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TWO NEW BIVALVES FROM THE PERMIAN "EURYDESMA FAUNA" OF EASTERN ARGENTINA

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ABSTRACT

Vacunella camachoi sp. nov. and **Deltopecten harringtoni** sp. nov. are described from the **Eurydesma** fauna, Bonete Formation (Pillahuinco Group), in the Sierras Australes of the Buenos Aires Province, Argentina.

A reassesment of the taxonomy, provincial affinities and age of the fauna reinforces its Gondwana character and indicates its probable correlation with early Permian faunas of Australia.

INTRODUCTION

Harrington (1955) described for the first time the **Eurydesma** fauna of the Sierras Australes of eastern Argentina. In addition to four species of **Eurydesma** he described from the fauna the brachiopods **"Chonetes" pillahuincensis, Notospirifer darwini** (Morris), the bivalves **Stutchburia? argentinensis** Harrington, **Astartella? pusila** Harrington, **Schizodus cycloliratus** Harrington, **Liopteria? dutoiti** Harrington, **L.? bonaerensis** Harrington, **Aphanaia? orbirugata** Harrington, **Promytilus acinaciformis** Harrington, and **Allorisma inflectoventris** Harrington. Harrington emphasized the Australian affinities of the fauna and indicated a general Permian age for it. Later (1969) he modified the taxonomic assignement of two species and referred to the presence in the fauna of deltopectinid bivalves, which probably correspond with one of the taxa treated below.

Dickins (1963) also suggested several amendments in the original generic determinations which nevertheless didn't alter Harrington's basic conclusions.

In the course of a revision of collections at the Departamento de Ciências Geológicas, Universidad de Buenos Aires, Argentina, on January, 1970, additional bivalves were recognized in the fauna. Some of these, together with specimens collected in the Sierra de la Ventana during field work in the company of Dr. Carlos R. Gonzalez, Instituto Miguel Lillo, Tucuman, Argentina, are described in this paper which also includes a short discussion of affinities and age of the **Eurydesma** fauna.

Except for the record of rare undescribed gastropods *(Murchisonia)* in the upper part of the Sauce Grande Formation and of the bivalve **Astartella? pusila** Harrington in the Piedra Azul Formation, most elements of the **Eurydesma**

fauna occur in the Bonete Formation (Pillahuinco Group). Besides the marine fauna, plant impressions of the **Glossopteris** flora have been described from the Bonete Formation (Harrington, 1934; Menendez, 1966), where they occur at some levels associated with the invertebrates, and more rarely in the Tunas Formation. See Harrington (1934, 1945, 1955 and 1969) for details on the Late Paleozoic stratigraphy and distribution of marine invertebrates and flora in the Sierras Australes.

Most specimens examined in the present research were collected at fossil locality M6, corresponding to mudstone bed BM6, with thickness varying from 32.5 – 42 m (Harrington, 1969), in the lower part of the Bonete Formation, at the Arroyo Piedra Azul area of the Sierra de Pillahuinco. The Bonete Formation is at least 314 m thick in this area. The fossils are generally badly preserved internal and external moulds.

AFFINITIES AND AGE OF THE EURYDESMA FAUNA

For a revised partial faunal list of the Sierras Australes see Rocha–Campos (1970).

Recent discussion on affinities and age of the **Eurydesma** fauna were presented by Rocha-Campos (1970) and Runnegar (1972). The bivalves described herein offer some additional information and thus, it seems convenient to review again the present status of knowledge. Reference will be made only to the more significant components of the fauna.

A complete taxonomic revision of the Argentinian specimens of **Eurydesma** is yet to be made, but a superficial analysis indicates that at least part of them are probably conspecific with **Eurydesma mytiloides** Reed and **E. playfordi** Dickins (Runnegar, 1970, 1972). **Eurydesma playfordi** is a typical member of the early Permian faunas of Eastern Australia (Runnegar, 1969). Species designated by Harrington (1955) as **E. cordatum** and **E. hobartense** are more difficult to assess. The latter is close to **E. hobartense hobartense** (Johnston, 1887, in Runnegar, 1970), from the Permian of Eastern Australia, but has more salient and pointed umbones and is more prosocline.

