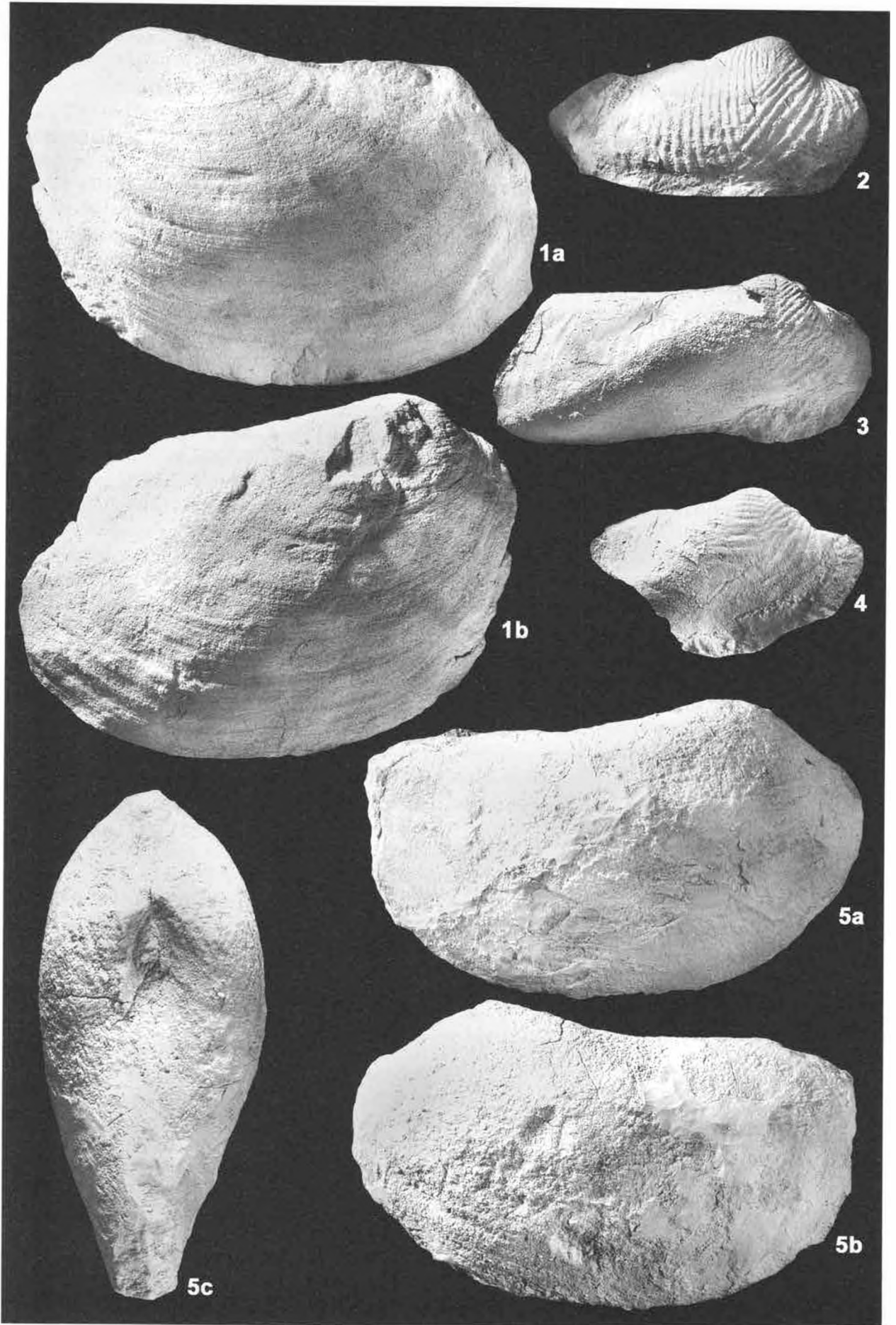
Remarks. The only other *Goniomya* that is comparable in size to the new species from Chile is *G. (Goniomya) bicarinata* FÜRSICH (1982: 99, fig. 36A-B) from the Upper Jurassic of East Greenland. In addition to maximum size, the two species correspond closely in outline and the presence of a shallow sulcus, but differences exist in

EXPLANATION OF PLATE 5

Figs. 1, 5. *Homomya neuquena* LEANZA 1942. 1. Articulated specimen: a: left valve view; b: right valve view; Pliensbachian of Cerro Tatu (HILLEBRANDT 711218/1); x 0.8. - SNGM 807. 5. Articulated specimen: a: right valve view; b: left valve view; c: dorsal view; Lower Pliensbachian of Río del Toro (HILLEBRANDT 670109/10); x 1. - SNGM 808.

Fig. 2. *Goniomya (Goniomya)* cf. *proboscidea* AGASSIZ 1842. Right valve; Lower Toarcian (*hoelderi* Zone) of Quebrada Asientos (HILLEBRANDT 670305/4); x 1. - SNGM 809.

Figs. 3-4. *Goniomya (Goniomya) cachinensis* sp. nov. 3. Articulated specimen, paratype, right valve view; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 860319/2); x 1. - SNGM 810. 4. Right valve; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 860319/2); x 1.2. - SNGM 811.



overall shape and the nature of ribbing. Whilst *G. asientosensis* is more elongated and the oblique ribs are separated by transverse bars, the anterior and posterior ribs of *G. bicarinata* meet directly on the dorsal half of the shell where they are forming a series of Vs. In addition to a diagonal ridge, a second, ill-defined ridge runs from the umbo to the ventral margin in *G. bicarinata*, a feature that is absent in *G. asientosensis*.

Another elongate, although much smaller form with a sulcus is *Goniomya sulcata* AGASSIZ (1842: 7, pl. 1, figs. 8-9, pl. 1b, figs. 9-12, pl. 1c, figs. 13-14; ARKELL 1935: 347, pl. 48, figs. 10-11) from the Middle Jurassic of western Europe. Apparently, AGASSIZ's figured specimens from the Swiss Jura are distorted by compaction, but nevertheless the sulcus is better defined, much broader and directed far more posteriorly than in *G. asientosensis* (see also FÜRSICH 1982: 101).

The posterior part of a *Goniomya* from the Lower Jurassic of Río Salado, Argentina, referred to as *Goniomya* sp. in BEHRENDSEN (1891: 384, 1922: 169, GZG Gö Orig K 497-20), is too poorly preserved to allow fuller identification.

Goniomya asientosensis is strikingly similar in maximum size, general outline and shape to *Pachymya (Pachymya) rotundocaudata* (LEANZA), which is treated below, and were it not for the characteristic ornamentation of *G. asientosensis* the two taxa could not be separated.

Goniomya (Goniomya) cachinensis sp. nov.

Pl. 5, Figs. 3-4; Pl. 6, Figs. 1, 6

Derivation of name. After Quebrada Cachina, the type locality of the species.

Type material. Holotype: Left valve SNGM 813 (Pl. 6, Fig. 6) from the Middle Hettangian of Quebrada Cachina. Paratypes: Articulated specimen SNGM 810 (Pl. 5, Fig. 3) and left valve SNGM 812 (Pl. 6, Fig. 1) from the Upper Hettangian of Quebrada Cachina.

Additional material. 1 right valve from the Middle Hettangian and 1 articulated specimen and 1 right valve from the Upper Hettangian of Quebrada Cachina (SNGM 811, PIW 20041 331-332). Only the holotype is preserved with shell material; all other specimens are internal or composite moulds.

Measurements (in mm).

Specimen	L	L _p	L _p /L	H	H/L	I	I/L
SNGM 810	73	56	0.77	31	0.42	24	0.33
SNGM 813	82	63	0.77	37	0.45	30	0.37

Diagnosis. Medium-sized, very elongate and inequilateral *Goniomya*. Ornament of oblique ribs and transverse bars confined to dorsal part of shell. Delicate riblets, composed of radially aligned, minute pustules, developed on whole shell surface. Posterodorsal margin

straight, posterior end obliquely truncated. Escutcheon very long and narrow, bordered by narrow, very acute ridges.

Description. The shell of *Goniomya cachinensis* is medium-sized, very elongate and inequilateral and of low inflation. The position of the orthogyrous to slightly prosogyrous umbones is at about three-tenth of the shell length from the anterior end. The nearly symmetrically curved anterior margin grades smoothly into the weakly curved ventral margin. The posterodorsal margin is straight and meets the obliquely truncated posterior margin at an obtuse angle. The posterior end has a narrow gape. A broadly rounded, diagonal ridge extends from the umbo to the posteroventral margin. The escutcheon is long and narrow and limited by sharp ridges. Similarly, the lunule is bordered by narrow, distinct ridges.

A *Goniomya*-like ornament, consisting of oblique ribs and transverse bars, is restricted to the dorsal part of the shell and fades away ventrally. An imaginary line, separating the anterior series of oblique ribs and the transverse bars, runs from the umbones in a slightly posterior direction. Fine radial riblets, composed of minute pustules are developed on the whole shell surface, and are visible on both shell and steinkerns.

Remarks. A delicate ornament of radial rows of minute pustules is known from several European and African Jurassic species of *Goniomya*, which however differ from *G. cachinensis* in shape and the nature of the oblique ribbing. Examples include: *G. constricta* AGASSIZ (1842: 9, pl. 1b, figs. 4-8), in which the oblique ribs are distributed over the whole shell surface, forming a series of Vs except for the umbonal region; *G. dubois* AGASSIZ (1842: 12, pl. 1a, figs. 2-12), which is ovate in outline and exhibits an ornament similar to that of *G. constricta*; *G. literata* J. SOWERBY (STEFANINI 1939: 254, pl. 26, fig. 3), a rather small species which also shows the kind of ornament typical of the above mentioned species; *G. ornati* QUENSTEDT (1852: 560, pl. 47, fig. 25), which lacks a truncated posterior end and has rhombic ribs distributed over the whole shell surface; and *G. trapezicostata* PUSCH (LAUBE 1867: 52, pl. 5, fig. 5), which is ovate in outline. Strongest affinities exist to *G. studeri* MOESCH (1867: 300, pl. 3, fig. 5), which not only shares the pustulate riblets with *G. cachinensis*, but also is very elongate, has a nearly straight posterodorsal margin and an obliquely truncated posterior end. It differs by being smaller (although specific separation should not be based on size per se), the presence of V-shaped ribs on the ventral part of the shell, and a much broader escutcheon and lunule.

Goniomya bolchovitinovae KOSHELKINA (1960: 112, pl. 24, fig. 3; 1963: 205, pl. 24, fig. 1) from the Volgian of eastern Siberia is very similar in overall shape and in

the oblique ribs being limited to the umbonal area. However, the Siberian species exhibits an anterior ridge and a sulcus, features that are absent in *G. cachinensis*.

Goniomya sulcata AGASSIZ (1842: 7, pl. 1, figs. 8-9, pl. 1b, figs. 9-12, pl. 1c, figs. 13-14; LISSAJOUS 1910: 383, pl. 12, fig. 8; ARKELL 1935: 347, pl. 48, figs. 10-11; SIBIRIAKOVA 1961: 150, pl. 26, fig. 1) shares the elongated shape of the shell with *G. cachinensis*, but differs by having more pronounced oblique ribs and by the presence of a well defined sulcus.

Goniomya rhombifera GOLDFUSS (1841: 264, pl. 154, fig. 11; KUHN 1936: 268, pl. 10, fig. 6; RIEGRAF 1985: 261, pl. 16, fig. 7) from the Upper Liassic of northern Bavaria is much shorter, and the rhombic ribs are present on the whole shell surface.

Goniomya (Goniomya) cf. proboscidea AGASSIZ 1842

Pl. 5, Fig. 2

- cf. 1842 *Goniomya proboscidea* sp. nov. - AGASSIZ: 17, pl. 1, figs. 6-7, pl. 1c, figs. 1-9. [non pl. 11, figs. 1-2]
- v 1926a *Goniomya proboscidea* AG. - JAWORSKI: 191, pl. 1, fig. 5. [see Pl. 10, Fig. 10]
- v 1926b *Goniomya proboscidea* AG. - JAWORSKI: 398. [see Pl. 10, Fig. 10]
- v 1931 *Goniomya proboscidea* AG. - WINDHAUSEN: pl. 26, fig. 10. [copy of JAWORSKI 1926a: pl. 1, fig. 5]

Material. 1 right valve from the Lower Toarcian of Quebrada Asientos (SNGM 809).

Description. A single, posterodorsally partly fragmented right valve of *Goniomya* agrees well with *Goniomya proboscidea* AGASSIZ. It is characterized by an inequilateral shell, the prosogyrous umbo being placed about one-fourth of the shell length from the anterior end. The anterior margin is evenly rounded, the posterior margin slightly truncated. The shell is covered with a series of V-shaped ribs except for the anterior and posterior regions, which bear commarginal growth rugae. The ornament is abraded on the umbo. An imaginary line, joining all points where the anterior and posterior series of ribs meet, is running slightly backward from the umbones to the ventral margin.

Remarks. In size, outline of the shell, position of the umbo and nature of ribbing the available specimen corresponds closely to *Goniomya proboscidea* AGASSIZ, which was also described and figured from the Toarcian of Argentina by JAWORSKI (1926a: 191, pl. 1, fig. 5, see Pl. 10, Fig. 10). Without further comments, ARKELL (1935: 344) listed *G. proboscidea* AGASSIZ as a junior synonym of *G. literata* (J. SOWERBY 1819). However, judging from ARKELL's illustrations (1935: pl. 48, figs.

