

NEW BRACHIOPODS FROM CUBA

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ABSTRACT—A new genus, *Orthothyris*, belonging to the Cancellothyridinae and coming from Cretaceous rocks of Habana Province is a lateral offshoot from *Terebratulina* or *Disculina*. A second new genus *Phragmothyris* is described. This proves to be a forerunner of the modern West Indian genus *Argyrotheca*. The Eocene *Phragmothyris* is unlike modern *Argyrotheca* in having a deltidial cover and strong muscle platforms. *Orthothyris* is represented by the type species only, *O. radiata*, n. sp., while five new species of *Phragmothyris* are described: *P. costellata*, *P. cubensis*, *P. palmeri*, *P. rotunda* and *P. subplana*.

THE brachiopods described and figured herein were presented to the U. S. National Museum by Dr. Robert H. Palmer (Acc. 182551). The collection presented is not a large one but it represents the accumulation of a life-time of collecting in the Mesozoic and Tertiary rocks of Cuba. I gathered from Dr. Palmer during a visit to the Museum some years ago that brachiopods are not common in the early Tertiary of Cuba, or indeed, in most of the Tertiary and Cretaceous. The specimens described herein are rare forms but they add considerably to our knowledge of the subfamilies Megathirinae and Cancellothyridinae. The enormous and corroded foramen of *Argyrotheca* and its allies of the Megathirinae has been a puzzling structure but the Cuban specimens show the foramen to have originally been constricted by a prominent symphytium. The member of the Cancellothyridinae herein described is clearly an aberrant form, a lateral off-shoot of the tribe.

SYSTEMATIC DESCRIPTIONS

Superfamily TEREBRATULACEA

Family TEREBRATULIDAE

Subfamily CANCELLOTHYRIDINAE

Genus ORTHOTHYRIS Cooper, n. gen.

Shell small, having the appearance of an orthid and with a wide, straight hinge; elongate oval in outline; anterior commissure broadly sulcate; profile slightly biconvex to markedly concavo-convex; surface distantly costate. Shell substance punctate.

Pedicle valve deeper than the brachial valve; beak ridges strong and sharp; interarea long and broad, concave; foramen small, margined by thickened, elevated deltidial plates; musculature unknown.

Brachial valve with deep sockets defined by erect socket plates welded to a broad thickening, sulcate in the middle, that protrudes slightly from the hinge and served as a cardinal process; loop attached to anterior base of socket plate. Loop short, somewhat obliquely placed and extending toward the pedicle valve, probably like *Terebratulina*. Anterior margin scalloped as in *Orthis*.

Type species.—*Orthothyris radiata* Cooper, n. sp.

Discussion.—This genus is characterized by its form and ornamentation which are like that of the genus *Orthambonites* of the Ordovician Period; the nature of the pedicle opening which is wide and modified only by elevated plates on its sides; the wide hinge and the interior. The genus has relationships to *Terebratulina* in the form of the hinge and the brachial interior but significant differences may be noted. *Orthothyris* is also different from all other genera now placed in the subfamily Cancellothyridinae.

Orthothyris differs from *Terebratulina* exteriorly in having the brachial valve convex only just anterior to the umbo and in having strong undivided costae. In the beak region of the pedicle valve *Terebratulina* has remnant deltidial plates located at the lower angles of the delthyrium but *Orthothyris* has the delthyrium margined by narrowly triangular plates along the delthyrial edge. These plates are fairly strongly elevated anteriorly but descend toward the apex. Unlike *Terebratulina* the delthyrium is bounded by a wide interarea which is margined laterally by sharply angular and prominent beak ridges. The apex appears to be thickened as it is in *Terebratulina*.

Inside the brachial valve the cardinal

process is wide, short and sulcate in the middle and lies between the small, narrow socket plates which are like those of *Terebratulina*. The bases of the loop arise abruptly at the base of the socket ridge and indicate that the loop extended toward the pedicle valve rather than anteriorly. The writer prepared several specimens but was unable to produce a complete loop. The brachial structures are so like those of *Terebratulina* that it is probable that the loop too, was like that of *Terebratulina*.

