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Ithaca, New York 14850
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EDITOR'S NOTE

Bulletins of American Paleontology, volume 74, number 302, was the last monograph published under the gifted editorship of Dr. Katherine V. W. Palmer, Director Emeritus of the Paleontological Research Institution. The profession has benefited from her exacting editorial skill and deep knowledge of the intricacies of taxonomic procedure for more than twenty-five years. We shall miss her guiding hand.

Dr. Peter R. Hoover
Director, Paleontological Research Institution
Editor, *Bulletins of American Paleontology*

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FIRST SUPPLEMENT TO THE CATALOGUE OF THE TYPE AND FIGURED SPECIMENS IN THE PALEONTOLOGICAL RESEARCH INSTITUTION

By

Stephen John Fast

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PREFACE

One of the prime services of a research institution to the scientific public is the publication of its resources. In the paleontologic world the location and availability of pertinent collections of fossils and related Recent material is imperative to refined studies. Particularly important in such research are the specimens of original descriptions, the so-called type specimens of species. Much time and energy may be spent in searching for their existence and perhaps complicated history. A useful tool for workers is a published catalogue of type material in specific institutions. To this end the Paleontological Research Institution has been ever conscious of that important service. In 1960 the *Catalogue of the Type and Figured Specimens* of the Paleontological Research Institution was published in Bulletins of American Paleontology, volume 40, Number 184, 996 pages. Since that time additional types have been deposited in the institution. To bring the supplementary information up to date the present catalogue has been compiled by Stephen J. Fast. He has done an efficient conscientious performance by critically checking the specimens with the original published data or related information. The cataloguing of the specimens was performed by Mrs. Dora Hurd.

The funds for the preparation of this catalogue by Stephen Fast for the Paleontological Research Institution was made possible by a grant in 1976 from the United States Steel Foundation, Incorporated, of Pittsburgh, Pennsylvania. The Paleontological Research Institution is grateful to that corporation and members of the board for making possible the compilation of this important, useful compendium.

A contribution from the Amoco Foundation, Inc., in 1976, provided financial aid toward the publication of the catalogue. The Paleontological Research Institution appreciates the help of the Amoco Foundation, Inc. and the directors in furthering this aid to scientific advancements.

February 1, 1978 — Katherine V. W. Palmer
Paleontological Research Institution — Director

FIRST SUPPLEMENT TO THE CATALOGUE OF THE TYPE AND FIGURED SPECIMENS IN THE PALEONTOLOGICAL RESEARCH INSTITUTION

Stephen John Fast

INTRODUCTION

This supplement is necessitated by the large number of specimens deposited with the Paleontological Research Institution since 1960, when the first catalogue of the type and figured specimens was compiled by Doris C. Brann and Lois S. Kent, and published as Bulletin of American Paleontology, volume 40, Number 184, 1960. The format of the Brann and Kent catalogue is followed, except in several minor ways. In most cases, for the sake of brevity, specimens from one locality are lumped under one reference. The locality descriptions are generally brief where such localities are specifically described in an author's cited publication. Specific name changes that have come to my attention are noted. Also in most cases, scientific names, formations, and ages are listed as originally published by an author, except where that author subsequently made corrections or reinterpretations. In this regard, the ages listed for most specimens should be accepted with the usual scientific caution. Some corrections were made for misspellings, word endings, and the like.

In 1971, Cornell University donated some type collections and other miscellaneous type specimens to the Paleontological Research Institution. The main collections were those of Dr. C. J. Maury (1912) from Trinidad and from Santo Domingo (Dominican Republic) (1917), including type specimens from the William M. Gabb Collection at Cornell, originally deposited there in the late 1800's. Also included were some plastotypes made from specimens in the Brazilian collection of Maury, Serviço Geologico e Mineralogico do Brasil, Monographia IV, 1925. In 1977, Cornell further donated Maury's duplicate material from Trinidad and Santo Domingo to the Paleontological Research Institution. While examining this duplicate collection, I found that the Gabb Collection of metatypes mentioned by Maury (1917) had been incorporated by Maury into her collection. Dr. Maury figured many of Gabb's specimens and in several cases did not mention that the specimen was Gabb's. As far as I was able, I have noted in this supplement the Gabb material. The localities given to Maury's Santo Domingo type specimens in the Cornell Catalogue are questionable, according to the following note in that catalogue: "First locality listed in Bull. Am. Pal., v. 5, No. 29 has been taken to be that from which figured shell came. This assumption may be incorrect."

The Paleontological Research Institution also received from Cornell in 1971 a suite of Devonian fossils figured by G. D. Harris in *Elementary Natural History Series,* Number 2, 1899. The plates of this ancient pamphlet were reproduced and the scientific names revised by K. V. W. Palmer and D. C. Brann in "Illustrations of Fossils of the Ithaca Area," 1966, available from the Paleontological Research Institution.

The original material which was the basis of the Edward Kindle, Ph.D. thesis, "The Relation of the Fauna of the Ithaca Group to the Faunas of the Portage and Chemung" [Upper Devonian], Bulletin of American Paleontology, volume 2, Number 6, 1896, was donated to the Paleontological Research Institution by Cornell University (1971). Those specimens remain on the original mounts, with the corresponding station numbers and specific identifications as made by Kindle and published in his thesis. This material is extensive and valuable because of its stratigraphic sequences and because many of the early localities are not now available.

ABBREVIATIONS FOR PUBLICATIONS GIVEN AS REFERENCES IN THIS CATALOGUE

A.N.S.P., Jr.	Academy of Natural Sciences of Philadelphia, Journal
ANSP, Mon.	Academy of Natural Sciences of Philadelphia, Monographs
ANSP, Proc.	Academy of Natural Sciences of Philadelphia, Proceedings
Acta Humboldtiana, ser. geol. palaeont.	Acta Humboldtiana, series geologica et palaeontologica
Ann. Géol. Paléont.	Annales de Géologie et de Paléontologie
Amer. Mus. Nov.	American Museum Novitates
Bol. Inf., AVGMP	Boletin Informativo, Asociacion Venezolana de Geologia, Mineria y Petroleo
Brann & Kent	Bulletins of American Paleontology, v. 40, No. 184, 1960
B.A.P.	Bulletins of American Paleontology
Bull. Br. Mus. Nat. Hist. (Geol.)	Bulletin of the British Museum (Natural History), Geology
Bull. Georgia Acad. Sci.	Bulletin of the Georgia Academy of Sciences

Bull. Marine Sci.	Bulletin of Marine Science
Calif. Univ. Publ. Geol. Sci.	University of California Publications in Geological Sciences
Can. Jr. Earth Sci.	Canadian Journal of Earth Sciences
Carn. Inst. Wash.	Carnegie Institution of Washington
Disc. in Dev. West. Can.	Discoveries in the Devonian of Western Canada
Elem. Geol.	Elementary Geology, by R. S. Tarr, Macmillan Co., 1897
Elem. Nat. Hist. Ser.	Elementary Natural History Series, Harris Co., Ithaca, 1899
Elucid. W. Can. Dev. Fms.	Elucidation of Some Western Canada Devonian Formations
Fossils	"Fossils", by E. L. Palmer, D. C. Heath & Co., 1971
G.S.A., Bull.	Geology Society of America, Bulletin
G.S.A., Mem.	Geological Society of America, Memoir
Geol. & Phys. Geog., Brazil	Geology and Physical Geography of Brazil, by C. F. Hartt, Fields, Osgood, & Co., 1870
Geos	Geos; Escuela de Geologia y Minas, Caracas, Venezuela
Gulf Coast Assoc. Geol. Soc., Trans.	Gulf Coast Association of Geological Societies, Transactions
Jr. Alberta Soc. Pet. Geol.	Journal of the Alberta Society of Petroleum Geologists
Jr. Pal.	Journal of Paleontology
Jr. Tenn. Acad. Sci.	Journal of the Tennessee Academy of Science
L. Dev. and other Coral Spp. in NW. Can.	Lower Devonian and other Coral Species in Northwestern Canada
Liddle, 1946	The Geology of Venezuela and Trinidad, by R. A. Liddle, 1946, PRI, Ithaca, N.Y.
Md. Geol. Surv., Miocene	Maryland Geological Survey, Miocene, Johns Hopkins Press, 1904
Meth. Ind. Agg. Stud. Div.	The Method of Indivisible Aggregates in Studies of the Devonian
Minnewanka Sect. of Miss.	The Minnewanka Section of the Mississippian
Miss. State Geol. Serv. Bull.	Mississippi State Geological Survey Bulletin
Moll. Trop. E. Pacific	Mollusks of the Tropical Eastern Pacific, PRI, 1961
NY. Acad. Sci. Scientific Surv. Porto Rico & Virgin Is.	New York Academy of Sciences Scientific Survey of Porto Rico and the Virgin Islands
N.Y. State Mus. Bull.	University of the State of New York Bulletin, New York State Museum
Nautilus	Nautilus
Neogene Moll. NW. Ecuador	Neogene Mollusks from Northwestern Ecuador, PRI, 1964
New Dev. Fossils W. Can.	New Devonian Fossils from Western Canada
New Spirif. Dev. W. Can.	New Spiriferidae from the Devonian of Western Canada
Nomen. Cert. Dev. Brach.	Nomenclature of Certain Devonian Brachiopods
Older Dev. Faunas N.W.T.	The Older Devonian Faunas of the Northwest Territories
P.A.	Palaeontographica Americana

Perry & Schwengel, 1955	Marine Shells of the Western Coast of Florida, by Perry & Schwengel, PRI, 1955
Quart. Jr. Fla. Acad. Sci.	Quarterly Journal of the Florida Academy of Sciences
Santa Barbara Mus. Nat. Hist., Occ. Paper	Santa Barbara Museum of Natural History, Occasional Papers
Science	Science
Sea Shells of Trop. W. America	Sea Shells of Tropical West America by M. Keen, Stanford University Press, 1971
Senckenbergiana	Senckenbergiana
Serv. Geol. Min. Brazil	Serviço Geologico e Mineralogico do Brasil, Monographia
Sig. Dev. Brachiopods W. Can.	Significant New Devonian Brachiopods from Western Canada
"Some Tert Moll. . . ."	Some Tertiary Mollusks from South Florida and the Caribbean, PRI, 1967
Trans. Roy. Soc. New Zealand, Zool.	Transactions of the Royal Society of New Zealand, Zoology
Treat. Invert. Pal., GSA	Treatise on Invertebrate Paleontology, Geological Society of America
Tulane Stud. Geol.	Tulane Studies in Geology (and Paleontology)
U.S.G.S., Bull.	United States Geological Survey, Bulletin
U.S.G.S., Prof. Paper	United States Geological Survey, Professional Paper
U.S.N.M., Bull.	United States National Museum, Bulletin
Univ. Kansas, Pal. Cont.	University of Kansas, Paleontological Contributions
Va. Div. Min. Res., RI	Virginia Division of Mineral Resources, Report of Investigations
Veliger	Veliger
W. Can. Sed. Basin, AAPG	Western Canada Sedimentary Basin, Pub. by the American Association of Petroleum Geologists, Tulsa, Okla., 1954

MARKS FOR SPECIAL REFERENCES

†Unlike the Brann & Kent catalogue, the dagger in this supplement refers to a paper by Jung, B.A.P., v. 49, No. 223, 1965. The specimen in question is listed in this supplement as a hypotype, but according to Jung, it is a "virtual topotype" as he feels his specimen was collected from the same place as Hodson's locality 2207. Hodson's description of his locality 2207 is vague and imprecise.

*Again, unlike the Brann & Kent catalogue, the asterisk refers to a locality in Maury's paper on Santo Domingo, B.A.P., v. 5, No. 29, 1917. It means that the locality given here was determined from an original label in Maury's duplicate Santo Domingo Collection. That label contained (a) the particular species name, (b) a locality, and (c) the word "Figure" in Maury's handwriting.

The age of lower Eocene given to the Soldado Formation in Maury, A.N.S.P., Jr., v. 15, 1912 and B.A.P., v. 10, No. 42, 1925 was changed in this supplement to Paleocene according to the present interpretation by Venezuelan authorities (Strat. Lexicon Venezuela, Bol. Geol., Spec. Pub. No. 1, pp. 555-562, Eng. Ed., 1970).

CATALOGUE

25530 **Acar gradata** (Broderip & Sowerby) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 82, pl. 6, figs. 6-6b
Palo Seco, Panama Canal Zone Recent

21598 **Acinophyllum vermetum** (Weisbord) Lectotype
Oliver, U.S.G.S., Prof. Paper 869, 1976, p. 67, pl. 29, figs. 1-4 for *Diphyphyllum vermetum* Weisbord *in* Brann & Kent, p. 328

21595 **Acinophyllum vermetum** (Weisbord) Paralectotype
Oliver, U.S.G.S., Prof. Paper 869, 1976, p. 67, pl. 29, figs. 9, 10 for *Diphyphyllum vermetum* Weisbord *in* Brann & Kent, p. 328

21596 **Acinophyllum vermetum** (Weisbord) Unfigured paralectotype
Oliver, U.S.G.S., Prof. Paper 869, 1976, p. 67 for *Diphyphyllum vermetum* Weisbord *in* Brann & Kent, p. 328

27637, 27638 **Acinophyllum vermetum** (Weisbord) Topotypes
Oliver, U.S.G.S., Prof. Paper 869, 1976, p. 67, pl. 29, figs. 5-8
Caño Grande Br. of Río Cachirí, St. of Zulia, Ven.
Caño Grande Fm., probably Middle Devonian

8233 **Acirsa ? solumcostata** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 52, pl. 4, fig. 9
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

28847 **Aclis acuminatoides** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 141, pl. 24, fig. 7
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26022 **Acmaea antillarum** (G. B. Sowerby, I) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 66, pl. 4, figs. 3-5
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27424 **Acmaea? astroides** Jung Cast of Holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 478, pl. 62, figs. 10, 11
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26023 **Acmaea cf. A. pustulata** (Helbling) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 68, pl. 4, figs. 6, 7 as *postulata* [sic]
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27556 **Acropora prolifera** (Lamarck) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 21, pl. 2, figs. 1-3
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25676 **Acrosterigma pristipleura** (Dall) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 248, pl. 37, fig. 7
Isla Gorgona, Colombia Recent

28570 **Acteocina canaliculata** (Say) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 13, pl. 3, fig. 2
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28571 **Acteocina recta** (d'Orbigny) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 14, pl. 3, fig. 3
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28572 **Acteocina (Cylichnella) triticumtritonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 14, pl. 3, fig. 4
Probably bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28569 **Acteon riomaensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 11, pl. 3, fig. 1
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26376 **Acteon** ? sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 449, pl. 45, figs. 22, 23; pl. 46, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

7053 **Actinocythereis exanthemata** (Ulrich & Bassler)
Sabol, B.A.P., v. 41, No. 191, 1960, p. 236 Unfigured hypotypes
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27186 **Actinocythereis exanthemata gomillionensis** (Howe & Ellis) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 66, pl. 20, fig. 6
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27308 **Actinocythereis exanthemata gomillionensis** (Howe & Ellis) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 66, pl. 21, fig. 1
Offshore well A-11, 195′ ?, near Newport News, Va.
Choptank? Fm., Miocene

27299 **Actinocythereis exanthemata marylandica** (Howe & Hough) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 66, pl. 21, fig. 2
Well 1-SW, 123′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
?, probably Miocene

28322 **Actinopteria boydi** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 18
Triphammer Falls, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., upper Devonian

25514 **Adrana crenifera** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 70, pl. 3, figs. 4, 4a
Between Punta Ancon and Punta Carnero, Santa Elena, Ecuador
Recent

25515 **Adrana crenifera** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 70, pl. 3, fig. 4b
Boca Pan, Peru Recent

25516 **Adrana exoptata** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 71, pl. 3, fig. 6
Esmeraldas, Ecuador Recent

25513 **Adrana sowerbyana** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 69, pl. 3, figs. 3, 3a
Isla del Gallo, Colombia Recent

26481 **Adrana cf. A. tellinoides** (G. B. Sowerby, I) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 47, pl. 2, figs. 14, 15
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

25517 **Adrano tonosiana** Pilsbry & Olsson Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 71, pl. 3, figs. 11, 11a
Búcaro, Panama Recent

25594 **Adula soleniformis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 132, pl. 16, fig. 3b
Manta, Ecuador Recent

25593 **Adula soleniformis panamensis** Olsson Holotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 132, pl. 16, figs. 3, 3a
(one valve broken prior to 1976)
El Lagartillo, Bahia Honda, Panama Recent

25612 **Aequipecten (Lectopecten) biolleyi** Hertlein & Strong Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 166, pl. 22, figs. 3, 3a not deposited, 1961
Esmeraldas, Ecuador Recent

25608 **Aequipecten (Plagioctenium) circularis** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 163, pl. 19, figs. 2, 2a
Fig. 2b not deposited. 1961. Panama Recent

Aequipecten maturensis (Maury)
See *Pecten maturensis* Maury

26567 **Aequipecten muscosus** (Wood) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 142, pl. 15, figs. 1, 2
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25607 **Aequipecten (Plagioctenium) purpuratus** (Lamarck) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 162, pl. 19, figs. 1-1b
Bayovar, Peru Recent

25610, **Aequipecten (Pacipecten) tumbezensis** (d'Orbigny) Hypotypes
25610a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 164, pl. 21, fig. 2 (Tumbez, Peru; fig. 2a not deposited, 1961; fig. 2b (Zorritos, Peru); fig. 2c (Puerto Pizarro, Peru); unfigured hypotype = PRI 25610a (Zorritos, Peru) All Recent

27511 **Aetea anguina** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 16, pl. 5, fig. 1
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27512 **Aetea cf. A. ligulata** Busk Figured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 22, pl. 5, figs. 2-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27474 **Agaronia testacea costaricensis** (Olsson) Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 541
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

29821- **Agaronia togoensis** Furon Unfigured hypotypes
29823 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 192
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

25687 **Agriopoma (Pitarella) catharia** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 279, pl. 40, fig. 2
Dredged from Panama Bay, Panama Recent

25749, 25749a **Agriopoma (Pitarella) catharia** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 274, pl. 49, figs. 5, 5a not deposited, 1961. Unfigured hypotype = PRI 25749a
Dredged from Panama Bay, Panama (H. Johnson Coll.) Recent

26125 **Alaba incerta** ? (d'Orbigny) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 189, pl. 16, figs. 3, 4
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26126 **Alaba incerta** ? (d'Orbigny) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 189, pl. 16, figs. 5, 6
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26124 **Alaba insculpta** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 191, pl. 16, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm. lower Pliocene

26127 **Alabina cereola** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 186, pl. 16, figs. 7, 8
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26129 **Alabina cereola** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 186, pl. 16, figs. 11, 12
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26128 **Alabina venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 188, pl. 16, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26237 **Alcira ? tropicana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 330, pl. 29, figs. 7, 8 lost during preparation, 1961. Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28737 **Alectrion cercadensis** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 90, pl. 15, figs. 19, 20
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
Fig. 20 selected as lectotype by Woodring, Carn. Inst. Wash., Pub. 385, 1928, p. 266 as *Nassarius (Uzita) cercadensis* (Maury)

28738 **Alectrion gurabensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 91, pl. 15, fig. 21
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Guarbo Fm., middle Miocene

28739 **Alectrion losquemadica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 91, pl. 15, fig. 22. Fig. 23 not deposited by Cornell Univ., 1971
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
Fig. 22 selected as lectotype by Woodring, Carn. Inst. Wash., Pub. 385, 1928, p. 266 as *"Alectrion" losquemadica* Maury

29332 **Alectrion pirabica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 133, pl. 7, fig. 5 (cast too poor for positive identification)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29335 **Alectrion praetrivittata** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 133, pl. 7, fig. 8
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

25662 **Aligena cokeri** Dall Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 234, pl. 33, figs. 6-6b
Venado Beach, Panama Canal Zone Recent

15035 **Allogona profunda** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 12a, 12b
Blevin's Gap Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27001 **Allotropiophyllum eumetrium** Crickmay Holotype
Crickmay, Minnewanka Sect of Miss., Pub. by author, Imp. Oil Ltd., Calgary, 1955, p. 9, pl. 1, fig. 4
1.1 mi. W. of Warm Springs, road between Banff & Sundance Canyon, Alberta, Can.
Rundle Fm., Mississippian

27002-27003 **Allotropiophyllum eumetrium** Crickmay Paratypes
Crickmay, Minnewanka Sect. of Miss., Pub. by author, Imp. Oil Ltd., Calgary, 1955, p. 9, pl. 1, figs. 2, 3 and several unfigured specimens
1.1 mi. W. of Warm Springs, road between Banff & Sundance Canyon, Alberta, Can.
Rundle Fm., Mississippian

26062 **Alvania meridioamericana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 126, pl. 8, figs. 18, 19
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26063 **Alvania playagrandensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 127, pl. 9, figs. 1, 2; pl. 10, figs 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26069 **Alvania** ? sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 129, pl. 10, figs. 3, 4
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28552 **Amauropsis caloramans** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 101, pl. 13, fig. 3
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28553 **Amauropsis**? **guariqueenensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 102, pl. 13, fig. 10
Trail from Lago de Asfalto to Guariqueen, Ven.
Hurupu beds (Querecual Fm.?), Cretaceous

28839 **Amauropsis guppyi** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 137, pl. 23, fig. 19
Locality and formation uncertain; Dominican Rep., Miocene

28840 **Amauropsis guppyi gurabensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 138, pl. 23, fig. 20 broken before 1977
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

29259 **Amauropsis** cf. **A. nativitatis** Maury Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 77, pl. 2, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28554- **Amauropsis smithiana** Maury Syntypes
28556 Maury, A.N.S.P., Jr., v. 15, 1912, p. 102, pl. 13, figs. 11-13
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28312 **Ambocoelia umbonata** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 19, pl. 5, figs. 4, 5
Glenwood, near Ithaca, Tompkins Co., N.Y.
Geneseo Sh., Genessee Gr., Upper Devonian

28365 **Ambocoelia umbonata "var. gregaria"** (Conrad)
Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 25, pl. 12, figs. 108, 109
E. Jamestown (formerly Dexterville), Chautauqua Co, N.Y.
Dexterville Sh. Mbr., Upper Devonian

26424 **Ammobaculites gutschicki** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 231
N. of New Haven, Nelson Co., Ky.
New Providence Fm., Lower Mississippian

29988, **Ammonia beccarii** (Linnaeus) Hypotypes
29989 Herrick, B.A.P., v. 70, No. 293, 1976, p. 146, pl. 14, figs. 81, 82
Altamaha Rd., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

28559 **Ammonites cf. A. mosquerae** Karsten Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 104, pl. 13, fig. 16
Between Guanoco and Hurupu, 10° 8′ N.; 3° 59′ 6″ E. of Caracas, Ven.
Hurupu beds (Querecual Fm.?), Cretaceous

26419 **Ammovertella cf. A. inclusa** (Cushman & Waters)
Conkin, B.A.P., v. 43, No. 196, 1961, p. 309 Unfigured specimen
S. of Nipgen, Pike Co., Ohio
Cuyahoga Fm., Lower Mississippian

26420 **Ammovertella labyrintha** Ireland Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 311
Fishing Creek, W. of Somerset, Pulaski Co., Ky.
New Providence Fm., Lower Mississippian

26421 **Ammovertella cf. A. primaparva** Ireland Unfigured specimen
Conkin, B.A.P., v. 43, No. 196, 1961, p. 312
1 mi. NW. of Jacobs Chapel Church, Floyd Co., Ind.
Rockford Ls., Lower Mississippian

29990 **Amphistegina lessonii** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 146, pl. 14, fig. 83
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

28547 **Ampullaria (Ceratodes) cornuarietis** (Linnaeus) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 99, pl. 13, fig. 4
The Barranca, 1 mi. NE. of Guanoco along Guanoco-Felicidad RR., Ven.
Raised beach, Quaternary

28546 **Ampullaria luteostoma** Swainson Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 99, pl. 13, fig. 3 spire missing prior to 1977
The Barranca, 1 mi. NE of Guanoco along Guanoco-Felicidad R.R., Ven.
Raised beach, Quaternary

29824 **Ampullina tapina kogbei** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 138
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28906 **Amusium papyraceum** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 190, pl. 26, fig. 22
Samba Hills, between Las Caobas and Rompino, Dominican Rep.*
Probably Gurabo Fm., middle Miocene or younger

25611 **Amusium (Cyclopecten) pernomus** Hertlein Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 168, pl. 21, fig. 6 not deposited, 1961
Playa Marinero, near Guanico, Panama Recent

Anachis asphaltoda (Maury)
See *Columbella asphaltoda* Maury

28795 **Anachis exilis** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 99, pl. 21, fig. 5
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene according to the Cornell Univ. catalog of the Gabb Coll., #7622

26222 **Anachis (Litotrema) exuta** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 317, pl. 28, figs. 9, 10
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26389 **Anachis (Litotrema) exuta** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 317
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29220 **Anachis (Costoanachis ?) fayae** Keen Unfigured paratypes
Keen, Sea Shells of Trop. W. America, Stanford Univ. Press, 1971, p. 579, No. 1178
Playa Caracol, Nuevo Guaymas, Sonora, Mex.
Recent

26220 **Anachis ? implumis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 315, pl. 28, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26221 **Anachis ? indistincta** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 316, pl. 28, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26388 **Anachis ? indistincta** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 316, broken originally
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26215 **Anachis (Costoanachis) obesa** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 310, pl. 27, figs. 18, 19
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26216 **Anachis (Costoanachis) obesa** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 310, pl. 27, figs. 20, 21
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26217 **Anachis (Costoanachis) obesa** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 310, pl. 27, figs. 22, 23
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26218 **Anachis (Costoanachis) plicatulum** ? (Dunker) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 313, pl. 28, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26219 **Anachis (Costoanachis) plicatulum** ? (Dunker) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 313, pl. 28, figs. 3, 4
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26390 **Anachis (Costoanachis) plicatulum** ? (Dunker)
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 313 Unfigured specimen
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

25543 **Anadara (Cunearca) aequatorialis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 95, pl. 9, fig. 4
Mompiche, Ecuador Recent

25544 **Anadara (Cunearca) aequatorialis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 95, pl. 9, fig. 4a
Búcaro, Panama Recent

25545 **Anadara (Cunearca) aequatorialis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 95, pl. 9, figs. 5, 5a
Limones, Ecuador Recent

25537 **Anadara (Caloosarca) biangulata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 98, pl. 8, figs. 5, 5a
Esmeraldas, Ecuador Recent

25542 **Anadara (Cunearca) bifrons** (Carpenter) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 94, pl. 9, figs. 3, 3a
Mompiche, Ecuador Recent

26515, **Anadara (Cunearca) brasiliana** (Lamarck) Hypotypes
26516 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 79, pl. 6, figs. 13-16
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26511 **Anadara (Lunarca ?) caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 77, pl. 6, figs. 5, 6
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26512 **Anadara (Lunarca ?) caboblanquensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 77, pl. 6, figs. 7, 8
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26605- **Anadara (Cunearca) chemnitzi** (Philippi) Hypotypes
26607 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 82, pl. 23, figs. 2-5
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

Anadara chemnitzioides Maury
See *Arca chemnitzioides* Maury

25536 **Anadara (Sectiarca) concinna** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 98, pl. 8, figs. 1, 1a
Sectarca [*sic*]
Fort Amador, Balboa, Panama Canal Zone Recent

27410 **Anadara (Scapharca) aff. A. cornellana** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 427 Unfigured specimens
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26517, **Anadara (Cunearca) cumanensis** (Dall) Hypotypes
26518 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 84, pl. 7, figs. 1-4
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26519 **Anadara (Cunearca) cumanensis** (Dall) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 84, pl. 7, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25533 **Anadara (Rasia) emarginata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 91, pl. 8, figs. 6, 6a
Zorritos, Peru Recent
25531, **Anadara (Grandiarca) grandis** (Broderip & Sowerby) Hypotypes
25532 Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 93, pl. 7, figs. 1, 1a
Puerto Pizarro, Tumbez, Peru Recent
25533 **Anadara (Grandiarca) grandis** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 93, pl. 7, figs. 1b, 1c
Portete, Ecuador Recent

Anadara henekeni (Maury)
See *Scapharca henekeni* Maury

27413 **Anadara (Cunearca) inutilis** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 425, pl. 51, figs. 1, 8
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
27415 **Anadara (Cunearca) inutilis** Jung Unfigured paratypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 425
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
26513 **Anadara (Lunarca ?) mareana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 78, pl. 6, figs. 9, 10
100 m W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26514 **Anadara (Lunarca ?) mareana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 78, pl. 6, figs. 11, 12
100 m W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26504 **Anadara (Larkinia) notabilis** (Röding) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 69, pl. 5, figs. 7, 8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26505 **Anadara (Larkinia) notabilis** (Röding) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 69, pl. 5, figs. 9, 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
27691 **Anadara (Caloosarca) notoflorida** H. E. Vokes
Unfigured paratypes
H. Vokes, Tulane Stud. Geol., v. 7, No. 1, 1969, p. 13
"Alligator Alley", 21.5 mi. E. of Fla. Hwy. 29, Collier Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene
25546 **Anadara (Cunearca) nux** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 96, pl. 9, figs. 8, 8a
Zorritos, Peru Recent
25540 **Anadara (Diluvarca) obesa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 89, pl. 8, figs. 8, 8a
Tumbez, Peru Recent
26507, **Anadara (Lunarca) ovalis** (Bruguière) Hypotypes
26508 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 72, pl. 5, figs. 13-16
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26509 **Anadara (Lunarca) ovalis** (Bruguière) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 72, pl. 6, figs. 1, 2
not PRI 36509 as in expl.
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26510 **Anadara (Lunarca) ovalis** (Bruguière) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 72, pl. 6, figs. 3, 4
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

25541 **Anadara (Cunearca) perlabiata** (Grant & Gale) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 96, pl. 9, figs. 2, 2a
Tumaco, Colombia Recent

25551 **Anadara (Esmerarca) reinharti** Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 100, pl. 10, figs. 4, 4a, 4d
(not PRI 25552) Panama Recent

25552 **Anadara (Esmerarca) reinharti** Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 100, pl. 10, figs. 4b, 4c
(not PRI 25551) Panama Recent

25553 **Anadara (Esmerarca)** cf. **A. reinharti** Lowe Figured specimen
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 100, pl. 10, figs. 5a, 5b
(pl. 9, fig. 1 not same as pl. 10, fig. 5a; not deposited, 1961)
Esmeraldas, Ecuador Recent

25553a **Anadara (Esmerarca)** cf. **A. reinharti** Lowe Figured specimen
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 100, pl. 10, fig. 5
Esmeraldas, Ecuador Recent

6085 **Anadara (Larkinia) sellardsi** Mansfield Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 528, pl. 78, figs. 2, 2a
Pinecrest, Miami Canal, Collier Co., Fla.
Pinecrest beds, Caloosahatchee Gr., Neogene

25534 **Anadara (Diluvarca) similis** (C. B. Adams) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 88, pl. 7, figs. 2, 2a
Market at Guayaquil, Ecuador Recent

26506 **Anadara (Larkinia)** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 72, pl. 5, figs. 11, 12 internal mold
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26520 **Anadara (Cunearca)** sp. indeterminate Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 86, pl. 7, figs. 7, 8 internal mold
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27414 **Anadara (Scapharca)** cf. **A. spiekeri** (Olsson)
Jung, B.A.P., v. 49, No. 223, 1965, p. 432 Unfigured specimens
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27412 **Anadara (Scapharca) tirantensis** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 430 Unfigured hypotype
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

25535 **Anadara (Diluvarca) tuberculosa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 87, pl. 7, figs. 3, 3a
Sua, Ecuador Recent

27411 **Anadara (Scapharca) veatchi matarucana** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 429 Unfigured hypotype
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

21887, **Anadara (Cunearca) zorritensis** Spieker
21889 Jung, B.A.P., v. 49, No. 223, 1965, p. 423 for *Arca (Scapharca) vueltana* H. K. Hodson *in* Brann & Kent, p. 82

21888, **Anadara (Cunearca) zorritensis** Spieker
21890 Jung, B.A.P., v. 49, No. 223, 1965, p. 423 for *Arca vueltana falconensis* H. K. Hodson *in* Brann & Kent, p. 82

29381, **Ancilla (Amalda) branneri** Maury Plastotypes
29395 Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 183, pl. 10, figs. 1, 15
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

1025 **Ancilla caroniana** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55. No. 247, 1969, p. 529
See Brann & Kent, p. 43

26288 **Ancilla (Eburna) tankervillei** (Swainson) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 392, pl. 36, figs. 3, 4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26289 **Ancilla (Eburna) venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 393, pl. 36, figs. 5, 6
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

15029, **Anguispira alternata** (Say) Hypotypes
15030 Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 7a-7b; 8a, 8b
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27585 **Anguispira alternata** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 234, pl. 15, figs. 18-20
Anquispira [*sic*]
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27283 **Angulogerina occidentalis** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 44, pl. 12, fig. 9
Well A-2, 70′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

29970 **Angulogerina occidentalis** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 63
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29971 **Angulogerina occidentalis** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 64
Coastal well, 59-79′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

27157 **Angulogerina** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 44, pl. 13, fig. 1
Offshore well A-11, 70′, near Newport News, Va.
Pleistocene

25646 **Anodontia (Lissosphaira) spherica** (Dall & Ochsner) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 222, pl. 30, fig. 2
Cabo Blanco, Ecuador Pliocene

20428 **Anodontia stainforthi** Marks Holotype
Olsson, Neogene Moll. NW. Ecuador, PRI, 1964, p. 50, pl. 6, fig. 6
See Brann & Kent, p. 47

20425 **Anodontia (Lissosphaira) thalmanni** (Marks) Holotype
Olsson, Neogene Moll. NW. Ecuador, PRI, 1964, p. 51, pl. 6, fig. 11 (not PRI 20426) for *Cavilucina thalmanni* Marks *in* Brann & Kent, p. 185

26868, **Anomalocardia brasiliana** (Gmelin) Hypotypes
26869 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 272, pl. 38, figs. 5-8
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26710 **Anomalocardia venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 274, pl. 39, figs. 3, 4
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26711 **Anomalocardia venezuelana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 274, pl. 39, figs. 5, 6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26589 **Anomia catiana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 171, pl. 19, figs. 2, 3
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26590, 26591, 26610 **Anomia catiana** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 171, pl. 19, figs. 4-6; pl. 23, fig. 9
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26585 **Anomia mareana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 169, pl. 18, figs. 4, 5
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26582 **Anomia mareana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 169, pl. 17, figs. 9, 10
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26586 **Anomia mareana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 169, pl. 18, figs. 6, 7
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26587 **Anomia mareana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 169, pl. 18, figs. 8, 9
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25622 **Anomia peruviana** d'Orbigny Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 177, pl. 24, fig. 2
Santa Elena, Ecuador Recent

25623, 25623a **Anomia peruviana** d'Orbigny Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 177, pl. 24, figs. 2a-2f
Unfigured hypotypes = PRI 25623a
Bayovar, Peru Recent

28899 **Anomia simplex** d'Orbigny Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 191, pl. 26, fig. 15
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

27510 **Anoteropora ? triovicellata** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 108, pl. 3, figs. 12-14; pl. 12, fig. 3
Quebrada Mare Abajo, Cabo Blanco, Ven. (locality I, not J as in text)
Lower Mare Fm., lower Pliocene

27632 **Anthraconauta cf. A. phillipsii** (Williamson) Figured specimen
Palmer, Bull. Georgia Acad. Sci., v. 28, 1970, p. 47, pl. 1, figs. 1, 4
Well (about 7000 ft.), Early Co., Ga.
Pennsylvanian
See Pojeta, *et al.*, U.S.G.S. Prof. Paper 879, 1976, p. 12, pl. 4, figs. 11, 13 as *Modiomorpha* ? sp.

27633 **Anthraconauta cf. A. phillipsii** (Williamson) Figured specimen
Palmer, Bull. Georgia Acad. Sci., v. 28, 1970, p. 47, pl. 1, figs. 2, 3, 5
Well (about 7000 ft.), Early Co., Ga.
Pennsylvanian
See Pojeta, *et al.*, U.S.G.S. Prof. Paper 879, 1976, p. 12, pl. 4, fig. 14 as *Modiomorpha* ? sp.

27634 **Anthraconauta** cf. **A. phillipsii** (Williamson) Unfigured specimen
Palmer, Bull. Georgia Acad. Sci., v. 28, 1970, p. 47
Well (about 7000 ft.), Early Co., Ga.
Pennsylvanian
See Pojeta, *et al.,* U.S.G.S. Prof. Paper 879, 1976, p. 12 as *Modiomorpha* ? sp.

27636 **Anthraconauta** cf. **A. phillipsii** (Williamson) Figured specimen
Palmer, Bull. Georgia Acad. Sci., v. 28, 1970, p. 47, pl. 1, fig. 6
Well (about 7000 ft.), Early Co., Ga.
Pennsylvanian
See Pojeta, *et al.,* U.S.G.S. Prof. Paper 879, 1976, p. 12 as *Modiomorpha* ? sp.

Anticlimax derbyi (Maury)
See *Discopsis derbyi* Maury

28414 **Antigona (Circomphalus) blandiana** (Guppy) Hypotype
Palmer, P. A., v. 1, No. 5, 1927, p. 131, pl. 31, fig. 6
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

29001 **Antigona (Ventricola) blandiana** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 217, pl. 37, fig. 5
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 131, pl. 31, figs. 11, 12 as *A. (Circomphalus) blandiana* (Guppy)

Antigona caribbeana Anderson
See *A. dominica* Palmer

28423 **Antigona (Dosina) dominica** Palmer Paratype
Palmer, P. A., v. 1, No. 5, 1927, p. 127, pl. 29, figs. 4, 7
Zone F, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
See Palmer, *op. cit.,* p. 216 as *A. caribbeana* Anderson
See Brann & Kent, p. 53

25753 **Antigona (Ventricolaria) isocardia** (Verrill) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 292, pl. 50, fig. 2
Isla la Plata, Ecuador Recent

29545 **Antigona proserpinae** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 425, pl. 18, fig. 5
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

26745 **Antigona (Ventricolaria)** aff. **A. rigida** (Dillwyn) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 303, pl. 43, figs. 9, 10 internal mold
Near Playa Grande Yachting Club Rd, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26746 **Antigona (Ventricolaria)** aff. **A. rigida** (Dillwyn) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 303, pl. 43, fig. 11
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26747 **Antigona (Ventricolaria) rugatina** (Heilprin) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 305, pl. 43, figs. 12, 13
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

29553 **Antigona (Ventricola) sanctaenoctis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 339, pl. 18, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29000 **Antigona tarquinia** (Dall) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 217, pl. 37, fig. 4
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 125, pl. 30, fig. 9 as *A. (Dosina) tarquinia antillica* Maury

Antigona tarquinia antillica Maury
See *A. tarquinia* (Dall)

29547, 29555 **Antigona (Ventricola) thalestris** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 337, pl. 18, figs. 7, 15
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29556 **Antigona thalestris amazoniana** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 339, pl. 18, fig. 16
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

27466 **Antillophos candei gatunensis** (Toula) Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 533
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27467 **Antillophos? aff. A. landesi** Marks Unfigured specimens
Jung, B.A.P., v. 49, No. 223, 1965, p. 534
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27513, 27531 **Antropora typica** (Canu & Bassler) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 26, pl. 5, fig. 5
Unfigured hypotype = PRI 27531
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

8245 **Apiotoma palmerae** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 92, pl. 15, fig. 21
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

28443 **Arca (Argina) billingsiana** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 45, pl. 8, figs. 2, 3
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 76, pl. 6, fig. 2
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 337, pl. 16, figs. 4, 5 as *Lunarca billingsiana* (Maury), lower Pliocene

804 **Arca billingsiana maturensis** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 337 as *Lunarca billingsiana* (Maury); See Brann & Kent, p. 57

Arca billingsiana schultzana Maury
See *Arca schultzana* Maury

28444 **Arca (Argina) brightonensis** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 46, pl. 8, figs. 4-6
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 76, pl. 7, fig. 7
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 337, pl. 16, figs. 6, 7 as *Lunarca billingsiana* (Maury), lower Pliocene

28439- **Arca (Cunearca) chemnitzioides** Maury Syntypes
28441 Maury, A.N.S.P., Jr., v. 15, 1912, p. 44, pl. 7, figs. 13-15; pl. 8, fig. 1
Road south of Pitch Lake, Brighton, Trinidad
Reddish-yellow marl, upper Miocene
Lectotype selected by Jung, B.A.P., v. 55, No. 247, 1969, p. 334, pl. 15, figs. 8, 9 (PRI 28439) as *Anadara chemnitzioides* Maury, upper Morne l'Enfer Fm., lower Pliocene

28411 **Arca idonea** Conrad Hypotype
Sheldon, P. A., v. 1, No. 1, 1917, p. 41, pl. 9, fig. 17
Alum Bluff, Apalachicola R., Liberty Co., Fla.
Shoal R. Fm., Alum Bluff Gr., Miocene

26484, **Arca (Arca) imbricata** Bruguière Hypotypes
26485 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 54, pl. 3, figs. 1-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26486 **Arca (Arca) imbricata** Bruguière Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 54, pl. 3, figs. 5, 6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26487 **Arca (Arca) imbricata** Bruguière Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 54, pl. 3, figs. 7, 8
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28934 **Arca lomasdesamba** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 164, pl. 30, fig. 12
Mining road between Las Caobas and Rompino, Samba Hills, Dominican Rep.
Formation unknown, Miocene

Arca mauryae Olsson
See *Barbatia* cf. *B. bonaczyi* Gabb

25523 **Arca (Arca) mutabilis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 76, pl. 4, figs. 3-3b
Rio Ocones beach, Los Santos, Panama Recent

25527 **Arca (Arca) mutabilis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 76, pl. 6, figs. 2, 2a
Esmeraldas, Ecuador Recent

25528 **Arca (Arca) mutabilis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 76, pl. 6, figs. 2b-2d
Santa Elena, Ecuador Recent

28915 **Arca occidentalis** Philippi Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 163, pl. 29, fig. 3
Locality and formation uncertain; Dominican Rep., Miocene

25518 **Arca (Arca) pacifica** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 76, pl. 4, figs. 2, 2a, 2c, 2d
Punta Patilla, Panama City, Panama Recent

25519 **Arca (Arca) pacifica** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 76, pl. 4, fig. 2b
Manta, Ecuador Recent

Arca (Argina) pariaensis Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 47, pl. 8, figs. 7-9 not deposited by Cornell Univ., 1971. Presumed lost
Gulf of Paria between La Brea and San Fernando, Trinidad
Recent See Maury, B.A.P., v. 10, No. 42, 1925, p. 74 as *Scapharca (Argina) campechiensis* (Gmelin), *campechensis* [*sic*]

28438 **Arca (Argina) schultzana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 46, pl. 7, figs. 10-12
Beach, S. of pier at Brighton, Trinidad
Recent See Maury, B.A.P., v. 10, No. 42, 1925, p. 77, pl. 5, fig. 1 as *A. billingsiana* var. *schultzana* Maury
28445 **Arca (Noetia) sheldoniana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 43, pl. 8, figs. 10, 11
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 39, pl. 8, fig. 11
28516 **Arca** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 47, pl. 7, fig. 16
Road south of Pitch Lake, Brighton, Trinidad
Marl, upper Miocene See Jung, B.A.P., v. 55, No. 247, 1969, as upper Morne l'Enfer Fm., lower Pliocene
28410 **Arca staminata** Dall Hypotype
Sheldon, P. A., v. 1, No. 1, 1917, p. 39, pl. 9, fig. 4
? Alum Bluff, Apalachicola R., Liberty Co., Fla.
Chipola Fm., Alum Bluff Gr., lower Miocene
28933 **Arca umbonata** Lamarck Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 163, pl. 30, fig. 11
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

Arca vueltana H. K. Hodson
See *Anadara zorritensis* Spieker

Arca vueltana falconensis H. K. Hodson
See *Anadara zorritensis* Spieker

28936 **Arca yaquensis** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 164, pl. 30, fig. 14
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene
26482 **Arca (Arca) zebra** (Swainson) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 50, pl. 2, figs. 16, 17
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26483 **Arca (Arca) zebra abisiniana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 54, pl. 2, figs. 18, 19
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene
27608 **Archaeoglobigerina blowi** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 316
Tradinghouse Creek, near Waco, McLennan Co., Tex.
Taylor Fm., "Lower Taylor Marl" Mbr., Upper Cretaceous
27609 **Archaeoglobigerina bosquensis** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 316
Cameron Park, Waco, McLennan Co., Tex.
Austin Chalk, "Atco" Mbr., Upper Cretaceous
8231 **Architectonica (Architectonica) billmoorei** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 41, pl. 2, fig. 7
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene
26096 **Architectonica nobilis** Röding Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 152, pl. 13, figs. 15, 16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27456 **Architectonica (Architectonica) nobilis** Röding
Jung, B.A.P., v. 49, No. 223, 1965, p. 486 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
20443, 20444 **Architectonica nobilis karsteni** Rutsch
Woodring, U.S.G.S. Prof. Paper 306-B, 1959, p. 167 for *A. sexlinearis haughti* Marks *in* Brann & Kent, p. 89
27490 **Architectonica (Architectonica) nobilis karsteni** Rutsch
Jung, B.A.P., v. 49, No. 223, 1965, p. 488 Unfigured hypotype
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Architectonica quadriseriata (G. B. Sowerby, II)
See *Solarium quadriseriatum* G. B. Sowerby, II

Architectonica sexlinearis haughti Marks
See *A. nobilis karsteni* Rutsch PRI 20443, 20444

Arcinella
See *Echinochama*

26685 **Arcinella** sp. "a" Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 247, pl. 34, figs. 9, 10
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene
26686 **Arcinella** sp. "b" Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 248, pl. 34, figs. 11-13
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
21272 **Arcinella trachyderma** (Pilsbry & Johnson)
Nicol, Jr., Pal., v. 26, No. 5, 1952, p. 808 for *Echinochama antiquata* Dall *in* Brann & Kent, p. 350
See also Keen, Veliger, v. 4, No. 4, 1962, p. 179
26499, 26500 **Arcopsis adamsi** "Shuttleworth" (E. A. Smith) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 65, pl. 4, figs. 14-17
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26501-26503 **Arcopsis adamsi** "Shuttleworth" (E. A. Smith) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 65, pl. 5, figs. 1-6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
25529 **Arcopsis solida** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 85, pl. 6, figs. 3-3b
La Puntilla, Santa Elena, Ecuador Recent
8210 **Arcoscalpellum ? choctowensis** Weisbord Holotype
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 145, pl. 19, figs. 9, 10
4.3 mi. W. of Silas, Choctaw Co., Ala.
North Creek Mbr., Yazoo Gr., upper Eocene
8211 **Arcoscalpellum ? choctawensis** Weisbord Paratype
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 145, pl. 19, figs. 11, 12
4.3 mi. W. of Silas, Choctaw Co., Ala.
North Creek Mbr., Yazoo Gr., upper Eocene
6072 **Arcoscalpellum hubrichti** Collins Holotype
Collins, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 6, 1973, p. 363, pl. 2, fig. 13
1.5 mi. N. of W. Greene, Greene Co., Ala.
Mooreville (Selma) Chalk, Upper Cretaceous

6073a **Arcoscalpellum hubrichti** Collins Paratype
Collins, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 6, 1973, p. 363, pl. 2, fig. 20a not PRI 6082a; pl. 3, fig. 7 not PRI 60873a
1.5 mi. N. of W. Greene, Greene Co., Ala.
Mooreville (Selma) Chalk, Upper Cretaceous

6073b **Arcoscalpellum hubrichti** Collins Paratype
Collins, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 6, 1973, p. 363, pl. 2, fig. 20b not PRI 6082b
1.5 mi. N. of W. Greene, Greene Co., Ala.
Mooreville (Selma) Chalk, Upper Cretaceous

6074 **Arcoscalpellum hubrichti** Collins Paratype
Collins, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 6, 1973, p. 363, pl. 3, fig. 1
1.5 mi. N. of W. Greene, Greene Co., Ala.
Mooreville (Selma) Chalk, Upper Cretaceous

6082 **Arcoscalpellum hubrichti** Collins Unfigured paratypes
Collins, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 6, 1973, p. 363
1.5 mi. N. of W. Greene, Greene Co., Ala.
Mooreville (Selma) Chalk, Upper Cretaceous

8212 **Arcoscalpellum toulmini** Weisbord Holotype
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 147, pl. 20, figs. 1, 2
3.0 mi. N. of Monterey, Butler Co., Ala.
Porter's Creek Fm., Paleocene

8213-8215 **Arcoscalpellum toulmini** Weisbord Paratypes
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 147, pl. 20, figs. 3-8
3.0 mi. N. of Monterey, Butler Co., Ala.
Porter's Creek Fm., Paleocene

25900 **Ardeamya columbiensis** (Hanley) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 418, pl. 74, figs. 5, 5a
Tumbez, Peru Recent

26037 **Arene (Marevalvata) laguairana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 83, pl. 6, figs. 1-3
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26036 **Arene maiquetiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 82, pl. 5, figs. 20-22
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27036 **Argutastrea arguta** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 11, pl. 7, figs. 3-5
W. end of Carcajou Ridge, 65° 36′ N., 128° 15′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian

Asaphis delicatus Weisbord
See *Pleiorytis caroniana* (Maury)

28765 **Aspella scalarioides** (Blainville) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 104, pl. 17, fig. 11 *scalaroides* [*sic*]
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
See Vokes, Tulane Stud. Geol., v. 11, No. 3, 1975, p. 136 as *Dermomurex (Dermomurex) engonatus* (Dall)

7093 **Astarte mauriana** Van Winkle Holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 19, pl. 3, figs. 1, 1a
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

8250 **Astarte pretriangulata** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 124, pl. 24, fig. 3
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm, Jackson Gr., upper Eocene

7094 **Astarte trinidadensis** Van Winkle Syntypes
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 20, pl. 3, figs. 2 (lost), 3
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

7076 **Astarte (Ashtarotha) undulata** Say Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm, upper Miocene

7074 **Astarte (Ashtarotha) undulata deltoidea** Gardner
Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, not listed on p. 215
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

26044 **Astraea (Astralium) brevispina** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 94, pl. 6, figs. 16-18
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26046 **Astraea (Lithopoma) ? diffidentia** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 98, pl. 7, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26045 **Astraea (Lithopoma) tuber** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 97, pl. 7, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26395 **Astraea (Lithopoma) tuber** (Linnaeus) Unfigured hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 97
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26385 **Astraea (Liotiastralium) venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 95, pl. 47, figs. 16-18
[*Liotistralium* (*sic*)]
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28856 **Astralium karlschmidti** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 155, pl. 24, fig. 18
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28855 **Astralium sublongispinum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 154, pl. 24, figs. 16, 17
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29935 **Astrononion glabrellum** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 139, pl. 10, fig. 29
Altamaha R., Doctortown. Wayne Co., Ga.
Duplin Marl, middle Pliocene

28796 **Astyris debooyi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 100, pl. 21, fig. 6
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

27097 **Athabaschia asmenista** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 10, pl. 9, figs. 14-19
Left bank of Athabasca R., Twsp. 97, Alberta, Can.
? Waterways Fm., late Middle Devonian

Athleta sayanus (Conrad)
See *Voluta sayana ipnotica* de Gregorio
See *Voluta sayana mica* de Gregorio
See *Voluta teplica* de Gregorio

25605, **Atrina (Servatrina) maura** (G. B. Sowerby, I) Hypotype
25605a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 145, pl. 18, fig. 7 not PRI 25695 as in expl. Unfigured hypotype = PRI 25605a
Cojimenes, Ecuador Recent

25776 **Atrina (Servatrina) maura** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 145, pl. 55, fig. 1
Venado Beach, Panama Canal Zone Recent

26538 **Atrina (Servatrina) seminuda** (Lamarck) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 109, pl. 10, fig. 4
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26539 **Atrina (Servatrina ?) aff. A. seminuda** (Lamarck) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 111, pl. 10, fig. 5
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26540, **Atrina (Servatrina) serrata** ? G. B. Sowerby, I
26541 Figured specimens
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 111, pl. 10, figs. 6-9
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27046 **Atrypa aperanta** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 15, pl. 8, figs. 11-15
Gayna R., 2 mi. from confluence with Mountain R., N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian
See *Desquamatia aperanta* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 3

27047- **Atrypa aperanta** Crickmay Paratypes
27052 Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 15, pl. 8, figs. 2-10
65 mi. NW. of mouth of S. Nahanni R., N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian
See *Desquamatia aperanta* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 3

27010 **Atrypa ciliipes** Crickmay Holotype
Crickmay, Elucid. W. Can. Dev. Fms., Pub. by author, Imp. Oil Ltd., Calgary, 1957, p. 14, pl. 1, figs. 3, 5, 8
Hay R., 54.75 mi. from Great Slave Lake, N. W. Terr., Can.
Grumbler Fm., Upper Devonian
See *Desquamatia ciliipes* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 5

27011- **Atrypa ciliipes** Crickmay Paratypes
27012 Crickmay, Elucid. W. Can. Dev. Fms., Pub. by author, Imp. Oil Ltd., Calgary, 1957, p. 14, pl. 1, figs. 1, 2, 4, 6, 7
Hay R., 54.75 mi. from Great Slave Lake, N. W. Terr., Can.
Grumbler Fm., Upper Devonian
See *Desquamatia ciliipes* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 5

26947 **Atrypa cosmeta** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 600, pl. 71, figs. 1-6
23 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian
See *Desquamatia cosmeta* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 5

26948 **Atrypa cosmeta** Crickmay Paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 600, pl. 71, fig. 7
23 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian
See *Desquamatia cosmeta* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 5

27106 **Atrypa hormophora** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 15, pl. 11, figs. 1-4
Mackenzie R., 128° 18′ W., N. W. Terr., Can.
Lower Ramparts Fm., Middle Devonian
See *Desquamatia hormophora* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 4

27105 **Atrypa percrassa** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 14, pl. 11, figs. 5-8
1 mi. N. of Mackenzie R., 1.6 mi. W. of Lake Jan, N. W. Terr., Can.
Upper Ramparts Fm., Middle Devonian

27006 **Atrypa perfimbriata** Crickmay Holotype
Crickmay, Elucid. W. Can. Dev. Fms., Pub. by author, Imp. Oil Ltd., Calgary, 1957, p. 13, pl. 1, fig. 14
Well, 1613′, S. 9, T. 86, R. 7, W4, Alberta, Can.
Elk Point Fm., Middle Devonian
See *Desquamatia perfimbriata* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 4

27007 **Atrypa perfimbriata** Crickmay Paratype
Crickmay, Elucid. W. Can. Dev. Fms., Pub. by author, Imp. Oil Ltd., Calgary, 1957, p. 13, pl. 1, figs. 12, 13
Undetermined locality in E. Athabasca area, Alberta, Can.
See *Desquamatia perfimbriata* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 4

27007a, **Atrypa perfimbriata** Crickmay Paratypes
27008 Crickmay, Elucid. W. Can. Dev. Fms., Pub. by author, Imp. Oil Ltd., Calgary, 1957, p. 13, pl. 1, fig. 13 and two unfigured specimens
Well, 1613′, S. 9, T. 86, R. 7, W4, Alberta, Can.
Elk Point Fm., Middle Devonian
See *Desquamatia perfimbriata* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 4

28347 **Atrypa reticularis** (Linnaeus) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 54
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm, Genessee Gr., Upper Devonian

27009 **Atrypa rubromitra** Crickmay Holotype
Crickmay, Elucid. W. Can. Dev. Fms., Pub. by author, Imp. Oil Ltd., Calgary, 1957, p. 13, pl. 1, figs. 9-11
2 mi. above Alexandra Falls, Hay R., N. W. Terr., Can.
Grumbler Fm., Upper Devonian

26877 **Aturia** sp. Unfigured specimen
Palmer, Jr. Pal., v. 39, No. 1, 1965, p. 155
Cowlitz R., near Vader, Lewis Co., Wash.
Cowlitz Fm., upper Eocene

Aturia ? sp.
See *Nautilus* ? sp.