1-7) and particularly from the holotype of *Mya? literata* (J. SOWERBY 1819: pl. 224, fig. 1; ARKELL 1935: pl. 48, fig. 1) it appears that the umbones of *G. literata* are in a submesial position rather than being placed in the anterior third as in *G. proboscidea* AGASSIZ (1842: pl. 1, figs. 6-7, pl. 1c, figs. 1-9). The matter is somewhat complicated because in his pl. 11, figs. 1-2, AGASSIZ (1842) refers to a specimen with submesial umbo and a nearly straight dorsal margin as *G. proboscidea*, but this specimen is not cited on p. 17, where the figured specimens of *G. proboscidea* are listed. In the same list, specimens illustrated in his pl. 1c, figs. 10-13 were assigned to *G. proboscidea*, but in the figure caption of pl. 1c these specimens are marked as *G. scalprum* and *G. sulcata*. Despite this confusion, specimens of pl. 1c, figs. 1-9 seem to be typical representatives of *G. proboscidea* as conceived by AGASSIZ, and since they differ from *G. literata* both species are kept separate at present, pending a thorough revision of the genus and of AGASSIZ's material. With only one, partly fragmented specimen available for study, it is assigned to *G. proboscidea* with reservation.

Goniomya cf. proboscidea can be distinguished from the two previously described species by the V-shaped nature of the ribs, which are distributed over almost the whole shell surface. *G. cf. proboscidea* AG. of BURCKHARDT (1900: 36, pl. 21, fig. 11; = *G. cf. duboisi* AG. in BURCKHARDT 1903: 25) from the Bajocian of western Argentina is an incomplete specimen with an ornamentation of oblique ribs and transverse bars on the dorsal part of the shell and, according to JAWORSKI (1926a) and WEAVER (1931), belongs to a different species.

Genus *Homomya* AGASSIZ 1843

Type species. *Mactra gibbosa* J. SOWERBY 1813; by subsequent designation (HERRMANNSEN 1847).

Homomya neuquena LEANZA 1942

Pl. 5, Figs. 1, 5

- v 1915 *Homomya gibbosa* SOW. - JAWORSKI: 423. [see Pl. 10, Fig. 11]
- v 1925 *Homomya gibbosa* SOW. - JAWORSKI: 105. [see Pl. 10, Fig. 11]
- v 1942 *Homomya neuquena* sp. nov. - LEANZA: 185, pl. 16, fig. 2.
- v 1982 *Homomya* sp. nov. (?) - PÉREZ: pl. 16, figs. 14-15.
- v 1992 *Homomya neuquena* LEANZA 1942 - ABERHAN: 20.

Material. 1 specimen from the Upper Sinemurian north of Juntas del Tolar (PIW 20041 333); 1 specimen from the Upper Sinemurian of Quebrada Noria (PIW 20041 334); 1 specimen from the Lower Pliensbachian of Quebrada El Bolito (PIW 20041 335); 1 specimen

from the Lower Pliensbachian of Río del Toro (SNGM 808): 1 specimen from the Pliensbachian (*Faminioceras fannini* Zone) of Salar de Pedernales (PIW 2004I 336); 1 specimen from the Pliensbachian of Quebrada El Patón (PIW 2004I 337); 1 specimen from the Upper Pliensbachian of Quebrada Pinte (PIW 2004I 338); 5 specimens from the Pliensbachian of Cerro Tatul (SNGM 807, PIW 2004I 339-342). All specimens are internal moulds except for specimen PIW 2004I 335, which is preserved with shell material.

Description. The shell of *Homomya neuquena* is large, elongate and very inequilateral with the broadly rounded umbones situated about one-fourth to one-fifth of the shell length from the anterior end. The posterodorsal margin is concave to almost straight, running roughly parallel to the somewhat asymmetrically curved ventral margin. The anterodorsal margin is weakly concave and merges into the slightly truncated anterior margin. The posterior end is rounded and gaping. The greatest inflation occurs a little anterior to the mid-length. The surface is covered with irregular commarginal growth lines.

Remarks. The material from Chile agrees perfectly with specimens of *Homomya* from the Pliensbachian of Piedra Pintada, Neuquén Province, Argentina that were studied by JAWORSKI (1915: 423, 1925: 105; see Pl. 10, Fig. 11) and LEANZA (1942: 185, pl. 16, fig. 2). *Homomya* sp. nov. (?) (PÉREZ 1982: pl. 16, figs. 14-15) from the Upper Pliensbachian of Quebrada Asientos is comparable in size, general outline and the position of the umbones and for this reason is considered part of the morphological spectrum of *H. neuquena*.

Based on two fragmented specimens from the Lower Jurassic of Portezuelo Ancho, Argentina, BEHRENDSEN erected the new species *Homomya bodenbenderi* BEHRENDSEN (1891: 385, pl. 22, fig. 10, 1922: 171, pl. 1, fig. 10, see Pl. 10, Figs. 12-13). From the same locality he identified three deformed specimens with subterminal umbones as *Homomya obliquata* PHILL. (BEHRENDSEN 1891: 385, 1922: 170, see Pl. 10, Fig. 14). Examination of BEHRENDSEN'S material together with Early Pliensbachian specimens collected from Portezuelo

Ancho by A. VON HILLEBRANDT reveals that both taxa belong to the same species, herein referred to as *H. bodenbenderi*. A characteristic feature of this species, which seems to be absent from Chile, is a shallow sulcus running from the umbo to the anterior part of the ventral margin. A complete articulated specimen is figured on Pl. 10, Fig. 15.

Homomya neuquena has strong affinities to European species of *Homomya* such as the Early Jurassic *H. alsatica* AGASSIZ (CHAPUIS & DEWALQUE 1853: 125, pl. 18, fig. 2) and *H. ventricosa* AGASSIZ (1842: 158, pl. 16, figs. 7-9, pl. 17, figs. 1-5), and the Middle to Late Jurassic *H. vezelayi* (D'ARCHIAC) (ARKELL 1935: 338, pl. 49, fig. 1). Similarly, *Homomya jurozephyriensis* CRICKMAY (1930: 58, pl. 6, figs. g-h) from the Bajocian of western Canada seems to be indistinguishable from *H. neuquena* (e.g., compare CRICKMAY'S fig. 6g with Pl. 5, Fig. 1). However, since the Chilean specimens are compactionally distorted to a variable degree, it is difficult to establish affinities properly.

Genus *Osteomya* MOESCH 1874

Type species. *Mya dilata* PHILLIPS 1829.

Osteomya dilata (PHILLIPS 1829)

Pl. 6, Figs. 4-5

1829 *Mya dilata* sp. nov. - PHILLIPS: 155, pl. 11, fig. 4.

1991 *Osteomya dilata* (PHILLIPS 1829) - YIN & FÜRSICH: 156, pl. 11, fig. 2. [see for synonymy list]

v 1992 *Osteomya* cf. *dilata* (PHILLIPS 1829) - ABERHAN: 20.

Material. 2 articulated specimens, preserved as internal moulds, from the Upper Sinemurian of Quebrada Pinte (SNGM 817-818).

Remarks. The moderately well preserved Chilean specimens show the diagnostic features of the Jurassic genus *Osteomya*, in particular the broad, depressed opisthogyrous umbones, an obliquely truncated posterior

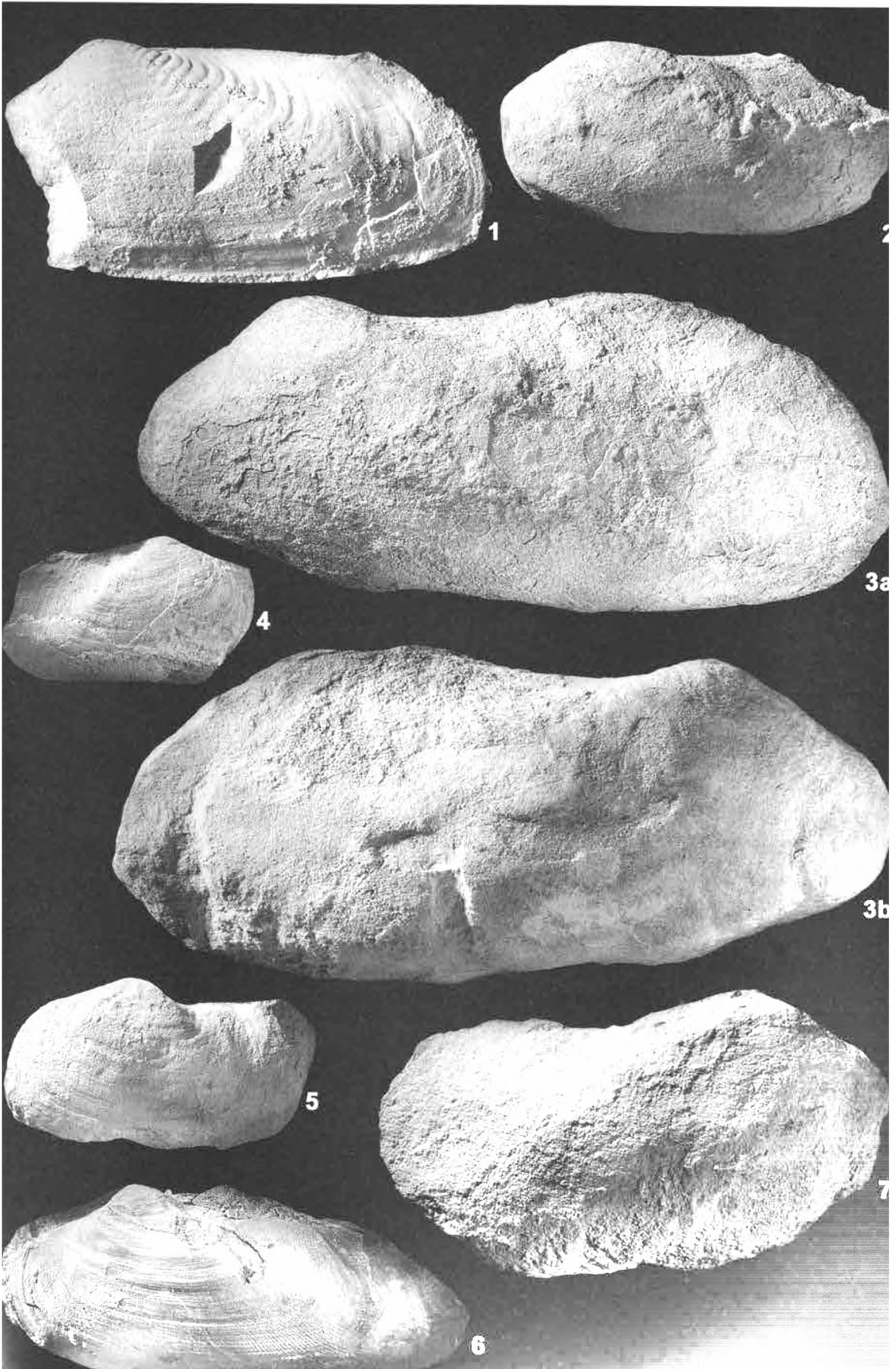
EXPLANATION OF PLATE 6

Figs. 1, 6. *Goniomya (Goniomya) cachinensis* sp. nov. 1. Left valve, paratype; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 860319/2); x 1. - SNGM 812. 6. Left valve, holotype; Middle Hettangian of Quebrada Cachina (HILLEBRANDT 841112/12); x 1. - SNGM 813.

Figs. 2, 7. *Pachymya (Pachymya) rotundocaudata* (LEANZA 1942). 2. Articulated specimen, left valve view; Upper Pliensbachian of Quebrada Pinte (HILLEBRANDT 670912/1a); x 1. - SNGM 814. 7. Articulated specimen, right valve view; Pliensbachian of Quebrada El Patón (HILLEBRANDT 680220/3); x 1. - SNGM 815.

Fig. 3. *Goniomya (Goniomya) asientosensis* sp. nov. Articulated specimen, paratype; a: left valve view; b: right valve view; Pliensbachian (*Faminioceras fannini* Zone) of Quebrada Asientos (section 3 in ABERHAN 1992, float); x 1. - SNGM 816.

Figs. 4-5. *Osteomya dilata* (PHILLIPS 1829). 4. Articulated specimen, right valve view; Upper Sinemurian of Quebrada Pinte (ABERHAN 1992: app. I + III, hor. 4-31 B2); x 1.2. - SNGM 817. 5. Articulated specimen, left valve view; Upper Sinemurian of Quebrada Pinte (ABERHAN 1992: app. I + III, hor. 4-31 B2); x 1.2. - SNGM 818.



end, and a posterior umbonal ridge, which is strongest in the umbonal region and weakens towards the posteroventral margin. The genus is apparently monospecific (PANDEY et al. 1996), and the Chilean material falls in the morphological range of the type species and is therefore grouped here with the latter. The available steinkerns of Quebrada Pinte are not strongly upcurved posteriorly as is the case in the articulated specimen figured by COX (1969a: fig. F14.1) or in other specimens from the Middle Jurassic of Europe (e.g. PHILLIPS 1829: 155, pl. 11, fig. 4; MORRIS & LYCETT 1855: 114, pl. 10, fig. 5; LAUBE 1867: 55, pl. 5, fig. 11; LISSAJOUS 1910: 386, pl. 12, fig. 16, 1923: 195, pl. 32, figs. 2-5). However, this is a variable feature, shown by some but by no means all specimens (COX 1969a; PANDEY et al. 1996). Similarly, figured specimens tend to be more elongate than the Chilean material. However, examination of museum collections revealed a fair amount of variation in this respect. Altogether, the specimens under discussion lie well within the intraspecific variability of *O. dilata* as documented recently by PANDEY et al. (1996: 60, pl. 5, figs. 7-9, pl. 6, figs. 1-5) in specimens from the Middle Jurassic of Kachchh, western India.