Although *Orthothyris* has the form of several other genera of the Cancellothyridae it is unlike any of them. The wide hinge is suggestive of *Chlidonophora* but the beak region and ornamentation are totally unlike. *Eucalathis* is fairly strongly costate but the umbonal region of the brachial valve of *Orthothyris* is different and that valve of *Eucalathis* is uniformly convex. *Murravia* is suggestive but it is not so wide hinged and is finely costellate. Inside the brachial valve the socket-ridges are closely crowded and thick rather than widely separated and slender as in *Orthothyris*. The beak region of the pedicle valve is likewise quite different, that of *Murravia* being more like *Terebratulina* in having discrete and thick deltidial plates located at the lateral angles of the delthyrium. *Orthothyris* differs from *Rhynchonellopsis* Vincent, a Belgian terebratulinoïd, in having a strongly costate ornamentation and a wide hinge.

ORTHOTHYRIS RADIATA Cooper, n. sp.
Plate 15, C, figures 16–20

Shell small, elongate oval in outline and with the widest part at about the middle; hinge narrower than the maximum shell-width, sides gently rounded; anterior margin narrowly rounded; surface costate.

Pedicle valve moderately convex in lateral profile and with the maximum curvature just posterior to the middle; anterior profile strongly and narrowly convex and with steep lateral slopes. Surface marked by strong, narrowly rounded costae separated by broad shallow grooves. Costae numbering 16 to 18. Beak strongly incurved; umbo narrowly convex, the convexity continued anteriorly and strongly to the valve middle, then lessening anteriorly, but nevertheless, forming a poorly defined fold.

Brachial valve with smooth, swollen umbo forming point from which costae radiate; lateral profile uneven, somewhat narrowly convex in the posterior fifth but moderately concave anteriorly; anterior profile broadly and gently concave. Posterolateral extremities flattened and marked by about five costellae radiating from the umbo; remainder of valve marked by strong distant costae, thus dividing the valve into two costellate sectors and a costate part, the latter occupying most of the valve. Place of division between two costellate sectors marked by oblique narrowly rounded but low fold. Median region anterior to the umbo gently concave to form a broad and shallow sulcus that extends to the anterior margin; flanks slightly convex and bent in the direction of the brachial valve.

Measurements in millimeters:

	Length	Brachial length	Mid-width	Hinge width	Thickness
Holotype	4.0	3.4	3.5	2.7	1.8

Types.—Holotype: USNM 108687; unfigured paratypes: USNM 108687a–r.

Horizon and locality.—Upper Cretaceous in Cuba, 1 mile west of Central San Antonio, Habana Province, Cuba.

Discussion.—No other species of this genus is known to which this one may be compared.

Superfamily TEREBRATELLACEA Subfamily MEGATHIRINAE

Genus PHRAGMOTHYRIS Cooper, n. gen.

Shell small, attaining a width of slightly more than a half inch; outline and profile variable, valves moderately to strongly convex, the pedicle valve always the deeper of the two; anterior commissure rectimarginate to broadly sulcate; surface multicostellate. Shell substance coarsely punctate.

Pedicle valve often misshapen and with a large submegathyrid foramen; symphytium rarely complete, usually resorbed and reduced to vestiges or not developed. Teeth large, not supported by dental plates; interarea narrow; median ridge extending from beak nearly to front margin. Pedicle collar short.

Brachial valve with wide and deep sockets bounded by strong, elevated socket-ridges; adductor muscles situated on a thick,

elevated muscle platform; median septum extending from beak to anterior margin, strongly elevated and bisecting the shell cavity. Median septum elevated above floor of muscle platform. Loop a broad ribbon extending from the socket-ridges around the outside of the muscle platform and uniting with the floor of the valve under the muscle platform.

Type species.—*Phragmothyris cubensis* Cooper, n. sp.

Discussion.—*Phragmothyris* has obvious similarities to modern *Argyrotheca* in its opposite folding, median septa in both valves, and the type of loop in the brachial valve. Differences appear in the lack of a supported pedicle collar or shelf in the pedicle valve, the median ridge or septum of the pedicle valve extending from apex nearly to the anterior margin, the loop of the brachial valve lacking the medially directed loop extensions at the posterior, the attachment of the loop to the septum at the base of the adductor callosity or platform and the presence of thick adductor platforms. The most significant difference, however, is the presence of a deltidial cover, probably a symphytium.

