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# NEW SPECIES OF MOLLUSCA FROM THE ENTRERRIENSE FORMATION (UPPER MIOCENE) OF CHUBUT PROVINCE, ARGENTINA AND SPECIES NOT PREVIOUSLY REPORTED FROM THIS FORMATION PART II – GASTROPODA

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CONTENTS



## I. ABSTRACT

The second part of this work contains the descriptions and systematics of gastropods obtained from the upper levels of the Entrerriense Formation (Late Miocene), outcropping at various localities in the Valdes Peninsula, Chubut Province, Argentina. Herein are treated 62 species, of which 37 are new to science, the remainder are either previously described or closely related to described species. Forty-two species are new to the fauna, which consolidates the affinities with the Panamanian, Caribbean, and Neozelandic Bioprovinces.

## II. INTRODUCTION

This paper is a continuation of a previous study examining the molluscan fauna of the Entrerriense Formation (Late Miocene) of the Valdes Peninsula, Chubut Province, Argentina, and with the material contained herein we increase the number of species of Gastropoda recorded in the formation to a total of 128, of which 83 are newly described. With regard to the historical considerations and stratigraphy, the reader is kindly referred to Part I (Brunet, 1995). We continue supporting the relationship of these strata with the upper levels of Paraná, Entre Rios Province, Argentina, reported by Bravard (1858), and consider both synchronous and corresponding to a paleogeographic event not yet elucidated.

## III. ACKNOWLEDGMENTS

I wish to thank Tulane University for its help in the publication of this second part, and all the persons who contributed to its realization. I am particularly grateful to Dra. Emily H. Vokes, Tulane University, for her enormous help in preparation of the manuscript and the moral support that she offered to me. I also acknowledge the Centro Nacional Patagónico (CENPAT), which permitted the use of their Servicio Fotográfico, as well as the technical help of Sr. Franciso Pertini.

## IV. SYSTEMATIC PALEONTOLOGY

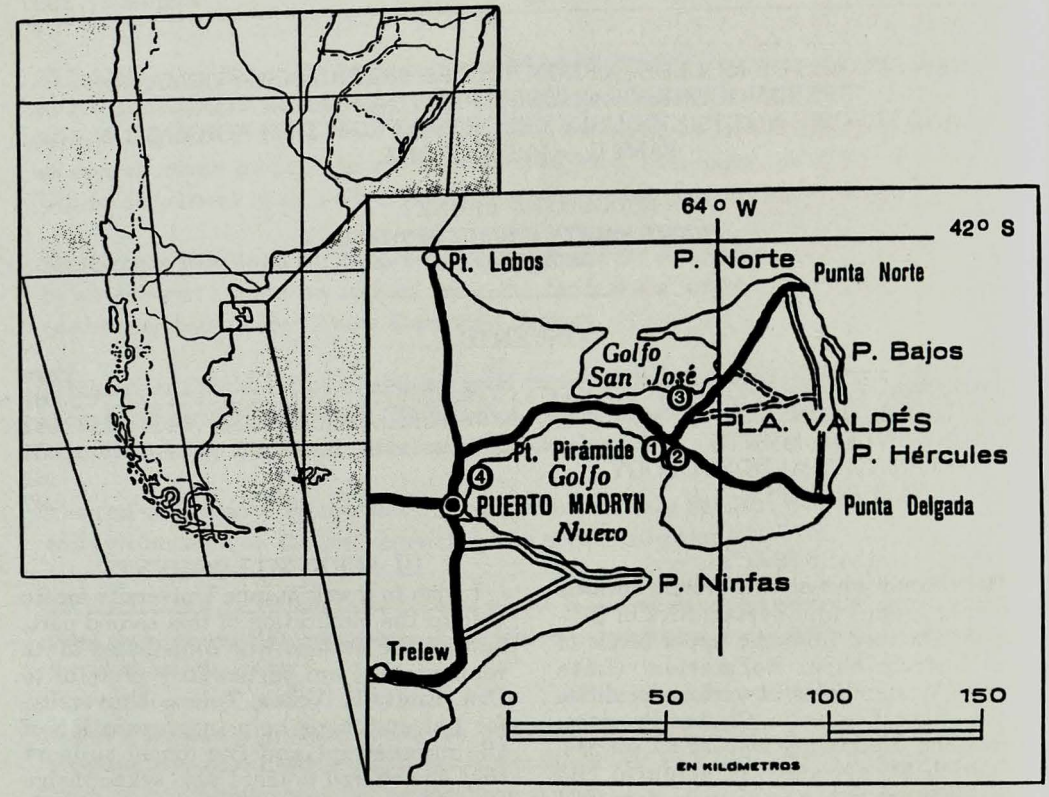
Class GASTROPODA
Order ARCHAEOGASTROPODA
Superfamily PATELLOIDA
Family ACMAEIDAE
Subfamily PECTINODONTINAE
Genus PECTINODONTA Dall, 1882

PECTINDONTA sp.
Plate 1, figure 1

*Description:* Shell coniform, small, curved, low and thin; apex blunt, subcentral, only a bit anterior. Muscle scar in form of a horseshoe with aperture anterior. Ornamented with fine concentric growth lines, in some examples dark concentric bands and fine radial striae, corresponding to original coloration of shell.

*Hypotype:* MPEF-PI-212; length 10 mm, height 4.1 mm, width 8.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.




Text-figure 1. Map of Argentina, showing location of Valdes Peninsula. Inset map with fossil localities: 1) Puerto Piramide; 2) Punta Pardela; 3) Playa Fracasso; 4) Baliza Punta Flecha.

*Discussion:* We assign this example to the genus *Pectinodonta*, because of the low, arcuate shell, with a large blunt apex. Dall (1882) reports *Pectinodonta arcuata* from the Recent of the West Indies. This is the first record of the genus from the Entrerriense Formation of South America.

Family PATELLIDAE
Subfamily NACELLINAE
Genus NACELLA Schumacher, 1817
Subgenus PATINIGERA Dall, 1905
NACELLA (PATINIGERA) aff.
N.(P.) DEAURATA (Gmelin, 1791)
Plate 1, figure 2

*Description:* Shell relatively thin, oval, slightly elevated. Apex situated on anterior third. Strong radial ribs initially thin at apical level, rapidly becoming wider near margin, other shorter ribs arising at middle of summit, extending to margin; strong concentric cords crossing over ribs, giving to them a tuberculate aspect. Projection of ribs (long and short) producing a scalloped lip. With transmitted light shell showing radiating striae chestnut-yellow in color, corresponding to original coloration of shell.

*Hypotype:* MPEF-PI-213; length 20.1 mm, height 9.5 mm, width 15.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* The example described presents conchological characters similar to the living species *N.(P.) deaurata*, the caracters differentiating them is the presence of short intercalated ribs between the longer ones and a strong concentric orna-

mentation. The Recent form lives from Latitude 38° South, to the Magellanic region and the Kerguelen Islands. We record this genus and subgenus for the first time from the Entrerriense Formation of South America.

Superfamily TROCHACEA
Family TROCHIDAE
Subfamily MONODONTINAE
Genus TEGULA Lesson, 1835
TEGULA ORBIGNYANA (Pilsbry, 1900)
Plate 1, figure 3

*Description:* Shell trocoid, with a high spire; five very convex, rounded whorls. Protoconch smooth; sutures very marked; with deep umbilicus. Peristome rounded, thin; columella with three teeth, in some examples only two, the third disappearing. Aperture lacking internal denticles. Ornamented with tuberculated spiral striae, 12 to 13 in number; base with ten to 11 smooth striae, in some examples tuberculated.

*Hypotype:* MPEF-PI-214; height 7.1 mm, width 10 mm.

*Locality:* Punta Norte, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* Our examples show no differences from specimens living from Mar del Plata to Santa Cruz (Argentina). They probably should be placed in the subgenus *Agathistoma* Olsson and Harbison, 1953. *Tegula patagonica* (d'Orbigny, 1840), which has been cited from the Entrerriense Formation, differs by having denticles on the inner margin of the lip.

Superfamily LITTORINOIDEA
Family LITTORINIDAE
Subfamily LITTORININAE
Genus LITTORINA Ferussac, 1822
LITTORINA aff. L. ZICZAC (Gmelin, 1791)
Plate 1, figures 4-6

*Description:* Shell small, conical, almost as high as wide, moderately heavy; five or six rather flat whorls (specimens very corroded); suture well marked and smooth. Body-whorl half of total height, very convex, with an obtuse peripheral carina. In some apparently gerontic examples a discontinuous subsutural carina (Bequaert, 1943). First two whorls smooth, sculpture only visible on base, consisting of fine spiral cords. Aperture pyriform; outer lip thin, united directly to body-whorl. Columellar area moderately long and wide, oblique within, smooth, at times rather concave; inner lip rounded, curving gradually toward base; lacking umbilicus.

*Hypotypes:* MPEF-PI-215; height 11.5 mm, width 11.5 mm (female example). MPEF-PI-216; height 7 mm, width 4 mm (male example). MPEF-PI-217; height 3.8 mm, width 2.2 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* From the Entrerriense Formation two species have been described as *Littorina unicostalis* Borchert, 1901, and *Littorina paranensis* Borchert, 1901, both from Paraná (Argentina); the first also has been reported from the Camacho Formation of Uruguay (Figueiras and Broggi, 1971-73). The specimen figured here (pl. 1, fig. 4; MPEF-PI-215) possibly represents a female example, in which case the other example (pl. 1, fig. 5; MPEF-PI-216) should be a male, ornamented with fine and coarse spiral cords. We have also observed other examples (pl. 1, fig. 6; MPEF-PI-217) with a very conical form and conspicuous peripheral carina, which resemble those from the area of Governor's Harbour, Eleuthra, Bahama Islands, figured by Bequaert (1943, pl. 5, fig. 5).

LITTORINA SAXATILIS (Olivi, 1792)
Plate 1, figure 7

*Description:* Shell turbinate, variable in shape, but higher than wide, heavy; three or four whorls increasing rapidly, the last two-thirds of total height, whorls convex; suture deep; without visible ornamentation. Aperture semicircular, outer lip thin, smooth. Columellar area wide, heavy, smooth, expanding toward basal margin and toward body-whorl. A small umbilicus beside columellar margin (juvenile example). Apparently color in this species variable, with yellow, orange, grayish-orange, or grayish-maroon in adults, with one or more spiral bands, white, gray-black, gray, or dark purple. Our specimen with uniform yellowish coloration, with dark purple band in middle of penultimate whorl and another subsutural band on body-whorl, coloration considered to be original color.

*Hypotype:* MPEF-PI-218; height 5 mm, width 3 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Littorina saxatilis* occurs in the boreal and arctic areas. In North America it extends from Cape Barrow, Southampton Id., and Hudson's Bay, to southern New Jersey. It also is found in Post-Pliocene deposits that represent brackish lagoons near Branford, Connecticut (Knight, 1934, *in* Bequaert, 1943, p. 10). This is the first record for this species from the Entrerriense Formation of South America, as well as the southernmost record of the species presently known.

LITTORINA PIRAMIDESIA, n. sp.
Plate 1, figure 8

*Description:* Shell of small size, turriform, heavy, high-spired, whorls convex; body-whorl almost twice height of spire, very globose with

PLATE 1

Figures Page

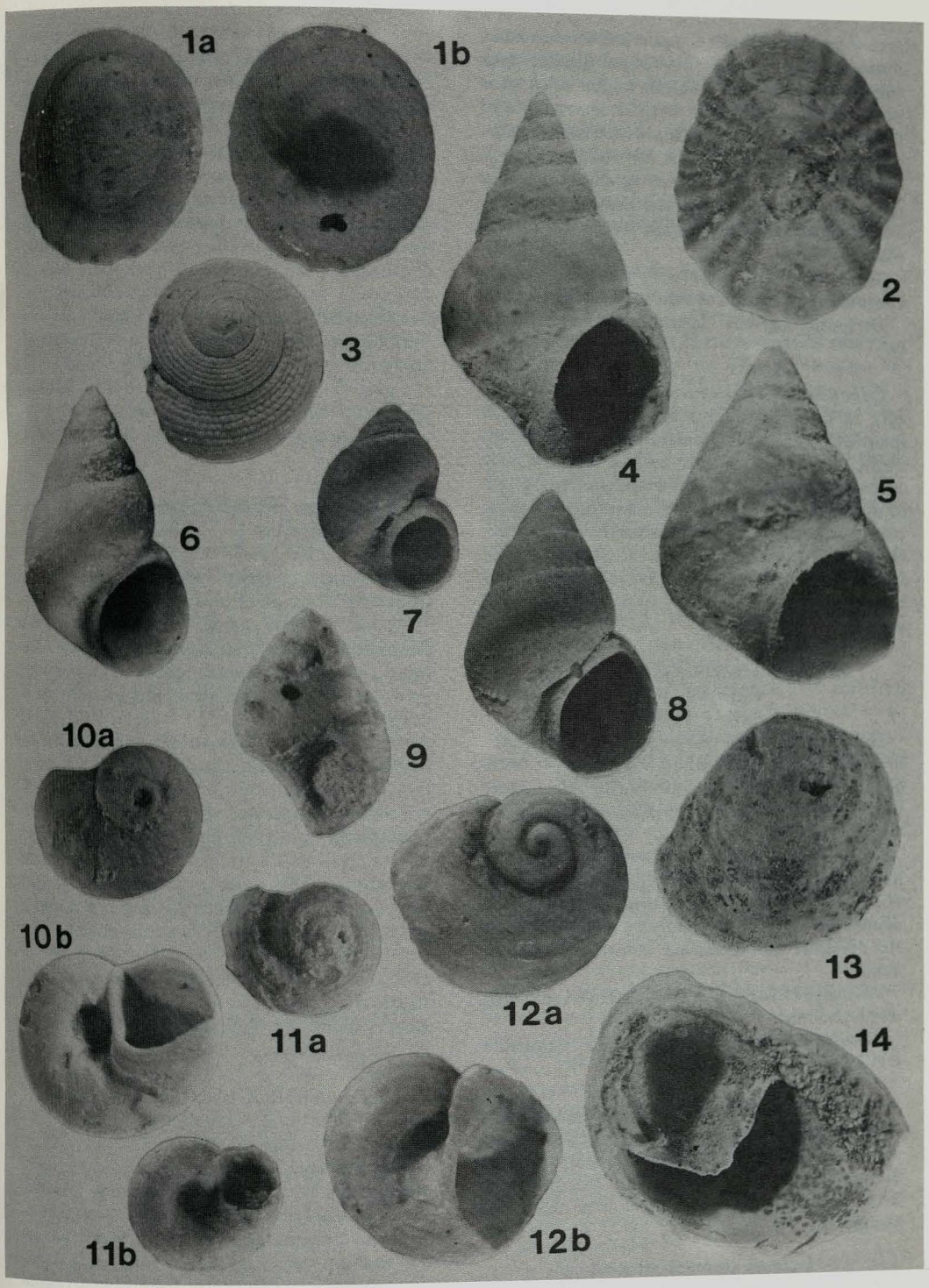



PLATE 1

heavy peripheral carina. Aperture semicircular; outer lip heavy, very curved; columellar area consisting of a heavy callus folded back over body-whorl, beginning within aperture and forming angle with basal lip, which also is wide. Base convex; umbilicus not covered by columellar callus. Although appearing smooth, under microscope (X 40) fine spiral striae present.

*Holotype:* MPEF-PI-219; height 7.2 mm, width 4.8 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Littorina piramidesia,* n. sp., is characterized and differentiated from other related species by the development of the columellar callus, by the very convex whorls, and the constant presence of an umbilicus in juvenile and adult specimens. In apparently female examples, there are microscopic spiral striae, while in male examples the spire is shorter and the ornamentation consists of fine spiral cords.

LITTORINA NEBULOSA TESSELLATA
Philippi, 1847
Plate 1, figure 9

*Description:* Shell very small; spire conical, low, but pointed; last whorl very globose, without peripheral carina, double or more than height of spire. Suture very marked, shoulder of whorls obtusely anguled by depth of suture. Aperture subcircular, outer lip thin. Columellar area long, wide and smooth, inner lip thickened, almost straight; ending abruptly below, separated by a slight depression in the outer lip. Neither umbilicus nor columellar depression.

*Hypotype:* MPEF-PI-220; height 3.9 mm, width 2.6 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We assign this example to the variety *tessellata* because of the angulation of the shoulder and the very globose body-whorl. This is the first record from the Entrerriense Formation of South America.

Family VITRINELLIDAE
Genus VITRINELLA C.B. Adams, 1850

VITRINELLA PARDELENSIS, n. sp.
Plate 1, figure 10

*Description:* Shell of small size, porcelaneous, compressed, smooth, widely umbilicate, diameter of shell 5.1 times diameter of umbilicus. Three and one-half convex whorls, the last inferiorly flat. Aperture strongly oblique, basal outline subrectangular due to superior extension of peristome, inferior retraction and parallel nature of the columellar and outer margins. Columellar margin folded back over whorl, extending to umbilicus, but not obscuring it. Ornamented with heavy growth lines.

*Holotype:* MPEF-PI-222; height 2 mm, diameter 5.1 mm, diameter of umbilicus 1 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Vitrinella pardelensis,* n. sp., is rather similar to *V. floridiana* Pilsbry and McGinty, 1946, which differs in having a proportionally larger umbilicus, an aperture that is oblique but not typically "teinostomiform" as in *V. pardelensis.* The columellar margin does not cover the basal whorl and the the aspect of the aperture laterally is rounded and basally subtriangular. *Vitrinella helicoidea* C.B. Adams, 1850, differs in having a parietal division of the lip into which penetrates the penultimate whorl, heavy periumbilical carina and the upper margin of the peristome is curved forward; the diameter of the shell is 3.3 times the diameter of the umbilicus. *Vitrinella praecox* Pilsbry and McGinty, 1946, differs by having a periumbilical carina, a peristome oblique but not "teinostomiform" and the diameter of the shell is 3.75 times the diameter of the umbilicus. We note for the first time this genus from the Entrerriense Formation of South America.

Genus CIRCULUS Jeffreys, 1865
CIRCULUS PARDELENSIS, n. sp.
Plate 1, figure 11

*Description:* Shell very small, heavy, spire moderately low, exposed, peripherially rounded. Suture weakly marked, with a wide parasutural groove beginning at protoconch and having six to eight poorly developed fine spiral striae. Protoconch smooth; penultimate whorl ornamented with five heavy spiral cords and ulti-

mate with 12 heavy cords. Aperture oblique, subquadrate, with extended upper lip, the lower and upper almost straight, the outer barely convex. Umbilicus very deep, with strong periumbilical growth lines only.

*Holotype:* MPEF-PI-223; height 1.3 mm, width 3.1 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion:* Relatively near living forms are known from the Atlantic and the Pacific. *Circulus trilix* (Bush, 1897) ranges from Cape Hatteras to Cuba, and is distinguished by being tricarinate and lacking the parasutural groove. Woodring (1957) cites this species from the Chipola (Early Miocene), Shoal River (Middle Miocene), and Gatun (Late Miocene) formations; also with tricarinate forms. *Circulus cerrosensis* Bartsch, 1907, from Santa Catalina Island, California, Baja California, and the Gulf of California, may be considered the Pacific homologue of *C. trilix*. *Cyclostremiscus glyptomphalus* Pilsbry and Olsson, 1952, from the Pleistocene of Panama, may be distinguished with difficulty from *C. trilix*; therefore, those authors suggested the existence of a "race" or a subspecies. *Circulus cosmius* Bartsch, 1907, from Ecuador is rather near *C. cerroensis*, but is characterized by a narrow curvature of the upper margin of the peristome, directed downward, extending forward, lacking the parasutural groove. *Circulus occidentalis* Pilsbry and Olsson, 1941, from the Pliocene of Ecuador, has the margin of the peristome directed below, lacks the parasutural groove and resembles *C. cosmius*. *Circulus philippii* (Cantraine, 1842) also has a deep umbilicus, is ornamented with a much greater number of spiral cords and lacks the parasutural groove.

Genus TEINOSTOMA H. Adams and A. Adams, 1854
Subgenus AEPYSTOMA Woodring, 1957
TEINOSTOMA (AEPYSTOMA) aff. T.(A.) ANDRIUM Woodring, 1957
Plate 1, figure 12

*Description:* Shell of small size, heavy, convex, with three and one-half whorls, spire somewhat elevated, last whorl very large. Protoconch smooth. Peristome typical, with upper margin projecting forward and lower withdrawn. Umbilicus open, on the basis of an immature example, with slight development of a callus. Sculture of spiral cords crossed by radiating cords, creating a cancellate ornamentation over entire surface.

*Hypotype:* MPEF-PI-224; height 2.4 mm, diameter 4 mm.

*Locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Discussion:* This form presents characters very similar to the holotype of Woodring (1957, p. 70, pl. 18, figs. 9-11), which also is an immature example. The dimensions of the holotype are: height 2 mm, diameter 4.7 mm. This is the first record for the genus *Teinostoma* and the subgenus *Aepystoma* from the Entrerriense Formation of South America.

Superfamily CERITHIOIDEA
Family TURRITELLIDAE
Genus TURRITELLA Lamarck, 1799
TURRITELLA HEIMI, n. sp.
Plate 2, figure 1

*Description:* Shell turriculate, of medium size. Six and one-half teleoconch whorls, with two smooth nepionic whorls. Suture deep and shoulder very marked. Whorls flat. First teleoconch whorl with four cords, the remaining with five, consisting of one strong anterior and one strong posterior, with three weaker intermediate cords, between each of these a very fine secondary cord; behind the posterior and bordering the shoulder one fine cord and, in advance of the anterior, another fine cord. Suture with a secondary cord above and another below. In adult examples, upper and infrasutural cords disappearing and on last whorls two or three very fine cords between primaries. Heavy growth lines causing some cords to appear tuberculate, especially the primaries. Base with a heavy peripheral cord and four low flat cords, between these one or two fine secondary cords. Aperture apparently oval, with a thin columellar border, columella convex. Growth lines typical of *T. conspicabilis* (Miocene of Australia) and of the *T. hybrida* group (Cretaceous-Eocene of Europe), according to Guillaume (1924).

*Holotype:* MPEF-PI-225; height 18.1 mm, width 5.8 mm, apical angle 16°.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Arnoldo Heim.

*Discussion: Turritella heimi*, n. sp., differs from *T. americana* (Bravard, 1858), which has only four primary cords per whorl and one irregular fine cord on the early whorls, while on the last whorl there may be intercalated up to two intermediate cords, all cords with granulations, over the early teleoconch whorls. *Turritella iheringiana* Figueiras and Broggi, 1976, differs in having each whorl with seven subequal cords, except the upper, which is stronger and peripheral to the shoulder. The sutural area lacks cords and the base has five flat cords. *Turritella indeterminata* Borchert, 1901, differs in having convex whorls, with nine cords, and with finer secondary cords.

TURRITELLA BROGGII, n. sp.
Plate 2, figure 2

*Description:* Shell turriform, of medium size, whorls flat, suture inconspicuous, without either sutural depression or shoulder. Twelve and one-half whorls, two smooth nepionic whorls; first teleoconch whorls with three smooth, irregular cords, the remaining with three primary cords, somewhat heavy, equal and granulose; on last whorl one anterior cord added, also granulose and corresponding to periphero-basal cord; between each pair of principal cords one fine, low secondary cord with small granules. Base with a heavy peripheral cord and five flatter cords, with one secondary cord between each of them. Columella straight and aperture subquadrate; no growth lines seen on any specimens.

*Holotype:* MPEF-PI-226; height 20 mm, width 6 mm, apical angle 19°.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the malacologist Sr. Jorge Broggi.

*Discussion: Turritella broggii*, n. sp., differs from *T. americana* (Bravard, 1858), which has four granulose primary cords per whorl and an inconsistant fine cord on the first whorls, while on the last whorl there may be intercalated up to two intermediate cords, also with granulations. *Turritella iheringia* Figueiras and Broggi, 1976, has seven cords per whorl, with the upper strongest and forming the shoulder; the base has five flat cords and the suture is within a deep groove. *Turritella indeterminata* Borchet, 1901, has convex whorls, the suture within a deep groove, with nine cords and finer secondaries. *Turritella heimi*, n. sp., has five principal cords, the anterior and the posterior stronger, and an intermediary secondary cord; the suture is within a deep groove, with one suprasutural cord and one infrasutural cord.

TURRITELLA FIGUEIRASI, n. sp.
Plate 2, figure 3

*Description:* Shell of medium size, whorls flat, suture within a deep groove, shoulder conspicuous. Ornamented with three very heavy cords, barely granulose, and one cord of equal strength in front of anterior suture; in front of this, three fine secondary cords, situated within suture; between anterior suture and cord situated in advance of it, two fine secondary cords; between anterior suture and the middle, one fine low central cord and four very fine cords on each side; between the middle and posterior suture, one fine central cord and three very fine cords on either side; above posterior suture, on shoulder, three or four fine cords, with some of these heavier than others. Base with one heavy peripheral cord and four flat cords, with three to six extremely fine secondary cords between these. Columella straight and aperture subquadrate. No growth lines seen on any specimens.

*Holotype:* MPEF-PI-227; height 24 mm; width 7.9 mm, apical angle 15°.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late paleontologist Dr. Alfredo Figueiras.

*Discussion: Turritella figueirasi*, n. sp., differs from *T. americana* (Bravard, 1858), which has four granulose cords with two intermediary cords intercalated. *Turritella indeterminata* Borchert, 1901, has strongly convex whorls, nine cords on each whorl, which increase in number on the body-whorl, with one secondary cord intercalated between the primaries. We have no information on the aperture of this species. *Turritella iheringiana* Figueiras

and Broggi, 1976, has seven subequal spiral cords, with the uppermost strongest; the base with five cords, and an apical angle of 20°. *Turritella broggii*, n. sp., has three primary cords, without a suprasutural cord, a distinct number of secondary cords, the base with five primary cords, a single secondary cord between these; lacking a sutural groove. *Turritella heimi*, n. sp., has five primary cords, with one finer secondary cord between them, one suprasutural cord and another subsutural cord; the base with five primary cords and one or two fine intermediary cords; the aperture is oval with a convex columella.