Genus *Pachymya* J. DE C. SOWERBY 1826

Type species. *Pachymya gigas* J. DE C. SOWERBY 1826.

Subgenus *Pachymya* J. DE C. SOWERBY 1826

Pachymya (Pachymya) rotundocaudata (LEANZA 1942)

Pl. 6, Figs. 2, 7; Pl. 7, Fig. 1

- v 1915 *Arcomya robusta* AG. - JAWORSKI: 391, pl. 7, fig. 1. [see Pl. 11, Fig. 1]

- v 1925 *Arcomya robusta* ET. - JAWORSKI: 104, pl. 3, fig. 1. [copy of JAWORSKI 1915: pl. 7, fig. 1]
 v 1931 *Arcomya robusta* ET. - WINDHAUSEN: pl. 20, fig. 3. [copy of JAWORSKI 1915: pl. 7, fig. 1]
 v 1942 *Arcomya (?) rotundocaudata* sp. nov. - LEANZA: 186, pl. 15, fig. 1.
 v 1992 *Pachymya (Pachymya?) rotundocaudata* (LEANZA 1942) - ABERHAN: 20.

Material. 23 specimens from the Upper Pliensbachian of Quebrada Pinte (SNGM 814, 819, PIW 20041 343-363); 2 specimens from the Pliensbachian of Quebrada El Patón (SNGM 815, PIW 20041 364). All specimens are articulated internal moulds.

Remarks. Based on two specimens from the Lower Jurassic of the Piedra Pintada region in western Argentina, this species was described in great detail as *Arcomya robusta* AGASSIZ by JAWORSKI (1915: 391, see also Pl. 11, Fig. 1). Due to differences in shell outline between the Argentine specimens and *A. robusta* AGASSIZ (1842: 173, pl. 9a, figs. 10-12), LEANZA (1942) questioned JAWORSKI's identification and, based on more material collected from Piedra Pintada, erected a new species, *Arcomya (?) rotundocaudata*. The specimens from Chile are certainly conspecific with the Argentine form, but as they are less well preserved, no further description is provided here.

Because of its evenly rounded anterior and posterior margins, LEANZA (1942) was dissatisfied with his generic identification, and mentioned affinities to the genus *Pachymya*. Following COX (1969a) *Arcomya* is regarded a subgenus of *Pachymya*, and in fact most Jurassic representatives of *Pachymya* belong to the subgenus *Arcomya*. *Pachymya sensu stricto* differs from *Arcomya* by attaining a larger size, being more strongly inflated with maximum inflation occurring at a point situated well posterior to the umbones, and the presence of a prominent diagonal ridge (see also PANDEY et al. 1996: 61).

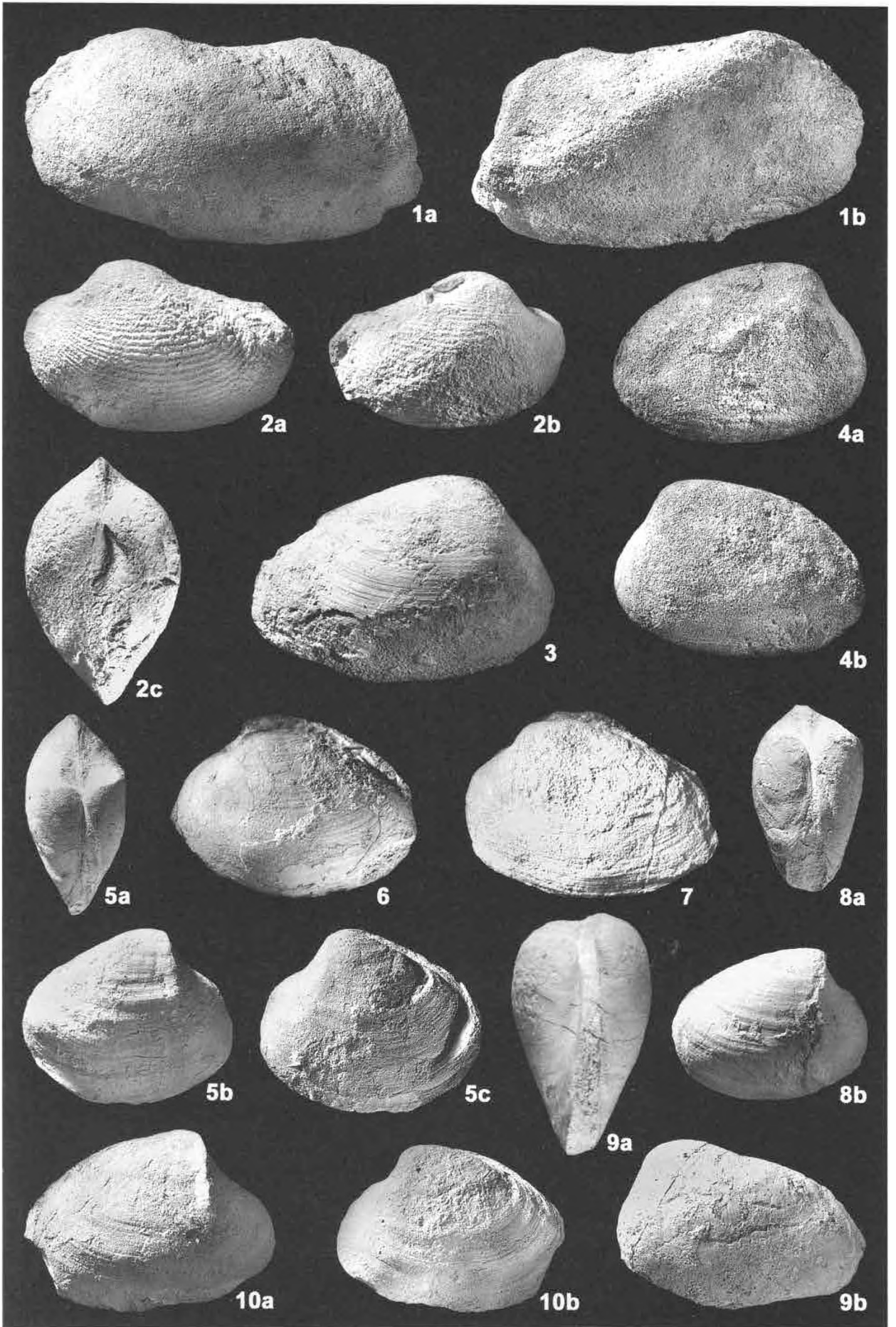
EXPLANATION OF PLATE 7

Fig. 1. *Pachymya (Pachymya) rotundocaudata* (LEANZA 1942). Articulated specimen; a: left valve view; b: right valve view; Upper Pliensbachian of Quebrada Pinte (ABERHAN 1992: app. I + III, hor. 3-13); x 1. - SNGM 819.

Fig. 2. *Ceratomya* sp. A. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Pliensbachian of Quebrada El Patón (HILLEBRANDT 680220/3); x 1. - SNGM 820.

Figs. 3-4, 6-7. *Gresslya peregrina* (PHILLIPS 1829). 3. Articulated specimen, right valve view; Lower Aalenian of Quebrada Chancoquin (HILLEBRANDT 671009/7); x 1. - SNGM 821. 4. Articulated specimen; a: right valve view; b: left valve view; Middle Toarcian of Quebrada La Totorá (ABERHAN 1992: app. I + III, hor. 5-1); x 1.2. - SNGM 822. 6. Articulated specimen, left valve view; Lower Aalenian of Quebrada La Totorá (ABERHAN 1992: app. I + III, hor. 5-6); x 1.2. - SNGM 823. 7. Articulated specimen, left valve view; Upper Toarcian of Quebrada Chancoquin (HILLEBRANDT 671009/6); x 1. - SNGM 824.

Figs. 5, 8-10. *Gresslya* sp. A. 5. Articulated specimen; a: dorsal view; b: right valve view; c: left valve view; Lower Sinemurian of Quebrada Yerbas Buenas (HILLEBRANDT 711211/2); x 1. - SNGM 825. 8. Articulated specimen; a: dorsal view; b: right valve view; Upper Sinemurian of Quebrada Yerbas Buenas (HILLEBRANDT 680221/3); x 1. - SNGM 826. 9. Articulated specimen; a: dorsal view; b: left valve view; Upper Sinemurian of Quebrada Matahuaico (HILLEBRANDT 790107/5); x 1.2. - SNGM 827. 10. Articulated specimen; a: right valve view; b: left valve view; Lower Sinemurian of Quebrada Yerbas Buenas (HILLEBRANDT 711211/2); x 1. - SNGM 828.



Considering these differences, *P. rotundocaudata* has stronger affinities to *P. (Pachymya)* than to *P. (Arcomya)*. In contrast, *Arcomya elongata* ROEM. (JAWORSKI 1926a: 192, pl. 1, fig. 7, see Pl. 11, Fig. 2) from the Pliensbachian of Argentina is best placed within *P. (Arcomya)*.

Pachymya? sp. A (J. SOWERBY 1813)

Pl. 9, Figs. 1, 6

Material. 1 articulated specimen from the Upper Sinemurian of Quebrada La Totorá (SNGM 844); 2 articulated specimens from the Upper Sinemurian of Quebrada Pinté (SNGM 843, PIW 20041 365). All are preserved as internal moulds.

Description. The shell of *Pachymya?* sp. A is elongated and well inflated with low, broadly rounded orthogyrous umbones, which are situated about one-fourth of the shell length from the anterior end. The greatest inflation is reached at about mid-length. The shells are closed anteriorly and moderately gaping posteriorly. Lunule and escutcheon are deeply excavated. A very obtuse carina runs from the umbo to the posteroventral corner of the shell.

Remarks. In general outline the specimens assigned to *Pachymya?* sp. A resemble, for example, *Lutraria elongata* MÜNSTER (in GOLDFUSS 1841: 258, pl. 153, fig. 4) and *Lutraria? jurassi* BRONGNIART (1821: 570, pl. 7, fig. 4), which both are considered as synonyms of *Pleuromya uniformis* J. SOWERBY (see discussion below). The Chilean specimens differ from *P. uniformis* by their much stronger inflation, and in this respect resemble *Pachymya (Pachymya)*. However, a prominent diagonal

ridge characteristic of *P. (Pachymya)* is not present in the Chilean specimens. Rather, the umbonal carina is very low. For this reason, the specimens are referred to *Pachymya* with reservation.

Pachymya? sp. from the Pliensbachian? of Sonora (DAMBORENEA & GONZÁLEZ-LEÓN 1998: 195, fig. 9.5) shares the very low umbonal carina with the specimens under discussion. In contrast, the Chilean specimens are more strongly inflated, the umbones are more anteriorly placed, and the ventral margin is convex rather than straight.

Family *Ceratomyidae* ARKELL 1934

Genus *Ceratomya* SANDBERGER 1864

Type species. *Isocardia excentrica* ROEMER 1836.

Ceratomya sp. A

Pl. 7, Fig. 2

Material. 1 articulated composite mould from the Pliensbachian of Quebrada El Patón (SNGM 820).