Inside the pedicle valve of most Recent *Argyrotheca* the apex is marked by a nearly flat or concave plate with concave to pointed anterior margin. The plate is generally supported by a narrow and elevated median septum that extends to the valve middle. In all of the specimens of *Phragmothyris* examined this plate was not present or had been completely eroded away by the close attachment habit of these shells. The median septum of *Phragmothyris* is less conspicuous than that of *Argyrotheca* and generally is only strongly developed in the posterior part on the diductor muscle callosity or platform. Anterior to this point the elevation is not a septum but a low, often broad ridge, as illustrated by the pedicle valve of *P. cubensis*, plate 15, H, fig. 54. The diductor platform extends anteriorly to a position about under the teeth. This thickening is considerable in *P. cubensis* but is not greatly developed in the other species.

The cover over the delthyrium is a feature unknown in any *Argyrotheca*, Recent or fossil. It is exhibited by only two specimens in the collection studied. In *P. palmeri*

which shows it in its most complete state, the plate is nearly flat on the sides but rises as a low arch highest at the middle. The foramen and the posterior edge of the cover are irregular and worn by pressure against the surface of attachment. The true nature of the foramen is thus unknown. The cover on the holotype of *P. cubensis* is a remnant only but it shows that this species must have had a calcified cover. In this species too the edge of the deltidial cover is worn and irregular as is the posterior margin of the foramen. It is my belief that these covers were preserved by accidents of life. In the instance of *P. palmeri* the animal lived in such a way that only the apex of the shell was brought tightly against the place of attachment. In *P. cubensis*, on the other hand, the surface on which the individual was attached was sufficiently large to rub away or prevent the growth of most of the deltidial plate as well as part of the posterior margin. It is believed that most of the other specimens would have had covers if by accident the attachment surface through life had not been a broad surface that wore most of the beak, including the deltidial cover, completely away. In some specimens of *P. rotunda* wear at the beak went so far that even part of the brachial umbo was abraded. The wear at the beak started so early in life that the deltidial covers of the few immature specimens in the collection were likewise worn off. The cover of *P. palmeri* extends from the foramen almost to the brachial valve and leaves only a small slit-like portion of delthyrium uncovered. This is a great contrast to Recent *Argyrotheca* in which the posterior part of the delthyrium is partially closed by the delthyrial plate and by disjunct and fragmentary deltidial plates. Some Recent specimens show small lateral plates along the delthyrial edge and at an angle to the interarea.

The interior of the brachial valve is essentially like that of *Argyrotheca* but differs importantly in some respects. The median septum and adductor platform are exceedingly variable. Like *Argyrotheca* the median ridge rises to a crest and is often serrated on its anterior edge but the septum of *Phragmothyris* is much more robust and is often thickened or expanded into a shovel- or spoon-shaped plate (see pl. 15,

D, figs. 21–23). Such a thickening is rare in the modern *Argyrotheca* but can be seen in some specimens of *A. lutea* Dall. In *Phragmothyris* the maximum thickening occupies nearly the posterior half. Two pairs of muscle scars are visible, one in the posterolateral side of the callosity and the other on the anteromedian side. When the callosity is viewed from the anterior, as in the case of *P. rotunda* in which the thickening is great, large punctae are visible on the anterior face, punctae that are much larger than the normal punctae of the shell.

The socket ridges of the brachial valve are generally somewhat more conspicuous than those of Recent *Argyrotheca*. The loop is short and makes a narrow curve laterally from the base of the socket ridge to which it is united by a short crus, to join the floor of the valve at the anterior base of the adductor callosity. In the Recent pauciplcate *Argyrotheca* the loop makes a broader curve and unites with the floor and the septum near the anterior margin. In Recent *Argyrotheca* a process of the loop extends medially as a sharp point or crural process. Preparations of *Phragmothyris* do not exhibit this process but do show an extension of the loop anteriorly and toward the pedicle valve. This feature can be seen in *P. subplana* and *P. costellata*.

The exterior of *Phragmothyris* is quite different from that of the type species of *Argyrotheca*, *A. cuneata*, the folding of which is paucicostate opposite. That of *Phragmothyris* is multicostellate opposite. It is an interesting fact that the costellation is opposite even in the most finely marked of the species. Two Recent West Indian species are like *Phragmothyris* in ornamentation and may be referable to that genus: *A. lutea* Dall and *A. barrettiana* Davidson.

PHRAGMOTHYRIS COSTELLATA

Cooper, n. sp.