Myonia inflectoventris (Harrington) is similar to **Myonia? costata** Rocha-Campos (1970a), from the Lower Permian of the Paraná Basin (Rio Bonito Formation) and to **Myonia** sp. (Dickins, 1963), from the *"Upper Marine"* sequence of Eastern Australia. **Myonia cycloliratа** is a relatively small, strongly carinate species, probably close to **Myonia** sp. nov. (Dickins, 1963), from the Fossil Cliff Formation (early Permian) of Western Australia.

Elongate, apparently dorso-ventrally compressed specimens formerly identified by Harrington (1955) as **Stutchburia? argentinensis** and listed as **Myonia** (or **Vacunella)? argentinensis** in Rocha-Campos(1970b), are remarkably similar to a specimen identified as **Myonia** (or **Vacunella)?** sp. (Rocha-Campos,1970b), from the top of the Itararé Subgroup (Tubarão Group), Paraná Basin. In spite of the deformation, a carina is visible in both the Argentinian and Brazilian species and thus, they may fit into the **Myonia.** A similar species from Australia is **Myonia** or **Vacunella?** sp. (Runnegar, 1967) from the Artinskian **Eurydesma** beds of Queensland. From the illustration (pl. 4, fig. 16) it is not clearly visible if the species is carinate or not; its vertical posterior margin differs from the more obliquely truncated margin of the South American species.

Deltopecten harringtoni sp. nov. is acoarsely ribbed species close to **D. waterfordi** Dickins both characteristic of the Lower Permian beds of Western Australia. A close comparable species, **Deltopecten illawarensis** (Morris) occurs in the early Permian (Asselian) Allandalle fauna

of Eastern Australia (Runnegar, 1969).

Notospirifer Harrington is being now considered as a junior synonym of **Martiniopsis** Waagen (Runnegar, 1972). Shape, arrangement of plates and ornamentation of **Notospirifer darwini** indicate its probable close relationship with **Martiniopsis ovulum** (Waterhouse), which Waterhouse (1971) considers a cosmopolitan component of the early Permian cold-water faunas. According to Runnegar (1972) this species is closely related to **M. konincki** from the early Permian "*Allandale fauna*" of Eastern Australia.

In synthesis, all subsequent modifications in the taxonomy of the Sierras Australes fauna stressed its Gondwana provincial affinities; it seems also reasonable to assign an early Permian (Asselian or Sakmarian) age to the fauna (Runnegar, 1972).

SYSTEMATIC PALEONTOLOGY

FAMILY DELTOPECTINIDAE Dickins, 1957

GENUS DELTOPECTEN Etheridge, Jr., 1892

Type species: Pecten illawarensis Morris, 1845, by original designation

Deltopecten harringtoni sp. nov.

Plate 1, figs. 1 – 6

Deltopecten sp. nov. Rocha-Campos , 1970b, p. 608.

Holotype: UBA 5872, Departamento de Ciencias Geologicas, Universidad de Buenos Aires, Argentina.

Diagnosis: Shell biconvex, probably isoconvex; moderately wide secondary costae appearing apparently by bifurcation and finer ones by intercalation; growth lines and lamellae curving slightly towards ventral margin on costae.

Description: Holotype is an almost complete internal mould of a bivalve specimen. The shell is oval and probably acline. The ribs on posterior half of left valve are incurved, while the ones on the anterior part are more straight and densely disposed, which results in an appearance of inequilaterality. The left valve seems also less convex than the right, with convexity diminishing towards the ventral margin, while the right seems more homogeneously convex. The specimen is, however, obviously deformed and so the shape is probably artificially modified.

Anterior auricle of left valve large, plane or slightly concave, its internal limit being formed by a sulcus at the base of the steep anterior flank of valve (possibly also accentuated by deformation). It has probably at least six radial costae with unprecise evidence of finer, intercalated, secondary ones. Concentric ornamentation formed by growth lines.