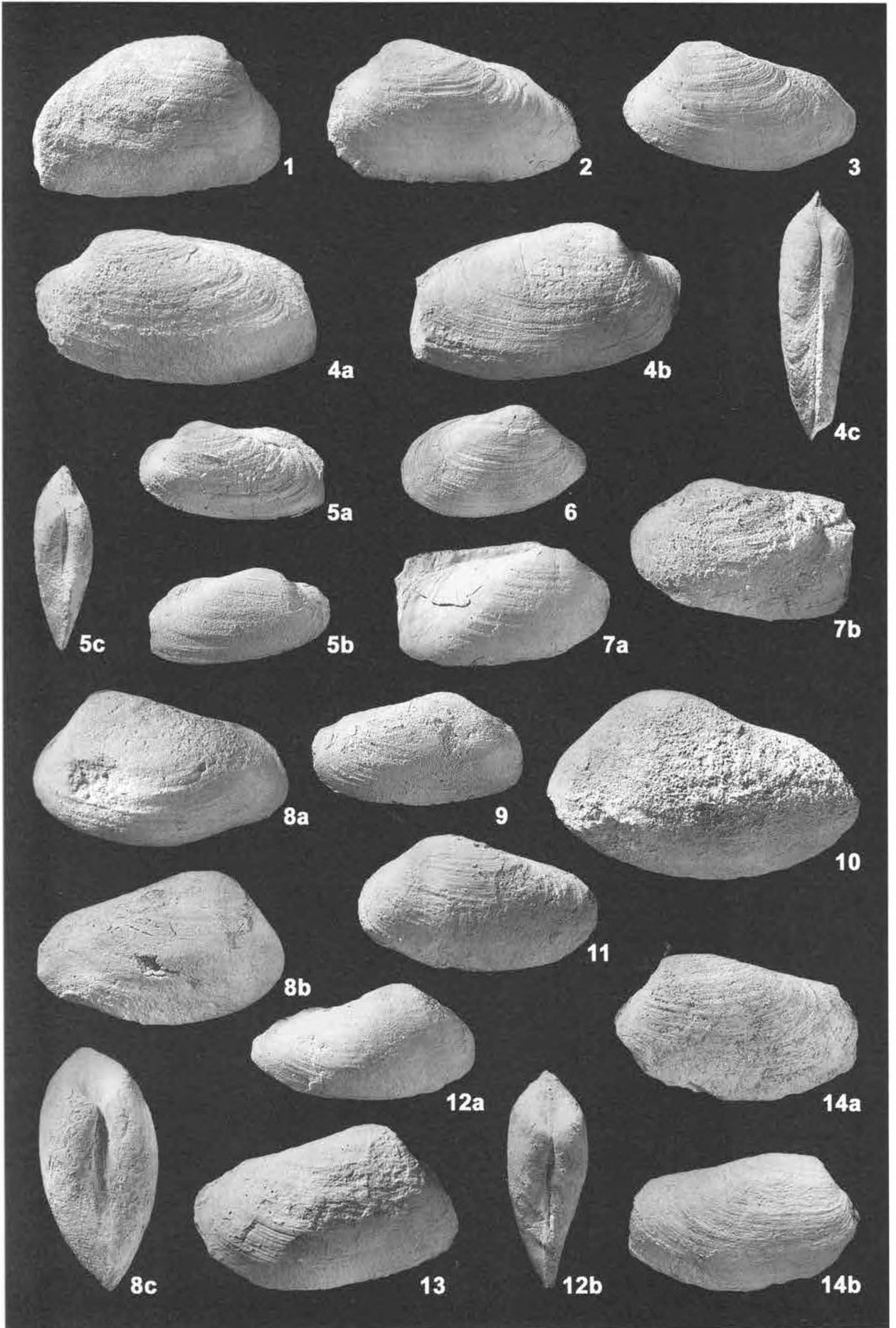
Remarks. As only a single, apparently somewhat distorted specimen is available, it is impossible to make a more precise identification at present. VOLKHEIMER et al. (1978) mentioned *Ceratomya* sp. from the Lower Jurassic of Argentina, but as this taxon never has been described or illustrated, its affinities to *Ceratomya* sp. A from Chile cannot be established. With *Ceratomya* sp. from the Lower Jurassic of Sonora, Mexico (DAMBORENEA & GONZÁLEZ-LEÓN 1998: 196, fig. 9.6), the Chilean specimen shares the ornamentation of very regularly

EXPLANATION OF PLATE 8

Fig. 1. *Gresslya* sp. A. Articulated specimen, right valve view; Upper Sinemurian of Quebrada La Totorá (HILLEBRANDT 671011/1); x 1. - SNGM 829.

Figs. 2-7. *Pleuromya galathea* AGASSIZ 1845. 2. Articulated specimen, left valve view; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 860319/3); x 1. - SNGM 830. 3. Left valve; Lower Hettangian south of Sierra Minillas (HILLEBRANDT 841112/16); x 1. - SNGM 831. 4. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Upper Hettangian of Quebrada Cachina (HILLEBRANDT 841112/4); x 1. - SNGM 832. 5. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Lower Hettangian south of Sierra Minillas (HILLEBRANDT 841112/16); x 1.5. - SNGM 833. 6. Right valve; Lower Hettangian south of Sierra Minillas (HILLEBRANDT 841112/16); x 1. - SNGM 834. 7. Articulated specimen; a: right valve view; b: left valve view; Lower Hettangian south of Sierra Minillas (HILLEBRANDT 841112/16); x 1.2. - SNGM 835.

Figs. 8-14. *Pleuromya uniformis* (J. SOWERBY 1813). 8. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Middle Toarcian of Quebrada La Totorá (ABERHAN 1992: app. I + III, hor. 5-2); x 1. - SNGM 836. 9. Articulated specimen, right valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I + III, hor. 2-61); x 1.2. - SNGM 837. 10. Articulated specimen, left valve view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I, section 3); x 1. - SNGM 838. 11. Articulated specimen, left valve view; Lower Aalenian of Quebrada Chancoquin (HILLEBRANDT 671009/7); x 1. - SNGM 839. 12. Articulated specimen; a: right valve view; b: dorsal view; Pliensbachian (*Fanninoceras fannini* Zone) of Quebrada Asientos (HILLEBRANDT 660708/1); x 1. - SNGM 842. 13. Articulated specimen, right valve view; Upper Aalenian of Manflas (HILLEBRANDT 661202/4); x 1. - SNGM 841. 14. Articulated specimen; a: left valve view; b: right valve view; Toarcian/Aalenian boundary interval of Quebrada Caballo Muerto (HILLEBRANDT 670304/5); x 1. - SNGM 840.



spaced commarginal undulations, but has a smaller height to length ratio. It is not clear to what extent this difference in shape is due to post-mortem distortion. *Ceromya steinmanni* MÖRCKE (1894: 57, pl. 4, fig. 4) from the Upper Toarcian and Aalenian of northern Chile belongs to the genus *Trigonastarte* and is very different from *Ceratomya* sp. A.

Genus *Gresslya* AGASSIZ 1834

Type species. *Lutraria gregaria* VON ZIETEN 1833; by subsequent designation (HERRMANNSEN 1847).

Gresslya peregrina (PHILLIPS 1829)

Pl. 7. Figs. 3-4, 6-7

- 1829 *Unio peregrinus* sp. nov. - PHILLIPS: 144, pl. 7, fig. 11.
 1854 *Panopaea turgida* sp. nov. - HUPE: 375, pl. C6, fig. 3.
 1863 *Gresslya peregrina*, PHILL., sp. - LYCETT: 79, pl. 36, figs. 2, 2a, 2b. [see for synonymy list]
 1878 *Gresslya* cf. *peregrina* PHILL. - GOTTSCH: 32, pl. 7, fig. 4.
 ? 1878 ? *Mactromya* sp. - GOTTSCH: 33, pl. 7, fig. 3.
 v 1898 *Gresslya gregaria* F. A. RÖMER sp. - TORNQVIST: 172, pl. 7, fig. 5. [see Pl. 11, Fig. 3]
 v 1898 *Gresslya gregaria* A. RÖMER sp. - TORNQVIST: 191.
 1925 *Gresslya* cf. *peregrina* PHILL. - GOTTSCH: 265, pl. 7, fig. 4. [copy of GOTTSCH 1878: pl. 7, fig. 4]
 ? 1925 ? *Mactromya* sp. - GOTTSCH: 265, pl. 7, fig. 3. [copy of GOTTSCH 1878: pl. 7, fig. 3]
 1934 *Gresslya peregrina* (PHILLIPS) - ARKELL: 319, pl. 43, fig. 7. [see for extensive synonymy list]
 v 1992 *Gresslya peregrina* (PHILLIPS 1829) - ABERHAN: 20.

Material. 1 specimen from the Pliensbachian (*Faminioceras famini* Zone). 1 specimen from the Toarcian/Aalenian boundary interval and 6 specimens from the Lower Aalenian of Quebrada Asientos (PIW 20041 366-373); 1 specimen from the Pliensbachian of Río Figueroa (PIW 20041 374); 3 specimens from the Middle Toarcian. 1 specimen

from the Upper Toarcian and 5 specimens from the Lower Aalenian of Quebrada Chancoquin (SNGM 821, 824, PIW 20041 375-381); 31 specimens from the Middle Toarcian of Quebrada Pinte (PIW 20041 382-412); 38 specimens from the Middle Toarcian, 6 specimens from the Upper Toarcian and 3 specimens from the Lower Aalenian of Quebrada La Totorá (SNGM 822-823, PIW 20041 413-457); 1 specimen from the Middle Toarcian of Quebrada Plaza (PIW 20041 458); 6 specimens from the Upper Toarcian north of Juntas del Tolar (PIW 20041 459-464). The specimens are predominantly preserved as internal moulds.

Description. The moderately inflated shell of *Gresslya peregrina* is elongate-oval in outline with the umbones situated about one-third of the shell length from the anterior end. The posterior end is tapering and compressed. The posterodorsal margin is weakly convex and passes into the sharply rounded posterior margin. The anterodorsal margin is concave and forms a subangular junction with the convex anterior margin. The ventral margin is weakly curved. A deeply excavated lunule is present. A characteristic feature of the genus is a long narrow slit in the right valve of internal moulds, originating at the beak and extending halfway to the posteroventral margin. The surface is ornamented with fine, closely set growth lines.

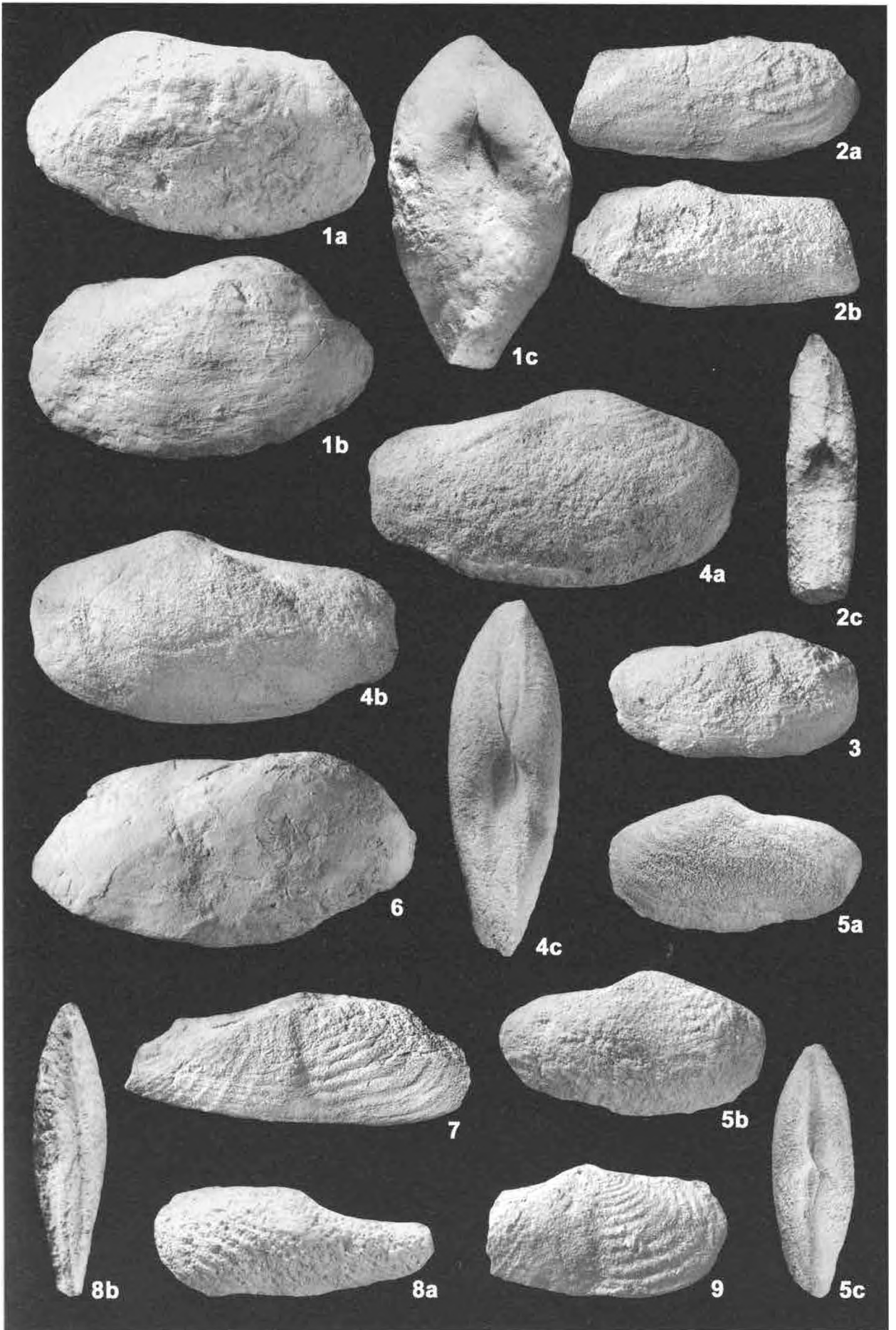
Remarks. A wealth of species of *Gresslya* has been described from the European Jurassic under various generic names such as *Amphidesma*, *Gresslya*, *Lutraria*, *Lyonsia*, *Myacites*, *Pleuromya* and *Unio*. Some, but by no means all of them, have subsequently been revised, e.g. by LYCETT (1863) and ARKELL (1934). The Chilean material is indistinguishable from such nominal species as *G. abducta* (PHILLIPS 1829: 156, pl. 11, fig. 42), *G. concentrica* AGASSIZ (1842: 213, pl. 14, figs. 10-15), *G. conformis* AGASSIZ (1842: 211, pl. 13b, figs. 4-6), *G. erycina* AGASSIZ (1842: 214, pl. 14, figs. 1-9), *G. latior* AGASSIZ (1842: 210, pl. 13b, figs. 10-12), *G. lunulata* AGASSIZ (1842: 208, pl. 13, figs. 7-10, pl. 13a, figs. 1-4)

EXPLANATION OF PLATE 9

Figs. 1, 6. *Pachymya?* sp. A. 1. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Upper Sinemurian of Quebrada Pinte (HILLEBRANDT 670910/6); x 1. - SNGM 843. 6. Articulated specimen, right valve view; Upper Sinemurian of Quebrada La Totorá (HILLEBRANDT 671010/2); x 1. - SNGM 844.