Plate 15, B, figures 7–15;

D, figures 21–23

Shell of medium size for the genus, wider than long; subrectangular in outline; hinge narrower than the greatest width which is at or near the middle; cardinal extremities rounded; sides and anterior margin broadly rounded; anterior commissure gently sul-

cate. Surface costellate; costellae narrowly rounded, separated by striae slightly narrower than the costellae and numbering about 40.

Pedicle valve gently convex in lateral profile but moderately and narrowly convex in anterior profile; umbo worn away; median region swollen; anterior region convex and with a slight suggestion of a fold at the anterior margin; flanks rounded and steep. Interarea short, mostly worn away.

Brachial valve fairly strongly convex in lateral profile and with the maximum convexity at about the middle; anterior profile broadly and strongly convex; umbo swollen; sulcus narrow and shallow, originating just anterior to the umbo; flanks swollen and with moderately long steep slopes. Interior with thickened muscle platforms and often expanded median septum.

Measurements in millimeters:

	Length	Brachial length	Mid-width	Hinge width	Thickness
Holotype	9.4	8.7	10.6	8.0	7.6

Types.—Holotype: USNM 561502a; figured paratypes: USNM 561502b, c; 561507; unfigured paratypes: USNM 561502d, f; 561503.

Horizon and locality.—Eocene in Cuba (1102) 4.65 kilometers west of Guanajay on the road to Mariel, Pinar del Rio Province; Cojimar formation (976), 1.5 to 2.5 kilometers west of Cojimar on the carretera to Casa Blanca, Habana Province.

Discussion.—This species is characterized by its small size, fine, sharp costellae, apsacline interarea, and the less elevated median septum. The species is most like *P. rotunda* but it is smaller and has sharper, more elevated costellae. Furthermore, the median septum of *P. rotunda* is more erect and the crest is turned posteriorly. In *P. costellata*, on the other hand, the crest of the septum is not so strongly elevated and is not curved in a posterior direction (compare pl. 15, D, fig. 23 with E, fig. 30).

PHRAGMOTHYRIS CUBENSIS

Cooper, n. sp.

Plate 15, H, figures 47–56

Shell large for the genus, length and width nearly equal; subtriangular in outline;

maximum width in the anterior half; sides oblique outward; anterolateral extremities narrowly rounded; anterior margin broadly rounded; anterior commissure rectimarginate; surface marked by irregular crowded costellae, broad and flattened, often curved; eight costellae in 5 mm. at the front margin.

Pedicle valve moderately convex in lateral profile, broadly and moderately convex in anterior profile. Umbonal region worn away; median region swollen, marked by a shallow and indistinct sulcus; flanks convex and steep. Symphytium a remnant; interarea short and orthocline.

Brachial valve unevenly convex in lateral profile and with the anterior and posterior flattened but the median region moderately convex; anterior profile broadly convex; umbo flattened; median region swollen; anterior somewhat flattened; flanks with long and gentle slopes.

Measurements in millimeters:

	Length	Brachial length	Mid-width	Hinge width	Thickness	Maximum width
Holotype	15.8	11.4	14.0	8.7	7.7	14.4

Types.—Holotype: USNM 561504a; figured paratypes: USNM 561504b, c.

Horizon and locality.—Eocene in Cuba in a deep cut north of Grua 9, Ramal Juan Criollo, Camaguey Province, Cuba.

Discussion.—This species is distinctive because of its elongated and erect beak, the delthyrium partially covered by a symphytium, the sharp costellae, the flattened brachial umbonal region, and the compressed form. The species is ornamented somewhat like *P. rotunda* but differs in having a shallower brachial valve, a flattened umbo on the brachial valve, and an elongated, erect beak. It differs from *P. costellata* in the same characters. It is larger, has a more erect beak and finer ornamentation than any of the other species described herein.

PHRAGMOTHYRIS PALMERI

Cooper, n. sp.

Plate 15, F, figures 33–38

Shell of about medium size for the genus, wider than long; hemiconical; cardinal extremities slightly obtuse; sides nearly straight; anterior margin broadly rounded; anterior commissure rectimarginate; surface marked by distant costellae that increase by implantation, six costellae meeting the

beak of the brachial valve, the others intercalated to produce 22 to 25 along the margin.

Pedicle valve hemiconical in outline, gently convex in lateral profile and narrowly convex in anterior profile; umbo resorbed, foramen large and irregular; median sulcus narrow and shallow extending for the full length of the valve; flanks bounding sulcus narrowly rounded and with steep slopes. Interarea long, apsacline; symphytium long, wide, and gently convex.