TURRITELLA FLECHENSIS, n. sp.
Plate 2, figure 4

*Description:* Shell slender, rather thin, whorls convex, suture shallow, shoulder wide, very oblique and barely concave or straight. Whorls with one heavy anterior cord and one posterior on margin of shoulder, somewhat finer; between these four or five finer cords and between the middle of all cords, three or four much finer tertiary threads; in front of primary anterior cord, one fine cord situated within suture. Shoulder with three or four fine cords. Base with one heavy peripheral cord and six flatter cords; between each of these one finer secondary cord. Growth lines as in *T. conspicabilis* (Miocene of Australia) and the *T. hybrida* group (Cretaceous-Eocene of Europe), following Guillaume (1924).

*Holotype:* MPEF-PI-228; height 19 mm, width 6 mm, apical angle 16°.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Turritella flechensis*, n. sp., differs from *T. indeterminata* Borchert, 1901, which has three spiral cords on the upper part of the whorl, these followed by six even stronger, on the last whorl even more numerous; aperture not seen in the holotype. *Turritella gatunensis gatunensis* Conrad, 1857, has two primary cords, one in the middle of the whorl and another on the anterior third or quarter, with numerous secondary cords, and with other extremely fine threads, observable under a microscope on the last whorl; the base with numerous fine spiral cords. In the figures of Woodring (1957, pl. 83, figs. 4, 5, 9, 14) there are two or three heavy cords located on the anterior half of the whorls. *Turritella gatunesis rhytodes* Woodring, 1957, has the last whorls very compressed posteriorly, without a well-defined shoulder, approximately 16 to 18 cords covering the entire whorl, from suture to suture, of these three or four most pronounced. *Turritella adela* Woodring, 1957, has approximately nine primary cords of various strength and very fine secondary intermediate cords. *Turritella matarucana* Hodson, 1926, has numerous cords that run from suture to suture, without a well-defined shoulder and with very deep sutures.

TURRITELLA HODSONI, n. sp.
Plate 2, figure 5

*Description:* Shell slender, with sutures barely visible; protoconch broken; first preserved whorls with three cords, the posterior very heavy, the medial of the strength of the posterior and the anterior somewhat more salient and appressed to suture, at times almost covering it. On last whorls posterior cord becoming flattened, the surface becoming concave, carrying in this concavity one fine cord; anteriorly continuing with median cord, followed by another concavity and finally the conspicuous anterior cord, projecting as a ledge over shallow suture. Aperture presumably suboval, with columella very concave and outer lip with a depression caused by projection of external groove. Apparently base with one heavy, almost flat, peripheral cord.

*Holotype:* MPEF-PI-229; height 29 mm, width 9.8 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late paleontologist Dr. Floyd Hodson.

*Discussion: Turritella hodsoni*, n. sp., is rather similar to *T. montanitensis* Hodson, 1926, from the Oligo-Miocene of Venezuela, especially the paratype illustrated by Hodson (1926, pl. 16, fig. 6), which differs from our holotype by having a submedial cord on the early teleoconch whorls, in the form of a smooth "V", with one anterior cord and another posterior one, markedly granulose, due to the growth lines and fine intermediate cords,

the secondaries also granulose. *Turritella montanitensis olcotti* Hodson, 1926, has cords with a lesser number of granules, but more conspicuous, especially on supra-sutural cord. *Turritella montanitenesis saladilloensis* Hodson, 1926, has the space between the primary anterior cord and the primary posterior cord more concave, the

PLATE 2

Figures Page

1. TURRITELLA HEIMI, n. sp. ..... 67
MPEF-PI-225 (holotype); height 18.1 mm, width 5.8 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
2. TURRITELLA BROGGII, n. sp. ..... 68
MPEF-PI-226 (holotype); height 20 mm, width 6 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
3. TURRITELLA FIGUEIRASI, n. sp. ..... 68
MPEF-PI-227 (holotype); height 24 mm, width 7.9 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
4. TURRITELLA FLECHENSIS, n. sp. ..... 69
MPEF-PI-228 (holotype); height 19 mm, width 6 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.
5. TURRITELLA HODSONI, n. sp. ..... 69
MPEF-PI-229 (holotype); height 29 mm, width 9.8 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
6. TURRITELLA PIRAMIDESIA, n. sp. ..... 72
MPEF-PI-230 (holotype); height 16 mm, width 6.1 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
7. TURRITELLA ALZOLAI, n. sp. ..... 72
MPEF-PI-231 (holotype); height 20.1 mm, width 7 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
8. SPIROCOLPUS FERUGLIOI, n. sp. ..... 73
MPEF-PI-232 (holotype); height 18.6 mm, width 12 mm.
Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
9. PETALOCONCHUS sp. ..... 73
MPEF-PI-233 (hypotype); height 6 mm, width 3.8 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.
10. HIPPONIX FLECHENSIS, n. sp. ..... 73
MPEF-PI-236 (holotype); height 1.8 mm, length 4 mm, width 3.9 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.
11. CAPULUS PIRAMIDENSIS, n. sp. ..... 74
MPEF-PI-235 (holotype); height 3 mm, length 6 mm, width 6 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
12. POLINICES (EUSPIRA) CONSIMILIS (Ihering, 1897) ..... 75
MPEF-PI-237 (hypotype); height 7 mm, width 8.5 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
13. POLINICES (EUSPIRA) ORTMANNI (Ihering, 1907) ..... 75
MPEF-PI-238 (hypotype); height 9 mm, width 7.2 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
14. ATAXOCERITHIUM PARDELENSIS, n. sp. ..... 75
MPEF-PI-239 (holotype); height 9.1 mm, width 4 mm.
Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
15. ATAXOCERITHIUM PIRAMIDENSIS, n. sp. ..... 76
MPEF-PI-240 (holotype); height 18.6 mm, width 7 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
16. BALCIS FLECHENSIS, n. sp. ..... 76
MPEF-PI-241 (holotype); height 6 mm, width 2 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

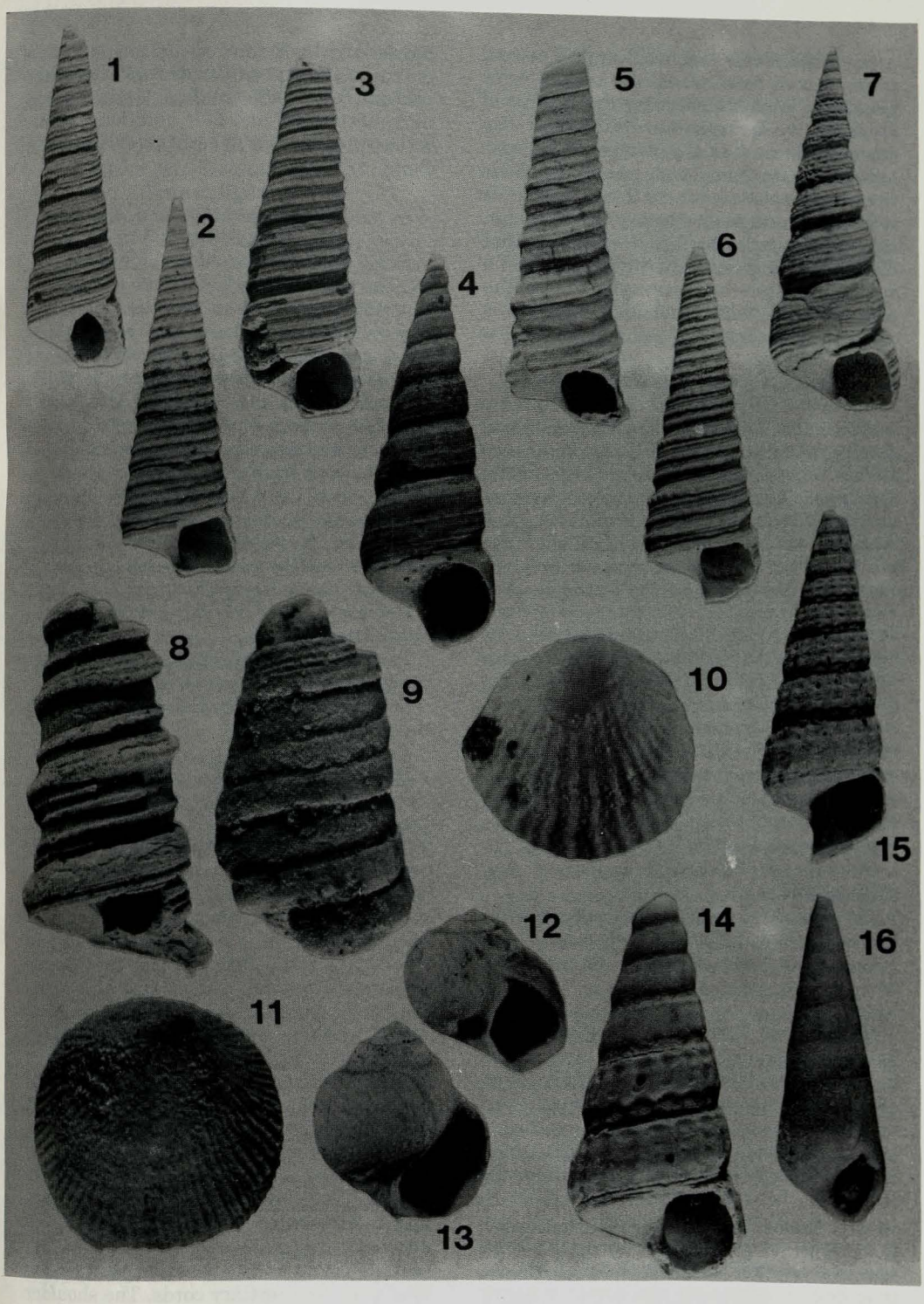



PLATE 2

primary posterior cord weaker, the second primary cord heavier and the two anterior primaries joined. Observing the figures of Hodson, we have some doubt that the example figured as a paratype of *T. montanitensis* (Hodson, 1926, pl. 16, fig. 6) is the same species, we believe that it is referable to another species of *Turritella*, somewhat similar to *T. hodsoni* n. sp., but distinguished from it by the presence of a surface oblique and straight above the anterior cord, while that of *T. hodsoni* is completely concave.

TURRITELLA PIRAMIDESIA, n. sp.
Plate 2, figure 6

*Description:* Shell of medium size, heavy and slender; eight and one-half flat whorls, two smooth nepionic whorls, suture not visible; shoulder well marked by a granulose posterior cord. Early teleoconch whorls with three spiral cords, the central twice the width of other two and the posterior granulose, with one fine cord occupying the space of the suture; cords increasing in number up to five, one of these becoming heaviest. In more adult whorls, between principal cords finer smooth secondary cords intercalated, up to five in number, one of these always becoming heavier. Principal cords following, the posterior and the median, becoming granulose, but anterior one smooth. Base with one peripheral cord and seven low, convex cords with one fine secondary cord between each of these. Columella curved and aperture oval. No growth lines visible.

*Holotype:* MPEF-PI-230; height 16 mm, width 6.1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Turritella piramidesia*, n. sp., differs from *T. broggii*, n. sp., which has a less well-marked shoulder, three equal granulose cords, with a fourth cord intercalated on the last whorl, and only one fine granulose secondary cord, which is intercalated between the primaries; the columella is straight and the aperture subquadrate. *Turritella heimi*, n. sp., has four cords on the early teleoconch whorls and five primary cords on the last whorls, with one anterior cord and another heavy posterior one and three finer intermediate cords; in the suture there are only two cords, one suprasutural and the other infrasutural. On the base there is one peripheral cord and four additional cords, with one or two secondaries between them.

TURRITELLA ALZOLAI, n. sp.
Plate 2, figure 7

*Description:* Shell turriform, of medium size. Ten and one-half whorls, with two smooth nepionic whorls. Suture deep, shoulder well-marked and oblique, with whorls very convex. First teleoconch whorls with three primary cords and one secondary cord between them, the middle primary heavier and projecting; later whorls with five primary cords, intercalated between these one to three secondary cords. At level of sutural groove three or four suprasutural cords, the second of these heavier, and one fine cord situated at crest of shoulder of whorl. Base with six doubled, flat cords. Columella convex, with heavy columellar callus covering one-third of base. Aperture subquadrate.

*Holotype:* MPEF-PI-231; height 20.1 mm, width 7 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to Dr. Rodolfo Mendez Alzola.

*Discussion: Turritella alzolai*, n. sp., differs from *T. gatunensis gatunesis* Conrad, 1857 (in Woodring, 1957, pl. 23, figs. 4, 5, 9, 14), which has the whorls more compressed posteriorly, causing the shoulder to be less well defined, with only two primary cords and numerous secondary cords, the primaries diminishing in strength on the last whorls; the base is sculptured with fine spiral cords. *Turritella gatunensis rhytodes* Woodring, 1957, has the whorls more compressed posteriorly, with deeper sutures; in this subspecies one or two of the primary cords tend to increase in size, thus the last whorl has five primary cords and numerous secondary cords on the shoulder of all of the whorls, which always reach the suture. *Turritella flechensis*, n. sp., has one heavy anterior cord and one heavy posterior one, with three or four fine secondary cords and between these three or four very fine tertiary cords. The shoulder has three or four fine cords and the base

has six flat cords and one fine intermediate cord. The columella is more convex and lacks a columellar callus.

### Genus SPIROCOLPUS Finlay, 1927

SPIROCOLPUS FERUGLIOI, n. sp.
Plate 2, figure 8

*Description:* Shell turriform, very heavy, with sutures poorly marked; shoulder conspicuous, straight and rather convex owing to great development of posterior cord. Ornamented with one heavy posterior cord at periphery of shoulder, with conspicuous granulations, this followed by two very fine cords and three cords even finer than posterior one, also granulose, with smooth interspaces, equal in width to cords, except interspace between middle and anterior cords, which is twice width of cords; one fine and apparently smooth suprasutural cord below and poorly defined fine cords at level of surface of shoulder completing ornamentation. Base and columella lacking, as well as early whorls. No growth lines visible.

*Holotype:* MPEF-PI-232; height 18.6 mm; width 12 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to Dr. Egidio Feruglio.

*Discussion: Spirocolpus feruglioi*, n. sp., differs from *S. ambulacrum* (Sowerby, 1846) and from *S. ambulacrum pyramidesia* (Ihering, 1907), by having one heavy crenulated peripheral cord at the shoulder and only three principal cords, with one fine suprasutural cord and, at the level of the surface of the shoulder, fine spiral cords. *Spirocolpus breantiana* (d'Orbigny, 1847) is more slender, with only three heavy cords, of which only the posterior is generally crenulated. These increase on the last whorls up to six in number; the shoulder is much less conspicuous and the suture deeper. *Spirocolpus iheringi* (Cossmann, 1898) has only three cords, with the posterior stronger, but less conspicuous than in *S. feruglioi*. Evidently this species is closely related to the species of *Spirocolpus* from Patagonia and to the species from the time period of Eocene-Middle Oligocene in New Zealand (Marwick, 1957).

### Family VERMETIDAE

### Genus PETALOCONCHUS Lamarck, 1799

PETALOCONCHUS sp.
Plate 2, figure 9

*Description:* Shell with only nepionic whorls and a few teleoconch whorls preserved. Protoconch with two or three smooth whorls, continuing with flat, smooth spiral bands, seven in number. Interior totally concealed by lime.

*Hypotype:* MPEF-PI-233; height 6 mm, width 3.8 mm.

*Locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Discussion:* Up to this time, we have obtained only two examples of this form. Because of the conchological characters, including the protoconch and part of the teleconch consisting of almost flat bands, apparently without ornamentation, we assign these tentatively to the genus *Petaloconchus*. In this case, this would be the first record of this genus from the Entrerriense Formation of South America.

### Superfamily HIPPONICOIDEA
### Family HIPPONICIDAE
### Genus HIPPONIX Defrance, 1819

HIPPONIX FLECHENSIS, n. sp.
Plate 2, figure 10

*Description:* Shell in form of a cap, small, thin; apex opistogyre, small, pointed, turned to the left, not extending beyond shell margin. Aperture suborbicular; lip crenulated by projection of ribs. Muscle scar in form of a horseshoe, open anteriorly; with an internal perilabral groove, corresponding to position of fixed disk. Ornamented with 42 heavy radial ribs (2 per mm), with interspaces equal in width to ribs; other shorter ribs intercalated, beginning at middle of height of shell, extending to peristome; heavy growth lines giving an almost cancellate aspect.

*Holotype:* MPEF-PI-236; height 1.8 mm, length 4 mm, width 3.9 mm.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Hipponix flechensis,* n. sp., differs from *H. oligocostata* Brunet, 1995, which has 37 radial ribs, without intermediate ribs. The height/width index is 0.54 and the width/length index is 0.85, where-

as in *H. flechensis* these indices are: height/width 0.46 and width/length 0.97. *Hipponix costata* Erdemann and Morra, 1985, from the Patagonian of Santa Cruz (Argentina) has more numerous ribs (approximately 50), without intermediate ribs, and its indices are: height/width 0.23 and width/length 0.89. *Hipponix conicus* (Shumacher, 1817), living in the western Pacific (Fremantle, Australia), has heavier ribs (1 per mm) with very fine interspaces, without intermediate ribs and the length of the shell is 2 cm.

Superfamily CREPIDULOIDEA
Family CREPIDULIDAE
Genus CREPIDULA Lamarck, 1799

CREPIDULA ANCESTRA, n. sp.
Plate 1, figures 13, 14

*Description:* Shell of medium size, subcircular to oval, low to high. Protoconch curved at an angle of 90°. Apex small, pointed or very strong and blunt, projecting beyond posterior margin. Septum small or very deep, depending on thickness of shell, with a medial longitudinal carina divided into two zones; edge of septum convex, in form of an "S," with a deep notch to the left. Pedal muscle scar semicircular, appressed to right insertion of septum. Ornamented with low, radial ribs, apparently without spines, with interspaces equal in width to ribs and with marked growth lines.

*Holotype:* MPEF-PI-234; height 21 mm, width 20.3 mm, diameter 6 mm (low form).

*Paratype:* MPEF-PI-235; height 26 mm, width 19.5 mm, diameter 12 mm (high form).

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for having characters of various species of *Crepidula*.

*Discussion: Crepidula ancestra*, n. sp., presents characters common to various living species. We consider both forms the same, due to the characteristics of the septum and the presence of the radial ribs. The low form is rather close to *C. dilatata* Lamarck, 1822, with its convex septum, but that has a smooth surface. It resembles *C. aculeata* (Gmelin, 1791), by the surface covered with ribs and the longitudinal carina of the septum, but that has the margin of the septum concave. *Crepidula dilatata* var. *patagonica* d'Orbigny, 1847, has the shell very rounded and the external surface weakly rugose, without conspicuous radial ribs. It differs from *Crepidula unguiformis* Lamarck, 1822, because in spite of its depressed form and its concave septum, it does not have conspicuous ribs nor a longitudinal carina on the septum. We believe that we may consider it a valid ancestor to *C. dilatata* var. *patagonica*. The high form resembles *C. protea* d'Orbigny, 1835, but that has a concave septum and a smooth surface. *Crepidula onyx* Sowerby, 1824, has the septum slightly concave and is smooth exteriorly. From Paraná (Entre Rios) *Crepidula paranensis* Borchert, 1901, has been described from a unique example having an oval form, with a blunt apex, which does not extend beyond the margin; the septum is broken, preventing a valid comparison. Closs (1970) has cited *C. paranensis* and *C. protea* from the Middle Miocene of Brazil. Consequently, this is the first record of the genus in the Entrerriense Formation of Patagonia.

Family CAPULIDAE
Genus CAPULUS Montfort, 1810

CAPULUS PIRAMIDENSIS, n. sp.
Plate 2, figure 11

*Description:* Shell in form of a cap, small but heavy, apex opistogyre, small, very pointed, not extending beyond margin of shell, protoconch clearly visible. Aperture circular, labrum crenulated by projection of ribs. Muscle-scar in form of horseshoe, open anteriorly. External ornamentation consisting of numerous radial ribs (5 per mm), where these are crossed by growth lines, rugae developed; interspaces more narrow than ribs and crossed by fine growth lines; some ribs divided.

*Holotype:* MPEF-PI-235; height 3 mm, length 6 mm, width 6 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Capulus piramidensis*, n. sp., differs from *C. ladyae* Brunet, 1995, which is lower and less broad, with indices of height/length: 0.42 and width/length: 0.83; while those of *C. piramidensis* are: height/length 0.50 and width/length 1.00. It has five ribs per mm, whereas *C. ladyae*

has three per mm and the apex extends past the labral margin. It is not comparable with *C. compressus* Smith, 1891, living in the Argentine littoral (8.5 x 2.5 x 8 mm), *C. incurvatus* (Gmelin, 1791), living from North Carolina to Brasil (16 x 10 mm), or with *C. hungaricus* (Linne, 1767), living from the coast of Iceland to the Mediterranean Sea (diameter 5 cm), which are much larger species. We may deduce that in the Entrerriense Sea there arose a "race" of *Capulus* of very small size, in contrast to those living in the Atlantic today.

Superfamily NATICOIDEA
Family NATICIDAE
Subfamily POLINICINAE
Genus POLINICES Montfort, 1810
Subgenus EUSPIRA Agassiz, 1838
POLINICES (EUSPIRA) CONSIMILIS
(Ihering, 1897)
Plate 2, figure 12

*Description:* Shell medium-sized, low-spired, the last whorl large and globose, representing four-fifths of total height; suture strongly channeled, whorls very convex. Aperture occupying three-fourths of body-whorl, semilunar in shape. Columella straight, with an inconspicuous callus and without funicule. Umbilicus deep; peristome narrow. Ornamented only by fine growth lines.

*Hypotype:* MPEF-PI-237; height 7 mm, width 8.5 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Polinices (Euspira) consimilis* is relatively abundant in the outcrops at the Valdes Peninsula (Chubut). It has been recorded from sediments of Oligocene age at Los Manantiales, La Cuevas, and Monte Entrance and from the Patagoniense of Golfo San Jorge. Ihering (1897) cited *Natica consimilis* from Monte Leon (Sta. Cruz) and, from Paraná (Entre Rios), Borchert (1901) mentioned *Natica entrerriana*, which we consider a synonym of *P.(E.) consimilis*. This taxon differs from *P.(E.) ortmanni* Ihering, 1907, mentioned from Yegua Quemada and Los Manatiales (Monte Leon Formation, Oligocene), by having a more globose form, a lower spire, a larger aperture, and deeper sutures.

POLINICES (EUSPIRA) ORTMANNI
Ihering, 1907
Plate 2, figure 13

*Description:* Shell small, somewhat globose, spire relatively high, with 4 1/2 whorls, including nepionic. Suture shallow. Body-whorl occupying 76% of total height. Aperture semilunar, occupying 71% of height of body-whorl; inner lip almost straight, with conspicuous posterior callus,the exterior narrow. Umblicus deep, without funicule. Ornamented with fine growth lines.

*Hypotype:* MPEF-PI-238; height 9 mm, width 7.2 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Polinices (Euspira) ortmanni* is relatively common in the outcrops of the Valdes Peninsula, we have collected at various times 38 examples in perfect condition, coming from Punta Pardela and Puerto Piramide principally. *Natica ovoidea* Philippi (Ortmann, 1900, p. 380) is a synonym of *Polinices ortmanni* Ihering, 1907.

Suborder HETEROGLOSSA
Superfamily CERITHIOPSOIDEA
Family CERITHIOPSIDAE
Subfamily CERITHIELLINAE
Genus ATAXOCERITHIUM Tate, 1893
ATAXOCERITHIUM PARDELENSIS, n. sp.
Plate 2, figure 14

*Description:* Shell small, turriculated and heavy. Spire with 4 1/2 whorls and three smooth nepionic whorls. Sutures marked with deep postsutural groove, superior margin of teleoconch whorls strongly projecting as a result of postsutural groove. The last whorls ornamented with three spiral cords up to penultimate and with four on the ultimate, the second much finer than the others, on both whorls the anterior cord more conspicuous; axial cords from 14 to 17 in number, not reaching suture and forming nodules where they cross spirals. Within suture one fine intrasutural cord. Base slightly convex, almost flat, without ornamentation, except for peripheral basal cord. Columella convex, with evidently siphonal canal short and barely curved. Aperture subquadrate.

*Holotype:* MPEF-PI-239; height 9.1 mm, width 4 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locali-

ty.

*Discussion: Ataxocerithium pardelensis,* n. sp., differs from *A. juliana* (Ihering, 1907), which has more convex whorls, without the typical postsutural depression of *A. pardelensis*. The type specimen of Ihering's species has a postsutural cord, from 18 to 20 axial cords per whorl and three spiral cords on all of the whorls. *Ataxocerithium trespunta* (Ihering, 1907), from the Patagoniense of Cabo Tres Puntas, has seven spiral cords and 30 axial cords per whorl, the base is ornamented with eight simple cords and it has a straight columella. It differs from *A. pullum* (Philippi, 1845), which lacks the postsutural groove, has two to three cords on the base, whorls always with three spiral cords, seeming on the last whorl not tuberculate, but rectangular.

ATAXOCERITHIUM PIRAMIDENSIS, n. sp.
Plate 2, figure 15

*Description:* Shell medium-sized, turriform, with 8 1/2 whorls plus two smooth nepionic whorls. Sutures deep, with two fine intrasutural cords. Ornamented with three spiral cords on all whorls and from 18 to 24 axial cords crossing spirals to form tubercules. Base weakly convex, with three fine peripheral cords. Columella convex, with siphonal canal short and oblique. Aperture oval.

*Holotype:* MPEF-PI-240; height 18.6 mm, width 7 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Ataxocerithium piramidensis,* n. sp., differs from *A. juliana* (Ihering, 1907), from the Superpatagoniense of San Julian (Sta. Cruz), which has one fine smooth postsutural cord, from 18 to 20 axial cords per whorl, the whorls very convex and narrow, with deeper sutures and the base smooth. *Ataxocerithium trespunta* (Ihering, 1907), from the middle Patagoniense of Cabo Tres Puntas (Sta. Cruz) has seven spiral cords per whorl and 30 axial cords; the base has eight simple cords; the columella is straight and the aperture subquadrangular. *Ataxocerithium pullum* (Philippi, 1845) has the sutures less deep, the whorls flatter, quadrangular tubercules on the last whorl and only two peripheral basal cords. The genus *Ataxocerithium* is noted here for the first time from the Entrerriense Formation of Argentina. Figueiras and Broggi (1986) cited *Cerithiopsis entrerriensis* from the Camacho Formation of Uruguay, as the unique representative of the genus.

