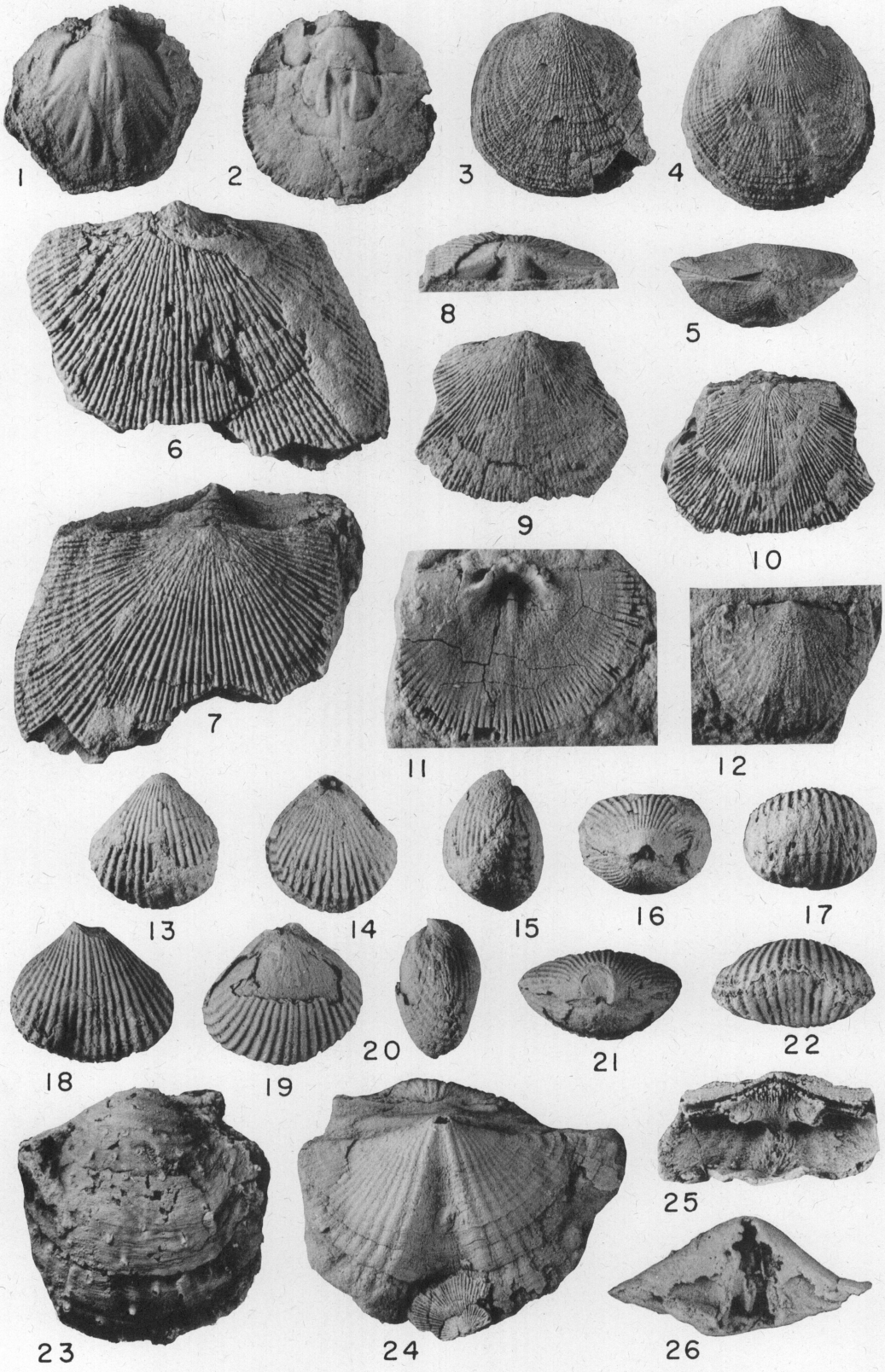
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JOURNAL OF PALEONTOLOGY, V. 40, NO. 1, P. 125-129, PL. 14, 2 TEXT-FIGS., JANUARY 1966

BRACHIOPODS FROM THE PILOT SHALE (DEVONIAN) IN SOUTHEASTERN NEVADA

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ABSTRACT—Six brachiopod species including *Syringothyris* sp. are described from the Pilot Shale in the Pahranagat Range of southeastern Nevada. The faunule also contains *Imitoceras* sp. The fossil-bearing beds are concluded to be of late Famennian age.