28575 **Atys doliolum** Maury — Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 18, pl. 3, fig. 7
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25582 **Aulacomya ater** (Molina) — Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 116, pl. 14, fig. 9
Paracas, Peru Recent

7062, 7061 **Aurilia conradi** (Howe & McGuirt) — Hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 238, pl. 27, figs. 9a-9c
Unfigured hypotypes = PRI 7061
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27081 **Australophyllum hesperium** Crickmay — Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 6, pl. 2, figs. 9-11; pl. 3, figs. 8, 9
Dog Creek, 65° 50′ N., 130° 00′ W., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27080 **Australophyllum praeclarum** Crickmay — Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 6, pl. 2, figs. 4, 5
Houston R., 65° 30′ N., 131° 15′ W., N. W. Terr., Can.
Hume Fm., early Middle Devonian

8235 **Austrocypraea towncreekensis** Dockery — Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 59, pl. 6, fig. 7
Town Creek, Jackson, Hinds Co., Miss.
Upper portion of Moodys Branch Fm., Jackson Gr., upper Eocene

28298 **Aviculopecten lautus ithacensis** Kindle — Holotype
Kindle, B.A.P., v. 2, No. 6, 1896, p. 45, pl. 1, fig. 3
Base of Ithaca Falls, Fall Cr., Ithaca, Tompkins Co., N.Y.
Sherburne Fm., Middle Devonian

28356 **Aviculopecten tenuis** Hall — Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 9, fig. 64
Salamanca, Cattaraugus Co., N.Y.
Conneaut Gr., Upper Devonian

25558 **Axinactis inaequalis** (G. B. Sowerby, I) — Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 109, pl. 11, figs. 8, 8b
Manta, Ecuador Recent

25559 **Axinactis inaequalis** (G. B. Sowerby, I) — Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 109, pl. 11, fig. 8a
Mancora, Peru Recent

28336 **Bactrites acicula** (Hall) — Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 36
McKinney's, N. of Ithaca, Tompkins Co., N.Y.
Sherburne Fm., Genessee Gr., Upper Devonian

7046 **Bairdoppilata triangulata** Edwards — Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 234
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

8216-8218 **Balanus antiquus** (Meyer) — Hypotypes
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 152, pl. 20, figs. 9-11; pl. 21, figs. 1-7
4.0-4.2 mi. W. of Silas, Choctaw Co., Ala.
North Creek Mbr., Yazoo Gr., upper Eocene

8219 ? **Balanus antiquus** (Meyer) Figured specimen
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 152, pl. 21, figs. 8, 9
4.0-4.2 mi. W. of Silas, Choctaw Co., Ala.
North Creek Mbr., Yazoo Gr., upper Eocene

27408 **Balanus (Balanus) bloxhamensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 48, pl. 12, figs. 5, 6 broken, 1965
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27356 **Balanus (Balanus) caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 26, pl. 5, figs. 5-7
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27357- **Balanus (Balanus) caboblanquensis** Weisbord Paratypes
27362 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 26, pl. 5, figs. 8-12; pl. 6, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27348 **Balanus (Balanus) caribensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 23, pl. 4, figs. 3, 4
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27349- **Balanus (Balanus) caribensis** Weisbord Paratypes
27352, Weisbord, B.A.P., v. 50, No. 225, 1966, p. 23, pl. 4, figs. 5-10; pl. 5,
27354, figs. 3, 4; pl. 7, figs. 5-7
27355, Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
27370 Playa Grande Fm., lower Pliocene

27353 **Balanus (Balanus) caribensis** Weisbord Paratypes
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 23, pl. 5, figs. 1, 2
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

27371 **Balanus (Balanus) caribensis** Weisbord Paratype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 23, pl. 7, fig. 8
Stream, near Litoral anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27372 **Balanus (Balanus) caribensis** Weisbord Paratype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 23, pl. 7, fig. 9
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27341 **Balanus (Balanus) laguairensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 18, pl. 3, figs. 1-3
Catia La Mar village, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27342, **Balanus (Balanus) laguairensis** Weisbord Paratypes
27344 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 18, pl. 3, figs. 4-6, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27343, **Balanus (Balanus) laguairensis** Weisbord Paratypes
27345, Weisbord, B.A.P., v. 50, No. 225, 1966, p. 18, pl. 3, figs. 7, 9, 10
27346 Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27392 **Balanus (Balanus) leonensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 43, pl. 9, figs. 7, 8
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27393- **Balanus (Balanus) leonensis** Weisbord Components of holotype
27397 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 43, pl. 10, figs. 1-9
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27398, **Balanus (Balanus) leonensis** Weisbord Paratypes
27399 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 43, pl. 10, figs. 10, 11
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27400 **Balanus (Balanus) ochlockoneensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 46, pl. 11, fig. 1
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27401- **Balanus (Balanus) ochlockoneensis** Weisbord Paratypes
27407 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 46, pl. 11, figs. 2-7; pl. 12, figs. 1-4
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27363 **Balanus (Balanus) playagrandensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 29, pl. 6, figs. 3-5
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27364- **Balanus (Balanus) playagrandensis** Weisbord Paratypes
27369 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 29, pl. 6, figs. 6-10; pl. 7, figs. 1-4
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27373 **Balanus sp.** Figured specimen
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 33, pl. 7, figs. 10, 11
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27374 **Balanus (Balanus) talquinensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 37, pl. 8, fig. 1
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27375 **Balanus (Balanus) talquinensis** Weisbord Paratype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 37, pl. 8, fig. 2 broken prior to 1976
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27376- **Balanus (Balanus) talquinensis** Weisbord Paratypes
27391 Weisbord, B.A.P., v. 50, No. 225, 1966, p. 37, pl. 8, figs. 3-13; pl. 9, figs. 1-6
Jackson Bluff, Leon Co., Fla.
Choctawhatchee Fm., Miocene

27327 **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 13, pl. 1, fig. 1 Hypotype
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27328 **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 13, pl. 1, figs. 2, 3 Hypotype
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27329, **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
27335 Hypotypes
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 13, pl. 1, figs. 4, 5; pl. 2, figs. 5, 6
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

27330 **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
Hypotype
Weisbord, B.A..P., v. 50, No. 225, 1966, p. 13, pl. 1, figs. 6, 7
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27331, 27333, 27334 **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
Hypotypes
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 13, pl. 1, figs. 8-10; pl. 2, figs. 1-4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27332 **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
Hypotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 13, pl. 1, figs. 11-13
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27336 **Balanus (Megabalanus) tintinnabulum antillensis** Pilsbry
Hypotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 13, pl. 2, figs. 7, 8
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27347 **Balanus (Balanus) aff. B. trigonus** Darwin Figured specimen
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 20, pl. 4, figs. 1, 2
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27338 **Balanus (Megabalanus) venezuelensis** Weisbord Holotype
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 17, pl. 2, fig. 10
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27337, 27339, 27340 **Balanus (Megabalanus) venezuelensis** Weisbord Paratypes
Weisbord, B.A.P., v. 50, No. 225, 1966, p. 17, pl. 2, figs. 9, 11, 12
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28937 **Barbatia cf. B. bonaczyi** Gabb Figured specimen
Maury, B.A.P., v. 5, No. 29, 1917, p. 165, pl. 30, fig. 15 not deposited by Cornell Univ., 1971
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.*
Gurabo Fm., middle Miocene
See Olsson, B.A.P., v. 9, No. 39, 1922, p. 182 as *Arca mauryae* Olsson

26488-26490 **Barbatia (Barbatia) candida** (Helbling) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 58, pl. 3, figs. 9-14
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26491 **Barbatia (Barbatia) candida** ? (Helbling) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 58, pl. 3, figs. 15, 16
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26492-26494 **Barbatia (Acar) domingensis** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 61, pl. 4, figs. 1-5 *dominguensis* [*sic*]
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26495, 26496 **Barbatia (Acar) domingensis** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 61, pl. 4, figs. 6-9 *dominguensis* [*sic*]
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

25520, **Barbatia (Cucullaearca) reeveana** (d'Orbigny) Hypotype
25520a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 81, pl. 4, fig. 4 not deposited, 1961. Unfigured hypotype = PRI 25520a
Isla la Plata, Ecuador Recent

25521 **Barbatia (Cucullaearca) reeveana** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 81, pl. 4, fig. 4b
Isla la Plata, Ecuador Recent

28938 **Barbatia (Acar) reticulata** (Gmelin) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 166, pl. 30, fig. 16
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26497, **Barbatia (Fugleria) tenera** (C. B. Adams) Hypotypes
26498 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 64, pl. 4, figs. 10-13
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25923 **Barnea (Anchomasa) subtruncata** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 444, pl. 78, figs. 2, 2b
Fig. 2a not deposited, 1961.
Mouth of Tumbez River, Peru Recent

Basilicorhynchus basilicum (Crickmay)
See *Leiorhynchus basilicum* Crickmay

29773, **Bayania cheneyi** Adegoke Unfigured paratypes
29774 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 74
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

27548 **Belemnosella floweri** (Palmer) Hypotype
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 33, pl. 1. figs. 1-3
Red R., below Montgomery Landing, Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27549 **Belemnosella palmerae** Allen Holotype
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 33, pl. 1, figs. 4-6
Red R., below Montgomery Landing, Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27553 **Belosaepia jeletzkyi** Allen Holotype
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 36, pl. 2, figs. 9-12
Mouth of Saline Bayou, St. Maurice, Winn Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene

27554 **Belosaepia** sp. Unfigured specimen
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 36
Montgomery, Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27551 **Belosaepia stenzeli** Allen Holotype
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 34, pl. 2, figs. 1-4
Mouth of Saline Bayou, St. Maurice, Winn Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene

27552 **Belosaepia stenzeli** Allen Paratype
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 34, pl. 2, figs. 5-8
Mouth of Saline Bayou, St. Maurice, Winn Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene

27550 **Belosaepia vokesi** Allen Holotype
Allen, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 34, pl. 1, figs. 7-10
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene

26378 **Benthonella ? loriei** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 129, pl. 46, figs. 7, 8; pl. 47, figs. 6, 7
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27498 **Biflustra cf. B. savartii** (Audouin-Savigny) Figured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 39, pl. 2, figs. 4, 5; pl. 6, fig. 2
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
27502 **Biflustra cf. B. savartii** (Audouin-Savigny) Figured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 39, pl. 2, fig. 9
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27503 **Biflustra cf. B. savartii** (Audouin-Savigny) Figured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 39, pl. 2, figs. 10, 11; pl. 4, fig. 1
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27514 **Biflustra cf. B. savartii** (Audouin-Savigny) Figured specimen
Weisbord, B. A. P., v. 53, No. 237, 1967, p. 39, pl. 7, fig. 1
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
27530 **Biflustra cf. B. savartii** (Audouin-Savigny) Unfigured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 39
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27029 **Billingsastraea stirps** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 7, pl. 5, figs. 1-5. Near Link Lake, Carcajou R. valley, N. W. Terr., Can.
Hume Fm., early Middle Devonian
27030 **Billingsastraea stirps** Crickmay Unfigured Paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 7
Near Link Lake, Carcajou R. valley, N. Y. Terr., Can.
Hume Fm., early Middle Devonian
27031 **Billingsastraea tapetiformis** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 8, pl. 4, figs. 2-4
Powell Cr., 5 mi. W. of mouth of Virgin R., N. W. Terr., Can.
Hume Fm., early Middle Devonian
27028 **Billingsastraea trichomisca** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 6, pl. 2, figs. 5-8
W. fork Prohibition Creek, 27 mi. below Fort Norman, N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian
26119 **Bittiolum caribense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 181, pl. 15, figs. 15, 16
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
28805 **Bittium asperoides** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 125, pl. 21, fig. 17
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28806 **Bittium canaliculatum** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 126, pl. 21, fig. 18
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
26114 **Bittium (Brachybittium) caraboboense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 176, pl. 15, figs. 5, 6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26117 **Bittium (Brachybittium) palitoense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 179, pl. 15, figs. 11, 12
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26118 **Bittium (Brachybittium) palitoense** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 179, pl. 15, figs. 13, 14
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26393 **Bittium (Brachybittium) salinae** Weisbord Unfigured holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 178
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26116 **Bittium (Brachybittium) salinae** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 178, pl. 15, figs. 9, 10
La Salina de Guaiguaza, W. of Puerto Gabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26115 **Bittium (Brachybittium) venezuelanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 177, pl. 15, figs. 7, 8
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
29958 **Bolivina advena** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 52
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
27238 **Bolivina lafayettei** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 38, pl. 10, fig. 2
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene
27278 **Bolivina lafayettei** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 38, pl. 10, fig. 1
Well A-2, 70′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary
29959 **Bolivina marginata** Cushman Unfigured hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
27280 **Bolivina marginata multicostata** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 39, pl. 11, fig. 3
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary
27282 **Bolivina marginata multicostata** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 39. pl. 11, fig. 2
Well A-1, 113′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene
29962 **Bolivina marginata multicostata** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 55
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27212 **Bolivina paula** Cushman & Cahill Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 39, pl. 10, fig. 6
Intersection of SR 628 & SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

27233 **Bolivina paula** Cushman & Cahill Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 39, pl. 10, fig. 7
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

27295- **Bolivina paula** Cushman & Cahill Hypotypes
27297 McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 39, pl. 10, figs. 3-5
Well A-2, 70′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

29960 **Bolivina paula** Cushman & Cahill Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 53
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29961 **Bolivina plicatella** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 54
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27317 **Bolivina plicatella mera** Cushman & Ponton Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 40, pl. 10, fig. 9
Well A-1, 165′, near Chesapeake Bay Bridge-Tunnel, Va.
Choptank Fm., Miocene

29949 **Bolivina** sp. Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 11, fig. 43
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

27256 **Bolivina** sp. A Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 41, pl. 10, fig. 8
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27228 **Bolivina** sp. B Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 41, pl. 11, fig. 4
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

27207 **Bolivina** sp. C Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 41, pl. 10, fig. 10
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27279 **Bolivina striatula** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 40, pl. 10, fig. 11
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27290 **Bolivina striatula** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 40, pl. 11, fig. 1
Well A-2, 81′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

29963 **Bolivina cf. B. suteri** Cushman & Renz Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 56
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

28409 **Bolloceras hartti** Flower Holotype
Flower, P.A., v. 2, No. 9, 1938, p. 63, pl. 3, fig. 13
Old Cornell Univ. Quarry, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Middle Devonian

7091 **Boreotrophon tenuisculptus** (Carpenter) Syntype
Van Winkle, B.A.P., v. 8, No. 36, 1921, p. 5, pl. 1, figs. 6, 7
Santa Barbara, Calif.
Pleistocene

7092 **Boreotrophon tenuisculptus** (Carpenter) Syntype
Van Winkle, B.A.P., v. 8, No. 36, 1921, p. 5, pl. 1, figs. 8, 9
Santa Barbara, Calif.
Pleistocene

26665 **Bornia tacaguana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 248, pl. 31, figs. 9, 10
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

27440 **Borsonia (Paraborsonia) cantaurana** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 572, pl. 77, figs. 11, 12
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27439 **Borsonia (Paraborsonia) cantaurana** Jung Unfigured paratypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 572
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28633 **Borsonia varicosa** (G B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 51, pl. 8, fig. 9
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

25596 **Botula fusca** (Gmelin) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 131, pl. 16, figs. 5-5c
Manta, Ecuador Recent

28982 **Botula hispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 193, pl. 35, fig. 11
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

21592 ?**Bowenelasma typa** Scrutton
Scrutton, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 4, 1973, p. 253 for *Cyathophyllum venezuelense* Weisbord *in* Brann & Kent, p. 297

25562 **Brachidontes citrinus** (Roeding) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 118, pl. 12, fig. 3
Florida Recent

25571 **Brachidontes ? granulatus** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, pl. 13, fig. 3
Paracas, Peru Recent

26529 **Brachidontes (Ischadium) recurvus** (Rafinesque) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 95, pl. 8, figs. 11-14
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26244 **Brachystyloma caribbeana** Weisbord Holotype
Weisbord, B.A.P., vol. 42, No. 193, 1962, p. 336, pl. 29, figs. 23, 24
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

24426, **Briantelasma oliveri** Scrutton Paratype
24433 Scrutton, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 4, 1973, p. 248 for *Heterophrentis venezuelensis* (Weisbord) *in* Brann & Kent, pp. 452-3 (PRI 24426 is a transverse sect. of PRI 24433)

24429, **Briantelasma oliveri** Scrutton Paratype
24430 Scrutton, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 4, 1973, p. 248 for *Heterophrentis venezuelensis* (Weisbord) *in* Brann & Kent, pp. 452-3 (PRI 24429 is a longitudinal sect. of one of the specimens, 24430A of Scrutton, in lot PRI 24430; the remainder is designated 24430B by Scrutton)

27676, **Brissopsis** cf. **B. atlantica** Mortensen Figured specimens
27678 Weisbord, B.A.P., v. 56, No. 252, 1969, p. 329, pl. 20, figs. 1-4; pl. 21, fig. 1
Stream, near Litoral anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27682 ? **Brissopsis** cf. **B. atlantica** Mortensen Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 329, pl. 21, figs. 8, 9
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27677, ? **Brissopsis** cf. **B. atlantica** Mortensen Figured specimens
27679- Weisbord, B.A.P., v. 56, No. 252, 1969, p. 329, pl. 20, fig. 5; pl. 21,
27681 figs. 2-7
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27155 **Buccella depressa** Andersen Unfigured hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 48
Well 3-S, 135′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Miocene (St. Marys-Choptank Fms., mixed)

27171 **Buccella depressa** Andersen Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 48, pl. 14, fig. 3
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27230 **Buccella depressa** Andersen Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 48, pl. 14, fig. 5
1.8 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27263 **Buccella depressa** Andersen Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 48, pl. 14, fig. 4
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

7029, **Buccella** cf. **B. depressa** Andersen Figured specimen
7028 Sabol, B.A.P., v. 41, No. 191, 1960, p. 230, pl. 27, figs. 4a-4c. Unfigured specimens = PRI 7028
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27183 **Buccella mansfieldi** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 49, pl. 15, fig. 1
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27306 **Buccella mansfieldi** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 49, pl. 14, fig. 6
Offshore well A-11, 160′, near Newport News, Va.
St. Marys Fm., Miocene

27323 **Buccella mansfieldi** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 49, pl. 14, fig. 7
Kings Mill Wharf (now destroyed), James R., James City Co., Va.
Basal Yorktown Fm., Miocene

29984, **Buccella mansfieldi** (Cushman) Hypotypes
29985 Herrick, B.A.P., v. 70, No. 293, 1976, p. 144, pl. 13, figs. 77, 78
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7031, **Buccella parkerae** Andersen Hypotype
7030 Sabol, B.A.P., v. 41, No. 191, 1960, p. 230, pl. 27, figs. 5a-5c
Unfigured hypotypes = PRI 7030
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27206 **Buccella parkerae** Andersen Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 49, pl. 15, figs. 2, 3
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27270 **Buccella parkerae** Andersen Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 49, pl. 15, fig. 4
Well A-1, 84', near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

7034 **Buccella** sp. Figured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 231, pl. 27, figs. 6a, 6b
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7032-7033 **Buccella** spp. Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 231
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28284 **Buccinum bidentatum** Emmons Syntypes
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 257(166), fig. 126 (three specimens)
Miocene marl beds of eastern N. Carolina
See Olsson, et al., ANSP, Mon. 8, 1953, p. 222 as *Nassarius (Uzita) bidentatus* (Emmons)

28285 **Buccinum moniliformis** Emmons Holotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 256(165), fig. 125
Miocene marl beds of eastern N. Carolina

28279 **Buccinum porcinum** Say Unfigured hypotypes
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 256(165)
Miocene marl beds of eastern N. Carolina

Buchiola
See *Cardiola*

29954 **Bulimina elongata** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 141, pl. 11, fig. 48
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7025 **Bulimina gracilis** Cushman Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 229
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27167 **Bulimina gracilis** Cushman Hypotypes
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 33, pl. 9, figs. 4, 5
Well 1-SE, 180', York R., between Gloucester Pt. and Yorktown, York Co., Va.
?, probably Miocene

27298 **Bulimina gracilis calveri** McLean Holotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 34, pl. 9, fig. 6
Well A-2, 81', near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

27201 **Bulimina inflata** Seguenza Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 34, pl. 12, fig. 7
Locality uncertain

29955 **Bulimina marginata** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 49
Coastal well, 60-65', E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

27161 **Bulimina cf. B. preacanthia** McLean, 1956 Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 35, pl. 12, fig. 8
Offshore well A-11, 65′, near Newport News, Va.
Pleistocene

29953 **Buliminella curta** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 141, pl. 11, fig. 47
Well, 55-60′, N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

27223 **Buliminella elegantissima** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 32, pl. 9, fig. 2
Pasture, 1 mi. N of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27232 **Buliminella elegantissima** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 32, pl. 9, fig. 1
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

27236 **Buliminella elegantissima** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 32, pl. 9, fig. 3
1.8 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

29952 **Buliminella elegantissima** (d'Orbigny) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 141, pl. 11, fig. 46
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

26344 **Bulla amygdala** Dillwyn Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 452, pl. 43, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26345 **Bulla amygdala** Dillwyn Hypotype
Weisbord, B.A.P., v. 42, No. 193, p. 452, pl. 43, figs. 3, 4
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26346 **Bulla occidentalis** A. Adams Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 454, pl. 43, figs. 5, 6
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26347 **Bulla striata** Bruguière Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 455, pl. 43, figs. 7, 8 not PRI 26342 as in expl.
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26348 **Bulla striata** Bruguière Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 455, pl. 43, figs. 9, 10
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28578 **Bullaria granosa** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 20, pl. 3, figs. 10, 10a
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
See Maury, N.Y. Acad. Sci. Scientific Surv. Porto Rico & Virgin Is., v. 3, 1920, p. 73 as *Haminea granosa* (G. B. Sowerby, II)

28576 **Bullaria paupercula** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 18, pl. 3, fig. 8
Locality uncertain; Dominican Rep. Cercado Fm., lower Miocene

28577 **Bullaria sarahberlinerae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 19, pl. 3, fig. 9
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
See Pilsbry, ANSP, Proc., v. 73, 1922, p. 313 as *B. solida* (Gmelin)

Bullaria solida (Gmelin)
See *B. sarahberlinerae* Maury.

28763 **Bursa amphitrites** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 109, pl. 17, fig. 9
Locality and formation uncertain; Dominican Rep., Miocene

28762 **Bursa bufoniopsis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 108, pl. 17, fig. 8
Zone B or D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28761 **Bursa crassa** Dillwyn Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 108, pl. 17, figs. 6, 7
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28275 **"Busicon" perversum** Conrad Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Sur., Rept., 1858, p. 249(158), fig. 107?
Miocene marl beds of eastern N. Carolina

29222 **Cadulus (Gadila) brazosensis** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 11
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

26897 **Cadulus (Gadila) bruscasensis** Weisbord Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 130, pl. 18, figs. 15, 16
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29223 **Cadulus (Gadila) curvus** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 12
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

28891 **Cadulus denticulustigris** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 160, pl. 26, fig. 7
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm. lower Miocene

28890 **Cadulus elegantissimus** Pilsbry & Sharp Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 160, pl. 26, fig. 6
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

29224 **Cadulus (Gadila) erleneae** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 15
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

29221 **Cadulus (Gadila) moseleyensis** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 17
Stone City Bluff, Brazos R., Burleson Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

29225 **Cadulus (Gadila) palmerae** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 17
Stone City Bluff, Brazos R., Burleson Co., Tex.
Stone City Fm., middle Eocene

28889 **Cadulus phenax** Pilsbry & Sharp Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 160, pl. 26, fig. 5
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26898 **Cadulus (Gadila) playagrandensis** Weisbord Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 131, pl. 18, figs. 17, 18
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26892 **Cadulus (Polyschides) quadridentatus** (Dall) Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 132, pl. 17, fig. 11; pl. 18, fig. 19
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26893 **Cadulus (Polyschides) quadridentatus** (Dall) Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 132, pl. 17, fig. 12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26899 **Cadulus (Polyschides) quadridentatus** (Dall) Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 132, pl. 18, fig. 20
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26895 ? **Cadulus** sp. indeterminate Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 135, pl. 17, fig. 14
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29226 **Cadulus (Gadila) stonecityensis** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 18
Stone City Bluff, Brazos R., Burleson Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

26894 **Cadulus (Polyschides) tetraschistus** ? (Watson)
Weisbord, B.A.P., v. 47, No. 214, 1964, Figured specimen
p. 134, pl. 17, fig. 13; pl. 18, fig. 21
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29227 **Cadulus (Gadila) zingulai** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 18
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

26106 **Caecum (Caecum) marense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 164, pl. 14, fig. 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26107 **Caecum (Caecum) puntagordanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 165, pl. 14, fig. 13
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26108 **Caecum (Caecum) puntagordanum** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 165, pl. 14, fig. 14
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26104, **Caecum (Caecum) regulare** Carpenter Hypotypes
26105 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 162, pl. 14, figs. 10, 11
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26109 **Caecum (Defolinia) tomaculum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 166, pl. 14, fig. 16 not 15 as in text and expl.
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26110 **Caecum (Fartulum) venezuelanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 167, pl. 14, fig. 15 not 16 as in text and expl.
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

6094 **Calappa robertsi** Ross, Lewis, & Scolaro Holotype
Ross, *et al.,* Quart. Jr. Fla. Acad. Sci., v. 27, No. 3, 1964, p. 187, figs. 2a, 2b; not PRI 6064
"Devil's Den", near Williston, Levy Co., Fla.
Ocala Ls., Williston Mbr., upper Eocene

6095 **Calappa robertsi** Ross, Lewis, & Scolaro Paratype
Ross, *et al.,* Quart. Jr. Fla. Acad. Sci., v. 27, No. 3, 1964, p. 187, fig. 2c; not PRI 6065
"Devil's Den", near Williston, Levy Co., Fla.
Ocala Ls., Williston Mbr., upper Eocene

29761- **Callianassa seefriedi** von Ammon Unfigured hypotypes
29763 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 62
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

26024 **Calliostoma caribbeanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 70, pl. 4, figs. 8-10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26026 **Calliostoma curucutianum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 72, pl. 4, figs. 13, 14
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26027 **Calliostoma curucutianum** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 72, pl. 4, figs. 15-17
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29244 **Calliostoma (Eutrochus) decamposi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 57, pl. 1, fig. 8
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29244A **Calliostoma (Eutrochus) decomposi** Maury Unfigured Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 57
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29243 **Calliostoma (Eutrochus) derbyi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 57, pl. 1, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28857 **Calliostoma grabaui** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 155, pl. 24, fig. 19
Locality and formation uncertain; Dominican Rep., Miocene

1108 **Calliostoma olssoni** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 421
See Brann & Kent, p. 149

29250 **Calliostoma pirabicum** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 55, pl. 1, fig. 17
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26025 **Calliostoma puntagordanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 71, pl. 4, figs. 11, 12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29251 **Calliostoma retectum** (White) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pp. 53, 391, pl. 1, fig. 19
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

Callista aequorea (Conrad)
See *Cytherea aequorea* mut. *cominduta* de Gregorio

Callista golfotristensis (Maury)
See *Meretrix subimpressa golfotristensis* Maury

28461 **Callista mcgrathiana** Rathbun Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 57, pl. 9, fig. 10
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 85, pl. 15, fig. 4 as *Callista (Costacallista) rathbunensis* Maury (paratype)

28462 **Callista mcgrathiana rathbunensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 58, pl. 9, fig. 11
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 85, pl. 15, fig. 8 as *Callista (Costacallista) rathbunensis* Maury (holotype)

Callista perovata subvitrea (de Gregorio)
See *Cytherea aequorea* mut. *subvitrea* de Gregorio

Callista rathbunensis Maury
See *Callista mcgrathiana* Rathbun & *C. m. rathbunensis* Maury

25522 **Calloarca alternata** (G. B. Sowerby, I) Hypotypes
Olson, Moll. Trop. E. Pacific, PRI, 1961, p. 84, pl. 4, figs. 5, 5a
Palo Seco, Panama Canal Zone Recent

29528 **Callocardia (Agriopoma) euglypta** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 329, pl. 17, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29529 **Callocardia (Agriopoma) hartti** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 327, pl. 17, fig. 8
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29525 **Callocardia recondita** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 331, pl. 17, fig. 4
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28548 **Calyptraea aperta** (Solander in Brander) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 99, pl. 13, fig. 5
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28549 **Calyptraea centralis** (Conrad) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 100, pl. 13, fig. 6
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene See Jung, B.A.P., v. 55, No. 247, 1969 as upper Morne l'Enfer Fm., lower Pliocene

8234 **Calyptraea glandaria** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 57, pl. 5, fig. 9
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

Calyptraphorus velatus (Conrad)
See *Rostellaria quidest* de Gregorio

28526, 28527 **Calyptraphorus velatus compressus** Aldrich Hypotypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 88, pl. 12, figs. 8-10
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm, Paleocene

28339 **Camarotoechia eximia** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 7, figs. 41, 42
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

29775 **Campanile nigeriense** Adegoke & Dessauvagie
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 75 Unfigured hypotype
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28661 **Cancellaria barretti** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 62, pl. 10, fig. 1
Bluff 1, 2, or 3, above Cercado on Rio Mao, Dominican Rep.
Formation uncertain, Miocene

27430 **Cancellaria (Bivetiella) beata** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 554, pl. 75, figs. 12, 13
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27431 **Cancellaria (Bivetiella) beata** Jung Unfigured paratype
Jung, B.A.P., v. 49, No. 223, 1965, p. 554
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Cancellaria cossmanni Olsson
See *Cancellaria petiti* Olsson

28662 **Cancellaria epistomifera** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 63, pl. 10, figs. 3, 4
Locality and formation uncertain; Dominican Rep., Miocene

28663 **Cancellaria epistomifera** Guppy, "var." Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 63, pl. 10, fig. 5
Locality and formation uncertain; Dominican Rep., Miocene

29372 **Cancellaria euclethra** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 189, pl. 9, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28665 **Cancellaria guppyi** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 64, pl. 10, fig. 7
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28666 **Cancellaria guppyi** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 64, pl. 10, fig. 8
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28668 **Cancellaria (Trigonostoma) gurabis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 65, pl. 10, fig. 11
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28667 **Cancellaria harrisi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 64, pl. 10, figs. 9, 10
Zone H or I, near Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

29378 **Cancellaria hartti** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 185, pl. 9, fig. 19 composite
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28960 **Cancellaria (Aphera) islacolonis** Maury Syntype
Maury, B.A.P., v. 5, No. 29, 1917, p. 65, pl. 10, fig. 12
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28669, **Cancellaria (Aphera) islacolonis** Maury Syntypes
28670 Maury, B.A.P., v. 5, No. 29, 1917, p. 65, pl. 10, figs. 12a, 12b
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28664 **Cancellaria laevescens** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 64, pl. 10, fig. 6
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28671 **Cancellaria (Narona) losquemadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 66, pl. 10, fig. 13
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

1046 **Cancellaria montserratensis** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 539
See Brann & Kent, p. 166

20966, **Cancellaria petiti** Olsson Syntypes
20968 Olsson, "Some Tert. Moll. . . .", PRI, 1967, p. 44, new name for *C. cossmanni* Olsson. See Brann & Kent, p. 165

29366 **Cancellaria pirabensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 187, pl. 9, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29373 **Cancellaria praeindentata** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 189, pl. 9, fig. 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

27427 **Cancellaria (Cancellaria) aff. C. rowelli** Dall
Jung, B.A.P., v. 49, No. 223, 1965, p. 551 Unfigured specimens
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27432 **Cancellaria (Charcollaria) terryi** Olsson Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 556
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26323 **Cancellaria torula** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 398, pl. 40, figs. 9-11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27428 **Cancellaria (Euclia) werenfelsi** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 552
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27429 **Cancellaria (Euclia) werenfelsi** Jung Unfigured paratype
Jung, B.A.P., v. 49, No. 223, 1965, p. 552
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27199 **Cancris sagra** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 52, pl. 16, fig. 5
Well A-5, 165', Lambert Pt., Norfolk, Va.
St. Marys Fm., Miocene

29987 **Cancris sagra** (d'Orbigny) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 146, pl. 14, fig. 80 *segra* [*sic*]
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

26247, **Cantharus (Pollia) auritulus** (Link) Hypotypes
26248 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 341, pl. 30, figs. 3-6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

Cantharus predistortus Marks
See *Northia predistorta* (Marks)

26249, **Cantharus (Pollia) tinctus** ? Conrad Figured specimens
26250 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 343, pl. 30, figs. 7-10
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27643 **Capulus cassis** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 71, pl. 1, figs. 3, 4
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

26144 **Capulus (Krebsia) incurvatus** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 207, pl. 18, figs. 18-20
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26145 **Capulus (Krebsia) incurvatus** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 207, pl. 19, figs. 1, 2
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28318 **Cardiola** [Buchiola] **retrostriata** (von Buch) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 11
N. of McKinney's, near Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28317 **Cardiola** [Buchiola] sp. Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 10
N. of McKinney's, near Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

25636 **Cardita (Cardita) cuvieri** Broderip Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 186, pl. 26, figs. 2a, 2b
Fig. 2 not deposited, 1961.
Manglaralto, Ecuador Recent

26628, **Cardita (Carditamera) gracilis** Shuttleworth Hypotypes
26629 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 200, pl. 26, figs. 3-7
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26630, **Cardita (Carditamera) gracilis** Shuttleworth Hypotypes
26631 Weisbord, BA.P., v. 45, No. 204, 1964, p. 200, pl. 26, figs. 8-11
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26632, **Cardita (Carditamera) gracilis** Shuttleworth Hypotypes
26633 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 200, pl. 26, figs. 12-15
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26634 **Cardita (Carditamera) gracilis** Shuttleworth Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 200, pl. 26, figs. 16, 17
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29479 **Cardita (Carditamera) manteia** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 271, pl. 15, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

25642 **Cardita (Strophocardia) megastropha** Gray Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 187, pl. 26, figs. 5, 5a
Manglaralto, Ecuador Recent

25685 **Cardita (Cardita) spurca beebei** Hertlein Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 186, pl. 39, fig. 6
Dredged off Panama (S. Jadis Coll.) Recent

25641 **Cardita (Cardita) tricolor** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 185, pl. 26, figs. 4-4c
Venado Beach, Panama Canal Zone Recent

28455, **Cardita (Carditamera) virginiae** Maury "Syntype"
28456 Maury, A.N.S.P., Jr., v. 15, 1912, p. 53, pl. 9, figs. 2, 3 (interior mold and negative of interior mold of same shell)
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 357, pl. 22, fig. 10 as *Carditamera virginiae* Maury, upper Morne l'Enfer Fm., lower Pliocene

25637, **Carditamera (Byssomera) affinis** (G. B. Sowerby, I) Hypotypes
25639 Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 189, pl. 26, figs. 3, 3a, 3c
Manta, Ecuador Recent

25638 **Carditamera (Byssomera) affinis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 189, pl. 26, fig. 3b
Mancora, Peru Recent

25640 **Carditamera (Byssomera) affinis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 189, pl. 26, fig. 3d
Burica Pen., Panama Recent

25634 **Carditamera (Carditamera) radiata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 189, pl. 26, figs. 1-1b
Panama City, Panama Recent

25635 **Carditamera (Carditamera) radiata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 189, pl. 26, fig. 1c
Garachiné, Panama Recent

Carditamera virginiae Maury
See *Cardita virginiae* Maury

28458 **Cardium (Trigoniocardia) carolinae** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 54, pl. 9, figs. 5, 6
1000 feet W. of of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
Selected as lectotyte by Jung, B.A.P., v. 55, No. 247, 1969, p. 366, pl. 25, fig. 10 as *Trigoniocardia (Trigoniocardia) maturensis* Dall, lower Pliocene

28989 **Cardium (Trachycardium) cinderellae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 211, pl. 36, fig. 4
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28984 **Cardium (Trachycardium) dominicanum** Dall Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 209, pl. 36, fig. 1
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29524 **Cardium (Fragum) estacianum** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 421, pl. 17, fig. 3
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28990 **Cardium (Trigoniocardia) haitense** G. B. Sowerby, II Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 211, pl. 36, figs. 5, 5a
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene
28991 **Cardium (Trigoniocardia) haitense cercadicum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 212, pl. 36, fig. 6
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
29527 **Cardium hortensium** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 419, pl. 17, fig. 6
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene
28985 **Cardium (Trachycardium) linguatigris** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 209, pl. 36, fig. 2
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
29532 **Cardium paraense** White Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 303, pl. 17, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29536 **Cardium pessoai Maury** (pessoae, emend.) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 307, pl. 17, fig. 15
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29537 **Cardium philotarium** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 307, pl. 17, fig. 16
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
28992 **Cardium (Trigoniocardia) sanbaicum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 212, pl. 36, fig. 7
Mining road between Las Caobas and Rompino, Samba Hills, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger
28993 **Cardium (Laevicardium) serratum** Linnaeus Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 212, pl. 36, fig. 8
Locality and formation uncertain; Dominican Rep., Miocene
29531 **Cardium** sp. indeterminate Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 309, pl. 17, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29519 **Cardium thalassium** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 309, pl. 16, fig. 21
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
28986, **Cardium (Trachycardium) tintinnabularum** Maury Syntypes
28987 Maury, B.A.P., v. 5, No. 29, 1917, p. 210, pl. 36, fig. 3
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene
28994 **Cardium (Laevicardium) venustum** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 213, pl. 36, fig. 9
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
29830, **Cardium (Cardium) zechi** Oppenheim Unfigured hypotypes
29831 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 268
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

Caricella bolaris (Conrad)
See *Voluta pyruloides sita* de Gregorio

Caricella doliata (Conrad)
See *Voluta cogitabunda* de Gregorio

8243 **Caricella (Reticulacella) fenestra** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 84, pl. 13, fig. 5
Town Creek, Jackson, Hinds Co., Miss.
Upper portion of Moodys Branch Fm., Jackson Gr., upper Eocene

8242 **Caricella giganta** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 83, pl. 13, fig. 1
Town Creek, Jackson, Hinds Co., Miss.
Upper portion of Moodys Branch Fm., Jackson Gr., upper Eocene

28486 **Caricella ogilviana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 68, pl. 10, fig. 7
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28487 **Caricella perpinguis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 68, pl. 10, fig. 8
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28488 **Caricella** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 68, pl. 10, fig. 9
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

Carinatina dysmorphostrota (Crickmay)
See *Spinatrypa dysmorphostrota* Crickmay

27601, **Carychium exile canadense** Clapp Hypotypes
27601A, Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 259, pl. 17, figs. 5-7
27601B Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

Caryocorbula (Caryocorbula) amethystina Olsson Paratype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 429, pl. 75, fig. 1a not PRI 25934; not deposited, 1961
Búcaro, Panama Recent

Caryocorbula helenae (Maury)
See *Corbula helenae* Maury
See *Corbula smithiana* Maury

25908, **Caryocorbula (Caryocorbula) marmorata** (Hinds) Hypotype
25908a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 431, pl. 75, fig. 5
Unfigured hypotypes = PRI 25908a
Santa Elena, Ecuador Recent

25906 **Caryocorbula (Caryocorbula) nasuta** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 429, pl. 75, figs. 3-3e
Zorritos, Peru Recent

25910, **Caryocorbula (Caryocorbula) nuciformis** (G. B. Sowerby, I)
25910a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 430, pl. 75, Hypotypes
figs. 7, 8 not deposited, 1961. Unfigured hypotypes = PRI 25910a
Zorritos, Peru Recent

25913, **Caryocorbula (Caryocorbula) nuciformis** (G. B. Sowerby, I)
25913a Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 430, pl. 76, fig. 7
Unfigured hypotypes = PRI 25913a
Limones, Ecuador Recent

25905A **Caryocorbula (Caryocorbula) ovulata** (G. B. Sowerby, I)
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 428, Hypotypes
pl. 75, figs. 2, 2a. Fig. 2b not deposited, 1961
Zorritos, Peru Recent
25905B **Caryocorbula (Caryocorbula) ovulata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 428, pl. 75, fig. 2c
Búcaro, Panama Recent

Caryorhynchus carya (Crickmay)
See *Leiorhynchus carya* Crickmay

27039 **Caryorhynchus hippocastanea** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 13, pl. 9, figs. 15-17
W. end of Carcajou Ridge, 65° 36′ N., 128° 15′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian
27040 **Caryorhynchus hippocastanea** Crickmay Paratype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 13, pl. 9, figs. 10-14
Hairpin Bend of Oscar Creek, N.W. Terr., Can.
Fm. not given
27041 **Caryorhynchus hippocastanea** Crickmay Unfigured paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 13
Locality and formation not specifically given
27265 **Cassidulina crassa** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 52, pl. 17, fig. 1
Well A-2, 101′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene
29993 **Cassidulina crassa** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 147, pl. 14, fig. 86
Altamaha R., Doctortown, Wayne Co, Ga.
Duplin Marl, middle Pliocene
29994 **Crassidulina laevigata** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 147, pl. 14, fig. 87
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene
27268 **Cassidulina laevigata carinata** Cushman Hypotypes
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 53, pl. 17, fig. 2
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary
29992 **Cassidulina laevigata carinata** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 147, pl. 14, fig. 85
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
29995 **Cassidulina subglobosa** H. B. Brady Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 147, pl. 14, fig. 88
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
29996 **Cassidulinoides bradyi** (Norman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 147, pl. 14, fig. 89
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene
28523 **Cassis (Phalium) guppyana** Maury Syntype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 84, pl. 12, fig. 5
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28524 **Cassis (Phalium) guppyana**? Maury Syntype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 84, pl. 12, fig. 6
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

29307 **Cassis inflata** Shaw Hypotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pl. 5, fig. 11
Coast of Brazil
Recent

26178 **Cassis** aff. **C. madagascariensis** Lamarck Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 251, pl. 23, figs. 9, 10
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28766 **Cassis sulcifera** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 110, pl. 18, fig. 1
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28767 **Cassis sulcifera** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 110, pl. 18, figs. 2, 3
Locality and formation uncertain; Dominican Rep., Miocene

28525 **Cassis togatus soldadensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 86, pl. 12, fig. 7
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28305 **Casteroceras alternatum** (Hall) Hypotype
Flower, B.A.P., v. 22, No. 76, 1936, p. 47, pl. 5, fig. 3
Manlius, Onondaga Co., N.Y.
Cherry Valley Ls., Marcellus Fm., Middle Devonian

Cavilucina thalmanni Marks
See *Anodontia thalmanni* (Marks)

27501 **Cellaria catiana** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 48, pl. 2, fig. 8; pl. 5, fig. 6
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28310 **Ceratites harttii** Hyatt Unfigured holotype
Hyatt *in* Hartt, Geol. & Phys. Geog., Brazil, 1870, p. 386
Maroïm, St. of Sergipe, Brazil
"Sapucahy Ls.", Upper Cretaceous

26122 **Cerithiopsis (Laskeya) emersonii** ? (C. B. Adams) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 184, pl. 15, figs. 21, 22
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26120 **Cerithiopsis maiquetiensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 182, pl. 15, figs. 17, 18
Quebrada La Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26121 **Cerithiopsis tela** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 183, pl. 15, figs. 19, 20
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28537 **Cerithiopsis veatchiana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 92, pl. 12, fig. 21
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

29284 **Cerithium calcivelatum** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 103, pl. 4, fig. 2
(cast too poor for positive identification)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28813 **Cerithium dominicense** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 125, pl. 22, fig. 7
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26113 **Cerithium** cf. **C. eburneum** Bruguière Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 172, pl. 15, figs. 3, 4
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

29288 **Cerithium gonzagae** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 101, pl. 4, fig. 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28811 **Cerithium gurabense** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 124, pl. 22, figs. 4, 5
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28534 **Cerithium harrisii** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 90, pl. 12, fig. 18
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 447, pl. 45, fig. 16; lower Pliocene

28535 **Cerithium isabellae** Maury Holotype
Maury, A.N.S.P., Jr. v. 15, 1912, p. 91, pl. 12, fig. 19
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene

29266 **Cerithium leei** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 103, pl. 3, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26112 **Cerithium litteratum playagrandensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 170, pl. 15, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28809 **Cerithium microlineatum** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 123, pl. 22, fig. 1
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.*
Gurabo Fm., middle Miocene

26444 **Cerithium misgum** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 118, pl. 10, fig. 29
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 775 as *Mitrella (Columbellopsis) elevata* (I. Lea)

28804 **Cerithium obesum** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 124, pl. 21, fig. 16
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

29290, 29289 **Cerithium pirabicum** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 99, pl. 4, fig. 7
Unfigured plastotype = PRI 29289
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28810 **Cerithium russelli** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 123, pl. 22, figs. 2, 3
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28536 **Cerithium soldadense** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 91, pl. 12, fig. 20
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28532, 28533 **Cerithium tinkeri** Maury Syntypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 92, pl. 12, fig. 17 not deposited by Cornell Univ., 1971. Unfigured specimen = PRI 28533
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene See Jung, B.A.P., vol. 55, No. 247, 1969, as upper Morne l'Enfer Fm., lower Pliocene

28812 **Cerithium turriculum** ? Gabb Figured specimen
Maury, B.A.P., v. 5, No. 29, 1917, p. 125, pl. 22, fig. 6
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28802, 28803 **Cerithium uniseriale** G. B. Sowerby, II Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 124, pl. 21, figs. 14, 15
Locality and formation uncertain; Dominican Rep., Miocene

29497 **Chama agronomica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 415, pl. 16, fig. 9
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

25664 **Chama buddiana** C. B. Adams Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 224, pl. 34, figs. 2, 2a
Pearl Islands, Panama Recent

25665 **Chama buddiana** C. B. Adams Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 224, pl. 34, figs. 2b, 2c
El Lagartillo, Panama Recent

28952 **Chama caimitica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 199, pl. 33, fig. 7
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

29517 **Chama callipona** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 283, pl. 16, fig. 19
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

7069 **Chama congregata** Conrad Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