Superfamily EULIMOIDEA
Family EULIMIDAE
Genus BALCIS Leach, 1847

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PLATE 3

Figures Page

1. TROPHON LEANZAI, n. sp. ..... 78
   MPEF-PI-116 (holotype); height 30.6 mm (incomplete), width 20.7 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
2. TROPHON HARRINGTONI, n. sp. ..... 78
   MPEF-PI-124 (holotype); height 23.9 mm (incomplete), width 19.7 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
3. TROPHON PLICATUS var. SANTACRUZENSIS Ihering, 1897 ..... 79
   MPEF-PI-128 (hypotype); height 38.8 mm (incomplete), width 25 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
4. TROPHON CONTORTUS, n. sp. ..... 80
   MPEF-PI-024 (holotype); height 32.8 mm (incomplete), width 27.2 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
5. TROPHON RETRORSUM, n. sp. ..... 79
   MPEF-PI-180 (holotype); height 58 mm (incomplete), width 44.2 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
6. "TROPHON" VOKESAE, n. sp. ..... 81
   MPEF-PI-019 (holotype); height 50 mm (incomplete), width 38.5 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

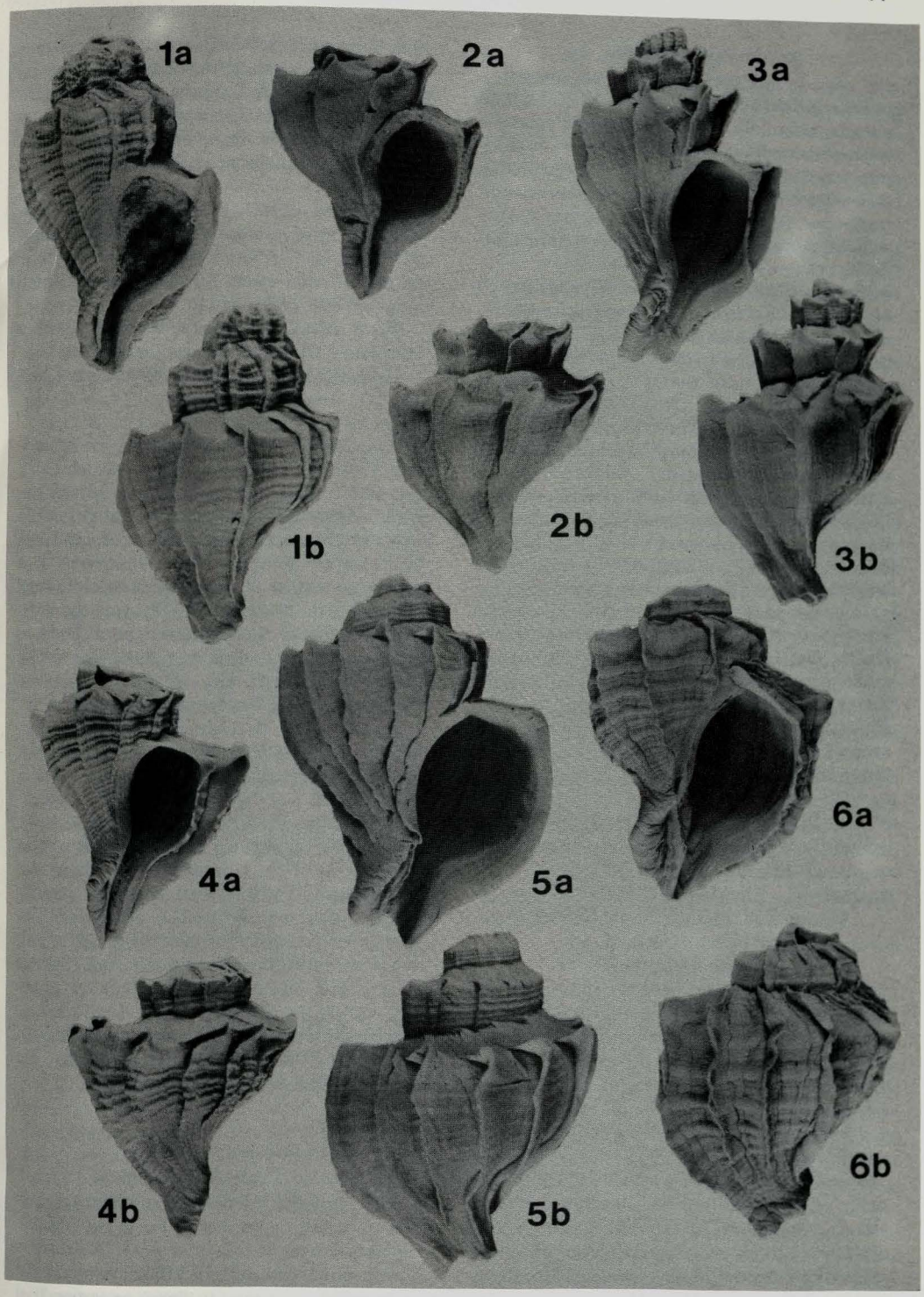


PLATE 3

BALCIS FLECHENSIS, n. sp.
Plate 2, figure 16

*Description:* Shell very small, slender, 9 1/2 whorls; all almost flat, body-whorl rounded, with strong basal carina; sutures weakly impressed. Aperture oval, external lip broken; columella arched. Without external ornamentation.

*Holotype:* MPEF-PI-241; height 6 mm, width 2 mm.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Balcis flechensis*, n. sp., differs from *B. cetia* Woodring, 1970, which has the suture profoundly impressed and very convex whorls. *Balcis aulaca* Woodring, 1970, has very convex whorls, the suture is better marked and there is no peripheral carina on the body-whorl. *Balcis lipara* Woodring, 1970, has somewhat convex whorls, a heavy columellar callus, no peripheral carina on the body-whorl and the two last whorls globose. *Balcis jacululum* (Maury, 1917) has deeper sutures, more convex whorls and lacks a peripheral carina on the body-whorl. This unique example represents the first record of the genus *Balcis* from the Entrerriense Formation of South America.

Superfamily MURICOIDEA
Family MURICIDAE Rafinesque, 1815
Subfamily TROPHONINAE
Cossmann, 1903
Genus TROPHON Montfort, 1810

TROPHON LEANZAI, n. sp.
Plate 3, figure 1

*Description:* Shell medium-sized, relatively thin. Spire elevated; whorls high and narrow. Aperture subtriangular, with concave columella forming an angle of almost 90 degrees with posterior lip; obtuse posterior angulation; outer lip curved and crenulated. Siphonal canal recurved and long, with umbilicus long and inconspicuous. Fasciole created by growth lines imbricated one above the other. Last whorl with nine relatively strong axial lamellae forming a slightly elevated angulation at shoulder level, continuing up to the suture. Shoulder smooth, at an angle of 45 degrees. Spiral ornamentation consisting of 15 heavy cords with finer alternating ones; one heavy cord forming shoulder of whorl. All heavy intercostal cords prolonged over lamellae, their projection over the edges giving these a crenulated aspect. Axially, between lamellae and crossing cords, from nine to 15 very fine threads. In juvenile examples, axial cords more conspicuous, giving a cancellate appearance.

*Holotype:* MPEF-PI-116; height 30.6 mm (lacking approximately three whorls), width 20.7 mm. Body-whorl: length 26 mm. Aperture: length 11 mm, width 7.5 mm. Siphonal canal: length 7 mm, width 1 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Armando F. Leanza.

*Discussion: Trophon leanzai*, n. sp., differs from *T. retrorsum*, n. sp., which has a greater number of lamellae (13) on the body-whorl, lacks the fine spiral cords alternating with the primaries, and has the spire proportionally lower. The siphonal canal is strongly oblique toward the left and the umbilicus forms the parietal margin of the siphonal canal. *Trophon contortus*, n. sp., differs by having a strong constriction at the beginning of the siphonal canal, better development of the lamellae and the lamellar angulations, which turn at the shoulder abruptly in a horizontal direction. The shoulder ramp is wider and horizontal. *Trophon harringtoni*, n. sp., differs in having nine to 11 lamellae, a strong constriction at the beginning of the siphonal canal, faint spiral ornamentation, and lamellar angulations upon reaching the shoulder. The shoulder ramp is broader and horizontal, without lamellar projections, and there is a straight siphonal canal. *Trophon plicatus* var. *santacruzensis* Ihering, 1897, is more similar to *T. plicatus* (Lightfoot, 1786) and thus is not comparable. This species is based on 44 examples.

TROPHON HARRINGTONI, n. sp.
Plate 3, figure 2

*Description:* Shell small, muriciform, elongated; spire long, composed of six to eight whorls, flattened over suture and nearly vertical on lower part, forming an almost acute angle. Each whorl with nine to eleven projecting axial lamellae, thin at margins, almost straight and

pointed on the angle. Lamellae somewhat varicose and recurved inward, principally on last whorl. Lamellae crossed by fine, regularly marked spiral striae, and barely visible axials. Last whorl twice the height of spire. Peristome somewhat rounded, with margin smooth and folded; siphonal canal narrow and elongated, oblique toward the left, with a narrow and long umbilicus.

*Holotype:* MPEF-PI-124; height 23.9 mm (lacking approximately three whorls and the protoconch), width 19.7 mm. Aperture: length 11 mm, width 7 mm. Siphonal canal: length 7 mm, width 1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivato nominis:* Dedicated to the late geologist Dr. Horacio Harrington.

*Discussion: Trophon harringtoni*, n. sp., differs from *T. orbignyi* Carcelles, 1946, which has the spire more elevated and the whorls more narrow; the height/width index of the holotype and 10 paratypes of *T. orbignyi* varies between 1.53 and 2.47, while the indices of the seven examples of *T. harringtoni* vary between 1.21 and 1.32 and apparently the spire does not exceed four whorls. The latter has more developed lamellae, a narrower siphonal canal, oblique to the left. *Trophon plicatus* var. *santacruzensis* Ihering, 1897, from the Early and Middle Patagoniense of Santa Cruz, Argentina, is much smaller in size, with well developed lamellae. The shoulder ramp is flattened, the siphonal canal longer and the umbilicus indefinite. *Trophon retrorsum*, n. sp., has a much larger size, a greater number of varices, and strong spiral ornamentation that produces crenulations on the lamellar margins. The lip is strongly beveled, the siphonal canal very oblique and the umbilicus long and deep. *Trophon contortus*, n. sp., has strong axial lamellae, conspicuous spiral ornamentation that produces strong crenulations on the lamellar margins and a siphonal canal that is longer and curved dorsally. We consider *T. harringtoni* a valid and unique predecessor of *T. orbignyi*.

TROPHON PLICATUS var. SANTACRUZENSIS
Ihering, 1897

Plate 3, figure 3

*Description:* Shell fusiform, heavy, with relatively high spire. Aperture oval with reflected labrum; columella concave with marked callus; siphonal canal wide and oblique. Fasciole formed by imbricated and projecting growth lines; umbilicus poorly defined. Body-whorl with nine laminar varices, strongly angled and curved almost backward to shoulder level; shoulder not flattened. On early whorls marked spiral striae crossing over laminae, later whorls almost smooth.

*Hypotype:* MPEF-PI-128; height 38.8 mm (lacking protoconch), width 25 mm. Aperture: length 15 mm, width 8 mm. Siphonal canal: length 8.5 mm, width 2 mm.

*Locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Trophon plicatus* var. *santacruzensis* differs from *T. plicatus* (Lightfoot, 1786) by having a higher spire, the siphonal canal twisted, more oblique, and wider; with fine spiral striations, very visible on the early whorls and inconspicuous on the body-whorl. The holotype of Ihering's species has 12 varices on the body whorl in contrast to our specimen with only nine. The shoulder is flattened and the siphonal canal is wider. According to Ihering (1907), specimens from Paraná, as well as those from Punta Ninfas and from Golfo Nuevo (Chubut Province), are poorly preserved, making it difficult to assign them to the Entrerriense Formation. Therefore, because of this doubt, we assign this well-preserved specimen to this species.

TROPHON RETRORSUM, n. sp.
Plate 3, figure 5

*Description:* Shell subfusiform with a short spire, whorls angulose, last whorl triple the height of spire. Aperture oval, with strong postero-external angulation; lip heavy and beveled; strong columellar callus, columella concave posteriorly, ending in one final lamina; siphonal canal broad and short; umbilicus long and deep, turned toward siphonal canal. Ornamentation on last whorl of slightly projecting lamellae, folded over whorl, 13 in number, crossed by inconspicuous spiral cords, alternating heavy and fine, at times doubled, producing crenulations along lamellar margins; lamellae angulated at shoulder level, but elevated only slightly

above it. Subsutural ramp radially wrinkled by growth lines and weak lamellar projections. Penultimate whorl with only five lamellae, all situated on final third of whorl, the remainder with no lamellae, only inconspicuous cords; also on antepenultimate whorl, with latter two whorls having four simple spiral cords.

*Holotype:* MPEF-PI-180; height 58 mm (only three whorls), width 44.2 mm. Body-whorl: length 50 mm. Aperture: length 24 mm, width 17 mm. Siphonal canal: length 12 mm, width 5 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for the twisted shell.

*Discussion:* We have observed above the differences between *T. retrorsum*, n. sp., *T. leanzai*, n. sp., and *T. harringtoni*, n. sp. *Trophon retrorsum* differs from *T. contortus*, n. sp., by being of a larger size, with a greater number of lamellae (13) and inconspicuous spiral ornamentation, lacking crenulations on the lamellar margins. The aperture is oval, the siphonal canal very wide and very oblique toward the left, with a conspicuous umbilicus that forms the inner body-whorl wall of the siphonal canal. The differences presented between *Trophon patagonicus* (Sowerby, 1846), from the lower Patagoniense of Santa Cruz (Early Oligocene), *Trophon geversianus* (Pallas, 1774), living on the Patagonian coast, and *Trophon retrorsum*, n. sp., permits us to consider the new species as an intermediate stage between *Trophon patagonicus* and the Recent varieties of *Trophon geversianus*, which is characterized by the presence of more or less well developed lamellae and marked spiral ornamentation or by almost equal development of the lamellae and the spiral ornamentation, such as we observe in the Golfo San Jose, Chubut Province, Argentina (Vokes, 1991B).

TROPHON CONTORTUS, n. sp.
Plate 3, figure 4

*Description:* Shell small, muriciform; aperture subquadrate; labrum thin with marked crenulations corresponding to projection of spiral cords. Strong prolongation of postero-external labral angle. Siphonal canal long and curved; spire short. The holotype with only 2 1/2 whorls, these somewhat oblique, wider than high, increasing rapidly in diameter, separated by a shallow suture. Ornamentation of last whorl consisting of nine thin lamellae, curved toward peristome, at shoulder of whorl turning abruptly in a horizontal direction; lamellae festoned with five to eight spiral cords passing over them; minor cords intercalated at rate of one between two principal cords; from middle of body-whorl aperturally cords becoming finer, the principal cords disappearing. Shoulder ramp of last whorl practically flat, and extending over it lamellae merging with growth lines, up to level of suture. Besides lamellae, only marked growth lines constituting axial ornamentation. On penultimate whorl, same type of ornamentation, except on shoulder ramp, with three weak spiral cords crossing lamellar projections. Columella curved, with convexity at beginning of siphonal canal, ending in a lamina; fasciole long and narrow, with strong wrinkles.

*Holotype:* MPEF-PI-024; height 32.8 mm (incomplete), width 27.2 mm. Body-whorl: length 30 mm. Aperture: length 13 mm, width 8 mm. Siphonal canal: length 11 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for the twist of the shell.

*Discussion: Trophon contortus*, n. sp., differs from *Trophon pelseneri* (Smith, 1915) in having lamellae that do not cross over the shoulder ramp, a wider siphonal canal and less developed lamellae. It differs from *Pagodula vaginatus* (Cristofori and Jan, 1832), which lacks the spiral ornamentation, in being of a much smaller size, having fewer lamellae, axial ornamentation elevated above the shoulder ramp, and the siphonal canal longer and straighter. *Pagodula coulmanensis* (Smith, 1907) has a lesser number of ribs, these being elevated over the shoulder ramp, with less developed spiral ornamentation and a longer and straighter siphonal canal. We have already established the differences between this species and the other species of *Trophon* s.s. described herein.

Genus TROPHON sensu lato

The typical species of *Trophon* have a

medium to large, thin, globose shell, with prominent axial ornamentation. The genus *Xanthochorus* Fischer, 1884, is characterized by a generally low spire, with spiral ornamentation almost equal to or more developed than the axial, with conspicuous tubercules on the intersections. The examples, which are here described as "*Trophon* s.l.", have spiral ornamentation rather similar to *Xanthochorus*, but with strong varices in the manner of the genus *Trophon*.

"TROPHON" VOKESAE, n. sp.
Plate 3, figure 6

*Description:* Shell muriciform, higher than wide, aperture subtriangular, siphonostomate; lip thin with undulations that correspond to projections of spiral cords; siphonal canal not long and slightly curved toward right. Spire low (in holotype, which lacks two whorls plus protoconch), with whorls wider than high and slightly oblique, enlarging rapidly in diameter; suture somewhat deep and irregular. External ornamentation of strong undulating lamellar processes, ten in number on last whorl. Lamellae 4 to 5 mm in height; in middle of body-whorl forming an angular prolongation reaching to shoulder of whorl; these curving toward right and extending over subsutural ramp up to suture, at this level 2.5 to 4 mm in height. In interlamellar spaces six convex principal cords, the first forming shoulder of whorl; between these from one to three lower convex cords, running spirally. From last primary cord up to fasciole, 12 or 13 low convex cords. On subsutural ramp of body-whorl from three to five barely convex cords. Axial growth lines passing over spiral cords, giving them an undulating aspect. Subsutural ramp oblique downward owing to great development of primary cord delineating it. Penultimate whorl with ten axial laminar processes 2 mm in height, with less marked angulations and four spiral cords; subsutural ramp with growth lines only. Columella slightly curved, ending at level of umbilicus with a heavy laminar process, Umbilicus long but shallow, with a well developed fasciole.

*Holotype:* MPEF-PI-019; height 50 mm (incomplete), width 38.5 mm. Body-whorl: length 40 mm. Aperture: length 25 mm, width 15 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the paleontologist Dra. Emily H. Vokes of Tulane University, New Orleans, Louisiana (U.S.A.).

*Discussion: "Trophon" vokesae*, n. sp., differs from *Trophon patagonicus* (Sowerby, 1846) by the greater development of the lamellae, by the greater number of spiral cords, by the lamellar prolongations directed backward, and by the curved siphonal canal. *Trophon geversianus paranaensis* (Borchert, 1901) has less developed axial ornamentation, a smooth lip, and lacks the angular projections on the shoulder, a less developed fasciole and a straight siphonal canal. *Trophon broggii*, n. sp., differs in the weaker development of the lamellae, which are fewer in number (eight), weaker development of the primary spiral ornamentation and a greater number of secondary cords. *"Trophon" piramidensis,* n. sp., has a ficoid form, a low spire, axial ornamentation consisting of eight heavy cords, a homogeneous spiral ornamentation, lacking differentiation between primary and secondary cords. It lacks an umbilicus and has an almost straight siphonal canal. This species is based on 55 adult examples and 73 juveniles.

"TROPHON" BROGGII, n. sp.
Plate 4, figure 1

*Description:* Shell of medium size, four whorls (lacking the protoconch); aperture oval; labrum broadly projecting toward outer side, with marked undulations formed by projection of spiral cords; strong prolongation of posterio-external angle. Siphonal canal short, barely oblique, recurved upward; spire short, composed of oblique whorls, wider than high, increasing rapidly in diameter, separated by shallow suture. Body-whorl four to five times higher than spire. Ornamentation formed by fine, slightly elevated axial lamellae, eight in number, strongly crenulated, forming a marked angulation on shoulder of whorl; prolonged perpendicularly above subsutural ramp to suture. Subsutural ramp oblique and forming an angle of 110 degrees relative to anterior whorl, the latter ornamented by seven or eight low, flat cords and a heavy cord forming margin of subsutural ramp. Body-whorl with five primary spiral cords, between these from four to seven finer, flat cords, being more numerous (from 20

to 25) from last primary cord to umbilical chink. Lamellae disappearing on two first whorls, being replaced by small axial cords, crossed by from five to eight spiral cords. Columella almost straight, enlarged at beginning of siphonal canal and terminating sharply. Umbilicus long and shallow; strong fasciole with marked folds.

*Holotype:* MPEF-PI-022; height 66.1 mm (incomplete), width 48 mm; height of spire 12 mm. Body-whorl: length 55 mm. Aperture: length 46 mm, width 16 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to Sr. Jorge Broggi, Uruguayan malacologist and paleontologist.

*Discussion: "Trophon" broggii,* n. sp., differs from *Trophon geversianus paranaensis* (Borchert, 1901), which has a proportionally more developed spire, a smooth lip, no lamellar angulosity at the shoulder, fewer spiral cords (three), and a straight siphonal canal. *Trophon patagonicus* (Sowerby, 1846) has a great number of lamellae (12), with undifferentiated and fewer spiral cords (from three to seven). In the latter, the lamellar angulations are directed upward, but in *Trophon broggii*, n. sp., they are extended laterally. *"Trophon" piramidensis*, n. sp., has a ficoid form, a low spire, axial ornamentation consisting of eight heavy cords, homogeneous spiral ornamentation, lacking differentiation between primary and secondary cords; it lacks an umbilicus and has a straight siphonal canal. Some adults have low varices, others with the varices more or less well developed are similar in appearance to *"T." vokesae*, n. sp., but the juvenile forms of both are easily distinguishable by the greater development of the axial ornamentation in *"T." vokesae*. This species is based upon 39 adult examples and 40 juveniles.

(?)"TROPHON" PIRAMIDENSIS, n. sp.
Plate 4, figure 2

*Description:* Shell ficoid, broad at level of shoulder of body-whorl, reducing notably its width toward siphonal canal. Spire short, whorls low and globose. Body-whorl constituting approximately 81% of total height (lacking one whorl and the protoconch), globose in posterior part, with shoulder rounded. Aperture subtriangular; columella curved and long; posterior labium concave, at a 90 degree angle to body-whorl; strong posterior angulation; labrum beveled, thin and directed toward outside, with small crenulations corresponding to projection of spiral cords; siphonal canal long, narrow and straight. Fasciole formed by imbricated, barely projecting growth lines, lacking an umbilicus. External ornamentation consisting of eight heavy, projecting axial cords, forming a small, inconspicuous tubercule at shoulder level; these cords lost on anterior third of body-whorl; spirally seven or eight cords above shoulder, and laterally up to 32 flat cords, alternating heavy and weak.

*Holotype:* MPEF-PI-119; height 28.6 mm (lacking one whorl plus the protoconch), width 19 mm. Aperture: length 15 mm, width 9 mm.

## PLATE 4

Figures

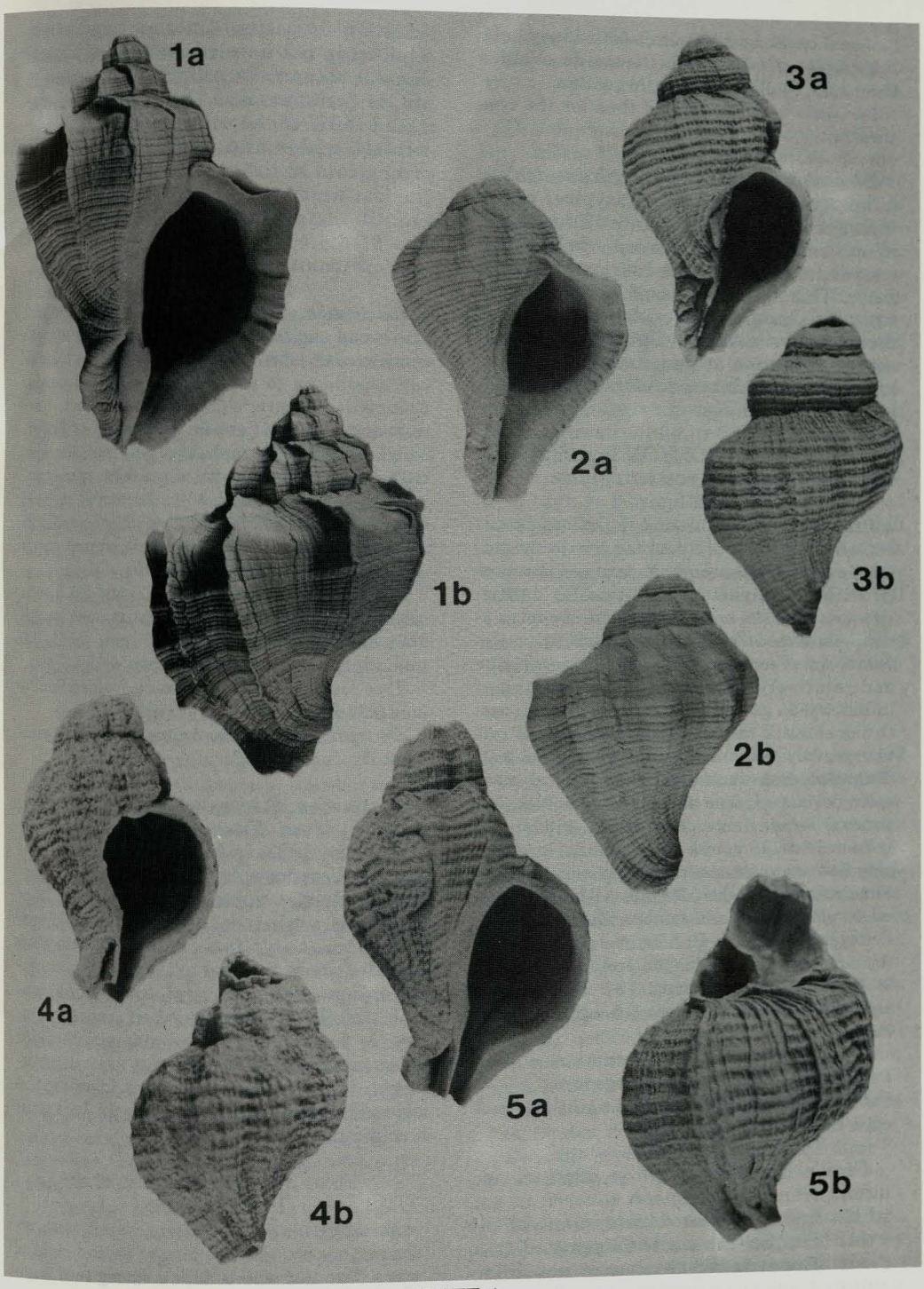


PLATE 4

TULANE STUDIES IN GEOLOGY AND PALEONTOLOGY

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# NEW SPECIES OF MOLLUSCA FROM THE ENTRERRIENSE FORMATION (UPPER MIOCENE) OF CHUBUT PROVINCE, ARGENTINA AND SPECIES NOT PREVIOUSLY REPORTED FROM THIS FORMATION PART II – GASTROPODA

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*PUERTO MADRYN, CHUBUT PROVINCE*
*ARGENTINA*

CONTENTS



## I. ABSTRACT

The second part of this work contains the descriptions and systematics of gastropods obtained from the upper levels of the Entrerriense Formation (Late Miocene), outcropping at various localities in the Valdes Peninsula, Chubut Province, Argentina. Herein are treated 62 species, of which 37 are new to science, the remainder are either previously described or closely related to described species. Forty-two species are new to the fauna, which consolidates the affinities with the Panamanian, Caribbean, and Neozelandic Bioprovinces.