INTRODUCTION

DURING detailed investigations of Paleozoic stratigraphy in the Pahranagat Range, Reso made a small collection of brachiopods together with a single ammonoid from a bed of yellowish-brown siltstone, approximately 240 feet below the top of the Pilot Shale at Bactrian Mountain, sec. 11, T.5S., R.59E., Lincoln Co., Nevada (text-figs. 1,2).

In the preparation of this paper, Reso was responsible for the identification of the stratigraphic position and collection of the fossils. Johnson prepared the sections on systematic paleontology and on age and correlation. Dr. W. A. Oliver, Jr. identified *Neozaphrentis?* sp. and Dr. M. R. House identified *Imitoceras* sp. Tenneco Oil Company paid for the cost of preparing photographs of the fossil specimens.

AGE AND CORRELATION

The Pilot Shale faunule contains:

Rhipidomella sp. cf. *R. missouriensis*
Schuchertella sp. cf. *S. lens*
Retichonetes? sp.
Orbinaria? sp.
Sinotectirostrum? sp.
Syringothyris sp.
indet. spiriferid
indet. athyridid
Neozaphrentis? sp.
Imitoceras sp.
aff. *Mourlonia*
indet. gastropods
indet. pelecypods

Dr. House, who identified *Imitoceras* sp. (1965; written communication, 1963) reported that the genus ranges from the Famennian into the Lower Carboniferous and that in the United States it occurs in beds younger than those with the Three Forks Shale fauna and that of the Percha Shale —that is, late Famennian or younger. The brachiopod genus *Syringothyris* has a similar range and makes its first appearance in the late Famennian. The concurrent evidence from these two diagnostic elements in the faunule suggests that approximately the upper 240 feet of the Pilot

EXPLANATION OF PLATE 14

FIGS. *1–5—Rhipidomella* sp. cf. *R. missouriensis*. *1*, Internal mold of pedicle valve ×2.2, UCLA 39710; *2*, internal mold of pedicle valve ×1.6, UCLA 39711; *3*, ventral view ×1.6, UCLA 39712; *4,5*, ventral and posterior views ×1.6, UCLA 39713.

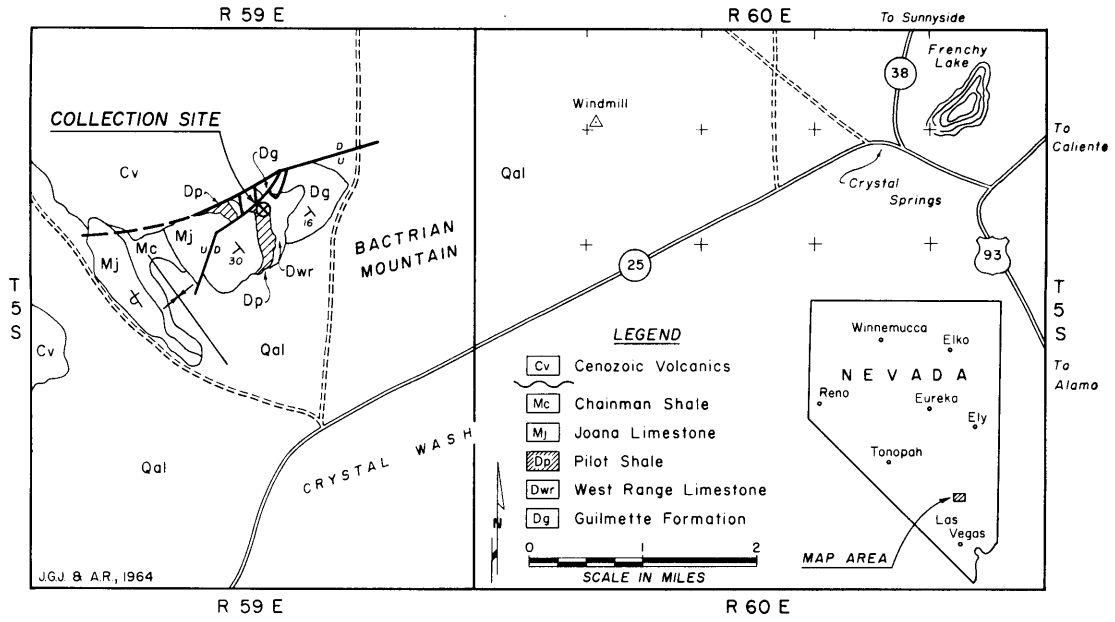
6–11—Schuchertella sp. cf. *S. lens*. *6,7*, Ventral and dorsal views ×3.3, UCLA 39714; *8*, posterior view of pedicle internal mold ×3.3, UCLA 39715, note absence of dental lamellae; *9,10*, Ventral and dorsal views ×2.2, UCLA, 39716, *11*, interior of brachial valve ×3.3, UCLA 39717.