26666 **Chama congregata** Conrad Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 235, pl. 31, figs. 11-14
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26667, 26671 **Chama congregata** Conrad Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 235, pl. 32, figs. 1, 2, 8, 9
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26668 **Chama congregata** Conrad Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 235, pl. 32, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26669, 26670 **Chama congregata** Conrad Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 235, pl. 32, figs. 5-7
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28953 **Chama congregatoides** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 200, pl. 33, fig. 8
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

25659 **Chama echinata** Broderip Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 224, pl. 33, fig. 3
Concepcion Beach, near Las Tablas, Panama Recent

29516 **Chama eudeiela** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 285, pl. 16, fig. 18
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26675 **Chama florida** Lamarck Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 241, pl. 33, figs. 3, 4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25663 **Chama frondosa** Broderip Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 225, pl. 34, fig. 1b **not** deposited, 1961
Manta, Ecuador Recent

28949-28951 **Chama involuta** Guppy Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 199, pl. 33, figs. 4-6
Rio Cana, near Cana, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

26674 **Chama macerophylla** Gmelin Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 238, pl. 33, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25658, 25667 **Chama pellucida** G. B. Sowerby, I Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 225, pl. 33, figs. 2, 2a; pl. 34, fig. 5
Bayovar, Peru Recent

8249 **Chama (Cipliacella) radiata** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 121, pl. 23, fig. 15
Ravine at Riverside Park, near Pearl R., Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

8248 **Chama (Cipliacella) radiata** Dockery Paratype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 121, pl. 23, fig. 13
Ravine at Riverside Park, near Pearl R., Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

28954 **Chama riocanica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 200, pl. 33, fig. 9
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

26672, 26673 **Chama sinuosa bermudensis** Heilprin Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 242, pl. 32, figs. 10-13
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

29700 **Charonia lampas weisbordi** Gibson-Smith Holotype
Gibson-Smith, Bol. Inf., AVGMP, v. 19, No. 1, 1976, p. 3, pl. 1, figs. 1, 2
Mare Abajo, Cabo Blanco, Dist. Fed., Ven.
Mare Fm., upper Pliocene

26194, 26195 **Charonia lampas weisbordi** Gibson-Smith Paratypes
Gibson-Smith, Bol. Inf., AVGMP, v. 19, No. 1, 1976, p. 3 for *Charonia* sp., Weisbord, PRI 26194, 26195 this catalog

26194 **Charonia** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 266, pl. 25, fig. 9
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
See *Charonia lampas weisbordi* Gibson-Smith

26195 **Charonia** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 266, pl. 25, figs. 10, 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
See *Charonia lampas weisbordi* Gibson-Smith

26141, 26142 **Cheilea equestris** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 202, pl. 18, figs. 8-12
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

Chicoreus dormani E. Vokes
See *Murex dormani* E. Vokes

Chicoreus dujardinoides E. Vokes
See *Murex lepidotus dujardinoides* E. Vokes

Chicoreus infrequens E. Vokes
See *Murex infrequens* E. Vokes

26463 **Chicoreus (Siratus) juliagardnerae** E. H. Vokes, new name
E. Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 99, as *M. gardnerae* E. H. Vokes Unfigured paratype
Above Farley Creek, Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene
See E. Vokes, Tulane Stud. Geol., v. 8, No. 1, 1970, p. 51

Chicoreus lepidotus E. Vokes
See *Murex lepidotus* E. Vokes

Chicoreus riparius E. Vokes
See *Murex riparius* E. Vokes

27689 **Chicoreus (Chicoreus) shirleyae** E. H. Vokes Unfigured paratype
E. Vokes, Tulane Stud. Geol., v. 5, No. 1, 1966, p. 36
Kissimmee Canal, Okeechobee Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

Chicoreus stetopus (de Gregorio)
See *Murex stetopus* de Gregorio

29552 **Chione agraria** (White) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 347, pl. 18, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26748 **Chione (Chione) cancellata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 306, pl. 44, figs. 1. 2
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Caraboro, Ven.
Guaiguaza Clay, upper Pliocene

26749 **Chione (Chione) cancellata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 306, pl. 44, fig. 3
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26750, **Chione (Chione) cancellata** (Linnaeus) Hypotypes
26751 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 306, pl. 44, figs. 4-6
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26752 **Chione (Chione) cancellata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 306, pl. 44, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28420 **Chione (Lirophora) carlottae** Palmer Paratype
Palmer, P. A., v. 1, No. 5, 1927, p. 179, pl. 42, fig. 11 right valve broken prior to 1977
Zone G (not I as in expl.), Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

Chione carlottae Palmer
See *C. hendersoni* Dall

25693 **Chione (Chione) compta** (Broderip) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 294, pl. 41, fig. 4; pl. 84, fig. 1
Bayovar, Sechura Bay, Peru Recent

25761 **Chione (Chione) compta** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 294, pl. 51, figs. 6, 6a
Bayovar, Sechura Bay, Peru Recent

29541 **Chione? cordeliae** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 353, pl. 18, fig. 1
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26770 **Chione (Lirophora) cultellata** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 326, pl. 47, figs. 7, 8 broken in transit, 1963
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26771 **Chione (Lirophora) cultellata** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 326, pl. 47, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26772 **Chione (Lirophora) cultellata** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 326, pl. 47, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28465 **Chione dalliana** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 59, pl. 9, fig. 16?
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 156, pl. 28, fig. 10
See Palmer, P. A., v. 1, No. 5, 1927, p. 154, pl. 40, figs. 7, 15
Lectotype selected by Jung, B.A.P., v. 55, No. 247, 1969, p. 377, pl. 28, fig. 5 as *Chione (Nioche) veatchiana* Maury, lower Pliocene

Chione dalliana Maury
See *Chione veatchiana* Maury, and *C. guppyana* Maury

29571 **Chione (Lirophora) glyptocyma** Dall Hypotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 351, pl. 19, fig. 14
Oak Grove, Santa Rosa Co., Fla.
Oak Grove sands, lower Miocene

28467 **Chione guppyana** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 59, pl. 9, fig. 19
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 158, pl. 28, fig. 13
See Palmer, P. A., v. 1, No. 5, 1927, p. 154, pl. 40, figs. 2, 14, 15 as *Chione (Chione) dalliana* Maury
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 377, pl. 28, figs. 6, 7 as *C. (Nioche) veatchiana* Maury, lower Pliocene

28421 **Chione (Lirophora) hendersoni** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 219, pl. 37, fig. 9
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene (locality and formation according to Palmer)
See Palmer, P. A., v. 1, No. 5, 1927, p. 179, pl. 42, fig. 15 as *C. (Lirophora) carlottae* Palmer (holotype)

28422 **Chione (Lirophora) hendersoni** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 219, pl. 37, fig. 8
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene (locality and formation according to Palmer)
See Palmer, P. A., v. 1, No. 5, 1927, p. 179, pl. 42, fig. 18 as *C. (Lirophora) carlottae* Palmer (paratype)

29561 **Chione intapurpurea** (Conrad) Hypotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pl. 19, fig. 5
Ft. Barrancas, Escambia Co., Fla.
Recent

25694 **Chione (Lirophora) kellettii** (Hinds) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 296, pl. 41, fig. 5; pl. 51, figs. 4, 4a
Dredged from Panama Bay, Panama Recent

26757 **Chione (Chione ?) laciniosa** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 315, pl. 45, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26758 **Chione (Chione ?) laciniosa** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 315, pl. 45, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26755 **Chione (Chione ?) mamoensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 313, pl. 44, figs. 12, 13
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26680 **Chione (Chione ?) mamoensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 313, pl. 33, figs. 11, 12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26870 **Chione (Chione ?) mamoensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 313, pl. 45, figs. 1, 2
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

25751 **Chione (Lirophora) mariae** (d'Orbigny) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 296, pl. 49, figs. 8, 8a
Rabo de Puerco, Puerto Armuelles, Panama Pleistocene

25747 **Chione (Lirophora) cf. C. mariae** (d'Orbigny) Figured specimen
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 296, pl. 49, fig. 2 not deposited, 1961
Zorritos, Peru Recent

26753 **Chione (Chione) pailasana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 311, pl. 44, fig. 9
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
26754 **Chione (Chione) pailasana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 311, pl. 44, figs. 10, 11
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
28468 **Chione paraensis** White var. Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 60, pl. 9, fig. 20?
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene
29564 **Chione (Chione) paraensis** White Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 341, pl. 19, fig. 8
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
27421 **Chione (Chionopsis) paraguanensis** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 465 Unfigured hypotypes†
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
29570 **Chione (Lirophora) penthesileae** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 353, pl. 19, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29569 **Chione (Lirophora) praepaphia** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 351, pl. 19, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29562 **Chione (Timoclea) praepectorina** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 453, pl. 19, fig. 6
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone
27422 **Chione (Lirophora) quirosensis** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 467 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
976 **Chione (Lirophora) riomaturensis** Maury Holotype
Palmer, P. A., v. 1, No. 5, 1927, p. 181, pl. 44, fig. 9
See Brann & Kent, p. 205
26763 **Chione (Lirophora) riomaturensis** Maury Hypotype
Weisbord, B.A.P. v. 45, No. 204, 1964, p. 323, pl. 45, figs. 15, 16
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26767 **Chione (Lirophora) riomaturensis** Maury Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 323, pl. 47, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26768, **Chione (Lirophora) riomaturensis** Maury Hypotypes
26769 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 323, pl. 47, figs. 3-6
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
972 **Chione (Chione) sanctidavidis** Maury Holotype
Palmer, P. A., v. 1, No. 5, 1927, p. 160, pl. 44, fig. 10
santi-davidis [*sic*]
See Brann & Kent, p. 206
7071 **Chione** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

25779 **Chione (Chione) subimbricata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 295, pl. 55, figs. 4, 4a
Venado Beach, Panama Canal Zone Recent

25780 **Chione (Chione) subimbricata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 295, pl. 55, fig. 4b
Pearl Islands, Panama (L. Beil, Coll.) Recent

26760, **Chione (Chionopsis) subrostrata** (Lamarck) Hypotypes
26761 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 320, pl. 45, figs. 9-12
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26762 **Chione (Chionopsis) subrostrata** (Lamarck) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 320, pl. 45, figs. 13, 14
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25760 **Chione (Iliochione) subrugosa** (Wood) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 298, pl. 51, figs. 5, 5a
Tumaco, Colombia Recent

26759 **Chione (Timoclea) tacaguana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 318, pl. 45, figs. 7, 8
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26764 **Chione (Timoclea) tacaguana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 318, pl. 46, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29551 **Chione thalassopora** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 345, pl. 18, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28466 **Chione veatchiana** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 58, pl. 9, figs. 17, 18
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 157, pl. 28, fig. 14
See Palmer, P. A., v. 1, No. 5, 1927, p. 154, pl. 40, figs. 15, 23 as *Chione (Chione) dalliana* Maury
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 377, pl. 28, figs. 3, 4 as *C. (Nioche) veatchiana* Maury, lower Pliocene

Chione veatchiana Maury
See *Chione dalliana* Maury, and *C. guppyana* Maury

29003 **Chione cf. C. walli** (Guppy) Figured specimens
Maury, B.A.P., v. 5, No. 29, 1917, p. 218, pl. 37, fig. 7
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 145, pl. 39, fig. 6 as *C. (Chione) woodwardi* (Guppy)

28415- **Chione (Chione) woodwardi** (Guppy) Hypotypes
28417, Palmer, P. A., v. 1, No. 5, 1927, p. 145, pl. 39, figs. 7, 9, 10, 12
28419 Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28418 **Chione (Chione) woodwardi** (Guppy) Hypotype
Palmer, P. A., v. 1, No. 5, 1927, p. 145, pl. 39, fig. 11
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
Possibly same shell as Maury, B.A.P., v. 5, No. 29, 1917, pl. 37, fig. 6

29002 **Chione woodwardi** (Guppy) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 218, pl. 37, fig. 6 not deposited as such by Cornell Univ., 1971, but may be the same shell as is figured by Palmer, P. A., v. 1, No. 5, 1927, p. 145, pl. 39, fig. 11, listed as *C. woodwardi* (PRI 28418) this catalog

Chione woodwardi (Guppy)
See *C.* cf. *C. walli* (Guppy)

25696 **Chionopsis amathusia** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 299, pl. 41, fig. 7; pl. 51, figs. 1, 1a (left valve not deposited, 1961); pl. 84, fig. 2
Dredged from Panama Bay, Panama Recent
25758 **Chionopsis montezuma** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 302, pl. 51, figs. 2, 2a
Palo Seco, Panama Canal Zone Recent
25759 **Chionopsis ornatissima** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 300, pl. 51, figs. 3, 3a
Panama Bay, Panama (H. Johnson Coll.) Recent
25765 **Chionopsis pulicaria** (Broderip) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 302, pl. 52, figs. 4-4c
Viveros Is., Pearl Islands, Panama Recent
25764 **Chionopsis purpurissata** (Dall) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 301, pl. 52, fig. 3
Punta Blanca, Ecuador Recent
26565, **Chlamys (Chlamys) benedicti** Verrill & Bush Hypotypes
26566 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 139, pl. 14, figs. 8-11
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
7066 **Chlamys (Placopecten) clintonia** (Say) Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 215
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene
26568 **Chlamys (Leptopecten) desultoria** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 145, pl. 15, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26569 **Chlamys (Leptopecten) desultoria** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 145, pl. 15, figs. 5, 6
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26570 **Chlamys (Argopecten) gibbus antecessor** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 148, pl. 15, figs. 7, 8
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene
26571 **Chlamys (Argopecten) gibbus antecessor** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 148, pl. 15, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26572 **Chlamys (Argopecten) gibbus antecessor** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 148, pl. 15, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26573 **Chlamys (Argopecten) gibbus antecessor** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 148, pl. 16, figs. 1, 2
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26574 **Chlamys (Argopecten) gibbus antecessor** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 148, pl. 16, figs. 3, 4
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26575 **Chlamys (Argopecten) imitata** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 152, pl. 16, figs. 5-8
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26576 **Chlamys (Argopecten) imitata** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 152, pl. 16, figs. 9, 10
Catia La Mar village, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

7075 **Chlamys jeffersonia** (Say) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 215
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

26563, **Chlamys (Chlamys) ornata** (Lamarck) Hypotypes
26564 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 137, pl. 14, figs. 4-7
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

7067 **Chlamys santamaria middlesexensis** Mansfield
Sabol, B.A.P., v. 41, No. 191, 1960, p. 215 Unfigured hypotype
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7063 **Chlamys** sp. Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, not listed on p. 215
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28313 **Chonetes lepidus** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 19, pl. 5, fig. 6
Glenwood, near Ithaca, Tompkins Co., N.Y.
Geneseo Sh., Genessee Gr., upper Devonian

28344 **Chonetes scitula** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 50
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., upper Devonian

27124 **Chonopectoides catamorphus** Crickmay Holotype,
Crickmay, Sig. Dev. Brachiopods W. Can., and Paratypes
Pub. by author, Calgary, 1963, p. 23, pl. 15, figs. 1-7
Well, 1304′, S. 11, T. 87, R. 17, W4, Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

26975 **Chonopectus horaeus** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 609, pl. 78, fig. 7
Well, 6032′, S. 11, T. 79, R. 22, W5, Alberta, Can.
"Lower D_1 Ls. zone", late Upper Devonian

26968 **Choristites glennfoxi** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 607, pl. 77, figs. 6, 7, 9-11
First mtn. peak SE. of RR., near Cadomin, Alberta, Can.
Upper Palliser Fm., Mississippian?

26969 **Choristites glennfoxi** Crickmay Paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 607, pl. 77, figs. 8, 12
First mtn. peak SE. of RR., near Cadomin, Alberta, Can.
Upper Palliser Fm., Mississippian?

26967 **Choristites protistus** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 607, pl. 77, figs. 1-5
Well, 5502′, S. 11, T. 79, R. 22, W5, Alberta, Can.
"Upper D_1 Ls. zone", Mississippian

25569 **Choromytilus chorus** (Molina) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 115, pl. 12, fig. 10
Chile Recent

25567, 25567a **Choromytilus palliopunctatus** (Carpenter) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 115, pl. 12, figs. 7, 7a **not** deposited, 1961. Unfigured hypotype = PRI 25567a
Acapulco, Mexico Recent

26359 **Chrysallida caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 467, pl. 44, figs. 9, 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26362 **Chrysallida cribrata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 469, pl. 44, figs. 15, 16
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26360 **Chrysallida salinensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 468, pl. 44, figs. 11, 12
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26361 **Chrysallida salinensis** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 468, pl. 44, figs. 13, 14
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

7045 **Cibicidella variabilis** (d'Orbigny) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 233
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27272 **Cibicidella variabilis** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 60, pl. 19, fig. 5
Well A-2, 70', near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27258 **Cibicides americanus** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 57, pl. 18, fig. 5
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

27301 **Cibicides americanus** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 57, pl. 19, fig. 1
Well A-5, 215', Lambert Pt., near Norfolk, Va.
Bottom of Choptank Fm., Miocene

30007 **Cibicides americanus** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 149, pl. 16, fig. 100
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

30003 **Cibicides duplinensis** Copeland Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 149, pl. 15, fig. 96
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7039 "**Cibicides** cf. **C. lobatulus** (Cushman)" Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 232 not PRI 3709
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

30004, 30009-30011 "**Cibicides lobatulus** (Walker & Jacob) 'var.' "
Herrick, B.A.P., v. 70, No. 293, 1976, p. 149, pl. 15, fig. 97; pl. 16, figs. 102-104 Figured specimens
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

30005 **Cibicides lobatulus** (Jacob) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 149, pl. 15, fig. 98
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

30006 **Cibicides sapeloensis** Darby & Hoyt Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 150, pl. 16, fig. 99
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

27198 **Cibicides** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 58, pl. 19, fig. 2
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

7040 **Cibicides sublobus** (Cushman) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 233
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29843 **Cimomia milleri** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 294
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29842 **Cimomia reymenti** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 292
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

26092 **"Circulus" duracinus** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 135, pl. 12, figs. 17-19
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28353 **Cladochonus** sp. Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 8, fig. 61
McKinney's, N. of Ithaca, Tompkins Co., N.Y.
Sherburne Fm., Genessee Gr., Upper Devonian

26332 **Clathrodrillia gibbosa** (Born) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 435, pl. 41, figs. 13-15
Clathodrilla [*sic*]
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27479 **Clathrodrillia? aff. C. islalindae** (Maury)
Cast of figured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 567, pl. 77, figs. 15, 16
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26333 **Clathrodrillia mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 437, pl. 41, figs. 16, 17
Clathodrillia [*sic*]
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27476 **Clathrodrillia puertocolombiana** (Weisbord)
Jung, B.A.P., v. 49, No. 223, 1965, p. 566 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28660 **Clathurella vendryesiana** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 62, pl. 9, fig. 18
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28648 **Clava plebeia** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 57, pl. 9, fig. 8
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28649 **Clava plebeia** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 57, pl. 9, figs. 8a, 8b
Rio Gurabo, about 2 mi. from Los Quemados, Dominican Rep.
Formation uncertain, Miocene

29267 **Clava williamsi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 105, ?(pl. 3, figs. 4, 10; pl. 4, fig. 1) Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28503 **Clavella harrisii** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 76, pl. 10, fig. 25
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29805, 29806 **Clavilithes (Cosmolithes) oluwasanmii** Adegoke
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 179 Unfigured paratypes
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

27525 **Cleidochasma contractum** (Waters) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 95, pl. 11, fig. 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27526 **Cleidochasma porcellanum** (Busk) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 92, pl. 11, fig. 3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27485 **Clementia (Clementia) dariena** (Conrad) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 456
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

25757, 25757a **Clementia (Egesta) solida** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 265, pl. 50, figs. 5, 5a not deposited, 1961. Unfigured hypotype = PRI 25757a
Pedernales, Ecuador Recent

27164 **Clithrocytheridea diagonalis** Malkin Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 63, pl. 20, fig. 5
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27176 **Clithrocytheridea diagonalis** Malkin Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 63, pl. 20, fig. 3
Well 3-S, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27179 **Clithrocytheridea diagonalis** Malkin Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 63, pl. 20, fig. 4
Well 3-S, 95′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

7049 **Clithrocytheridea virginiensis** Malkin Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 235
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27226 **Clithrocytheridea virginiensis** Malkin Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 64, pl. 23, fig. 2
1.8 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

25660 **Codakia (Codakia) distinquenda** Tryon Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 217, pl. 33, figs. 4, 4a
Isla la Plata, Ecuador Recent

26657- **Codakia (Lentillaria) orbicularis** (Linnaeus) Hypotypes
26660 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 226, pl. 30, figs. 1-8
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28972 **Codakia orbicularis** (Linnaeus) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 202, pl. 35, fig. 1 not deposited by Cornell Univ., 1971
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

26662 **Codakia (Jagonia) orbiculata** (Montagu) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 229, pl. 31, figs. 1-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26663 **Codakia (Jagonia) pectinata** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 232, pl. 31, figs. 5, 6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26664 **Codakia (Jagonia) umbonicostata** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 234, pl. 31, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27085 **Coenites verruculosus** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 9, pl. 5, figs. 1, 5
Well, 8846′, S. 25, T. 63, R. 12, W5, Alberta, Can.
Beaverhill Lake Fm., Upper Devonian

27085a **Coenites verruculosus** Crickmay Paratype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 9, pl. 5, fig. 4
Well, 8846′, S. 25, T. 63, R. 12, W5, Alberta, Can.
Beaverhill Lake Fm., Upper Devonian

29310 **Colubraria paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 127, pl. 6, fig. 1
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

27644 **Colubraria vokesae** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 71, pl. 2, figs. 10, 11
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

28519, **Columbella asphaltoda** Maury Syntypes
28520 Maury, A.N.S.P., Jr., v. 15, 1912, p. 81, pl. 12, fig. 2 (PRI 28519)
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
PRI 28520 is figured by Jung, B.A.P., v. 55, No. 247, 1969, p. 501, pl. 52, figs. 7, 8 as *Anachis (Anachis) asphaltoda* (Maury), lower Pliocene

28518 **Columbella labreana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 80, pl. 12, fig. 1 not deposited by Cornell Univ., 1971, presumed lost
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene

26214 **Columbella mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 309, pl. 27, figs. 16, 17
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26211 **Columbella mercatoria** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 306, pl. 27, figs. 10, 11
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26212 **Columbella mercatoria** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 306, pl. 27, figs. 12, 13
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26213 **Columbella williamgabbi** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 308, pl. 27, figs. 14, 15
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

15009 **Columella alticola** (Ingersoll) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 2
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27600 **Columella alticola** (Ingersoll) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 255, pl. 17, fig. 4
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

Conomitra fusoides lepa de Gregorio
See *Mitra fusoides lepa* de Gregorio

29975 **Conorbina orbicularis** (Terquem) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 144, pl. 12, fig. 68
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

28351 **Conularia congregata** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No 2, 1899, p. 22, pl. 8, fig. 59
Above McKinney's, N. of Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., upper Devonian

27444 **Conus aristos** Jung Unfigured paratype
Jung, B.A.P., v. 49, No. 223, 1965, p. 577
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28622 **Conus bonaczyi** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 47, pl. 7, fig. 13 not deposited by Cornell Univ., 1971
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

28600 **Conus catenatus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 38, pl. 5, fig. 4
Locality uncertain; Dominican Rep.
Gurabo Fm., middle Miocene

28600a, **Conus catenatus** G. B. Sowerby, II Hypotypes
28601 Maury, B.A.P., v. 5, No. 29, 1917, p. 38, pl. 6, figs. 1, 2
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28613 **Conus cercadensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 43, pl. 7, fig. 4
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29004 **Conus consobrinus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 39, pl. 6, fig. 5 not deposited by Cornell Univ., 1971
Locality and formation uncertain; Dominican Rep., Miocene

29005 **Conus consobrinus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 39, pl. 6, fig. 6
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28624 **Conus dalli** Toula Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 48, pl. 7, fig. 15
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

26320 **Conus (Lithoconus)** cf. **C. daucus** Hwass Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 425, pl. 40, figs. 3, 4
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26436 **Conus deperditus subdiadema** de Gregorio ?Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 20, pl. 1, figs. 56-58?
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 597 as *Conus sauridens* Conrad

26321 **Conus (Chelyconus) federalis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 426, pl. 40, figs. 5, 6
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28610, 28611 **Conus furvoides** Gabb Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 42, pl. 7, figs. 1, 2
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28621 **Conus gaza** Johnson & Pilsbry Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 46, pl. 7, fig. 12
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28605 **Conus gracilissimus** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 40, pl. 6, fig. 8
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28604 **Conus granozonatoides** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 39, pl. 6, fig. 7
Locality and formation uncertain; Dominican Rep., Miocene

28597 **Conus haytensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 35, pl. 5, fig. 1
Locality and formation uncertain; Dominican Rep., Miocene

28596 **Conus haytensis gurabensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 35, pl. 4, fig. 9
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

27445 **Conus aff. C. imitator** Brown & Pilsbry Unfigured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 579
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26313 **Conus (Leptoconus) jaspideus caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 42. No. 193, 1962, p. 420, pl. 39, figs. 5, 6
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26314-26318 **Conus (Leptoconus) jaspideus caboblanquensis** Weisbord Paratypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 420, pl. 39, figs. 7-16
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28623 **Conus karlschmidti** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 47, pl. 7, fig. 14 not deposited by Cornell Univ., 1971
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28614 **Conus kitteredgei** Maury Syntype
Maury, B.A.P., v. 5, No. 29, 1917, p. 44, pl. 7, fig. 5
Zone H or I, Rio Cana, near Caimito, Dominican Rep.
Cercado Fm., lower Miocene

28615 **Conus kitteredgei** Maury, "var." Syntype
Maury, B.A.P., v 5, No. 29, 1917, p. 44, pl. 7, fig. 6
Zone H or I, Rio Cana, near Caimito, Dominican Rep.
Cercado Fm., lower Miocene

29416 **Conus lisboai** Maury (**lisboae,** emend.) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 213, pl. 11, fig. 18
Rio Pirabas, St. of Para, Brazil
Pirabas Fm., lower Miocene

29403 **Conus longesperatus** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pp. 215, 401, pl. 11, fig. 5
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

1028 **Conus (Dendroconus) maga** H. Vokes
Vokes, Amer. Mus. Novitates, No. 988, 1938, p. 19 for *C. stenostoma* G. B. Sowerby, II *in* Brann & Kent, p. 249

Conus maga H. Vokes
See *C. stenostoma* G. B. Sowerby, II PRI 28603

28620 **Conus marginatus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 46, pl. 7, fig. 11
Zone D or G, Rio Gurabo, about 2 mi. from Los Quemados, Dominican Rep.
Formation uncertain, Miocene

26309, 26310 **Conus (Conus) mus** Hwass Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 416, pl. 38, figs. 13-16
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28612 **Conus olssoni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 43, pl. 7, fig. 3
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28607 **Conus ornatus** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 41, pl. 6, fig. 10
Dominican Rep. (Santo Domingo, Gabb Coll., Gabb MS name), Miocene

29408 **Conus pachecoi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 211, pl. 11, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28619 **Conus planiliratus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 45, pl. 7, fig. 10
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

26319 **Conus (Dendroconus) planitectum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 424, pl. 40, figs. 1, 2
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

6067 **Conus presozoni** Olsson & Petit Unfigured paratype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 538
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

28608 **Conus proteus** Hwass Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 42, pl. 6, fig. 11
Locality and formation uncertain; Dominican Rep., Miocene
28988 **Conus recognitus** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 45, pl. 7, fig. 9 not deposited by Cornell Univ., 1971
Locality and formation uncertain; Dominican Rep., Miocene
26312 **Conus (Conus)** cf. **C. regius** Gmelin Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 419, pl. 39, figs. 3, 4
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene
3334 **Conus (Lithoconus) sauridens** Conrad Hypotype
Previously figured by Tarr, Elem. Geol., Macmillan Co., 1897, p. 437, fig. 11
See Brann & Kent, p. 248
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene

Conus sauridens Conrad
See *C. deperditus subdiadema* de Gregorio

28599, 28602 **Conus sewalli** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 37, pl. 5, fig. 3; pl. 6, fig. 3
Locality uncertain; Dominican Rep.
Gurabo Fm., middle Miocene
26311 **Conus (Conus)** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 418, pl. 39, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

Conus stenostoma G. B. Sowerby, II PRI 1028
See *C. maga* H. Vokes

28603 **Conus stenostoma** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 39, pl. 6, fig. 4
Locality uncertain; Dominican Rep.
Gurabo Fm., middle Miocene
See Vokes, Amer. Mus. Nov., No. 988, 1938, p. 19 as *C. maga* H. Vokes, n. sp.
28616, 28617 **Conus symmetricus** G. B. Sowerby, II Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 36, pl. 7, figs. 7, 7a
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
29036 **Conus symmetricus domingensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 37, pl. 4, fig. 10 not deposited by Cornell Univ., 1971
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene
28618 **Conus symmetricus semiobsoletus** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 37, pl. 7, fig. 8
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
27447 **Conus talis** Jung Unfigured paratypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 579
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28606 **Conus tortuosostriatus** Toula Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 41, pl. 6, fig. 9
Zone E or G, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Formation uncertain, Miocene
28609 **Conus vanattai** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 42, pl. 6, fig. 12
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
27446 **Conus wiedenmayeri** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 574, pl. 77, figs. 17-19
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
28598 **Conus williamgabbi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 36, pl. 5, fig. 2
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
Cooperella subdiaphana (Carpenter) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 318, pl. 84, fig. 4 not PRI 25935; not deposited, 1961
San Pedro, California Recent
28983 **Coralliophaga coralliophaga** (Gmelin) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 197, pl. 35, fig. 12
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
26210 **Coralliophila caribaea** Abbott Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 304, pl. 27, figs. 7-9
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
28769 **Coralliophila miocenica** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 105, pl. 18, fig. 6
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
28290 **Corbicula densata** Conrad Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 290(199), fig. 215A?
Miocene marl beds of Cape Fear R., Bladen Co., N. Carolina
26841, **Corbula (Juliacorbula) aequivalvis** Philippi Hypotypes
26842 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 393, pl. 57, figs. 3-6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26766 **Corbula (Notocorbula) bruscasensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 399, pl. 46, figs. 5, 6
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
29035 **Corbula (Cuneocorbula) caimitica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 233, pl. 39, figs. 18, 19
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
29034 **Corbula (Cuneocorbula) cercadica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 232, pl. 39, figs. 16, 17 not deposited by Cornell Univ., 1971
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
29575 **Corbula delgada** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 373, pl. 20, fig. 2
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29033 **Corbula (Cuneocorbula) dominicensis** Gabb Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 232, pl. 39, figs. 14, 15
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

27455 **Corbula (Caryocorbula) fortis** Jung Unfigured paratypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 475
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

29585 **Corbula giga** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 373, pl. 20, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28472 **Corbula (Cuneocorbula) helenae** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 62, pl. 9, fig. 25
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 108, pl. 20, fig. 15
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 407, pl. 38, figs. 12, 13 as *Caryocorbula (Caryocorbula) helenae* (Maury), lower Pliocene

26448 **Corbula (Neaera) ignota** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 232, pl. 37, figs. 15-18
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 252 as Cf. *Parmicorbula gibbosa* (Lea), not PRI 264448

909 **Corbula islatrinitatis** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 411 as *Notocorbula islatrinitatis* (Maury) ; See Brann & Kent, p. 265

26843, **Corbula (Caryocorbula) cf. C. lavaleana** d'Orbigny
26844 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 396, Figured specimens
pl. 57, figs. 7-10 *lavallcana* [*sic*]
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26845 **Corbula (Caryocorbula) cf. C. lavaleana** d'Orbigny
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 396, Figured specimen
pl. 57, figs. 11, 12 *lavalleana* [*sic*]
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26846 **Corbula (Caryocorbula) cf. C. lavaleana** d'Orbigny
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 396, Figured specimen
pl. 57, figs. 13, 14 *lavalleana* [*sic*]
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29834- **Corbula nigeriensis** Adegoke Unfigured paratypes
29838 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 290
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29580 **Corbula pauciornata** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 375, pl. 20, fig. 7
(cast too poor for positive identification)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26847 **Corbula (Notocorbula) puntagordensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 401, pl. 57, figs. 15, 16
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

29581 **Corbula querida** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 375, pl. 20, fig. 8
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Corbula sanctidominici Maury
See *C. vieta* Guppy

28475 **Corbula (Bothrocorbula) smithiana** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 63, pl. 9, figs. 29, 30
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 109, pl. 20, fig. 18
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 408, pl. 39, figs. 1, 2 as *Caryocorbula (Caryocorbula) helenae* (Maury), lower Pliocene

7068 **Corbula** sp. Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28473 **Corbula** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 64, pl. 9, figs. 26, 27
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene
See Jung, B.A.P., v. 55, No. 247, 1969 as upper Morne l'Enfer Fm., lower Pliocene

28471 **Corbula (Cuneocorbula) subengonata** Dall Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 62, pl. 9, fig. 24
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

903 **Corbula (Aloidis) vieta** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 231, pl. 39, fig. 13
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 98, pl. 19, fig. as *C. (Aloidis) sanctidominici* Maury (holotype); and Brann & Kent, p. 270

919 **Corbula (Bothrocorbula) viminea** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 233, pl. 39, fig. 20
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 108, pl. 19, fig. 19; also Brann & Kent, p. 274

29037 **Corbula (Bothrocorbula) viminea** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 233, pl. 39, fig. 21
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28474 **Corbula (Cuneocorbula) weaveri** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 63, pl. 9, fig. 28
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28292 **Coronula macsotayi** Weisbord Holotype
Weisbord, B.A.P., v. 60, No. 265, 1971, p. 91, pl. 20, figs. 1-4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29833 **Costacallista adabionensis** (Oppenheim) Unfigured hypotype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 281
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28348 **Crania hamiltoniae** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, figs. 56, 57
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

298 **Crassatella alta** Conrad Hypotype
Tarr, Elem. Geol., Macmillan Co., 1897, p. 439, fig. 1
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene

28457 **Crassatellites** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 54, pl. 9, fig. 4
6 mi. S. of Parare, between Parare and Coycuar, Ven.
Black shales of Hurupu beds (?Querecual Fm.), Cretaceous

998 **Crassatellites trinitarius** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 351 as *Eucrassatella trinitaria* (Maury); See Brann & Kent, p. 287

7077 **Crassatellites** cf. **C. undulatus** (Say) Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

26625 **Crassinella aduncata** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 197, pl. 25, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26626 **Crassinella aduncata** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 197, pl. 25, figs. 13, 14
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28905 **Crassinella guppyi** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 197, pl. 26, fig. 21
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25630 **Crassinella pacifica** (C. B. Adams) Hypotypes
Olsson, Moll. Trop E. Pacific, PRI, 1961, p. 181, pl. 25, figs. 5-5b
Esmeraldas, Ecuador Recent

25631, **Crassinella pacifica** (C. B. Adams) Hypotype
25631a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 181, pl. 25, fig. 5c not deposited, 1961. Unfigured hypotypes = PRI 25631a
Panama City, Panama

25632, **Crassinella pacifica** (C. B. Adams) Hypotype
25632a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 181, pl. 25, fig. 5d
Unfigured hypotypes = PRI 25632a
Zorritos, Peru Recent

26627 **Crassinella triquetra** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 199, pl. 26, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25633, **Crassinella varians** Carpenter Hypotypes
25633a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 183, pl. 25, figs. 7-7b
Unfigured hypotypes = PRI 25633a
Punta Blanca, Ecuador Recent

27435 **Crassispira conica** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 564, pl. 76, figs. 9, 10
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27438 **Crassispira conica** Jung Unfigured paratypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 564
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27480 **Crassispira** aff. **C. consors** (G. B. Sowerby, I) Unfigured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 565
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27434 **Crassispira henekeni** (G. B Sowerby, I) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 562
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26533, **Crenella divaricata** (d'Orbigny) Hypotypes
26534 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 102, pl. 9, figs. 9-12
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28902 **Crenella divaricata** (d'Orbigny) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 194, pl. 26, fig. 18
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25946, **Crenella ecuadoriana** Pilsbry & Olsson Hypotypes
25946a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 130, pl. 17, figs. 7, 7a not
PRI 25803 as in expl. Unfigured hypotypes = PRI 25946a
Santa Elena, Ecuador Recent

26152 **Crepidula (Bostrycapulus) aculeata venezuelana** Weisbord
Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 213, pl. 20, figs. 1, 2
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26153 **Crepidula (Bostrycapulus) aculeata venezuelana** Weisbord
Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 213, pl. 20, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26147 **Crepidula avirostra** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 209, pl. 19, figs. 6, 7
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26148 **Crepidula corcovada** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 211, pl. 19, figs. 8-10
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26150 **Crepidula juliella** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 213, pl. 19, figs. 14, 15
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26146 **Crepidula phalaena** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 208, pl. 19, figs. 3-5
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26151 **Crepidula phalaena** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 208, pl. 19, figs. 16-18
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26149 **Crepidula plana triangula** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 212, pl. 19, figs. 11-13
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28799 **Crepitacella cepula** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 121, pl. 21, fig. 9
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28800 **Crepitacella cepula spiralistriata** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 122, pl. 21, fig. 10
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
26154 **Crucibulum (Crucibulum) auricula** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 215, pl. 20, figs. 5-7
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26155 **Crucibulum (Crucibulum) auricula** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 215, pl. 20, figs. 8, 9
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26156 **Crucibulum (Dispotaea) marense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 218, pl. 20, figs. 10, 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
28828 **Crucibulum (Dispotaea)** cf. **C. pileolum** H. C. Lea
Figured specimen
Maury, B.A.P., v. 5, No. 29, 1917, p. 133, pl. 23, fig. 6
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
26157 **Crucibulum (Dispotaea) venezuelanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 219, pl. 20, figs. 12-14
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27459 **Crucibulum (Dispotaea) waltonense** Gardner Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 497
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
26970 **Crurithyris youngstownensis** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 608, pl. 77, fig. 17
Well, 3457′, S. 3, T. 30, R. 9, W4, Alberta, Can.
Three Forks Fm., late Upper Devonian
26976 **Crurithyris youngstownensis** Crickmay Paratypes
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 608, pl. 77, figs. 13-16
Well, 3457′, S. 3, T. 30, R. 9, W4, Alberta, Can.
Three Forks Fm., late Upper Devonian
25914 **Cryptomya californica** (Conrad) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 423, pl. 77, fig. 2
Negritos, Peru Recent
25915 **Cryptomya californica** (Conrad) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 423, pl. 77, fig. 2a
Ventura, California Recent
28345 **Cryptonella eudora** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 51
Buttermilk Gorge, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian
28345a **Cryptonella eudora** Hall Unfigured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22
Locality unknown
?Ithaca Fm., Genessee Gr., Upper Devonian
27505, **Cryptosula pallasiana** (Moll) Hypotypes
27505a Weisbord, B.A.P., v. 53, No. 237, 1967, p. 62, pl. 2, fig. 14; pl. 6, figs. 3, 4
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28446 **Cucullaea harttii** Rathbun Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 48, pl. 8, fig. 12
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

Cumingia adamsi Carpenter Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 372, pl. 67, fig. 6 not PRI 24854; not deposited, 1961
Jaramijo, Ecuador Recent

25845 **Cumingia lamellosa** G. B. Sowerby, I Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 371, pl. 66, fig. 10
Fig. 10a not deposited, 1961. Negritos, Peru, Recent

25852 **Cumingia lamellosa** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 371, pl. 67, figs. 3, 3a
San Pedro, Calif. Recent

25839 **Cumingia mutica** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 372, pl. 66, fig. 4
Callao, Peru Recent

27492, 27493 **Cupuladria biporosa** Canu & Bassler Hypotypes
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 27, pl. 1, figs. 1-5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27635 **Curvirimula ? ovalis** (Dawson) Hypotype
Palmer, Bull. Georgia Acad. Sci., v. 28, 1970, p. 46, pl. 3, figs. 3, 7
Mouth of Parrsboro R., Nova Scotia
Upper Carboniferous

7050 **Cushmanidea ashermani** (Ulrich & Bassler) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 235
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7051 **Cushmanidea ulrichi** (Howe & Johnson) Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 235
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

25944A **Cuspidaria (Cardiomya) costata** (G. B. Sowerby, I) Hypotype
25944a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 465, pl. 83, fig. 6
Unfigured hypotype = PRI 25944a
Santa Elena, Ecuador Recent

25944B **Cuspidaria (Cardiomya) costata** (G. B. Sowerby, I) Hypotype
25944b Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 465, pl. 83, fig. 6a
Unfigured hypotype = PRI 25944b
Manta, Ecuador Recent

28904 **Cuspidaria islahispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 196, pl. 26, fig. 20 badly broken prior to 1977
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26854 **Cyathodonta cf. C. tristani** Olsson Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 409, pl. 59, figs. 3, 4 internal mold
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26855 **Cyathodonta cf. C. tristani** Olsson Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 409, pl. 59, figs. 5, 6 internal mold
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

Cyathophyllum venezuelense Weisbord
See *Heterophrentis simplex* (Hall)
See *?Bowenclasma typa* Scrutton
See *Heliophyllum halli* (Edwards & Haime)

25691 **Cyclinella saccata** (Gould) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 263, pl. 40, fig. 6; pl. 42, figs. 4, 4a
Dredged from Panama Bay, Panama Recent

25712 **Cyclinella saccata** (Gould) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 263, pl. 43, figs. 4, 4a
Dredged from Panama Bay, Panama (H. Johnson Coll.) Recent

25714 **Cyclinella saccata** (Gould) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 263, pl. 43, figs. 6, 6a
Búcaro, Panama Recent

25713 **Cyclinella singleyi** Dall Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 265, pl. 43, figs. 5, 5a
Bella Vista Beach, Panama City, Panama Recent

25777, **Cyclinella subquadrata** (Hanley) Hypotype
25777a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 263, pl. 55, fig. 2
Unfigured hypotype = PRI 25777a
Bayovar, Sechura Bay, Peru Recent

27484 **Cyclinella venezuelana** H. K. Hodson Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 455
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26094 **Cyclostremiscus caraboboensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 140, pl. 13, figs. 7-9
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26067 **Cyclostremiscus (Ponocyclus) maiquetiensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 137, pl. 9, figs. 9, 10; pl. 13, figs. 1-3
Quebrda Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26095 **Cyclostremiscus puntagordensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 141, pl. 13, figs. 10-12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26397 **Cyclostremiscus salinensis** Weisbord Unfigured holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 139
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26093 **Cyclostremiscus salinensis** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 139, pl. 13, figs. 4-6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26066 **Cyclostromella venezuelana Weisbord** Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 136, pl. 9, figs. 7, 8; pl. 12, figs. 20-22
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29812- **Cylichna makanjuolai** Adegoke Unfigured paratypes
29814 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 216
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28481 **Cylichna solivaga** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 65, pl. 10, fig. 1
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

26380 **Cylichnella mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 458, pl. 47, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26190, 26191 **Cymatium (Septa) krebsii** (Mörch) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 260, pl. 25, figs. 1-4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26192 **Cymatium (Monoplex) parthenopeum** (von Salis) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 262, pl. 25, figs. 5, 6
Near Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26188 **Cymatium (Septa) pileare martinianum** (d'Orbigny) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 257, pl. 24, figs. 9, 10
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26189 **Cymatium (Septa) pileare martinianum** (d'Orbigny) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 257, pl. 24, figs. 11, 12
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26193 **Cymatium** ? sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 265, pl. 25, figs. 7, 8
Quebreda Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25867 **Cymatoica undulata** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 418, pl. 69, fig. 7 **not** deposited, 1961
Esmeraldas, Ecuador Recent

27472 **Cymatophos cocoditoensis** (F. Hodson) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 530
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27465 **Cymatophos paraguanensis** (F. Hodson) Unfigured hypotypes†
Jung, B.A.P., v. 49, No. 223, 1965, p. 531
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

29991 **Cymbaloporetta squammosa** (d'Orbigny) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 146, pl. 14, fig. 84
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

Cymia brightoniana Maury
See *Cymia woodii* (Gabb)

27462 **Cymia cocoditana** H. K. Hodson Unfigured hypotypes†
Jung, B.A.P., v. 49, No. 223, 1965, p. 527
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28757 **Cymia henekeni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 104, pl. 17, fig. 1
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28512 **Cymia woodii** (Gabb) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 82, pl. 11, figs. 9, 10
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 215 as *C. brightoniana* Maury (holotype)
See Jung, B.A.P., v. 55, No. 247, 1969, p. 497, pl. 51, figs. 1, 2 as *C. brightoniana* Maury, lower Pliocene

28513 **Cypraea bartlettiana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 86, pl. 11, figs. 11-13
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

26164, **Cypraea (Luria) cinerea** Gmelin Hypotypes
26167 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 228, pl. 21, figs. 11, 12; pl. 22, figs. 1, 2
Beach of Playa Grade Yachting Club, Cabo Blanco, Ven.
Recent

26165 **Cypraea (Luria) cinerea catiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 230, pl. 21, figs. 13, 14
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28781 **Cypraea dominicensis?** Gabb Figured specimen
Maury, B.A.P., v. 5, No. 29, 1917, p. 116, pl. 19, fig. 11
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm, middle Miocene

28782 **Cypraea (Pustularia) gabbiana** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 116, pl. 19, fig. 12
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26169 **Cypraea (Muracypraea) henekeni** G. B. Sowerby, II Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 236, pl. 22, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28775 **Cypraea henekeni** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 114, pl. 19, fig. 4
Locality and formation uncertain; Dominican Rep., Miocene

28776 **Cypraea noueli** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 114, pl. 19, fig. 5
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28780 **Cypraea patrespatriae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 116, pl. 19, fig. 10
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28777 **Cypraea spurca** Linnaeus Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 115, pl. 19, fig. 6
Locality and formation uncertain; Dominican Rep., Miocene

26166 **Cypraea (Erosaria) spurca acicularis** Gmelin Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 232, pl. 21, figs. 15, 16
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28778 **Cypraea spurcoides** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 115, pl. 19, fig. 7
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28779 **Cypraea spurcoides** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 115, pl. 19, figs. 8, 9
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28514 **Cypraea vaughani** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 87, pl. 11, figs. 14, 15
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene
See *Erato vaughani* (Maury)

26168 **Cypraea (Trona) zebra** Linnaeus Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 234, pl. 22, figs. 3, 4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26179, 26180 **Cypraecassis testiculus** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 252, pl. 23, figs. 11-14
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

8237 **Cypraedia pittsi** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 61, pl. 7, fig. 4
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

28341 **Cyrtina hamiltonensis** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 45
W. side of Bald Hill, E. of Ithaca, Tompkins Co., N.Y.
Ithaca Fm.? Genessee Gr., Upper Devonian

26953 **Cyrtiopsis hiraethlynae** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 605, pl. 74, fig. 9
Well, 3438', S. 3, T. 30, R. 9, W4, Alberta, Can.
Three Forks Sh., late Upper Devonian

26954-26955 **Cyrtiopsis hiraethlynae** Crickmay Paratypes
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 605, pl. 74, figs. 10-14
Well, 3438', S. 3, T. 30, R. 9, W4, Alberta, Can.
Three Forks Sh., late Upper Devonian

26956 **Cyrtiopsis mimetes** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 604, pl. 75, figs. 1-3, 5, 8
Deception Creek, 33 mi. E. of Jasper, Alberta, Can.
Upper Cheviot Fm., late Upper Devonian

26957 **Cyrtiopsis mimetes** Crickmay Paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 604, pl. 75, figs. 4, 6
Deception Creek, 33 mi. E. of Jasper, Alberta, Can.
Upper Cheviot Fm., late Upper Devonian

26958 **Cyrtiopsis mimetes** Crickmay Paratypes
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 604, pl. 75, fig. 7 and two spec. unfigured
Deception Creek, 33 mi. E. of Jasper, Alberta, Can.
Upper Cheviot Fm., late Upper Devonian

26950 **Cyrtiopsis nahanniensis** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 603, pl. 72, figs. 9-13, 15
Mackenzie R., 8 mi. above mouth of N. Nahanni R., N. W. Terr., Can.
"*Leiorhynchus* Ls.", late Upper Devonian

26951 **Cyrtiopsis nahanniensis** Crickmay Paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 603, pl. 72, fig. 14
Mackenzie R., 8 mi. above mouth of N. Nahanni R., N. W. Terr., Can.
"*Leiorhynchus* Ls.", late Upper Devonian

26952 **Cyrtiopsis normandvillana** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 605, pl. 74, figs. 1-8
Well, 6032', S. 11, T. 79, R. 22, W5, Alberta, Can.
"D_1 zone", late Upper Devonian

26959 **Cyrtiopsis prepta** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 604, pl. 75, figs. 9-13
Deception Creek, 33 mi. E. of Jasper, Alberta, Can.
Upper Cheviot Fm., late Upper Devonian

26960- **Cyrtiopsis prepta** Crickmay Paratypes
26962 Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 604, pl. 75, figs. 14-16 and one unfigured specimen
Deception Creek, 33 mi. E. of Jasper, Alberta, Can.
Upper Cheviot Fm., late Upper Devonian

25924, **Cyrtopleura (Cyrtopleura) cruciger** (G. B. Sowerby, I) Hypotypes
25924a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 445, pl. 78, figs. 3, 3a
Fig. 3b not deposited, 1961. Unfigured hypotype = PRI 25924a
Isla del Gallo, Colombia Recent

26945 **Cyrtospirifer alexandrae** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 602, pl. 71, figs. 8-13
31 mi. above mouth of Hay R., N. W. Terr., Can.
Base of Alexandra Falls Ls., Upper Devonian

26946 **Cyrtospirifer alexandrae** Crickmay Unfigured paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 602
31 mi. above mouth of Hay R., N. W. Terr., Can.
Base of Alexandria Falls Ls., Upper Devonian

26942 **Cyrtospirifer charitopes** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 602, pl. 71, figs. 14-17, 19
Vermilion Chutes, Alberta, Can.
Grumbler Fm., Upper Devonian

26943 **Cyrtospirifer charitopes** Crickmay Paratypes
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 602, pl. 71, fig. 18
Vermilion Chutes, Alberta, Can.
Grumbler Fm., Upper Devonian

26944 **Cyrtospirifer charitopes** Crickmay Unfigured paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 602
Vermilion Chutes, Alberta, Can.
Grumbler Fm., Upper Devonian

26936 **Cyrtospirifer glaucus** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 600, pl. 73, fig. 1
14 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian
See *Regelia glauca* (Crickmay) *in* Crickmay, Nomen. Cert. Dev. Brach., Pub. by author, Imp. Oil Ltd., Calgary, 1952

26937- **Cyrtospirifer glaucus** Crickmay Paratypes
26939 Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 600, pl. 73, figs. 2-5
14 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian
See *Regelia glauca* (Crickmay) *in* Crickmay, Nomen. Cert. Dev. Brach., Pub. by author, Imp. Oil Ltd., Calgary, 1952

26940 **Cyrtospirifer thalattodoxa** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 601, pl. 72, figs. 1, 2, 4, 5, 8
23 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