## II. INTRODUCTION

This paper is a continuation of a previous study examining the molluscan fauna of the Entrerriense Formation (Late Miocene) of the Valdes Peninsula, Chubut Province, Argentina, and with the material contained herein we increase the number of species of Gastropoda recorded in the formation to a total of 128, of which 83 are newly described. With regard to the historical considerations and stratigraphy, the reader is kindly referred to Part I (Brunet, 1995). We continue supporting the relationship of these strata with the upper levels of Paraná, Entre Rios Province, Argentina, reported by Bravard (1858), and consider both synchronous and corresponding to a paleogeographic event not yet elucidated.

## III. ACKNOWLEDGMENTS

I wish to thank Tulane University for its help in the publication of this second part, and all the persons who contributed to its realization. I am particularly grateful to Dra. Emily H. Vokes, Tulane University, for her enormous help in preparation of the manuscript and the moral support that she offered to me. I also acknowledge the Centro Nacional Patagónico (CENPAT), which permitted the use of their Servicio Fotográfico, as well as the technical help of Sr. Franciso Pertini.

## IV. SYSTEMATIC PALEONTOLOGY

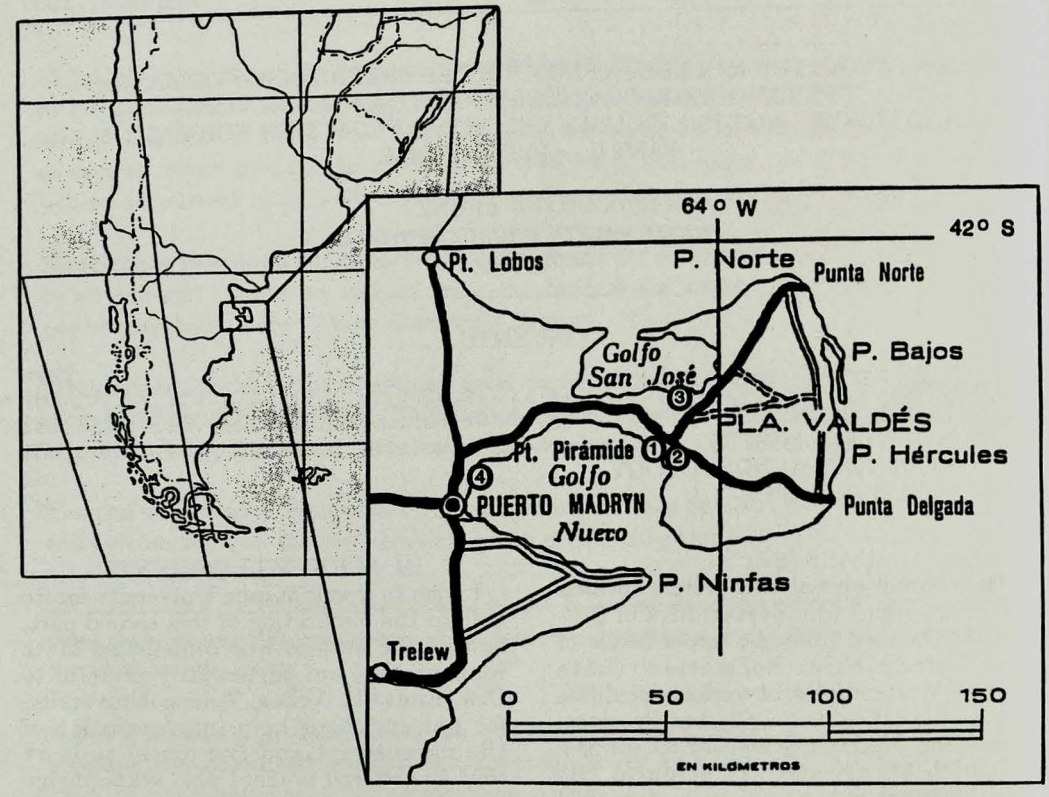
Class GASTROPODA
Order ARCHAEOGASTROPODA
Superfamily PATELLOIDA
Family ACMAEIDAE
Subfamily PECTINODONTINAE
Genus PECTINODONTA Dall, 1882

PECTINDONTA sp.
Plate 1, figure 1

*Description:* Shell coniform, small, curved, low and thin; apex blunt, subcentral, only a bit anterior. Muscle scar in form of a horseshoe with aperture anterior. Ornamented with fine concentric growth lines, in some examples dark concentric bands and fine radial striae, corresponding to original coloration of shell.

*Hypotype:* MPEF-PI-212; length 10 mm, height 4.1 mm, width 8.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.




Text-figure 1. Map of Argentina, showing location of Valdes Peninsula. Inset map with fossil localities: 1) Puerto Piramide; 2) Punta Pardela; 3) Playa Fracasso; 4) Baliza Punta Flecha.

*Discussion:* We assign this example to the genus *Pectinodonta*, because of the low, arcuate shell, with a large blunt apex. Dall (1882) reports *Pectinodonta arcuata* from the Recent of the West Indies. This is the first record of the genus from the Entrerriense Formation of South America.

Family PATELLIDAE
Subfamily NACELLINAE
Genus NACELLA Schumacher, 1817
Subgenus PATINIGERA Dall, 1905
NACELLA (PATINIGERA) aff.
N.(P.) DEAURATA (Gmelin, 1791)
Plate 1, figure 2

*Description:* Shell relatively thin, oval, slightly elevated. Apex situated on anterior third. Strong radial ribs initially thin at apical level, rapidly becoming wider near margin, other shorter ribs arising at middle of summit, extending to margin; strong concentric cords crossing over ribs, giving to them a tuberculate aspect. Projection of ribs (long and short) producing a scalloped lip. With transmitted light shell showing radiating striae chestnut-yellow in color, corresponding to original coloration of shell.

*Hypotype:* MPEF-PI-213; length 20.1 mm, height 9.5 mm, width 15.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* The example described presents conchological characters similar to the living species *N.(P.) deaurata*, the caracters differentiating them is the presence of short intercalated ribs between the longer ones and a strong concentric orna-

mentation. The Recent form lives from Latitude 38° South, to the Magellanic region and the Kerguelen Islands. We record this genus and subgenus for the first time from the Entrerriense Formation of South America.

Superfamily TROCHACEA
Family TROCHIDAE
Subfamily MONODONTINAE
Genus TEGULA Lesson, 1835
TEGULA ORBIGNYANA (Pilsbry, 1900)
Plate 1, figure 3

*Description:* Shell trocoid, with a high spire; five very convex, rounded whorls. Protoconch smooth; sutures very marked; with deep umbilicus. Peristome rounded, thin; columella with three teeth, in some examples only two, the third disappearing. Aperture lacking internal denticles. Ornamented with tuberculated spiral striae, 12 to 13 in number; base with ten to 11 smooth striae, in some examples tuberculated.

*Hypotype:* MPEF-PI-214; height 7.1 mm, width 10 mm.

*Locality:* Punta Norte, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* Our examples show no differences from specimens living from Mar del Plata to Santa Cruz (Argentina). They probably should be placed in the subgenus *Agathistoma* Olsson and Harbison, 1953. *Tegula patagonica* (d'Orbigny, 1840), which has been cited from the Entrerriense Formation, differs by having denticles on the inner margin of the lip.

Superfamily LITTORINOIDEA
Family LITTORINIDAE
Subfamily LITTORININAE
Genus LITTORINA Ferussac, 1822
LITTORINA aff. L. ZICZAC (Gmelin, 1791)
Plate 1, figures 4-6

*Description:* Shell small, conical, almost as high as wide, moderately heavy; five or six rather flat whorls (specimens very corroded); suture well marked and smooth. Body-whorl half of total height, very convex, with an obtuse peripheral carina. In some apparently gerontic examples a discontinuous subsutural carina (Bequaert, 1943). First two whorls smooth, sculpture only visible on base, consisting of fine spiral cords. Aperture pyriform; outer lip thin, united directly to body-whorl. Columellar area moderately long and wide, oblique within, smooth, at times rather concave; inner lip rounded, curving gradually toward base; lacking umbilicus.

*Hypotypes:* MPEF-PI-215; height 11.5 mm, width 11.5 mm (female example). MPEF-PI-216; height 7 mm, width 4 mm (male example). MPEF-PI-217; height 3.8 mm, width 2.2 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* From the Entrerriense Formation two species have been described as *Littorina unicostalis* Borchert, 1901, and *Littorina paranensis* Borchert, 1901, both from Paraná (Argentina); the first also has been reported from the Camacho Formation of Uruguay (Figueiras and Broggi, 1971-73). The specimen figured here (pl. 1, fig. 4; MPEF-PI-215) possibly represents a female example, in which case the other example (pl. 1, fig. 5; MPEF-PI-216) should be a male, ornamented with fine and coarse spiral cords. We have also observed other examples (pl. 1, fig. 6; MPEF-PI-217) with a very conical form and conspicuous peripheral carina, which resemble those from the area of Governor's Harbour, Eleuthra, Bahama Islands, figured by Bequaert (1943, pl. 5, fig. 5).

LITTORINA SAXATILIS (Olivi, 1792)
Plate 1, figure 7

*Description:* Shell turbinate, variable in shape, but higher than wide, heavy; three or four whorls increasing rapidly, the last two-thirds of total height, whorls convex; suture deep; without visible ornamentation. Aperture semicircular, outer lip thin, smooth. Columellar area wide, heavy, smooth, expanding toward basal margin and toward body-whorl. A small umbilicus beside columellar margin (juvenile example). Apparently color in this species variable, with yellow, orange, grayish-orange, or grayish-maroon in adults, with one or more spiral bands, white, gray-black, gray, or dark purple. Our specimen with uniform yellowish coloration, with dark purple band in middle of penultimate whorl and another subsutural band on body-whorl, coloration considered to be original color.

*Hypotype:* MPEF-PI-218; height 5 mm, width 3 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Littorina saxatilis* occurs in the boreal and arctic areas. In North America it extends from Cape Barrow, Southampton Id., and Hudson's Bay, to southern New Jersey. It also is found in Post-Pliocene deposits that represent brackish lagoons near Branford, Connecticut (Knight, 1934, *in* Bequaert, 1943, p. 10). This is the first record for this species from the Entrerriense Formation of South America, as well as the southernmost record of the species presently known.

LITTORINA PIRAMIDESIA, n. sp.
Plate 1, figure 8

*Description:* Shell of small size, turriform, heavy, high-spired, whorls convex; body-whorl almost twice height of spire, very globose with

PLATE 1

Figures Page

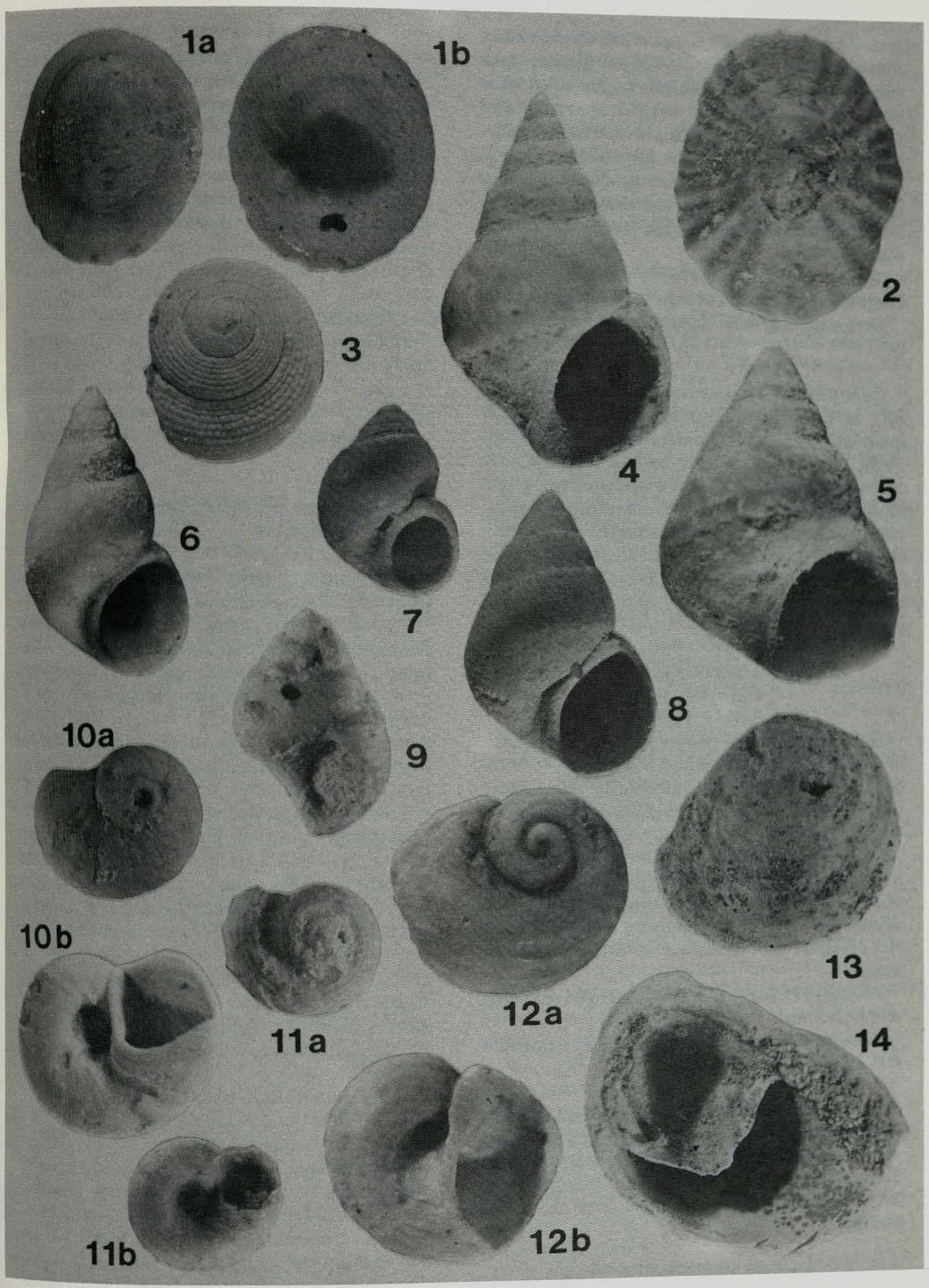



PLATE 1

heavy peripheral carina. Aperture semicircular; outer lip heavy, very curved; columellar area consisting of a heavy callus folded back over body-whorl, beginning within aperture and forming angle with basal lip, which also is wide. Base convex; umbilicus not covered by columellar callus. Although appearing smooth, under microscope (X 40) fine spiral striae present.

*Holotype:* MPEF-PI-219; height 7.2 mm, width 4.8 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Littorina piramidesia,* n. sp., is characterized and differentiated from other related species by the development of the columellar callus, by the very convex whorls, and the constant presence of an umbilicus in juvenile and adult specimens. In apparently female examples, there are microscopic spiral striae, while in male examples the spire is shorter and the ornamentation consists of fine spiral cords.

LITTORINA NEBULOSA TESSELLATA
Philippi, 1847
Plate 1, figure 9

*Description:* Shell very small; spire conical, low, but pointed; last whorl very globose, without peripheral carina, double or more than height of spire. Suture very marked, shoulder of whorls obtusely anguled by depth of suture. Aperture subcircular, outer lip thin. Columellar area long, wide and smooth, inner lip thickened, almost straight; ending abruptly below, separated by a slight depression in the outer lip. Neither umbilicus nor columellar depression.

*Hypotype:* MPEF-PI-220; height 3.9 mm, width 2.6 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We assign this example to the variety *tessellata* because of the angulation of the shoulder and the very globose body-whorl. This is the first record from the Entrerriense Formation of South America.

Family VITRINELLIDAE
Genus VITRINELLA C.B. Adams, 1850

VITRINELLA PARDELENSIS, n. sp.
Plate 1, figure 10

*Description:* Shell of small size, porcelaneous, compressed, smooth, widely umbilicate, diameter of shell 5.1 times diameter of umbilicus. Three and one-half convex whorls, the last inferiorly flat. Aperture strongly oblique, basal outline subrectangular due to superior extension of peristome, inferior retraction and parallel nature of the columellar and outer margins. Columellar margin folded back over whorl, extending to umbilicus, but not obscuring it. Ornamented with heavy growth lines.

*Holotype:* MPEF-PI-222; height 2 mm, diameter 5.1 mm, diameter of umbilicus 1 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Vitrinella pardelensis,* n. sp., is rather similar to *V. floridiana* Pilsbry and McGinty, 1946, which differs in having a proportionally larger umbilicus, an aperture that is oblique but not typically "teinostomiform" as in *V. pardelensis.* The columellar margin does not cover the basal whorl and the the aspect of the aperture laterally is rounded and basally subtriangular. *Vitrinella helicoidea* C.B. Adams, 1850, differs in having a parietal division of the lip into which penetrates the penultimate whorl, heavy periumbilical carina and the upper margin of the peristome is curved forward; the diameter of the shell is 3.3 times the diameter of the umbilicus. *Vitrinella praecox* Pilsbry and McGinty, 1946, differs by having a periumbilical carina, a peristome oblique but not "teinostomiform" and the diameter of the shell is 3.75 times the diameter of the umbilicus. We note for the first time this genus from the Entrerriense Formation of South America.

Genus CIRCULUS Jeffreys, 1865
CIRCULUS PARDELENSIS, n. sp.
Plate 1, figure 11

*Description:* Shell very small, heavy, spire moderately low, exposed, peripherially rounded. Suture weakly marked, with a wide parasutural groove beginning at protoconch and having six to eight poorly developed fine spiral striae. Protoconch smooth; penultimate whorl ornamented with five heavy spiral cords and ulti-

mate with 12 heavy cords. Aperture oblique, subquadrate, with extended upper lip, the lower and upper almost straight, the outer barely convex. Umbilicus very deep, with strong periumbilical growth lines only.

*Holotype:* MPEF-PI-223; height 1.3 mm, width 3.1 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion:* Relatively near living forms are known from the Atlantic and the Pacific. *Circulus trilix* (Bush, 1897) ranges from Cape Hatteras to Cuba, and is distinguished by being tricarinate and lacking the parasutural groove. Woodring (1957) cites this species from the Chipola (Early Miocene), Shoal River (Middle Miocene), and Gatun (Late Miocene) formations; also with tricarinate forms. *Circulus cerrosensis* Bartsch, 1907, from Santa Catalina Island, California, Baja California, and the Gulf of California, may be considered the Pacific homologue of *C. trilix*. *Cyclostremiscus glyptomphalus* Pilsbry and Olsson, 1952, from the Pleistocene of Panama, may be distinguished with difficulty from *C. trilix*; therefore, those authors suggested the existence of a "race" or a subspecies. *Circulus cosmius* Bartsch, 1907, from Ecuador is rather near *C. cerroensis*, but is characterized by a narrow curvature of the upper margin of the peristome, directed downward, extending forward, lacking the parasutural groove. *Circulus occidentalis* Pilsbry and Olsson, 1941, from the Pliocene of Ecuador, has the margin of the peristome directed below, lacks the parasutural groove and resembles *C. cosmius*. *Circulus philippii* (Cantraine, 1842) also has a deep umbilicus, is ornamented with a much greater number of spiral cords and lacks the parasutural groove.

Genus TEINOSTOMA H. Adams and A. Adams, 1854
Subgenus AEPYSTOMA Woodring, 1957
TEINOSTOMA (AEPYSTOMA) aff. T.(A.) ANDRIUM Woodring, 1957
Plate 1, figure 12

*Description:* Shell of small size, heavy, convex, with three and one-half whorls, spire somewhat elevated, last whorl very large. Protoconch smooth. Peristome typical, with upper margin projecting forward and lower withdrawn. Umbilicus open, on the basis of an immature example, with slight development of a callus. Sculture of spiral cords crossed by radiating cords, creating a cancellate ornamentation over entire surface.

*Hypotype:* MPEF-PI-224; height 2.4 mm, diameter 4 mm.

*Locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Discussion:* This form presents characters very similar to the holotype of Woodring (1957, p. 70, pl. 18, figs. 9-11), which also is an immature example. The dimensions of the holotype are: height 2 mm, diameter 4.7 mm. This is the first record for the genus *Teinostoma* and the subgenus *Aepystoma* from the Entrerriense Formation of South America.

Superfamily CERITHIOIDEA
Family TURRITELLIDAE
Genus TURRITELLA Lamarck, 1799
TURRITELLA HEIMI, n. sp.
Plate 2, figure 1

*Description:* Shell turriculate, of medium size. Six and one-half teleoconch whorls, with two smooth nepionic whorls. Suture deep and shoulder very marked. Whorls flat. First teleoconch whorl with four cords, the remaining with five, consisting of one strong anterior and one strong posterior, with three weaker intermediate cords, between each of these a very fine secondary cord; behind the posterior and bordering the shoulder one fine cord and, in advance of the anterior, another fine cord. Suture with a secondary cord above and another below. In adult examples, upper and infrasutural cords disappearing and on last whorls two or three very fine cords between primaries. Heavy growth lines causing some cords to appear tuberculate, especially the primaries. Base with a heavy peripheral cord and four low flat cords, between these one or two fine secondary cords. Aperture apparently oval, with a thin columellar border, columella convex. Growth lines typical of *T. conspicabilis* (Miocene of Australia) and of the *T. hybrida* group (Cretaceous-Eocene of Europe), according to Guillaume (1924).

*Holotype:* MPEF-PI-225; height 18.1 mm, width 5.8 mm, apical angle 16°.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Arnoldo Heim.

*Discussion: Turritella heimi*, n. sp., differs from *T. americana* (Bravard, 1858), which has only four primary cords per whorl and one irregular fine cord on the early whorls, while on the last whorl there may be intercalated up to two intermediate cords, all cords with granulations, over the early teleoconch whorls. *Turritella iheringiana* Figueiras and Broggi, 1976, differs in having each whorl with seven subequal cords, except the upper, which is stronger and peripheral to the shoulder. The sutural area lacks cords and the base has five flat cords. *Turritella indeterminata* Borchert, 1901, differs in having convex whorls, with nine cords, and with finer secondary cords.

TURRITELLA BROGGII, n. sp.
Plate 2, figure 2

*Description:* Shell turriform, of medium size, whorls flat, suture inconspicuous, without either sutural depression or shoulder. Twelve and one-half whorls, two smooth nepionic whorls; first teleoconch whorls with three smooth, irregular cords, the remaining with three primary cords, somewhat heavy, equal and granulose; on last whorl one anterior cord added, also granulose and corresponding to periphero-basal cord; between each pair of principal cords one fine, low secondary cord with small granules. Base with a heavy peripheral cord and five flatter cords, with one secondary cord between each of them. Columella straight and aperture subquadrate; no growth lines seen on any specimens.

*Holotype:* MPEF-PI-226; height 20 mm, width 6 mm, apical angle 19°.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the malacologist Sr. Jorge Broggi.

*Discussion: Turritella broggii*, n. sp., differs from *T. americana* (Bravard, 1858), which has four granulose primary cords per whorl and an inconsistant fine cord on the first whorls, while on the last whorl there may be intercalated up to two intermediate cords, also with granulations. *Turritella iheringia* Figueiras and Broggi, 1976, has seven cords per whorl, with the upper strongest and forming the shoulder; the base has five flat cords and the suture is within a deep groove. *Turritella indeterminata* Borchet, 1901, has convex whorls, the suture within a deep groove, with nine cords and finer secondaries. *Turritella heimi*, n. sp., has five principal cords, the anterior and the posterior stronger, and an intermediary secondary cord; the suture is within a deep groove, with one suprasutural cord and one infrasutural cord.

TURRITELLA FIGUEIRASI, n. sp.
Plate 2, figure 3

*Description:* Shell of medium size, whorls flat, suture within a deep groove, shoulder conspicuous. Ornamented with three very heavy cords, barely granulose, and one cord of equal strength in front of anterior suture; in front of this, three fine secondary cords, situated within suture; between anterior suture and cord situated in advance of it, two fine secondary cords; between anterior suture and the middle, one fine low central cord and four very fine cords on each side; between the middle and posterior suture, one fine central cord and three very fine cords on either side; above posterior suture, on shoulder, three or four fine cords, with some of these heavier than others. Base with one heavy peripheral cord and four flat cords, with three to six extremely fine secondary cords between these. Columella straight and aperture subquadrate. No growth lines seen on any specimens.