12—Retichonetes? sp. Ventral view ×3.3, UCLA 39718.

13–22—Sinotectirostrum? sp. *13–17*, Ventral, dorsal, lateral, posterior, and anterior views ×2.2, UCLA 39719; *18–22*, ventral, dorsal, lateral, posterior, and anterior views ×2.2, UCLA 39720.

23—Orbinaria? sp. Ventral view ×3.3, UCLA 39721.

24–26—Syringothyris sp. *24*, Ventral view ×2.2, UCLA 39722 and 39723, note brachial valve still attached; *25*, brachial interior ×4.4, UCLA 39723 after disarticulation, note nearly linear sockets, cardinal plate and supporting septum, and striate area of diductor attachment; *26*, Posterior view of pedicle valve ×2.2, UCLA 39722, note portion of syrinx still attached to fragment of transverse subdelthyrial plate.



TEXT-FIG. 1—Index map showing collection site for brachiopods from the Pilot Shale.

Shale at Bactrian Mountain is of post Percha-Three Forks age (i.e. post Platyclymenia-Stufe; House, 1962, p. 262).

In the western United States, brachiopod assemblages are widely reported in faunal lists which bear considerable similarity to the faunule described below (Holland, 1952, p. 1707,1720; Sadlick, 1956, p. 66; Gutschick, Sutter, & Switek, 1962, p. 83). In the two latter papers the authors note a marked resemblance to the fauna of the Louisiana Limestone. Our faunule also bears some similarity with the Louisiana Limestone fauna (Williams, 1943) and may be correlative. The occurrence of *Rhipidomella* of the *missouriensis* type and *Schuchertella* of the *lens* type together with *Syringothyris*, *Imitoceras*, and possibly *Orbinaria* is in support of the correlation. *Neozaphrentis*? sp., although questionably identified generically, is very similar to specimens illustrated by Williams (1943, pl. 6, figs. 31–37) as *Neozaphrentis* spp. (W. A. Oliver, Jr., written communication, 8-18-59).

Tentative correlation with the Louisiana Limestone, now regarded as of latest Devonian age (Collinson, Scott, & Rexroad, 1962, p. 154, 155), together with the stratigraphic position of the Pilot Shale faunule above early Famennian West Range Limestone fauna (Reso, 1963) suggests that at least the lower part of the Pilot Shale at the Bactrian Mountain section is of Famennian rather than Early Carboniferous age.

Imitoceras has also been reported from a horizon 250 feet below the Pilot-Joana contact near Conger Mountain in the southern part of the Confusion Range (Sadlick, 1960 & written communication, 1963) and in other recent papers a Devonian age has been demonstrated for part of the formation (Clark & Becker, 1960, p. 1668; Langenheim, 1961).

SYSTEMATIC PALEONTOLOGY

Family RHIPIDOMELLIDAE

Subfamily RHIPIDOMELLINAE

Genus RHIPIDOMELLA Oehlert

RHIPIDOMELLA sp. cf. R. MISSOURIENSIS (Swallow, 1860)

Pl. 14, figs. 1–5

Material.—There are 65 specimens in the collection.