26941 **Cyrtospirifer thalattodoxa** Crickmay Paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 601, pl. 72, figs. 3, 6, 7
23 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

26307 **Cysticus** ? sp. Figured specimen
Weisbord, B.A.P. v. 42, No. 193, 1962, p. 416, pl. 38, figs. 9, 10
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28655 **Cythara caimitica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 60, pl. 9, fig. 14
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28656 **Cythara cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 61, pl. 9, fig. 15
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28653 **Cythara elongata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 59, pl. 9, fig. 12
Locality and formation uncertain; Dominican Rep., Miocene

28652 **Cythara gibba** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 59, pl. 9, fig. 11?
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28654 **Cythara polygona** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 60, pl. 9, fig. 13
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26450 **Cytherea aequorea** mut. **cominduta** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 216, pl. 34, figs. 5, 6
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 57 as *Callista (Costacallista) aequorea* (Conrad)

26451 **Cytherea aequorea** mut. **subvitrea** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 216, pl. 33, figs. 16-21
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 60 as *Callista (Callista) perovata subvitrea* (de Gregorio)

27312 **Cytherella chipolensis** Puri Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 75, pl. 23, fig. 5
Offshore well A-11, 165′, near Newport News, Va.
St. Marys Fm., Miocene

7059 **Cytheretta ulrichi** Puri Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 238
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27175 **Cytheretta ulrichi** Puri Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 73, pl. 23, fig. 1
Well 3-S, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27185 **Cytheretta ulrichi** Puri Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 73, pl. 22, fig. 9
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27231 **Cytheromorpha** cf. **C. warneri** Howe & Spurgeon
Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 72, pl. 22, fig. 8
1.8 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27262 **Cytheromorpha** cf. **C. warneri** Howe & Spurgeon
Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 72, pl. 22, fig. 7
? 0.7 mi. NNE of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

27220 **Cytherura bajacala** Benson Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 62, pl. 20, fig. 1
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

27202 **Cytherura reticulata** Edwards Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 62, pl. 20, fig. 2
Locality uncertain

27325A **Cytherura wardensis** Howe & Brown Unfigured hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 62
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27522 **Dakaria subtorquata** (d'Orbigny) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 68, pl. 10, fig. 1
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

?*Dalmanites* cf. *D. patacamayaensis* Kozłowski
See *Dechenella boteroi* Caster & Richter

5477 **Dechenella (Basidechenella ?) boteroi** Caster & Richter Holotype
Richter, R. & E., Senckenbergiana, 31, 1950, p. 161 for ?*Dalmanites* cf. *D. patacamayaensis* Kozłowski *in* Brann & Kent, p. 312

5477A **Dechenella (Basidechenella ?) boteroi** Caster & Richter Holotype
Richter, R. & E., Senckenbergiana, 31, 1950, p. 161 for ?*Dalmanites* cf. *D. patacamayaensis* Kozłowski *in* Brann & Kent, p. 312
(external mold of PRI 5477)

5457 **Dechenella (Basidechenella ?) boteroi** Caster & Richter Paratype
Richter, R. & E., Senckenbergiana, 31, 1950, p. 161 for ?*Dalmanites* cf. *D. patacamayaensis* Kozłowski *in* Brann & Kent, p. 312

26884, **Dentalium (Antalis)** aff. **D. antillarum** d'Orbigny
26885 Weisbord, B.A.P., v. 47, No. 214, 1964, p. 124, Figured specimens
pl. 17, figs. 3, 4; pl. 18, fig. 6
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27454 **Dentalium (Dentalium) bocasense** Olsson Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 411
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

7078 **Dentalium carolinense** Conrad Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28887 **Dentalium cossmannianum** Pilsbry & Sharp Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 159, pl. 26, fig. 3
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

26882 **Dentalium (Antalis) disparile** d'Orbigny Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 122, pl. 16, figs. 7, 8; pl. 18, figs. 4, 5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26883 **Dentalium (Antalis) disparile** d'Orbigny Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 122, pl. 17, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28885 **Dentalium dissimile** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 158, pl. 26, fig. 1
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28886 **Dentalium dissimile ponderosum** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 158, pl. 26, fig. 2
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28888 **Dentalium glaucoterrarum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 159, pl. 26, fig. 4
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

29764-29769 **Dentalium (Laevidentalium) guineense** Adegoke
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 62 Unfigured paratypes
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28558 **Dentalium microstria** Heilprin Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 103, pl. 13, fig. 15
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

29228 **Dentalium (Antalis) minutiannulatum** Hodgkinson Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 20
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

26880 **Dentalium (Graptacme) semistriolatum** Guilding Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 119, pl. 16, figs. 3-5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26881 **Dentalium (Graptacme) semistriolatum** Guilding Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 119, pl. 16, fig. 6
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26886 **Dentalium (Antalis)** sp. Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 126, pl. 17, fig. 5
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26879 **Dentalium (Antalis ?)** sp. Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 126, pl. 16, fig. 2; pl. 18, figs. 2, 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26887 ? **Dentalium** sp. indeterminate Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 127, pl. 17, fig. 6
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm, lower Pliocene

26878 **Dentalium (Dentalium) cf. D. texasianum rioense** Henderson
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 118, pl. 16, fig. 1; pl. 18, fig. 1 Figured specimen
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

7090 **Dentiscala insculpta** (Carpenter) Holotype
Van Winkle, B.A.P., v. 8, No. 36, 1921, p. 4, pl. 1, figs. 10, 11
Santa Barbara, Calif.
Pleistocene

Dermomurex engonatus (Dall)
See *Aspella scalarioides* (Blainville)

Dermomurex (Viator) sexangulus (Dall)
See *Murex gilletteorum* E. Vokes

27607 **Deroceras laeve** (Müller) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 232, pl. 17, figs. 17, 18
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

Desquamatia aperanta (Crickmay)
See *Atrypa aperanta* Crickmay

Desquamatia ciliipes (Crickmay)
See *Atrypa ciliipes* Crickmay

Desquamatia cosmeta (Crickmay)
See *Atrypa cosmeta* Crickmay

Desquamatia hormophora (Crickmay)
See *Atrypa hormophora* Crickmay

Desquamatia perfimbriata (Crickmay)
See *Atrypa perfimbriata* Crickmay

27127 **Devonoproductus minimus** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 24, pl. 14, figs. 6-8
E. side Sulphur Pt., S. shore Gt. Slave Lake, N. W. Terr., Can.
Presqu'ile Fm., Middle Devonian

27128-27129 **Devonoproductus minimus** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 24, pl. 14, figs. 9, 21, 22
E. side Sulphur Pt., S. shore Gt. Slave Lake, N. W. Terr., Can.
Presqu'ile Fm., Middle Devonian

27125 **Devonoproductus primus** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 24, pl. 14, figs. 1-5
Dawson Landing, Great Slave Lake, N. W. Terr., Can.
Pine Point Fm., Middle Devonian

27126 **Devonoproductus primus** Crickmay Unfigured paratype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 24
Dawson Landing, Great Slave Lake, N. W. Terr., Can.
Pine Point Fm., Middle Devonian

27130 **Devonoproductus secundus** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 26, pl. 14, figs. 10-12
Mtn. SE. of Cecilia Lake, 53° 56′ N., B. C., Can.
Upper Flume Fm., early Upper Devonian

27131-27132 **Devonoproductus secundus** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 26, pl. 14, figs. 13-17
Mtn. SE. of Cecilia Lake, 53° 56′ N., B. C., Can.
Upper Flume Fm., early Upper Devonian

27133 **Devonoproductus tertius** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 26, pl. 14, figs. 23, 25
Well, 7720′, S. 31, T. 63, R. 8, W5, Alberta, Can.
Lower Beaverhill Lake Fm., Upper Devonian

27134-27135 **Devonoproductus tertius** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 26, pl. 14, figs. 24, 26
Well, 7720′, S. 31, T. 63, R. 8, W5, Alberta, Can.
Lower Beaverhill Lake Fm., Upper Devonian

26019 **Diodora ? anomala** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 57, pl. 3, figs. 16, 17
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26012 **Diodora cayenensis** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 50, pl. 2, figs. 15-17
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26013 **Diodora cayenesis** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 50, pl. 2, figs. 18-20
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26020 **Diodora dorsenula** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 58, pl. 3, figs. 18, 19
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26014 **Diodora listeri** (d'Orbigny) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 53, pl. 3, figs. 1-3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26015 **Diodora meta** (von Ihering) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 54, pl. 3, figs. 4-6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26016 **Diodora meta** (von Ihering) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 54, pl. 3, figs. 7-9
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26017 **Diodora meta** (von Ihering) Hypotype
Weisbord, B.A.P., v 42, No. 193, 1962, p. 54, pl. 3, figs. 10-12
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26018 **Diodora meta** (von Ihering) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 54, pl. 3, figs. 13-15
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26021 **Diodora** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 59, pl. 4, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29020 **Diplodonta capuloides** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 207, pl. 39, fig. 1
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25652 **Diplodonta (Felaniella) cornea** (Reeve) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 203, pl. 32, figs. 1-1b
not PRI 25662 as in expl.
Tumbez, Peru
Recent

25656 **Diplodonta (Diplodonta) discrepans** Carpenter Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 202, pl. 32, fig. 7
Isla del Gallo, Colombia
Recent

26643 **Diplodonta (Diplodonta) mareana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 211, p. 27, figs. 13, 14
100 mi. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26613 **Diplodonta (Phlyctiderma) semiaspera** Philippi Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 213, pl. 23, fig. 13
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25654, 25654a **Diplodonta (Felaniella) tellinoides** (Reeve) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 203, pl. 32, figs. 4, 4a
Unfigured hypotype = PRI 25654a
Tumaco, Colombia
Recent

27562 **Diploria strigosa** (Dana) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 46, pl. 6, figs. 3-5; pl. 7, fig. 1
Stream, near Litoral anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27563, 27573 **Diploria strigosa** (Dana) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 46, pl. 7, figs. 2-4
Unfigured hypotype = PRI 27573
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27575 **Diploria strigosa** (Dana) Unfigured hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 46
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

6092 **Dirocerithium whitfieldi** (Heilprin) Hypotype
Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 635, pl. 4, figs. 1, 2 not PRI 6062 as in expl.
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., upper middle Eocene

6093 **Dirocerithium whitfieldi** (Heilprin) Hypotype
Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 635, pl. 4, fig. 3 not PRI 6063 as in expl.
Claiborne Bluff, Alabama R, Monroe Co., Ala.
Gosport Sd., upper middle Eocene

27494 **Discoporella umbellata** (DeFrance) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 31, pl. 1, figs. 6-8
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27495 **Discoporella umbellata** (DeFrance) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 31, pl. 1, figs. 9-11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27496 **Discoporella umbellata** (DeFrance) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 31, pl. 1, figs. 12, 13
Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

28858 **Discopsis derbyi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 156, pl. 24, fig. 20
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep
Cercado Fm., lower Miocene
See Pilsbry & Olsson, B.A.P., v. 33, No. 135, 1950, p. 7, pl. 1, figs. 1-1b as *Anticlimax derbyi* (Maury)

27242, 27244 **Discorbis candeiana** (d'Orbigny) Hypotypes
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 45, pl. 13, figs. 3, 4
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

27196 **Discorbis consobrina** (d'Orbigny) Holotype
McLean, Va. Div. Min Res., RI No. 9, 1966, p. 46, pl. 13, fig. 5
Well 3-N, 115', York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27195 **Discorbis floridana** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 46, pl. 14, fig. 1
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

27254 **Discorbis floridana** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 46, pl. 13, fig. 6
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27264 **Discorbis floridana** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 46, pl. 13, fig. 7
Well A-2, 81′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

27252 **Discorbis** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 47, pl. 13, fig. 8
0.7 mi. NNE of Benns Church, Isle of Wight Co., Va.
Pleistocene

15032 **Discus cronkhitei** (Newcomb) Hypotypes
Brown & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 10a, 10b
Johnsontown Sec., Louisville, Jefferson Co., Ky.
Tazewell water deposited silt, Wisconsin Stage, Pleistocene

27577 **Discus cronkhitei** (Newcomb) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 235, pl. 15, figs. 2, 3, 14
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27580 **Discus cronkhitei catskillensis** (Pilsbry) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 237, pl. 15, figs. 6, 7
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

26196 **Distorsio (Rhysema) clathrata** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 267, pl. 25, figs. 12, 13
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26197 **Distorsio (Rhysema) clathrata** (Lamarck) Hypotype
Weisbord, B.A.P., v. 52, No. 193, 1962, p. 267, pl. 25, figs. 14-16
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28760 **Distortrix simillima** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 107, pl. 17, figs. 4, 5
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

22708 **Divaricella dentata** Wood Representative specimen
Not in Perry & Schwengel, 1955, but included in the faunal unit of Sanibel mollusks.
Sanibel Is., Lee Co., Fla.
Recent

25648 **Divaricella eburnea** (Reeve) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 220, pl. 31, fig. 2
Punta Blanca, Ecuador
Pliocene

25647 **Divaricella perparvula** Dall Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 220, pl. 31, figs. 1-1b not deposited, 1961.
Viveros Is., Pearl Islands, Panama
Recent

28981 **Divaricella prevaricata** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 207, pl. 35, fig. 10
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

26661 **Divaricella** ? sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 235, pl. 30, fig. 9 internal mold
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29029, 29030 **Donax aequalis** Gabb Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 229, pl. 39, figs. 10, 11
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

25802 **Donax asper** Hanley Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 343, pl. 59, figs. 1, 1a
Figs. 1b, 1d not deposited, 1961
Búcaro, Panama
Recent

25803 **Donax asper** Hanley Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 343, pl. 59, fig. 1c
Tumbez, Peru
Recent

25811 **Donax carinatus** Hanley Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 342, pl. 60, fig. 4a
Fig. 4 not deposited, 1961.
Tumbez, Peru
Recent

25812 **Donax carinatus** Hanley Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 342, pl. 60, fig. 4b
Camarones, Ecuador
Recent

25807, 25807a **Donax (Amphichaena) culter** Hanley Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 346, pl. 59, figs. 5-5b not deposited, 1961. Unfigured hypotypes = PRI 25807a
Acapulco, Mexico
Recent

29584 **Donax denticulatus** Linnaeus Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 455, pl. 20, fig. 11
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone

26803-26806 **Donax denticulatus** Linnaeus Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 361, pl. 52, figs. 3-8
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25804 **Donax dentiferus** Hanley Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 344, pl. 59, fig. 2b
Figs. 2, 2a not deposited, 1961.
Charapota, Ecuador
Recent

25813, 25813a **Donax gracilis** Hanley Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 341, pl. 60, fig. 5 not deposited, 1961. Unfigured hypotype = PRI 25813a
Búcaro, Panama
Recent

26812 **Donax higuerotensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 366, pl. 53, fig. 1
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26813, **Donax higuerotensis** Weisbord Paratypes
26814 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 366, pl. 53, figs. 2-9
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26816 **Donax marensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 369, pl. 53, figs. 12, 13
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

25810, **Donax naviculus** Hanley Hypotypes
25810a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 341, pl. 60, figs. 3, 3a
Unfigured hypotype = PRI 25810a.
San Carlos, Panama
Recent

25815 **Donax obesus** d'Orbigny Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 344, pl. 61, fig. 5
Búcaro, Panama
Recent

25805, **Donax panamensis** Philippi Hypotype
25805a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 339, pl. 59, figs. 3, 3a not deposited, 1961. Unfigured hypotype = PRI 25805a
Concepcion Beach, near Las Tablas, Panama
Recent

25809, **Donax peruvianus** Deshayes Hypotypes
25809a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 343, pl. 60, figs. 2-2e
Unfigured hypotype = PRI 25809a.
Negritos, Peru
Recent

25816, **Donax punctatostriatus** Hanley Hypotypes
25816a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 341, pl. 61, fig. 6 (Guaymas, Mex.), figs. 6a, 6b (Acapulco, Mex.) not deposited, 1961. Unfigured hypotype = PRI 25816a (locality uncertain)
Recent

25814 **Donax rostratus** C. B. Adams Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 338, pl. 61, figs. 1-1b
Cojimenes, Ecuador
Recent

26807- **Donax striatus** Linnaeus Hypotypes
26811 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 363, pl. 52, figs. 9-17
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25806 **Donax (Machaerodonax) transversus** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 345, p. 59, figs. 4-4b
Punta Montanita, Ecuador
Recent

26815 **Donax vagus** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 368, pl. 53, figs. 10, 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25701, **Dosinia (Dosinidia) annae** Carpenter Hypotype
25701a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 262, pl. 42, figs. 2-2b
Unfigured hypotype = PRI 25701a
Cojimenes, Ecuador
Recent

29538 **Dosinia (Dosinidia) brasiliensis** White Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 319, pl. 17, fig. 17
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26702 **Dosinia (Dosinidia) concentrica prosapia** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 268, pl. 37, figs. 3, 4
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26703 **Dosinia (Dosinidia) concentrica prosapia** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 268, pl. 37, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26704 **Dosinia (Dosinidia) concentrica prosapia** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 268, pl. 37, figs. 7-10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26705, 26706 **Dosinia (Dosinidia) concentrica prosapia** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 268, pl. 38, figs. 1-4
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26709 **Dosinia (Dosinidia) concentrica prosapia** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 268, pl. 39, figs. 1, 2
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26852 **Dosinia (Dosinidia) concentrica prosapia** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 268, pl. 58, figs. 10, 11 internal mold
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25702 **Dosinia (Dosinidia) dunkeri** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 261, pl. 42, fig. 3a
Santa Elena, Ecuador
Recent

25703 **Dosinia (Dosinidia) dunkeri** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 261, pl. 42, figs. 3, 3b
San Miguel, Rey Is., Panama
Recent

25690 **Dosinia (Dosinidia) ponderosa** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 260, pl. 40, fig. 5
Venado Beach, Panama Canal Zone
Recent

25697 **Dosinia (Dosinidia) ponderosa** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 260, pl. 42, fig. 1
Palo Seco, Panama Canal Zone
Recent

25698 **Dosinia (Dosinidia) ponderosa** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 260, pl. 42, fig. 1a
Gulf of California
Recent

25699 **Dosinia (Dosinidia) ponderosa** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 260, pl. 42, fig. 1b
Jama, Ecuador
Pliocene

25700 **Dosinia (Dosinidia) ponderosa** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 260, pl. 42, fig. 1c
Manta, Ecuador
Recent

25711 **Dosinia (Dosinidia) ponderosa** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 260, pl. 43, fig. 1
Jaramijo, Ecuador
Recent

28635 **Drillia cercadonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 52, pl. 8, fig. 12
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28637 **Drillia consors** (G. B. Sowerby, II) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 53, pl. 8, figs. 15, 16
Zone A, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

29417, **Drillia consors pennai** Maury (**pennae,** emend.) Plastotypes
29418, Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 205, pl. 12, figs.
29420, 1, 2, 4, 6
29422 (assumed to be named for Sr. Ferriera Penna)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29419 **Drillia crandalli** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 207, pl. 12, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28644 **Drillia donalbertonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 55, pl. 9, fig. 4
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28634 **Drillia fusiformis** (Gabb) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 51, pl. 8, figs. 10, 11
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28638 **Drillia henekeni** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 53, pl. 8, fig. 17
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28639 **Drillia henekeni** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 53, pl. 8, fig. 18
Bluff 1 or 3, above Cercado on Rio Mao, Dominican Rep.
Formation uncertain, Miocene

28646 **Drillia hispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 56, pl. 9, fig. 6
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28647 **Drillia islalindae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 57, pl. 9, fig. 7 broken before 1977
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28643 **Drillia losquemadica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 55, pl. 9, figs. 3, 3a not deposited by Cornell Univ., 1971
Zone D, Rio Gurabo, about 2 mi. W. of Los Guemados, Dominican Rep.
Gurabo Fm., middle Miocene

28645 **Drillia maonisriparum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 56, pl. 9, fig. 5
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29411 **Drillia pirabica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 205, pl. 11, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28642 **Drillia riogurabonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 54, pl. 9, fig. 2
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26340 **"Drillia"** sp. "a" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 448, pl. 42, figs. 13, 14
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26341 **"Drillia"** sp. "b" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 448, pl. 42, figs. 15, 16
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28640 **Drillia squamosa** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 54, pl. 9, fig. 1
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28641 **Drillia squamosa** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 54, pl. 9, fig. 1a
Dominican Rep. (Santo Domingo, Gabb Coll.)
Miocene

28636 **Drillia venusta** (G. B. Sowerby, II) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 52, pl. 8, fig. 14; fig. 13 not deposited by Cornell Univ., 1971
Dominican Rep. (Santo Domingo, Gabb Coll.)
Miocene

29776 **Druidwilsonia nigeriana** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 80
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

26205 **Drupa (Morula) gilbertharrisi** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 295, pl. 26, figs. 12-14
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26203 **Drupa (Morula) nodulosa** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 293, pl. 26, figs. 9, 10
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26204 **Drupa (Morula) nodulosa** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 293, pl. 26, fig. 11
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27302 **Dyocibicides perforatus** Cushman & Valentine Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 60, pl. 19, fig. 4
Well 3-N, 125', York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

26411 **Earlandia consternatio** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 273
E. of Sloans Valley, Pulaski Co., Ky.
Glen Dean Ls., Upper Mississippian

28297 **Echinocaris punctata** (Hall) Hypotype
Olsson, B.A.P., v. 5, No. 23, 1912, p. 7, pl. 7, fig. 2
Old Cornell Univ. Quarry, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Middle Devonian

28955 **Echinochama antiquata** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 201, pl. 33, fig. 10
Bluff, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene
See Nicol, Jr. Pal., v. 26, No. 5, 1952, p. 808 as *E. trachyderma* Pilsbry & Johnson, and Keen, Veliger, v. 4, No. 4, 1962, p. 179 as *Arcinella*

Echinochama antiquata Dall PRI 21272
See *Arcinella trachyderma* (Pilsbry & Johnson)

28956, 28957 **Echinochama antiquata yaquensis** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 201, pl. 33, figs. 11, 12
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene
See Nicol, Jr. Pal., v. 26, No. 5, 1952, p. 809, pl. 118, fig. 3 (PRI 28956) as *E. yaquensis* Maury, and Jung, B.A.P., v. 49, No. 223, 1965, p. 450

29520 **Echinochama praearcinella** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 291, pl. 16, fig. 22
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29489 **Echinochama pristina** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 417, pl. 16, fig. 1
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

29514 **Echinochama pristina** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 287, pl. 16, fig. 16
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Echinochama trachyderma Pilsbry & Johnson
See *E. antiquata* Dall PRI 28955

Echinochama yaquensis Maury
See *E. antiquata yaquensis* Maury

7054 **Echinocythereis clarkana** (Ulrich & Bassler)
Sabol, B.A.P., v. 41, No. 191, 1960, p. 236 Unfigured hypotypes
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27314, 27173 **Echinocythereis clarkana** (Ulrich & Bassler) Hypotypes
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 70, pl. 22, figs. 3, 4
Well 3-S, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27673 ? **Echinolampas** sp. indeterminate Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 323, pl. 19, figs. 1-3
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27664-27668 **Echinometra lucunter** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 302, pl. 16, figs. 1-7; pl. 17, figs. 1-5
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27669, **Echinometra viridis** A. Agassiz Hypotypes
27670 Weisbord, B.A.P., v. 56, No. 252, 1969, p. 310, pl. 17, figs. 6-12
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28725, **Ectracheliza truncata** Gabb Hypotypes
28726 Maury, B.A.P., v. 5, No. 29, 1917, p. 93, pl. 15, figs. 1, 2
Dominican Rep. (Santo Domingo, Gabb Coll.)
Miocene

27107 **Eleutherokomma aechmophora** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 16, pl. 11, figs. 10-12
Gypsum Cliffs, Peace R., Alberta, Can.
Lower Waterways Fm., late Middle Devonian

27108 **Eleutherokomma aechmophora** Crickmay Paratype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 16, pl. 11, figs. 9, 13
Gypsum Cliffs, Peace R., Alberta, Can.
Lower Waterways Fm., late Middle Devonian

26927 **Eleutherokomma beardi** Crickmay Holotype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 223, pl. 37, fig. 3
Well, 8090′, S. 17, T. 56, R. 8, W5, Alberta, Can.
Late Middle, or early Upper Devonian

26928 **Eleutherokomma beardi** Crickmay Paratype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 223, pl. 37, fig. 1
Well, 8090′, S. 17, T. 56, R. 8, W5, Alberta, Can.
Late Middle, or early Upper Devonian

26921 **Eleutherokomma hamiltoni** Crickmay Holotype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 220, pl. 36, fig. 1
La Saline Rock, Athabasca R., Alberta, Can.
Waterways Fm., late Middle Devonian

26922, **Eleutherokomma hamiltoni** Crickmay Paratypes
26923 Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 220, pl. 36, figs. 2, 3
La Saline Rock, Athabasca R., Alberta, Can.
Waterways Fm., late Middle Devonian

26981 **Eleutherokomma impennis** Crickmay Holotype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 3, pl. 2, figs. 1, 6
Well, 341′, S. 36, T. 88, R. 8, W4, Alberta, Can.
Waterways Fm., late Middle Devonian

26982 **Eleutherokomma impennis** Crickmay Paratype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 3, pl. 2, fig. 2 only
Well, 341′, S. 36, T. 88, R. 8, W4, Alberta, Can.
Waterways Fm., late Middle Devonian

26924 **Eleutherokomma killeri** Crickmay Holotype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 222, pl. 36, figs. 4, 5
Well, 4430′, S. 14, T. 58, R. 22, W4, Alberta, Can.
Late Middle, or early Upper Devonian

26925 **Eleutherokomma leducensis** Crickmay Holotype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 222, pl. 36, figs. 6, 7
Well in Leduc oilfield, 6058′, S. 6, T. 48, R. 24, W4, Alberta, Can.
Late Middle, or early Upper Devonian

26926 **Eleutherokomma leducensis** Crickmay Paratype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 222, pl. 36, fig. 8
Well in Leduc oilfield, 6058′, S. 6, T. 48. R. 24, W4, Alberta, Can.
Late Middle, or early Upper Devonian

26929 **Eleutherokomma reidfordi** Crickmay Holotype
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 224, pl. 37, fig. 4
14 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

26930, 26931 **Eleutherokomma reidfordi** Crickmay Paratypes
Crickmay, Jr. Pal., v. 24, No. 2, 1950, p. 224, pl. 37, figs. 5-9
14 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

27159 **Elphidium advena** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 29, pl. 7, fig. 5
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

29936, 29937 **Elphidium advena** (Cushman) Hypotypes
Herrick, B.A.P., v. 70, No. 293, 1976, p. 139, pl. 10, figs. 30, 31
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27156 **Elphidium clavatum** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 30, pl. 7, figs. 7, 8
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

27162 **Elphidium clavatum** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 30, pl. 7, fig. 6
Offshore well A-11, 100′, near Newport News, Va.
Pleistocene

29939, 29944, 29946 **Elphidium clavatum** Cushman Hypotypes
Herrick, B.A.P., v. 70, No. 293, 1976, p. 139, pl. 10, figs. 33, 38, 40
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29941 **Elphidium gunteri** Cole Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 10, fig. 35
Well, 55-60′, N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

29942 **Elphidium gunteri** Cole Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 10, fig. 36
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27217 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 7
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

27215 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 4
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27170 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 1
0.75 mi. S. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27219 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 5
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27234 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 3
1.8 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27158 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 6
Offshore well A-11, 81′, near Newport News, Va.
Pleistocene

27241 **Elphidium florentinae** Shupack Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 31, pl. 8, fig. 2
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene-Miocene (Yorktown Fm.) mixture

29940 **Elphidium incertum** (Williamson) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 10, fig. 34
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29938, **Elphidium poeyanum** (d'Orbigny) Hypotypes
29947, Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 10, fig. 32; pl. 11,
29948 figs. 41, 42
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29943, **Elphidium varium** Buzas Hypotypes
29945 Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 10, figs. 37, 39
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

25863 **Elpidollina decumbens** (Carpenter) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 407, pl. 68, fig. 15
Fig. 14 not deposited, 1961.
Old Panama, Panama
Recent

26002 **Emarginula mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 46, pl. 1, figs. 7, 8
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26001 **Emarginula multiradiata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 44, pl. 1, figs. 4-6
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26003 **Emarginula? tropica** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 47, pl. 1, figs. 9, 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27671 **Encope emarginata** (Leske) Hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 313, pl. 18, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27672 **Encope emarginata** (Leske) Hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 313, pl. 18, figs. 3, 4
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27038 **Endophyllum barbatum** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 12, pl. 7, figs. 6, 7
2 mi. N. of Peace R., 12 mi. below Finlay Forks, N. W. Terr., Can.
Probably from Hare Indian Sh., Middle Devonian

28273 **Engina corinnae** Crovo Unfigured paratype
Crovo, Veliger, v. 14, No. 1, p. 30 growth series
Off Boynton Beach, Palm Beach Co., Fla.
Recent

26245 **Engina** ? sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 338, pl. 29, figs. 25, 26
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27292 **Entosolenia bifida** McLean Holotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 35, pl. 9, fig. 9
Well, A-1, 84', near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27276 **Entosolenia carteri** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 36, pl. 9, fig. 7
Well A-2, 70', near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27251 **Entosolenia nodosa** Wiesner Hypotype
McLean, Va. Div. Min. Res., RI No. 9, p. 36, pl. 9, fig. 8
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27222 **Entosolenia** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 37, pl. 9, fig. 10
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

8246 **Eoclathurella ornata** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 97, pl. 16, fig. 3
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

27649 **Eodaphne powelli** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 76, pl. 2, figs. 16-18
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27418 **Eontia aff. E. centrota** (Guppy) Cast of figured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 436, pl. 53, figs. 8, 9
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Eoschuchertella adoceta (Crickmay)
See *Schuchertella adoceta* Crickmay

27109 **Eostrophalosia pedderi** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 17, pl. 12, figs. 6-8, 10
26 mi. below McMurray, Athabasca R., Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

27110 **Eostrophalosia pedderi** Crickmay Paratype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 17, pl. 12, figs. 9, 11, 12
26 mi. below McMurray, Athabasca R., Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

28845 **Epitonium cercadicum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 140, pl. 24, fig. 5 *Epitomium* [*sic*]
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26138 **Epitonium (Asperiscala) laguairense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 199, pl. 18, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26135 **Epitonium (Asperiscala ?) marenum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 200, pl. 17, figs. 3, 4; pl. 18, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28843 **Epitonium minutissimum** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 139, pl. 24, fig. 3 *Epitomium* [*sic*]
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28844 **Epitonium riparum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 139, pl. 24, fig. 4 *Epitomium* [*sic*]
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26139 **Epitonium** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 201, pl. 18, fig. 5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28846 **Epitonium textuvestitum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 140, pl. 24, figs. 6, 9 *Epitomium* [*sic*]
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26134 **Epitonium (Asperiscala) venezuelense** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 197, pl. 16, figs. 22, 23
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29982 **Eponides antillarum** (d'Orbigny) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 13, fig. 75
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29983 **Eponides** cf. **E. regularis** Phleger & Parker Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 13, fig. 76
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

28798 **Erato maugeriae domingensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 118, pl. 21, fig. 8
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28515 **Erato vaughani** (Maury) Topotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 23, pl. 3, fig. 8
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene
See *Cypraea vaughani* Maury

26140 **Erato venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 224, pl. 18, figs. 6, 7
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26836 **Ervilia antilleana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 389, pl. 56, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26837 **Ervilia antilleana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 389, pl. 56, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26838 **Ervilia caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 391, pl. 56, figs. 13, 14 broken, 1963
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26839 **Ervilia mareana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 392, pl. 56, figs. 15, 16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26840 **Ervilia mareana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 392, pl. 57, figs. 1, 2
100 mi. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26829 **Ervilia nitens venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 387, pl. 55, figs. 9, 10
100 mi. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26830 **Ervilia nitens venezuelana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 387, pl. 55, figs. 11, 12
100 mi. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26831, **Ervilia nitens venezuelana** Weisbord Paratypes
26835 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 387, pl. 55, figs. 13, 14; pl. 56, figs. 7, 8
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26832, **Ervilia nitens venezuelana** Weisbord Paratypes
26834 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 387, pl. 56, figs. 1, 2, 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26833 **Ervilia nitens venezuelana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 387, pl. 56, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25669 **Erycina colpoica** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 229, pl. 36, figs. 5, 5a
Near Taboga Is., Panama (L. Beil Coll.)
Recent

27653 **Eucidaris tribuloides** (Lamarck) Hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 287, pl. 14, fig. 1; pl. 15, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27654 **Eucidaris tribuloides** (Lamarck) Hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 287, pl. 14, figs. 2, 3; pl. 15, fig. 3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27655, **Eucidaris tribuloides** (Lamarck) Hypotypes
27656 Weisbord, B.A.P., v. 56, No. 252, 1969, p. 287, pl. 14, figs. 4-6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27657 **Eucidaris tribuloides** (Lamarck) Hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 287, pl. 14, fig. 7
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27658 **Eucidaris tribuloides** (Lamarck) Hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 287, pl. 14, fig. 9; pl. 15, fig. 5
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27659 **Eucidaris tribuloides** (Lamarck) Unfigured hypotype
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 287
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

15014 **Euconulus fulvus** (Müller) Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, figs. 7a, 7b
Blevin's Gap Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

15015 **Euconulus fulvus** (Müller) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 7c
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27589 **Euconulus fulvus** (Müller) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 224, pl. 16, figs. 4-6
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

26624 **Eucrassatella (Hybolophus) antillarum** (Reeve) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 194, pl. 25, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25627 **Eucrassatella (Hybolophus) gibbosa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 179, pl. 25, fig. 1
San Carlos, Panama
Recent

25628 **Eucrassatella (Hybolophus) gibbosa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 179, pl. 25, fig. 1a
Santa Elena, Ecuador
Recent

25629 **Eucrassatella (Hybolophus) gibbosa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 179, pl. 25, fig. 1b
Punta Blanca, Ecuador
Recent

Eucrassatella trinitaria (Maury)
See *Crassatellites trinitarius* Maury

26352 **Eulimella ? binata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 461, pl. 43, figs. 17-19
broken originally
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27441 **Eupleura kugleri** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 524, pl. 70, figs. 3, 4
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26900, **Eupomatus cf. E. dianthus** (Verrill) Figured specimens
26901 Weisbord, B.A.P., v. 47, No. 214, 1964, p. 158, pl. 22, figs. 1, 2
Eupomutus [*sic*]
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25855 **Eurytellina (Eurytellina) eburnea** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 394, pl. 68, fig. 2
Charapota, Ecuador
Recent

25875 **Eurytellina (Eurytellina) eburnea** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 394, pl. 71, fig. 3
Venado Beach, Panama Canal Zone
Recent

25877 **Eurytellina (Eurytellina) ecuadoriana** Pilsbry & Olsson
Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 395, pl. 71, figs. 5, 5a
Mompiche, Ecuador
Recent

25878 **Eurytellina (Eurytellina) ecuadoriana** Pilsbry & Olsson Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 395, pl. 71, fig. 5b
Punta Blanca, Ecuador
Recent

25883 **Eurytellina (Eurytellina) inaequistriata** (Donovan) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 396, pl. 71, figs. 9, 9a
Rabo de Puerco, Puerto Armuelles, Panama
Pleistocene

25854 **Eurytellina (Eurytellina) laceridens** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 392, pl. 68, fig. 1
Sua, Ecuador
Recent

25882 **Eurytellina (Eurytellina) laceridens** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 392, pl. 71, figs. 8, 8a
Búcaro, Panama
Recent

25876 **Eurytellina (Eurytellina) laplata** Pilsbry & Olsson Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 393, pl. 71, figs. 4, 4a
Bayovar, Peru
Recent

25879 **Eurytellina (Eurytellina) prora** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 397, pl. 71, figs. 6, 6a
Fort Amador Beach, Panama Canal Zone
Recent

25859 **Eurytellina (Eurytellina) rubescens** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 395, pl. 68, fig. 8
Venado Beach, Panama Canal Zone
Recent

25880, **Eurytellina (Eurytellina) rubescens** (Hanley) Hypotype
25880a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 395, pl. 71, fig. 7 not deposited, 1961.
Unfigured hypotype = PRI 25880a
San Miguel, Pearl Islands, Panama
Recent

25881 **Eurytellina (Eurytellina) rubescens** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 395, pl. 71, fig. 7a
Venado Beach, Panama Canal Zone
Recent

25874A **Eurytellina (Eurytellina) simulans** (C. B. Adams) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 396, pl. 71, fig. 1
Búcaro, Panama
Recent

25874B **Eurytellina (Eurytellina) simulans** (C. B. Adams) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 396, pl. 71, fig. 1a
Punta Ancon, Ecuador
Recent

8205 **Euscalpellum ? isneyensis** Weisbord Holotype
Weisbord, B.A.P., v. 72, No. 297, 1977, p. 150, pl. 19, figs. 1, 2
4.0-4.2 mi. W . of Silas, Choctaw Co., Ala.
North Creek Mbr., Yazoo Gr., upper Eocene

8206- **Euscalpellum ? isneyensis** Weisbord Paratypes
8209 Weisbord, B.A.P., v. 72, No. 297, 1977, p. 150, pl. 19, figs. 3-8
Unfigured paratype = PRI 8209
4.0-4.2 mi. W of Silas, Choctaw Co., Ala.
North Creek Mbr., Yazoo Gr., upper Eocene

6066 **Eutrephoceras eyerdami** Palmer Holotype
Palmer, Jr. Pal., v. 35, No. 3, 1961, p. 533, pl. 73, figs. 1-6
Cowlitz R., near Vader, Lewis Co., Wash.
Cowlitz Fm., upper Eocene

29788, 29789 **Ewekoroia acirsoides** (Furon) Unfigured hypotypes
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 103
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29783 **Ewekoroia nigeriensis** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 102
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

Exilifrons atypica (Crickmay)
See *Hexagonaria atypica* Crickmay

Exilifrons furtiva (Crickmay)
See *Hexagonaria furtiva* Crickmay

Exilifrons impedita (Crickmay)
See *Hexagonaria impedita* Crickmay

28703 **Fasciolaria carminamaris** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 81, pl. 13, fig. 2
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

26256 **Fasciolaria (Pleuroploca ?) crassinoda** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 354, pl. 31, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26255 **Fasciolaria hollisteri** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 351, pl. 31, figs. 1, 2
100 mi. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28697 **Fasciolaria kempi** (Maury), 1910 Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 81, pl. 12, fig. 4
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
Mistakenly described as *Siphonalia kempi* Maury from the Florida Chipola Fm. *in* Maury, B.A.P., v. 4, No. 21, 1910, p. 20, pl. 5, fig. 5
See also Brann & Kent, p. 800

29847 **Fasciolaria okeechobensis** Tucker & Wilson Holotype
Tucker & Wilson, B.A.P., v. 18, No. 65, 1932, p. 10, pl. 1, fig. 6
Port Mayaca, Martin Co., Fla.
Caloosahatchee Gr., Pliocene?

28702 **Fasciolaria semistriata** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 80, pl. 13, fig. 1
Locality and formation uncertain; Domican Rep.
Miocene

26253 **Fasciolaria semistriata mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 353, pl. 30, figs. 15, 16
100 mi. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28278 **Fasciolaria sparrowi** Emmons Holotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 253 (162), fig. 115
Miocene marl beds of Bladen Co., eastern N. Carolina

26257 **Fasciolaria (Pleuroploca ?) sp.** Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 356, pl. 32, figs. 1, 2
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28368 **Fenestella** sp. Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 26, pl. 13, fig. 123
Bath, Steuben Co., N.Y.
Formation uncertain, Upper Devonian

1085, 1088 **Ficus carbasea** (Guppy)
See Vokes, Amer. Mus. Novitates, No. 988, 1938, p. 26 for ***Pyrula trinitaria*** Maury *in* Brann & Kent, p. 762

27460 **Ficus carbasea** (Guppy) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 515
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper Middle Miocene

26007 **Fissurella (Cremides) angusta** Gmelin Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 61, pl. 2, figs. 1-3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26010 **Fissurella (Cremides) longipora** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 65, pl. 2, figs. 10-12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26005, 26006 **Fissurella (Fissurella) nimbosa** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 60, pl. 1, figs. 13-17
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26008 **Fissurella (Cremides) rosea** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 62, pl. 2, figs. 4-6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26009 **Fissurella (Cremides) rosea** ? (Gmelin) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 63, pl. 2, figs. 7-9
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26398 **Fissurella (Cremides) rosea** ? (Gmelin) Unfigured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 63
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26011 **Fissurella** ? sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 65, pl. 2, figs. 13, 14
Mare Fm., lower Pliocene

28860 **Fissuridea alternata** (Say) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 157, pl. 24, fig. 22
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29239 **Fissuridea derbyi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 49, pl. 1, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28859 **Fissuridea henekeni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 157, pl. 24, fig. 21
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

29913 **Fissurina lucida** (Williamson) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 138, pl. 8, fig. 13
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29912 **Fissurina marginatoperforata** (Seguenza) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 138, pl. 8, fig. 12 *marginatorperforata* [*sic*]
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29914 **Fissurina orbignyana lacunata** (Burrows & Holland) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 138, pl. 8, fig. 14
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

25848 **Florimetis cognata** (Pilsbry & Vanatta) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 410, pl. 67, fig. 2 not PRI 25484; pl. 68, fig. 10.
Venado Beach, Panama Canal Zone
Recent

25849 **Florimetis cognata** (Pilsbry & Vanatta) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 410, pl. 67, fig. 2a
Punta Blanca, Ecuador
Recent

25850 **Florimetis cognata** (Pilsbry & Vanatta) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 410, pl. 67, fig. 2b
Palo Seco, Panama Canal Zone (not Punta Blanca, Ecuador)
Recent

25851 **Florimetis cognata** (Pilsbry & Vanatta) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 410, pl. 67, figs. 2c, 2d
El Lagartillo, Panama
Recent

27576 **Fossaria dalli** (F. C. Baker) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 263, pl. 15, fig. 1
Henderson, Henderson Co., Ky.
Farmdale loess, Wisconsin Stage, Pleistocene

27578 **Fossaria obrussa decampi** (Streng) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 265, pl. 15, fig. 4
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

25525 **Fulgeria illota** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 83, pl. 6, figs. 1, 1a
Fort Amador Beach, Panama Canal Zone
Recent

25526 **Fulgeria illota** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 83, pl. 6, fig. 1b
Jaramijo, Ecuador
Recent

Fusimitra millingtoni (Conrad)
See *Mitra subconquisita* de Gregorio

26263 **Fusinus closter caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 364, pl. 32, figs. 13, 14
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26264 **Fusinus closter caboblanquensis** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 364, pl. 33, figs. 1, 2
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26262 **Fusinus marensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 362, (p. 363 not PRI 26263), pl. 32, figs. 11, 12
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26401 **Fusinus marensis** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 362
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27469 **Fusinus mithras** Jung — Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 537, pl. 73, figs. 3, 4
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28505, 28506 **Fusoficula juvenis** (Whitfield) — Syntypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 78, pl. 11, figs. 2, 3
Spire missing prior to 1977 on fig. 2 (PRI 28505)
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

29230 **Fustiaria (Episiphon) acicula** Hodgkinson — Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 22
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

29229 **Fustiaria (Fustiaria) leroyi** Hodgkinson — Unfigured paratype
Hodgkinson, Univ. Kansas, Pal. Cont., Pap. 70, 1974, p. 23
Little Brazos R., Brazos Co., Tex.
Cook Mtn. Fm., Wheelock Mbr., middle Eocene

26889 **Fustiaria (Laevidentalium) perlongum** ? (Dall) — Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 128, pl. 17, fig. 8; pl. 18, figs. 9, 10
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26890 **Fustiaria (Laevidentalium) perlongum** ? (Dall) — Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 128, pl. 17, fig. 9
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26891 **Fustiaria (Laevidentalium) perlongum** ? (Dall) — Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 128, pl. 17, fig. 10; pl. 18, fig. 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26896 **Fustiaria (Laevidentalium) sp.** — Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 130, pl. 18, figs. 12-14
Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26888 **Fustiaria (Laevidentalium ?) venezuelana** Weisbord — Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 127, pl. 17, fig. 7; pl. 18, figs. 7, 8
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29359 **Fusus baumanni** Maury — Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 149, pl. 8, fig. 22
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28495 **Fusus bocarepertus** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 72, pl. 10, fig. 17
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28493, 28494 **Fusus bocaserpentis** Maury — Syntypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 73, pl. 10, figs. 15, 16
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28496 **Fusus colubri,** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 72, pl. 10, fig. 18
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29355 **Fusus** cf. **F. doris** White — Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 147, pl. 8, fig. 18
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28277 **Fusus equalis** Emmons — Syntypes
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 250 (159), fig. 111?
Miocene marl beds of Cape Fear R., eastern N. Carolina

28286 **Fusus exilis** Conrad — Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 251 (160), fig. 111A?
Miocene marl beds of eastern N. Carolina

28694 **Fusus henekeni** G. B. Sowerby, II — Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 78, pl. 12, fig. 1
Locality and formation uncertain; Dominican Rep., Miocene

28695 **Fusus henekeni haitensis** G. B. Sowerby, II — Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 79, pl. 12, fig. 2
Locality and formation uncertain; Dominican Rep., Miocene

28696 **Fusus henekeni veatchi** Maury — Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 79, pl. 12, fig. 3
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28497 **Fusus longiusculoides** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 73, pl. 10, fig. 19
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28498 **Fusus meunieri** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 73, pl. 10, fig. 20
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28499 **Fusus mohrioides** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 74, pl. 10, fig. 21
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28500 **Fusus sewalliana** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 75, pl. 10, fig. 22
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28501 **Fusus sirenideditus** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 75, pl. 10, fig. 23
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29354, **Fusus soperi** Maury — Plastotypes
29356 Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 149, pl. 8, figs. 17, 19
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28502 **Fusus taeniensis** Maury — Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 75, pl. 10, fig. 24
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

26056 **Gabrielona bruscasensis** Weisbord — Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 111, pl. 8, figs. 5-7
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26054 **Gabrielona sphaera** Weisbord — Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 109, pl. 8, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26055 **Gabrielona sphaera** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 109, pl. 8, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

7073 **Gafrarium metastriatum** (Conrad) Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28281 **Galeodia hodgii** Conrad Hypotypes
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 257(166), fig. 128?, broken
Miocene marl beds of Cape Fear R., eastern N. Carolina

25826 **Gari (Gobraeus) maxima** (Deshayes) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 356, pl. 63, fig. 7b
Fig. 7a not deposited, 1961
San Lorenzo, Ecuador
Recent

25934 **Gastrochaena (Rocellaria) ovata** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 441, pl. 80, figs. 7-7b
Manta, Ecuador
Recent

15010 **Gastrocopta armifera** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 3
Johnsontown Sec., Louisville, Jefferson Co., Ky.
Tazewell water deposited silt, Wisconsin Stage, Pleistocene

27579 **Gastrocopta armifera** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 246, pl. 15, fig. 5
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27602 **Gastrocopta contracta** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 249, pl. 17, fig. 8
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27599 **Gastrocopta tappaniana** (C. B. Adams) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 248, pl. 17, fig. 3
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

26999 **Geranocephalus inopinus** Crickmay Holotype
Crickmay, W. Can. Sed. Basin, AAPG, Tulsa, 1954, p. 157, pl. 1, figs. 1-3
Redfern Lake, B.C., Can.
Elk Point ("Ramparts") Fm., Middle Devonian

27000 **Geranocephalus inopinus** Crickmay Paratype
Crickmay, W. Can. Sed. Basin, AAPG, Tulsa, 1954, p. 157, pl. 1, figs. 4-12
Redfern Lake, B.C., Can.
Elk Point ("Ramparts") Fm., Middle Devonian

29997 **Globigerina bulloides** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 147, pl. 14, fig. 90
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29998, **Globigerina nepenthes** Todd Hypotype
29998A Herrick, B.A.P., v. 70, No. 293, 1976, p. 148, pl. 15, fig. 91
Unfigured hypotype = PRI 29998A
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7035 **Globigerina** spp. Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 231
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27151 **Globigerina** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 54, pl. 17, fig. 4
Offshore well A-11, 95′, near Newport News, Va.
Pleistocene

27300 **Globigerina** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 54, pl. 18, fig. 2
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

27266 **Globigerina** sp. form A McLean, 1956 Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 54, pl. 17, fig. 3
Well A-2, 101′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

27248 **Globigerina** sp. form E McLean, 1956 Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 55, pl. 17, fig. 5
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

27211 **Globigerina** sp. form E McLean, 1956 Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 55, pl. 18, fig. 1
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

27613 **Globigerinelloides bollii** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 275
Near Prairie Hill, Limestone Co., Tex.
Taylor Fm., "Upper Taylor Marl" Mbr., Upper Cretaceous

27614 **Globigerinelloides prairiehillensis** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 277
Near Prairie Hill, Limestone Co., Tex.
Taylor Fm., "Upper Taylor Marl" Mbr., Upper Cretaceous

27257 **Globorotalia menardii** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 56, pl. 18, fig. 4
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

30000 **Globorotalia menardii** (d'Orbigny) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 149, pl. 15, fig. 93
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7036 **Globorotalia** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 232
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27612 **Globotruncana hilli** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 343
Near Prairie Hill, Limestone Co., Tex.
Taylor Fm., "Upper Taylor Marl" Mbr., upper Cretaceous

27610 **Globotruncana loeblichi** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 349
Baron Brick Co. clay pit, Palmer, Ellis Co., Tex.
Taylor Fm., "Lower Taylor Marl" Mbr., Upper Cretaceous

27611 **Globotruncana stephensoni** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 354
Near Prairie Hill, Limestone Co., Tex.
Taylor Fm., "Upper Taylor Marl" Mbr., Upper Cretaceous

29926 **Globulina caribaea** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 135, pl. 9, fig. 22
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Miocene

29924 **Globulina gibba** d'Orbigny Unfigured hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29925 **Globulina inaequalis** Reuss Unfigured hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

28896 **Glycymeris acuticostata** (G. B. Sowerby, II) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 180, pl. 26, fig. 12
Locality uncertain, Dominican Rep.
Probably Gurabo Fm., middle Miocene

Glycymeris canalis Browne & Pilsbry
See *G. secticostata* Nicol

29446 **Glycymeris crashleyi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 245, pl. 13, fig. 11
Rio Pirabas. St. of Pará, Brazil
Pirabas Fm., lower Miocene

26526 **Glycymeris (Glycymerella) decussata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 92, pl. 8, figs. 5, 6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26527, 26528 **Glycymeris (Glycymerella) decussata** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 92, pl. 8, figs. 7-10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26530 **Glycymeris (Glycymerella) decussata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 92, pl. 9, figs. 1, 2
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29455 **Glycymeris eumita** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 249, pl. 13, fig. 21
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29445 **Glycymeris cf. G. eumita** Maury Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 411, pl. 13, fig. 10
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28897 **Glycymeris jamaicensis** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 181, pl. 26, fig. 13
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

29449 **Glycymeris linda** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 247, pl. 13, fig. 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Glycymeris lloydsmithi multicostata Weisbord
See *G. lloydsmithi striatidentata* Nicol