*Holotype:* MPEF-PI-227; height 24 mm; width 7.9 mm, apical angle 15°.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late paleontologist Dr. Alfredo Figueiras.

*Discussion: Turritella figueirasi*, n. sp., differs from *T. americana* (Bravard, 1858), which has four granulose cords with two intermediary cords intercalated. *Turritella indeterminata* Borchert, 1901, has strongly convex whorls, nine cords on each whorl, which increase in number on the body-whorl, with one secondary cord intercalated between the primaries. We have no information on the aperture of this species. *Turritella iheringiana* Figueiras

and Broggi, 1976, has seven subequal spiral cords, with the uppermost strongest; the base with five cords, and an apical angle of 20°. *Turritella broggii*, n. sp., has three primary cords, without a suprasutural cord, a distinct number of secondary cords, the base with five primary cords, a single secondary cord between these; lacking a sutural groove. *Turritella heimi*, n. sp., has five primary cords, with one finer secondary cord between them, one suprasutural cord and another subsutural cord; the base with five primary cords and one or two fine intermediary cords; the aperture is oval with a convex columella.

TURRITELLA FLECHENSIS, n. sp.
Plate 2, figure 4

*Description:* Shell slender, rather thin, whorls convex, suture shallow, shoulder wide, very oblique and barely concave or straight. Whorls with one heavy anterior cord and one posterior on margin of shoulder, somewhat finer; between these four or five finer cords and between the middle of all cords, three or four much finer tertiary threads; in front of primary anterior cord, one fine cord situated within suture. Shoulder with three or four fine cords. Base with one heavy peripheral cord and six flatter cords; between each of these one finer secondary cord. Growth lines as in *T. conspicabilis* (Miocene of Australia) and the *T. hybrida* group (Cretaceous-Eocene of Europe), following Guillaume (1924).

*Holotype:* MPEF-PI-228; height 19 mm, width 6 mm, apical angle 16°.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Turritella flechensis*, n. sp., differs from *T. indeterminata* Borchert, 1901, which has three spiral cords on the upper part of the whorl, these followed by six even stronger, on the last whorl even more numerous; aperture not seen in the holotype. *Turritella gatunensis gatunensis* Conrad, 1857, has two primary cords, one in the middle of the whorl and another on the anterior third or quarter, with numerous secondary cords, and with other extremely fine threads, observable under a microscope on the last whorl; the base with numerous fine spiral cords. In the figures of Woodring (1957, pl. 83, figs. 4, 5, 9, 14) there are two or three heavy cords located on the anterior half of the whorls. *Turritella gatunesis rhytodes* Woodring, 1957, has the last whorls very compressed posteriorly, without a well-defined shoulder, approximately 16 to 18 cords covering the entire whorl, from suture to suture, of these three or four most pronounced. *Turritella adela* Woodring, 1957, has approximately nine primary cords of various strength and very fine secondary intermediate cords. *Turritella matarucana* Hodson, 1926, has numerous cords that run from suture to suture, without a well-defined shoulder and with very deep sutures.

TURRITELLA HODSONI, n. sp.
Plate 2, figure 5

*Description:* Shell slender, with sutures barely visible; protoconch broken; first preserved whorls with three cords, the posterior very heavy, the medial of the strength of the posterior and the anterior somewhat more salient and appressed to suture, at times almost covering it. On last whorls posterior cord becoming flattened, the surface becoming concave, carrying in this concavity one fine cord; anteriorly continuing with median cord, followed by another concavity and finally the conspicuous anterior cord, projecting as a ledge over shallow suture. Aperture presumably suboval, with columella very concave and outer lip with a depression caused by projection of external groove. Apparently base with one heavy, almost flat, peripheral cord.

*Holotype:* MPEF-PI-229; height 29 mm, width 9.8 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late paleontologist Dr. Floyd Hodson.

*Discussion: Turritella hodsoni*, n. sp., is rather similar to *T. montanitensis* Hodson, 1926, from the Oligo-Miocene of Venezuela, especially the paratype illustrated by Hodson (1926, pl. 16, fig. 6), which differs from our holotype by having a submedial cord on the early teleoconch whorls, in the form of a smooth "V", with one anterior cord and another posterior one, markedly granulose, due to the growth lines and fine intermediate cords,

the secondaries also granulose. *Turritella montanitensis olcotti* Hodson, 1926, has cords with a lesser number of granules, but more conspicuous, especially on supra-sutural cord. *Turritella montanitenesis saladilloensis* Hodson, 1926, has the space between the primary anterior cord and the primary posterior cord more concave, the

PLATE 2

Figures Page

1. TURRITELLA HEIMI, n. sp. ..... 67
MPEF-PI-225 (holotype); height 18.1 mm, width 5.8 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
2. TURRITELLA BROGGII, n. sp. ..... 68
MPEF-PI-226 (holotype); height 20 mm, width 6 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
3. TURRITELLA FIGUEIRASI, n. sp. ..... 68
MPEF-PI-227 (holotype); height 24 mm, width 7.9 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
4. TURRITELLA FLECHENSIS, n. sp. ..... 69
MPEF-PI-228 (holotype); height 19 mm, width 6 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.
5. TURRITELLA HODSONI, n. sp. ..... 69
MPEF-PI-229 (holotype); height 29 mm, width 9.8 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
6. TURRITELLA PIRAMIDESIA, n. sp. ..... 72
MPEF-PI-230 (holotype); height 16 mm, width 6.1 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
7. TURRITELLA ALZOLAI, n. sp. ..... 72
MPEF-PI-231 (holotype); height 20.1 mm, width 7 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
8. SPIROCOLPUS FERUGLIOI, n. sp. ..... 73
MPEF-PI-232 (holotype); height 18.6 mm, width 12 mm.
Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
9. PETALOCONCHUS sp. ..... 73
MPEF-PI-233 (hypotype); height 6 mm, width 3.8 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.
10. HIPPONIX FLECHENSIS, n. sp. ..... 73
MPEF-PI-236 (holotype); height 1.8 mm, length 4 mm, width 3.9 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.
11. CAPULUS PIRAMIDENSIS, n. sp. ..... 74
MPEF-PI-235 (holotype); height 3 mm, length 6 mm, width 6 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
12. POLINICES (EUSPIRA) CONSIMILIS (Ihering, 1897) ..... 75
MPEF-PI-237 (hypotype); height 7 mm, width 8.5 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
13. POLINICES (EUSPIRA) ORTMANNI (Ihering, 1907) ..... 75
MPEF-PI-238 (hypotype); height 9 mm, width 7.2 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
14. ATAXOCERITHIUM PARDELENSIS, n. sp. ..... 75
MPEF-PI-239 (holotype); height 9.1 mm, width 4 mm.
Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
15. ATAXOCERITHIUM PIRAMIDENSIS, n. sp. ..... 76
MPEF-PI-240 (holotype); height 18.6 mm, width 7 mm.
Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
16. BALCIS FLECHENSIS, n. sp. ..... 76
MPEF-PI-241 (holotype); height 6 mm, width 2 mm.
Locality: Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

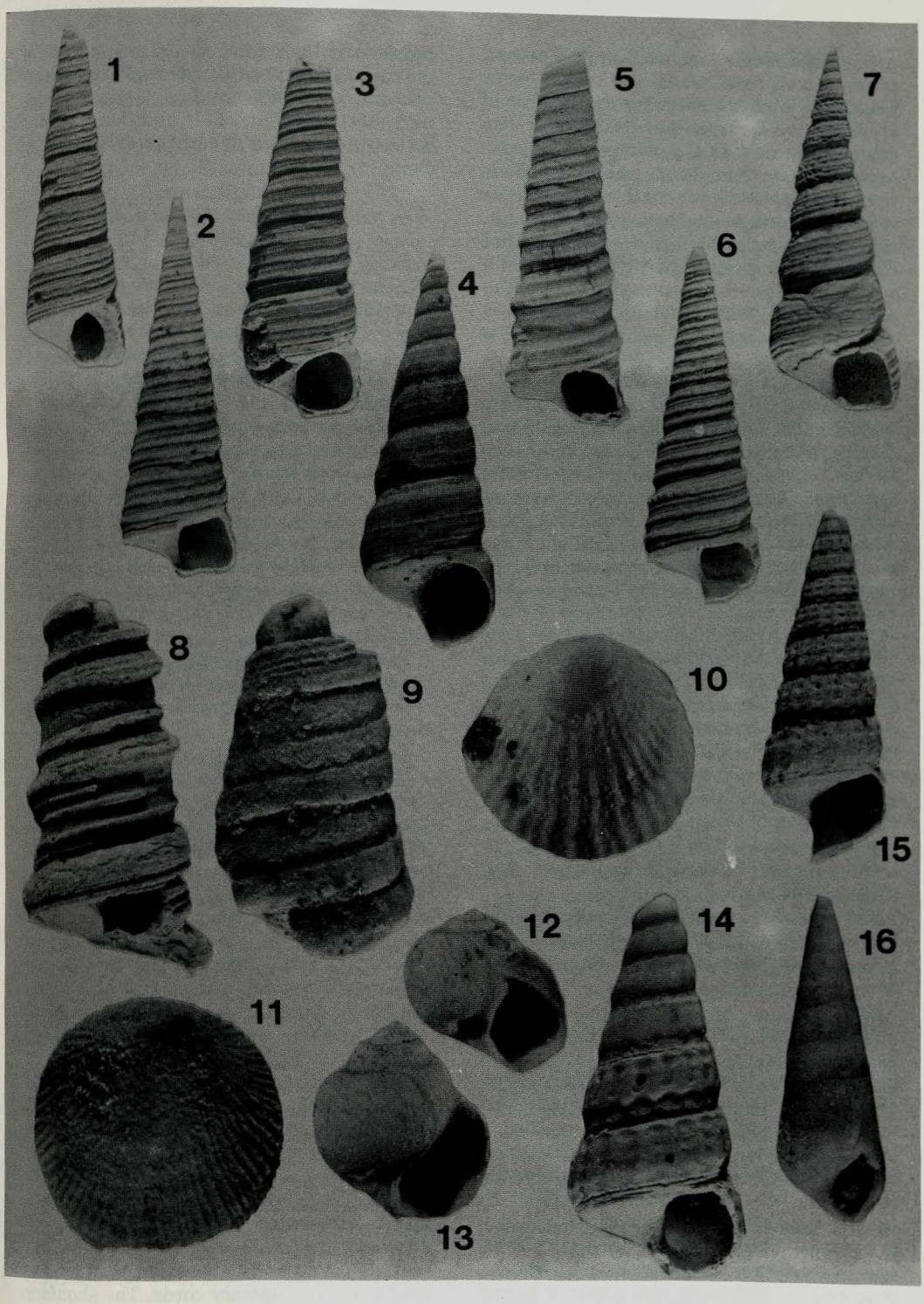



PLATE 2

primary posterior cord weaker, the second primary cord heavier and the two anterior primaries joined. Observing the figures of Hodson, we have some doubt that the example figured as a paratype of *T. montanitensis* (Hodson, 1926, pl. 16, fig. 6) is the same species, we believe that it is referable to another species of *Turritella*, somewhat similar to *T. hodsoni* n. sp., but distinguished from it by the presence of a surface oblique and straight above the anterior cord, while that of *T. hodsoni* is completely concave.

TURRITELLA PIRAMIDESIA, n. sp.
Plate 2, figure 6

*Description:* Shell of medium size, heavy and slender; eight and one-half flat whorls, two smooth nepionic whorls, suture not visible; shoulder well marked by a granulose posterior cord. Early teleoconch whorls with three spiral cords, the central twice the width of other two and the posterior granulose, with one fine cord occupying the space of the suture; cords increasing in number up to five, one of these becoming heaviest. In more adult whorls, between principal cords finer smooth secondary cords intercalated, up to five in number, one of these always becoming heavier. Principal cords following, the posterior and the median, becoming granulose, but anterior one smooth. Base with one peripheral cord and seven low, convex cords with one fine secondary cord between each of these. Columella curved and aperture oval. No growth lines visible.

*Holotype:* MPEF-PI-230; height 16 mm, width 6.1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Turritella piramidesia*, n. sp., differs from *T. broggii*, n. sp., which has a less well-marked shoulder, three equal granulose cords, with a fourth cord intercalated on the last whorl, and only one fine granulose secondary cord, which is intercalated between the primaries; the columella is straight and the aperture subquadrate. *Turritella heimi*, n. sp., has four cords on the early teleoconch whorls and five primary cords on the last whorls, with one anterior cord and another heavy posterior one and three finer intermediate cords; in the suture there are only two cords, one suprasutural and the other infrasutural. On the base there is one peripheral cord and four additional cords, with one or two secondaries between them.

TURRITELLA ALZOLAI, n. sp.
Plate 2, figure 7

*Description:* Shell turriform, of medium size. Ten and one-half whorls, with two smooth nepionic whorls. Suture deep, shoulder well-marked and oblique, with whorls very convex. First teleoconch whorls with three primary cords and one secondary cord between them, the middle primary heavier and projecting; later whorls with five primary cords, intercalated between these one to three secondary cords. At level of sutural groove three or four suprasutural cords, the second of these heavier, and one fine cord situated at crest of shoulder of whorl. Base with six doubled, flat cords. Columella convex, with heavy columellar callus covering one-third of base. Aperture subquadrate.

*Holotype:* MPEF-PI-231; height 20.1 mm, width 7 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to Dr. Rodolfo Mendez Alzola.

*Discussion: Turritella alzolai*, n. sp., differs from *T. gatunensis gatunesis* Conrad, 1857 (in Woodring, 1957, pl. 23, figs. 4, 5, 9, 14), which has the whorls more compressed posteriorly, causing the shoulder to be less well defined, with only two primary cords and numerous secondary cords, the primaries diminishing in strength on the last whorls; the base is sculptured with fine spiral cords. *Turritella gatunensis rhytodes* Woodring, 1957, has the whorls more compressed posteriorly, with deeper sutures; in this subspecies one or two of the primary cords tend to increase in size, thus the last whorl has five primary cords and numerous secondary cords on the shoulder of all of the whorls, which always reach the suture. *Turritella flechensis*, n. sp., has one heavy anterior cord and one heavy posterior one, with three or four fine secondary cords and between these three or four very fine tertiary cords. The shoulder has three or four fine cords and the base

has six flat cords and one fine intermediate cord. The columella is more convex and lacks a columellar callus.

### Genus SPIROCOLPUS Finlay, 1927

SPIROCOLPUS FERUGLIOI, n. sp.
Plate 2, figure 8

*Description:* Shell turriform, very heavy, with sutures poorly marked; shoulder conspicuous, straight and rather convex owing to great development of posterior cord. Ornamented with one heavy posterior cord at periphery of shoulder, with conspicuous granulations, this followed by two very fine cords and three cords even finer than posterior one, also granulose, with smooth interspaces, equal in width to cords, except interspace between middle and anterior cords, which is twice width of cords; one fine and apparently smooth suprasutural cord below and poorly defined fine cords at level of surface of shoulder completing ornamentation. Base and columella lacking, as well as early whorls. No growth lines visible.

*Holotype:* MPEF-PI-232; height 18.6 mm; width 12 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to Dr. Egidio Feruglio.

*Discussion: Spirocolpus feruglioi*, n. sp., differs from *S. ambulacrum* (Sowerby, 1846) and from *S. ambulacrum pyramidesia* (Ihering, 1907), by having one heavy crenulated peripheral cord at the shoulder and only three principal cords, with one fine suprasutural cord and, at the level of the surface of the shoulder, fine spiral cords. *Spirocolpus breantiana* (d'Orbigny, 1847) is more slender, with only three heavy cords, of which only the posterior is generally crenulated. These increase on the last whorls up to six in number; the shoulder is much less conspicuous and the suture deeper. *Spirocolpus iheringi* (Cossmann, 1898) has only three cords, with the posterior stronger, but less conspicuous than in *S. feruglioi*. Evidently this species is closely related to the species of *Spirocolpus* from Patagonia and to the species from the time period of Eocene-Middle Oligocene in New Zealand (Marwick, 1957).

### Family VERMETIDAE

### Genus PETALOCONCHUS Lamarck, 1799

PETALOCONCHUS sp.
Plate 2, figure 9

*Description:* Shell with only nepionic whorls and a few teleoconch whorls preserved. Protoconch with two or three smooth whorls, continuing with flat, smooth spiral bands, seven in number. Interior totally concealed by lime.

*Hypotype:* MPEF-PI-233; height 6 mm, width 3.8 mm.

*Locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Discussion:* Up to this time, we have obtained only two examples of this form. Because of the conchological characters, including the protoconch and part of the teleconch consisting of almost flat bands, apparently without ornamentation, we assign these tentatively to the genus *Petaloconchus*. In this case, this would be the first record of this genus from the Entrerriense Formation of South America.

### Superfamily HIPPONICOIDEA
### Family HIPPONICIDAE
### Genus HIPPONIX Defrance, 1819

HIPPONIX FLECHENSIS, n. sp.
Plate 2, figure 10

*Description:* Shell in form of a cap, small, thin; apex opistogyre, small, pointed, turned to the left, not extending beyond shell margin. Aperture suborbicular; lip crenulated by projection of ribs. Muscle scar in form of a horseshoe, open anteriorly; with an internal perilabral groove, corresponding to position of fixed disk. Ornamented with 42 heavy radial ribs (2 per mm), with interspaces equal in width to ribs; other shorter ribs intercalated, beginning at middle of height of shell, extending to peristome; heavy growth lines giving an almost cancellate aspect.

*Holotype:* MPEF-PI-236; height 1.8 mm, length 4 mm, width 3.9 mm.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Hipponix flechensis,* n. sp., differs from *H. oligocostata* Brunet, 1995, which has 37 radial ribs, without intermediate ribs. The height/width index is 0.54 and the width/length index is 0.85, where-

as in *H. flechensis* these indices are: height/width 0.46 and width/length 0.97. *Hipponix costata* Erdemann and Morra, 1985, from the Patagonian of Santa Cruz (Argentina) has more numerous ribs (approximately 50), without intermediate ribs, and its indices are: height/width 0.23 and width/length 0.89. *Hipponix conicus* (Shumacher, 1817), living in the western Pacific (Fremantle, Australia), has heavier ribs (1 per mm) with very fine interspaces, without intermediate ribs and the length of the shell is 2 cm.

Superfamily CREPIDULOIDEA
Family CREPIDULIDAE
Genus CREPIDULA Lamarck, 1799

CREPIDULA ANCESTRA, n. sp.
Plate 1, figures 13, 14

*Description:* Shell of medium size, subcircular to oval, low to high. Protoconch curved at an angle of 90°. Apex small, pointed or very strong and blunt, projecting beyond posterior margin. Septum small or very deep, depending on thickness of shell, with a medial longitudinal carina divided into two zones; edge of septum convex, in form of an "S," with a deep notch to the left. Pedal muscle scar semicircular, appressed to right insertion of septum. Ornamented with low, radial ribs, apparently without spines, with interspaces equal in width to ribs and with marked growth lines.

*Holotype:* MPEF-PI-234; height 21 mm, width 20.3 mm, diameter 6 mm (low form).

*Paratype:* MPEF-PI-235; height 26 mm, width 19.5 mm, diameter 12 mm (high form).

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for having characters of various species of *Crepidula*.

*Discussion: Crepidula ancestra*, n. sp., presents characters common to various living species. We consider both forms the same, due to the characteristics of the septum and the presence of the radial ribs. The low form is rather close to *C. dilatata* Lamarck, 1822, with its convex septum, but that has a smooth surface. It resembles *C. aculeata* (Gmelin, 1791), by the surface covered with ribs and the longitudinal carina of the septum, but that has the margin of the septum concave. *Crepidula dilatata* var. *patagonica* d'Orbigny, 1847, has the shell very rounded and the external surface weakly rugose, without conspicuous radial ribs. It differs from *Crepidula unguiformis* Lamarck, 1822, because in spite of its depressed form and its concave septum, it does not have conspicuous ribs nor a longitudinal carina on the septum. We believe that we may consider it a valid ancestor to *C. dilatata* var. *patagonica*. The high form resembles *C. protea* d'Orbigny, 1835, but that has a concave septum and a smooth surface. *Crepidula onyx* Sowerby, 1824, has the septum slightly concave and is smooth exteriorly. From Paraná (Entre Rios) *Crepidula paranensis* Borchert, 1901, has been described from a unique example having an oval form, with a blunt apex, which does not extend beyond the margin; the septum is broken, preventing a valid comparison. Closs (1970) has cited *C. paranensis* and *C. protea* from the Middle Miocene of Brazil. Consequently, this is the first record of the genus in the Entrerriense Formation of Patagonia.

Family CAPULIDAE
Genus CAPULUS Montfort, 1810

CAPULUS PIRAMIDENSIS, n. sp.
Plate 2, figure 11

*Description:* Shell in form of a cap, small but heavy, apex opistogyre, small, very pointed, not extending beyond margin of shell, protoconch clearly visible. Aperture circular, labrum crenulated by projection of ribs. Muscle-scar in form of horseshoe, open anteriorly. External ornamentation consisting of numerous radial ribs (5 per mm), where these are crossed by growth lines, rugae developed; interspaces more narrow than ribs and crossed by fine growth lines; some ribs divided.

*Holotype:* MPEF-PI-235; height 3 mm, length 6 mm, width 6 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Capulus piramidensis*, n. sp., differs from *C. ladyae* Brunet, 1995, which is lower and less broad, with indices of height/length: 0.42 and width/length: 0.83; while those of *C. piramidensis* are: height/length 0.50 and width/length 1.00. It has five ribs per mm, whereas *C. ladyae*

has three per mm and the apex extends past the labral margin. It is not comparable with *C. compressus* Smith, 1891, living in the Argentine littoral (8.5 x 2.5 x 8 mm), *C. incurvatus* (Gmelin, 1791), living from North Carolina to Brasil (16 x 10 mm), or with *C. hungaricus* (Linne, 1767), living from the coast of Iceland to the Mediterranean Sea (diameter 5 cm), which are much larger species. We may deduce that in the Entrerriense Sea there arose a "race" of *Capulus* of very small size, in contrast to those living in the Atlantic today.

Superfamily NATICOIDEA
Family NATICIDAE
Subfamily POLINICINAE
Genus POLINICES Montfort, 1810
Subgenus EUSPIRA Agassiz, 1838
POLINICES (EUSPIRA) CONSIMILIS
(Ihering, 1897)
Plate 2, figure 12

*Description:* Shell medium-sized, low-spired, the last whorl large and globose, representing four-fifths of total height; suture strongly channeled, whorls very convex. Aperture occupying three-fourths of body-whorl, semilunar in shape. Columella straight, with an inconspicuous callus and without funicule. Umbilicus deep; peristome narrow. Ornamented only by fine growth lines.

*Hypotype:* MPEF-PI-237; height 7 mm, width 8.5 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Polinices (Euspira) consimilis* is relatively abundant in the outcrops at the Valdes Peninsula (Chubut). It has been recorded from sediments of Oligocene age at Los Manantiales, La Cuevas, and Monte Entrance and from the Patagoniense of Golfo San Jorge. Ihering (1897) cited *Natica consimilis* from Monte Leon (Sta. Cruz) and, from Paraná (Entre Rios), Borchert (1901) mentioned *Natica entrerriana*, which we consider a synonym of *P.(E.) consimilis*. This taxon differs from *P.(E.) ortmanni* Ihering, 1907, mentioned from Yegua Quemada and Los Manatiales (Monte Leon Formation, Oligocene), by having a more globose form, a lower spire, a larger aperture, and deeper sutures.

POLINICES (EUSPIRA) ORTMANNI
Ihering, 1907
Plate 2, figure 13

*Description:* Shell small, somewhat globose, spire relatively high, with 4 1/2 whorls, including nepionic. Suture shallow. Body-whorl occupying 76% of total height. Aperture semilunar, occupying 71% of height of body-whorl; inner lip almost straight, with conspicuous posterior callus,the exterior narrow. Umblicus deep, without funicule. Ornamented with fine growth lines.

*Hypotype:* MPEF-PI-238; height 9 mm, width 7.2 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Polinices (Euspira) ortmanni* is relatively common in the outcrops of the Valdes Peninsula, we have collected at various times 38 examples in perfect condition, coming from Punta Pardela and Puerto Piramide principally. *Natica ovoidea* Philippi (Ortmann, 1900, p. 380) is a synonym of *Polinices ortmanni* Ihering, 1907.

Suborder HETEROGLOSSA
Superfamily CERITHIOPSOIDEA
Family CERITHIOPSIDAE
Subfamily CERITHIELLINAE
Genus ATAXOCERITHIUM Tate, 1893
ATAXOCERITHIUM PARDELENSIS, n. sp.
Plate 2, figure 14

*Description:* Shell small, turriculated and heavy. Spire with 4 1/2 whorls and three smooth nepionic whorls. Sutures marked with deep postsutural groove, superior margin of teleoconch whorls strongly projecting as a result of postsutural groove. The last whorls ornamented with three spiral cords up to penultimate and with four on the ultimate, the second much finer than the others, on both whorls the anterior cord more conspicuous; axial cords from 14 to 17 in number, not reaching suture and forming nodules where they cross spirals. Within suture one fine intrasutural cord. Base slightly convex, almost flat, without ornamentation, except for peripheral basal cord. Columella convex, with evidently siphonal canal short and barely curved. Aperture subquadrate.

*Holotype:* MPEF-PI-239; height 9.1 mm, width 4 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locali-

ty.

*Discussion: Ataxocerithium pardelensis,* n. sp., differs from *A. juliana* (Ihering, 1907), which has more convex whorls, without the typical postsutural depression of *A. pardelensis*. The type specimen of Ihering's species has a postsutural cord, from 18 to 20 axial cords per whorl and three spiral cords on all of the whorls. *Ataxocerithium trespunta* (Ihering, 1907), from the Patagoniense of Cabo Tres Puntas, has seven spiral cords and 30 axial cords per whorl, the base is ornamented with eight simple cords and it has a straight columella. It differs from *A. pullum* (Philippi, 1845), which lacks the postsutural groove, has two to three cords on the base, whorls always with three spiral cords, seeming on the last whorl not tuberculate, but rectangular.