Brachial valve gently convex in lateral and anterior profiles; umbo gently swollen; median sulcus narrow and shallow, disappearing at about the valve middle where two costellae are intercalated. Flanks very gently convex.

Measurements in millimeters:

	Length	Brachial length	Mid-width	Hinge width	Thickness
Holotype	7.3	5.6	8.2	7.9	6.9

Type.—Holotype: USNM 561506.

Horizon and locality.—Eocene in Cuba in a deep cut north of Grua 9, Ramal Juan Criollo, Camaguey Province, Cuba.

Discussion.—This species is unlike any other described in this paper in having the delthyrium completely covered by a long and prominent symphytium. The brachial valve is gently convex and ornamented by somewhat distant costellae rather than closely crowded ones as in *P. rotunda*, *P. costellata* and *P. cubensis*. The ornamentation is suggestive of *Argyrotheca* rather than *Phragmothiris*.

PHRAGMOTHYRIS ROTUNDA

Cooper, n. sp.

Plate 15, E, figures 24–32

Shell large for the genus, rounded in outline but slightly wider than long; hinge narrower than the shell width; sides and anterior margin well rounded; anterior commissure straight; surface marked by broadly rounded costae numbering 30 to 40 at the front margin; increase of costae is by intercalation.

Pedicle valve unevenly convex in lateral profile, the posterior half having the greater convexity, the anterior half somewhat flattened, anterior profile strongly convex. Umbonal and beak regions worn away; posteromedian region inflated; anterior

somewhat flattened; flanks gently convex and steep-sided. Interarea strongly apsacline; symphytium remnants small.

Brachial valve moderately convex in lateral profile and broadly and moderately convex in anterior profile; umbo and median region moderately swollen; anterior and lateral slopes about equally inclined, moderately steep. Muscle callosities moderately elevated.

Measurements in millimeters:

	Length	Brachial length	Mid-width	Hinge width	Thickness
Holotype	11.8	10.7	13.5	10.2	8.0
561509a	13.4	12.9	15.5	11.0	10.8

Types.—Holotype: USNM 561508a; figured paratype: USNM 561508b; measured paratype: USNM 561509a; unfigured paratypes: USNM 561509b-f.

Horizon and locality.—Eocene in Cuba, north of Carretera Central, 2.1–2.2 miles on road to San Diego los Banos, Habana Province.

Discussion.—This is the largest of all the known species of *Phragmothyrus*. The species is most like *P. costellata* and the differences and similarities are discussed under that species. The median ridge reaches its most elaborate development in this species.

PHRAGMOTHYRIS SUBPLANA

Cooper, n. sp.

Plate 15, A, figures 1–6;

G, figures 39–46

Shell of about medium size for the genus, subrectangular in outline, wider than long but with the hinge narrower than the mid-width. Sides gently rounded; anterior margin broadly rounded; cardinal extremities narrowly rounded. Anterior commissure broadly sulcate. Surface marked by about 32 broadly rounded costellae, increasing by intercallation in three generations; costellae beaded near the margins.

Pedicle valve gently convex in lateral profile and with the maximum convexity in

the posterior half; anterior profile broadly and moderately domed. Umbonal and median regions somewhat narrowly swollen to form a poorly defined median fold. Flanks flattened and with long, steep slopes to the margins. Interarea short, strongly apsacline. Foramen large.

Brachial valve gently convex in lateral profile and with the maximum convexity in the posterior half, anterior half somewhat flattened. Anterior profile broadly and faintly convex. Umbonal region gently convex; sulcus originating just anterior to umbo, broad and shallow; flanks bounding sulcus gently convex.

Measurements in millimeters:

	Length	Brachial length	Mid-width	Hinge width	Thickness
Holotype	9.9	9.1	10.7	8.4	5.5
Paratype 561498	10.6	10.2	13.3	11.4	6.2

Types.—Holotype: USNM 561500a; figured paratypes: USNM 561498, 561500b.

Horizon and locality.—Eocene in Cuba (1640) in deep cut north of Grua 9, Ramal Juan Criollo, Camaguey Province; (1102) 4.65 kilometers west of Guanajay on the road to Mariel, Pinar del Rio Province; Oligocene in Cuba (1660) in the long cut south of the Y-switch Ramal Valle, Central Jatibonico, Camaguey Province.