22903, 22903A **Glycymeris lloydsmithi striatidentata** Nicol — Syntypes
Nicol, Jr. Pal., v. 19, No. 6, 1945, p. 622, new name for *G. l. multicostata*
Weisbord *in* Brann & Kent, p. 425

25554 **Glycymeris (Glycymeris) maculata** (Broderip) — Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 106, pl. 11, fig. 2
Sua, Ecuador
Recent

25556 **Glycymeris (Glycymeris) maculata** (Broderip) — Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 106, pl. 11, fig. 5
Manta, Ecuador
Recent

29451 **Glycymeris naiadis** Maury — Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 249, pl. 13, fig. 16
(cast too poor for positive identification)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

25557 **Glycymeris (Glycymeris) ovata** (Broderip) — Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 105, pl. 11, figs. 6-6b
Lobos del Tierra, Peru
Recent

26523-26525 **Glycymeris (Tucetona) pectinata** (Gmelin) — Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 89, pl. 7, figs. 13, 14; pl. 8, figs. 1-4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

21148 **Glycymeris secticostata** Nicol — Holotype
Nicol, Jr. Pal., v. 19, No. 6, 1945, p. 623, pl. 85, fig. 3 for *G. canalis*
Brown & Pilsbry "var." *in* Brann & Kent, p. 422

21146, 21147, 21150 **Glycymeris secticostata** Nicol — Unfigured paratypes
Nicol, Jr. Pal., v. 19, No. 6, 1945, p. 623 for *G. canalis*
Brown & Pilsbry *in* Brann & Kent, p. 422

21149 **Glycymeris secticostata** Nicol — Paratype
Nicol, Jr. Pal., v. 19, No. 6, 1945, p. 623, pl. 85, fig. 5 for *G. canalis*
Brown & Pilsbry "var." *in* Brann & Kent, p. 422

21151 **Glycymeris secticostata** Nicol — Paratype
Nicol, Jr. Pal., v. 19, No. 6, 1945, p. 623, pl. 85, figs. 4, 6 for *G. canalis*
Brown & Pilsbry *in* Brann & Kent, p. 422

7072 **Glycymeris cf. G. subovata** (Say) — Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 215
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29770, 29825 **Glycymeris (Glycymeris) togoensis** (Oppenheim)
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 224 — Unfigured hypotypes
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

Glycymeris trigonella (Conrad)
See *Pectunculus deltoideus* mut. *ignus* de Gregorio
See *Pectunculus deltoideus* mut. *percuneatus* de Gregorio

26521 **Glycymeris (Glycymeris) undata** (Linnaeus) — Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 86, pl. 7, figs. 9, 10
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26522 **Glycymeris (Glycymeris) undata** (Linnaeus) — Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 86, pl. 7, figs. 11, 12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28447 **Glycymeris (Axinaea) viamediae** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 49, pl. 8, fig. 13
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28657 **Glyphostoma dentiferum** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 61, pl. 9, fig. 16
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

27478 **Glyphostoma dentiferum** Gabb Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 571
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28658, **Glyphostoma golfoyaquensis** Maury Syntypes
28659 Maury, B.A.P., v. 5, No. 29, 1917, p. 61, pl. 9, figs. 17, 17a
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

26858 **Glyphostoma yaekeli** Olsson Holotype
Olsson, Neogene Moll. N.W. Ecuador, PRI, 1964, p. 107, pl. 18, figs. 3, 3a *yeakeli* [*sic*]; Not deposited, 1964
Quebrada Carriel, Río Tupisa, Darien, Panama
Top of Aquaqua Series, Miocene

28300 **Gomphoceras jewetti** Flower Holotype
Flower, B.A.P., v. 32, No. 129, 1948, p. 5, pl. 1, figs. 1-3
Lockport, Niagara Co., N. Y.
Irondequoit Ls., Clinton Gr., Silurian

28334 **Gomphoceras tumidum** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 32
Cascadilla Creek ?, Ithaca, Tompkins Co., N. Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28315 **Goniatites complanatus** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 8
Fernbank, Cayuga Lake, near Ithaca, Tompkins Co., N. Y.
Geneseo Sh., Genessee Gr., Upper Devonian

28323 **Goniophora cf. G. minor** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 19
Locality unknown
Ithaca Fm., Genessee Gr., Upper Devonian

25686, **Gouldia californica** Dall Hypotype
25686a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 271, pl. 39, fig. 9 not deposited, 1961. Unfigured hypotypes = PRI 25686a
Esmeraldas, Ecuador
Recent

26723 **Gouldia ? diffidentia** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 282, pl. 40, figs. 16, 17
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26717 **Gouldia venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 280, pl. 40, figs. 5, 6
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26718- **Gouldia venezuelana** Weisbord Paratypes
26720 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 280, pl. 40, figs. 7 (broken, 1963), 8, 9 (broken prior to 1976), 10, 11
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26721, **Gouldia venezuelana** Weisbord Paratypes
26722 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 280, pl. 40, figs. 12-15
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28326 **Grammysia elliptica** (Hall & Whitfield) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 22
Fall Creek, Ithaca, Tompkins County, N. Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28325 **Grammysia subarcuata** (Hall & Whitfield) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 21
Cascadilla Creek, Ithaca, Tompkins Co., N. Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28309 **Granatocrinus (Pentremites) leda** Hall Unfigured hypotype
Cleland, U.S.G.S., Bull. No. 206, 1903, p. 38 *Pentremilis* [*sic*]
Shurgers' Glen, Cayuga Lake, Tompkins Co., N. Y.
Hamilton Gr., Middle Devonian

Gryphus? sp.
See *Terebratula stantoni* Maury

28764 **Gutternium gracile gurabonicum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 107, pl. 17, fig. 10
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

7016 **Guttulina austriaca** d'Orbigny Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 227 *austrica* [*sic*]
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29918 **Guttulina austriaca** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136, pl. 9, fig. 17
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29920 **Guttulina austriaca** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136, pl. 9, fig. 19
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

29919 **Guttulina caudata** d'Orbigny Hypotype
Herrick, B.A.P, v. 70, No. 293, 1976, p. 136, pl. 9, fig. 18
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7017 **Guttulina pseudocostatula** McLean Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 227
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27194 **Guttulina pseudocostatula** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 23, pl. 5, fig. 9
Well 3-N, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

29921, **Guttulina pseudocostatula** McLean Hypotypes
29922 Herrick, B.A.P., v. 70, No. 293, 1976, p. 136, pl. 9, figs. 20, 21
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29923 **Guttulina pseudocostatula** McLean Unfigured hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7018 **Guttulina** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 227
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29981 **Gyroidina orbicularis** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 13, fig. 74
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27090 **Hadrorhynchia intermissa** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 2, pl. 7, figs. 3-7
MacKay Is., Great Slave Lake, N.W. Terr., Can.
Pine Point Fm., Middle Devonian

27091-27092 **Hadrorhynchia intermissa** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 2, pl. 7, figs. 2, 8, 9
MacKay Is., Great Slave Lake, N.W. Terr., Can.
Pine Point Fm., Middle Devonian

27093 **Hadrorhynchia vallorum** Chickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 3, pl. 7, figs. 11-16
Ramparts of Mackenzie Rd., N.W. Terr., Can.
Hare Indian Sh., Middle Devonian

25704 **Halodakra subtrigona** (Carpenter) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 319, pl. 27, figs. 1-1c
Salinas, Santa Elena, Ecuador
Recent

Haminea granosa (G. B. Sowerby, II)
See *Bullaria granosa* (G. B. Sowerby, II)

15036 **Hantkenina (Cribrohantkenina) bermudezi** Thalmann Topotype
Spraul, Jr. Pal., v. 37, No. 2, 1963, p. 367, pl. 41, figs. 3a, 3b; also Gulf Coast Assoc. Geol. Soc., Trans. v. 12, 1962, p. 344, pl. 1, figs. 3a, 3b
N. of Grua 9, Ramal Juan Criollo of C. Jatibonico, Camaguey Prov., Cuba
Upper Eocene

7041, 7042 **Hanzawaia concentrica** (Cushman) Hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 233, *Hanzwaia* [*sic*], pl. 27, figs. 7a, 7b; 8a, 8b
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7043, 7044 **Hanzawaia concentrica** (Cushman) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 233 *Hanzwaia* [*sic*]
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27153 **Hanzawaia concentrica** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 59, pl. 19, fig. 3 not 4 as in text
Well A-2, 59′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene

30008 **Hanzawaia concentrica** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 150, pl. 16, fig. 101
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

15016 **Haplotrema concavum** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 8a
Johnsontown Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

15017 **Haplotrema concavum** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 8b
Blevin's Gap Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27587 **Haplotrema concavum** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 222, pl. 15, figs. 24-26
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27529 **Harmerella dichotoma** (Hincks) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 103, pl. 12, fig. 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25787 **Harvella elegans** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 329, pl. 56, fig. 5a
Figs. 5, 5b not deposited, 1961
Tumbez, Peru
Recent

25927 **Hastasia melanura** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 448, pl. 78, fig. 6
Guanico, Panama
Recent

25932, 25932a **Hastasia quadra** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 449, pl. 80, fig. 2
Fig. 2a not deposited, 1961. Unfigured hypotypes = PRI 25932a
Crucitas, Ecuador
Recent

25929, 25929a **Hastasia tubifera** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 448, pl. 79, figs. 4b, 4d
Figs. 4, 4a, 4c, 4e? not deposited, 1961. Unfigured hypotype = PRI 25929a
Manta, Ecuador
Recent

27452 **Hastula lissa** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 593, pl. 79, fig. 16
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

29786, 29787 **Haustator nigeriensis** Adegoke Unfigured paratypes
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 95
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

27593 **Hawaiia minuscula** (Binney) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 228, pl. 16, figs. 16-18
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27122 **Helaspis caurina** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 20, pl. 12, figs. 20, 21
Ramparts of Mackenzie R. (at the Trail), N.W. Terr., Can.
Upper Ramparts Fm., Middle Devonian

27123 **Helaspis caurina** Crickmay Paratype
Crickmay, Sig. Dev. Brachiopods, W. Can., Pub. by author, Calgary, 1963, p. 20, pl. 12, figs. 22-24
Ramparts of Mackenzie R. (at the Trail), N.W. Terr., Can.
Upper Ramparts Fm., Middle Devonian

15033, **Helicodiscus parallellus** (Say) Hypotypes
15034 Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, fig. 11a, 11b
parallelus [*sic*]
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27584 **Helicodiscus parallellus** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 238, pl. 15, figs. 15-17
parallelus [*sic*]
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

29804 **Heligmotoma (Douvilletoma) oluwolei** Adegoke
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 172 Unfigured paratype
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

21791 **Heliophyllum halli** (Edwards & Haime)
Scrutton, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 4, 1973, p. 257 for *Cyathophyllum venezuelense* Weisbord *in* Brann & Kent, p. 297 (figured on pl. 1, fig. 4 of Weisbord, 1926)

28283 **Helix tridentata** Say Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 273(182), fig. 183?
Miocene marl beds of eastern N. Carolina

7060 **Hemicythere schmidtae** Malkin Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 238
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27324 **Hemicytherura clathrata** (Sars) Unfigured hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 63
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

26004 **Hemitoma octoradiata** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 48, pl. 1, figs. 11, 12
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

15028 **Hendersonia occulta** (Say) Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 6a, 6b
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27592 **Hendersonia occulta** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 260, pl. 16, figs. 13-15
Henderson, Henderson Co., Ky.
Farmdale ? loess, Wisconsin Stage, Pleistocene

25922 **Heterodonax bimaculatus** (Linnaeus) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 355, p. 85, fig. 10
Farfan Beach, Panama Canal Zone
Recent

21593 **Heterophrentis simplex** (Hall)
Scrutton, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 4, 1973, p. 254, pl. 5, figs. 4, 5 for *Cyathophyllum venezuelense* Weisbord *in* Brann & Kent, p. 297

21594, **Heterophrentis venezuelensis** (Weisbord) Lectotype
24421 Scrutton, Bull. Br. Mus. Nat. Hist. (Geol.), v. 23, No. 4, 1973, p. 252, pl. 5, figs. 1, 2. See Brann & Kent, pp. 452, 297(not fig. 4)

Heterophrentis venezuelensis (Weisbord)
See *Briantelasma oliveri* Scrutton

27034 **Hexagonaria atypica** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 9, pl. 6, figs. 4, 5
S. shore of Little Doctor Lake, 2 mi. E. of efflux, N.W. Terr., Can.
Hare Indian Sh., Middle Devonian
See *Exilifrons atypica* (Crickmay) *in* Crickmay, L. Dev. and other Coral Spp. of N.W. Can., Pub. by author, Calgary, 1968, p. 6

27035 **Hexagonaria furtiva** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 10, pl. 6, figs. 6, 7
65 mi. NW. of mouth of S. Nahanni R., N.W. Terr., Can.
Hare Indian Sh., Middle Devonian
See *Exilifrons furtiva* (Crickmay) *in* Crickmay, L. Dev. and other Coral Spp. in NW. Can., Pub. by author, Calgary, 1968, p. 6

27032 **Hexagonaria gemmifera** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 8, pl. 5, figs. 6-8
S. Nahanni R., 61° 15′ N., 124° 25′ W., N.W. Terr., Can.
Probably from Hare Indian Sh., Middle Devonian

27033 **Hexagonaria impedita** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 9, pl. 6, figs. 1-3
1 mi. W. of point on Mountain R., 2 mi. from confluence of Virgin R., N.W. Terr., Can.
Hume Fm., early Middle Devonian
See *Exilifrons impedita* (Crickmay) *in* Crickmay, L. Dev. and other Coral Spp. in NW. Can., Pub. by author, Calgary, 1968, p. 6

3002 **Hexaplex (Hexaplex) colei** (Palmer) Holotype
Vokes, Tulane Stud. Geol., v. 6, No. 3, 1968, p. 96, pl. 2, figs. 4a, 4b for *Murex colei* Palmer *in* Brann & Kent, p. 570

4648 **Hexaplex (Hexaplex) katherinae** E. Vokes Holotype
Vokes, Tulane Stud. Geol., v. 6, No. 3, 1968, p. 100, pl. 1, figs. 4a, 4b for *Murex vanuxemi* Conrad *in* Brann & Kent, p. 572

4649 **Hexaplex (Hexaplex) katherinae** E. Vokes Paratype
Vokes, Tulane Stud. Geol., v. 6, No. 3, 1968, p. 100, for *Murex vanuxemi* Conrad *in* Brann & Kent, p. 572

3000 **Hexaplex (Hexaplex) texanus** E. Vokes Holotype
Vokes, Tulane Stud. Geol., v. 6, No. 3, 1968, p. 94, pl. 1, figs. 1a, 1b for *Murex vanuxemi* Conrad *in* Brann & Kent, p. 572. PRI 3000 only

25918A **Hiatella solida** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 425, pl. 77, fig. 6
Mancora, Peru
Recent

25918B **Hiatella solida** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 425, pl. 77, fig. 6a
Punta Ancon, Eucador
Recent

27521 **Hippodiplosia pertusa** (Esper) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 78, pl. 9, fig. 4
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26143 **Hipponix antiquatus** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 204, pl. 18, figs. 13-15
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27506 **Hippopodinella venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 86, pl. 3, figs. 1-3; pl. 10, fig. 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27509, 27515 **Hippoporidra janthina** (Smitt) Hypotypes
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 87, pl. 3, figs. 10, 11; pl. 7, fig. 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28406 **Holonema rugosum** (Claypole) Hypotype
Caster, B.A.P., v. 15, No. 58, 1930, p. 104, pl. 56, fig. 3 for *Holoptychius* sp. *in* Williams, U.S.G.S., Bull. No. 41, 1887, p. 101
About 200′ below Olean Cgl., Mt. Raub, Bradford, McKean Co., Pa.
"Genessee Sect.", upper Devonian

28407 **Holonema rugosum** (Claypole) Hypotype
Wells, B.A.P., v. 27, No. 107, 1943, p. 4, pl. 1; actual specimen
Field, 1 mi. E. of Maine, Broome Co., N.Y.
? Upper Enfield Fm., Upper Devonian

Holoptychius sp.
See *Holonema rugosum* (Claypole)

25561, 25561a **Hormomya exustus** (Linnaeus) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 118, pl. 12, fig. 2
Unfigured hypotypes = PRI 25561a Florida
Recent

27311 **Hulingsina ashermani** (Ulrich & Bassler) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 74, pl. 23, fig. 4
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

27188 **Hulingsina ulrichi** (Howe & Johnson) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 74, pl. 23, fig. 3
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

26308 **Hyalina (Volvarina) lustra** Weisbord Holotype
Weisbord, B.A.P., v. 52, No. 193, 1962, p. 415, pl. 38, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26103 **Hydroides** aff. **H. bispinosa** Bush Figured specimen
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 156, pl. 21, figs. 1-3 for *Serpulorbis birugosus* Weisbord *in* Weisbord, 1962, which see

26406 **Hyperammina casteri** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 260 (megalospheric form)
Fishing Creek, W. of Somerset, Pulaski Co., Ky.
New Providence Fm., Lower Mississippian

26407 **Hyperammina casteri** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 260 (microspheric form)
1.85 mi. S. of Hilda Post Office, Rowan Co., Ky.
New Providence Fm., Lower Mississippian

26408 **Hyperammina kentuckyensis** Conkin Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 264 (microspheric form)
1.25 mi. N. of Carwood, Clark Co., Ind.
New Providence Fm., Lower Mississippian

26409 **Hyperammina kentuckyensis** Conkin Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 264 (megalospheric form)
1.25 mi. N. of Carwood, Clark Co., Ind.
New Providence Fm., Lower Mississippian

26410 **Hyperammina rockfordensis** Gutschick & Treckman
Conkin, B.A.P., v. 43, No. 196, 1961, p. 267 Unfigured hypotype
5.5 mi. W. of Morehead, Rowan Co., Ky.
New Providence Fm., Lower Mississippian

27103 **Hypothyridina florens** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 13, pl. 10, figs. 1-3, 5, 6
Rt. bank of Mackenzie R., 128° 15′ 30″ W., N.W. Terr., Can.
Ramparts Fm., Middle Devonian

27104 **Hypothyridina florens** Crickmay Paratype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 13, pl. 10, fig. 4
Rt. bank of Mackenzie R., 128° 15′ 30″ W., N.W. Terr., Can.
Ramparts Fm., Middle Devonian

25735 **Hysteroconcha brevispinosa** (G. B. Sowerby, II) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 284, pl. 47, figs. 4, 4a
Limones, Ecuador
Recent

25729 **Hysteroconcha lupanaria** (Lesson) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 283, pl. 47, fig. 1b
Santa Elena, Ecuador
Recent

25730 **Hysteroconcha lupanaria** (Lesson) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 283, pl. 47, fig. 1c
Baco Pan, Peru
Recent

25731 **Hysteroconcha multispinosa** (G. B. Sowerby, II) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 284, pl. 47, figs. 2c, 2d
Guanico, Panama
Recent

25732 **Hysteroconcha rosea** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 284, pl. 47, fig. 3a
Manglaralto, Ecuador
Recent

25733 **Hysteroconcha rosea** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 284, pl. 47, figs. 3b, 3c
San Francisco, Ecuador
Recent

25734 **Hysteroconcha rosea** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 284, pl. 47, fig. 3d
Buenaventura, Colombia
Recent

28436, **Inoceramus labiatus** Schlotheim Hypotypes
28453 Maury, A.N.S.P., Jr., v. 15, 1912, p. 41, pl. 7, figs. 7, 8
Between Guanoco and Hurupu, 10° 8′ N., 3° 59′ 6″ E. of Caracas, Ven.
Hurupu beds (?Querecual Fm.), Cretaceous

29587 **Inoceramus (Sergipia) posidonomyaformis** Maury Holotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 597, pl. 22, fig. 6
Sapucahy, St. of Sergipe, Brazil
Cretaceous

26415 **Involutina exserta** (Cushman) Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 286
Bainbridge, Ross Co., Ohio
Cuyahoga Fm., Lower Mississippian

26416 **Involutina longexserta** Gutschick & Treckman
Conkin, B.A.P., v. 43, No. 196, 1961, p. 288 Unfigured hypotype
.25 mi. W. of Olympia Springs, Bath Co., Ky.
Bedford Sh., Lower Mississippian

26414 **Involutina semiconstricta** (Waters) Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 290
NE. of Henley, Scioto Co., Ohio
Bedford Sh., Lower Mississippian

25808 **Iphigenia altior** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 346, pl. 60, fig. 1, 1a
Puerto Chame, Chorrera, Panama
Recent

26536 **Isonomon alatus** (Gmelin) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 106, pl. 10, figs. 1, 2
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25602 **Isognomon chemnitziana** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 149, pl. 18, fig. 2
Esmeraldas, Ecuador
Recent

25606 **Isognomon chemnitziana** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 149, pl. 18, fig. 2a
Manta, Ecuador
Recent

27073 **Iteophyllum virgatum** Crickmay Holotype & paratypes
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 1, pl. 1, figs. 3, 4; pl. 2, figs. 1-3; pl. 4, figs. 1-4
Blackrock Lake, N.W. Terr., Can.
Hume Fm., early Middle Devonian

26286 **Jaspidella caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 390, pl. 35, figs. 19, 20
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26285 **Jaspidella ? praecipua** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 391, pl. 35, figs. 17, 18
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25931, **Jouannetia (Jouannetia) duchassaingi** Fischer Hypotypes
25931a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 450, pl. 80, figs. 1a-1c
Unfigured hypotype = PRI 25931a
Manta, Ecuador
Recent

25909, **Juliacorbula bicarinata** (G. B. Sowerby, I) Hypotype
25909a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 436, pl. 75, figs. 6-6b
Unfigured hypotype = PRI 25909a
Isla la Plata, Ecuador
Recent

25907 **Juliacorbula biradiata** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 437, pl. 75, figs. 4-4b
San Miguel, Rey Is., Pearl Islands, Panama
Recent

6075b **Kathpalmeria georgiana** Ross Holotype
Ross, Quart. Jr. Fla. Acad. Sci., v. 28, No. 1, 1965, p. 63, fig. 1 scutum of shell (PRI 6075a)
Shell Bluff Landing, Savannah R., Burke Co., Ga.
Barnwell Fm., upper Eocene

6075a **Kathpalmeria georgiana** Ross Unfigured holotype (part)
Ross, Quart. Jr. Fla. Acad. Sci., v. 28, No. 1, 1965, p. 63 shell
Shell Bluff Landing, Savannah R., Burke Co., Ga.
Barnwell Fm., upper Eocene

6076- **Kathpalmeria georgiana** Ross Paratypes
6079 Ross, Quart. Jr. Fla. Acad. Sci., v. 28, No. 1, 1965, p. 63, figs. 2a, 2b, 2d-2f
Shell Bluff Landing, Savannah R., Burke Co., Ga.
Barnwell Fm., upper Eocene

6080 **Kathpalmeria georgiana** Ross Unfigured paratypes
Ross, Quart. Jr. Fla. Ecad. Sci., v. 28, No. 1, 1965, p. 63
Shell Bluff Landing, Savannah R., Burke Co., Ga.
Barnwell Fm., upper Eocene

29811 **Keilostoma septemzonatum** Cox Unfigured hypotype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 208
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

25661, **Kellia suborbicularis** (Montagu) Hypotypes
25661a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 231, pl. 35, fig. 6 not pl. 33, fig. 5. Pl. 33, fig. 5 not deposited, 1961. Unfigured hypotypes = PRI 25661a
Isla del Gallo, Colombia
Recent

27437 **Knefastia kugleri** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 570, pl. 77, figs. 1, 2
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27442 **Knefastia kugleri** Jung Unfigured paratypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 570
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27477 **Knefastia** aff. **K. lavinoides** (Olsson) Unfigured specimens
Jung, B.A.P., v. 49, No. 223, 1965, p. 569
"Cantaure", Mesa de Cocodite, Paraguaná, Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27004 **Koninckophyllum arizelum** Crickmay Holotype
Crickmay, Minnewanka Sect. of Miss., Pub. by author, Imp. Oil Ltd., Calgary, 1955, p. 11, pl. 1, figs. 5, 6
E. side Cascade Pt., N. shore Minnewanka Lake, Alberta, Can.
Upper Rundle Fm., Mississippian
See Nelson, Jr. Pal., v. 34, 1960, p. 124, pl. 25, fig. 5 as *Lithostrotion arizelum* (Crickmay)

26335 **Kurtziella caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 441, pl. 42, figs. 1, 2
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26337 **Kurtziella ? morona** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 444, pl. 42, figs. 6-8
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26334 **Kurtziella tropica** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 439, pl. 41, figs. 18-21
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26336 **Kurtziella venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 442, pl. 42, figs. 3-5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25791 **Labiosa anatina** (Spengler) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 333, pl. 57, figs. 3, 3a
Santa Elena, Ecuador
Recent

26828 **Labiosa (Raeta) aff. L. plicatella** (Lamarck) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 385, pl. 55, figs. 7, 8
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27094 **Ladogioides mollicomus** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 6, pl. 9, figs. 8-13
1 mi. N. of Mackenzie R., 1.6 mi. W. of Lake Jan, N.W. Terr., Can.
Ramparts Fm., Middle Devonian

25679 **Laevicardium (Laevicardium) elatum** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 257, pl. 38, figs. 1-1b not deposited, 1961.
Gulf of California (Burch Coll.)
Recent

25680 **Laevicardium (Laevicardium) elenense** (G. B. Sowerby, II) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 256, pl. 38, figs. 2, 2a
Esmeraldas, Ecuador
Recent

26700 **Laevicardium** ? sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 265, pl. 36, figs. 13, 14
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

29905 **Lagena costata amphora** Reuss Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 134, pl. 8, fig. 6
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27322 **Lagena hexagona scalariformis** (Williamson) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 17, pl. 4, fig. 5
0.5 mi. N. of Williamsburg, along St. Hwy. 132Y, York Co., Va.
Basal Yorktown Fm., Miocene

27213 **Lagena laevis** (Montagu) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 18, pl. 4, fig. 6
Intersection of SR 628 & SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

29906 **Lagena laevis** (Montagu) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 134, pl. 8, fig. 7
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

29907 **Lagena laevis** "var." (Montagu) Unfigured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 134
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27249 **Lagena pageae** McLean Holotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 19, pl. 4, fig. 9
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

27260 **Lagena pageae** McLean Paratype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 19, pl. 4, fig. 8
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27294 **Lagena pageae** McLean Paratype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 19, pl. 4, fig. 7
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

7012 **Lagena palmerae** McLean Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 226
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7013 **Lagena pseudosulcata** McLean Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 226
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27209 **Lagena pseudosulcata** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 20, pl. 5, fig. 2
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

27237 **Lagena pseudosulcata** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 20, pl. 5, fig. 1
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

29908 **Lagena semistriata** Williamson Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 134, pl. 8, fig. 8
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7015 **Lagena** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 226
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27288 **Lagena** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 21, pl. 5, fig. 8
Well A-1, 93′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

27274 **Lagena substriata** Williamson Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 20, pl. 5, fig. 3
Well A-1, 113′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

29909 **Lagena substriata** Williamson Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 134, pl. 8, fig. 9
Well, 55-60′, N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

7014 **Lagena substriata** Williamson Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 226
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27246 **Lagena sulcata** Jacob Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 21, pl. 5, fig. 4 as (Walker & Jacob)
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

29910 **Lagena sulcata** Jacob Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 135, pl. 8, fig. 10
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7011 **Lagena sulcata** Jacob Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 225 as (Walker and Jacob) Parker and Jones
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27163 **Lagena sulcata** Jacob Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 21, pl. 5, fig. 5 as (Walker & Jacob)
Offshore well A-11, 65′, near Newport News, Va.
Pleistocene

27289 **Lagena tenuis** (Bornemann) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 22, pl. 5, fig. 7
Well A-2, 101′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

27320 **Lagena tenuis** (Bornemann) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 22, pl. 5, fig. 6
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

29911 **Lagena tenuis** (Bornemann) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 135, pl. 8, fig. 11
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

25689 **Lamelliconcha callicomata** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 289, pl. 40, fig. 4
Dredged from Panama Bay, Panama
Recent

25750 **Lamelliconcha callicomata** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 289, pl. 49, fig. 6
Dredged from Panama Bay, Panama (H. Johnson Coll.)
Recent

25736 **Lamelliconcha circinata alternata** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 286, pl. 48, fig. 1
Santa Elena, Ecuador
Recent

25737, **Lamelliconcha circinata alternata** (Broderip) Hypotypes
25737a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 286, pl. 48, fig. 1a
Fig. 1b not deposited, 1961. Unfigured hypotype = PRI 25737a
Manta, Ecuador
Recent

25738 **Lamelliconcha circinata circinata** (Born) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 286, pl. 48, fig. 3
Chiriqui Lagoon, Panama (Caribbean)
Recent

25744 **Lamelliconcha circinata vinacea** Olsson Paratype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 287, pl. 48, fig. 2
Guanico, Panama
Recent

25745 **Lamelliconcha circinata vinacea** Olsson Paratype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 287, pl. 48, fig. 2a
Santa Elena, Ecuador
Recent

25739, **Lamelliconcha concinna** (G. B. Sowerby, I) Hypotypes
25739a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 287, pl. 48, figs. 4-4c
Unfigured hypotype = PRI 25739a
Santa Elena, Ecuador
Recent

25741 **Lamelliconcha paytensis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 288, pl. 48, fig. 6 not deposited, 1961
Negritos, Peru
Recent

25742 **Lamelliconcha paytensis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 288, pl. 48, fig. 6a
Tumbez, Peru
Recent

25743 **Lamelliconcha paytensis** (d'Orbigny) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 288, pl. 48, fig. 6b
Punta Montanita, Ecuador
Recent

25740 **Lamelliconcha tortuosa** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 288, pl. 48, fig. 5a
Puerto Chame, Chorrera, Panama
Recent
25746 **Lamelliconcha tortuosa** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 288, pl. 48, fig. 5
Tumbez, Peru
Recent
25688 **Lamelliconcha unicolor** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 289, pl. 40, fig. 3
Guanico, Panama
Recent
25748, **Lamelliconcha unicolor** (G. B. Sowerby, I) Hypotype
25748a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 289, pl. 49, figs. 4, 4a not deposited, 1961
Unfigured hypotypes = PRI 25748a
Búcaro, Panama
Recent
8244 **Lapparia fasciola** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 85, pl. 14, fig. 6
Ravine on J. W. Tinnin property, near Yazoo City, Yazoo Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene
29931 **Laryngosigma williamsoni** (Terquem) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 137, pl. 9, fig. 26
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
25670 **Lasaea rubra** (Montagu) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 230, pl. 36, figs. 6, 6a
Boynton Beach, Fla. (McGinty Coll.)
Recent
27470 **Latirus (Polygona)** aff. **L. anapetes** Woodring
Cast of figured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 539, pl. 73, fig. 1
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
28712 **Latirus exilis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 83, pl. 14, fig. 4
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
28705 **Latirus fusiformis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 83, pl. 13, fig. 4
Locality and formation uncertain; Dominican Rep., Miocene
28704 **Latirus infundibulum** Gmelin Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 82, pl. 13, fig. 2
Zone A, B, or E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
8241 **Latirus liratus** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 75, pl. 10, fig. 6
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene
26254 **Latirus (Polygona) recticanalis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 356, pl. 30, figs. 17, 18
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26392 **Latirus (Polygona) recticanalis** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 356
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28504 **Latirus tortilis** (Whitfield) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 77, pl. 11, fig. 1
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm.. Paleocene

27471 **Latirus** cf. **L. tumbeziensis** (Olsson) Unfigured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 538
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27645 **Latirus (Polygona) vokesi** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 71, pl. 1, figs. 5-7
Mouth of Saline Bayou, St. Maurice, Winn Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene

29429, **Leda** cf. **L. acuta** (Conrad) Cast of figured specimen
29434 Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 447, pl. 12, fig. 13
Cast of unfigured specimen = PRI 29434
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone

Leda (Adrana) agronomica Maury
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 405, pl. 12. fig. 12 (specimen disintegrated after being drawn). Jung, 1969, B.A.P., No. 247, p. 324
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

7102 **Leda elongatoides** Aldrich "var?" Hypotype
Harris, B.A.P., v. 1, No. 4, 1896, p. 55, pl. 4, fig. 10
Found 1977. Reported lost in Brann & Kent, p. 476, which see

28893 **Leda peltella** Dall Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 161, pl. 26, fig. 9
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.*
Cercado Fm., lower Miocene

26934 **Leiorhynchus basilicum** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 600, pl. 70, figs. 12-16
Mackenzie R., 1 mi. above mouth of Root R., N.W. Terr., Can.
"*Leiorhynchus* Ls.", late Upper Devonian
see *Basilicorhynchus basilicum* (Crickmay) *in* Crickmay, Nomen. Cert. Dev. Brach., Pub. by author, Imp. Oil Ltd., Calgary, 1952

26935 **Leiorhynchus basilicum** Crickmay Paratypes
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 600, pl. 70, figs. 17-21
Mackenzie R., 1 mi. above mouth of Root R., N.W. Terr., Can.
"*Leiorhynchus* Ls.", late Upper Devonian
see *Basilicorhynchus basilicum* (Crickmay) *in* Crickmay. Nomen. Cert. Dev. Brach., Pub. by author, Imp. Oil Ltd., Calgary, 1952

26932 **Leiorhynchus carya** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 599, pl. 70, figs. 1-5
Mtn. N. of Mt. Cheviot, Alberta, Can.
Upper Perdrix Fm., early Upper Devonian
See *Caryorhynchus carya* (Crickmay) *in* Crickmay, Nomen. Cert. Dev. Brach., Pub. by author, Imp. Oil Ltd., Calgary, 1952

26933 **Leiorhynchus carya** Crickmay Paratype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 599, pl. 70, figs. 8-11
Mtn. N. of Mt. Cheviot, Alberta, Can.
Upper Perdrix Fm., early Upper Devonian
See *Caryorhynchus carya* (Crickmay) *in* Crickmay, Nomen. Cert. Dev. Brach., Pub. by author, Imp. Oil Ltd., Calgary, 1952

28340 **Leiorhynchus mesacostalis** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 44
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr, Upper Devonian

27095 **Leiorhynchus optimum** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 7, pl. 8, figs. 1-6
1 mi. N. of Mackenzie R., 1.6 mi. W. of Lake Jan, N.W. Terr., Can.
Ramparts Fm., Middle Devonian

27096 **Leiorhynchus rhabdotum** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 8, pl. 8, figs. 7-12
1 mi. N. of Mackenzie R., 1.6 mi. W. of Lake Jan, N.W. Terr., Can.
Ramparts Fm., Middle Devonian

29904 **Lenticulina americana** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 135, pl. 8, fig. 5
Coastal well, 59-79′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

29903 **Lenticulina mayi** (Cushman & Parker) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 135, pl. 8, fig. 4
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

26859 ? **Lepidosigillaria whitei** Krausel & Weyland
Unfigured specimen
Grierson & Banks, P.A., v. 4, No. 31, 1963, pp. 228, 255
Finger Lakes Stone Quarry, E. of Ithaca, Tompkins Co., N.Y.
Enfield Fm., upper Devonian

28360 **Leptodesma lichas** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 9, fig. 72
Alfred, Allegany Co., N.Y.
Conneaut Gr., Upper Devonian

28359 **Leptodesma potens** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 9, fig. 71
Busti, Chautauqua Co., N.Y.
Conneaut Gr., Upper Devonian

28361 **Leptodesma potens** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 9, fig. 70
Alfred, Allegany Co., N.Y.
Conneaut Gr., Upper Devonian

28370 **Leptodesma sociale** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 16
Williams Brook, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

25840, **Leptomya ecuadoriana** Soot-Ryen Hypotype
25840a Olsson, Moll Trop. E. Pacific, PRI, 1961, p. 374, pl. 66, fig. 5 not deposited, 1961. Unfigured hypotype = PRI 25840a
Tumbez, Peru
Recent

26261 **Leucozonia caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 361, pl. 32, figs. 9, 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26259 **Leucozonia nassa** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 360, pl. 32, figs. 5, 6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26260 **Leucozonia nassa** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 360, pl. 32, figs. 7, 8
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26258 **Leucozonia ocellata** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 358, pl. 32, figs. 3, 4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28492 **Levifusus pagoda** (Heilprin) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 71, pl. 10, fig. 14
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28568 **Levifusus whitei** Van Winkle Holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 21, pl. 3, fig. 11
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

25599, **Lima (Submantellum) orbignyi** Lamy Hypotype
25599a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 170, pl. 17, fig. 3 not deposited, 1961. Unfigured hypotype = PRI 25599a
Manta, Ecuador
Recent

25597 **Lima (Promantellum) pacifica** d'Orbigny Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 170, pl. 17, figs. 1, 1a
Boca Pan, Peru
Recent

25598 **Lima (Promantellum) pacifica** d'Orbigny Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 170, pl. 17, fig. 1b
Bayovar, Peru
Recent

26584 **Lima (Limaria) pellucida** C. B. Adams Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 167, pl. 18, figs. 2, 3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28895 **Limopsis hatoviejonis** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 162, pl. 26, fig. 11
Rio Amina, between Hato Viejo and Potrero, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

28894 **Limopsis ovalis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 162, pl. 26, fig. 10
Rio Amina, between Hato Viejo and Potrero, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

Linga pomilia (Conrad)
See *Lucina impressa sublaevigata* de Gregorio

Linga pomilia alveata (Conrad)
See *Lucina impressa subcuneata* de Gregorio

28349 **Lingula punctata** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 58
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

26535 **Lioberus ? marensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 105, pl. 9, figs. 13, 14
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28557 **Liotia lillianae** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 103, pl. 13, fig. 14
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

25524c **Litharca lithodomus** (G. B. Sowerby, I) Unfigured hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 78
Manta, Ecuador
Recent

25524, 25524a, 25524b **Litharca lithodomus** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 78, pl. 5, figs. 1-1b, 1d, 1e
Manta, Ecuador
Recent

25591 **Lithophaga (Myoforceps) aristata** (Dillwyn) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 137, pl. 16, fig. 2
Mafafa, Rey Is., Pearl Islands, Panama
Recent

25592 **Lithophaga (Myoforceps) aristata** (Dillwyn) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 137, pl. 16, figs. 2a-2c
Manta, Ecuador
Recent

25584 **Lithophaga (Labis) attenuata** (Deshayes) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 134, pl. 15, figs. 3, 3a
Esmeraldas, Ecuador
Recent

25585 **Lithophaga (Labis) attenuata** (Deshayes) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 134, pl. 15, figs. 3b, 3c
Manta, Ecuador
Recent

25586 **Lithophaga (Labis) attenuata** (Deshayes) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 134, pl. 15, fig. 4
Peru (Weyrauch Coll.)
Recent

25583, 25583a **Lithophaga (Labis) peruviana** (d'Orbigny) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 135, pl. 15, figs. 2, 2a not deposited, 1961. Unfigured hypotypes = PRI 25583a
Paracas, Peru
Recent

25589 **Lithophaga (Diberus) plumula** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 138, pl. 16, figs. 1, 1a broken
Esmeraldas, Ecuador
Recent

25590 **Lithophaga (Diberus) plumula** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 138, pl. 16, fig. 1b
Manta, Ecuador
Recent

25588, 25588a **Lithophaga (Leiosolenus) spatiosa** Carpenter Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 136, pl. 15, fig. 7
Unfigured hypotype = PRI 25588a broken
Near Las Tablas, Bahia Honda, Panama
Recent

25587 **Lithophaga (Diberus) cf. L. subula** (Reeve) Figured specimen
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 138, pl. 15, fig. 6
Manta, Ecuador
Recent

Lithostrotion arizelum (Crickmay)
See *Koninckophyllum arizelum* Crickmay

Lithostrotionella shimeri (Crickmay)
See *Lonsdaleia shimeri* Crickmay

28280 **"Litorina" lineata** Emmons Syntypes
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 271(180), fig. 170 on p. 256(165)
Miocene marl beds of eastern N. Carolina
See Olsson, *et. al.*, ANSP, Mon. 8, 1953, p. 328, *Littorina irrorata* (Say)

26402 **Littorina (Melarhaphe) nebulosa** (Lamarck) Unfigured hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 117 operculum; not PRI 26397 as in text.
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26061 **Littorina (Melarhaphe) nebulosa** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 117, pl. 8, figs. 16, 17
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26028 **Livona pica** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 73, pl. 5, fig. 1
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

27005 **Lonsdaleia shimeri** Crickmay Holotype
Crickmay, Minnewanka Sect. of Miss., Pub. by author, Imp. Oil Ltd., Calgary, 1955, p. 13, pl. 1, figs. 9, 10
W. side of Cascade Pt., N. Shore of Minnewanka Lake, Alberta, Can.
Upper Rundle Fm., Mississippian
See Nelson, Jr. Pal., v. 34, 1960, p. 114, pl. 21, fig. 15 as *Lithostrotionella shimeri* (Crickmay)

27098 **Lorangerella phaulomorpha** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 11, pl. 10, figs. 7-12
Well, 7495′, S. 21, T. 78, R. 20, W5, Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

27099 **Lorangerella phaulomorpha** Crickmay Paratype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 11, pl. 10, figs. 14, 15
Well, 7495′, S. 21, T. 78, R. 20, W5, Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

27100 **Lorangerella sulciplicata** Crickmay **Holotype**
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 12, pl. 10, figs. 16-18
0.75 mi. below Moberly Rapid, Athabasca R., Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

27101-27102 **Lorangerella sulciplicata** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 12, pl. 10, figs. 13, 19-21
0.75 mi. below Moberly Rapid, Athabasca R., Alberta, Can.
Moberly Mbr., Waterways Fm., late Middle Devonian

28759 **Lotorium praefemorale** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 106, pl. 17, fig. 3
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

27180 **Loxoconcha purisubrhomboidea** Edwards Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 72, pl. 22, fig. 6
Well 3-S, 95′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27218 **Loxoconcha purisubrhomboidea** Edwards Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 72, pl. 22, fig. 5
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

7048 **Loxoconcha** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 234
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28332 **Loxonema** sp. Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 30
Base of Buttermilk Falls, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

27224 **Loxostomum wilsoni** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 41, pl. 11, fig. 6
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27285 **Loxostomum wilsoni** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 41, pl. 11, fig. 5
Well A-1, 84', near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

25649, 25649a **Lucina (Bellucina) cancellaris** Philippi Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 211, pl. 31, fig. 4a
Unfigured hypotype = PRI 25649a
Punta Blanca, Ecuador
Pliocene

28973 **Lucina chrysostoma** Philippi Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 202, pl. 35, fig. 2 not deposited by Cornell Univ., 1971
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

26648 **Lucina (Parvilucina) ephraimi** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 219, pl. 28, figs. 9, 10
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26649, 26650 **Lucina (Parvilucina) ephraimi** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 219, pl. 28, figs. 11, 12; pl. 29, figs. 1, 2
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26651, 26652 **Lucina (Parvilucina) ephraimi** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, p. 219, pl. 29, figs. 3-6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25645 **Lucina (Lucinisca) fenestrata** Hinds Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 213, pl. 29, fig. 10
Dredged from Panama Bay; (H. Johnson Coll.)
Recent

29493 **Lucina frugalis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 417, pl. 16, fig. 5
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26452 **Lucina impressa subcuneata** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 203, pl. 28, figs. 12, 13
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 175, as *Linga (Cavilinga) pomilia alveata* (Conrad)

26455 **Lucina impressa sublaevigata** de Gregorio ?Holotype
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 203, pl. 28, figs. 10-11?
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 174 as *Linga (Cavilinga) pomilia* (Conrad)

26647 **Lucina (Bellucina) katherinepalmerae** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 217, pl. 28, figs. 7, 8
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25643 **Lucina (Lucinisca) liana** Pilsbry Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 212, pl. 29, fig. 9
Punta Blanca, Ecuador
Pliocene

25644 **Lucina (Lucinisca) liana** Pilsbry Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 212, pl. 29, fig. 9a
Búcaro, Panama
Recent

25651 **Lucina (Parvilucina) mazatlanica** Carpenter Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 214, pl. 31, figs. 9, 9a
Búcaro, Panama
Recent

26653 **Lucina (Parvilucina) multilineata** Tuomey & Holmes Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 221, pl. 29, figs. 7, 8
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26654- **Lucina (Lucinisca) muricata** (Spengler) Hypotypes
26656 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 223, pl. 29, figs. 9-14
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26457 **Lucina papyracea** Lea Hypotypes
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 205, ?(pl. 28, figs. 22-28)
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene

25650 **Lucina (Cavilinga) prolongata** Carpenter Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 210, pl. 31, figs. 8, 8a **not** deposited, 1961
Puerto Callo, Ecuador
Recent

26646 **Lucina (Callucina ?) sp.** Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 216, pl. 28, figs. 5, 6
broken prior to 1976
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26644 **Lucina (Cavilinga) trisulcata blanda** (Dall & Simpson) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 214, pl. 28, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26645 **Lucina (Cavilinga) trisulcata blanda** (Dall & Simpson) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 214, pl. 28, figs. 3, 4
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

Lunarca billingsiana (Murphy)
See *Arca billingsiana maturensis* Maury

Lunarca billingsiana (Maury)
See *Arca billingsiana* Maury
See *Arca brightonensis* Maury

25539, 25539a **Lunarca brevifrons** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 101, pl. 8, figs. 7, 7a, 7c
Fig. 7b not deposited, 1961. Unfigured hypotype = PRI 25539a
Tumbez, Peru
Recent

26900 **Lutetia parisiensis** Deshayes Hypotypes
Olsson, Neogene Moll. NW. Ecuador, PRI, 1964, p. 45, pl. 38, fig. 1
Fercourt, Oise, France (*fide* A. Chavan)
Paris Basin, Lutetian Eocene

25870, 25870a **Lyratellina lyra** (Hanley) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 384, pl. 70, fig. 1b
Figs. 1, 1a not deposited, 1961. Unfigured hypotype = PRI 25870a
Búcaro, Panama
Recent

25871 **Lyratellina lyra** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 384, pl. 70, fig. 1c
Fort Amador Beach, Balboa, Panama Canal Zone
Recent

25873 **Lyratellina lyrica** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 384, pl. 70, figs. 6, 6a
Dredged off Punta Mala, Panama
Recent

29348 **Lyria calligona** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 173, pl. 8, figs. 9, 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29351 **Lyria musicinoides** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 173, pl. 8, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28686, 28687 **Lyria pulchella** (G. B. Sowerby, II) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 73, pl. 11, figs. 10, 10a
Locality and formation uncertain, Dominican Rep.
Miocene

28491 **Lyria wilcoxiana aldrichiana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 71, pl. 10, figs. 12, 13
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

27079 **Lyrielasma sperabilis** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 5, pl. 1, fig. 7; pl. 3, figs. 1-5
Well, 2680′, 60° 11′ 42″ N., 124° 38′ 19″ W., N.W. Terr., Can.
Ramparts Fm., Middle Devonian
See *Redstonea sperabilis* (Crickmay) *in* Crickmay, L. Dev. and other Coral Spp. in NW. Can., Pub. by author, Calgary, 1968, p. 7

26583 **Lyropecten (Nodipecten) arnoldi** Aguerrevere Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 159, pl. 18, fig. 1; pl. 19, fig. 1
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26577 **Lyropecten (Nodipecten) nodosus** ? (Linnaeus) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 156, pl. 17, fig. 1
Stream, near Litoral anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26578 **Lyropecten (Nodipecten)** sp. "a" Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 162, pl. 17, figs. 2, 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26579 **Lyropecten (Nodipecten)** sp. "b" Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 162, pl. 17, figs. 4, 5
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25609 **Lyropecten (Nodipecten) subnodosus** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 161, pl. 20, figs. 1-1b
Manta, Ecuador
Recent

27075 **Macgeea calostrota** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 3, pl. 4, figs. 10, 11
Well, 2520′, S. 33, T. 55, R. 9, W4, Alberta, Can.
Cooking Lake Fm., Upper Devonian

27076 **Macgeea telopea** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 4, pl. 2, figs. 12, 13; pl. 4, fig. 7
Carlson Creek, 62° 27′ N., 123° 39′ W., N.W. Terr., Can.
Jean-Marie Mbr., Grumbler Fm., Upper Devonian

27077-27078 **Macgeea telopea** Crickmay Paratypes
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 4, pl. 4, figs. 5, 6
Carlson Creek, 62° 27′ N., 123° 39′ W., N.W. Terr., Can.
Jean-Marie Mbr., Grumbler Fm., Upper Devonian

29028 **Macoma (Cymatoica) hispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 227, pl. 39, fig. 9
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26765 **Macoma (Psammacoma) hybrida** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 352, pl. 46, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29578 **Macoma** sp. indeterminate Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 361, pl. 20, fig. 5
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29027 **Macoma (Psammacoma) yaquensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 227, pl. 39, fig. 8 broken before 1977
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25724, 25724a **Macrocallista (Megapitaria) aurantiaca** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 273, pl. 46, fig. 1b. Figs. 1, 1a, 1c not deposited, 1961
Unfigured hypotype = PRI 25724a
Manta, Ecuador
Recent

29827 **Macrocallista ewekoroensis** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 284
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

22992 **Macrocallista maculata** (Linnaeus)
Jung, B.A.P., v. 49, No. 223, 1965, p. 460, for *Pitaria quirosana* H. K. Hodson *in* Brann & Kent, p. 704

26731 **Macrocallista maculata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 286, pl. 41, fig. 15
Near Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26729, **Macrocallista maculata** (Linnaeus) Hypotypes
26730, Weisbord, B.A.P., v. 45, No. 204, 1964, p. 286, pl. 41, figs. 11-14; pl.
26732, 42, figs. 1-4; Figs. 3, 4 broken prior to 1976
26733 Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26734 **Macrocallista maculata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 286, pl. 42, figs. 5, 6 internal mold
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25725 **Macrocallista (Macrocallista) squalida** (G. B. Sowerby, I)
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 273, Hypotypes
pl. 46, fig. 2b. Figs. 2, 2a not deposited, 1961
Pearl Is., Panama
Recent

25726 **Macrocallista (Macrocallista) squalida** (G. B. Sowerby, I)
Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 273, pl. 46, fig. 2c
Santa Elena, Ecuador
Recent

28566 **Macrocallista? veatchi** Van Winkle Holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 21, pl. 3, figs. 6, 7
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28331 **Macrocheilus** sp. Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 29
Base of Buttermilk Falls, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

25790 **Mactra (Micromactra) angusta** Reeve Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 325, pl. 57, figs. 2, 2a
Fig. 2b not deposited, 1961
Punta Blanca, Ecuador
Recent

28470 **Mactra austeniana** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 61, pl. 9, figs. 22, 23
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 144, pl. 27, fig. 2 as *Tivela austeniana* (Maury)
See Palmer, P.A., v. 1, No. 5, 1927, p. 109, pl. 22, figs. 5, 12 as *T. nasuta austeniana* (Maury)
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 373, pl. 25, figs. 13, 14 as *T. austeniana* (Maury), lower Pliocene

25794 **Mactra (Micromactra) californica** Conrad Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 324, pl. 57, figs. 6, 6a
Anaheim Bay, Calif. (T. Burch Coll.)
Recent

25789 **Mactra (Mactromeris) dolabriformis** (Conrad) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 323, pl. 57, figs. 1, 1a
Concepcion Beach, near Las Tablas, Panama
Recent

25801 **Mactra (Mactromeris) dolabriformis** (Conrad) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 323, pl. 58, figs. 4, 4a
Atacames, Ecuador
Recent

25792 **Mactra (Micromactra) fonsecana** Hertlein & Strong Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 324, pl. 57, figs. 4, 4a
Palo Seco, Panama Canal Zone
Recent

25784 **Mactra fragilis** Linnaeus Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 321, pl. 56, fig. 2 not deposited, 1961
Dominican Republic
Recent

26825 **Mactra (Mactrellona ?) iheringi** (Dall) Hypotype
Weisbord. B.A.P., v. 45, No. 204, 1964, p. 381, pl. 55, figs. 1, 2
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25793 **Mactra (Micromactra) vanattae** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 325, pl. 57, fig. 5
San Miguel, Rey Is., Pearl Islands, Panama
Recent

25795 **Mactra (Mactroderma) velata** Philippi Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 322, pl. 58, figs. 1-1b
Mancora, Peru
Recent

25796, 25796a **Mactra (Mactroderma) velata** Philippi Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 322, pl. 58, fig. 1c not deposited, 1961. Unfigured hypotype = PRI 25796a
Santa Elena, Ecuador
Recent

25786, 25786a **Mactrellona alata** (Spengler) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 327, pl. 56, fig. 4 not deposited, 1961. Unfigured hypotype = PRI 25786a
Búcaro, Panama
Recent

25783, 25783a **Mactrellona clisea** (Dall) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 328, pl. 56, fig. 1 (left valve not deposited, 1961). Unfigured hypotype = 25783a
San Pedro, Ecuador
Recent

25800 **Mactrellona exoleta** (Gray) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 328, pl. 58, figs. 3-3b
Guanico, Panama
Recent

28774 **Malea camura** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 112, pl. 19, fig. 3
Locality uncertain, Dominican Rep.
Probably Cercado Fm., lower Miocene

26184 **Malea ringens mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 272, pl. 24, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26458 **Mammuthus cf. M. primigenius** (Blumenbach) Figured specimen
E. L. Palmer, "Fossils", D. C. Heath & Co., 1965, p. 21, fig. on p. 22
Also figured on PRI 1965 Christmas card
E. of Odessa, Schuyler Co., N.Y.
Pleistocene

28301 **Mandaloceras chaceae** Flower Holotype
Flower, B.A.P., v. 32, No. 129, 1948, p. 4, pl. 1, figs. 5, 6 *chaseae* [sic]
Lockport, Niagara Co., N.Y.
Irondequoit Ls., Clinton Gr., Silurian

26338 **Mangelia (Agathotoma) aff. M. fusca** (C. B. Adams) Figured specimen
Weisbord, B.A.P.. v. 42, No. 193, 1962, p. 445, pl. 42, figs. 9, 10
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28651 **Mangelia lalonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 58, pl. 9, fig. 10 *Mangila* [*sic*]
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28650 **Mangelia maoica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 58, pl. 9, fig. 9 *Mangilia* [*sic*]
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

27560 **Manicina areolata puntagordensis** Weisbord Holotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 51, pl. 4, fig. 5; pl. 5, figs. 1-5; pl. 12, fig. 4
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

7095 **Marcia pariaensis** Van Winkle Holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 20, pl. 3, figs. 4, 5
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

1037 **Marginella calypsonis** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 534 as *Prunum (Egouena) calypsonis* (Maury) ; See Brann & Kent, p. 527

28685 **Marginella (Persicula) cercadensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 73, pl. 11, fig. 9
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28682 **Marginella christineladdae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 70, pl. 11, fig. 6
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26293 **Marginella (Prunum) circumvittata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 403, pl. 36, figs. 13, 14
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26294 **Marginella (Prunum) circumvittata** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 403, pl. 36, figs. 15, 16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28681 **Marginella coniformis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 70, pl. 11, figs. 5, 5a?
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28484 **Marginella dalliana** Maury Syntype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 67, pl. 10, fig. 5
700 feet E. of pier at Brighton, Trinidad (according to Cornell catalog)
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 533, pl. 57, figs. 1, 2, lower Pliocene. His listing of the locality as 1000 feet W. of the pier is incorrect, as per above

28485 **Marginella dalliana** Maury Syntype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 67, pl. 10, fig. 6
1000 feet W. of pier at Brighton, Trinidad (according to Cornell catalog)
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
Designated paralectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 533, pl. 57, figs. 3, 4, lower Pliocene

29344 **Marginella estaciana** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 395, pl. 8, fig. 5
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28684 **Marginella hispaniolana** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 72, pl. 11, fig. 8
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

26291 **Marginella (Egouana ?) laguairana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 402, pl. 36, figs. 11, 12
specimen and fragments of Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28683 **Marginella maoensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 71, pl. 11, fig. 7 not deposited by Cornell Univ., 1971
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29346 **Marginella perlatens** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 169, pl. 8, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26292 **Marginella (Marginella) prunum** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 400, pl. 36, figs. 9, 10
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

Marginella sp.? Casts
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925 (There are two casts too poor to identify with the figures; possibly they are *M. pirabica* Maury and *M. acuta* (White).