Exterior.—Small shells are transversely suboval. In larger shells the suboval outline is commonly modified to a semi-quadrate one and uncommonly the shape of large shells is slightly elongate and subpyriform. The maximum width of most shells is somewhat anterior to midlength. The valves are subequally to unequally biconvex with the brachial valve slightly more convex, especially in the anterior half of the shell. The anteromedial portions of the pedicle valve tend to be almost flat. No suggestion of fold or sulcus is discernible and the anterior commissure is rectimarginate. The interarea of the pedicle valve is less than half of the maximum width of the shell and is low, apsacline, and incurved. The inter-

area of the brachial valve is orthocline and nearly flat.

Ornament consists of growth lines that are strongly defined at regular intervals, crossed by fine costellae.

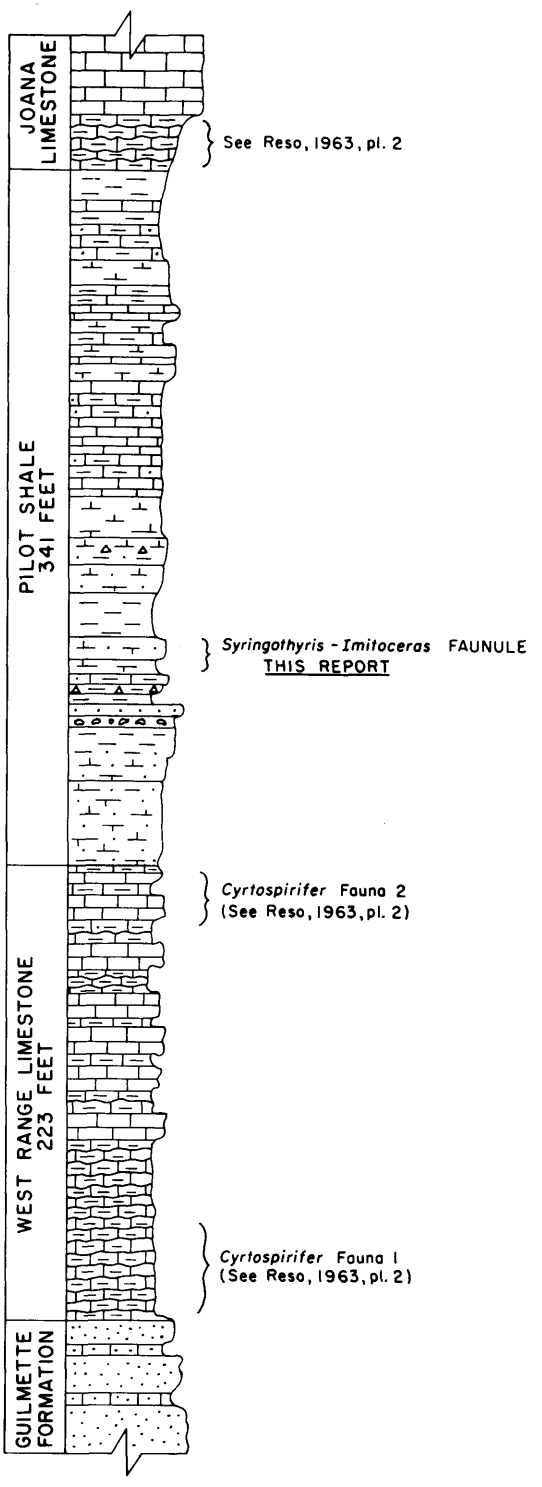
Interior of pedicle valve.—The beak bears a well developed pedicle callist across which there are broadly arcuate transverse striae. The callist is sharply set off from the posterior portion of the muscle field by a small step. Thin, short, widely divergent dental lamellae are present adjacent to the posterior portion of the adjustor muscle impressions. The muscle field has relatively large adductor impressions enclosed laterally and anteriorly by flabellate diductor impressions. The diductor scars are commonly straight-sided laterally and are each basically bilobed anteriorly in some shells, but in others the diductor impressions are multilobed and relatively large. The median pair of diductor lobes project further anteriorly than do the lateral ones. The muscle field in the less flabellate specimens is more or less restricted to the medial two-fifths of the width of the shell and projects very slightly anterior to the midlength of the shell. The crenulations at the anterior margin consist of simple, rounded ridges separated by U-shaped interspaces.