ATAXOCERITHIUM PIRAMIDENSIS, n. sp.
Plate 2, figure 15

*Description:* Shell medium-sized, turriform, with 8 1/2 whorls plus two smooth nepionic whorls. Sutures deep, with two fine intrasutural cords. Ornamented with three spiral cords on all whorls and from 18 to 24 axial cords crossing spirals to form tubercules. Base weakly convex, with three fine peripheral cords. Columella convex, with siphonal canal short and oblique. Aperture oval.

*Holotype:* MPEF-PI-240; height 18.6 mm, width 7 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Ataxocerithium piramidensis,* n. sp., differs from *A. juliana* (Ihering, 1907), from the Superpatagoniense of San Julian (Sta. Cruz), which has one fine smooth postsutural cord, from 18 to 20 axial cords per whorl, the whorls very convex and narrow, with deeper sutures and the base smooth. *Ataxocerithium trespunta* (Ihering, 1907), from the middle Patagoniense of Cabo Tres Puntas (Sta. Cruz) has seven spiral cords per whorl and 30 axial cords; the base has eight simple cords; the columella is straight and the aperture subquadrangular. *Ataxocerithium pullum* (Philippi, 1845) has the sutures less deep, the whorls flatter, quadrangular tubercules on the last whorl and only two peripheral basal cords. The genus *Ataxocerithium* is noted here for the first time from the Entrerriense Formation of Argentina. Figueiras and Broggi (1986) cited *Cerithiopsis entrerriensis* from the Camacho Formation of Uruguay, as the unique representative of the genus.

Superfamily EULIMOIDEA
Family EULIMIDAE
Genus BALCIS Leach, 1847

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PLATE 3

Figures Page

1. TROPHON LEANZAI, n. sp. ..... 78
   MPEF-PI-116 (holotype); height 30.6 mm (incomplete), width 20.7 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
2. TROPHON HARRINGTONI, n. sp. ..... 78
   MPEF-PI-124 (holotype); height 23.9 mm (incomplete), width 19.7 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
3. TROPHON PLICATUS var. SANTACRUZENSIS Ihering, 1897 ..... 79
   MPEF-PI-128 (hypotype); height 38.8 mm (incomplete), width 25 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
4. TROPHON CONTORTUS, n. sp. ..... 80
   MPEF-PI-024 (holotype); height 32.8 mm (incomplete), width 27.2 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
5. TROPHON RETRORSUM, n. sp. ..... 79
   MPEF-PI-180 (holotype); height 58 mm (incomplete), width 44.2 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
6. "TROPHON" VOKESAE, n. sp. ..... 81
   MPEF-PI-019 (holotype); height 50 mm (incomplete), width 38.5 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

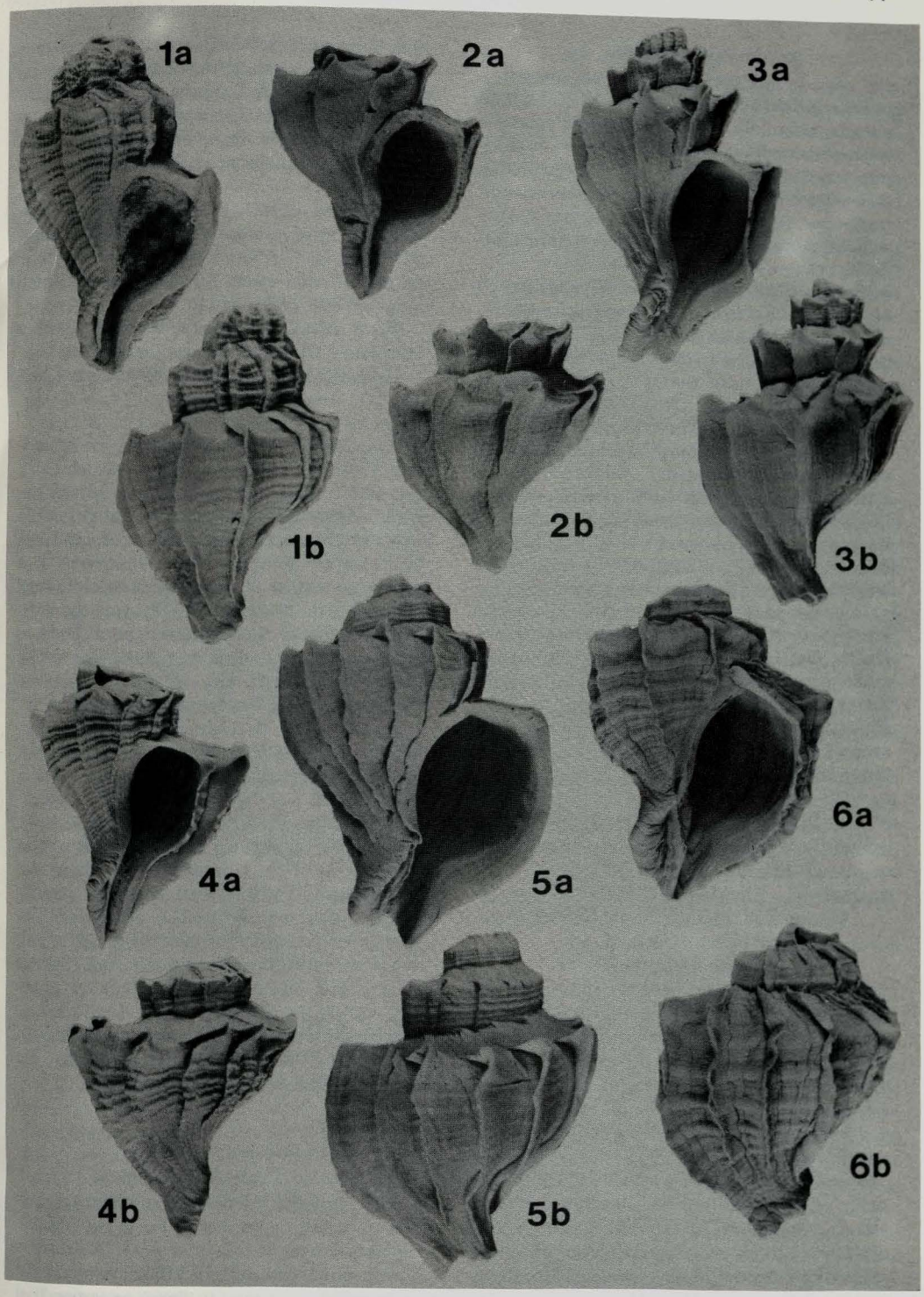


PLATE 3

BALCIS FLECHENSIS, n. sp.
Plate 2, figure 16

*Description:* Shell very small, slender, 9 1/2 whorls; all almost flat, body-whorl rounded, with strong basal carina; sutures weakly impressed. Aperture oval, external lip broken; columella arched. Without external ornamentation.

*Holotype:* MPEF-PI-241; height 6 mm, width 2 mm.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Balcis flechensis*, n. sp., differs from *B. cetia* Woodring, 1970, which has the suture profoundly impressed and very convex whorls. *Balcis aulaca* Woodring, 1970, has very convex whorls, the suture is better marked and there is no peripheral carina on the body-whorl. *Balcis lipara* Woodring, 1970, has somewhat convex whorls, a heavy columellar callus, no peripheral carina on the body-whorl and the two last whorls globose. *Balcis jacululum* (Maury, 1917) has deeper sutures, more convex whorls and lacks a peripheral carina on the body-whorl. This unique example represents the first record of the genus *Balcis* from the Entrerriense Formation of South America.

Superfamily MURICOIDEA
Family MURICIDAE Rafinesque, 1815
Subfamily TROPHONINAE
Cossmann, 1903
Genus TROPHON Montfort, 1810

TROPHON LEANZAI, n. sp.
Plate 3, figure 1

*Description:* Shell medium-sized, relatively thin. Spire elevated; whorls high and narrow. Aperture subtriangular, with concave columella forming an angle of almost 90 degrees with posterior lip; obtuse posterior angulation; outer lip curved and crenulated. Siphonal canal recurved and long, with umbilicus long and inconspicuous. Fasciole created by growth lines imbricated one above the other. Last whorl with nine relatively strong axial lamellae forming a slightly elevated angulation at shoulder level, continuing up to the suture. Shoulder smooth, at an angle of 45 degrees. Spiral ornamentation consisting of 15 heavy cords with finer alternating ones; one heavy cord forming shoulder of whorl. All heavy intercostal cords prolonged over lamellae, their projection over the edges giving these a crenulated aspect. Axially, between lamellae and crossing cords, from nine to 15 very fine threads. In juvenile examples, axial cords more conspicuous, giving a cancellate appearance.

*Holotype:* MPEF-PI-116; height 30.6 mm (lacking approximately three whorls), width 20.7 mm. Body-whorl: length 26 mm. Aperture: length 11 mm, width 7.5 mm. Siphonal canal: length 7 mm, width 1 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Armando F. Leanza.

*Discussion: Trophon leanzai*, n. sp., differs from *T. retrorsum*, n. sp., which has a greater number of lamellae (13) on the body-whorl, lacks the fine spiral cords alternating with the primaries, and has the spire proportionally lower. The siphonal canal is strongly oblique toward the left and the umbilicus forms the parietal margin of the siphonal canal. *Trophon contortus*, n. sp., differs by having a strong constriction at the beginning of the siphonal canal, better development of the lamellae and the lamellar angulations, which turn at the shoulder abruptly in a horizontal direction. The shoulder ramp is wider and horizontal. *Trophon harringtoni*, n. sp., differs in having nine to 11 lamellae, a strong constriction at the beginning of the siphonal canal, faint spiral ornamentation, and lamellar angulations upon reaching the shoulder. The shoulder ramp is broader and horizontal, without lamellar projections, and there is a straight siphonal canal. *Trophon plicatus* var. *santacruzensis* Ihering, 1897, is more similar to *T. plicatus* (Lightfoot, 1786) and thus is not comparable. This species is based on 44 examples.

TROPHON HARRINGTONI, n. sp.
Plate 3, figure 2

*Description:* Shell small, muriciform, elongated; spire long, composed of six to eight whorls, flattened over suture and nearly vertical on lower part, forming an almost acute angle. Each whorl with nine to eleven projecting axial lamellae, thin at margins, almost straight and

pointed on the angle. Lamellae somewhat varicose and recurved inward, principally on last whorl. Lamellae crossed by fine, regularly marked spiral striae, and barely visible axials. Last whorl twice the height of spire. Peristome somewhat rounded, with margin smooth and folded; siphonal canal narrow and elongated, oblique toward the left, with a narrow and long umbilicus.

*Holotype:* MPEF-PI-124; height 23.9 mm (lacking approximately three whorls and the protoconch), width 19.7 mm. Aperture: length 11 mm, width 7 mm. Siphonal canal: length 7 mm, width 1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivato nominis:* Dedicated to the late geologist Dr. Horacio Harrington.

*Discussion: Trophon harringtoni*, n. sp., differs from *T. orbignyi* Carcelles, 1946, which has the spire more elevated and the whorls more narrow; the height/width index of the holotype and 10 paratypes of *T. orbignyi* varies between 1.53 and 2.47, while the indices of the seven examples of *T. harringtoni* vary between 1.21 and 1.32 and apparently the spire does not exceed four whorls. The latter has more developed lamellae, a narrower siphonal canal, oblique to the left. *Trophon plicatus* var. *santacruzensis* Ihering, 1897, from the Early and Middle Patagoniense of Santa Cruz, Argentina, is much smaller in size, with well developed lamellae. The shoulder ramp is flattened, the siphonal canal longer and the umbilicus indefinite. *Trophon retrorsum*, n. sp., has a much larger size, a greater number of varices, and strong spiral ornamentation that produces crenulations on the lamellar margins. The lip is strongly beveled, the siphonal canal very oblique and the umbilicus long and deep. *Trophon contortus*, n. sp., has strong axial lamellae, conspicuous spiral ornamentation that produces strong crenulations on the lamellar margins and a siphonal canal that is longer and curved dorsally. We consider *T. harringtoni* a valid and unique predecessor of *T. orbignyi*.

TROPHON PLICATUS var. SANTACRUZENSIS
Ihering, 1897

Plate 3, figure 3

*Description:* Shell fusiform, heavy, with relatively high spire. Aperture oval with reflected labrum; columella concave with marked callus; siphonal canal wide and oblique. Fasciole formed by imbricated and projecting growth lines; umbilicus poorly defined. Body-whorl with nine laminar varices, strongly angled and curved almost backward to shoulder level; shoulder not flattened. On early whorls marked spiral striae crossing over laminae, later whorls almost smooth.

*Hypotype:* MPEF-PI-128; height 38.8 mm (lacking protoconch), width 25 mm. Aperture: length 15 mm, width 8 mm. Siphonal canal: length 8.5 mm, width 2 mm.

*Locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Trophon plicatus* var. *santacruzensis* differs from *T. plicatus* (Lightfoot, 1786) by having a higher spire, the siphonal canal twisted, more oblique, and wider; with fine spiral striations, very visible on the early whorls and inconspicuous on the body-whorl. The holotype of Ihering's species has 12 varices on the body whorl in contrast to our specimen with only nine. The shoulder is flattened and the siphonal canal is wider. According to Ihering (1907), specimens from Paraná, as well as those from Punta Ninfas and from Golfo Nuevo (Chubut Province), are poorly preserved, making it difficult to assign them to the Entrerriense Formation. Therefore, because of this doubt, we assign this well-preserved specimen to this species.

TROPHON RETRORSUM, n. sp.
Plate 3, figure 5

*Description:* Shell subfusiform with a short spire, whorls angulose, last whorl triple the height of spire. Aperture oval, with strong postero-external angulation; lip heavy and beveled; strong columellar callus, columella concave posteriorly, ending in one final lamina; siphonal canal broad and short; umbilicus long and deep, turned toward siphonal canal. Ornamentation on last whorl of slightly projecting lamellae, folded over whorl, 13 in number, crossed by inconspicuous spiral cords, alternating heavy and fine, at times doubled, producing crenulations along lamellar margins; lamellae angulated at shoulder level, but elevated only slightly

above it. Subsutural ramp radially wrinkled by growth lines and weak lamellar projections. Penultimate whorl with only five lamellae, all situated on final third of whorl, the remainder with no lamellae, only inconspicuous cords; also on antepenultimate whorl, with latter two whorls having four simple spiral cords.

*Holotype:* MPEF-PI-180; height 58 mm (only three whorls), width 44.2 mm. Body-whorl: length 50 mm. Aperture: length 24 mm, width 17 mm. Siphonal canal: length 12 mm, width 5 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for the twisted shell.

*Discussion:* We have observed above the differences between *T. retrorsum*, n. sp., *T. leanzai*, n. sp., and *T. harringtoni*, n. sp. *Trophon retrorsum* differs from *T. contortus*, n. sp., by being of a larger size, with a greater number of lamellae (13) and inconspicuous spiral ornamentation, lacking crenulations on the lamellar margins. The aperture is oval, the siphonal canal very wide and very oblique toward the left, with a conspicuous umbilicus that forms the inner body-whorl wall of the siphonal canal. The differences presented between *Trophon patagonicus* (Sowerby, 1846), from the lower Patagoniense of Santa Cruz (Early Oligocene), *Trophon geversianus* (Pallas, 1774), living on the Patagonian coast, and *Trophon retrorsum*, n. sp., permits us to consider the new species as an intermediate stage between *Trophon patagonicus* and the Recent varieties of *Trophon geversianus*, which is characterized by the presence of more or less well developed lamellae and marked spiral ornamentation or by almost equal development of the lamellae and the spiral ornamentation, such as we observe in the Golfo San Jose, Chubut Province, Argentina (Vokes, 1991B).

TROPHON CONTORTUS, n. sp.
Plate 3, figure 4

*Description:* Shell small, muriciform; aperture subquadrate; labrum thin with marked crenulations corresponding to projection of spiral cords. Strong prolongation of postero-external labral angle. Siphonal canal long and curved; spire short. The holotype with only 2 1/2 whorls, these somewhat oblique, wider than high, increasing rapidly in diameter, separated by a shallow suture. Ornamentation of last whorl consisting of nine thin lamellae, curved toward peristome, at shoulder of whorl turning abruptly in a horizontal direction; lamellae festoned with five to eight spiral cords passing over them; minor cords intercalated at rate of one between two principal cords; from middle of body-whorl aperturally cords becoming finer, the principal cords disappearing. Shoulder ramp of last whorl practically flat, and extending over it lamellae merging with growth lines, up to level of suture. Besides lamellae, only marked growth lines constituting axial ornamentation. On penultimate whorl, same type of ornamentation, except on shoulder ramp, with three weak spiral cords crossing lamellar projections. Columella curved, with convexity at beginning of siphonal canal, ending in a lamina; fasciole long and narrow, with strong wrinkles.

*Holotype:* MPEF-PI-024; height 32.8 mm (incomplete), width 27.2 mm. Body-whorl: length 30 mm. Aperture: length 13 mm, width 8 mm. Siphonal canal: length 11 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for the twist of the shell.

*Discussion: Trophon contortus*, n. sp., differs from *Trophon pelseneri* (Smith, 1915) in having lamellae that do not cross over the shoulder ramp, a wider siphonal canal and less developed lamellae. It differs from *Pagodula vaginatus* (Cristofori and Jan, 1832), which lacks the spiral ornamentation, in being of a much smaller size, having fewer lamellae, axial ornamentation elevated above the shoulder ramp, and the siphonal canal longer and straighter. *Pagodula coulmanensis* (Smith, 1907) has a lesser number of ribs, these being elevated over the shoulder ramp, with less developed spiral ornamentation and a longer and straighter siphonal canal. We have already established the differences between this species and the other species of *Trophon* s.s. described herein.

Genus TROPHON sensu lato

The typical species of *Trophon* have a

medium to large, thin, globose shell, with prominent axial ornamentation. The genus *Xanthochorus* Fischer, 1884, is characterized by a generally low spire, with spiral ornamentation almost equal to or more developed than the axial, with conspicuous tubercules on the intersections. The examples, which are here described as "*Trophon* s.l.", have spiral ornamentation rather similar to *Xanthochorus*, but with strong varices in the manner of the genus *Trophon*.

"TROPHON" VOKESAE, n. sp.
Plate 3, figure 6

*Description:* Shell muriciform, higher than wide, aperture subtriangular, siphonostomate; lip thin with undulations that correspond to projections of spiral cords; siphonal canal not long and slightly curved toward right. Spire low (in holotype, which lacks two whorls plus protoconch), with whorls wider than high and slightly oblique, enlarging rapidly in diameter; suture somewhat deep and irregular. External ornamentation of strong undulating lamellar processes, ten in number on last whorl. Lamellae 4 to 5 mm in height; in middle of body-whorl forming an angular prolongation reaching to shoulder of whorl; these curving toward right and extending over subsutural ramp up to suture, at this level 2.5 to 4 mm in height. In interlamellar spaces six convex principal cords, the first forming shoulder of whorl; between these from one to three lower convex cords, running spirally. From last primary cord up to fasciole, 12 or 13 low convex cords. On subsutural ramp of body-whorl from three to five barely convex cords. Axial growth lines passing over spiral cords, giving them an undulating aspect. Subsutural ramp oblique downward owing to great development of primary cord delineating it. Penultimate whorl with ten axial laminar processes 2 mm in height, with less marked angulations and four spiral cords; subsutural ramp with growth lines only. Columella slightly curved, ending at level of umbilicus with a heavy laminar process, Umbilicus long but shallow, with a well developed fasciole.

*Holotype:* MPEF-PI-019; height 50 mm (incomplete), width 38.5 mm. Body-whorl: length 40 mm. Aperture: length 25 mm, width 15 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the paleontologist Dra. Emily H. Vokes of Tulane University, New Orleans, Louisiana (U.S.A.).

*Discussion: "Trophon" vokesae*, n. sp., differs from *Trophon patagonicus* (Sowerby, 1846) by the greater development of the lamellae, by the greater number of spiral cords, by the lamellar prolongations directed backward, and by the curved siphonal canal. *Trophon geversianus paranaensis* (Borchert, 1901) has less developed axial ornamentation, a smooth lip, and lacks the angular projections on the shoulder, a less developed fasciole and a straight siphonal canal. *Trophon broggii*, n. sp., differs in the weaker development of the lamellae, which are fewer in number (eight), weaker development of the primary spiral ornamentation and a greater number of secondary cords. *"Trophon" piramidensis,* n. sp., has a ficoid form, a low spire, axial ornamentation consisting of eight heavy cords, a homogeneous spiral ornamentation, lacking differentiation between primary and secondary cords. It lacks an umbilicus and has an almost straight siphonal canal. This species is based on 55 adult examples and 73 juveniles.

"TROPHON" BROGGII, n. sp.
Plate 4, figure 1

*Description:* Shell of medium size, four whorls (lacking the protoconch); aperture oval; labrum broadly projecting toward outer side, with marked undulations formed by projection of spiral cords; strong prolongation of posterio-external angle. Siphonal canal short, barely oblique, recurved upward; spire short, composed of oblique whorls, wider than high, increasing rapidly in diameter, separated by shallow suture. Body-whorl four to five times higher than spire. Ornamentation formed by fine, slightly elevated axial lamellae, eight in number, strongly crenulated, forming a marked angulation on shoulder of whorl; prolonged perpendicularly above subsutural ramp to suture. Subsutural ramp oblique and forming an angle of 110 degrees relative to anterior whorl, the latter ornamented by seven or eight low, flat cords and a heavy cord forming margin of subsutural ramp. Body-whorl with five primary spiral cords, between these from four to seven finer, flat cords, being more numerous (from 20

to 25) from last primary cord to umbilical chink. Lamellae disappearing on two first whorls, being replaced by small axial cords, crossed by from five to eight spiral cords. Columella almost straight, enlarged at beginning of siphonal canal and terminating sharply. Umbilicus long and shallow; strong fasciole with marked folds.

*Holotype:* MPEF-PI-022; height 66.1 mm (incomplete), width 48 mm; height of spire 12 mm. Body-whorl: length 55 mm. Aperture: length 46 mm, width 16 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to Sr. Jorge Broggi, Uruguayan malacologist and paleontologist.

*Discussion: "Trophon" broggii,* n. sp., differs from *Trophon geversianus paranaensis* (Borchert, 1901), which has a proportionally more developed spire, a smooth lip, no lamellar angulosity at the shoulder, fewer spiral cords (three), and a straight siphonal canal. *Trophon patagonicus* (Sowerby, 1846) has a great number of lamellae (12), with undifferentiated and fewer spiral cords (from three to seven). In the latter, the lamellar angulations are directed upward, but in *Trophon broggii*, n. sp., they are extended laterally. *"Trophon" piramidensis*, n. sp., has a ficoid form, a low spire, axial ornamentation consisting of eight heavy cords, homogeneous spiral ornamentation, lacking differentiation between primary and secondary cords; it lacks an umbilicus and has a straight siphonal canal. Some adults have low varices, others with the varices more or less well developed are similar in appearance to *"T." vokesae*, n. sp., but the juvenile forms of both are easily distinguishable by the greater development of the axial ornamentation in *"T." vokesae*. This species is based upon 39 adult examples and 40 juveniles.

(?)"TROPHON" PIRAMIDENSIS, n. sp.
Plate 4, figure 2

*Description:* Shell ficoid, broad at level of shoulder of body-whorl, reducing notably its width toward siphonal canal. Spire short, whorls low and globose. Body-whorl constituting approximately 81% of total height (lacking one whorl and the protoconch), globose in posterior part, with shoulder rounded. Aperture subtriangular; columella curved and long; posterior labium concave, at a 90 degree angle to body-whorl; strong posterior angulation; labrum beveled, thin and directed toward outside, with small crenulations corresponding to projection of spiral cords; siphonal canal long, narrow and straight. Fasciole formed by imbricated, barely projecting growth lines, lacking an umbilicus. External ornamentation consisting of eight heavy, projecting axial cords, forming a small, inconspicuous tubercule at shoulder level; these cords lost on anterior third of body-whorl; spirally seven or eight cords above shoulder, and laterally up to 32 flat cords, alternating heavy and weak.

*Holotype:* MPEF-PI-119; height 28.6 mm (lacking one whorl plus the protoconch), width 19 mm. Aperture: length 15 mm, width 9 mm.