1038 **Marginella springvalensis** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 534 as *Prunum (Egouena) springvalense* (Maury); See Brann & Kent, p. 532

27489 **Marginocypraea wegeneri** (Schilder) Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 502
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27615 **Marginotruncana pseudolinneiana** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 310
Gosautal, Edelbachgraben, Austria
Marl from L. Gosau beds, Upper Cretaceous

27281 **Marginulina** sp. A Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 14, pl. 3, fig. 8
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27286 **Marginulina** sp. B Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 14, pl. 4, fig. 1
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27275 **Marginulina** sp. C Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 14, pl. 4, fig. 2
Well A-2, 70′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

27303 **Marginulina** sp. D of Clapp Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 14, pl. 4, fig. 3
Offshore well A-11, 170′, near Newport News, Va.
St. Marys Fm., Miocene

28477 **Martesia oligocenica** Maury Syntypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 65, pl. 9, figs. 32, 33
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene
Another syntype is figured by Jung, B.A.P., v. 55, No. 247, 1969, p. 415, pl. 40, fig. 13. He designated the horizon as upper Morne l'Enfer Fm., lower Pliocene

29038 **Martesia sanctidominici** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 234, pl. 39, fig. 22 broken before 1977
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

29039 **Martesia sanctipauli** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 234, pl. 39, fig. 23
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25930, 25930A, 25930a **Martesia (Martesia) striata** (Linnaeus) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 446, pl. 79, figs. 6, 7a (PRI 25930); pl. 79, fig. 7 (PRI 25930A); unfigured hypotypes = PRI 25930a
Venado Beach, Panama Canal Zone
Recent

26848 **Martesia striata** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 403, pl. 58, figs. 1-3
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26236 **Mazatlania aciculata** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 330, pl. 29, figs. 9, 10
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26238, 26239 **Mazatlania aciculata** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 330, pl. 29, figs. 11-14
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26240 **Mazatlania aciculata** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 330, pl. 29, figs. 15, 16 (nodulous variant)
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26241 **Mazatlania aciculata** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 330, pl. 29, figs. 17, 18 (nodulous variant)
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

Mazatlanica aciculata (Lamarck)
See *Strombina ? galba* Weisbord

27543 **Meiocardia palmerae** Nicol Holotype
Nicol, Nautilus, v. 81, No. 3, 1968, p. 90, figs. 1, 2
Zuber, Marion Co., Fla.
Crystal River Fm., upper Eocene

27544 **Meiocardia palmerae** Nicol Paratype
Nicol, Nautilus, v. 81, No. 3, 1968, p. 90, fig. 5
Zuber, Marion Co., Fla.
Crystal River Fm., upper Eocene

27545 **Meiocardia palmerae** Nicol Unfigured paratype
Nicol, Nautilus, v. 81, No. 3, 1968, p. 90
Zuber, Marion Co., Fla.
Crystal River Fm., upper Eocene

27546 **Meiocardia palmerae** Nicol Unfigured paratype
Nicol, Nautilus, v. 81, No. 3, 1968, p. 90
Haile Quarries, NE. of Newberry, Alachua Co., Fla.
Crystal River Fm., upper Eocene

27547 **Meiocardia palmerae** Nicol Unfigured paratype
Nicol, Nautilus, v. 81, No. 3, 1968, p. 90
Abandoned Ls. quarry, 1 mi. W. of I-75 and 2 mi. S. of Rte. 26, Alachua Co., Fla.
Crystal River Fm., upper Eocene

26381 **Melampus flavus** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 481, pl. 47, figs. 3-5
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28863 **Melanella (Eulima) cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 142, pl. 25, fig. 1
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28865 **Melanella (Eulima) jacululum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 143, pl. 25, fig. 3
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28864 **Melanella (Eulima) maoica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 142, pl. 25, fig. 2
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26373 **Melanella (Polygireulima) spatha** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 480, pl. 45, figs. 16, 17
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26374 **Melanella (Polygireulima) spatha** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 480, pl. 45, figs. 18, 19
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26375 **Melanella** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 480, p. 45, figs. 20, 21
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28866 **Melanella (Eulima) tethyos** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 143, pl. 25, fig. 4
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28294 **Melocrinus (Trichotocrinus) harrisi** Olsson Holotype
Olsson, B.A.P., v. 5, No. 23, 1912, p. 3, pl. 6, figs. 1, 2
Old Cornell Univ. Quarry, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Middle Devonian

28296 **Melocrinus reticularis** Olsson Holotype
Olsson, B.A.P., v. 5, No. 23, 1912, p. 5, pl. 7, fig. 1
Old Cornell Univ. Quarry, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Middle Devonian

28295 **Melocrinus williamsi** Olsson Holotype
Olsson, B.A.P., v. 5, No. 23, 1912, p. 4, pl. 6, fig. 3
Near Cortland, Cortland Co., N.Y.
Ithaca Fm., Middle Devonian

29599 **Melongena consors** (G. B. Sowerby, II) Hypotype
Tucker & Wilson, B.A.P., v. 18, No. 65, 1932, p. 10, pl. 2, fig. 1
Okeechobee City, Okeechobee Co., Fla.
Fm. not determined, Pliocene

28713 **Melongena consors** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 85, pl. 14, fig. 5
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

26251 **Melongena melongena** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 345, pl. 30, figs. 11, 12
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

28508 **Melongena melongena** (Linnaeus) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 79, pl. 11, fig. 5
The Barranca, 1 mi. NE. of Guanoco along Guanoco-Felicidad RR., Ven.
Raised beach, Quaternary

27468 **Melongena melongena consors** (G. B. Sowerby, II)
Jung, B.A.P., v. 49, No. 223, 1965, p. 536 Unfigured hypotype
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27499 **Membranipora tacaguana** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 24, pl. 2, fig. 6
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27500 **Membranipora tacaguana** Weisbord Paratype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 24, pl. 2, fig. 7
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

7065 **Mercenaria** sp. Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

Meretrix angelinae Harris
See *Pitaria angelinae* (Harris)

28480 **Meretrix** cf. **M. nuttalliopsis** (Heilprin) Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 55, pl. 9, fig. 8
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28460 **Meretrix subimpressa golfotristensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 56, pl. 9, fig. 9
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 81, pl. 13, fig. 6 as *Callista (Callista) golfotristensis* (Maury)

25872 **Merisca crystallina** (Spengler) [**cristallina**] Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 382, pl. 70, figs. 2, 2a
Monte Christi, Dominican Rep.
Recent

29777 **Mesalia fallockensis ewekoroensis** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 83
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28543 **Mesalia pumila allentonensis** (Aldrich) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 97, pl. 12, fig. 27
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28544 **Mesalia pumila nettoana** White Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 97, pl. 12, fig. 28
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29272, **Mesalia rathbuni** Maury Plastotypes
29281 Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 91, pl. 3, figs. 9, 19
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29280 **Mesalia rathbuni** Maury Unfigured plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 91
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29780, **Mesalia reymenti** Adegoke Unfigured paratypes
29781 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 88
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29778, **Mesalia salvani** Adegoke Unfigured paratypes
29779 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 86
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

27591 **Mesodon elevatus** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 219, pl. 16, figs. 10-12
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

28727 **Meta islahispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 93, pl. 15, fig. 3
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28728 **Meta perplexabilis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 94, pl. 15, figs. 4, 5
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28724 **Metula cancellata** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 85, pl. 14, fig. 19
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

21050 **Metula (Metula) cancellata** Gabb Hypotype
Olsson & Bayer, Bull. Marine Sci., v. 22, No. 4, 1972, p. 911, fig. 5
Broken prior to 1977. See Brann & Kent, p. 552

Metula harrisi Olsson
See *Metula olssoni* Woodring, 1928

21044 **Metula (Agassitula) limonensis** Olsson Lectotype
Olsson & Bayer, Bull. Marine Sci., v. 22, No. 4, 1972, p. 921 not PRI 21043
See Brann & Kent, p. 553

21048 **Metula olssoni** Woodring Holotype
Woodring, Carn. Inst. Wash., Pub. No. 385, 1928, p. 287, new name for *M. harrisi* Olsson *in* Brann & Kent, p. 553
Refig. in Olsson, "Some Tert. Moll. . . .", PRI, 1967, p. 34, pl. 8, figs. 7, 7a and Olsson & Bayer, Bull. Marine Sci., v. 22, No. 4, 1972, p. 913, fig. 8. Slightly broken prior to 1977

4062 **Metula (Metula) pilsbryi** Olsson Holotype
Olsson & Bayer, Bull. Marine Sci., v. 22, No. 4, 1972, p. 913, fig. 7
See Brann & Kent, p. 553

28744 **Metulella fusiformis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 89, pl. 15, fig. 28
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28742, 28743 **Metulella venusta** (G. B. Sowerby, II) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 89, pl. 15, figs. 26, 27
Locality and formation uncertain; Dominican Rep.
Miocene

28745 **Metulella williamgabbi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 90, pl. 15, fig. 29
Dominican Rep. (Santo Domingo, Gabb Coll.)
Miocene

25674 **Mexicardia procera** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 247, pl. 37, figs. 4, 4a
Bayovar, Peru
Recent

28324 **Microdon bellistriatus** Conrad Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 20
Six Mile Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

27523 **Microporella ciliata** (Pallas) s.l. Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 72, pl. 10, fig. 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27555 **Millepora alcicornis** Linnaeus Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 16, pl. 1, figs. 1-4
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

28693 **Mitra berlineri** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 76, pl. 11, figs. 15, 15a
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

26429 **Mitra dubia** (H. C. Lea) Hypotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 75, pl. 5, figs. 56a, 57b
Locality and formation uncertain
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 720. Not *Voluta dubia* H. C. Lea = *Lapparia pactilis* (Conrad); cf. *L. dumosa exigua* Palmer from the Jackson Eocene, Palmer (pers. comm.)

26446 **Mitra (Conomitra) fusoides lepa** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 72, pl. 5, figs. 34-36 (9 spec.)
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 593 as *Conomitra fusoides lepa* de Gregorio

28698, 28699 **Mitra henekeni** G. B. Sowerby, II Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 74, pl. 12, figs. 5, 5a
Zone F, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.*
Gurabo Fm., middle Miocene

28688, 28689 **Mitra longa** Gabb Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 74, pl. 11, figs. 11, 11a
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

26290 **Mitra (Uromitra) nodulosa** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 395, pl. 36, figs. 7, 8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28709, 28710 **Mitra (Strigatella?) perturbatrix** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 76, pl. 14, figs. 1, 2
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28690 **Mitra quemadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 75, pl. 11, fig. 12
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
See Pilsbry, ANSP, Proc., v. 73, 1922, p. 340, as *M. rudis* Gabb

Mitra rudis Gabb
See *M. quemadica* Maury

29379 **Mitra senecta** (White) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 171, pl. 9, fig. 20
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29387 **Mitra senecta**? (White) Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 171, pl. 10, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26427 **Mitra subconquisita** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 76, pl. 5, figs. 50, 51
Locality uncertain; probably Jackson Gr., upper Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 683 as *Fusimitra millingtoni* (Conrad)

28692 **Mitra titan** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 75, pl. 11, figs. 14, 14a
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28691 **Mitra tortuosa** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 76, pl. 11, fig. 13
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

Mitrella elevata (I. Lea)
See *Cerithium misgum* de Gregorio

27463 **Mitrella quirosana** (H. K. Hodson) Unfigured hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 529
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28437 **Modiola cf. M. alabamensis** Aldrich Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 43, pl. 7, fig. 9
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

26531 **Modiolus americanus** Leach Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 98, pl. 9, figs. 3-6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25578 **Modiolus capax** Conrad Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 126, pl. 14, figs. 4, 4a
Venado Beach, Panama Canal Zone Recent

28900 **Modiolus cercadicus** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 192, pl. 26, fig. 16
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25579, 25579a **Modiolus eiseni** Strong & Hertlein Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 126, pl. 14, figs. 5, 5a
Unfigured hypotypes = PRI 25579a
Manta, Ecuador Recent

29475 **Modiolus falcatus** d'Orbigny Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 451, pl. 15, fig. 8
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone

28901 **Modiolus maonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 192, pl. 26, fig. 17
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28363 **Modiomorpha mytiloides** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 10, fig. 83
Chemung Narrows, Chemung Co., N.Y.
West Falls Gr., Upper Devonian

Modiomorpha ? sp.
See *Anthraconauta* cf. *A. phillipsii* (Williamson)

28321 **Modiomorpha subalata** "var. **chemungensis**" (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 15
Locality unknown
Ithaca Fm., Genessee Gr., Upper Devonian

25866 **Moerella (Moerella) erythronotus** (Pilsbry & Lowe) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 402, pl. 69, figs. 2, 2a not deposited, 1961. Old Panama, Panama Recent

25357 **Moerella (Moerella) erythronotus** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 402, pl. 68, fig. 4 not deposited, 1961. Old Panama, Panama Recent

Moerella (Moerella) felix (Hanley) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 403, pl. 69, figs. 6, 6a not PRI 25865; not deposited, 1961. Fort Amador, Panama Canal Zone and Bahia Honda, near Las Tablas, Panama Recent

25936, 25936a **Moerella (Moerella) hiberna** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 404, pl. 84, fig. 6
Unfigured hypotype = PRI 25936a
Zorritos, Peru Recent

25868 **Moerella (Moerella) meropsis** Dall Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 401, pl. 69, figs. 9, 9a not deposited, 1961
Esmeraldas, Ecuador Recent

25869 **Moerella (Moerella) suffusa** (Dall) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 402, pl. 69, figs. 10, 10a not deposited, 1961
Isla del Gallo, Colombia Recent

25886 **Moerella (Scissula) virgo** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 406, pl. 72, fig. 4
El Lagartillo, Panama Recent

27674, 27675 **Moira atropos** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 325, pl. 19, figs. 4-10
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29021 **Montacuta cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 208, pl. 39, fig. 2
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29023 **Montacuta hispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 209, pl. 39, fig. 4
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29022 **Montacuta maoica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 208, pl. 39, fig. 3
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28770, **Morum domingense** (G. B. Sowerby, II) Hypotypes
28771 Maury, B.A.P., v. 5, No. 29, 1917, p. 112, pl. 18, figs. 7, 8
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

29296 **Morum harrisi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 115, pl. 4, fig. 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26826, **Mulinia cleryana** (d'Orbigny) Hypotypes
26827 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 382, pl. 55, figs. 3-6
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25797 **Mulinia pallida** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 330, pl. 58, fig. 2 not PRI 25798 as in expl.
Old Panama, Panama Recent

25798 **Mulinia pallida** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 330, pl. 58, fig. 2a
Guanico, Panama Recent

25799 **Mulinia pallida** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 330, pl. 58, figs. 2b, 2c
Panama City, Panama Recent

26464 **Murex (Murex) anniae bellegladeensis** E. H. Vokes
Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 111
2 mi. S. of Belle Glade, Palm Beach Co., Fla.
Bermont Fm., upper Pliocene
See Hoerle, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 63, footnote #2, *M. bellegladeensis*

27690 **Murex (Murex) bellegladeensis** E. H. Vokes Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 111
2 mi. S. of Belle Glade, Palm Beach Co., Fla.
Bermont Fm., upper Pliocene
See Hoerle, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 63, footnote #2

26387 **Murex (Chicoreus) brevifrons** Lamarck Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 288, pl. 48, figs. 1, 2
Near Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

29316 **Murex cf. M. brevifrons** Lamarck Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 139, pl. 6, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26201 **Murex (Chicoreus ?) brevifrons** ? Lamarck Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 291, pl. 26, figs. 5, 6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

Murex brevifrons Lamarck
See *Murex cornurectus* Guppy (PRI 28753-4)

26459 **Murex (Murex) chipolanus** Dall Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 98
Ten Mile Creek, about 1.5 mi. W. of Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

26198 **Murex (Murex) chrysostoma** G. B. Sowerby, II Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 282, pl. 25, figs. 17, 18
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26862 **Murex (Panamurex) clarksvillensis** (Mansfield) Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 161
Pit at Jackson Bluff, Ochlockonee R., Leon Co., Fla.
Choctawhatchee Fm., upper Miocene

Murex colei Palmer
See *Hexaplex colei* (Palmer)

28752 **Murex compactus** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 103, pl. 16, fig. 8
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28753, 28754 **Murex (Phyllonotus) cornurectus** Guppy Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 103, pl. 16, figs. 9, 10 not (*Chicoreus*) as in expl.
Locality and formation uncertain; Dominican Rep., Miocene
See Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 139 as *Murex brevifrons* Lam.

27461 **Murex (Siratus ?) denegatus** Jung Cast of holotype
Jung, Tulane Stud. Geol., v. 4, No. 2, 1966, p. 77 new name for *M. triangularis* Jung *in* Jung, B.A.P., v. 49, No. 223, 1965, p. 522, pl. 70, figs. 1, 2
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28747, 28748 **Murex domingensis** G. B. Sowerby, II Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 101, pl. 16, figs. 3, 4
Rio Cana, Guayubin to Mao Rd. near Cana, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

28749 **Murex domingensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 101, pl. 16, fig. 5
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28750 **Murex domingensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 101, pl. 16, fig. 6
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28521 **Murex** cf. **M. domingensis** G. B. Sowerby, II Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 84, pl. 12, fig. 3
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene See Jung, B.A.P., v. 55, No. 247, 1969, as upper Morne l'Enfer Fm., lower Pliocene

26864 **Murex (Phyllonotus) dormani** E. Vokes Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 156
Vicksburg, Warren Co., Miss.
Byram Marl, middle Oligocene
See Vokes, *ibid.*, v. 5, No. 3, 1967, p. 139 as *Chicoreus (Phyllonotus) dormani* E. Vokes

Murex (Murex) gardnerae E. Vokes
See *Chicoreus (Siratus) juliagardnerae* E. Vokes

26860 **Murex (Panamurex) gilletteorum** E. Vokes Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 160
Marl-pit near Webb Cr., .75 mi. SW. of Silverdale, Onslow Co., N.C.
Silverdale beds, lower Miocene
See Vokes, *ibid.*, v. 11, No. 3, 1975, p. 152 as *Dermomurex (Viator) sexangulus* (Dall)

26460 **Murex (Murex) gilli** (Maury) Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 100
Ten Mile Creek, at bridge of Fla. Hwy. 73, Calhoun Co., Fla.
Chipola Fm., lower Miocene

26863 **Murex (Phyllonotus) infrequens** E. Vokes Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 156
Ten Mile Cr., at bridge of Fla. Hwy. #73, Calhoun Co., Fla.
Chipola Fm., uppermost lower Miocene
See Vokes, *ibid.*, v. 5, No. 3, 1967, p. 143 as *Chicoreus (Phyllonotus) infrequens* E. Vokes

2999 **?"Murex" laevavaricosus** Whitfield
Vokes, Tulane Stud. Geol., v. 5, No. 3, 1967, p. 138 for *Murex* cf. *M. migus* de Gregorio *in* Brann & Kent, p. 571

26865 **Murex (Chicoreus) lepidotus** E. Vokes Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 152
W. bank of Chipola R., Calhoun Co., Fla.
Lower beds of Chipola Fm., uppermost lower Miocene
See Vokes, *ibid.*, v. 3, No. 4, 1965, p. 185 as *Chicoreus (Chicoreus) lepidotus* E. Vokes

26867 **Murex (Chicoreus) lepidotus dujardinoides** E. Vokes
Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 155
W. bank of Chipola R., Calhoun Co., Fla.
Upper beds of Chipola Fm., uppermost lower Miocene
See Vokes, *ibid.*, v. 3, No. 4, 1965, p. 185 as *Chicoreus (Chicoreus) dujardinoides* E. Vokes

26861 **Murex (Murexiella) macgintyi facetus** E. Vokes
Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 157
Pit at Jackson Bluff, Ochlockonee R., Leon Co., Fla.
Choctawhatchee Fm., upper Miocene
See Vokes, *ibid.*, v. 6, No. 3, 1968, p. 113 as *Murexiella (Murexiella) macgintyi faceta* E. Vokes

28746 **Murex messorius** G. B. Sowerby, II Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 101, pl. 16, figs. 1, 2 not deposited by Cornell Univ., 1971
Locality and formation uncertain; Dominican Rep., Miocene

Murex cf. *M. migus* de Gregorio
See *"Murex" laevavaricosus* Whitfield

26200 **Murex (Murex) olssoni** E. Vokes Paratype
E. H. Vokes, Tulane Studies in Geol., v. 5, No. 2, 1967, p. 84, pl. 3, fig. 3 for *M. recurvirostris* Broderip *in* Weisbord, 1962, which see

29313 **Murex pennai** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 141, pl. 6, fig. 4. See Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 102
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26199 **Murex (Phyllonotus) pomum** Gmelin Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 285, pl. 26, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28755 **Murex (Phyllonotus) praepauxillus** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 103, pl. 16, fig. 11
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26202 **Murex (Favartia) puntagordanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 292, pl. 26, figs. 7, 8
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26200 **Murex (Murex) recurvirostris recurvirostris** Broderip Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 278, pl. 26, figs. 3, 4
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
See E. Vokes, 1967, *M. olssoni,* paratype, PRI 26200

26382 **Murex (Murex) recurvirostris recurvirostris** Broderip Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 278, pl. 47, figs. 8, 9
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26866 **Murex (Phyllonotus) riparius** E. Vokes Unfigured paratype
Vokes, Tulane Stud. Geol., v. 1, No. 4, 1963, p. 157
Pit at Jackson Bluff, Ochlockonee R., Leon Co., Fla.
Choctawhatchee Fm., upper Miocene
See Vokes, *ibid.,* v. 5, No. 3, 1967, p. 147 as *Chicoreus (Phyllonotus) riparius* E. Vokes

26461 **Murex (Murex) rubidus** Baker Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 108
Harney Pond Canal, Glades Co., Fla.
Caloosahatchee Fm., Pliocene

26462 **Murex (Murex) rubidus** Baker Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 1, No. 3, 1963, p. 108
Spoil banks of canal, .3 mi. E. of Brighton, Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28274 **Murex sexcostata** Emmons Holotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv., Rept., 1858, p. 248(157), fig. 106
Miocene marl beds of eastern N. Carolina
See Vokes, Tulane Stud. Geol., v. 3, No. 4, 1965, p. 189 as *Chicorcus (Chicorcus) floridanus* E. Vokes

29323 **Murex** sp. indeterminate Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pl. 6, fig. 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26431 **Murex stetopus** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 96, pl. 7, fig. 34
Locality uncertain, but see Vokes, Tulane Stud. Geol., v. 5, No. 3, 1967, p. 138, pl. 1, fig. 1 as *Chicorcus (Phyllonotus) stetopus* (de Gregorio)

29320 **Murex toreia** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 145, pl. 6, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Murex (Siratus ?) triangularis Jung
See *M. denegatus* Jung

Murex vanuxemi Conrad
See *Hexaplex katherinae* E. Vokes

Murex vanuxemi Conrad
See *Hexaplex texanus* E. Vokes

29317 **Murex williamsi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 141, pl. 6, fig. 8
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28751 **Murex yaquensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 102, pl. 16, fig. 7
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

29321 **Murex cf. M. yaquensis** Maury, 1917 Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 143, pl. 6, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Murexiella macgintyi faceta E. Vokes
See *Murex macgintyi facetus* E. Vokes

Murotriton grassator de Gregorio
See *Triton ? grassator* de Gregorio

27200 **Murrayina barclayi** McLean, 1957 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 67, pl. 21, fig. 3
Locality uncertain

27309 **Murrayina gunteri** (Howe & Chambers) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 68, pl. 21, fig. 4
Well 1-NW, 118′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

7055 **Murrayina howei** Puri Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 236
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27177 **Murrayina howei** Puri Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 68, pl. 21, fig. 6
Well 3-S, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27184 **Murrayina howei** Puri Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 68, pl. 21, fig. 5
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27193 **Murrayina howei** Puri Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 68, pl. 22, fig. 1
Offshore well A-11, 185′, near Newport News, Va.
Top of Choptank Fm., Miocene

7056 **Murrayina martini** (Ulrich & Bassler) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 237
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27318 **Murrayina martini** (Ulrich & Bassler) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 68, pl. 22, fig. 2
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

7057 **Murrayina** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 237
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

25595 **Musculus (Gregariella) coarctatus** (Carpenter) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 129, pl. 16, figs. 4-4d
Manta, Ecuador Recent

26532 **Musculus lateralis** (Say) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 100, pl. 9, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28974 **Myrtaea lomasdesamba** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 203, pl. 35, fig. 3
Mining road between Las Caobas and Rompino, Samba Hills, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

25668 **Mysella compressa** (Dall) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 234, pl. 35, fig. 10
Zorritos, Peru Recent

25568, **Mytella guyanensis** (Lamarck) Hypotypes
25568a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 123, pl. 12, figs. 8, 8a
Unfigured hypotype = PRI 25568a
Guayaquil, Ecuador Recent

25580, **Mytella speciosa** (Reeve) Hypotype
25580a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 124, pl. 14, fig. 6
Unfigured hypotype = PRI 25580a
Negritos, Peru Recent

28328 **Mytilarca chemungensis** (Conrad) "var." Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 24
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

27325 **Mytiloconcha dariensis** Olsson Holotype
Olsson, "Some Tert. Moll.", PRI, 1967, p. 7, pl. 1, figs. 3, 3a
Rio Chico, Tuira Basin, Darien, Panama
Pucro Series, Miocene

29024 **Mytilopsis domingensis** (Recluz) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 195, pl. 39, fig. 5
Zone H or "sandy clays", on Rio Cana near Caimito, Dominican Rep.
?Cercado Fm., lower Miocene

26642 **Mytilopsis leucophaeatus** ? Conrad Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 206, pl. 27, figs. 11, 12
leucopheatus [*sic*]
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25937 **Mytilopsis trautwineana** (Tryon) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 140, pl. 84, figs. 8, 8a
Rio Cayapas, Ecuador Recent

25938, **Mytilopsis zeteki** Hertlein & Hanna Hypotypes
25938a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 141, pl. 84, figs. 9, 9a
Unfigured hypotypes = PRI 25938a
Venado Beach, Panama Canal Zone Recent

25563 **Mytilus arciformis** (Dall) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 113, pl. 12, figs. 4, 4a, broken
Santa Elena, Ecuador Recent

25564, **Mytilus arciformis** (Dall) Hypotype
25564a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 113, pl. 12, fig. 4b not deposited, 1961. Unfigured hypotype = PRI 25564a
Posorja, Ecuador Recent

25566 **Mytilus edulis** (Linnaeus) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 113, pl. 12, fig. 6
New Jersey Recent
29473 **Mytilus solisianus** d'Orbigny Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 449, pl. 15, fig. 7
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone
28793 **Nassarina olssoni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 88, pl. 21, fig. 2
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

Nassarius cercadensis (Maury)
See *Alectrion cercadensis* Maury

26252 **Nassarius (Phrontis) vibex** (Say) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 349, pl. 30, figs. 13, 14
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene
26175 **Natica (Naticarius) canrena** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 244, pl. 23, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
28831 **Natica canrena** (Linnaeus) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 134, pl. 23, fig. 10
Locality and formation uncertain; Dominican Rep., Miocene
27453 **Natica (Naticarius) canrena antinacca** Cossmann
Jung, B.A.P., v. 49, No. 223, 1965, p. 504 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
28550 **Natica eminulopsis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 101, pl. 13, fig. 7 not deposited by Cornell Univ., 1971. Presumed lost
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene
28424 **Natica (Polinices) onusta** Whitfield Hypotype
Harris, B.A.P., v. 1, No. 4, 1896, p. 118, pl. 2, fig. 17
Matthews' Landing, Alabama R., Wilcox Co., Ala.
Midway Gr., Paleocene
(Listed as missing in Brann & Kent, p. 583; found, 1971)
28551 **Natica** cf. **N. semilunata** Lea var. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 101, pl. 13, fig. 8
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
28834 **Natica (Stigmaulax) sulcata** Born Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 135, pl. 23, fig. 13
Locality uncertain, Dominican Rep.
Probably Cercado Fm., lower Miocene
29245 **Natica (Stigmaulax) sulcata cerux** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 73, pl. 1, fig. 9
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
28832, **Natica youngi** Maury Syntypes
28833 Maury, B.A.P., v. 5, No. 29, 1917, p. 135, pl. 23, figs. 11, 12
Locality and formation uncertain; Dominican Rep., Miocene
28299 **Nautilus** ? sp. Figured specimen
Martin, Md. Geol. Surv., Miocene, 1904, p. 130, pl. 39, fig. 1
Miller, G.S.A., Mem. 23, 1947, p. 111, pl. 74, fig. 6 as *Aturia* ? sp.
Plum Pt., Calvert Co., Md.
Calvert Fm., Chespeake Gr., Miocene

25708 **Neocyrena fortis** (Prime) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 197, pl. 28, figs. 2c, 2d
Cojimenes, Ecuador Recent

25709 **Neocyrena radiata** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 198, pl. 28, fig. 5 not PRI 125709 as in expl.
Guanico, Panama Recent

28307 **Neptunea antiqua** (Linnaeus) Hypotype
Wells, Nautilus, v. 74, No. 1, 1960, p. 26, pl. 4, fig. 3
North Sea
Recent

28306 **Neptunea cf. N. antiqua** (Linnaeus) Figured specimen
Wells, Nautilus, v. 74, No. 1, 1960, p. 26, pl. 4, fig. 1
Six Mile Cr., 1 mi. S. of Ithaca, Tompkins Co., N.Y.
Ground moraine of Wisconsin glaciation

27488 **Nerita (Nerita) fulgurans** Gmelin Cast of hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 479, pl. 62, fig. 14
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26059 **Nerita peloronta** Linnaeus Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 114, pl. 8, figs. 12, 13
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26057 **Nerita tessellata** Gmelin Hypotype
Weisbord, B.A.P.. v. 42, No. 193, 1962, p. 111, pl. 8, figs. 8, 9
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26058 **Nerita versicolor** Gmelin Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 113, pl. 8, figs. 10, 11
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

28849 **Neritina (Puperita) figulopicta** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 152, pl. 24, fig. 10
From gravels on Rio Cana, near Caimito, Dominican Rep.
Cercado Fm., lower Miocene

28850 **Neritina (Smaragdia) viridemaris** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 152, pl. 24, fig. 11 not deposited by Cornell Univ., 1971
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26971 **Nervostrophia vestita** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 608, pl. 78, figs. 1, 3
22 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

26972- **Nervostrophia vestita** Crickmay Paratypes
26974 Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 608, pl. 78, figs. 2, 4-6 and one unfigured specimen
22 mi. above mouth of Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

27596 **Nesovitrea (Perpolita) binneyana** (Morse) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 226, pl. 16, figs. 25-27
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

28837, **Neverita nereidis** Maury Syntypes
28838 Maury, B.A.P., v. 5, No. 29, 1917, p. 137, pl. 23, figs. 17, 18
Zone H or I, near Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

27457 **Neverita paraguanensis** F. Hodson Unfigured hypotypes†
Jung, B.A.P., v. 49, No. 223, 1965, p. 507
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

25768 **Nioche (Nioche) asperrima** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 307, pl. 53, figs. 3, 3a
Bayovar, Sechura Bay, Peru Recent

25775 **Nioche (Nioche) asperrima** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 307, pl. 54, fig. 6
Guaymas, Mexico Recent

25769 **Nioche (Nioche) asperrima histrionica** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 307, pl. 53, figs. 4, 4a
Panama City, Panama Recent

25756 **Nioche (Antinioche) beili** Olsson Paratype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 310, pl. 50, fig. 4
Esmeraldas, Ecuador Recent

25778 **Nioche (Nioche) metodon** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 308, pl. 55, figs. 3, 3a
El Lagartillo, Panama Recent

25752, 25752a **Nioche (Nioche) squamosa** (Carpenter) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 309, pl. 49, fig. 10 not deposited, 1961. Unfigured hypotype = PRI 25752a
Santa Elena, Ecuador Recent

28848 **Niso grandis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 143, pl. 24, fig. 8
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28794 **Nitidella cibaoica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 99, pl. 21, figs. 3, 4
Locality and formation uncertain; Dominican Rep., Miocene

26223, 26224 **Nitidela laevigata** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 318, pl. 28, figs. 11-14
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26225, 26226 **Nitidella laevigata** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 318, pl. 28, figs. 15-18
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26227, 26228 **Nitidella nitida** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 320, pl. 28, figs. 19-22
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26229 **Nitidella cf. N. ocellata** (Gmelin) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 322, pl. 28, figs. 23, 24
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

29951 **Nodogenerina advena** Cushman & Laiming Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 11, fig. 45
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7009 **Nodosaria catesbyi** d'Orbigny Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 225
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7010 **Nodosaria catesbyi** d'Orbigny Hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 225, pl. 27, figs. 2, 3
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27321 **Nodosaria catesbyi hustonae** McLean Holotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 15, pl. 4, fig. 4
Kings Mill Wharf (now destroyed), James R., James City Co., Va.
Basal Yorktown Fm., Miocene

27417 **Noetia dauleana paraguanensis** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 434, pl. 53, figs. 10, 11
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27416 **Noetia dauleana paraguanensis** Jung Unfigured paratype
Jung, B.A.P., v. 49, No. 223, 1965, p. 434
"Cantaure", Mesa de Cocodite, Paraguaná Pen, St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28939, 28940 **Noetia (Sheldonella) maoica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 166, pl. 30, figs. 17, 18
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25549 **Noetia (Eontia) olssoni** Sheldon & Maury Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 102, pl. 10, figs. 2, 2a
Manta, Ecuador Recent

25547 **Noetia (Noetia) reversa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 101, pl. 10, figs. 1, 1a
Limones, Ecuador Recent

25548 **Noetia (Noetia) reversa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 101, pl. 10, fig. 1b
Sua, Ecuador Recent

27152 **Nonion grateloupi** (d'Orbigny) Unfigured hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 26
Well 3-S, 95', York R., between Gloucester Pt. and Yorktown, York Co., Va.
"Pleistocene-Miocene" (St. Marys Fm.) boundary

27271, 27267 **Nonion grateloupi** (d'Orbigny) Hypotypes
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 26, pl. 6, figs. 5, 6
Well A-2, 81', near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

29933 **Nonion grateloupi** (d'Orbigny) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 138, pl. 9, fig. 27
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27190 "**Nonion grateloupi** Clapp" Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 27, pl. 6, fig. 4
Well 1-NE, 200', York R., between Gloucester Pt. and Yorktown, York Co., Va.
?, probably Miocene

27168 **Nonion mediocostatus** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 27, pl. 6, fig. 8
Well 3-S, 115', York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27182 **Nonion mediocostatus** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 27, pl. 6, fig. 7
Well 3-S, 105', York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

7022, 7023 **Nonion pizarrensis** (W. Berry) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 228
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27189 **Nonion pizarrensis** (W. Berry) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 28, pl. 7, fig. 2
Well 1-SW, 160′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
?, probably Miocene

27191 **Nonion pizarrensis** (W. Berry) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 29, pl. 7, fig. 1
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27150 **Nonion** sp. Unfigured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 28
Offshore well A-11, 95′, near Newport News, Va.
Pleistocene

29934 **Nonionella atlantica** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 139, pl. 19, fig. 28
Coastal well, 59-79′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7024 **Nonionella auris** (d'Orbigny) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 229
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27160 **Nonionella auris** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 27, pl. 7, fig. 3
Offshore well A-11, 80′, near Newport News, Va.
Pleistocene

27203 **Nonionella auris** (d'Orbigny) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 29, pl. 7, fig. 4
Locality uncertain

21026, **Northia (Northia) northiae miocenica** Olsson, 1922 Syntypes
21032 Olsson, Neogene Moll. NW. Ecuador, PRI, 1964, p. 159, pl. 27, figs. 4, 4a
See Brann & Kent, p. 602

20474 **Northia (Nicema) predistorta** (Marks) Holotype
Olsson, Neogene Moll. NW. Ecuador, PRI, 1964, p. 160, pl. 27, figs. 1, 1a for *Cantharus (Triumphis) predistortus* Marks *in* Brann & Kent, p. 170

25695a **Notochione columbiensis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 303, pl. 41, fig. 6; pl. 52, fig. 1b
San Carlos, Panama Recent

25695b **Notochione columbiensis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 303, pl. 41, fig. 6
Lobitos, Peru Recent

25762 **Notochione columbiensis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 303, pl. 52, fig. 1
Búcaro, Panama Recent

25763, **Notochione columbiensis** (G. B. Sowerby, I) Hypotype
25763a, Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 303, pl. 52, fig. 1a
25763b (Manta, Ecuador) not deposited, 1961. Unfigured hypotypes = PRI 25763a (Santa Elena, Ecuador); PRI 25763b (San Lorenzo, Ecuador)
Recent

Notocorbula islatrinitatis (Maury)
See *Corbula islatrinitatis* Maury

8236 **Notoluponia ampla** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 60, pl. 6, fig. 6
Town Creek, Jackson, Hinds Co., Miss.
Upper portion of Moodys Branch Fm., Jackson Gr., upper Eocene

27537 **Nucinella alleni** H. E. Vokes Holotype
H. Vokes, Tulane Stud. Geol., v. 5, No. 1, 1966, p. 38, text-fig. 1
Near Columbus, Sabine R., Sabine Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene

27538, 27539 **Nucinella alleni** H. E. Vokes Paratypes
H. Vokes, Tulane Stud. Geol., v. 5, No. 1, 1966, p. 38, text-fig. 1
Near Columbus, Sabine R., Sabine Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene

28320 **Nucula corbuliformis** (Hall & Whitfield) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 14
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

25502 **Nucula (Nucula) declivis** Hinds Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 55, pl. 1, figs. 4, 4a
Manta, Ecuador Recent

25501 **Nucula (Nucula) exigua** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 56, pl. 1, figs. 2-2b *exiqua* [*sic*]
Manta, Ecuador Recent

25504, 25504a **Nucula (Nucula) exigua** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 56, pl. 1, figs. 10, 10a
Unfigured hypotypes = PRI 25504a
Búcaro, Panama Recent

25512 **Nucula (Nucula) iphigenia azulensis** Olsson, 1942 Hypotype
Olsson, Moll, Trop. E. Pacific, PRI, 1961, p. 55, pl. 2, figs. 9, 9a
Punta Piedra, near Puerto Armuelles, Panama Pliocene

26468 **Nucula (Ennucula) mareana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 39, pl. 1, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26469 **Nucula (Ennucula) mareana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 39, pl. 1, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25500 **Nucula (Nucula) paytensis** A. Adams Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 56, pl. 1, figs. 1a, 1b
Fig. 1 not deposited, 1961
Bayovar, Peru Recent

28892 **Nucula tenuisculpta** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 161, pl. 26, fig. 8
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm, lower Miocene

26465 **Nucula (Nucula) venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 36, pl. 1, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26466, 26467 **Nucula (Nucula) venezuelana** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 36, pl. 1, figs. 3-6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25511 **Nuculana (Saccella) acapulcensis** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 65, pl. 2, fig. 8a
Palo Seco, Panama Canal Zone Recent

26476 **Nuculana (Saccella) axelolssoni** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 43, pl. 2, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26477 **Nuculana (Saccella) axelolssoni** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 43, pl. 2, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26478 **Nuculana (Saccella) axelolssoni** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 43, pl. 2, figs. 9, 10 broken, 1976
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25509 **Nuculana (Saccella) eburnea** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 62, pl. 2, fig. 4; pl. 3, fig. 10
Zorritos, Peru Recent

25510, 25510a **Nuculana (Saccella) eburnea** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 62, pl. 2, fig. 4a not deposited, 1961; Not pl. 3, fig. 10. Unfigured hypotype = PRI 25510a
Santa Elena, Ecuador Recent

25503 **Nuculana (Saccella) elenensis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 63, pl. 1, fig. 9
Santa Elena, Ecuador Recent

25506 **Nuculana (Saccella) fastigata** Keen Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 62, pl. 2, fig. 2
Zorritos, Peru Recent

25507 **Nuculana (Saccella) fastigata** Keen Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 62, pl. 2, fig. 2a
Punta Blanca, Ecuador Pliocene

27409 **Nuculana (Saccella) gnomon** Jung Unfigured paratype
Jung, B.A.P., v. 49, No. 223, 1965, p. 415
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26470 **Nuculana (Saccella) karlmartini** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 41, pl. 1, fig. 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26471, 26472 **Nuculana (Saccella) karlmartini** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 41, pl. 1, figs. 12-15
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26473-26475 **Nuculana (Saccella) karlmartini** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 41, pl. 1, figs. 16, 17; pl. 2, figs. 1-4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26479 **Nuculana (Saccella) marella** Weisbord Holotype
(= *N. tacaguana* Weisbord)
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 45, pl. 2, figs. 11, 12 broken prior to 1976
Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene
See Jr. Pal., v. 39, No. 1, 1965, p. 164, *N. marella* preoccupied

25508 **Nuculana (Saccella) ornata** (d'Orbigny) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 60, pl. 2, figs. 3, 3a
Manta, Ecuador Recent

25505, 25505a **Nuculana (Politoleda) polita** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 66, pl. 2, figs. 1, 1a
Unfigured hypotypes = PRI 25505a
Old Panama, Panama Recent

26480 **Nuculana (Saccella)** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 47, pl. 2, fig. 13, internal mold
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26604 **Nuculana (Jupiteria ?)** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 47, pl. 23, fig. 1 internal mold
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

Nuculana tacaguana Weisbord
See *N. marella* Weisbord

27564 **Oculina diffusa** Lamarck Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 62, pl. 8, figs. 1-3
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27561 **Oculina** cf. **O. valenciennesi** Edwards & Haime Figured specimen
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 65, pl. 6, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29840 **Odontaspis** sp. indet. Unfigured specimen
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 299
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

26130 **Odostomia ? ambigua** Weisbord Holotype
Weisbord, B.A.P., v 42, No. 193, 1962, p. 462, pl. 16, figs. 13, 14; pl. 17, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26355 **Odostomia (Evalea) antilleana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 463, pl. 44, figs. 1, 2
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26356 **Odostomia (Evalea) antilleana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 463, pl. 44, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

8247 **Odostomia jacksonensis** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 101, pl. 17, fig. 13
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

26357 **Odostomia (Evalea) mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 465, pl. 44, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26358 **Odostomia (Parthenina) meridioamericana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 466, pl. 44, figs. 7, 8 [*meridoamericana* (*sic*)] Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26353 **Odostomia playagrandensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 462, pl. 43, figs. 20, 21
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28883 **Odostomia sanctidominici** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 151, pl. 25, fig. 21
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28884 **Odostomia yaquica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 151, pl. 25, fig. 22
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
28675 **Oliva brevispira** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 68, pl. 10, fig. 16
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
= *Oliva cercadia* Maury *in* Maury, B.A.P., v. 10, No. 42, 1925, p. 196
28676 **Oliva brevispira** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 68, pl. 10, fig. 17
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene
= *Oliva cercadia* Maury *in* Maury, B.A.P., v. 10, No. 42, 1925, p. 196

Oliva cercadia Maury
See *O. brevispira* Gabb

28674 **Oliva cristobalcoloni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 67, pl. 10, fig. 15
Zone H or I, near Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
28672, **Oliva cylindrica** G. B. Sowerby, II Hypotypes
28673 Maury, B.A.P., v. 5, No. 29, 1917, p. 67, pl. 10, figs. 14, 14a
Locality and formation uncertain; Dominican Rep., Miocene
27473 **Oliva (Oliva) cf. O. cylindrica** G. B. Sowerby, II
Jung, B.A.P., v. 49, No. 223, 1965, p. 540 Unfigured specimens
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
29360 **Oliva paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 175, pl. 9, fig. 1
(cast too poor for positive identification) Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29374 **Oliva paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 175, pl. 9, fig. 15
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29361, **Oliva pirabica** Maury Plastotypes
29365 Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 175, pl. 9, figs. 2, 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
26265 **Oliva (Ispidula) reticularis** Lamarck Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 368, pl. 33, figs. 3, 4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26266 **Oliva (Ispidula) schepmani** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 370, pl. 33, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26267 **Oliva (Ispidula) schepmani** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 370, pl. 33, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26268 **Oliva (Ispidula) schepmani** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 370, pl. 33, figs. 9-11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26269 **Oliva (Ispidula) schepmani** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 370, pl. 33, figs. 12, 13
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28483 **Oliva trinidadensis** Maury "Syntype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 67, pl. 10, fig. 4
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 525, pl. 56, fig. 7
He designated the horizon as upper Morne l'Enfer Fm., lower Pliocene

29362 **Olivella calcis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 179, pl. 9, fig. 3 (cast too poor for positive identification)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26278 **Olivella (Minioliva) fundarugata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 385, pl. 35, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26279 **Olivella (Minioliva) fundarugata** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 385, pl. 35, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26280 **Olivella (Minioliva) fundarugata** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 385, pl. 35, figs. 5-8
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26274 **Olivella (Olivella) gracilis ternuculata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 378, pl. 34, figs. 9, 10
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28679 **Olivella indivisa** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 69, pl. 11, fig. 3
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26282 **Olivella (Minioliva) maiquetiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 388, pl. 35, figs. 11, 12
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26283 **Olivella (Minioliva) maiquetiana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 388, pl. 35, figs. 13, 14
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26391 **Olivella (Niteoliva) minuta** (Link) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 383, text-figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28677 **Olivella muticoides** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 68, pl. 11, fig. 1
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28678 **Olivella muticoides canaliculata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 68, pl. 11, fig. 2
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

29363 **Olivella paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 177, pl. 9, fig. 4
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26270 **Olivella (Olivella) petiolita** ? (Duclos) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 374, pl. 34, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26284 **Olivella (Minioliva) salinae** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 389, pl. 35, figs. 15, 16
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