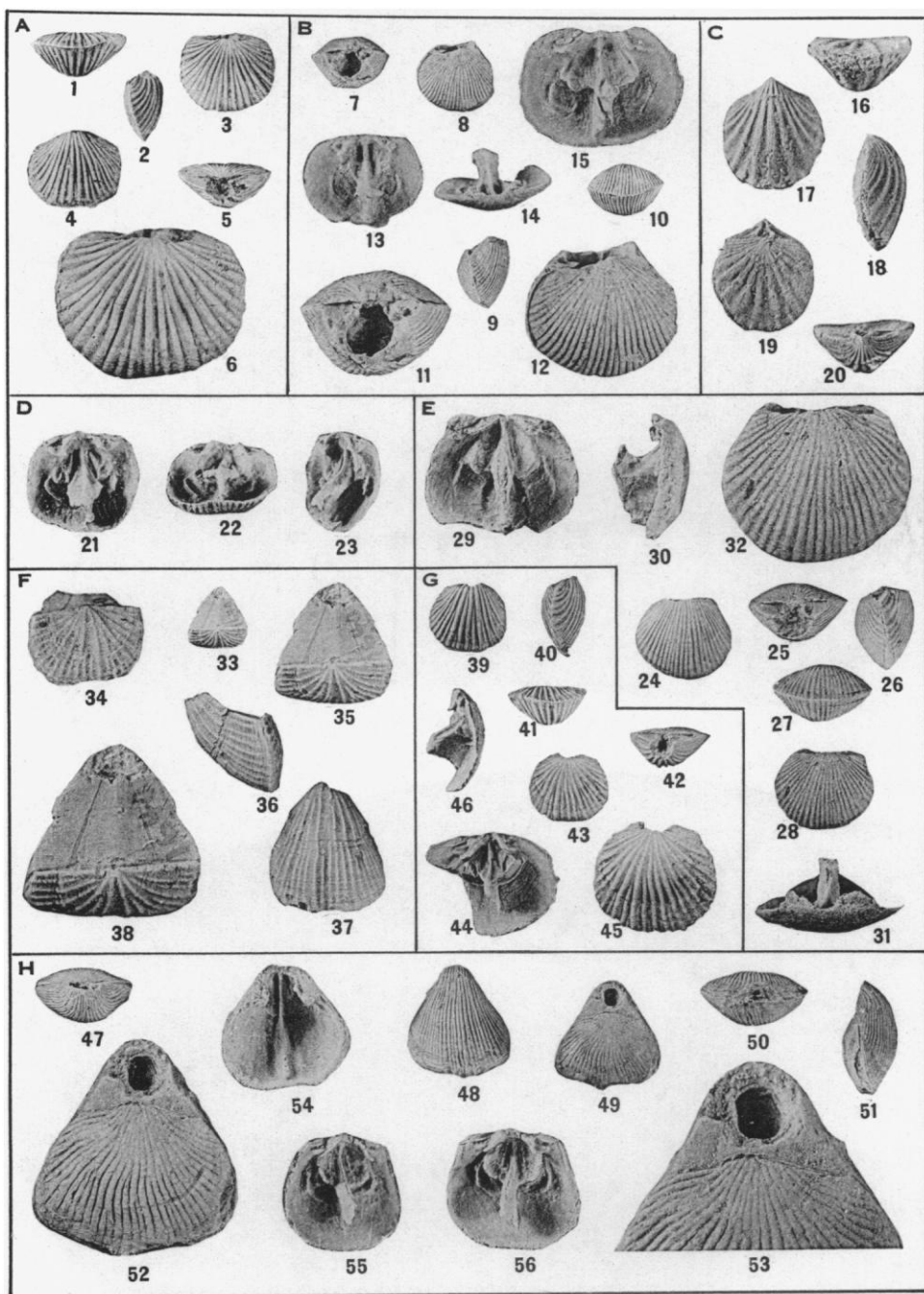
Discussion.—This species is more suggestive of *Argyrotheca* than the more convex types. Its costellae are more like some forms of *Argyrotheca* than the costellae of *P. costellata*, *P. rotunda* or *P. cubensis*. The brachial valve is distinctly convex but only moderately so. The anterior half or less of the brachial valve is flattened to concave and a shallow sulcus is perceptible. The species thus differs from *P. rotunda*, *P. costellata* and *P. cubensis* in its shallow brachial valve and strong costellation. It differs from *P. palmeri* in not possessing a symphytium. The median septum is short and erect but not curved posteriorly.