Interior of brachial valve.—The cardinalia are not well exposed, but are seen to consist of straight rounded brachiophores that diverge at an angle of approximately 115 degrees and laterally flank an erect cardinal process. The adductor scars are relatively smooth, broadly elongate oval, and separated by a prominent myophragm that extends to about midlength.

Family SCHUCHERTELLIDAE
Subfamily SCHUCHERTELLINAE
Genus SCHUCHERTELLA Girty
SCHUCHERTELLA sp. cf. S. LENS
(White, 1862)
Pl. 14, figs. 6–11

Material.—There are 21 specimens of this form in the collection.

Exterior.—The shells are slightly wider than long and suboval to slightly quadrate in outline. The valves are unequally biconvex in lateral profile with the pedicle valve having a convexity about twice that of the brachial valve. In small specimens, the umbo of the pedicle valve is relatively convex and the curvature toward the anterior is very slight. In addition, the maximum width is very close to the hinge line. In large specimens, convexity of the pedicle valve is more uniform from posterior to anterior and the maximum width is near midlength. The interarea of the pedicle valve is prominent, nearly flat, and apsacline to nearly catacline. The convex pseu-



TEXT-FIG. 2—Columnar section of Pilot Shale and associated rocks at Bactrian Mountain exposures.

dodeltidium covers the delthyrium and bears growth lines continuous with the interarea. The shells are small to medium sized for the genus. The largest specimen is 20 mm long.

Concentric ornament is not well developed. Radial ornament consists of costellae of uniform size distributed evenly across the shell without any trace of parvicostellation. The costellae increase in number anteriorly by bifurcation on the pedicle valve and by intercalation on the brachial valve. On the brachial valve of one specimen there are 10 costellae per 2 mm. at a distance of 5 mm. from the beak. The anterior commissure is rectimarginate.

Interior of pedicle valve.—An internal mold reveals the tracks of the teeth impressed along the sides of the delthyrium, but dental lamellae are completely absent. The interior is crenulated by the impression of the costellae.

Interior of brachial valve.—The cardinalia consist of socket ridges joined posteromedially by a posteriorly directed bilobed cardinal process. There is a short longitudinal ridge at the anteromedial edge of the cardinal plate. The adductor muscle filed appears to be flabellate, although its anterolateral margins blend almost imperceptibly with the surrounding shell interior. A low myophragm bisects the muscle field. The margins are crenulated by the impression of the costellae.

Family CHONETIDAE
Subfamily CHONETINAE

Muir-Wood (1962, p. 62) assigned *Retichonetes* to a new subfamily Retichonetinae, but the type species of *Retichonetes* (the only genus assigned to the new subfamily) is so close to *Chonetes* s.s. in overall morphology and particularly in the presence of both lateral and accessory septa and in the style of the cardinalia (Muir-Wood, 1962, fig. 13, p. 62) that the writer assigns *Retichonetes* to the Chonetinae.

Genus RETICHONETES Muir-Wood
RETICHONETES? sp.
Pl. 14, fig. 12

Material.—There are 15 specimens in the collection.

Exterior.—The shells are very small and are concavo-convex in lateral profile. The cardinal angles are obtusely rounded so that maximum width is attained slightly anterior to the hinge line. The outline is transverse shield-shaped. The ornament consists of approximately 20 to 28 costellae on each valve.

Interior of pedicle valve.—On one specimen, small triangular teeth and a short but distinct median septum are discernible.

Interior of brachial valve.—One fragmentary brachial valve was etched free. It bears what appears to be a very long, thin accessory septum and a median ridge. The cardinalia are not preserved.