28680 **Olivella sanctidominici** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 69, pl. 11, fig. 4
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26287 **"Olivella" sp.** Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 392, pl. 36, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26275 **Olivella (Olivella) spissilabiata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 380, pl. 34, figs. 11-14
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26281 **Olivella (Minioliva) subfilifera** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 386, pl. 35, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29369 **Olivella subperdita** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 179, pl. 9, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26271 **Olivella (Olivella) venezuelensis** Olsson Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 376, pl. 34, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26272, **Olivella (Olivella) venezuelensis** Olsson Hypotypes
26273 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 376, pl. 34, figs. 5-8
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26276, **Olivella (Niteoliva) verreauxii** (Ducros) Hypotypes
26277 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 381, pl. 34, figs. 15-18
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

29916 **Oolina hexagona scalariformis** (Williamson) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 137, pl. 8, fig. 15
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29917 **Oolina hexagona scalariformis** (Williamson) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 137, pl. 8, fig. 16
Well, 55-60′, N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

Opalia (? *crenatoides* var.) *insculpta* Carpenter
See *Dentiscala insculpta* (Carpenter)

27284 **Orbulina universa** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 55, pl. 18, fig. 3
Well A-2, 90', near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

29999 **Orbulina universa** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 148, pl. 15, fig. 92
Well, 55-60', N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

26351 **Orinella ? (Cricolophus) humboldti** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 460, pl. 43, figs. 15, 16
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26350 **Orinella ? salinae** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 459, pl. 43, figs. 13, 14
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

29293 **Orthaulax brasiliensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 111, pl. 4, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28333 **Orthoceras bebryx "var. cayuga"** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 33
Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

Ostrea abrupta d'Orbigny Hypotypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 40, pl. 5, figs. 1, 2 not deposited by Cornell Univ., 1971. Presumed lost
Route to El Pilar, near Coycuar, Ven. Cretaceous

27140 **Ostrea ammonitides** Crickmay Holotype
Crickmay, Bull. Can. Pet. Geol., v. 12, No. 1, 1964, p. 157, pl. 1, figs. 1, 2
Well, 6965', S. 28, T. 52, R. 11, W5, west-central Alberta, Can.
Nordegg Mbr. (Fm.), early Lower Jurassic

27141-27142 **Ostrea ammonitides** Crickmay Paratypes
Crickmay, Bull. Can. Pet. Geol., v. 12, No. 1, 1964, p. 157, pl. 1, figs. 1-3
Well, 6965', S. 28, T. 52, R. 11, W5, west-central Alberta, Can.
Nordegg Mbr. (Fm.), early Lower Jurassic

27143 **Ostrea ammonitides** Crickmay Paratype
Crickmay, Bull. Can. Pet. Geol., v. 12, No. 1, 1964, p. 157, pl. 1, fig. 4
Well, 7674', S. 5, T. 51, R. 11, W5, west-central Alberta, Can.
Nordegg Mbr. (Fm.), early Lower Jurassic

26623 **Ostrea (Agerostrea ?) antecursor** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 192, pl. 25, figs. 7, 8
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26620 **Ostrea (Alectryonia ?) caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 190, pl. 25, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26621 **Ostrea (Alectryonia ?) caboblanquensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 190, pl. 25, figs. 3, 4
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26622 **Ostrea (Alectryonia ?) caboblanquensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204. 1964, p. 190, pl. 25, figs. 5, 6
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26602 **Ostrea (Ostrea) caraboboensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 180, pl. 22, figs. 9, 10
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26612 **Ostrea (Ostrea) caraboboensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 180, pl. 23, figs. 11, 12 *carabobensis* [*sic*]
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

25618 **Ostrea (Crassostrea) columbiensis** Hanley Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 172, pl. 23, figs. 4, 4a
Market at Guayaquil, Ecuador Recent

25614, 25614a **Ostrea (Crassostrea) corteziensis** Hertlein Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 171, pl. 23, figs. 1, 1a
Cathedral Rocks, Panama City, Panama Recent

28427, 28428 **Ostrea crenulimarginata** Gabb Hypotypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 36, pl. 5, fig. 11; pl. 6, fig. 4
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28429 **Ostrea cynthiae** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 37, pl. 6, fig. 5
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

7079 **Ostrea disparilis** Conrad Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 215
Cobhams, Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28944 **Ostrea gilbertharrisi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 182, pl. 32, figs. 1-3
Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Formation uncertain, Miocene

28442 **Ostrea golfotristensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 37, pl. 7, fig. 1 broken and mostly gone prior to 1977
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28943 **Ostrea haitensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 182, pl. 31, figs. 1, 2 broken before 1977
Locality and formation uncertain; Dominican Rep., Miocene

25613 **Ostrea iridescens** Gray Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 174, pl. 22, fig. 7
Fig. 7a not deposited, 1961
Punta Patilla, Panama City, Panama Recent

25615 **Ostrea iridescens** Gray Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 174, pl. 23, fig. 2
Caleto Sal, Peru Recent

25616 **Ostrea iridescens** Gray Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 174, pl. 23, fig. 2a not deposited, 1961
Cathedral Rocks, Panama City, Panama Recent

26596 **Ostrea (Ostrea) libella** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 176, pl. 21, figs. 3, 4
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26594, **Ostrea (Ostrea) libella** Weisbord Paratypes
26597 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 176, pl. 20, figs. 3, 4; pl. 21, figs. 5, 6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26599 **Ostrea (Ostrea) lixula** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 179, pl. 22. figs. 3, 4
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26600 **Ostrea (Ostrea) lixula** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 179, pl. 22, figs. 5, 6
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26601 **Ostrea (Ostrea) lixula** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 179, pl. 22, figs. 7, 8
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

840 **Ostrea megodon** Hanley Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 183, pl. 34, fig. 3
Rio Cana, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger
See Maury, B.A.P., v. 10, No. 42, 1925, p. 82, pl. 11, fig. 3 as *O. messor caimitica* Maury (holotype); and Brann & Kent, p. 635

25617 **Ostrea (Alectryonia) megodon** Hanley Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 172, pl. 23, figs. 3, 3a
Bayovar, Peru Recent

Ostrea messor caimitica Maury
See *Ostrea megodon* Hanley PRI 840

29839 **Ostrea paleomarginidentata** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 245
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

25600, **Ostrea (Alectryonia) palmula** Carpenter Hypotype
25600a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 173, pl. 17, figs. 6, 6a
Unfigured hypotype = PRI 25600a
Camarones, near Esmeraldas, Ecuador Recent

25619 **Ostrea (Alectryonia) palmula** Carpenter Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 173, pl. 23, figs. 5, 5a not PRI 26519 as in expl.
Guanico, Panama Recent

25620 **Ostrea (Alectryonia) palmula** Carpenter Hypotype
Olsson, Moll Trop. E. Pacific, PRI, 1961, p. 173, pl. 23, figs. 7, 7a not deposited, 1961
Guanico, Panama Recent

26598 **Ostrea (Ostrea) pannucea** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 177, pl. 22, figs. 1, 2
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28431 **Ostrea cf. O. percrassa** Conrad and **O. compressirostra** Say
Maury, A.N.S.P., Jr., v. 15, 1912, p. 37, pl. 6, fig. 7 Figured specimen
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

Ostrea puelchana d'Orbigny Hypotypes
Maury, A.N.S.P., Jr., v. 15, 1912, p. 40, pl. 5, figs. 3-5, 9, 10
not deposited by Cornell Univ., 1971. Presumed lost
Union Estate, Brighton, Trinidad "upper Oligocene"

28435 **Ostrea pulaskensis** Harris Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 38, pl. 7, fig. 2
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

26615 **Ostrea (Crassostrea) rhizophorae** Guilding Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 185, pl. 24, figs. 3, 4
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26614 **Ostrea (Crassostrea)** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 184, pl. 24, figs. 1, 2
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

28430 **Ostrea thalassoklusta** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 39, pl. 6, fig. 6
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28425, **Ostrea thirsae** (Gabb) Hypotypes
28426 Maury, A.N.S.P., Jr., v. 15, 1912, p. 39, pl. 5, figs. 6-8
Bed 8 (not bed 6), Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

26616 **Ostrea (Alectryonia) vespertina venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 187, pl. 24, figs. 5, 6
Stream, near Litoral anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26617- **Ostrea (Alectryonia) vespertina venezuelana** Weisbord Paratypes
26619 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 187, pl. 24, figs. 7-11
Stream, near Litoral anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26603 **Ostrea (Crassostrea) virginica** Gmelin Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 181, pl. 22, figs. 11, 12
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26068 **Otiomyllon venezuelanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 143, pl. 9, figs. 11, 12; pl. 13, figs. 13, 14 Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28823 **Ovula (Neosimnia) wisewoodae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 113, pl. 22, fig. 17
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28308 **Pachecdyceras murale** Flower Holotype
Flower, Jr. Pal., v. 21, No. 5, 1947, p. 430, pl. 59, figs. 2, 3, 6
Chazy, Clinton Co., N.Y.
Chazy Ls. (Gr.), Ordovician

26000 **Pachychilus caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 482, pl. 1, figs. 1-3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28319 **Palaeoneilo filosa** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 12
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

25912 **Panamicorbula cylindrica** Morrison Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 435, pl. 76, figs. 2, 2a
Limones, Ecuador Recent

25911 **Panamicorbula inflata** (C. B. Adams) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 435, pl. 76, figs. 1-1c
Puerto Palmas, Santa Elena, Ecuador Recent

25939A **Pandora (Clidiophora) arcuata** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 456, pl. 81, fig. 1 not deposited, 1961
Charapota, Ecuador Recent

25939B, 25939a **Pandora (Clidiophora) arcuata** G. B. Sowerby, I Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 456, pl. 81, figs. 1a-1d, 1g
Unfigured hypotype = PRI 25939a (locality uncertain)
Zorritos, Peru Recent

28903 **Pandora inconspicua** Gabb Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 195, pl. 26. figs. 19?, 19a
Probably Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25940, 25940a **Pandora (Foveadens) panamensis** Dall Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 457, pl. 81, figs. 2-2b
Unfigured hypotype = PRI 25940a
Old Panama, Panama Recent

25941, 25941a **Pandora (Pandora) uncifera** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 454, pl. 81, fig. 4
Unfigured hypotypes = PRI 25941a
Manta, Ecuador Recent

25781 **Paphonotia elliptica** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 312, pl. 55, fig. 10
Negritos, Peru Recent

25684 **Papyridea mantaensis** Olsson Paratype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 250, pl. 38, fig. 7
Manta, Ecuador Recent

26701 **Papyridea** aff. **P. soleniformis** (Bruguière) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 266, pl. 37, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25677 **Papyridea soleniformis aspersa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 249, pl. 37, fig. 8
Manta, Ecuador Recent

25683 **Papyridea soleniformis aspersa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 249, pl. 38, figs. 6-6b
Panama Canal Zone Recent

27568 **Paracyathus defilippii** Duchassaing & Michelotti Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 71, pl. 10, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

7047 **Paracypris choctawhatcheensis** Puri Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 234
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29915 **Parafissurina marginata** (Walker & Jacob) Unfigured hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 138 author not Montagu
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27293 **Parafissurina marginata** (Walker & Jacob) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 44, pl. 13, fig. 2
Well A-1, 84', near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

25926, 25926a **Parapholas acuminata** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 447, pl. 78, figs. 5a, 5c, 5d
Unfigured hypotypes = PRI 25926a
Crucitas, Ecuador Recent

25933 **Parapholas calva** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 447, pl. 80, figs. 5, 5a, 6, 6a not deposited, 1961
Jaramijo, Ecuador Recent

Paraseraphs sp.
See worm tube?

22709 **Parastarte triquetra** (Conrad) Unfigured specimen
Perry, B.A.P., v. 26, No. 95, 1940, p. 68; Perry & Schwengel, 1955, p. 75
Sanibel Is., Lee Co., Fla.
Recent

Parmicorbula gibbosa (Lea)
See *Corbula ignota* de Gregorio

26047 **Parviturbo venezuelensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 99, pl. 7, figs. 5-7 lost prior to 1965
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
27481 **Paziella (Panamurex ?) cf. P. gatunensis** (Brown & Pilsbry) Cast of figured specimen
Jung, B.A.P., v. 49, No. 223, 1965, p. 523, pl. 69, figs. 11, 12
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene
798 **Pecten archon** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 344
See Brann & Kent, p. 656
28969 **Pecten caimitica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 189, pl. 34, fig. 12
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene
26549 **Pecten (Pecten) caribeus** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 121, pl. 12, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26608 **Pecten (Pecten) caribeus** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 121, pl. 23, fig. 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26609 **Pecten (Pecten) caribeus** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 121, pl. 23, figs. 7, 8
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26547 **Pecten (Pecten) catianus** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 119, pl. 11, figs. 9, 10
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
26548 **Pecten (Pecten) catianus** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 119, pl. 11, figs. 11-13
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
28968 **Pecten cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 188, pl. 34, fig. 11
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28961, **Pecten eugrammatus** Dall Hypotypes
28962 Maury, B.A.P., v. 5, No. 29, 1917, p. 184, pl. 34, figs. 4, 5
Samba Hills, between Las Caobas and Rompino, Dominican Rep.*
Probably Gurabo Fm., middle Miocene or younger

28965 **Pecten excentricus** [sic] Gabb [**eccentricus**] Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 187, pl. 34, fig. 8
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.*
Cercado Fm., lower Miocene

29459 **Pecten grapteus** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 261, pl. 14, fig. 4
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28970, **Pecten hatoviejonis** Maury Syntypes
28971 Maury, B.A.P., v. 5, No. 29, 1917, p. 189, pl. 34, figs. 13, 14
Rio Amina, between Hato Viejo and Potrero, Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

26550 **Pecten (Pecten) maiquetiensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 124, pl. 12, figs. 3, 4
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26551 **Pecten (Pecten) maiquetiensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 124, pl. 12, figs. 5, 6
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26562 **Pecten (Amusium) marensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 136, pl. 14, figs. 2, 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

900 **Pecten maturensis** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 346 as *Aequipecten (Plagioctenium) maturensis* (Maury); See Brann & Kent, p. 666

26559 **Pecten (Amusium) papyraceus** (Gabb) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 131, pl. 13, figs. 7, 8
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26560 **Pecten (Amusium) papyraceus** (Gabb) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 131, pl. 13, fig. 9; pl. 14, fig. 1
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28289 **Pecten princepoides** Emmons Syntypes
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 280(189), fig. 198?
Meherrin R., Murfreesboro, Hertford Co.. N. Carolina
Marl beds, Miocene

26554 **Pecten (Pecten?) remulus** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 127, pl. 12, figs. 9, 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26552 **Pecten (Pecten)** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 126, pl. 12, fig. 7
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26553 **Pecten (Pecten)** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 126, pl. 12, fig. 8
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28287 **Pecten** sp. ?Figured specimen
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 282(191), fig. 201?
Miocene marl beds of eastern N. Carolina

28433 **Pecten** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, pl. 7, fig. 5
Brighton, Trinidad
?Upper Pliocene

28963 **Pecten (Aequipecten) thetidis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 185, pl. 34, fig. 6
Samba Hills, between Las Caobas and Rompino, Dominican Rep.*
Probably Gurabo Fm., middle Miocene or younger

28966, 28967 **Pecten thompsoni** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 188, pl. 34, figs. 9, 10
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28964 **Pecten vaginulus** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 186, pl. 34, fig. 7
Mining road between Las Caobas and Rompino, Samba Hills, Dominican Rep.
Formation unknown, Miocene

26555 **Pecten (Euvola) ziczac caboblancoensis** Druckerman Topotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 128 *ziczag* [*sic*], pl. 13, fig. 1
Catia La Mar village, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26556 **Pecten (Euvola) ziczac caboblancoensis** Druckerman Topotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 128 *ziczag* [*sic*], pl. 13, figs. 2, 3
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26557 **Pecten (Euvola) ziczac caboblancoensis** Druckerman Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 128 *ziczag* [*sic*], pl. 13, figs. 4, 5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26558 **Pecten (Euvola) ziczac caboblancoensis** Druckerman Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 128 *ziczag* [*sic*], pl. 13, fig. 6
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26453 **Pectunculus deltoideus** mut. **ignus** de Gregorio Syntype
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 194 *deltoidus* [*sic*], pl. 23, fig. 36 *deltidoideus* [*sic*]
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 154 as *Glycymeris trigonella* (Conrad)

26456 **"Pectunculus deltoideus** mut. **ignus"** de Gregorio "Syntype"
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 194, pl. 23, fig. 34
Fig. 34 is not the same as pl. 23, figs. 33, 36, 37 and is, it is assumed, not this species
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 154, *Glycymeris trigonella* (Conrad) ?

26454 **Pectunculus deltoideus** mut. **percuneatus** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 194 *deltoidus* [*sic*], pl. 23, figs. 38-41 *deltidoideus* [*sic*]
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1965, p. 154 as *Glycymeris trigonella* (Conrad)

26744 **Periglypta** aff. **P. listeri** (Gray) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 300, pl. 43, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25754 **Periglypta multicostata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 293, pl. 50, fig. 3, 3a
Pedro Gonzalez Is., Pearl Islands, Panama Recent

25755 **Periglypta multicostata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 293, pl. 50, fig. 3b
Taboga Island, Panama Recent

8251 **Periploma equalum** Dockery Holotype
Dockery, Miss. State Geol. Surv. Bull. 120, 1977, p. 138, pl. 28, fig. 1
Ravine at Riverside Park, near Pearl R., Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

26849 **Periploma margaritacea** (Lamarck) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 407, pl. 58, figs. 4, 5
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26850, 26851, 26853 **Periploma margaritacea** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 407, pl. 58, figs. 6-9; pl. 59, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25943, 25943a **Periploma (Albimanus) pentadactylus** Pilsbry & Olsson Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 464, pl. 82, figs. 3, 3a not deposited, 1961. Unfigured hypotype = PRI 25943a
Guanico, Panama Recent

25942A **Periploma (Periploma) planiuscula** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 463, pl. 82, fig. 2 not deposited, 1961. Guanico, Panama Recent

25942B 25942a **Periploma (Periploma) planiuscula** G. B. Sowerby, I Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 463, pl. 82, figs. 2a, 2b not deposited, 1961. Fig. 2c not deposited, 1961, locality unknown.
Unfigured hypotypes = PRI 25942a (locality uncertain)
Tumbez, Peru Recent

23434 **Perna obliqua** Lamarck Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 41, pl. 7, fig. 6
Black Rock, near Soldado Rock, Gulf of Paria, Trinidad
Recent

26295 **Persicula (Gibberula) glandula** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 404, pl. 37, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26296 **Persicula (Gibberula) glandula** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 404, pl. 37, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26305 **Persicula (Rabicea ?) hodsoni** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 412, pl. 38, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26306 **Persicula (Rabicea ?) hodsoni** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 412, pl. 38, figs. 7, 8
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26299 **Persicula (Rabicea) interrupta mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 409, pl. 37, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26300 **Persicula (Rabicea) interrupta mareana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 409, pl. 37, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26301 **Persicula (Rabicea) interrupta mareana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 409, pl. 37, figs. 13, 14
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26298 **Persicula (Rabicea) interruptalineata** (Megerle von Mühlfeld)
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 407, Hypotype
pl. 37, figs. 7, 8 *interruptelineata* [*sic*]; not PRI 26278 as in expl.
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26297 **Persicula (Gibberula) lavalleeana** (d'Orbigny) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 405, pl. 37, figs. 5, 6
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26302, **Persicula (Rabicea) venezuelana lavelana** (F. Hodson) Hypotypes
26304 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 413, pl. 37, figs. 15, 16; pl. 38, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26303 **Persicula (Rabicea) venezuelana lavelana** (F. Hodson) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 413, pl. 38, figs. 1, 2
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27443 **Persicula (Rabicea) venezuelana lavelana** (F. Hodson)
Jung, B.A.P., v. 49, No. 223, 1965, p. 560 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

25560 **Perumytilus purpuratus** (Lamarck) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 117, pl. 12, fig. 1
Paracas, Peru Recent

25577, **Perumytilus purpuratus** (Lamarck) Hypotypes
25577a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 117, pl. 14, figs. 1a, 1b
Fig. 1 not deposited, 1961. Unfigured hypotypes = PRI 25577a
Paracas, Peru Recent

28817 **Petaloconchus domingensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 128, pl. 22, fig. 11
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene See Maury, B.A.P., v. 10, No. 42, 1925, p. 226 as *P. sculpturatus domingensis* G. B. Sowerby, II

28818 **Petaloconchus laddfranklinae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 128, pl. 22, fig. 12
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

Petaloconchus sculpturatus domingensis G. B. Sowerby, II
See *P. domingensis* G. B. Sowerby, II

8232 **Petaloconchus transcostatus** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 46, pl. 3, fig. 18
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

29007 **Petricola caimitica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 219, pl. 37, fig. 11
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

25774, **Petricola (Petricolaria) concinna** G. B. Sowerby, I Hypotypes
25774a Olsson, Moll. Trop. E. Pacific, PRI, 1961, pl. 54, figs. 4-4b not deposited, 1961. Unfigured hypotype = 25774a
Esmeraldas, Ecuador Recent

25770 **Petricola (Petricola) denticulata** G. B. Sowerby, I Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 314, pl. 54, figs. 1-1c
Santa Elena, Ecuador Recent

25771 **Petricola (Petricola) denticulata** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 314, pl. 54, fig. 1d not deposited, 1961. Galeras, Ecuador Recent

26773 **Petricola (Naranio) lapicida** (Gmelin) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 327, pl. 47, figs. 13, 14
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25773 **Petricola (Petricolaria) parallela** Pilsbry & Lowe Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 316, pl. 54, figs. 3-3b
Búcaro, Panama Recent

29008 **Petricola (Rupellaria) riocanensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 220, pl. 37, fig. 12
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

25772 **Petricola (Petricola) robusta** G. B. Sowerby, I Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 315, pl. 54, figs. 2, 2a
Montanita, Ecuador Recent

25782 **Petricola (Naranio) sp.** Figured specimen
Olsson, Moll. Trop. E. Pacific, PRI, p. 317, pl. 55, fig. 11 not deposited, 1961. Off Esmeraldas, Ecuador Recent

26774- **Petricola (Rupellaria) typica** (Jonas) Hypotypes
26776 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 329, pl. 47, fig. 15; pl. 48, figs. 1-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26777 **Petricola (Rupellaria) typica** (Jonas) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 329, pl. 48, figs. 5, 6
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28976 **Phacoides (Lucinisca) cercadica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 204, pl. 35, fig. 5
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29492 **Phacoides (Here) eudaidalus** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 293, pl. 16, fig. 4
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29518 **Phacoides (Lucinisca) fluctivagus** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 299, pl. 16, fig. 20
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29491 **Phacoides (Here) glomeramen** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 294, pl. 16, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28975 **Phacoides (Lucinisca) hispaniolana** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 204, pl. 35, fig. 4
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29500 **Phacoides (Lucinisca) luciniolae** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 297, pl. 16, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28978 **Phacoides (Miltha) riocanensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 205, pl. 35, fig. 7
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28977 **Phacoides (Miltha) smithwoodwardii** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 204, pl. 35, fig. 6
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29501 **Phacoides (Lucinisca) thalassogonus** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 301, pl. 16, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28979 **Phacoides (Parvilucina) yaquensis** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 206, pl. 35, fig. 8 not deposited by Cornell Univ., 1971
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28355 **Phacops rana** Green Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 8, fig. 63
"Above Glenwood", near Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28768 **Phalium moniliferum** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 110, pl. 18, figs. 4, 5
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28772 **Phalium moniliferum reclusum** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 110, pl. 19, fig. 1
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29303 **Phalium paraense** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 119, pl. 5, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28551, **Phasianella punctata** (Gabb) Hypotypes
28852 Maury, B.A.P., v. 5, No. 29, 1917, p. 153, pl. 24, fig. 12, 13
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

27650 **Philine (Megistostoma) dockeryi** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 76, pl. 1, figs. 8, 9 broken during photography
Riverside Park, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

25655 **Phlyctiderma orbella** (Gould) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 204, pl. 32, fig. 5
Mission Bay, San Diego, Calif. (T. Burch Coll.) Recent

25653 **Phlyctiderma semiaspera** (Philippi) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 204, pl. 32, figs. 3a, 3c
Figs. 3, 3b not deposited, 1961. Manta, Ecuador Recent

26856 **Pholadomya** cf. **P. candida** G. B. Sowerby, I Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 411, pl. 59, figs. 7, 8 internal mold
Near Playa Grande Yatching Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25925A **Pholas (Thovana) chiloensis** Molina Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 443, pl. 78, fig. 4
Tumbez, Peru Recent

25925B **Pholas (Thovana) chiloensis** Molina Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 443, pl. 78, fig. 4a
Jaramijo, Ecuador Recent

28476 **Pholas mackiana** Maury "Snytype"
Maury, A.N.S.P., Jr., v. 15, 1912, p. 64, pl. 9, fig. 31
700 feet E. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
Selected as lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 414, pl. 40, fig. 12, lower Pliocene

28720 **Phos costatus** Gabb Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 88, pl. 14, figs. 13, 14
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28717 **Phos elegans** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 86, pl. 14, fig. 10
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28721, **Phos fasciolatus** Dall Hypotypes
28722 Maury, B.A.P., v. 5, No. 29, 1917, p. 88, pl. 14, figs. 15, 16
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

29334 **Phos fictilis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 131, pl. 7, fig. 7
(cast too poor for positive identification)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28714 **Phos gabbi** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 86, pl. 14, fig. 6
Zone 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28716 **Phos guppyi** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 87, pl. 14, fig. 9
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28715 **Phos moorei** Guppy Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 86, pl. 14, fig. 8; fig. 7 not deposited by Cornell Univ., 1971
Zone E or F, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28718, **Phos semicostatus** Gabb Hypotypes
28719 Maury, B.A.P., v. 5, No. 29, 1917, p. 87, pl. 14, figs. 11, 12
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28302 **Phragmocerina litchfieldensis** Flower Holotype
Flower, B.A.P., v. 32, No. 129, 1948, p. 9, pl. 2, figs. 1-3
Litchfield, Herkimer Co., N.Y.
Manlius Ls., L. Devonian

27569 **Phyllangia americana** Edwards & Haime Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 68, pl. 10, fig. 3; pl. 11, fig. 1
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25860 **Phyllodina fluctigera** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI. 1961, p. 380, pl. 68, fig. 9; pl. 69, fig. 5 not deposited, 1961
Zorritos, Peru Recent

25603 **Pinctada mazatlanica** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 147, pl. 18, figs. 3-3b
Pearl Islands, Panama Recent

26537 **Pinna** aff. **P. carnea** Gmelin Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 107, pl. 10, fig. 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26246 **Pisania pusio** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 339, pl. 30, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26735 **Pitar (Pitar) albida** (Gmelin) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 291, pl. 42, figs. 7, 8
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26678 **Pitar (Pitar ?) antillensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 294, pl. 33, figs. 8, 9 broken prior to 1976
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

27483 **Pitar (Lamelliconcha) circinatus** (Born) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 463
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

25723 **Pitar (Pitar) consanguineus** (C. B. Adams) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 274, pl. 45, figs. 3a-3c
Fig. 3 not deposited, 1961
Venado Beach, Panama Canal Zone Recent

26740 **Pitar (Hysteroconcha) dione** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 298, pl. 42, figs. 17-19
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26741, **Pitar (Hysteroconcha) dione** (Linnaeus) Hypotypes
26742 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 298, pl. 43, figs. 1-4 *Ptiar* [*sic*]
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26743 **Pitar (Hysteroconcha) dione** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 298, pl. 43, figs. 5, 6 *Ptiar* [*sic*]
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

29832 **Pitar (Pitar) ewekoroensis** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 280
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

25715, **Pitar (Pitar) fluctuatus** (G. B. Sowerby, II) Hypotype
25715a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 275, pl. 43, figs. 7, 7a
Unfigured hypotype = PRI 25715a Guanico, Panama Recent

26736 **Pitar (Pitar) maiquetiensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 293, pl. 42, figs. 9, 10
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26737 **Pitar (Nanopitar ?) marensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 295, pl. 42, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26738 **Pitar (Nanopitar ?) marensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 295, pl. 42, figs. 13, 14
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27486 **Pitar (Pitarella) paraguanensis** (H. K. Hodson)
Jung, B.A.P., v. 49, No. 223, 1965, p. 461 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26679 **Pitar (Pitarella ?) scutellaris** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 296, pl. 33, fig. 10; pl. 42, figs. 15, 16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28998 **Pitaria acuticostata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 216, pl. 37, fig. 2 not deposited by Cornell Univ., 1971
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

1411, 1412 **Pitaria (Pitaria) angelinae** (Harris) Syntypes
Palmer, P. A., v. 1, No. 5, 1927, p. 17, pl. 4, figs. 16, 19 for *Meretrix angelinae* Harris *in* Brann & Kent, p. 543

29560 **Pitaria (Lamelliconcha) baumanni** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 333, pl. 19, fig. 4
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29006 **Pitaria cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 216, pl. 37, fig. 10 hinge broken and lost prior to 1977
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 37, pl. 7, fig. 8; pl. 9, fig. 4 as *P. (Pitarella) cercadica* Maury

28412 **Pitaria (Lamelliconcha) circinata** (Born) Hypotype
Palmer, P. A., v. 1, No. 5, 1927, p. 48, pl. 9, fig. 11
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28463 **Pitaria (Lamelliconcha) circinata** (Born) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 56, pl. 9, figs. 12, 13
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene

28997 **Pitaria (Lamelliconcha) circinata** (Born) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 215, pl. 37, fig. 1
Zone H or I, on Rio Cana near Caimito, Dominican Rep.
Cercado Fm., lower Miocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 50 as *P. circinata mauryae* Palmer (paratype)

29542 **Pitaria cf. P. circinata** (Born) Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 453, pl. 18, fig. 2
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone

28413 **Pitaria (Lamelliconcha) circinata mauryae** Palmer Holotype
Palmer, P. A., v. 1, No. 5, 1927, p. 50, pl. 9, fig. 21
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

Pitaria circinata mauryae Palmer
See *P. circinata* (Born) PRI 28997

28464 **Pitaria (Lamelliconcha) labreana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 57, pl. 9, figs. 14, 15
1000 feet W. of pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene
See Palmer, P. A., v. 1, No. 5, 1927, p. 51, pl. 8, figs. 19, 28
See Jung, B.A.P., v. 55, No. 247, 1969, p. 375, pl. 27, figs. 3, 4, lower Pliocene

28479 **Pitaria (Lamelliconcha) labreana** Maury, 1912 Hypotype
Maury, B.A.P., v. 10, No. 42, 1925, p. 151, pl. 27, fig. 11 broken before 1977
Outcrops near the pier at Brighton, Trinidad
Asphaltic marl (upper Morne l'Enfer Fm.), upper Pliocene

29546 **Pitaria (Lamelliconcha) perarcana** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 333, pl. 18, fig. 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28999 **Pitaria planivieta** (Guppy) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 217, pl. 37, fig. 3 not deposited by Cornell Univ., 1971
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

Pitaria quirosana H. K. Hodson
See *Macrocallista maculata* (Linnaeus), PRI 22992

29544 **Pitaria vertumni** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 424, pl. 18, fig. 4
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

25621, 25621a **Placuanomia cumingii** Broderip Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 178, pl. 24, figs. 1, 1a
Unfigured hypotype = PRI 25621a
Jaramijo, Ecuador Recent

28958, 28959 **Placunanomia lithobleta** Dall Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 192, pl. 34, figs. 1, 2
Rio Cana, near Cana on Guayubin to Mao Rd., Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

26111 **Planaxis (Supplanaxis) nucleus** ? (Bruguière) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 168, pl. 14, figs. 17, 18
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

27022 **Planetophyllum planetum** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 4, pl. 1, fig. 1
Stony Is., Twsp. 122, Slave R., Alberta, Can.
Basal Devonian Ls. (? *adoceta* zone), ? early Middle Devonian

27023-27025 **Planetophyllum planetum** Crickmay Paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 4, pl. 1, figs. 1-3
Stony Is., Twsp. 122, Slave R., Alberta, Can.
Basal Devonian Ls. (? *adoceta* zone), ? early Middle Devonian

7037, **Planulina depressa** (d'Orbigny) Unfigured hypotypes
7038 Sabol, B.A.P., v. 41, No. 191, 1960, p. 232
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

30001, **Planulina depressa** (d'Orbigny) Hypotypes
30002 Herrick, B.A.P., v. 70, No. 293, 1976, p. 149, pl. 15, figs. 94, 95
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27084 **Platyaxum dimitrum** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 8, pl. 1, figs. 5, 6; pl. 5, figs. 2, 3
Well, 8815', S. 25, T. 63, R. 12, W5, Alberta, Can.
Beaverhill Lake Fm., Upper Devonian

28330 **Platyceras** sp. Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 28
Williams Brook, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

29950 **Plectofrondicularia** cf. **P. longistriata** Le Roy Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 140, pl. 11, fig. 44
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

22932, **Pleiorytis caroniana** (Maury)
22933 Vokes, Amer. Mus. Nov., No. 988, 1938, p. 15, fig. 11 (PRI 22932), for *Asaphis delicatus* Weisbord *in* Brann & Kent, p. 91

26778 **Pleiorytis venezuelensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 332, pl. 48, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26779 **Pleiorytis venezuelensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 332, pl. 48, figs. 9, 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26780 **Pleiorytis venezuelensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 332, pl. 48, figs. 11, 12
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

Pleurofusia longirostropsis de Gregorio
See *Pleurotoma longirostropsis* de Gregorio

7096 **Pleurophopsis unioides** Van Winkle Holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 24, pl. 3, fig. 12 *Pleuropopsis* [*sic*]
1 mi. W. of Godineau R., shore of Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Tertiary
See *Unio* sp. indet. PRI 28452

7097, **Pleurophopsis unioides fernandensis** Van Winkle Syntypes
7098 Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 25, pl. 3, figs. 13, 14
1 mi. W. of Godineau R., shore of Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Tertiary

28482 **Pleurotoma guppyana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 66, pl. 10, fig. 3
Bed 8 (not bed 6), Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

26447 **Pleurotoma (Pleurofusia) longirostropsis** de Gregorio Unfigured syntypes
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 34; there are 3 unfigured specimens from the De Gregorio Collection that appear to be this species
? Claiborne Bluff, Alabama R., Monroe Co., Ala.
? Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 830 as *Pleurofusia longirostropsis* de Gregorio ? (type lost)

28291 **Pleurotoma lunatum** Lea Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 264(173), fig. 144?, broken
Miocene marl beds of Cape Fear R., eastern N. Carolina

28288 **Pleurotoma tuberculata** Emmons Holotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 265(174), fig. 147?, broken
Miocene marl beds of eastern N. Carolina

26546 **Plicatula caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 118, pl. 11, figs. 5-8
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27651 **Plicatula creola** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 77, pl. 1, figs. 10, 11
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27652 **Plicatula creola** Allen Paratype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 77, pl. 1, figs. 12, 13
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

29471 **Plicatula eroessa** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 413, pl. 15, fig. 3
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

29472 **Plicatula flabellifera** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 263, pl. 15, fig. 5
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26542 **Plicatula gibbosa** Lamarck Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 113, pl. 10, figs. 10, 11
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26543 **Plicatula gibbosa** Lamarck Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 113, pl. 10, figs. 12, 13
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

29589- **Plicatula hunterae** Shaak & Nicol Unfigured paratypes
29593 Shaak & Nicol, Tulane Stud. Geol. & Pal., v. 11, No. 2, 1974, p. 108
Warren Bros. Marl Pit, E. of Sarasota, Sarasota Co., Fla.
Pinecrest Beds, Pliocene

Plicatula cf. P. torta Gabb Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 41, pl. 7, fig. 3 not deposited by Cornell Univ., 1971. Presumed lost
Headwaters of Rio Grande, near Guariqueen, Ven. Cretaceous

26544 **Plicatula venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 117, pl. 11, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26545 **Plicatula venezuelana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 117, pl. 11, figs. 3, 4
broken prior to 1976
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28711 **Plochelaea crassilabra** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 77, pl. 14, fig. 3
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

29594 **Plumalina densa** Hall Unfigured hypotype
Sass & Rock, B.A.P., v. 67, No. 287, 1975, p. 409
RR cut, along N.Y. Rte. 21, opposite Almond Dam, Steuben Co., N.Y.
Canaseraga SS ?, upper Devonian

29595 **Plumalina plumaria** Hall Unfigured hypotype
Sass & Rock, B.A.P., v. 67, No. 287, 1975, p. 412, not PRI 29593 as in text
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Renwick Sh., Ithaca Fm., upper Devonian

28354 **Plumalina plumaria** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 8, fig. 62
Base of West Hill, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

25624 **Pododesmus foliatus** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 178, pl. 24, figs. 3, 3a
Lobitos, Peru Recent

25625 **Pododesmus foliatus** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 178, pl. 24, fig. 3b
Punta Blanca, Ecuador Recent

25626 **Pododesmus foliatus** (Broderip) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 178, pl. 24, figs. 3c, 3d
Isla la Plata, Ecuador Recent

6086 **Pododesmus rudis** (Broderip) Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 529, pl. 77, fig. 1
Key West, Fla.
Recent

26592, 26611 **Pododesmus rudis** (Broderip) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 173, pl. 19, figs. 7, 8; pl. 23, fig. 10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

6087 **Pododesmus waccamawensis** (Gardner) Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 530, pl. 77, fig. 2
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

6088 **Pododesmus waccamawensis** (Gardner) Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 530, pl. 77, figs. 2a, 2b
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

6089 **Pododesmus waccamawensis** (Gardner) Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 530, pl. 77, fig. 2c
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

26171 **Polinices hepaticus** (Röding) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 240, pl. 22, figs. 9, 10
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26170 **Polinices lacteus** (Guilding) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 238, pl. 22, figs. 7, 8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27464 **Polinices nelsoni** Olsson Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 506
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28836 **Polinices stanislasmeunieri** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 136, pl. 23, figs. 15, 16
Rio Cana, near Cana on Cerro Gordo to Mao Rd., Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

28835 **Polinices subclausus** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 136, pl. 23, fig. 14
Locality and formation uncertain; Dominican Rep., Miocene

26172-26174 **Polinices subclausus** (G. B. Sowerby, II) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 241, pl. 22, figs. 11-16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25707, 25707a **Polymesoda (Egeta) anomala** (Deshayes) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 194, pl. 27, fig. 7
Unfigured hypotype = PRI 25707a
Tumbez, Peru Recent

25705 **Polymesoda (Egeta) inflata** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 195, pl. 27, figs. 3, 3a
Tumaco, Colombia Recent

25706, 25706a **Polymesoda (Polymesoda) notabilis** (Deshayes) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 192, pl. 27, fig. 6 (Tumbez, Peru); fig. 6a (Limones, Ecuador); unfigured hypotype = PRI 25706a (locality uncertain) Recent

25710 **Polymesoda (Polymesoda) notabilis** (Deshayes) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 192, pl. 28, fig. 6
Sua, Ecuador Recent

27475 **Polystira barretti** (Guppy) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 561
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

27581 **Pomatiopsis lapidaria** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 262, pl. 15, fig. 8
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

26902 **Pomatoceros minutus** Rioja Hypotype
Weisbord, B.A. P., v. 47, No. 214, 1964, p. 161, pl. 22, fig. 3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26903 **Pomatoceros minutus** Rioja Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 161, pl. 22, fig. 4
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26097 **Pomatoceros minutus** Rioja Hypotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 161, pl. 21, figs. 4, 5 for *Serpulorbis catella* Weisbord *in* Weisbord, 1962, which see

27570 **Porites branneri** Rathbun Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 42, pl. 10, fig. 4
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

27559 **Porites furcata** Lamarck Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 38, pl. 4, figs. 1-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

29986 **Poroeponides lateralis** (Terquem) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 146, pl. 14, fig. 79
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

26131 **Portoricia salinensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 174, pl. 16, figs. 15-17
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

Potamides infraliratus Spieker
See *P. suprasulcatus* (Gabb)

28814 **Potamides ormei** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 126, pl. 22, fig. 8
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
For citations see Woodring, U.S.G.S. Prof. Paper 306-B, 1959, p. 176 as *Potamides suprasulcatus* (Gabb)

Potamides (Lampanella) ormei Maury
See *P. suprasulcatus* (Gabb)

2330, 2338 **Potamides suprasulcatus** (Gabb)
Hedberg, G.S.A. Bull., v. 48, No. 12, 1937, p. 2024 for *Potamides infraliratus* Spieker *in* Brann & Kent, p. 735
See also Woodring, U.S.G.S. Prof. Paper, 306-B, 1959, p. 176

22967 **Potamides suprasulcatus** (Gabb)
Hedberg, G.S.A. Bull., v. 48, No. 12, 1937, p. 2024 for *Potamides (Lampanella) ormei* Maury *in* Brann & Kent, p. 735

Potamides suprasulcatus (Gabb)
See *Potamides ormei* Maury

27114 **Productella gulosi** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 19, pl. 13, figs. 9-13
Carcajou Rock, Mackenzie R., 128° 26′ 28″ W., N. W. Terr., Can.
Uppermost Ramparts Fm., Middle Devonian

27115-27117 **Productella gulosi** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 19, pl. 13, figs. 14-18
Carcajou Rock, Mackenzie R., 128° 26′ 28″ W., N. W. Terr., Can.
Uppermost Ramparts Fm., Middle Devonian

28369 **Productella speciosa** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 46
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28350, 28342 **Productella truncata** Hall Figured specimens
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, figs. 47, 48
Locality unknown
Ithaca Fm., Genessee Gr., Upper Devonian

27118 **Productella verecunda** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 20, pl. 13, figs. 1-3
Dawson Landing, Great Slave Lake, N. W. Terr., Can.
Pine Point Fm., Middle Devonian

27119-27121 **Productella verecunda** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 20, pl. 13, figs. 4-8
Dawson Landing, Great Slave Lake, N. W. Terr., Can.
Pine Point Fm., Middle Devonian

26404 **Proteonina cumberlandiae** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 248
SW. of Morehead, Rowan Co., Ky.
New Providence Fm., Lower Mississippian

26405 **Proteonina wallingfordensis** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 250
Kenwood Hill, Louisville, Jefferson Co., Ky.
New Providence Fm., Lower Mississippian

28459 **Protocardia coycuarensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 54, pl. 9, fig. 7
6 mi. S. of Parare, between Parare and Coycuar, Ven.
Black shales of Hurupu beds (?Querecual Fm.), Cretaceous

28995 **Protocardia gurabica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 213, pl. 36, fig. 10
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

28996 **Protocardia islahispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 214, pl. 36, fig. 11
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

25767, 25767a **Protothaca (Tropithaca) grata** (Say) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 305, pl. 53, figs. 2-2b
Unfigured hypotypes = PRI 25767a. Esmeraldas, Ecuador Recent

25692, 25692a **Protothaca (Protothaca) thaca** (Molina) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 304, pl. 41, fig. 1
Unfigured hypotype = PRI 25692a Lima, Peru Recent

25766, 25766a **Protothaca (Protothaca) thaca** (Molina) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 304, pl. 53, figs. 1, 1a (Lima, Peru; W. Weywrack Coll.) not deposited, 1961
Unfigured hypotype = PRI 25766a (Paracas, Peru) Recent

26102 **Protula ? playagrandensis** (Weisbord) Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 164, pl. 21, figs. 6, 7 for *Serpulorbis pallidus* Weisbord *in* Weisbord, 1962, which see

Prunum calypsonis (Maury)
See *Marginella calypsonis* Maury

27433 **Prunum (Prunum) quirosense** (F. Hodson) Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 558
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Prunum springvalense (Maury)
See *Marginella springvalensis* Maury

25902 **Psammacoma elytrum** Keen Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 415, pl. 74, fig. 7 not deposited, 1961. Cojimenes, Ecuador Recent

27420 **Psammacoma? cf. P. falconensis** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 473 Unfigured specimen
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

25861 **Psammacoma lamproleuca** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 414, pl. 68, fig. 12
Búcaro, Panama Recent

25898A **Psammacoma lamproleuca** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 414, pl. 74, fig. 3
Búcaro, Panama Recent

25898B **Psammacoma lamproleuca** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 414, pl. 74, fig. 3a
Pedernales, Ecuador Recent

25898C **Psammacoma lamproleuca** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 414, pl. 74, fig. 3b
Sua, Ecuador Recent

25904 **Psammacoma siliqua** (C. B. Adams) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 415, pl. 74, fig. 9
Fig. 9a not deposited, 1961
Venado Beach, Panama Canal Zone Recent

29032 **Psammosolen sanctidominici** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 228, pl. 37, fig. 13
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25847, 25847a **Psammothalia cognata** (C. B. Adams) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 417, pl. 67, figs. 1-1b not deposited, 1961. Unfigured hypotypes = PRI 25847a
Tumbez, Peru Recent

25864, 25864a **Psammothalia cognata** (C. B. Adams) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 417, pl. 68, fig. 16 not deposited, 1961. Unfigured hypotype = PRI 25864a
Boca Pan, Peru Recent

25895 **Psammotreta asthenodon** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 413, pl. 74, fig. 1
Puerto Chame, Panama Recent

25896, 25896a **Psammotreta asthenodon** (Pilsbry & Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 413, pl. 74, fig. 1a not deposited, 1961. Unfigured hypotype = PRI 25896a
Tumbez, Peru Recent

25901 **Psammotreta aurora** (Hanley) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 411, pl. 74, figs. 6, 6a
Palo Seco, Panama Canal Zone Recent

25897, 25897a **Psammotreta dombei** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 412, pl. 74, fig. 2 not deposited, 1961. Unfigured hypotypes = PRI 25897a
El Lagartillo, Panama Recent

25853 **Psammotreta grandis** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 412, pl. 67, fig. 4
Mompiche, Ecuador Recent

25858 **Psammotreta grandis** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 412, pl. 68, fig. 7
Psammetreta [*sic*]. Mompiche, Ecuador Recent

25899 **Psammotreta gubernacula** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 413, pl. 74, figs. 4, 4a not deposited, 1961. Palo Seco, Panama Canal Zone Recent

25903 **Psammotreta** sp. Figured specimens
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 411, pl. 74, figs. 8, 8a
San Miguel, Rey Is., Pearl Islands, Panama Recent

29809, 29810 **Pseudaulicina simplex** Furon Unfigured hypotypes
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 201
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

25666 **Pseudochama corrugata** (Broderip) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 226, pl. 34, figs. 4-4b
Poicri, near Las Tablas, Panama Recent

25657, 25657a **Pseudochama panamensis** (Reeve) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 225, pl. 33, figs. 1, 1a
Fig. 1b not deposited, 1961. Unfigured hypotype = PRI 25657a
La Libertad, Santa Elena, Ecuador Recent

26676 **Pseudochama radians** (Lamarck) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 243, pl. 33, figs. 5, 6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26681, 26682 **Pseudochama radians** (Lamarck) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 243, pl. 34, figs. 1-4
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26683 **Pseudochama radians** ? (Lamarck) Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 243, pl. 34, figs. 5, 6
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26684 **Pseudochama** ? sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 246, pl. 34, figs. 7, 8
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28509 **Pseudoliva bocaserpentis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 79, pl. 11, fig. 6
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29802, 29803 **Pseudoliva (Buccinorbis) guineensis** Adegoke
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 166 Unfigured paratypes
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28567 **Pseudoliva soldadoensis** Van Winkle Holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 22, pl. 3, fig. 10
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

Pseudoliva vetusta linosa Conrad *in* Gabb
See *P. vetusta moerens* de Gregorio

26430 **Pseudoliva vetusta moerens** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 109, pl. 8, figs. 39, 40
? Claiborne Bluff, Alabama R., Monroe Co., Ala.
? Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 858 as ? *Pseudoliva vetusta linosa* Conrad *in* Gabb

29790, 29791 **Pseudomalaxis (Platylaxis) nigeriensis** Adegoke
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 120 Unfigured paratypes
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

7019 **Pseudopolymorphina rutila** (Cushman) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 227
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29928 **Pseudopolymorphina rutila** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136, pl. 9, fig. 24
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29927 **Pseudopolymorphina** sp. Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 136, pl. 9, fig. 23
Coastal well, 59-79', E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

28898 **Pteria inornata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 181, pl. 26, fig. 14
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25604 **Pteria sterna** (Gould) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 146, pl. 18, fig. 4
Lobitos, Peru Recent
28357 **Pterinea chemungensis** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 9, fig. 67
Owego, Tioga Co., N.Y.
West Falls Gr., Upper Devonian
28358 **Pterinea chemungensis** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 9, fig. 69
? Owego, Tioga Co., N.Y.
West Falls Gr., Upper Devonian
7081 **Pterotyphis (Tripterotyphis) fayae** Keen & Campbell
Unfigured paratype
Keen & Campbell, Veliger, v. 7, No. 1, 1964, p. 54
Barra de Navidad, Jalisco, Mex.
Recent
7052 **Pterygocythereis americana** (Ulrich & Bassler)
Sabol, B.A.P., v. 41, No. 191, 1960, p. 235 Unfigured hypotype
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene
26920 **Pterynotus (Nothotyphis) norfolkensis** Fleming Cast of paratype
Fleming, Trans. Roy. Soc. New Zealand, Zool., v. 2, No. 14, 1962, p. 117 (cast of TM 3146)
Probably beach drift on Norfolk Is., N. of New Zealand
Recent See Vokes, B.A.P., v. 61, No. 268, 1971, p. 75 as *Tripterotyphis norfolkensis* (Fleming)
7088 **Ptiloncodus harrisi** Bordeau Holotype
Bordeau, Jr. Tenn. Acad. Sci., v. 47, No. 3, 1972, p. 119, fig. 6
Flying L Ranch, near Dougherty, Murray Co., Okla.
Viola Ls., Fernvale Phase, Ordovician
7083, **Ptiloncodus harrisi** Bordeau Paratypes
7084, Bordeau, Jr. Tenn. Acad. Sci., v. 47, No. 3, 1972, p. 119, figs. 1, 2, 5
7087 Flying L Ranch, near Dougherty, Murray Co., Okla.
Viola Ls., Fernvale Phase, Ordovician
7085, **Ptiloncodus harrisi** Bordeau Paratypes
7086 Bordeau, Jr. Tenn. Acad. Sci., v. 47, No. 3, 1972, p. 119, figs. 3, 4
Outcrop along U.S. Hwy. 77, about 4 mi. N. of Springer, Carter Co., Okla.
Viola Ls., Fernvale Phase, Ordovician
7089 **Ptiloncodus harrisi** Bordeau Paratype
Bordeau, Jr. Tenn. Acad. Sci., v. 47, No. 3, 1972, p. 119, fig. 7 *Ptilocodus* [*sic*]
Outcrop along U.S. Hwy. 77, about 4 mi. N. of Springer, Carter Co., Okla.
Viola Ls., Fernvale Phase, Ordovician
15031 **Punctum minutissimum** (Lea) Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 9a, 9b
Johnsontown Sec.?, Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene
27605 **Punctum minutissimum** (Lea) Hypotype
Brown & Bruder, B.A.P., v. 54, No. 241, 1968, p. 240, pl. 17, figs. 12-14
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene
15008 **Pupoides albilabris** (C. B. Adams) Hypotype
Brown & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 1
Johnsontown Sec., Louisville. Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

7058 **Puriana rugipunctata** (Ulrich & Bassler) Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 237
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29319 **Purpura** cf. **P. floridana** Conrad Cast of unfigured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 445
Bahia de Tury-Assú, St. of Maranhão, Brazil
Pliocene or Pleistocene sandstone

26206 **Purpura patula** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 297, pl. 26, figs. 15, 16
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm.?, lower Pliocene ?