Main part of left valve has at least 24 primary costae; they tend to be flat at an early stage and some show faint evidence of bifurcation. A few finer costae seem to intercalate irregularly among the primary ones. Costae are more densely spaced on both flanks of valve, close to auricles. Ornamentation on main part of right valve similar.

Anterior auricle of right valve is plane or slightly convex, separated from body of valve by a deep notch. Costae on this auricle are at least five, crossed by concentric growth lines and more conspicuous lamellae; posterior auricle not preserved.

Concentric ornamentation of both valves formed by growth lines and by lamellae, less conspicuous than on auricles. Both slightly swing towards ventral margin on costae.

Features of the ligament area not perfectly known; the mould of the left valve shows only part of the area with unprecise evidence of fine grooves parallel to its base and of a more

or less triangular depression under the umbo.

Paratypes A, B and C, fragmentary internal moulds of right valves, show details of shape and ornamentation of anterior auricle, flat and bifurcating costae and concentric ornamentation.

Dimensions	(mm)	Lenght	Height	Width (two valves)
Holotype UBA	5872	47 (inc.)	64	28
Paratype A UBA	5800A	–	53 (inc.)	–

Occurrence: Bonete Formation, Sierra de la Ventana, Buenos Aires Province, Argentina.

Discussion: Although smaller, **Deltopecten harringtoni** seems closely related to two flat ribbed species from Australia, **Deltopecten lyonensis** Dickins (1957, p. 41–44, pl. 7, figs. 1–5 and 9, pl. 8, figs. 11–13, pl. 9, fig. 12, pl. 10, figs. 3–4, and text-fig. 9), and **Deltopecten waterfordi** Dickins (1963, p. 79–81, pl. 12 , figs. 5–11), both from early Permian strata of Western Australia. From the first, it can be distinguished by the isoconvexity of valves, and probably by the character of ligament area. Dickins (1957) does not discuss the behaviour of the growth lines, but judging from his illustrations (pl. 7, fig. 1), the situation is similar as in **D. harringtoni.** From **D. waterfordi** the Argentinian species differs by its more oval shape and details of ornamentation, specialy opposing direction of inflection of concentric ornamentation on body of shell. The two species are, otherwise, strikingly similar and confrontation of larger collections of both may minimize their differences.

The species name is a tribute to the late Dr. Horacio Harrington, who first described the **Eurydesma** fauna of Argentina.

FAMILY PHOLADOMYIDAE Fleming, 1828
SUBFAMILY PHOLADOMYINAE Fleming, 1828
GENUS **VACUNELLA** Waterhouse, 1965
Type-species: Allorisma curvatum Morris, 1845, by original designation of Waterhouse, 1965
Vacunella camachoi, sp. nov.

Pl. 1, figs. 7–16

Vacunella sp. A, Rocha-Campos, 1970b, p. 608

Holotype: GP/IT 1200, Departamento de Paleontologia e Estratigrafia, Instituto de Geociências, Universidade de São Paulo.

Diagnosis: Moderately inflated, lacking a well marked lateral sulcus, with subparallel dorsal and ventral margins; beaks of umbones apparently slightly opisthogyrous.

Description: Holotype is an almost complete internal mould of a specimen with the two valves together. In antero-posterior view the shell seems inequivalve, with anterior upper margin and umbo of right valve higher than the left, but this may have been due to deformation. It is relatively elongated and moderately inflated. There is only a faint evidence of a shallow umbonal sulcus running from umbo to the middle of ventral margin. Anterior margin rounded; dorsal margin concave, ventral margin evenly convex, both subparallel, posterior end not preserved, but probably with a siphonal gape. Ventral margin shows a pedal gape which seems to extend at least to the intersection of umbonal sulcus. A narrow skutcheon is present, but the lunule is less visible. Ornamentation is composed of fine growth lines and rugae. Internal features

unknown.

Paratype A, a compressed internal mould of bivalved specimen shows a better marked, shallow lateral sulcus.