Figs. 2-5. *Platymyoida?* cf. *longa* (BUVIGNIER 1852). 2. Articulated specimen; a: right valve view; b: left valve view; c: dorsal view; Pliensbachian (*Faminioceras famini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I, section 3); x 1.2. - SNGM 845. 3. Articulated specimen, right valve view; Pliensbachian (*Faminioceras famini* Zone) of Quebrada Asientos (ABERHAN 1992: app. I + III, hor. 2-81 B1); x 1. - SNGM 846. 4. Articulated specimen; a: right valve view; b: left valve view; c: dorsal view; Pliensbachian (*Faminioceras famini* Zone) of Portezuelo de Pedernales (HILLEBRANDT 660710/3); x 1. - SNGM 847. 5. Articulated specimen; a: left valve view; b: right valve view; c: dorsal view; Pliensbachian (*Faminioceras famini* Zone) of Portezuelo de Pedernales (HILLEBRANDT 660710/1); x 1. - SNGM 848.

Figs. 7-9. *Ceromya* (*Capillmya*) *peruviana* COX 1956. 7. Articulated specimen, right valve view; Upper Toarcian of Quebrada Chancoquin (HILLEBRANDT 671009/6); x 1. - SNGM 850. 8. Articulated specimen; a: left valve view; b: dorsal view; Aalenian of Cerro Tatul (HILLEBRANDT 711218/4); x 1.2. - SNGM 852. 9. Articulated specimen, right valve view; Upper Toarcian of Manflas (HILLEBRANDT 661202/6); x 1.2. - SNGM 851.



and *G. ovata* AGASSIZ (1842: 208, pl. 13, figs. 4-6, pl. 13b, figs. 7-9), which all are thought to belong to a single species, *G. peregrina* (see LYCETT 1863; ARKELL 1934). The type of *Gresslya gregaria* (VON ZIETEN 1833: 85, pl. 64, fig. 1) is more elongated and triangular in shape than the typical *G. peregrina*. However, judging from subsequent illustrations (ROEMER 1836: 124, pl. 8, fig. 11; GOLDFUSS 1841: 255, pl. 152, fig. 10; COX 1969b: N841, fig. F18.2c) and evaluation of museum collections, *G. gregaria* appears to be another synonym of *G. peregrina*.

The Late Pliensbachian to Early Toarcian *Gresslya intermedia* (SIMPSON) (TATE 1876: 403, pl. 13, fig. 8) from the Yorkshire Lias and its likely synonym *Gresslya anglica* AGASSIZ (1842: 217, pl. 13c, figs. 10-12) differ by having a more elongated shape, a straight posterodorsal margin and more broadly rounded umbones.

Panopaea turgida HUPÉ (1854: 375, pl. C6, fig. 3) from the Inferior Oolite of Coquimbo, central Chile, *Gresslya* cf. *peregrina* from the lower Middle Jurassic of Paso del Espinacito, western Argentina (GOTTSCHIE 1878: 32, pl. 7, fig. 4), and *Gresslya gregaria* (in TORNQUIST 1898: 172, 191, pl. 7, fig. 5) from the Bajocian and Callovian of the same locality clearly are conspecific with the material described here from northern Chile. To illustrate this point, specimens collected by A. VON HILLEBRANDT from the uppermost Aalenian of the Argentine locality are illustrated herein (Pl. 11, Fig. 5), together with TORNQUIST's original material (Pl. 11, Figs. 3-4). The identity of ? *Mactromya* sp. in GOTTSCHIE (1878: 33, pl. 7, fig. 3) is difficult to evaluate, but possibly it is a distorted specimen of *G. peregrina*.

EXPLANATION OF PLATE 10

Jurassic bivalves from Argentina and Chile.

Figs. 1-2. *Pholadomya (Pholadomya) corrugata* KOCH & DUNKER 1837. 1. Articulated specimen, left valve view, Early Jurassic (Pliensbachian?) of Arroyo Serrucho, Mendoza Province, Argentina; x 1. - IPB Jaworski 51a (original material of *Pholadomya hemicardia* ROEM. in JAWORSKI 1926a: 193, pl. 1, fig. 2, 1926b: 399). 2. Articulated specimen, right valve view, Early Jurassic (Pliensbachian?) of Arroyo Serrucho, Mendoza Province, Argentina; x 1. - IPB Jaworski 51b (original material of *Pholadomya hemicardia* ROEM. in JAWORSKI 1926a: 193, pl. 1, fig. 3, 1926b: 399).

Figs. 3-5. *Pholadomya (Pholadomya) fidicula* J. DE C. SOWERBY 1826. 3. Articulated specimen, right valve view, Early Jurassic of Portezuelo Ancho, Mendoza Province, Argentina; x 1. - GZG Gö Orig K 497-23 (original material of *Pholadomya Acostae* BAYLE et COQU. in BEHRENDSEN 1891: 384, 1922: 170). 4. Articulated specimen, left valve view, Middle Jurassic of Río Catanlil, Neuquén Province, Argentina; x 1.5. - GZG Gö Orig K 498-14 (original material of *Pholadomya* cf. *fidicula* SOW. in BEHRENDSEN 1892: 12, 1922: 207). 5. Articulated specimen, right valve view, Middle Jurassic (Callovian) of Paso del Espinacito, San Juan Province, Argentina; x 1. - GZG Gö Orig K 496-502 (original material of *Pholadomya fidicula* SOWERBY in TORNQUIST 1898: 190).

Fig. 6. *Pholadomya (Pholadomya) idea* D'ORBIGNY 1850. Articulated specimen; a: left valve view; b: right valve view; Early Jurassic (Pliensbachian?) of Arroyo Blanco, Río Atuel, Argentina; x 1. - IPB Jaworski 120 (original material of *Pholadomya ambigua* SOW. in JAWORSKI 1915: 423).

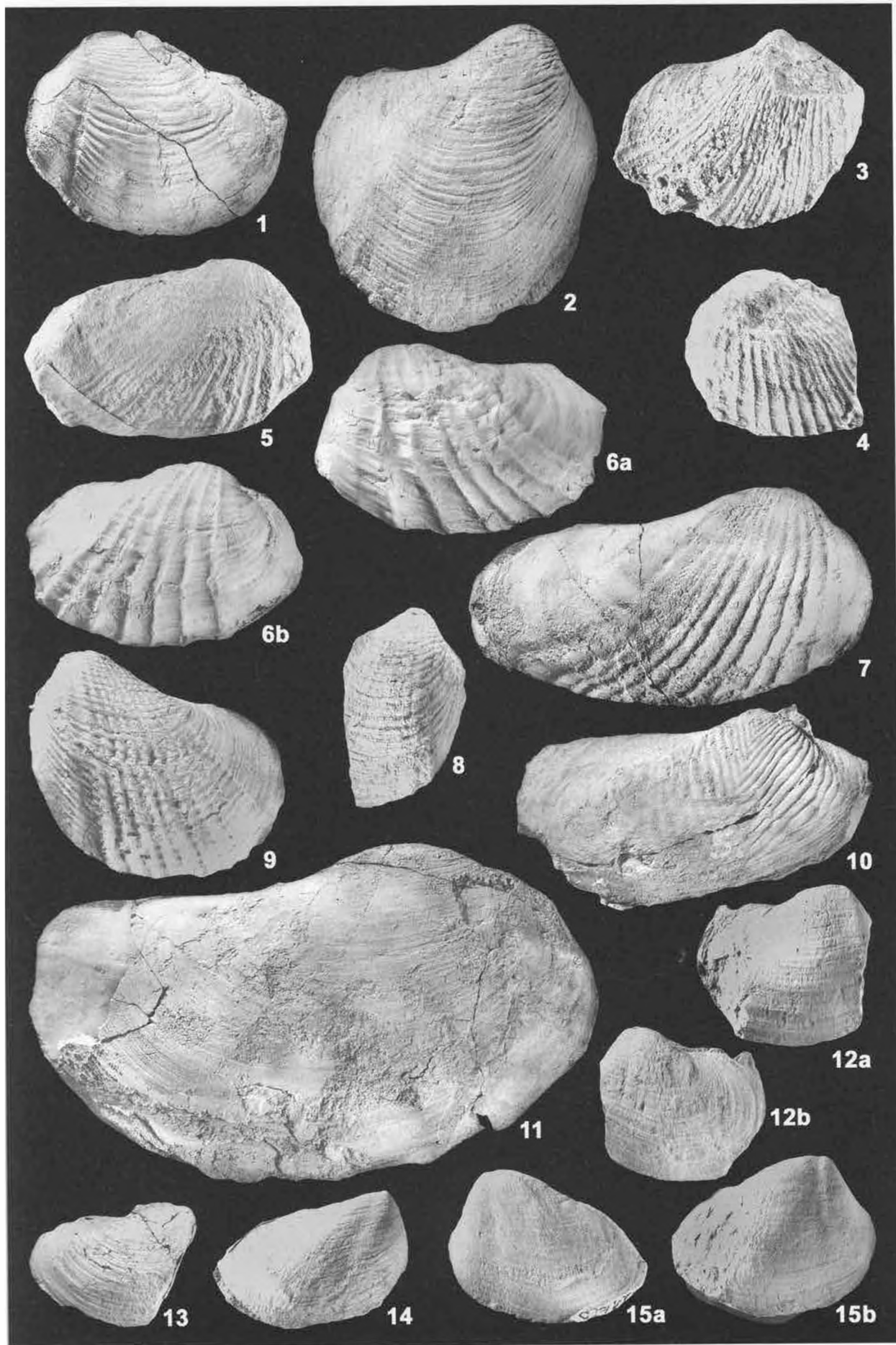
Fig. 7. *Pholadomya (Pholadomya) plagemanni* MÖRICKÉ 1894. Articulated specimen, right valve view, Bajocian near Iquique, northern Chile; x 1. - IPB Jaworski 121.

Figs. 8-9. *Pholadomya (Pholadomya) cf. decorata* HARTMANN. 8. Articulated specimen, right valve view, Early Jurassic ('Middle Liassic') of Río Salado, Mendoza Province, Argentina; x 1. - GZG Gö Orig K 497-21 (original material of *Pholadomya decorata* ZIET. in BEHRENDSEN 1891: 384, 1922: 170). 9. Articulated specimen, left valve view, Early Jurassic (Pliensbachian?) of Arroyo Blanco, Río Atuel, Argentina; x 1. - IPB Jaworski 122 (original material of *Pholadomya decorata* HART. in JAWORSKI 1915: 447).

Fig. 10. *Goniomya (Goniomya) cf. proboscidea* AGASSIZ 1842. Right valve, Toarcian of Cerro Puchenque, Mendoza Province, Argentina; x 1. - IPB Jaworski 49 (original material of *Goniomya proboscidea* AG. in JAWORSKI 1926a: 191, pl. 1, fig. 5, 1926b: 398).

Fig. 11. *Homomya neuquena* LEANZA 1942. Articulated specimen, right valve view, Pliensbachian of Piedra Pintada, Neuquén Province, Argentina; x 0.8. - IPB Jaworski 123 (original material of *Homomya gibbosa* SOW. in JAWORSKI 1915: 423, 1925: 105).

Figs. 12-15. *Homomya bodenbenderi* BEHRENDSEN 1891. 12. Articulated specimen; a: right valve view; b: left valve view; Lower Jurassic of Portezuelo Ancho, Mendoza Province, Argentina; x 1. - GZG Gö Orig K 497-30 (original material of *Homomya bodenbenderi* sp. nov. in BEHRENDSEN 1891: 385, pl. 22, fig. 10, 1922: 171, pl. 1, fig. 10). 13. Articulated specimen, right valve view; Lower Jurassic of Portezuelo Ancho, Mendoza Province, Argentina; x 1. - GZG Gö Orig K 497-31 (original material of *Homomya bodenbenderi* sp. nov. in BEHRENDSEN 1891: 385, 1922: 171). 14. Articulated specimen, right valve view; Lower Jurassic of Portezuelo Ancho, Mendoza Province, Argentina; x 1. - GZG Gö Orig K 497-27 (original material of *Homomya obliquata* PHILL. in BEHRENDSEN 1891: 385, 1922: 170). 15. Articulated specimen; a: left valve view; b: right valve view; Lower Pliensbachian of Portezuelo Ancho, Mendoza Province, Argentina (HILLEBRANDT 790216/5); x 1. - MLP 31232.



Gresslya sp. A

Pl. 7. Figs. 5, 8-10; Pl. 8. Fig. 1

Material. 5 specimens from the Lower Sinemurian and 2 specimens from the Upper Sinemurian of Quebrada Yervas Buenas (SNGM 825-826, 828, PIW 2004I 465-468); 3 specimens from the Upper Sinemurian of Quebrada San Pedrito (PIW 2004I 469-471); 1 specimen from the Upper Sinemurian of Quebrada Matahuaico (SNGM 827); 1 specimen from the Upper Sinemurian of Quebrada La Totorá (SNGM 829); 1 specimen from the Lower Pliensbachian of Quebrada El Peñon (PIW 2004I 472). All are preserved as internal moulds.