## PLATE 4

Figures

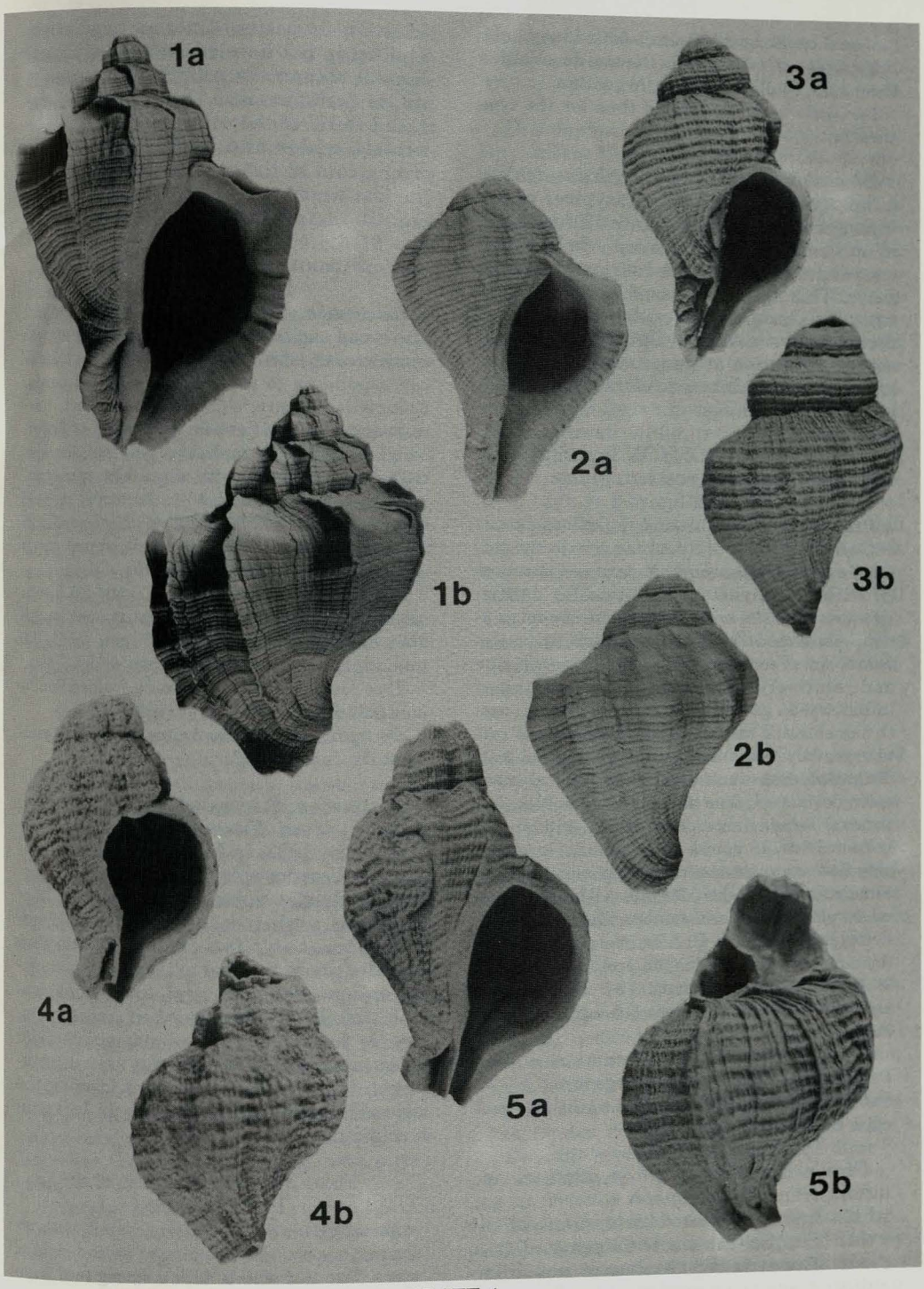


PLATE 4

Siphonal canal: length 6 mm, width 1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named thus for the type locality.

*Discussion: (?)"Trophon" piramidensis*, n. sp., presents characters atypical of the "muriciforms." It differs from *"T." vokesae*, n. sp., and *"T." broggii*, n. sp., for the reasons expressed in the discussion of each of these. This species is based upon 26 adult examples and 15 juveniles, in some of these there are varices that form a small, acute angulation at the shoulder; in other examples the axial cords are less elevated, but equal in number.

## Genus FUEGOTROPHON Powell, 1951

### FUEGOTROPHON FLINTI, n. sp.

Plate 4, figure 3

*Description:* Shell fusiform, spire not elevated; whorls rounded. Aperture pyriform; columella concave posteriorly and convex anteriorly, with well developed columellar callus. Labrum recurved with weak posterior angulation, crenulated along entire margin by projection of spiral cords; siphonal canal long, oblique and relatively wide. Fasciole consisting of imbricated growth lines; no umbilicus. Ornamentation of body-whorl consisting of certain growth lines, more marked than the rest, intercalated as weak axial cords. Spiral cords more developed, four at level of shoulder, one stronger forming shoulder of whorl, and laterally from 16 to 19 spiral cords. Axially innumerable fine, corrugated striae. Penultimate whorl rounded, without shoulder and with nine spiral cords, plus lamelliform axial cordlets.

*Holotype:* MPEF-PI-121; height 29.6 mm (lacking two whorls, plus the protoconch), width 17.5 mm. Aperture: length 11.5 mm, width 7 mm. Siphonal canal: length 6.5 mm, width 1.5 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Richard Foster Flint.

*Discussion: Fuegotrophon flinti,* n. sp., differs from *Fuegotrophon turneri,* n. sp., which has a greater development of the axial ornamentation, consisting of true cords. The subsutural ramp is not differentiated and the aperture is totally rounded, without postero-external angulation. The lip is not beveled and the siphonal canal is oblique. *Fuegotrophon asperum,* n. sp., is fusiform, with the spire more elevated (50% of the total height), and the whorls wider and high. There is one strong cord at the level of the shoulder on the last whorl.

### FUEGOTROPHON TURNERI, n. sp.

Plate 4, figure 4

*Description:* Shell broad and low; last whorl also broad and relatively short. Aperture almost semicircular; labrum rounded with crenulations corresponding to projections of spiral cords. Columella concave; siphonal canal short, narrow, and oblique. Fasciole consisting of imbricated growth lines, umbilicus long but shallow. Body-whorl inflated, with seven heavy, projecting cords; spirally from 16 to 20 cords, crossed by numerous fine, corrugated axial cordlets. Penultimate whorl with only six spiral cords and nine much heavier axial cords.

*Holotype:* MPEF-PI-122; height 23.5 mm (lacking two whorls and the protoconch), width 16.4 mm. Aperture: length 9.5 mm, width 6.5 mm. Siphonal canal: length 6 mm, width 1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Juan C.M. Turner.

*Discussion: Fuegotrophon turneri*, n. sp., differs from *Fuegotrophon pallidus* (Broderip, 1833) in having a less fusiform shell, a broader spire, a semicircular aperture, a shorter siphonal canal, and by having an umbilicus. It differs from *Fuegotrophon flinti*, n. sp., by having heavier, more marked axial cords, a shorter, oblique siphonal canal, and a conspicuous umbilicus. *Fuegotrophon asperum*, n. sp., is fusiform, with inconspicuous axial ornamentation, but strong spiral ornamentation, and a strong cord forming the shoulder of the body-whorl. It lacks an umbilicus.

### FUEGOTROPHON ASPERUM, n. sp.

Plate 5, figure 1

*Description:* Shell fusiform, small, with six convex whorls, the last almost twice height of spire. Two last whorls with a strong cord forming a shoulder. Aperture oval, with outer lip

beveled and crenulated by projection of spiral cords; siphonal canal narrow, long and oblique. External ornamentation consisting of nine spiral cords, plus two on subsutural ramp; on last whorl four or five poorly defined axial cords. It is not possible to detail other characters of specimen due to incrustation of bryozoans and state of fossilization of shell.

*Holotype:* MPEF-PI-023; height 18 mm, width 7.9 mm. Body-whorl: length 13 mm. Aperture: length 5 mm, width 3 mm. Siphonal canal: length 3 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Denominated thus for the roughness of the shell.

*Discussion: Fuegotrophon asperum,* n. sp., is most similar to the species *Fuegotrophon pallidus* (Broderip, 1833), but differs from it in having a lesser number of spiral cords and in having the aperture represent 62% of the length of the aperture-siphonal canal, whereas in the first species it is 69%. It differs from *F. flinti*, n. sp., and *F. turneri*, n. sp., for the reasons previously discussed under each of these species.

## Genus XYMENOPSIS Powell, 1951

### XYMENOPSIS FLECHENSIS, n. sp.

Plate 4, figure 5

*Description:* Shell fusiform, whorls rounded (only 2 1/2 whorls preserved); aperture oval, labrum festooned by projection of spiral cords, siphonal canal rather long and curved; suture shallow and irregular. External ornamentation consisting of eight heavy, wide and rounded, single or double cords, running axially, diminishing in thickness aperturally; from 15 to 17 marked spiral cords, passing over axials; last whorl rounded, with a length more than double that of spire, without forming a shoulder, but axial cords continuing up to suture; penultimate whorl with eleven heavy longitudinal cords, crossed by five finer spiral cords, passing over primaries. Columella slightly concave, ending at canal as a lamina. Umbilicus long, wide and deep; fasciole well developed, with strong folds.

*Holotype:* MPEF-PI-025; height 32.5 mm (incomplete), width 20.5 mm. Body-whorl: length 28 mm. Aperture: length 14 mm, width 8 mm.

*Type locality:* Baliza Punta Flecha, Puerto Madryn, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Xymenopsis flechensis,* n. sp., differs from *Xymenopsis muriciformis* (King and Broderip, 1832) in having fewer axial cords (eight), weaker development of the spiral ornamentation, with a prevalence of the axial ornamentation over the spiral. The aperture with the peristome is much more closed anteriorly, and there is a wide umbilicus. *Xymenopsis falklandicus* (Strebel, 1908) has better development of the spiral ornamentation, a greater number of axial cords and lacks an umbilicus. *Xymenopsis michelii*, n. sp., differs in having lower, wider, more globose whorls. The platform is undifferentiated and the axial ornamentation inconspicuous. The aperture is more elongated, the lip not beveled, the siphonal canal is straight and there is no umbilicus. *Xymenopsis quenseli*, n, sp., has ten strong axial cords, which end in angulations at the level of the shoulder. There is a strong constriction that begins at the siphonal canal. The platform is concave and there is no umbilicus.

### XYMENOPSIS MICHELII, n. sp.

Plate 5, figure 2

*Description:* Elongated shell with rounded whorls, spire high; last whorl representing 81% of total height. External ornamentation consisting of fine axial and spiral cords. Aperture broad, elliptical, with strong columellar callus; labrum rounded with crenulations corresponding to projection of spiral ornamentation; siphonal canal short, wide and slightly curved; fasciolar area consisting of imbricated growth lines and a long but shallow umbilicus.

*Holotype:* MPEF-PI-118; height 34.2 mm (lacking approximately one whorl plus the protoconch), width 18.8 mm. Aperture: length 11 mm, width 8 mm. Siphonal canal: length 7 mm, width 1.5 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the diver Sr. Ricardo Micheli.

*Discussion: Xymenopsis michelii*, n. sp., differs from *X. albidus* (Philippi, 1846) by having a less developed columellar callus and unequal axial ornamentation, without

defined cords. The peristome is not reflected outward, and the crenulations are much less conspicuous. The umbilicus is longer and less deep. *Xymenopsis flechensis*, n. sp., has more globose whorls and more defined axial ornamentation in the form of heavy cords. The aperture is semicircular, the siphonal canal oblique and the umbilicus of greater size. *Xymenopsis quenseli*, n. sp., has the whorls not so globose, with a greater development of the spiral ornamentation and a well defined shoulder. The platform is concave, the axial ornamentation well defined and conspicuous, with on some whorls small angulations at the level of the shoulder. *Xymenopsis peninsularis,* n. sp., has a strong constriction at the beginning of the siphonal canal, ornamentation consisting of strong rounded cords, a deep perisutural groove and a semi-closed siphonal canal.

XYMENOPSIS QUENSELI, n. sp.
Plate 5, figure 3

*Description:* Shell relatively short and broad, with low whorls. Aperture almost semicircular, with concave columella, posterior lip at a 45 degree angle to body-whorl, with poorly defined posterior angulation, remainder of lip recurved, with crenulations corresponding to projection of spiral cords. Strong constriction at beginning of short, straight, oblique siphonal canal. Fasciole with imbricated growth lines, no umbilicus. Body-whorl ornamented by ten heavy axial cords. Strong spiral ornamentation of 15 to 18 cords, passing over axial cords, alternating between heavy and weak, that forming shoulder heavier. Shoulder oblique, with weak growth lines and two or three weak spiral striae.

*Holotype:* MPEF-PI-120; height 24 mm (lacking two whorls and the protoconch), width 16.4 mm. Aperture: length 10 mm, width 7.5 mm. Siphonal canal: length 5 mm, width 2 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the late geologist Dr. Percy Quensel.

*Discussion:* We have established above the differences between *Xymenopsis quenseli*, n. sp., *X. flechensis*, n. sp., and *X. michelii*, n. sp. *Xymenopsis peninsularis*, n. sp., has more globose whorls, eight axial cords on the body-whorl, with less development of the spiral ornamenation. It lacks the shoulder ramp, which is replaced in this case by a perisutural groove. The siphonal canal is closed at the beginning by a projection of the lip.

XYMENOPSIS PENINSULARIS, n. sp.
Plate 5, figure 4

*Description:* Shell ficoid, very thin, with short spire and globose whorls. Body-whorl broad at beginning, diminishing rapidly in diameter. Aperture pyriform, columella concave, with a conspicuous columellar callus. Labrum strongly crenulated by projection of external spiral cords; siphonal canal moderately long, closed at beginning by a projection of lip, more open anteriorly. Fasciole composed of imbricated but weakly projecting growth lines. Ornamentation of body-whorl consisting of heavy tuberculate cords beginning at level of suture, eight in number; disappearing in middle of whorl. Five spiral cords on shoulder and from 18 to 20 on lateral face; between these finer threads intercalated. At suture a deep groove bordering all whorls, crossed only by growth striae.

*Holotype:* MPEF-PI-123; height 20 mm (lacking two whorls and the protoconch), width 14.7 mm. Aperture: length 8 mm, width 5 mm. Siphonal canal: length 6 mm, width 1 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the Valdes Peninsula, site of the type locality.

*Discussion: Xymenopsis peninsularis*, n. sp., differs from *X. flechensis*, n. sp., *X. michelii*, n. sp., and *X. quenseli*, n. sp., for the reasons mentioned in the treatment of each of these species. It differs from the living representatives of the genus by the presence of a conspicuous perisutural groove.

Genus PAGODULA Monterosato, 1884
PAGODULA CARCELLESI, n. sp.
Plate 5, figure 5

*Description:* Shell fusiform, strong; spire high and stepped (approximately 20% of total height); apex with three angular whorls and two nepionic whorls. Aperture subpyriform. Labrum arcuate, corrugated toward outside, with strong posterior angulation. Columellar callus inconspicuous. Siphonal canal long, narrow and open, straight in juvenile examples,

but somewhat curved in adults. Fasciole long, formed by weakly marked imbricate growth lines. Ornamentation consisting of strong, wide lamellae, on body-whorl starting from beginning of siphonal canal, extending separately from body-whorl and upon reaching shoulder becoming markedly elevated and twisted backward. On other whorls, lamellae beginning at suture, running separated from wall of whorl, markedly elevated at level of shoulder and curved backward. Shoulder of whorls showing growth lines in form of an "S," reaching to suture. Well-marked spiral striae on all lamellar surfaces and an axial ornamentation consisting of fine undulating striae, better marked on siphonal canal.

*Holotype:* MPEF-PI-129; height 57.3 mm (lacking approximately 1/4 of the siphonal canal), width 34.5 mm. Aperture: length 19 mm, width 12 mm. Siphonal canal: length not measurable, width 3.5 mm. Height of lamellae above body-whorl: 6 mm (average).

*Type locality:* Playa Fracasso, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Dedicated to the eminent malacologist Alberto Carcelles.

*Discussion: Pagodula carcellesi*, n. sp., differs from *Padogula carduelis* (Watson, 1883), living in eastern Australia, which has a much smaller size (32 mm; BMNH type collection 87.2.9.571-2), with the spire proportionally higher (29.4% of the total height), and with a greater development of the labral margin and of the postero-lateral angulation. It has strong spiral ornamentation on the early whorls and the columellar callus is more developed. *Pagodula coulmanensis* (E.A. Smith, 1907), living in the Antarctic Zone, has a much smaller size (10.4 mm; BMNH type collection 1905.9.25.02), with fewer lamellae on the body-whorl (six), straight whorls and the shoulder ramp also straight. The spire is proportionally more elevated (39% of total height), the lamellae elevated above the shoulder and the siphonal canal proportionally shorter. This species is based on seven adult examples, in varying states of preservation, collected exclusively from Playa Fracasso over a period of ten years. This is the first record of this genus in the Entrerriense Formation of South America.

PAGODULA aff. P. CARDUELIS (Watson, 1883)
Plate 5, figure 6

*Description:* Shell muriciform, spire high, whorls slightly rounded. Last whorl with a height of 71% of the total; spire with six whorls; aperture ovoid; columella concave. Labrum beveled and reflected. Siphonal canal long and narrow. Body-whorl ornamented with ten axial lamellae, elevated above the shoulder.

*Hypotype:* MPEF-PI-125; height 22 mm (only four whorls preserved), width 16.7 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* Given the state of the shell, which had to be extracted by plastering the shell *in situ*, we assign the species with reservation to *Pagodula carduelis* (Watson, 1883), living off the eastern coast of Australia. We have also studied another two examples, also in a bad state of preservation.

## Subfamily THAIDINAE
## Genus STRAMONITA Schumacher, 1817

STRAMONITA HOMOGENEUS, n. sp.
Plate 5, figure 7

*Description:* Shell heavy, oval-oblong, with whorls markedly convex, the last three times the size of the spire; aperture subtriangular; labrum crenulated, crenulations prolonged toward interior of aperture; siphonal canal short and slightly curved; suture shallow. Ornamentation of last whorl provided by axial ribs formed only by growth lines, in places more notable (in some examples forming small nodules on shoulder of whorl). Spiral ornamentation consisting of barely projecting, almost flat cords, from 35 to 45 in number; among these more conspicuous ones forming shoulder of whorl, with two or three more distributed on external face. Growth lines running longitudinally, crossing cords. Penultimate whorl also with weak axial cords and six spiral cords, forming the shoulder. Suture having small oblique folds, forming growth lines upon reaching suture. External lip slightly angulate (very angulate in examples possessing tubercules at shoulder). Columella concave, with post-siphonal thickening forming internal margin of umbilical zone. Umbilicus scarcely suggested; fasciole strong, beginning from parietal lip and forming external rim of umbilical zone.

*Holotype:* MPEF-PI-026; height 45.7 mm, width 29 mm; height of spire 13 mm. Body-whorl: length 38 mm. Aperture: length 20 mm,

width 12 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named thus for the inconspicuous ornamentation of the shell.

*Discussion: Stramonita homogeneus*, n. sp., differs from *Stramonita haemastoma floridiana* (Conrad, 1837) in having an umbilicus, a greater development of the fasciole, and weaker axial ribs. It differs from *Stramonita haemastoma haemastoma* (Linne, 1767) by the absence of tubercules, lacking the palatal sinus and by the presence of an umbilicus. This new species is similar to the subspecies of *Stramonita haemastoma* from Rio de Janeiro and to *Stramonita haemastoma floridiana* from the Florida peninsula. Having obtained a considerable number of specimens permits us to confirm that already in the Tertiary there is a great variability of forms, such as the presence of the umbilicus, although poorly marked, indicating a tendancy toward the disappearance of the same. In the future the reader will be informed on the variability of this species in the Tertiary of Patagonia.

## Family NASSARIIDAE

### Genus ILYANASSA Stimpson, 1865

ILYANASSA sp.

Plate 6, figure 1

*Description:* In this unique example there is preserved only part of the last whorl and a small portion of the penultimate. The last whorl apparently wide and strong, the outer lip broken, but it is possible to see lirae interiorly, which end at interior margin of lip. Columella very strong, convex, with one heavy fold at the level of the pillar. Columellar callus very wide, curving over part of wall of body-whorl. Siphonal canal short, deep and oblique toward left. Basal fasciole reaching to middle of body-whorl, with four heavy plications, very projecting and curved. Exteriorly, in spite of wear, appearing to be ornamented with strong axial striae.

*Hypotype:* MPEF-PI-242; measurement impractical.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion: Ilyanassa* sp., in spite of the poor state of preservation, is distinguishable from *I. arata* (Say, 1824), which has a straight siphonal canal, less conspicuous fasciole and spiral ornamentation. *Ilyanassa irrorata* (Conrad, 1863) does not have the heavy columellar plicae and has cancellate ornmentation. *Ilyanassa sex-*

## PLATE 5

Figures — Page

1. FUEGOTROPHON ASPERUM, n. sp. ..... 84
   MPEF-PI-023 (holotype); height 18 mm, width 7.9 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
2. XYMENOPSIS MICHELII, n. sp. ..... 85
   MPEF-PI-118 (holotype); height 34.2 mm (incomplete), width 18.8 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
3. XYMENOPSIS QUENSELI, n. sp. ..... 86
   MPEF-PI-120 (holotype); height 24 mm (incomplete), width 16.4 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
4. XYMENOPSIS PENINSULARIS, n. sp. ..... 86
   MPEF-PI-123 (holotype); height 20 mm (incomplete), width 14.7 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
5. PAGODULA CARCELLESI, n. sp. ..... 86
   MPEF-PI-129 (holotype); height 57.3 mm (incomplete), width 34.5 mm.
   Locality: Playa Fracasso, Valdes Peninsula, Chubut Province, Argentina.
6. PAGODULA aff. P. CARDUELIS (Watson, 1883) ..... 87
   MPEF-PI-125 (hypotype); height 22 mm (incomplete), width 16.7 mm (incomplete).
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
7. STRAMONITA HOMOGENEUS, n. sp. ..... 87
   MPEF-PI-026 (holotype); height 45.7 mm, width 29 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

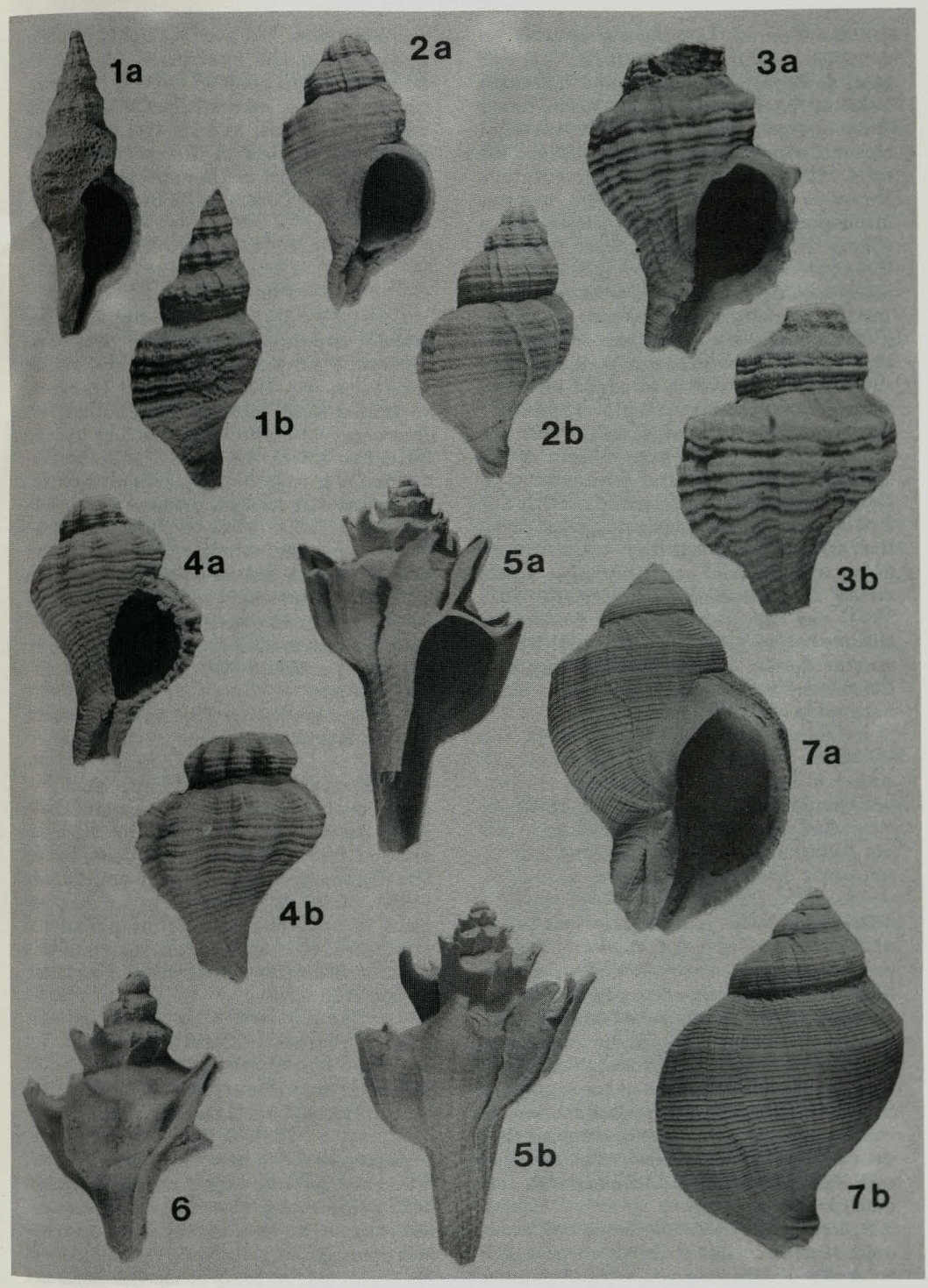


PLATE 5

*dentata* (Conrad, 1843) has a lip with six denticles, a sigmoidal columellar lip, and axial and spiral ornamentation. *Ilyanassa wilmingtonensis* Gardner, 1948, has a more elongate form, a shallow straight siphonal canal, slightly oblique toward the right with axial and spiral ornamentation. *Ilyanassa isogramma* Dall, 1892, has one inconspicuous columellar plication and a poorly differentiated anterior fasciole. *Ilyanassa obsoleta* (Say, 1822) has one heavy columellar plication, with axial and spiral ornamentation. *Ilyanassa granifera* (Conrad, 1868) has cancellate ornamentation. *Ilyanassa schizopyga* Dall, 1892, is subumbilicate, with a straight anterior siphonal canal and cancellate ornamentation. *Iyanassa johnsoni* (Dall, 1892) has the columellar callus exceedingly developed and axial and spiral ornamentation. *Ilyanassa scalaspira* (Conrad, 1868) differs by its inconspicuous columellar plication and its ornamentation consisting of heavy spaced axial cords and fine spiral striae. *Ilyanassa harpuloides* (Conrad, 1844) has the fasciole poorly developed, shallow siphonal canal and cancellate ornamentation. This is the first record of the genus *Ilyanassa* from the Entrerriense Formation of South America.