Family PRODUCTELLIDAE
Subfamily PRODUCTELLINAE
Genus ORBINARIA Muir-Wood & Cooper
ORBINARIA? sp.
Pl. 14, fig. 23

Material.—There are 13 specimens in the collection.

Exterior.—The shells are small and concavo-convex with the pedicle valve very strongly convex. The hinge line is straight, laterally forming small auricular projections adjoining the umbo. Maximum width is near midlength. The pedicle valve is covered with fine, closely-spaced growth lines that are distinctly irregular and wavy. Poorly developed rugae are present at irregular intervals anterior to the beak. Spines are present on the surface of the pedicle valve at more or less widely spaced intervals. In most cases, the spines originate at the anterior ends of short radial ridges as in *Spinulicosta*. Spines are not present on the brachial valve.

Family TRIGONIRHYNCHIIDAE
Genus SINOTECTIROSTRUM Sartenaer
SINOTECTIROSTRUM? sp.
Pl. 14, figs. 13–22

Material.—There are 51 articulated specimens in the collection.

Exterior.—The valves vary from somewhat flatly biconvex to strongly biconvex with the brachial valve more convex than the pedicle valve. Most of the specimens are transversely suboval, but a few have a somewhat triangular outline with the maximum width well anterior to midlength. A few shells are elongate suboval. The beak of the pedicle valve is small and is strongly incurved over the beak of the brachial valve. There is a shallow sulcus in the pedicle valve and a corresponding low fold at the anterior of the brachial valve. However, the fold and sulcus merge gradually with the flanks of the valves and are not sharply set off as in many rhynchonellids. In several of the larger specimens the shape is subcuboidal and there is a well developed tongue at the anterior commissure of the pedicle valve giving the shells a hypothyridinaform appearance. The number of rounded costae varies between about 22 to 26 on each shell. There are seven costae in the sulcus of the pedicle valve of most specimens.

Interior structures.—There appear to be thin, short, dental lamellae in the pedicle valve, but brachial valve structures are not preserved in the specimens studied.

Family SYRINGOTHYRIDIDAE
Subfamily SYRINGOTHYRIDINAE
Genus SYRINGOTHYRIS Winchell
SYRINGOTHYRIS sp.
Pl. 14, figs. 24–26

Material.—There are 7 pedicle valves and 3 brachial valves in the collection.

Exterior.—The valves are unequally biconvex with the pedicle valve strongly convex and cyrtinaform. The shells are transverse and attain their greatest width at or near the hinge line. The ventral interarea is nearly catacline and flat to slightly incurved. Its height varies from slightly less to slightly more than the length of the pedicle valve. The delthyrium encompasses an angle of approximately 30 degrees. The vertical striae on the interarea are normal to the hinge line near the delthyrium, but diverge slightly laterally so that the striae near the lateral margins approximately parallel the sides of the delthyrium. The dorsal interarea is anacline. An unplicated ventral sulcus and a dorsal fold are present. About 15 low rounded plications are present on each flank of the single well preserved pedicle valve. Growth lines are not prominent. Fine ornament is not preserved.

Interior of pedicle valve.—Long narrowly divergent dental lamellae are present, reaching more than half way to the anterior of the valve. The edges of the dental lamellae are strongly concave dorsally. The umbonal cavities are partly filled with shell material, but not so completely as to obscure the dental lamellae. Beneath the edges of the delthyrium there is a concave subdelthyrial plate connecting the dental lamellae. A syrinx, in the form of an elongate incomplete tube, constitutes the medial part of the subdelthyrial plate. There is a deep longitudinal groove medially on the inner side of the syrinx. A median septum is not developed.

Interior of brachial valve.—The sockets are linear and lie along the inner edge of the interarea, diverging widely laterally. A cardinal plate joins the inner socket walls and posteriorly bears a very broad striate area of diductor attachment. Flatly oval crural bases form the anterior portions of the cardinal plate and diverge widely anterolaterally. Medially the cardinal plate is supported by a pillar-like septum that does not extend beyond its anterior edge. The interior is crenulated by the impression of the plications.

Shell structure.—No trace of punctation was observed although the disposition of the calcite fibers was clearly visible on one of the specimens.

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