Remarks. The Chilean specimens have some resemblance to *Gresslya donaciformis*, a poorly documented species, which was first figured from the Toarcian of the Yorkshire coast by PHILLIPS (1829: pl. 12, fig. 5) and subsequently from the Swabian Lias by VON ZIETEN (1833: pl. 63, fig. 3). Because much of the shape variation observable in the Chilean material appears to be due to post-depositional distortion and because only a few specimens are available for study, an identification at the species level is not possible at present.

Pleuromya galathea AGASSIZ (1845: 239, pl. 28, figs. 1-3), which is described below from the Hettangian of northern Chile, is less inflated than *Gresslya* sp. A and lacks the diagnostic slit that is developed along the dorsal margin on internal moulds of right valves of *Gresslya* sp. A.

Family *Pleuromyidae* DALL 1900Genus *Pleuromya* AGASSIZ 1843Type species. *Mya gibbosa* J. DE C. SOWERBY 1823.*Pleuromya galathea* AGASSIZ 1845

Pl. 8, Figs. 2-7

- 1845 *Pleuromya galathea* sp. nov. - AGASSIZ: 239, pl. 28, figs. 1-3.
 1858 *Pleuromya Galathea* - CHAPUIS: 62, pl. 12, fig. 4.
 1871 *Gresslya Galathea* AGASSIZ - BRAUNS: 299, pl. 2, figs. 1-2.
 v 1991 *Pleuromya galathea* AGASSIZ - POULTON: 33, pl. 1, fig. 19, pl. 4, figs. 24, 28, 29, pl. 5, figs. 1-3.
 v 1991 *Gresslya(?)* sp. - POULTON: 33, pl. 4, figs. 16-23, 25-27. [non pl. 18, figs. 26-27]

EXPLANATION OF PLATE 11

Jurassic bivalves from Argentina and Peru.

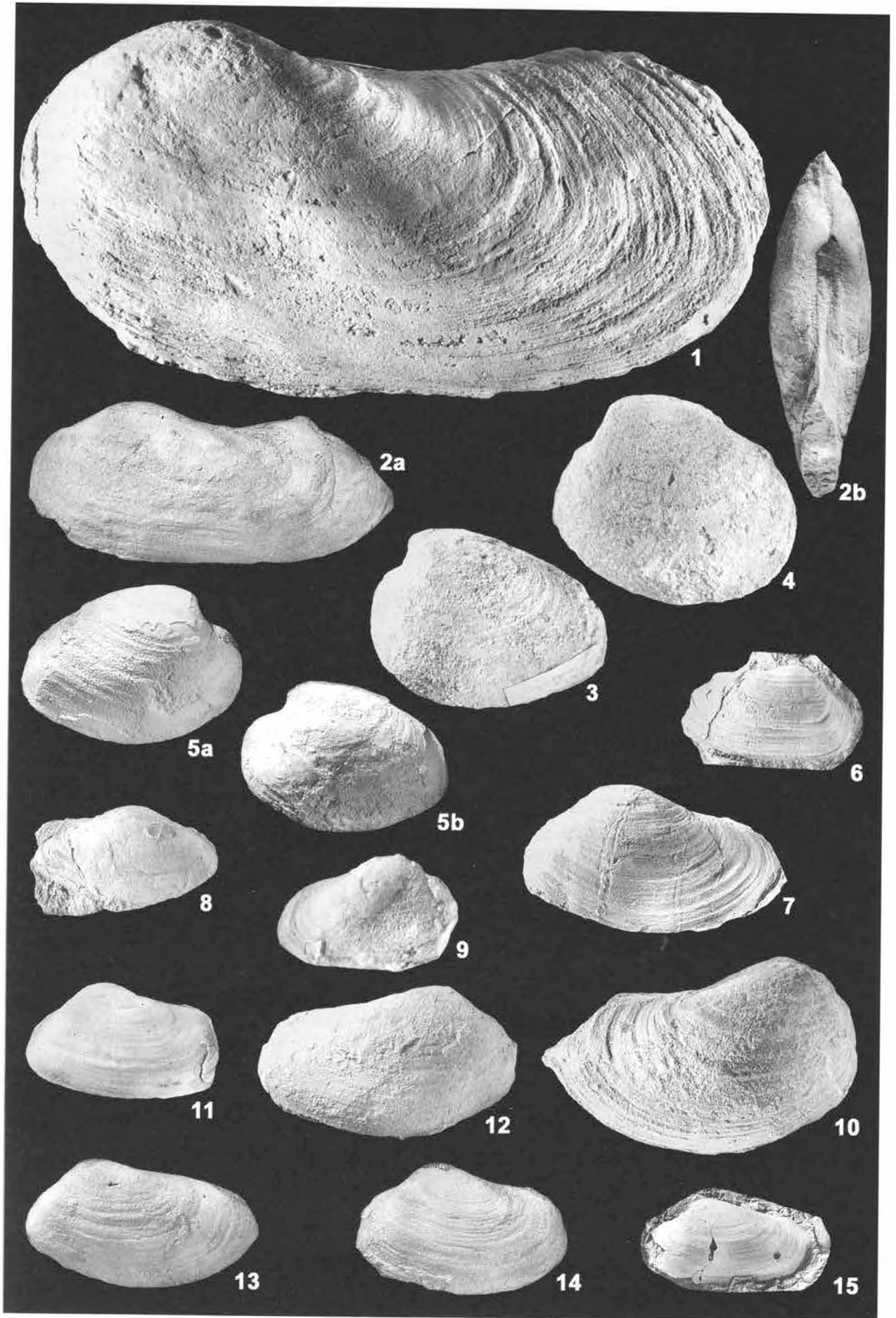
Fig. 1. *Pachymya (Pachymya) rotundocaudata* (LEANZA 1942). Articulated specimen, left valve view, Pliensbachian of Piedra Pintada, Neuquén Province, Argentina; x 1. - IPB Jaworski 11 (original material of *Arcomya robusta* AG. in JAWORSKI 1915: 391, pl. 7, fig. 1, 1925: 104, pl. 3, fig. 1 and *Arcomya robusta* E1. in WINDHAUSEN 1931: pl. 20, fig. 3).

Fig. 2. Original material of *Arcomya elongata* ROEM. in JAWORSKI (1926a: 192, pl. 1, fig. 7). Articulated specimen; a: left valve view; b: dorsal view; Pliensbachian of Arroyo Serrucho, Mendoza Province, Argentina; x 1. - IPB Jaworski 50.

Figs. 3-5. *Gresslya peregrina* (PHILLIPS 1829). 3. Articulated specimen, left valve view, Bajocian of Paso del Espinacito, San Juan Province, Argentina; x 1. - GZG Gö Orig K 496-403 (original material of *Gresslya gregaria* F. A. RÖMER sp. in TORNIQUIST 1898: 172, pl. 7, fig. 5). 4. Articulated specimen, left valve view, Bajocian of Paso del Espinacito, San Juan Province, Argentina; x 1. - GZG Gö Orig K 496-405 (original material of *Gresslya gregaria* F. A. RÖMER sp. in TORNIQUIST 1898: 172). 5. Articulated specimen; a: right valve view; b: left valve view; Upper Aalenian of Paso del Espinacito, San Juan Province, Argentina (HILLEBRANDT 680107/1); x 1.2. - MLP 31233.

Figs. 6-9, 11-15. *Pleuromya uniformis* (J. SOWERBY 1813). 6. Articulated specimen, right valve view, Lower Jurassic ('Middle Liassic') of Río Salado, Mendoza Province, Argentina; x 1.2. - GZG Gö Orig K 497-17 (original material of *Pleuromya striatula* AGASS. in BEHRENDSEN 1891: 384, 1922: 169). 7. Articulated specimen, left valve view, Middle Jurassic of eastern foot of Cerro Colorado, north of Río Malargüe, Mendoza Province, Argentina; x 1. - GZG Gö Orig K 497-134 (original material of *Pleuromya jurassi* AGAS. in BEHRENDSEN 1891: 397, 1922: 180). 8. Articulated specimen, right valve view, Middle Jurassic of Río Catán Lil, Neuquén Province, Argentina; x 1. - GZG Gö Orig K 498-9 (original material of *Pleuromya gottschei* sp. nov. in BEHRENDSEN 1892: 11, pl. 2, fig. 5, 1922: 206, pl. 3, fig. 13). 9. Articulated specimen, right valve view, Middle Jurassic of Río Catán Lil, Neuquén Province, Argentina; x 1.2. - GZG Gö Orig K 498-10 (original material of *Pleuromya gottschei* sp. nov. in BEHRENDSEN 1892: 11, 1922: 206). 11. Articulated specimen, left valve view, Middle Jurassic (Bajocian) of Paso del Espinacito, San Juan Province, Argentina; x 1. - GZG Gö Orig K 496-398 (original material of *Pleuromya striatula* AGASSIZ in TORNIQUIST 1898: 171). 12. Articulated specimen, right valve view, Middle Jurassic (Callovian) of Paso del Espinacito, San Juan Province, Argentina; x 1. - GZG Gö Orig K 496-512 (original material of *Pleuromya voltzi* AGASSIZ in TORNIQUIST 1898: 190). 13. Articulated specimen, left valve view, Early Jurassic of Chunumayo, Peru; x 1. - IPB Jaworski 124 (original material of *Pleuromya liasina* SCHÜBL. in JAWORSKI 1915: 447). 14. Articulated specimen, left valve view, Early Jurassic (Pliensbachian?) of Arroyo Serrucho, Mendoza Province, Argentina; x 1. - IPB Jaworski 125 (original material of *Pleuromya striatula* AG. in JAWORSKI 1926a: 188). 15. Left valve, Middle Jurassic of Bardas Blancas, Mendoza Province, Argentina; x 1. - IPB Jaworski 126 (original material of *Pleuromya liasina* SCHÜBL. in JAWORSKI 1926a: 188, 1926b: 398).

Fig. 10. *Pleuromya?* cf. *uniformis* (J. SOWERBY 1813). Articulated specimen, right valve view, Middle Jurassic (Bajocian) of Paso del Espinacito, San Juan Province, Argentina; x 1. - GZG Gö Orig K 496-385 (original material of *Pleuromya jurassi* AGASSIZ in TORNIQUIST 1898: 171).



Material. 3 left valves, 1 right valve and 2 articulated specimens from the Lower Hettangian south of Sierra Minillas (SNGM 831, 833-835, PIW 20041 473-474); 6 articulated specimens from the Upper Hettangian of Quebrada Cachina (SNGM 830, 832, PIW 20041 475-478). The specimens are preserved as internal moulds with rarely attached shell relics.

Description. *Pleuromya galathea* is characterized by an elongate-subelliptical, compressed shell. The prosogyrous, depressed umbones are placed about one-third of the shell length from the anterior end. The posterodorsal margin is straight to weakly convex and runs more or less parallel to the moderately curved ventral margin. The anterior end is produced, the posterior end obliquely truncated. The surface is covered with fine growth lines and unevenly spaced commarginal corrugations, the latter being best developed on the posterodorsal region of the shell.

Remarks. The straight to weakly convex posterodorsal margin of *P. galathea* is uncommon for a *Pleuromya*. This feature is reminiscent of the Jurassic genus *Gresslya*, and in fact *P. galathea* was (doubtfully) attributed to *Gresslya* e.g. by BRAUNS (1871: 299, pl. 2, figs. 1-2) and in the faunal lists of HALLAM (1976, 1987). However, in the collections he studied, HALLAM (pers. comm., 2000) failed to see the characteristic slit of *Gresslya* that extends back from the umbo on internal moulds of right valves, and therefore agrees with the placement of *galathea* with *Pleuromya*. Likewise, the specimens from Chile lack the diagnostic groove in internal moulds of right valves. Compared to specimens illustrated from Europe (see synonymy list above), the Chilean specimens tend to be more compressed and to have a more produced anterior end, but these features are thought to be part of the morphological spectrum of *P. galathea*. Also, the internal moulds of *Gresslya*(?) sp. from the Upper Sinemurian of northwestern Canada (POULTON 1991: 33, pl. 4, figs. 16-23, 25-27) lack the slit in the right valve. These specimens are indistinguishable from *Pleuromya galathea* AGASSIZ (POULTON 1991: 33, pl. 1, fig. 19, pl. 4, figs. 24, 28, 29, pl. 5, figs. 1-3) with which they co-occur in the same bed.

Pleuromya suevica ROLLE (TROEDSON 1951: 138, pl. 3, figs. 5-7) from the Hettangian of southern Sweden also is rather compressed and exhibits a convex dorsal margin and a produced anterior end. It appears to be somewhat shorter and more coarsely ribbed than *P. galathea*, but possibly lies within the morphological range of this species. *Pleuromya cf. hashidatensis* HAYAMI (CHEN 1988: 73, pl. 22, figs. 14-16) from the Lower Jurassic of southern China also seems to belong here.