Other specimens collected from the Bonete Formation which are tentatively included in the new species (e.g. Fig. spec. GP/IT 1199) are considerably more elongate (possibly compressed dorso-ventrally) and show a deeper marked lateral sulcus. Anterior and posterior margins are incomplete and thus presence and characteristics of anterior and posterior gapes are difficult to assess. The latter is, however, probably present.

Dimensions	**(mm)**	**Lenght**	**Height** (at umbo)	**Width**
Holotype GP/IT	1200	54 (inc.)	23	21
Paratype A		42 (inc.)	20	10
Fig. spec. GP/IT	1199	65 (inc.)	25	19

Occurrence: All specimens from mudstone bed BM6, Bonete Formation, collecting site M6 in Harrington (1969), Sierra de la Ventana, Buenos Aires Province, Argentina.

Discussion: The retangular profile of **Vacunella camachoi** with subparallel dorsal and ventral margins, moderate inflation and absence of well marked lateral sulcus separate it from the other species described in the genus.

The elongate specimens tentatively included in the new species differ from **Myonia** (or **Vacunella**)? sp., from the upper part of the Itararé Subgroup (Tubarão Group) of Paraná Basin (Rocha-Campos, 1970a) and from **Stutchburia? argentinensis** Harrington (1955; = **Myonia** (or **Vacunella**)? **argentinensis**, in Rocha-Campos. 1970) which are still more elongate and carinate. The South American specimens seem however, compressed dorso-ventrally and thus, the comparison may be misleading. The holotype of **Stutchburia? argentinensis** is illustrated herein for comparison.

All specimens of **V. camachoi** examined have the valves together. During field work several specimens were found with longest axes inclined at about 50º from the bedding plane of the bioturbated mudstone bed (BM 6, in Harrington, 1969) and with posterior end upwards. A similar situation was reported by Dickins (in Veevers **et al.**, 1964, p. 79, pl. 9, fig. 2) for **Vacunella** and interpreted as representing the living position of a deep burrowing bivalve (Runnegar, 1966). The Argentinian species were oriented in a subparallel fashion (ranging from N110º – 150º magnetic), possibly in response to some environmental circunstance. As pointed out above, the moulds are variably crushed, probably as a result of sedimentary compaction, but some deformation and reorientation may have also been caused by folding and metamorphism which affected the Late Paleozoic rocks of the Sierra de la Ventana (Coates, 1969).

The species has been named after Prof. Horacio Camacho, University of Buenos Aires, Argentina.

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PLATE 1

Figs. 1–6 **Deltopecten harringtoni** sp. nov.

Fig. 1 UBA 5872, holotype, internal mould, lateral view of left valve, X1.

Fig. 2 idem, internal mould, lateral view of right valve, X1.

Fig. 3 idem, profile view showing biconvex shell, X1.

Fig. 4 UBA 5800A, paratype A, fragmentary internal mould of right valve showing ornamentation on body and anterior wing, X1.

Fig. 5 UBA 5848, paratype B, fragmentary internal mould of right (?) valve showing ornamentation, X1.

Fig. 6 UBA 5800B, paratype C, fragmentary internal mould of right valve showing ornamentation, X1.

Figs. 7, 9 – 11 **Vacunella camachoi** sp. nov.

Fig. 7 GP/IT 1200, holotype, internal mould, lateral view of left valve, X1.

Fig. 9 idem, ventral view showing pedal gape, X1.

Fig.10 idem, anterior view, X1.

Fig.11 idem, dorsal view, X1.

Fig. 12 **Vacunella** camachoi, UBA 5837, Paratype A, internal mould, lateral view of left valve showing lateral sulcus, X1.

Fig. 13 – 14 **Myonia** (or **Vacunella**) **argentinensis** (Harrington)

Fig. 13 UBA 5778, holotype, internal mould, lateral view of right valve showing carina, X 0.8.

Fig. 14 idem, lateral view of left valve, X 0.8.

Figs. 8, 15, 16 **Vacunella camachoi**?

Fig. 8 GP/IT 1199, internal mould, anterior view, X1.

Fig.15 idem, lateral view of right valve, showing lateral sulcus, X1.

Fig.16 idem, ventral view, X1.

PLATE 1