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(For explanation of Plate 15, please turn to next page)

EXPLANATION OF PLATE 15

- A. *Phragmothyris subplana* Cooper, n. sp. (p. 69)
 FIGS. 1-6—1-5, Respectively anterior, side, brachial, pedicle and posterior views of a complete specimen, $\times 1$, paratype USNM 561498; 6, brachial view of the same specimen $\times 2$.
 Oligocene in long cut south of Y-switch Ramal Valle, Central Jatibonico, Camaguey Province, Cuba.
- B. *Phragmothyris costellata* Cooper, n. sp. (p. 67)
 FIGS. 7-15—7-10, Respectively posterior, brachial, side and anterior views of the holotype, USNM 561502a; 11, 12, respectively posterior and brachial views of the holotype, $\times 2$; 13, 14, interior and posterior views of the brachial valve, $\times 3$, showing septum with spoon-like plate, paratype USNM 561502b; 15, interior of another brachial valve, $\times 3$, showing muscle platform and median septum, paratype USNM 561502c.
 Eocene, 4.65 km. west of Guanajay on road to Mariel, Pinar del Rio Province, Cuba.
- C. *Orthothyris radiata* Cooper, n. sp. (p. 65)
 FIGS. 16-20, Respectively anterior, pedicle, side, brachial and posterior views of the holotype, USNM 108687.
 Upper Cretaceous, 1 km. west of Central San Antonio, Habana Province, Cuba.
- D. *Phragmothyris costellata* Cooper, n. sp. (p. 67)
 FIGS. 21-23, Respectively normal interior view, a view of the shell tilted and a view of the same shell tilted to the side, brachial valve, $\times 3$, paratype USNM 561507. Shows septum with spoon-like plate, and base of loop on each side of it.
 Eocene (Cojimar), 1.5-2.5 km. west of Cojimar on the road to Casa Blanca, Habana Province, Cuba.
- E. *Phragmothyris rotunda* Cooper, n. sp. (p. 68)
 FIGS. 24-32—24-28, Respectively pedicle, posterior, side, anterior and brachial views of the holotype, $\times 1$, USNM 561508a; 32, brachial view of the holotype, $\times 2$; 29-31, normal, side and posterior views of the brachial interior, $\times 2$, showing median septum, muscle platforms and base of loop, paratype USNM 561508b.
 Eocene, north of Carretera Central, 2.1-2.2 miles on road to San Diego los Banos, Habana Province, Cuba.
- F. *Phragmothyris palmeri* Cooper, n. sp. (p. 68)
 FIGS. 33-38—33, Posterior view of the holotype, $\times 1$, USNM 561506; 34-37, respectively brachial, posterior, side and pedicle views of the holotype, $\times 2$; 38, posterior view of the holotype, $\times 3$, showing large delthyrial plate.
 Eocene, deep cut north of Grua 9, Ramal Juan Criollo, Camaguey Province, Cuba.
- G. *Phragmothyris subplana* Cooper, n. sp. (p. 69)
 FIGS. 39-46—39-43, Respectively pedicle, side, anterior, posterior and brachial views of the holotype, $\times 1$, USNM 561500a; 45, brachial view of the holotype, $\times 2$; 44, 46, side and normal view of the brachial interior showing septum, muscle platform and base of loop, $\times 2$, paratype USNM 561500b.
 Eocene, deep cut north of Grua 9, Ramal Juan Criollo, Camaguey Province, Cuba.
- H. *Phragmothyris cubensis* Cooper, n. sp. (p. 67)
 FIGS. 47-56—47-51, Respectively posterior, pedicle, brachial, anterior and side views of the holotype, $\times 1$, USNM 561504a; 52, brachial view of holotype, $\times 2$; 53, view of apical region of holotype, $\times 3$, showing remnant of delthyrial plate; 54, interior of the pedicle valve showing median septum, $\times 2$, paratype USNM 561504b; 55, 56, brachial interior tilted to the side and in normal view, $\times 3$, showing muscle platform, median septum and base of loop on each side of muscle platform, paratype USNM 561504c.
 Eocene, deep cut north of Grua 9, Ramal Juan Criollo, Camaguey Province, Cuba.



Cooper, Cretaceous and Eocene brachiopods, Cuba