Pleuromya uniformis (J. SOWERBY 1813)

Pl. 8, Figs. 8-14

- 1813 *Unio uniformis* sp. nov. - J. SOWERBY: 83, pl. 33, fig. 4.
 1851 *Panopaea peregrina*, d'ORB. - BAYLE & COQUAND: 28, pl. 6, fig. 6.
 ? 1854 *Pholadomya laevigata* sp. nov. - HUPE: 378, pl. C6, fig. 6.
 1878 *Pleuromya jurassi* AG. - GOTTSCHIE: 32, pl. 7, fig. 5.
 1878 *Pleuromya* sp. - GOTTSCHIE: 32, pl. 7, fig. 6.
 v 1891 *Pleuromya striatula* AGASS. - BEHRENDSEN: 384. [see Pl. 11, Fig. 6]
 v 1891 *Pleuromya jurassi* AGAS. - BEHRENDSEN: 397. [see Pl. 11, Fig. 7]
 v 1892 *Pleuromya Gottschei* nov. spec. - BEHRENDSEN: 11, pl. 2, fig. 5. [see Pl. 11, Figs. 8-9]
 v ? 1898 *Pleuromya jurassi* AGASSIZ. - TORNQUIST: 171. [see Pl. 11, Fig. 10]
 v 1898 *Pleuromya striatula* AGASSIZ. - TORNQUIST: 171. [see Pl. 11, Fig. 11]
 v 1898 *Pleuromya Voltzi* AGASSIZ. - TORNQUIST: 190. [see Pl. 11, Fig. 12]
 1900 *Pleuromya jurassi* AG. - BURCKHARDT: 35, pl. 21, figs. 12-13.
 1903 *Pleuromya striatula* AG. - BURCKHARDT: 11, 25.
 v 1915 *Pleuromya liasina* SCHÜBL. - JAWORSKI: 447. [see Pl. 11, Fig. 13]
 v 1922 *Pleuromya striatula* AGASS. - BEHRENDSEN: 169. [see Pl. 11, Fig. 6]
 v 1922 *Pleuromya jurassi* AGAS. - BEHRENDSEN: 180. [see Pl. 11, Fig. 7]
 v 1922 *Pleuromya Gottschei* nov. sp. - BEHRENDSEN: 206, pl. 3, fig. 13. [copy of BEHRENDSEN 1892: pl. 2, fig. 5]
 1925 *Pleuromya jurassi* AG. - GOTTSCHIE: 264, pl. 7, fig. 5. [copy of GOTTSCHIE 1878: pl. 7, fig. 5]
 1925 *Pleuromya* sp. - GOTTSCHIE: 264, pl. 7, fig. 6. [copy of GOTTSCHIE 1878: pl. 7, fig. 6]
 v 1926a *Pleuromya striatula* AG. - JAWORSKI: 188. [see Pl. 11, Fig. 14]
 v 1926a *Pleuromya liasina* SCHÜBL. - JAWORSKI: 188. [see Pl. 11, Fig. 15]
 v 1926b *Pleuromya liasina* SCHÜBL. - JAWORSKI: 398. [see Pl. 11, Fig. 15]
 1935 *Pleuromya uniformis* (J. SOWERBY) - ARKELL: 325, pl. 45, figs. 1-13. [see for extensive synonymy list]
 v 1942 *Pleuromya striatula* AGASSIZ - LEANZA: 183, pl. 16, fig. 4.
 1956 *Pleuromya uniformis* (J. SOWERBY) - COX: 1185, pl. 128, fig. 3.
 1977 *Pleuromya tellina* AGASSIZ - ALLENCASTER: 161, figs. 16a-c.
 1978 *Pleuromya uniformis* (J. SOWERBY, 1813) - DUFF: 116, pl. 13, figs. 11, 14, 18, 21. [see for synonymy list]
 v 1982 *Pluromya* [sic] ex gr. *jurassi* AGASSIZ - PÉREZ: pl. 14, fig. 8.
 v 1982 *Pleuromya cf. striatula* AGASSIZ - PÉREZ: pl. 14, fig. 10.
 v 1982 *Pleuromya* (?) sp. A. - PÉREZ: pl. 16, figs. 4, 8.
 1983 *Pleuromya uniformis* (J. SOWERBY), 1813 - QUILLY: 413, figs. 49-50.

Material. 55 specimens from the Pliensbachian (*Fanninoceras fannini* Zone), 1 specimen from the Toarcian/Aalenian boundary interval and 11 specimens from the Upper Aalenian of Quebrada Asientos (SNGM 837-838, 842, PIW 2004I 479-542); 3 specimens from the Lower Pliensbachian and 1 specimen from the Lower Aalenian of Quebrada El Bolito (PIW 2004I 543-546); 8 specimens from the Pliensbachian (*Fanninoceras fannini* Zone) of Portezuelo de Pedernales (PIW 2004I 547-554); 3 specimens from the Lower Pliensbachian of Quebrada Potrerillos (PIW 2004I 555-557); 2 specimens from the Lower Pliensbachian of Quebrada Vaca Muerta (PIW 2004I 558-559); 1 specimen from the Upper Pliensbachian of Rio Jorquera (PIW 2004I 560-561); 1 specimen from the Pliensbachian of Cerro Salto del Toro (PIW 2004I 562); 87 specimens from the Upper Pliensbachian, 30 specimens from the Middle Toarcian, 31 specimens from the Upper Toarcian and 2 specimens from the Lower Aalenian of Quebrada Pinte (PIW 2004I 563-712); 2 specimens from the Middle Toarcian and 2 specimens from the Lower Aalenian of Quebrada Chancoquin (SNGM 839, PIW 2004I 713-715); 1 specimen from the Middle Toarcian of Quebrada La Plata (PIW 2004I 716); 36 specimens from the Middle Toarcian, 8 specimens from the Upper Toarcian and 2 specimens from the Aalenian of Quebrada La Totorá (SNGM 836, PIW 2004I 717-761); 2 specimens from the Upper Toarcian north of Juntas del Tolar (PIW 2004I 762-763); 11 specimens from the Upper Toarcian, 2 specimens from the Toarcian/Aalenian boundary interval and 11 specimens from the Aalenian of Salar de Pedernales (PIW 2004I 764-787); 1 specimen from the Upper Toarcian of Rio Plata (PIW 2004I 788); 3 specimens from the Upper Toarcian of Quebrada Plaza (PIW 2004I 789-791); 1 specimen from the Toarcian/Aalenian boundary interval of Quebrada Caballo Muerto (SNGM 840); 1 specimen from the Lower Aalenian of Quebrada La Chaucha (PIW 2004I 792); 5 specimens from the Lower and 6 specimens from the Upper Aalenian of Manflas (SNGM 841, PIW 2004I 793-802); 3 specimens from the Lower Aalenian and 1 specimen from the Aalenian of Quebrada San Pedrito (PIW 2004I 803-806); 1 specimen from the Lower Aalenian of Quebrada Yerbas Buenas (PIW 2004I 807); 1 specimen from the Upper Aalenian of Rio Manflas (PIW 2004I 808). All specimens are articulated and the majority is preserved as composite moulds. Shell preservation is relatively common among Aalenian specimens.

Remarks. Species of *Pleuromya* are difficult to recognize and to separate, and more than 120 nominal species, most of them poorly defined, exist in the literature for the Jurassic alone (PANDEY et al. 1996). In addition to considerable intraspecific variation within at least some widespread species, compactional distortion often hampers the identification of distinct species of *Pleuromya*. Most of the specimens from Chile are here accommodated in *P. uniformis*, one of the most long ranging bivalve species in the European Jurassic.

Detailed descriptions and a synonymy of European representatives of *P. uniformis* have been provided by ARKELL (1935), COX & ARKELL (1948) and DUFF (1978). The Chilean specimens display a high degree of variation, even if individuals from a single bed are compared. Relatively common is an elongated variety (e.g. Pl. 8, Fig. 12), which resembles *Lutraria elongata* MÜNSTER (in GOLDFUSS 1841: 258, pl. 153, fig. 4) and *Lutraria? jurassi* BRONGNIART (1821: 570, pl. 7, fig. 4; holotype

figured by ARKELL 1935: pl. 45, fig. 13). Both forms are regarded as junior synonyms of *P. uniformis* by British authors (ARKELL 1935; DUFF 1978), a view which is followed here. Specimens that more closely correspond to the 'typical' European form (e.g. ARKELL 1935: pl. 45, figs. 1-7) are illustrated on Pl. 8, Figs. 8-11, 13-14. It should be stressed that populations from different stratigraphic levels are connected by numerous transitional forms.

South American Jurassic specimens of *Pleuromya* commonly have been referred to as *P. jurassi*, which was erected by BRONGNIART (1821) but erroneously is often attributed to AGASSIZ, and *P. striatula* AGASSIZ. Figured records of these species (see synonymy list) all fall well within the range of *P. uniformis*. The same is true of the hitherto unfigured material of *P. liasina* SCHÜBL. from the Lower Jurassic of Peru (JAWORSKI 1915: 447, see Pl. 11, Fig. 13) and specimens from the Lower and Middle Jurassic of Argentina which have been assigned to the following species: *P. liasina* (JAWORSKI 1926a: 188, 1926b: 398, see Pl. 11, Fig. 15), *P. jurassi* (BEHRENDSEN 1891: 397, 1922: 180, see Pl. 11, Fig. 7), *P. striatula* (BEHRENDSEN 1891: 384, 1922: 169, see Pl. 11, Fig. 6; TORNQUIST 1898: 171, see Pl. 11, Fig. 11; JAWORSKI 1926a: 188, see Pl. 11, Fig. 14) and *P. voltzi* AGASSIZ (TORNQUIST 1898: 190, see Pl. 11, Fig. 12), which all are figured herein for the first time.

BEHRENDSEN (1892) considered *Pleuromya* sp. in GOTTSCHKE (1878: 32, pl. 7, fig. 6) to be conspecific with his new species *Pleuromya gottschei* BEHRENDSEN (1892: 11, pl. 2, fig. 5, 1922: 206, pl. 3, fig. 13), the type specimen of which is an elongated specimen with submesially situated umbones (see Pl. 11, Fig. 8). In view of the variability of *P. uniformis* both taxa also belong here.

Pleuromya (?) sp. A. (PÉREZ 1982: pl. 16, figs. 4, 8) from the Upper Pliensbachian of Quebrada Asientos, northern Chile, seems to be a *P. uniformis*, which has suffered some degree of compactional distortion. In general, where compaction has affected specimens that were embedded in life position, there is a tendency for the anterior region to be shortened leading to subterminal to terminal umbones, for the inflation and the height-length ratio to increase, and a tendency towards a more strongly convex ventral margin. Several of these features are realized in *Pleuromya* (?) sp. A.

Pleuromya cf. *unioides* GOLDF. in BEHRENDSEN (1891: 383, 1922: 169, GZG Gö Orig K 497-16) from the Lower Jurassic of Rio Salado, Mendoza Province, Argentina, is based on a single fragment which is unidentifiable even at the generic level.

Family **Laternulidae** HEDLEY 1918Genus *Cercomya* AGASSIZ 1843

Type species. *Cercomya pinguis* AGASSIZ 1843.

Remarks. KEEN & COX (1969: N845) and SKELTON & BENTON (1993) placed *Cercomya* in the family Laternulidae (order Pholadomyoidea). Based on preliminary analysis of shell microstructure, the ?superfamily Cercomyoidea CRICKMAY was doubtfully assigned to the bivalve order Pterioidea by CARTER (1990). This latter approach was followed in ABERHAN (1994) and *Cercomya undulata* (J. DE C. SOWERBY 1827) was described from the Lower Jurassic of northern Chile. The final determination of the affinities of the Cercomyidae must still await information of hinge, ligament and shell microstructure for the type species of *Cercomya*. Since the first part of this monograph was published (ABERHAN 1994), additional material of *Cercomya* from the Toarcian to Aalenian of northern Chile has become available. This includes a species which was previously unreported from northern Chile, and therefore inclusion of *Cercomya* herein seems justified.

Subgenus *Capillimya* CRICKMAY 1936

Type species. *Capillimya capillifera* CRICKMAY 1936.

Cercomya (Capillimya) peruviana COX 1956

Pl. 9, Figs. 7-9

v 1956 *Cercomya peruviana* sp. nov. - COX: 1185, pl. 128, fig. 7.

1992 *Cercomya peruviana* COX - DAMBORENEA in DAMBORENEA et al.: pl. 118, fig. 6.

Material. 1 specimen from the Upper Toarcian of Manflas (SNGM 851); 1 specimen from the Upper Toarcian of Quebrada Chanchoquin (SNGM 850); 1 specimen from the Aalenian of Cerro Tatul (SNGM 852). All specimens are double-valved internal moulds.

Description. *Cercomya (Capillimya) peruviana* resembles *C. undulata* in overall shape. The anterior region is covered with strong, rounded commarginal folds, which terminate laterally at a shallow sulcus running from the umbo perpendicularly to the ventral margin. In addition to growth lines the posterior region is bearing unevenly spaced radial riblets which become more densely spaced posteriorly.

Remarks. At its type locality in Peru, *C. peruviana* occurs in Bajocian strata together with *C. undulata* (J. DE C.

SOWERBY) (COX 1956). *C. peruviana* can be distinguished from *C. undulata* by the presence of distinct radial riblets on the posterior surface and a shallow sulcus extending from the umbo to the ventral margin. Well preserved specimens of *C. undulata* may exhibit fine riblets, composed of radially aligned, minute pustules (personal observation). In contrast to *C. peruviana*, however, these are more delicate and are distributed over the whole shell surface.