## Family VOLUTIDAE
## Subfamily ZIDONINAE
## Genus ADELOMELON Dall, 1906
## Subgenus ADELOMELON s.s.

### ADELOMELON (ADELOMELON) BECKII (Broderip, 1836)
### Plate 6, figure 2

*Description:* Shell juvenile, very small, 4 1/2 whorls, with two nepionic whorls; last whorl very elongate and narrow, with deep suture, shoulder marked, very wide, edged with conspicuous tubercules. Lip joined to body-whorl very low, forming an angulation as a consequence of projection of tubercules, then describing a gentle curve, closing in at top of siphonal canal. Columella with heavy callus and two columellar plications, the anterior stronger than the posterior. Shell practically smooth, with only fine growth lines and some inconspicuous, widely spaced spiral striae.

*Hypotype:* MPEF-PI-259; height 30.3 mm, width 13 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We attribute this juvenile example to the species *A. (A.) beckii* because of its general aspect, its protoconch, its very marked shoulder, bordered with tubercules, and its two columellar plications, typical of the species. This is the first record of this species from the Entrerriense Formation of South America.

### ADELOMELON (ADELOMELON) FERUSSACII (Donovan, 1824)
### Plate 6, figure 6

*Description:* Shell of medium size, five convex whorls, two forming protoconch; last whorl inflated, 5 1/2 times height of spire, without tubercules; spire short and pointed. Lip convex, with anal canal inconspicuous, but marked. Aperture wide, with maximum amplitude in anterior third, siphonal canal broken. Columella strongly convex posteriorly, then continuing almost straight, with two heavy plications. Columellar callus very heavy, margined by a glassy surface; fasciole oblique, with marked margin and numerous very imbricate plications. Ornamented with heavy axial cords caused by a great development of growth lines, with fine intermediate cords.

*Hypotype:* MPEF-PI-243; height 63.2 mm, width 37 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* The figured specimen presents conchological characters similar to *A. ferussacii*, differing only by the presence of two columellar plications, but in the figure given by Clench and Turner (1964, pl. 98) it is possible to see the presence of only two columellar plications; therefore, this is the first record of this species from the Entrerriense Formation of South America.

## Subgenus PACHYCYMBIOLA Ihering, 1907

### ADELOMELON (PACHYCYMBIOLA) aff. A.(P.) BRASILIANA (Lamarck, 1811)
### Plate 6, figure 3

*Description:* We have only part of the last whorl and posterior edge of the lip. Body-whorl with conspicuous tubercules, which continue forward in the form of fine cords. Posterior labral margin very angulate. Columella convex its entire length; heavy columellar callus and two plications, the anterior much heavier than the posterior.

*Hypotype:* MPEF-PI-244; measurement impractical.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We assign this specimen with some doubt to *A.(P.) brasiliana* on the basis of the heavy posterior labral angulation, the wide callus, and the presence of two unequal columellar plications. This is the first record of the subgenus in the Enterrriense Formation of South America.

Subfamily ODONTOCYMBIOLINAE
Genus ODONTOCYMBIOLA Clench and Turner, 1964

ODONTOCYMBIOLA PARDELENSIS, n. sp.
Plate 6, figure 4

*Description:* Shell of medium size, only last whorl preserved, that relatively narrow, with a row of tubercules at shoulder. Aperture wide, lip attached to body-whorl at a sharp angle, gradually opening so that aperture is wider in the anterior third. Siphonal canal short but wide. Columella convex posteriorly, practically straight and oblique anteriorly, with two very heavy plications, the anterior more conspicuous. Columellar callus very developed. Ornamented with tubercules prolonged axially by heavy plications. Fasciole oblique, subparallel to columella, not very high, with heavy curved plications.

*Holotype:* MPEF-PI-245; height incomplete, width 59 mm.

*Type locality:* Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Odontocymbiola pardelensis*, n. sp., differs from *O americana* (Reeve, 1856) by its outline, which is wider at the shoulder level, appearing less cylindrical, by having only two columellar plications, a better developed callus, a wider siphonal canal, and less conspicuous tubercules. It differs from the varieties of *O. americana*, such as *O. cleryana* Petit, 1856, which has three columellar plications. *Odontocymbiola magellanica* (Gmelin, 1791) differs by generally lacking tubercules, having a much wider last whorl, and a columella with two to five small plications. *Odontocymbiola subnodosa* (Leach) (in Clench and Turner, 1964, p. 155, pls. 95, 96), has one heavy posterior labral angulation, from three to four columellar plications, but we believe that we can consider our species a good ancestor. This is the first record of the genus *Odontocymbiola* in the Entrerriense Formation of South America.

Family OLIVIDAE
Subfamily OLIVINAE
Genus OLIVANCILLARIA d'Orbigny, 1840

OLIVANCILLARIA PRISCA Ihering, 1907
Plate 6, figure 7

*Description:* Shell of medium size, oliviform, spire low, conical, apex pointed; suture channeled in final part of last whorl; body-whorl occupying 87% of total height. Aperture subtriangular, anteriorly very wide. Columella with three very heavy oblique plications, fasciole very large, reaching almost to middle of length of aperture. Columellar callus conspicuous, extending to canalicular suture, without covering spire. Ornamented with undulating growth lines.

*Hypotype:* MPEF-PI-247; height 15 mm, width 6 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We consider that this example presents the characters described by Ihering (1907) for *O. prisca*, from the uppermost Entrerriense of Paraná. Figueiras and Broggi (1971-73) mention the species from the Camacho Formation of Uruguay on the basis of internal and external molds with shell remains. Philippi (1893) described, on the basis of a indeterminable mold, *Oliva platensis*; therefore, Ihering decided to denominate the Paraná species as *O. prisca.*

OLIVANCILLARIA FRACASSOENSIS, n. sp.
Plate 6, figure 5

*Description:* Shell of medium size, heavy. Spire broken; suture canaliculated at least on last whorl; aperture very large, rhomboidal, lip forming a sharp angle with body-whorl and a small posterior siphonal pseudocanal, greatest diameter of aperture in anterior third, then notably narrowing and forming short and narrow anterior siphonal canal. Columella curved, with two conspicuous plications at beginning of anterior third. Columellar callus well developed, not extending to cover spire. Basal fasciole relatively small in proportion; with strong

cords that are a continuation of conspicuous axial cords ornamenting shell.

*Holotype:* MPEF-PI-248; height incomplete, width 36 mm.

*Type locality:* Playa Fracasso, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Olivancillaria fracassoensis*, n. sp., differs from *O. auricularia* (Lamarck, 1810) by its more elongated form, an aperture posteriorly narrow, with its maximum diameter in the anterior third; its longer and narrower siphonal canal; its columellar plications located more posteriorly, and its small fasciole with heavy cords as ornamentation. In *O. auricularia* the fasciole is smooth, occupying more than 1/3 of the surface of the shell, and is delimited by a fine groove. *Olivancillaria carcellesi* Klappenbach, 1965, has only one basal plication and seven small columellar plications, a deeper anal canal, the width the aperture is greatest anteriorly, and the siphonal canal is shorter and wider. It differs from *O. teaguei* Klappenbach, 1964, which has a height of only approximately 25 mm, a columellar callus slightly developed, a long constricted aperture, ten oblique plications and four longitudinal to the columellar axis. *Olivancillaria urceus* (Röding, 1798) (= *O. brasiliana* Lamarck, 1810) has

PLATE 6

Figures

1. ILYANASSA sp. ..... 88
   MPEF-PI-242 (hypotype); measurement impractical.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
2. ADELOMELON (ADELOMELON) BECKII (Broderip, 1836) ..... 90
   MPEF-PI-259 (hypotype); height 30.3 mm, width 13 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
3. ADELOMELON (PACHYCYMBIOLA) aff. A.(P.) BRASILIANA (Lamarck, 1811) ... 90
   MPEF-PI-244 (hypotype); measurement impractical.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
4. ODONTOCYMBIOLA PARDELENSIS, n. sp. ..... 91
   MPEF-PI-245 (holotype); height incomplete, width 59 mm.
   Locality: Punta Pardela, Valdes Peninsula, Chubut Province, Argentina.
5. OLIVANCILLARIA FRACASSOENSIS, n. sp. ..... 91
   MPEF-PI-248 (holotype); height incomplete, width 36 mm.
   Locality: Playa Fracasso, Valdes Peninsula, Chubut Province, Argentina.
6. ADELOMELON (ADELOMELON) FERUSSACII (Donovan, 1824) ..... 90
   MPEF-PI-243 (hypotype); height 63.2 mm, width 37 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
7. OLIVANCILLARIA PRISCA Ihering, 1907 ..... 91
   MPEF-PI-247 (hypotype); height 15 mm, width 6 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
8. OLIVELLA aff. O. PLATA (Ihering, 1909) ..... 94
   MPEF-PI-251 (hypotype); height 6 mm, width 3 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
9. OLIVANCILLARIA aff. O. URETAI Klappenbach, 1965 ..... 94
   MPEF-PI-249 (hypotype); height 17.5 mm, width 7.2 mm.
   Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
10. OLIVELLA aff. O. PUELCHA (Duclos, 1840) ..... 95
    MPEF-PI-250 (hypotype); height 8.5 mm, width 4 mm.
    Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.
11. OLIVELLA FRACASSOENSIS, n. sp. ..... 94
    MPEF-PI-252 (holotype); height 9 mm, width 3.2 mm.
    Locality: Playa Fracasso, Valdes Peninsula, Chubut Province, Argentina.
12. PRUNUM sp. ..... 95
    MPEF-PI-253 (hypotype); height 22 mm, width 9 mm.
    Locality: Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

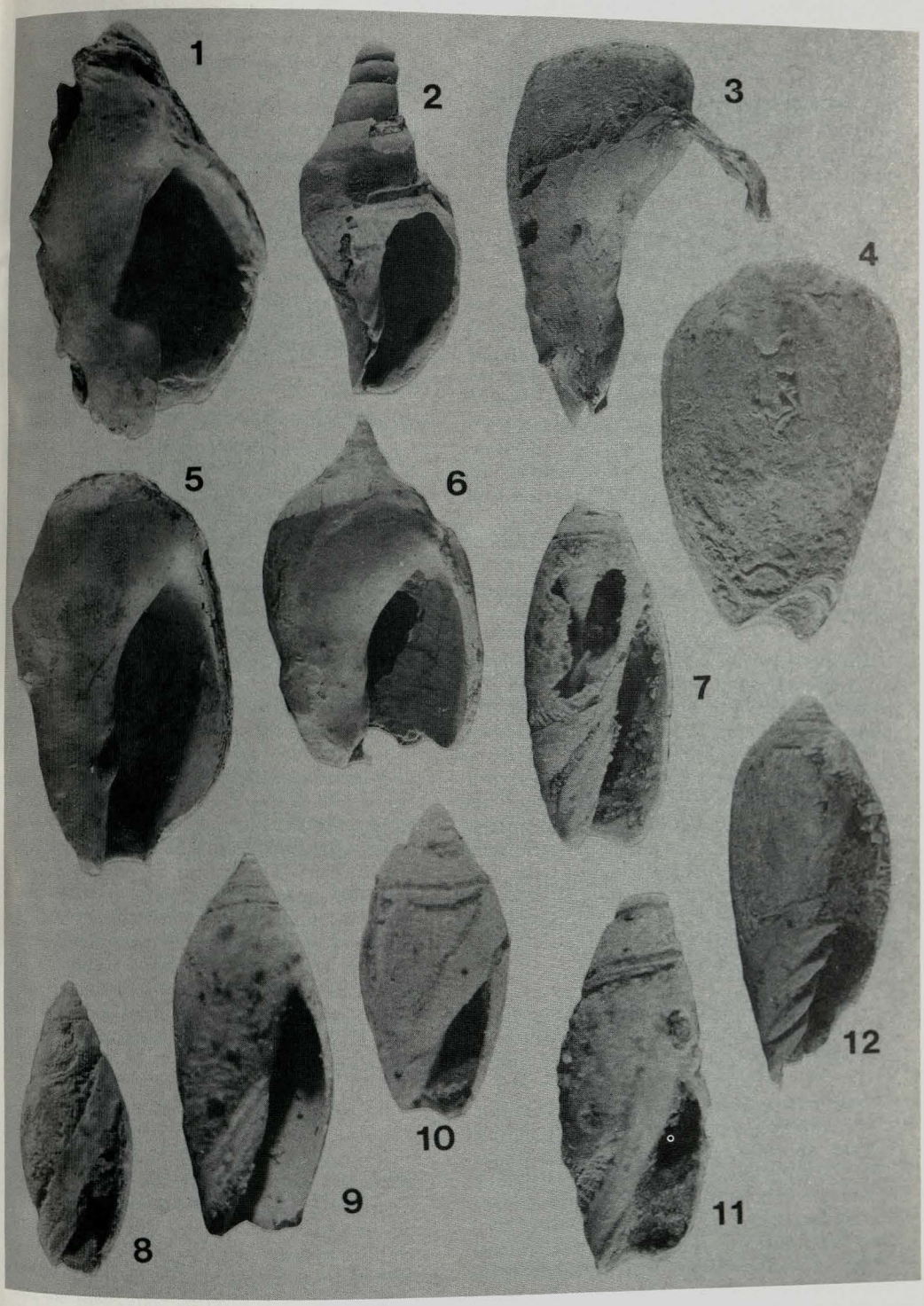


PLATE 6

the last whorl conical, with its greatest diameter posteriorly, a more reduced callus, only one basal plication and small columellar plications, a straight lip, a fasciole occupying 1/3 of the surface of the shell, and a short and wide siphonal canal.

OLIVANCILLARIA aff. O. URETAI
Klappenbach, 1965
Plate 6, figure 9

*Description:* Shell oliviform, spire low, conical, apex pointed. Suture channeled on final part of last whorl. Callus weak, but extending in an inconspicuous form to sutural channel, without covering spire. Columella almost straight with five to six oblique plications, separated by a groove of the basal plication. Fasciolar band inconspicuous. Aperture occupying four-fifths of total length. Ornamented with undulating growth lines.

*Hypotype:* MPEF-PI-249; height 17.5 mm, width 7.2 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We associate this example with the species *O. uretai,* because of the presence of five to six fine columellar plications, differing in their configuration, being thinner, and presenting an aperture less wide than the living form, but we consider it a valid ancestor to the latter. This is the first record of this species from the Entrerriense Formation of South America. Previously there has been noted from this formation *O. prisca* and *O. urceus* (Röding, 1798), cited as *O. brasiliana,* by Nieves de Medina (1962) from the well at Chuy (Uruguay), at 124 meters depth.

Subfamily OLIVELLINAE
Genus OLIVELLA Swainson, 1831
OLIVELLA aff. O. PUELCHA (Duclos, 1840)
Plate 6, figure 10

*Description:* Shell very small, conical, elongated, extended, spire sharp; whorls high and narrow. Aperture extended posteriorly, expanding in advance. Sutural channel deep. Columella with only one anterior plication, separated by a groove of the basal plication. Well-developed callus reaching suture, without covering spire. Ornamented with growth lines. Fasciole well marked.

*Hypotype:* MPEF-PI-250; height 8.5 mm, width 4 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* We relate this specimen to *O. puelcha* basically by the presence of a single columellar plication. Figueiras and Broggi (1971-73) mention this species from the Barranca de San Pedro, Colonia (Camacho Formation); consequently this is the first record from the Entrerriense Formation of Argentina. From the Middle Miocene of Brasil, Closs (1970), cited *Olivella (Olivina) bullula* (Reeve, 1850) and *Olivella (Toroliva) goliath* Olsson, 1922.

OLIVELLA aff. O. PLATA (Ihering, 1909)
Plate 6, figure 8

*Description:* Shell small, slender, spire thin, whorls high, suture deep; last whorl narrow; callus slightly marked, extending past aperture, but not reaching to suture. Lip weakly curved. Columella barely concave, with one wide basal plication and a second very marked plication above dorsum of shell, separated from the first by a conspicuous groove.

*Hypotype:* MPEF-PI-251; height 6 mm, width 3 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* This species is living from the coast of the Province of Buenos Aires to the Golfo Nuevo. It has been recorded from the Pampeano of Puerto Militar, Ihering (1907) citing it as *Olivancillaria auricularia plata,* and from the Interensenadense of Punta Piedras. The fossil examples differ from the living ones only by the greater posterior expansion of the callus, which reaches to the suture. This is the first report of this species from the Entrerriense Formation of South America.

OLIVELLA FRACASSOENSIS, n. sp.
Plate 6, figure 11

*Description:* Shell small, elongated and slender, spire very high and pointed; sutures deep; whorls of spire convex. Body-whorl corresponding to 87% of total height; aperture enlarging very little anteriorly, its length representing 47% of total height. Callus reaching sutural channel, without covering spire. Only one columellar plication, separated from basal plication by a groove. Columella rather concave due

to presence of conspicuous indentation beginning at siphonal canal. Fasciole inconspicuous and smooth.

*Holotype:* MPEF-PI-252; height 9 mm, width 3.2 mm. Body-whorl: length 7.8 mm. Aperture: length 4.2 mm.

*Type locality:* Playa Fracasso, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Olivella fracassoensis*, n. sp., differs from *O. puelcha*, in having only one columellar plication; it is much higher and narrower, with less expansion of the aperture anteriorly, spire much higher, and columellar indentation. It differs from *O. plata* by having one very wide basal plication and a second plication over the dorsum of the shell; it has a lower spire and narrower body-whorl. *Olivella carolinae* Gardner, 1948, has an ovoid-conical form, being of much greater size (16.2 mm in height), the aperture is wider anteriorly, the spire proportionally lower, the body-whorl much wider and lacking the columellar indentation.

Family MARGINELLIDAE
Genus PRUNUM Herrmansen, 1852
PRUNUM sp.
Plate 6, figure 12

*Description:* Shell medium-sized, elongate, relatively oviform; spire low, aperture apparently narrow, outer lip destroyed. Columella straight, with four heavy plications; columellar callus appearing to reach only to middle of aperture; siphonal canal destroyed.

*Hypotype:* MPEF-PI-253; height 22 mm, width 9 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* The example described is unique, being found almost destroyed. We tentativaly place it in the genus *Prunum* because of the apparently low spire, the lip begining below the spire, with a sharp angle, and with four columellar plications. Castellanos (1967) lists *Marginella prunum* (Gmelin, 1791) from the Antilles, Brasil, Uruguay, and Argentina, as far south as Golfo San Matias. Figueiras and Broggi (1971-1973) cited *Prunum pruniformis* (Ihering, 1907) from the Barranca de San Pedro, Uruguay (Camacho Formation); while from the marine Miocene of southern Brasil they cited *Prunum prunum* (Gmelin, 1791). This is the first record of the genus *Prunum* in the Entrerriense Formation of Argentina.

Subclass HETEROBRANCHIA
Order ALLOGASTROPODA
Superfamily PYRAMIDELLOIDEA
Family PYRAMIDELLIDAE
Subfamily TURBONILLINAE
Genus TURBONILLA Risso, 1826
TURBONILLA URUGUAYENSIS Pilsbry, 1897
Plate 7, figure 1

*Description:* Shell turriform, slender, strong. Ten almost straight whorls, with conspicuous sutures; first whorls smooth, later whorls with fine oblique ribs, on last whorls these becoming heavier, tabulate, and vertical. Aperture subquadrate, with columella practicaly vertical, simple and rather tilted toward base. Base only with growth lines.

*Hypotype:* MPEF-PI-254; height 7.7 mm, width 2.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* The fossil specimen presents the conchological characters of the living species. Figueiras and Broggi (1971-73) list *Turbonilla* sp. from the Camacho Formation of Uruguay, undoubtedly assignable to the subgenus *Pyrgiscus*. From the marine Miocene of southern Brasil is listed for the genus *Pyramidella* Lamarck, 1799, *P. candida* Mörch, 1875, and for the genus *Turbonilla* Risso, 1826, *T. (Pyrgiscus) interrupta* Totten, 1835. Brown and Pilsbry (1913) proposed as forms representing the genus *Turbonilla* from the Gatun Formation (Late Miocene), *T. bartschiana* and *T. gatunensis*. This is the first record of the genus *Turbonilla* in the Entrerriense Formation of Argentina.

Subgenus PYRGISCUS Philippi, 1841
TURBONILLA (PYRGISCUS) sp.
Plate 7, figure 2

*Description:* Shell very small, thin, with 9 1/2 convex whorls; sutures conspicuous; first whorls smooth, the following whorls with fine axial ribs, on last whorls these becoming somewhat heavier, with addition of heavy spiral cords. Base with strong spiral striations. Aperture subquadrate; columella almost straight.

*Hypotype:* MPEF-PI-255; height 5 mm, width 1.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* This unique example is almost complete, but in bad condition. It is characterized by the heavy spiral ornamentation on the last whorls; therefore, it is assigned with doubt to the subgenus *Pyrgiscus*. From the marine Miocene of Brasil *T.(P.) interrupta* Totten, 1835, has been recorded; consequently, this is the first record from the Entrerriense Formation of Argentina.

Subclass OPISTOBRANCHIA
Order CEPHALASPIDEA
Superfamily PHILINOIDEA?
Family SCAPHANDRIDAE
Genus ACTEOCINA Gray, 1847
ACTEOCINA PIRAMIDESIA, n. sp.
Plate 7, figure 3

*Description:* Shell very small, slender, subcylindrical. Spire low, visible only in apertural view, dorsally only the protoconch visible, lacking in this example. Posterior margin of lip very elevated, reaching same height as spire, lateral margin parallel to body-whorl, with aperture very narrow; anteriorly lip opening widely. Base of columella broken; therefore, plications unknown. Exteriorly smooth under microscope (X 40).

*Holotype:* MPEF-PI-256; height 6 mm, width 3 mm.

*Type locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Derivatio nominis:* Named for the type locality.

*Discussion: Acteocina piramidesia,* n. sp., differs from *A. bullata* (Kiener, 1834), living in the West Indies, which has the lip straight, without anterior expansion, the aperture wider and spiral striations as ornamentation. *Acteocina elachista* Woodring, 1970, has a higher spire, the aperture beginning below the shoulder of the body-whorl is much wider and without anterior expansion. *Acteocina rusa* Gardner, 1937, has a higher spire, the aperture begins below the shoulder of the whorl; it is much wider, lacks an anterior expansion, and is ornamented with axial striations. *Acteocina candei* (d'Orbigny, 1842), living from the Antilles to Puerto Quequen (Prov. Bs. Aires), has the spire more elevated, the aperture beginning below the shoulder of the body-whorl is wider and lacks the anterior expansion. According to the author there are fine spiral striations. This is the first record for the Entrerriense Formation of South America.

Family RETUSIDAE
Genus VOLVULELLA Newton, 1891
VOLVULELLA aff. V. PHOINICOIDES
(Gardner, 1937)
Plate 7, figure 4

*Description:* Shell of small size, cylindrical, very thin; height three times width. Apical spine short, twisted, leaving a depresion between spine and shell. Outer lip thin, anteriorly expanded forming a flange. Strong columellar callus. Microscopically (X 40) no ornamentation seen.

*Hypotype:* MPEF-PI-257; height 3 mm, width 1.1 mm.

*Locality:* Puerto Piramide, Valdes Peninsula, Chubut Province, Argentina.

*Discussion:* This specimen is the only example obtained to date. From the conchological characters it is near *V. phoinicoides*, especially in its apical characters and its measurements. It differs by the structure of the anterior end, with a conspicuous columellar callus. This is the first record of the genus *Volvulella* from the Entrerriense Formation of South America.

Subclass PULMONATA
Order STYLOMMATOPHORA
Suborder ELASMOGNATHA
Superfamily SUCCINEOIDEA
Family SUCCINEIDAE
Subfamily SUCCINEINAE
Genus SUCCINEA Draparnaud, 1801
SUCCINEA MERIDIONALIS d'Orbigny, 1846
Plate 7, figure 5

*Description:* Shell diminutive, thin and fragile, translucent, imperforate; consisting of three convex whorls, the last representing more than two-thirds of total height; spire short with linear sutures, deep and inclined. Aperture elongate-oval, wider anteriorly, holoperistomate. Exteriorly smooth, with only growth lines.

*Hypotype:* MPEF-PI-258; height 7 mm, width 6 mm. Body-whorl: length 6 mm.

*Locality:* Puerto Piramide, Valdes Peninsula,

Chubut Province, Argentina.

*Discussion:* The presence of a pulmonate gastropod is not new to the Tertiary of Patagonia. Ihering (1907) mentioned for the Entrerriense of Paraná, as well as for the gray sands of the Rionegrense, the genera *Strophocheilus, Chilina, Ampullaria, Diplodon* and *Corbiculella*; also in that work are described species of the genus *Littorina* from waters typically brackish. But this is the first mention of the genus *Succinea* from the Entrerriense Formation of South America. We have no doubts with respect to the stratigraphic position of this example, having been obtained in depth and sieved from the sediments.

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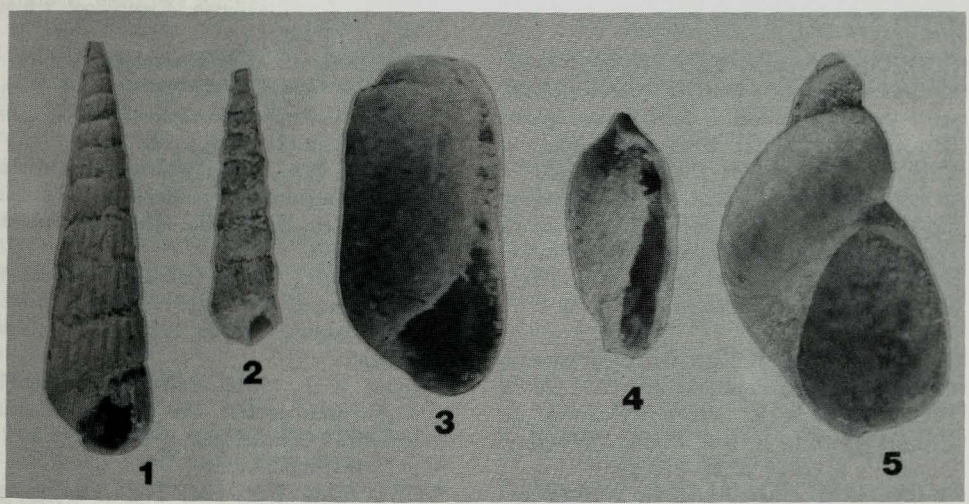


PLATE 7

Figures Page

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