Cercomya punctata STANTON (1899: 628, pl. 74, fig. 5; IMLAY 1964: C37, pl. 4, fig. 31; IMLAY 1967: 87, pl. 5, figs. 39-41) from the Bajocian of the Western Interior and *Cercomya semiradiata* WHITEAVES (1900: 288, pl. 37, fig. 4) from the Callovian of British Columbia share with *C. peruviana* the radial ornament of the posterior part and the presence of a shallow sulcus which separates an anterior region from a posterior region. With only a few specimens known, the morphological variability of the three species still needs to be established. At least in *C. punctata* intraspecific variation of the radial ornament seems to be fairly high (compare figs. 39-41 in IMLAY 1967), and it cannot be ruled out that all three taxa belong to a single species.

Comparable species from the Upper Jurassic of Europe are *C. versicostata* (BUVIGNIER 1852: 10, pl. 9, figs. 11-13) and its junior synonyms *C. magnifica* (CONTEJEAN 1860: 349, pl. 27, figs. 1-2) and *C. lorioli* (DUMORTIER & FONTANNES 1876: 135, pl. 19, figs. 2, 2a,b). Their radial riblets are composed of minute pustules and the commarginal folds apparently cover the whole shell surface. *Cercomya striata* AGASSIZ (1842: 149, pl. 11, figs. 13-15, pl. 11a, figs. 5-7) from the Upper Jurassic of Switzerland lacks a median sulcus and has much finer radial striae.

Genus *Platymyoidea* COX 1964

Type species. *Platymya dilatata* AGASSIZ 1843.

Platymyoidea? cf. *longa* (BUVIGNIER 1852)

Pl. 9, Figs. 2-5

cf. 1852 *Panopaea Longa* sp. nov. - BUVIGNIER: 6, pl. 7, figs. 1-3.

cf. 1876 *Arcomya longa*. BUVIGNIER - TATE: 410, pl. 11, fig. 11.

v 1992 *Machomya* sp. - ABERHAN: 20.

v 1992 *Pachymya (Arcomya)* sp. A - ABERHAN: 20.

v 1994 *Cercomya?* cf. *undulata* (J. DE C. SOWERBY 1827) - ABERHAN: 21, text-fig. 14.

Material. 5 specimens from the Pliensbachian (*Famminoceras fannini* Zone) of Quebrada Asientos (SNGM 845-846, PIW 20041 809-811); 3 specimens from the Pliensbachian (*Famminoceras fannini* Zone) of Portezuelo de Pedernales (SNGM 847-848, PIW 20041 812). The specimens are preserved as internal moulds. Only rarely shell relics are attached.

Description. The shell of *Platymyoidea?* cf. *longa* is of medium size, elongate-elliptical, little inflated and has a narrow posterior gape. The broad umbones are situated about four-tenth of the shell length from the anterior end. The anterodorsal margin is straight, the posterodorsal margin weakly concave. The ventral margin is moderately convex and passes laterally into the curved anterior and posterior margins. The escutcheon is long and narrow and bordered by two faint ridges. A posterior umbonal ridge is very distinct in the umbonal region and weakens towards the posterventral corner of the shell where it disappears. The anterior end of the shell is ornamented with strong, regular commarginal folds. The posterior part of the shell surface bears minute, radially aligned pustules.

Remarks. The bivalve genus *Platymya*, later renamed in *Platymyoidea* by COX (1964: 42), was erected by AGASSIZ (1843: 180) to accommodate species which, compared to *Arcomya*, exhibit scarcely protruding umbones in a more mesial position and which are not tapering posteriorly. The ornament of *Platymyoidea* consists of commarginal folds which are strongest on the anterior part of the shell. All these diagnostic features are evident in the specimens from Chile and suggest that they belong to *Platymyoidea*. In their diagnosis of *Platymyoidea*, however, KEEN & COX (1969: N845) also mention the presence of a well developed internal umbonal plate. Because this internal feature is not seen in the poorly preserved Chilean specimens, a precise generic placement is not possible at the moment.

The Chilean material has strongest affinities to several nominal species erected by BUVIGNIER (1852) from the Pliensbachian of northern France, which probably are conspecific: *Panopaea broliensis* BUVIGNIER (1852: 6, pl. 8, figs. 6-7); *Panopaea petrea* BUVIGNIER (1852: 6, pl. 7, figs. 4-5); and *Panopaea longa* BUVIGNIER (1852: 6, pl. 7, figs. 1-3). BUVIGNIER did not mention the presence of an internal umbonal plate, but HALLAM (1976) referred to one of BUVIGNIER's species as *Platymyoidea longa* (BUVIGNIER). In terms of outline, shape, position of the broad, somewhat protruding umbones and shell ornament, the Chilean specimens agree very well with coeval specimens of *P. longa* from France (e.g. compare BUVIGNIER's type material with Pl. 9, Fig. 4). As the posterior umbonal ridge of the Chilean material appears to be somewhat more distinct, I refer to the Chilean specimens as *P.?* cf. *longa*.

Machomya sp. and *Pachymya* (*Arcomya*) sp. A are two taxa listed in the faunal list of Early Jurassic bivalves from northern Chile by ABERHAN (1992), but are here included in *P.?* cf. *longa*. The specimen identified as

Machomya sp. in ABERHAN (1992) is figured on Pl. 9, Fig. 2. While its elongate shape is in fact reminiscent of the Jurassic genus *Machomya* (e.g. compare with COX 1969a: Fig. F13, 2a-b), it lacks the diagnostic anterior sulcus seen on internal moulds, which corresponds to an oblique, anteroventrally directed ridge on the interior of the shell. Its straight dorsal margin and only scarcely protruding umbones are probably caused by post-mortem distortion. On the other hand, development of the umbonal ridge, weak inflation of the shell and the ornament, consisting of rounded commarginal folds in the anterior region, agree very well with *P.?* cf. *longa*. Similarly, *Pachymya* (*Arcomya*) sp. A of ABERHAN (1992) (e.g. Pl. 9, Fig. 3) and *Cercomya?* cf. *undulata* (J. DE C. SOWERBY) of ABERHAN (1994: 21, text-fig. 14) cannot be distinguished from *P.?* cf. *longa*. All three previously identified taxa, *Machomya* sp., *Pachymya* (*Arcomya*) sp. A, and *Cercomya?* cf. *undulata*, are of the same age (Pliensbachian, *Fanninoceras fannini* Zone) and occur at the same locality in the Quebrada Asientos, partly even in the same horizon. They can be grouped into one species, i.e. *Platymyoidea?* cf. *longa*.

Another closely related taxon is *Platymyoidea* sp. from the Pliensbachian? of Sonora, Mexico (DAMBORENEA & GONZÁLEZ-LEÓN 1998: 196, fig. 9.8). The figured specimen differs from *P.?* cf. *longa* by the presence of very low umbones and a convex rather than straight anterodorsal shell margin, but otherwise corresponds well to the specimens from Chile. As the morphological variability of the Mexican forms is not known, the comparison with *P.?* cf. *longa* must remain preliminary at present. In the same paper, DAMBORENEA & GONZÁLEZ-LEÓN (1998: 197) tentatively assign *Arcomya elongata* ROEM. (JAWORSKI 1926a: 192, pl. 1, fig. 7, see Pl. 11, Fig. 2) from the Pliensbachian of Argentina to *Platymyoidea*. However, position of the umbones in the anterior third of the shell length and lack of stronger commarginal folds at the anterior end of the shell, suggest that this species is better kept with *Pachymya* (*Arcomya*).

The Chilean *Platymyoidea?* may not be confused with some species of *Cercomya* such as *C. peruviana* (see above). The ornament of *C. peruviana* is very similar and, as in *P.?* cf. *longa*, consists of coarse, rounded commarginal folds, which are restricted to the anterior part of the shell. The posterior surface is covered with fine radial riblets, although these are much stronger than in *P.?* cf. *longa*. However, *C. peruviana* is tapering posteriorly, the anterior part is more produced, the umbones are hardly protruding beyond the anterodorsal margin and the posterodorsal margin is more strongly concave.

Acknowledgements

I would like to thank S. E. DAMBORENEA and F. T. FÜRSICH for critically reading the manuscript and A. v. HILLEBRANDT for making his collection available for study. I am also grateful to all the curators who kindly allowed access to specimens under their care and from whom I have borrowed specimens. Additional thanks are due to E. PÉREZ and L. A. QUINZIO for supporting field

work in Chile. W. HARRE and C. RADKE carried out the photographic work, P. MENDAU and E. SIEBERT assisted in drawing the text-figures, and H. KRUEGER prepared the specimens. The study was financially supported by a grant from the Deutsche Forschungsgemeinschaft (Ab 109/2-1), which is acknowledged with gratitude.

Tab. 1. List of Chilean localities which yielded Jurassic anomalodesmatan bivalves and main references.

1	Quebrada Cachina	HILLEBRANDT (2000: 125, figs. 10, 22, 24)
2	south of Sierra Minillas	QUINZIO (1987: 36, figs. 12, 16); HILLEBRANDT (1990: 30, figs. 1, 3, 2000: 130, figs. 25-26)
3	Salar de Pedernales	HILLEBRANDT & SCHMIDT-EFFING (1981: 6, fig. 1); ABERHAN (1992: 9)
4	Portezuelo de Pedernales	HILLEBRANDT & SCHMIDT-EFFING (1981: 8, fig. 2)
5	Quebrada Asientos	HILLEBRANDT & SCHMIDT-EFFING (1981: 8, figs. 2-3); ABERHAN (1992: 9, figs. 3-4, appendix I)
6	Quebrada Caballo Muerto	HILLEBRANDT & WESTERMANN (1985: 7, fig. 2)
7	Quebrada La Chaucha	HILLEBRANDT & SCHMIDT-EFFING (1981: 11, fig. 1); MERCADO (1982: 25); HILLEBRANDT & WESTERMANN (1985: 7, fig. 1)
8	Quebrada El Peñon	HILLEBRANDT & SCHMIDT-EFFING (1981: 11, figs. 1, 3a); MERCADO (1982: 29)
9	Quebrada El Bolito	HILLEBRANDT & SCHMIDT-EFFING (1981: 14, figs. 1, 5); MERCADO (1982: 28); HILLEBRANDT & WESTERMANN (1985: 8); (= Quebrada La Tola in HILLEBRANDT 1973: fig. 1)
10	Quebrada El Patón	MERCADO (1982: 32); HILLEBRANDT & WESTERMANN (1985: 9, fig. 3)
11	Quebrada San Pedrito	HILLEBRANDT (1973: 176, fig. 1)
12	Quebrada Yervas Buenas	HILLEBRANDT (1973: 175, fig. 1); HILLEBRANDT & SCHMIDT-EFFING (1981: 16, figs. 1, 6)
13	Quebrada Vaca Muerta	HILLEBRANDT (1973: fig. 1)
14	Quebrada Potrerillos	HILLEBRANDT (1973: fig. 1); HILLEBRANDT & SCHMIDT-EFFING (1981: 18, fig. 1)
15	Quebrada Noria	HILLEBRANDT (1973: fig. 1); HILLEBRANDT & SCHMIDT-EFFING (1981: 20, figs. 1, 8)
16	Quebrada San Miguel	HILLEBRANDT & SCHMIDT-EFFING (1981: 21)
17	Río Figueroa	HILLEBRANDT (1973: fig. 1); MERCADO (1982: 36)
18	Río Jorquera	HILLEBRANDT & SCHMIDT-EFFING (1981: 21, figs. 1, 9)
19	Quebrada Amolanas (w of Embalse Lautaro)	HILLEBRANDT (2002: 50)
20	Manflas	HILLEBRANDT (1977: 40, figs. 2-3); HILLEBRANDT & WESTERMANN (1985: 10, fig. 4)
21	Río Manflas	HILLEBRANDT & SCHMIDT-EFFING (1981: 24, fig. 1)
22	Cerro Salto del Toro	HILLEBRANDT & SCHMIDT-EFFING (1981: 25, figs. 1, 10)
23	north of Juntas del Tolar	HILLEBRANDT & SCHMIDT-EFFING (1981: fig. 10)
24	Río del Toro	HILLEBRANDT & SCHMIDT-EFFING (1981: 27, figs. 1, 10)
25	Quebrada La Totora	HILLEBRANDT (1973: fig. 2); ABERHAN (1992: 9, figs. 3-4, appendix I); (includes locality south of Quebrada El Corral in HILLEBRANDT & SCHMIDT-EFFING (1981: 28, fig. 1)
26	Quebrada Chancoquin	HILLEBRANDT & SCHMIDT-EFFING (1981: 30, figs. 1, 11)
27	Quebrada Plaza	HILLEBRANDT (1973: figs. 2-3)
28	Cerro Tatul	HILLEBRANDT (1973: 189, fig. 3)
29	Quebrada Pinte	HILLEBRANDT (1973: fig. 2); ABERHAN (1992: 9, figs. 3-4, appendix I)
30	Río Plata	HILLEBRANDT (1973: 191, fig. 3)
31	Cerro Picudo	HILLEBRANDT (1973: 191, fig. 3)
32	Quebrada La Plata	HILLEBRANDT (1973: 184, fig. 3)
33	Quebrada La Papa	HILLEBRANDT (1973: 189)
34	Quebrada Matahuaico	DEDIÓS (1967)

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