28522 **Purpura** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 82, pl. 12, fig. 4
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene See Jung, B.A.P., v. 55, No. 247, 1969, as upper Morne l'Enfer Fm., lower Pliocene

29828 **Pycnodonte ewekoroensis** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 249
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28872 **Pyramidella (Orinella) arionis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 146, pl. 25, fig. 10
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28867 **Pyramidella canaliculata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 144, pl. 25, fig. 5
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28871 **Pyramidella (Callolongchaeus) cercadensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 146, pl. 25, fig. 9
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28869 **Pyramidella diademata** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 145, pl. 25, fig. 7
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28870 **Pyramidella olssoni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 145, pl. 25, fig. 8
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28868 **Pyramidella semicanaliculata** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 144, pl. 25, fig. 6
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

8240 **Pyramimitra quadralirata** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 72, pl. 9, fig. 10
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

Pyrazisinus harrisi Maury
See *Terebralia dentilabris* (Gabb)

Pyrene aureola Howard, 1963
See *Pyrene aureomexicana* Howard, 1963

26857 **Pyrene aureomexicana** Howard Unfigured paratypes
Howard, Santa Barbara Mus. Nat. Hist. Occ. Paper No. 7 (Supplement), June, 1963 new name for *P. aureola* Howard *in* Santa Barbara Mus. Nat. Hist. Occ. Paper No. 7, May, 1963, p. 2
Norse Beach, Punta Penasco, Sonora, Mex.
Recent

26243 **Pyrene (Eurypyrene ?) occidentalis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 334, pl. 29, figs. 21, 22 [*Euryprene (sic)*]
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26242 **Pyrene (Eurypyrene) venezuelanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 332, pl. 29, figs. 19, 20 [*Euryprene (sic)*]
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26371 **Pyrgiscus bruscasensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 477, pl. 45, figs. 10-13
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26372 **Pyrgiscus curucutiensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 479, pl. 45, figs. 14, 15
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26370 **Pyrgiscus facetus** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 476, pl. 45, figs. 8, 9
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26369 **Pyrgiscus granadensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 476, pl. 45, figs. 6, 7
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26367 **Pyrgiscus magnacrista** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 474, pl. 45. fig. 4; pl. 46, figs. 3, 4
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26368 **Pyrgiscus magnacrista** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 474, pl. 45, fig. 5
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27307 **Pyrgo denticulata** (H. B. Brady) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 10, pl. 3, fig. 2
Well 1-NE, 184′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
?, probably Miocene

29306, 29308 **Pyrula paraensis** (White) Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 123, pl. 5, figs. 10, 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28276 **Pyrula reticulata** Lamarck Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 250(159), fig. 109?
Miocene marl beds of eastern N. Carolina

Pyrula trinitaria Maury
See *Ficus carbasea* (Guppy)

27208 **Quinqueloculina lamarckiana** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 8, pl. 2, fig. 3
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27243, 27216 **Quinqueloculina lamarckiana** d'Orbigny Hypotypes
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 8, pl. 2, figs. 4, 5
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

27205 **Quinqueloculina seminula** (Linnaeus) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 9, pl. 2, fig. 6
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27227 **Quinqueloculina seminula** (Linnaeus) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 9, pl. 3, fig. 1
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

27240 **Quinqueloculina seminula** (Linnaeus) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 9, pl. 2, fig. 7
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

7008 **Quinqueloculina** sp. Unfigured specimen
Sabol, B.A.P., v. 41, No. 191, 1960, p. 225
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

25788 **Raeta undulata** (Gould) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 332, pl. 56, figs. 6a, 6b
Fig. 6 not deposited, 1961. Tumbez, Peru Recent

28563 **Ranina porifera** Woodward Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 106, pl. 13, fig. 23
Farallon Rock, near San Fernando, Trinidad
? Mt. Moriah Fm. (Liddle, 1946), upper Eocene

Redstonea sperabilis (Crickmay)
See *Lyrielasma sperabilis* Crickmay

Regelia glauca (Crickmay)
See *Cyrtospirifer glaucus* Crickmay

26412 **Reophax kunklerensis** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 279
Kunkler Quarry, W. of Uniontown, Perry Co., Ind.
Menard Ls., Upper Mississippian

26413 **Reophax mcdonaldi** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 283
Near Vanceburg, Lewis Co., Ky.
New Providence Fm., Lower Mississippian

Reticulariopsis timetea (Crickmay)
See *Warrenella timetea* Crickmay

15013 **Retinella cf. R. binneyana** (Morse) Figured specimen
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, figs. 6a, 6b
Johnsontown Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27583 **Retinella indentata** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 227, pl. 15, figs. 11-13
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

28574 **Retusa yaquensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 17, pl. 3, fig. 6
Locality uncertain; Dominican Rep. Cercado Fm., lower Miocene
29964 **Reussella spinulosa** (Reuss) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 11, fig. 57
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
29818, **Reymentella olaniyani** Adegoke Unfigured paratypes
29819 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 99
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene
26349 **Rhizorus bruscasensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 457, pl. 43, figs. 11, 12
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
27527 **Rhynchozoon caboblanquense** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 100, pl. 11, fig. 4
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27528 **Rhynchozoon caribense** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 102, pl. 12, fig. 1
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
27516 **Rhynchozoon** cf. **R. verruculatum** (Smitt) Figured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 98, pl. 7, fig. 5
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
29815- **Rimella ewekoroensis** Adegoke Unfigured paratypes
29817 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 130
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene
28528 **Rimella fowleriana** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 89, pl. 12, fig. 11
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
28529, **Rimella knappiana** Maury Syntypes
28530 Maury, A.N.S.P., Jr., v. 15, 1912, p. 89, pl. 12, figs. 12, 13
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
29792, **Rimella subhumerosa** (Oppenheim) Unfigured hypotypes
29793 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 129
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene
28579 **Ringicula dominicana** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 21, pl. 3, fig. 11
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
26342 **Ringicula (Ringiculella) maiquetiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 450, pl. 42, figs. 17, 18
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
26343 **Ringicula (Ringiculella) maiquetiana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 450, pl. 42, figs. 19, 20
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
26070 **Rissoa trabeata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 119, pl. 10, figs. 5, 6
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26072 **Rissoina (Eurissolina) bicrepida** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 121, pl. 10, figs. 9, 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26396 **Rissoina (Eurissolina) bicrepida** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 121
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26075 **Rissoina (Cibdezebina) caribella** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 125, pl. 10, figs. 15, 16
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28807 **Rissoina crassilabris** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 132, pl. 21, fig. 19 slightly broken prior to 1977
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26073 **Rissoina (Schwartziella ?) maiquetiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 122, pl. 10, figs. 11, 12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26071 **Rissoina (Phosinella) puntagordana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 119, pl. 10, figs. 7, 8
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28808 **Rissoina sagraiana** d'Orbigny Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 132, pl. 21, fig. 20
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26074 **Rissoina (Schwartziella) venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 123, pl. 10, figs. 13, 14
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

29956 **Robertina** cf. **R. subteres** (H. B. Brady) Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 141, pl. 11, fig. 50
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27169 **Robulus americanus** (Cushman) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 11, pl. 3, fig. 4
Offshore well A-11, 195′, near Newport News, Va.
Choptank Fm., Miocene

27166 **Robulus calcar** (Linnaeus) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 12, pl. 3, fig. 5
Well 1-SW, 160′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
?, probably Miocene

27315 **Robulus pseudoiota,** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 13, pl. 3, fig. 6
Offshore well A-11, 165′, near Newport News, Va.
St. Marys Fm., Miocene

27277 **Robulus** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 13, pl. 3, fig. 7
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

29973, **Rosalina floridana** (Cushman) Hypotypes
29974 Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 12, figs. 66, 67
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29977- **Rosalina subaraucana** (Cushman) Hypotypes
29979 Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 12, fig. 70; pl. 13, figs. 71, 72
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29976 **Rosalina turrita** (Cushman) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 12, fig. 69
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

26434 **Rostellaria (Calyptraphorus) quidest** de Gregorio
Unfigured syntype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 115
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 551 as *Calyptraphorus velatus* (Conrad) This specimen reported as figured in de Gregorio (pl. 10, figs. 1, 2a-b); it is not.

27310 **Rotalia bassleri** Cushman & Cahill Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 50, pl. 15, fig. 6
Offshore well A-11, 165', near Newport News, Va.
St. Marys Fm., Miocene

27313 **Rotalia bassleri** Cushman & Cahill Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 50, pl. 15, fig. 5
Offshore well A-11, 165', near Newport News, Va.
St. Marys Fm., Miocene

27245 **Rotalia beccarii** ? (Linnaeus) Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 51, pl. 16, fig. 4
2.2 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27305 **Rotalia beccarii** ? (Linnaeus) Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 51, pl. 16, fig. 2
Well A-5, 205', Lambert Pt., near Norfolk, Va.
Choptank Fm., Miocene

27197 **Rotalia beccarii tepida** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 50, pl. 16, fig. 3
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

27225 **Rotalia beccarii tepida** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 50, pl. 16, fig. 1
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27229 **Rotalia beccarii tepida** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 50, pl. 15, fig. 8
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene-Miocene (Yorktown Fm.) mixture

27259 **Rotalia beccarii tepida** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 50, pl. 15, fig. 7
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27616 **Rugoglobigerina tradinghousensis** Pessagno
Pessagno, P. A., v. 5, No. 37, 1967, p. 367 Unfigured paratypes
Tradinghouse Creek, near Waco, McLennan Co., Tex.
Taylor Fm., "Lower Taylor Marl" Mbr., Upper Cretaceous

27639 **Sablea minuta** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 70, pl. 2, figs. 1-3
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27640 **Sablea minuta** Allen Paratype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 70, pl. 2, figs. 4-6
Below Montgomery Landing, Red R.., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene
27641 **Sablea minuta** Allen Paratype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 70, pl. 2, figs. 7-9
Mouth of Saline Bayou, St. Maurice, Winn Par., La.
Cook Mtn. Fm., Claiborne Gr., middle Eocene
25928 **Sanguinolaria (Psammotella) bertini** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 349, pl. 77, fig. 8
Tumbez, Peru Recent
26817, **Sanguinolaria (Psammotella) operculata** (Gmelin) Hypotypes
26818 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 370, pl. 53, figs. 14-17
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent
29009 **Sanguinolaria (Psammotella) smithwoodwardi** Maury Syntype
Maury, B.A.P., v. 5, No. 29, 1917, p. 229, pl. 38, fig. 1
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.*
Cercado Fm., lower Miocene
29010 **Sanguinolaria (Psammotella) smithwoodwardi** Maury Syntype
Maury, B.A.P., v. 5, No. 29, 1917, p. 229, pl. 38, fig. 2
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.*
Cercado Fm., lower Miocene
25920A **Sanguinolaria (Sanguinolaria) tellinoides** A. Adams Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 348, pl. 77, fig. 10
Isla del Gallo, Colombia Recent
25920B **Sanguinolaria (Sanguinolaria) tellinoides** A. Adams Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 348, pl. 77, fig. 11
Cojimenes, Ecuador Recent
25921 **Sanguinolaria (Sanguinolaria) vespertina** Pilsbry & Lowe
Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 348, pl. 85, fig. 5
Guanico, Panama Recent
29423 **Scaphander paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 217, pl. 12, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
29433 **Scapharca agraria** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 409, pl. 12, fig. 17
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene
29439 **Scapharca agronomica** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 5, 1925, p. 407, pl. 13, fig. 2
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene
28921, **Scapharca arthurpennelli** Maury Syntypes
28922 Maury, B.A.P., v. 5, No. 29, 1917, p. 178, pl. 29, figs. 9, 10
Zone 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
28910 **Scapharca auriculata** (Lamarck) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 175, pl. 28, fig. 3
Found loose at Sabaneta on Rio Yaguajal, Dominican Rep. (origin unknown)
28935 **Scapharca caimitaca** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 172, pl. 30, fig. 13 *caimitica* [*sic*]
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

Scapharca campechiensis (Gmelin)
See *Arca pariaensis* Maury

28917 **Scapharca cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 169, pl. 29, fig. 5
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

28909 **Scapharca chiriquiensis** (Gabb) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 174, pl. 28, fig. 2
Cut on Sabaneta to Guayubin Rd., Dominican Rep.
Formation and age not given, probably Miocene

28941, **Scapharca cibaoica** Maury Syntypes
28942 Maury, B.A.P., v. 5, No. 29, 1917, p. 173, pl. 30, figs. 19, 20
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28927- **Scapharca corcupidonis** Maury Syntypes
28929 Maury, B.A.P., v. 5, No. 29, 1917, p. 175, pl. 30, figs. 5-7
Bluff 2 or 3, above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29438 **Scapharca crandalli** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 231, pl. 13, fig. 1
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29441 **Scapharca crashleyi** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 235, pl. 13, fig. 5
Rio Pirabas, St. of Pára, Brazil
Pirabas Fm., lower Miocene

28912 **Scapharca golfoyaquensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 168, pl. 28, fig. 5
Locality and formation uncertain; Dominican Rep., Miocene

28911, **Scapharca guayubinica** Maury Syntypes
28913 Maury, B.A.P., v. 5, No. 29, 1917, p. 170, pl. 28, fig. 4; pl. 29, fig. 1
Rio Cana, near Cana on Guayubin to Mao Rd., Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

28914, **Scapharca henekeni** Maury Hypotypes
28924 Maury, B.A.P., v. 5, No. 29, 1917, p. 167, new name, pl. 29, fig. 2; pl. 30, fig. 2
Locality and formation uncertain; Dominican Rep., Miocene
See Pflug, Acta Humboldtiana, ser. geol. palaeont., No. 1, p. 71 as *Anadara henekeni* (Maury)

28931, **Scapharca hispaniolana** Maury Syntypes
28932 Maury, B.A.P., v. 5, No. 29, 1917, p. 176, pl. 30, figs. 9, 10
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28930 **Scapharca inaequilateralis** (Guppy) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 171, pl. 30, fig. 8
Locality and formation uncertain; Dominican Rep., Miocene

29431 **Scapharca inaequilateralis** (Guppy) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 223, pl. 12, fig. 15
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28923 **Scapharca losquemadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 172, pl. 30, fig. 1
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28908 **Scapharca margaretae** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 169, pl. 28, fig. 1
Rio Cana, near Cana on Guayubin to Mao Rd., Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

29447 **Scapharca melloi** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 237, pl. 13, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29448 **Scapharca paraensis** White (restricted) Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 229, pl. 13, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28907 **Scapharca patricia** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 173, pl. 27, fig. 1
Arca patricia beds near Caimito on Rio Cana, Dominican Rep.
Probably Gurabo Fm., middle Miocene

28920 **Scapharca pennelli** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 177, pl. 29, fig. 8
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

29442 **Scapharca pertenuicostata** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 231, pl. 13, fig. 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29444 **Scapharca pinguescens** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 237, pl. 13, fig. 9
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29443 **Scapharca recondita** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 409, pl. 13, fig. 7
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28925, **Scapharca riocanensis** Maury Syntypes
28926 Maury, B.A.P., v. 5, No. 29, 1917, p. 176, pl. 30, figs. 3, 4
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28916 **Scapharca riogurabonica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 170, pl. 29, fig. 4
Zone A or B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

29440 **Scapharca vanwinkleae** Sheldon & Maury Plastotype
In Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 233, pl. 13, fig. 4
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28918, **Scapharca (Cunearca) willardausteni** Maury Syntypes
28919 Maury, B.A.P., v. 5, No. 29, 1917, p. 179, pl. 29, figs. 6, 7 *williardausteni* [*sic*]
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

6071 **Scaphella brennmortoni** Olsson & Petit Unfigured paratypes
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 546
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

28311 **Schizobolus concentricus** Vanuxem Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 19, pl. 5, fig. 3
Locality unknown
Geneseo Sh., Genessee Gr., Upper Devonian

28327 **Schizodus chemungensis** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 23
Eddy's Dam, Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28362 **Schizodus chemungensis** "var." **quadrangularis"** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 23, pl. 10, fig. 77
2 mi. NE. of Waverly, Tioga Co., N.Y.
West Falls Gr., Upper Devonian

28346 **Schizophoria impressa** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 52
Forest Home, near Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

28366 **Schizophoria tioga** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 25, pl. 12, fig. 111
Elmira, Chemung Co., N.Y.
West Falls Gr., Upper Devonian

27507 **Schizoporella floridana** Osburn Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 52, pl. 3, figs. 4-6; pl. 7, fig. 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm, lower Pliocene

27508 **Schizoporella floridana** ? Osburn Figured specimen
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 60, pl. 3, figs. 7-9; pl. 7, fig. 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27518 **"Schizoporella" mamoensis** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 61, pl. 8, fig. 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27059 **Schuchertella adoceta** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 18, pl. 10, fig. 17
Mt. St. Charles, N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian

27059A **Schuchertella adoceta** Crickmay Paratype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 18, pl. 10, fig. 17
Mt. St. Charles, N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian

27060 **Schuchertella adoceta** Crickmay Paratype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 18, pl. 10, figs. 10, 11
5 mi. above mouth of Prohibition Creek, N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian

27061-27065 **Schuchertella adoceta** Crickmay Paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 18, pl. 10, figs. 12-16; pl. 11, fig. 1
5 mi. above mouth of Bosworth Creek, N. W. Terr., Can.
Lower beds of basal Dev. Ls. (lower Hume Fm.), early Middle Devonian
See Johnson &. Perry, Can. Jr. Earth Sci., v. 13, No. 5, 1976, pl. 2, figs. 4, 7(PRI 27064); figs. 5, 6(PRI 27061) as *Eoschuchertella adoceta* (Crickmay)

25565 **Scolimytilus (Aeidimytilus) adamsianus** (Dunker) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 121, pl. 12, fig. 5 not PRI 25564 as in expl.
Jipijapa (Puerto Callo), Ecuador Recent

25572, 25572a **Scolimytilus (Aeidimytilus) adamsianus** (Dunker) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 121, pl. 13, fig. 4 not deposited, 1961. Unfigured hypotype = PRI 25572a
Punta Centinella, Santa Elena, Ecuador Recent

25573, 25573a **Scolimytilus (Aeidimytilus) adamsianus** (Dunker) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 121, pl. 13, fig. 4a not deposited, 1961. Unfigured hypotype = PRI 25573a
Jipijapa (Puerto Callo), Ecuador Recent

25575, 25575a **Scolimytilus (Aeidimytilus) adamsianus** (Dunker) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 121, pl. 13, fig. 6
Unfigured hypotypes = PRI 25575a
Punta Banda, Lower California Recent

25570 **Scolimytilus (Scolimytilus) playasensis** (Pilsbry & Olsson) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 119, pl. 13, figs. 2-2c
Playas, Ecuador Recent

25574, 25574a **Scolimytilus (Aeidimytilus) puntarenensis** (Pilsbry & Lowe) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 121, p. 13, figs. 5, 5a *puntarensis* [*sic*]. Unfigured hypotype = PRI 25574a
Punta Carnero, Santa Elena, Ecuador Recent

29287 **Sconsia felix** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 117, pl. 4, fig. 5
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28773 **Sconsia laevigata** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 111, pl. 19, fig. 2
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

27458 **Sconsia laevigata** (G. B. Sowerby, II) Cast of hypotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 510, pl. 68, figs. 7, 8
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26123 **Seila adamsii** ? (H. C. Lea) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 192, pl. 15, figs. 23, 24
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28980 **Semele claytoni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 227, pl. 35, fig. 9 broken before 1977
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

25827 **Semele corrugata** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 361, pl. 64, figs. 1a, 1b
Fig. 1 not deposited, 1961, Bahia de la Independencia, Peru Recent

25830, 25830a **Semele elliptica** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 362, pl. 64, fig. 5 not deposited, 1961. Unfigured hypotype = PRI 25830a
El Lagartillo, Panama Recent

25829, 25829a **Semele flavescens** (Gould) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 362, pl. 64, figs. 4-4b
Unfigured hypotype = PRI 25829a.
Santa Elena, Ecuador Recent

25841 **Semele guaymasensis** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 369, pl. 66, fig. 6
Palo Seco, Panama Canal Zone Recent

25831 **Semele laevis** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 361, pl. 64, fig. 6
Mompiche, Ecuador Recent

25836 **Semele lenticulare** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 363, pl. 65, fig. 8
San Francisco, Ecuador Recent
25837 **Semele lenticulare** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 363, pl. 65, fig 8a broken
Jaramijo, Ecuador Recent
25844 **Semele lenticulare** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 363, pl. 66, figs. 9, 9a
Manta, Ecuador Recent
25935 **Semele margarita** Olsson Holotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 370, pl. 66, fig. 3
Pearl Islands, Panama Recent
25935a **Semele margarita** Olsson Unfigured paratype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 370
Pearl Islands, Panama Recent
25843 **Semele pallida** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 364, pl. 66, fig. 8
Esmeraldas, Ecuador Recent
26799 **Semele proficua** (Pulteney) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 356, pl. 51, figs. 9, 10 not PRI 26807 as in expl.
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26800 **Semele proficua** (Pulteney) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 356, pl. 51, figs. 11, 12
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26801 **Semele proficua** (Pulteney) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 356, pl. 51, figs. 13, 14
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
25834 **Semele pulchra** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 368, pl. 65, fig. 5
Búcaro, Panama Recent
26798 **Semele purpurascens** (Gmelin) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 353, pl. 51, figs. 7, 8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
25833 **Semele rosea** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 366, pl. 64, fig. 8 not deposited, 1961. Manta, Ecuador Recent
25835 **Semele sowerbyi** Lamy Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 367, pl. 65, figs. 7, 7a
Búcaro, Panama Recent
25842 **Semele sparsilineata** Dall Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 363, pl. 66, fig. 7
Manta, Ecuador Recent
25832 **Semele tabogensis** Pilsbry & Lowe Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 366, pl. 64, fig. 7 not deposited, 1961. Venado Beach, Panama Canal Zone Recent
25828 **Semele tortuosa** (C. B. Adams) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 365, pl. 64, figs. 3, 3b
Puerto Callo, Ecuador Recent
25838 **Semele venusta** (Reeve) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 370, pl. 66, figs. 1, 1a
Palo Seco, Panama Canal Zone Recent

26802 **Semelina nuculoides** (Conrad) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 359, pl. 52, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25846, **Semelina subquadrata** (Carpenter) Hypotype
25846a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 375, pl. 66, fig. 11
Unfigured hypotype = PRI 25846a
Concepcion Beach, near Las Tablas, Panama Recent

26181, **Semicassis (Tylocassis) granulata** (Born) Hypotypes
26182 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 254, pl. 23, figs. 15, 16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26183 **Semicassis (Tylocassis) granulata** (Born) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 254, pl. 23, figs. 17, 18
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25581, **Semimytilus algosus** (Gould) Hypotype
25581a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 114, pl. 14, fig. 8
Unfigured hypotypes = PRI 25581a
Bahia Lagunillas, Paracas, Peru Recent

25601, **Semimytilus nonuranus** (Pilsbry & Olsson) Hypotype
25601a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 115, pl. 17, fig. 10 not deposited, 1961. Unfigured hypotypes = PRI 25601a
Nonura Bay, Sechura, Peru Recent

25576, **Septifer zeteki** Hertlein & Strong Hypotype
25576a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 122, pl. 13, figs. 7, 7a
Unfigured hypotype = PRI 25576a
Jipijapa (Puerto Callo), Ecuador Recent

29236 **Seraphs (Seraphs) belemnitus** Palmer Topotypes
Jung, P. A., v. 8, No. 47, 1974, p. 25, pl. 6, figs. 12-16
2.9 mi. S. of N. limits of Gulf Hammock, Levy Co., Fla.
Inglis Fm., Ocala Gr., upper Eocene

26101 **"Serpula" catiana** Weisbord Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 152, pl. 19, figs. 1, 2 for *Serpulorbis* aff. *S. conicus* (Dillwyn) *in* Weisbord, 1962, which see

26904 **"Serpula" catiana** Weisbord Topotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 152, pl. 20, figs. 1, 2 not paratype
Catia La Mar village, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28562 **Serpula clymenioides** (Guppy) Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 105, pl. 13, figs. 20-22
Farallon Rock, near San Fernando, Trinidad
? Mt. Moriah Fm. (Liddle, 1946), upper Eocene

26099 **"Serpula" incompta** (Weisbord) Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 154, pl. 19, figs. 3, 4 for *Serpulorbis incomptus* Weisbord *in* Weisbord, 1962, which see

26100 **"Serpula" incompta** (Weisbord) Paratype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 154, pl. 19, figs. 5, 6 for *Serpulorbis incomptus* Weisbord *in* Weisbord, 1962, which see

26905, **"Serpula" incompta** (Weisbord) Topotypes
26906 Weisbord, B.A.P., v. 47, No. 214, 1964, p. 154, pl. 20, figs. 3-5 not paratypes
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29262 **Serpulorbis amazoniana** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4. 1925, p. 95, pl. 2, fig. 15; pl. 3, fig. 21
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26103 **Serpulorbis birugosus** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 157, pl. 14, figs. 8, 9
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
See Weisbord, 1964, *Hydroides* aff. *H. bispinosa* Bush, PRI 26103

26097 **Serpulorbis catella** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 156, pl. 13, figs. 17, 18
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene
See Weisbord, 1964, *Pomatoceros minutus* Rioja, PRI 26097

26101 **Serpulorbis** aff. **S. conicus** (Dillwyn) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 160, pl. 14, figs. 5, 6
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
See Weisbord, 1964, *"Serpula" catiana* Weisbord, PRI 26101

29263 **Serpulorbis corticesculpturata** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 95, pl. 2, fig. 16
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28815 **Serpulorbis granifera** (Say) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 127, pl. 22, fig. 9
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

26099 **Serpulorbis incomptus** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 160, pl. 14, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
See Weisbord, 1964, *"Serpula" incompta* (Weisbord), PRI 26099

26100 **Serpulorbis incomptus** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 160, pl. 14, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
See Weisbord, 1964, *"Serpula" incompta* (Weisbord), PRI 26100

26102 **Serpulorbis pallidus** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 162, pl. 14, fig. 7
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
See Weisbord, 1964, *Protula ? playagrandensis* (Weisbord), PRI 26102

28816 **Serpulorbis papulosus** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 127, pl. 22, fig. 10
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

26098 **Serpulorbis** cf. **S. papulosus** (Guppy) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 158, pl. 13, figs. 19, 20
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27517 **Setosella antilleana** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 45, pl. 8, fig. 1
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25550 **Sheldonella delgada** (Lowe) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 103, pl. 10, fig. 3 ***delgata*** [*sic*]
Not deposited, 1961
Puerto Armuelles, Panama Recent

27557 **Siderastrea (Siderastrea) radians** (Pallas) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 28, pl. 2, figs. 4, 5
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

27558 **Siderastrea (Siderastrea) siderea** (Ellis & Solander) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 33, pl. 3, figs. 1-5
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

7020 **Sigmomorphina concava** (Williamson) Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 228
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29929 **Sigmomorphina pearceyi** Cushman & Ozawa Unfigured hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 137
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7021 **Sigmomorphina semitecta** "var." **terquemiana** (Fornasini)
Sabol, B.A.P., v. 41, No. 191, 1960, Unfigured hypotypes
p. 228 (author Fornasini, not Cushman and Ozawa)
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27247 **Sigmomorphina semitecta terquemiana** (Fornasini) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 24, pl. 6, fig. 1
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27287 **Sigmomorphina semitecta terquemiana** (Fornasini) Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 24, pl. 6, fig. 2
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Mary Fm.) boundary

27273 **Sigmomorphina** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 25, pl. 6, fig. 3
Well A-2, 81′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

29930 **Sigmomorphina terquemiana** (Fornasini) Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 137, pl. 9, fig. 25
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29932 **Sigmomorphina cf. S. undulosa** (Terquem) Unfigured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 137
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29031 **Siliqua subaequalis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 230, pl. 39, fig. 12 broken before 1977
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28819 **Siliquaria gurabensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 129, pl. 22, fig. 13
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28758 **Simpulum antillarum cercadicum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 106, pl. 17, fig. 2
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29322 **Simpulum chlorostomoides** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 125, pl. 6, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29325 **Simpulum infelix** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 123, pl. 6, fig. 16
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

27647 **Sinistrella meyeri** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 72, pl. 2, figs. 12, 13
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

27648 **Sinistrella meyeri** Allen Paratype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 72, pl. 2, figs. 14, 15
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

28842 **Sinum gatunense** (Toula) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 138, pl. 24, fig. 2
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

8239 **Sinum jacksonense** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 63, pl. 7, fig. 6
Town Creek, Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene

28841 **Sinum nolani** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 139, pl. 24, fig. 1
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26137 **Sinum ? peculiaris** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 250, pl. 17, figs. 7, 8; pl. 23, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

6091 **Siphocypraea (Siphocypraea) carolinensis floridana** (Mansfield) Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 558, pl. 83, figs. 2-2b
Pinecrest, Miami Canal, Collier Co., Fla.
Pinecrest beds, Caloosahatchee Gr., Neogene

27624-27627 **Siphocypraea (Muracypraea) mus** (Linnaeus) Hypotypes
Olsson & Petit, B.A.P., v. 54, No. 242, 1968, p. 281, pl. 18, figs. 3-3e
Ski Beach, Judibana, Paraguana Pen., Ven.
Recent

6090 **Siphocypraea (Siphocypraea) problematica** Heilprin Hypotype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 560, pl. 83, figs. 4-4b
Harney Pond, Route 78, Glades Co., Fla.
Caloosahatchee Marl, Caloosahatchee Gr., Neogene

27622 **Siphocypraea (Siphocypraea) transitoria** Olsson & Petit Hypotype
Olsson & Petit, B.A.P., v. 54, No. 242, 1968, p. 283, pl. 18, fig. 2
Brighton, Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

27619- **Siphocypraea (Siphocypraea) transitoria** Olsson & Petit
27621, Olsson & Petit, B.A.P., v. 54, No. 242, 1968, Hypotypes
27623 p. 283, pl. 18, figs. 1, 1b, 1c, 2a, 2b
Kissimmee, Osceola Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

29326 **Siphonalia harrisi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 135, pl. 7, fig. 1
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Siphonalia kempi Maury
See *Fasciolaria kempi* (Maury)

26060 **Smaragdia viridis venezuelensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 116, pl. 8, figs. 14, 15
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27519 **Smittipora abyssicola** (Smitt) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 82, pl. 8, fig. 3
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

29771, **Solariella adedayoi** Adegoke Unfigured paratypes
29772 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 71
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28565 **Solariella godineauensis** Van Winkle Cast of holotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 26, pl. 3, fig. 17
1 mi. W. of Godineau R., shore of Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Tertiary

7101 **Solariella godineauensis** Van Winkle Unfigured topotype
Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 26
1 mi. W. of Godineau R., shore of Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Tertiary

Solariella stalagmium (Conrad)
See *Solarium perinum* de Gregorio
See *Solarium supravenustum* de Gregorio

29253 **Solarium eudaidelum** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 391, pl. 2, fig. 2
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28826 **Solarium granulatum** Lamarck Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 131, pl. 23, fig. 3
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

29255 **Solarium granulatum** Lamarck Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 61, pl. 2, fig. 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29254 **Solarium intraornatum** White Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pp. 59, 393, pl. 2, fig. 4
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

26443 **Solarium perinum** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 137, pl. 12, figs. 49-52
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 913 as *Solariella stalagmium* (Conrad)

28824, **Solarium quadriseriatum** G. B. Sowerby, II Hypotypes
28825 Maury, B.A.P., v. 5, No. 29, 1917, p. 131, pl. 23, figs. 1, 2
Locality and formation uncertain; Dominican Rep., Miocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 237 as *Architectonica quadriseriata* (G. B. Sowerby, II)

28545 **Solarium stephanephorum** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 98, pl. 13, figs. 1, 2
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

28827 **Solarium stonemanae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 132, pl. 23, figs. 4, 5
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26445 **Solarium supravenustum** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 137, pl. 12 (not pl. 17), figs. 54a-56
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 913 as *Solariella stalagmium* (Conrad)

26824 **Solecurtus cumingianus** (Dunker) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 379, pl. 54, figs. 11, 12
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26821 **Solen (Solena) obliquus** Spengler Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 376, pl. 54, figs. 5, 6
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

29567 **Solen (Solena) obliquus** Spengler Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 369, pl. 19, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

25825 **Solen (Solen) pfeifferi** Dunker Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 420, pl. 63, fig. 6 *pfeifferri* [*sic*]
Santa Elena, Ecuador Recent

25824, **Solen (Solena) rudis** C. B. Adams Hypotypes
25824a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 420, pl. 63, fig. 1
Fig. 1a not deposited, 1961. Unfigured hypotype = PRI 25824a
Burica Peninsula, Panama Recent

26822 **Solen** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 378, pl. 54, figs. 7, 8
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26823 **Solen** sp. Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 378, pl. 54, figs. 9, 10
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

27571 **Solenastrea cf. S. bournoni** Edwards & Haime Figured specimen
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 60, pl. 12, figs. 1-3
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27565 **Solenastrea hyades** (Dana) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 57, pl. 8, figs. 4, 5
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27566 **Solenastrea hyades** (Dana) Hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 57, pl. 8, figs. 6-8; pl. 9, figs. 1-4
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

27572 **Solenastrea hyades** (Dana) Unfigured hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 57
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27574 **Solenastrea hyades** (Dana) Unfigured hypotype
Weisbord, B.A.P., v. 55, No. 246, 1968, p. 57
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28329 **Spathella typica** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 25
Base of Ithaca Falls, Ithaca, Tompkins Co., N.Y.
Sherburne Fm., Genessee Gr., Upper Devonian

25919 **Sphenia fragilis** Carpenter Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 424, pl. 77, figs. 9-9b
Venado Beach, Panama Canal Zone Recent

27628 **Sphenia tumida** Lewis Unfigured paratype
Lewis, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 26 broken after deposit
About 8 mi. W. of Bunnell, Flagler Co., Fla.
Pamlico Fm., Pleistocene

27629-27631 **Sphenia tumida** Lewis Unfigured paratypes
Lewis, Tulane Stud. Geol., v. 6, No. 1, 1968, p. 26
About 8 mi. W. of Bunnell, Flagler Co., Fla.
Pamlico Fm., Pleistocene

27043 **Spinatrypa coriacea** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 14, pl. 9, figs. 6-9
3 mi. SW. of point on Mountain R., 5 mi. from confluence of Virgin R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27044, 27045 **Spinatrypa coriacea** Crickmay Paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 14, pl. 11, figs. 2, 3
3 mi. SW. of point on Mountain R., 5 mi. from confluence of Virgin R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27042 **Spinatrypa dysmorphostrota** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 13, pl. 9, figs. 1-5 *dysmorphostrata* [*sic*]
1 mi. W. of point on Mountain R., 2 mi. from confluence of Virgin R., N. W Terr., Can.
Hume Fm., early Middle Devonian
See *Carinatina dysmorphostrota* (Crickmay) *in* Crickmay, Meth. Ind. Agg. Stud. Dev., Pub. by author, Calgary, 1967, p. 5

27066 **Spinulicosta stainbrooki** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 18, pl. 11, figs. 4-6
3 mi. SW of point on Mountain R, 5 mi. from confluence of Virgin R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27067-27070 **Spinulicosta stainbrooki** Crickmay Paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 18, pl. 11, figs. 7-15
3 mi. SW of point on Mountain R., 5 mi. from confluence of Virgin R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

26966 **Spirifer eudoxus** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 606, pl. 76, figs. 7, 9-11
Well, 4790', S. 10, T. 49, R. 26, W4, Alberta, Can.
"Upper D_1 Ls. zone", Mississippian

28338 **Spirifer laevis** Hall Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 7, fig. 38
Base of Ithaca Falls, Ithaca, Tompkins Co., N.Y.
Sherburne Fm., Genessee Gr., Upper Devonian

28364 **Spirifer mesacostalis** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 24, pl. 11, fig. 89
Locality unknown
Formation uncertain, probably Upper Devonian

26963 **Spirifer zantedeschii** Crickmay Holotype
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 606, pl. 76, figs. 2, 4, 5
Well, 4790', S. 10, T. 49, R. 26, W4, Alberta, Can.
"Upper D_1 Ls. zone", Mississippian

26964- **Spirifer zantedeschii** Crickmay Paratypes
26965 Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 606, pl. 76, figs. 1, 3, 6
Well, 4790', S. 10, T. 49, R. 26, W4, Alberta, Can.
"Upper D_1 Ls. zone", Mississippian

26908 **Spirorbis (Laeospira) venezuelensis** Weisbord Holotype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 166 *spirobis* [*sic*], pl. 19, figs. 7-10
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26907 **Spirorbis (Laeospira) venezuelensis** Weisbord Paratype
Weisbord, B.A.P., v. 47, No. 214, 1964, p. 166 *Spirobis* [*sic*], pl. 20, figs. 6, 7
Near Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26580, **Spondylus americanus** Hermann Hypotypes
26581, Weisbord, B.A.P., v. 45, No. 204, 1964, p. 163, pl. 17, figs. 6-8; pl. 21,
26595 figs. 1, 2
100 m. W. of Costa Fault, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26593 **Spondylus americanus** Hermann Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 163, pl. 20, figs. 1, 2
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28945 **Spondylus bostrychites** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 190, pl. 32, fig. 4
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.*
Gurabo Fm., middle Miocene

29458 **Spondylus pinguisculus** White Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 267, pl. 14, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28432 **Spondylus** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 41, pl. 7, fig. 4
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

27074 **Spongonaria filicata** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 2, pl. 1, figs. 1, 2; pl. 3, figs. 6, 7
Houston R., 65° 30′ N., 131° 15′ W., Yukon Terr., Can.
Bear Rock Fm., Lower Devonian

1087 **Springvaleia leroyi** (Guppy) "Neotype"
See Jung, B.A.P., v. 55, No. 247, 1969, p. 440 for discussion
Also see Brann & Kent, p. 818

26088 **Springvaleia leroyi secunda** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 150, pl. 12, figs. 2-4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26089 **Springvaleia leroyi secunda** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 150, pl. 12, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

28304 **Spyroceras geneva** (Clarke) Hypotype
Flower, B.A.P., v. 22, No. 76, 1936, p. 26, pl. 1, fig. 9
Cherry Valley, Otsego Co., N.Y.
Cherry Valley Ls., Marcellus Fm., Middle Devonian

28303 **Spyroceras** cf. **S. nuntium** (Hall) Figured specimen
Flower, B.A.P., v. 22, No. 76, 1936, p. 27, pl. 1, fig. 4
Near Cazenovia, Madison Co., N.Y.
Cherry Valley Ls., Marcellus Fm., Middle Devonian

27497 **Steganoporella magnilabris** (Busk) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 35, pl. 2, figs. 1-3; pl. 6, fig. 1
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

27111 **Stelckia galearius** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 21, pl. 12, figs. 13, 14
1 mi. N. of Mackenzie R., 1.6 mi. W. of Lake Jan, N. W. Terr., Can.
Upper Ramparts Fm., Middle Devonian

27112-27113 **Stelckia galearius** Crickmay Paratypes
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 21, pl. 12, figs. 15-19
1 mi. N. of Mackenzie R., 1.6 mi W. of Lake Jan, N. W. Terr., Can.
Upper Ramparts Fm., Middle Devonian

27590 **Stenotrema barbatum** Clapp Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 215, pl. 16, figs. 7-9
Henderson, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

15024 **Stenotrema fraternum** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, fig. 2
Mound View Sec., Louisville, Jefferson Co., Ky.
Tazewell water deposited silt, Wisconsin Stage, Pleistocene

15023, 15023a **Stenotrema leai** (Binney) Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 1a, 1b
Unfigured hypotypes = PRI 15023a, p. 177
Blevin's Gap Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27588 **Stenotrema leai** (Binney) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 218, pl. 16, figs. 1-3
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

15025 **Stenotrema leai aliciae** (Pilsbry) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, fig. 3
Mound View Sec., Louisville, Jefferson Co., Ky.
Tazewell water deposited silt, Wisconsin Stage, Pleistocene

15026 **Stenotrema stenotrema** Pfeiffer Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, fig. 4
Blevin's Gap Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

28408 **Stereotoceras gibbosum** Flower Holotype
Flower, P.A., v. 3, No. 24, 1950, p. 20, pl. 2, fig. 3; pl. 4, fig. 3
Old Cornell Univ. Quarry, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Middle Devonian

28352 **Stictopora meeki** Nicholson Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 8, fig. 60
Glenwood, near Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

26176 **Stigmaulax guppiana** ? (Toula) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 247, pl. 23, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

29799, 29800 **Strepsidura kerstingi** Oppenheim Unfigured hypotypes
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 158
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29801 **Strepsidura (Eamesidura) newtoni** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 160
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28507 **Strepsidura? soldadensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 78, pl. 11, fig. 4
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm, Paleocene

26384 **Streptorygma erugata** Weisbord Holotype
Weisbord, BA.P., v. 42, No. 193, 1962, p. 337, pl. 47, figs. 14, 15
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29026 **Strigilla caimitica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 225, pl. 39, fig. 7
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

25892 **Strigilla (Strigilla) carnaria** (Linnaeus) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 387, pl. 73, figs. 4, 4a
Santa Elena, Ecuador Recent

26794 **Strigilla carnaria** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 349, pl. 50, figs. 9-12
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26795 **Strigilla carnaria** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 349, pl. 51, figs. 1, 2
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26796, 26797 **Strigilla carnaria** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 349, pl. 51, figs. 3-6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

25893 **Strigilla (Strigilla) chroma** (Salisbury) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 388, pl. 73, fig. 5
Pearl Islands, Panama Recent

25891 **Strigilla (Strigilla) cicerula** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 388, pl. 73, fig. 3
Búcaro, Panama Recent

25890 **Strigilla (Strigilla) dichotoma** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 389, pl. 73, fig. 2
Punta Blanca, Ecuador Recent

25887 **Strigilla (Strigilla) disjuncta** Carpenter Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 387, pl. 73, fig. 1
Isla del Gallo, Colombia Recent

25888 **Strigilla (Strigilla) disjuncta** Carpenter Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 387, pl. 73, fig. 1a
Sua, Ecuador Recent

25889 **Strigilla (Strigilla) disjuncta** Carpenter Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 387, pl. 73, figs. 1b, 1c
El Lagartillo, Panama Recent

25894 **Strigilla (Strigilla) ervilia** (Philippi) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 389, pl. 73, figs. 6, 6a
Santa Elena, Ecuador Recent

26791, **Strigilla pisiformis** (Linnaeus) Hypotypes
26792 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 346, pl. 50, figs. 3-6
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26793 **Strigilla pisiformis** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 41, No. 204, 1964, p. 346, pl. 50, figs. 7, 8
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

29025 **Strigilla pisiformis** (Linnaeus) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 225, pl. 39, fig. 6
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

27087 **Stringocephalus aleskanus** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 12, pl. 1, fig. 11; pl. 8, figs. 4-7
Carcajou Ridge, 65° 36′ N., 128° 15′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian

27088 **Stringocephalus aleskanus** Crickmay Paratype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 12, pl. 6, figs. 1-3
Carcajou Ridge, 65° 36′ N., 128° 15′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian

27089 **Stringocephalus aleskanus** Crickmay Paratype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 12, pl. 6, fig. 6; pl. 9, figs. 2, 3
Gayna R. valley, 65° 18′ N., 129° 27′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian

27136 **Stringocephalus asteius** Crickmay Holotype
Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 28, pl. 16, figs. 1-3
Ramparts of Mackenzie R., N. W. Terr., Can.
Lower Ramparts Fm., Middle Devonian

27137- **Stringocephalus asteius** Crickmay Paratypes
27139 Crickmay, Sig. Dev. Brachiopods W. Can., Pub. by author, Calgary, 1963, p. 28, pl. 6, figs. 1-4, 8, 10-12; pl. 16, figs. 5, 6
Ramparts of Mackenzie R., N. W. Terr., Can.
Lower Ramparts Fm., Middle Devonian

26997 **Stringocephalus axius** Crickmay Holotype
Crickmay, W. Can. Sed. Basin, AAPG, Tulsa, 1954, p. 158, pl. 2, fig. 1; pl. 3, figs. 1, 2, 6; also Jr. Pal., v. 34, 1960, p. 887, figs. E1-E2
Redfern Lake, B.C., Can.
Elk Point ("Ramparts") Fm., Middle Devonian

26998 **Stringocephalus axius** Crickmay Paratype
Crickmay, W. Can. Sed. Basin, AAPG, Tulsa, 1954, p. 158, ?(pl. 2, figs. 2-9)
Redfern Lake, B.C., Can.
Elk Point ("Ramparts") Fm., Middle Devonian

27019 **Stringocephalus chasmognathus** Crickmay Holotype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 885, pl. 114, fig. 6; pl. 115, figs. 1, 4-6
7 mi. NW. of Monkman Lake, B.C, Can.
"Ramparts" Ls., Middle Devonian

27020, 27021 **Stringocephalus chasmognathus** Crickmay Paratypes
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 885, pl. 114, figs. 5, 7; pl. 115, figs. 2, 3; text-figs. C5-C9
7 mi. NW. of Monkman Lake, B.C., Can.
"Ramparts" Ls., Middle Devonian

27013 **Stringocephalus glaphyrus** Crickmay Holotype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 882, pl. 113, figs. 1-3, 5
10 mi. E. of Sentinel Peak, NW. of Monkman Lake, B.C., Can.
"Ramparts" Ls., Middle Devonian

27014 **Stringocephalus glaphyrus** Crickmay Paratype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 882, pl. 113, figs. 4, 6-8
5 mi. NW. of Fishhook Lake, B.C., Can.
"Ramparts" Ls., Middle Devonian

27015 **Stringocephalus glaphyrus** Crickmay Paratype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 882, text-figs. A1-A4
10 mi. E. of Sentinel Peak, NW. of Monkman Lake, B.C., Can.
"Ramparts" Ls., Middle Devonian

27016 **Stringocephalus sapiens** Crickmay Holotype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 882, pl. 114, figs. 2-4; text-figs. A7-A9
6 mi. E. of Sentinel Peak, NW. of Monkman Lake, B.C., Can.
"Ramparts" Ls., Middle Devonian

27017 **Stringocephalus sapiens** Crickmay Paratype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 882, pl. 113, figs. 9-12; pl. 114, fig. 1; text-figs. A10-A13
10 mi. E. of Sentinel Peak, NW. of Monkman Lake, B.C., Can.
"Ramparts" Ls., Middle Devonian

27018 **Stringocephalus sapiens** Crickmay Paratype
Crickmay, Jr. Pal., v. 34, No. 5, 1960, p. 882, text-figs. B1-B5
5 mi. NW. of headwaters of Sukunka R., B.C., Can.
"Ramparts" Ls., Middle Devonian

27086 **Stringocephalus vernaculus** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 10, pl. 7, figs. 2-7; pl. 8, figs. 1-3
2.25 mi. N. of E. end of Redfern Lake, B.C., Can.
Ramparts Fm., Middle Devonian

27082 **Stringophyllum glomerulatum** Crickmay Holotype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 7, pl. 1, fig. 15; pl. 2, fig. 6; pl. 4, fig. 8
Houston R., 65° 30′ N., 131° 15′ W., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27083 **Stringophyllum glomerulatum** Crickmay Paratype
Crickmay, New Dev. Fossils W. Can., Pub. by author, Calgary, 1962, p. 7, pl. 2, fig. 7; pl. 4, fig. 9
Houston R., 65° 30′ N., 131° 15′ W., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27595 **Strobilops labyrinthica** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 244, pl. 16, figs. 22-24
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

28736 **Strombina bassi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 96, pl. 15, fig. 17
Zone D or E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

26234 **Strombina caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 323, pl. 29, figs. 3, 4
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26230-26233 **Strombina caboblanquensis** Weisbord Paratypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 323, pl. 28, figs. 25-30; pl. 29, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., Pliocene

29702 **Strombina (Strombina ?) cantaurana** Gibson-Smith Unfigured paratypes
Gibson-Smith, Bol. Inf., AVGMP, v. 17, Nos. 4, 5, 6, 1974, p. 58
"Cantaure", Paraguana Pen., Ven.
Cantaure Fm., lower Miocene

28729 **Strombina caribaea** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 98, pl. 15, fig. 6
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28730 **Strombina cyphonotus** Pilsbry & Johnson Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 97, pl. 15, figs. 7, 8 not deposited by Cornell Univ., 1971
Locality and formation unknown

26235 **Strombina ? galba** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 329, pl. 29, figs. 5, 6
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
See Gibson-Smith, Bol. Inf., AVGMP, v. 17, Nos. 4, 5, 6, 1974, p. 57 as *Mazatlanica aciculata* (Lamarck)

28735 **Strombina nanniebellae** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 96, pl. 15, figs. 15, 16
Near Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28732 **Strombina nuestrasenorae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 98, pl. 15, fig. 11 *neustrasenorae* [*sic*], corrected in errata
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

28731 **Strombina prisma** Pilsbry & Johnson Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 97, pl. 15, figs. 9, 10 not deposited by Cornell Univ., 1971
Locality and formation unknown

28733 **Strombina pseudohaitensis** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 95, pl. 15, figs. 12, 13
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28734 **Strombina pseudohaitensis gurabensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 95, pl. 15, fig. 14
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

29701a
29701b **Strombina (Strombina ?) rutschi** Gibson-Smith Unfigured paratypes
Gibson-Smith, Bol. Inf., AVGMP, v. 17, Nos. 4, 5, 6, 1974, p. 60
Estado Falcon (type-loc. of Punta Gavilan Fm.), Ven.
Punta Gavilan Fm., Neogene

28797 **Strombinella acuformis** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 100, pl. 21, fig. 7
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
29295 **Strombus** cf. **S. aldrichi** Dall Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 107, pl. 4, fig. 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
28787, **Strombus bifrons** G. B. Sowerby, II Hypotypes
28788 Maury, B.A.P., v. 5, No. 29, 1917, p. 119, pl. 20, figs. 2, 3
Locality and formation uncertain; Dominican Rep., Miocene
29294 **Strombus** cf. **S. gigas** Linnaeus Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 109, pl. 4, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
28786 **Strombus haitensis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 118, pl. 20, fig. 1
Locality and formation uncertain; Dominican Rep., Miocene
28792 **Strombus maoensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 120, pl. 21, fig. 1
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene
28789 **Strombus proximus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 119, pl. 20, fig. 4
Locality and formation uncertain; Dominican Rep., Miocene
28790 **Strombus proximus** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 119, pl. 20, fig. 5
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
26159 **Strombus pugilis pugilis** Linnaeus Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 220, pl. 21, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26160 **Strombus pugilis pugilis** Linnaeus Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 220, pl. 21, figs. 3, 4
Near Quebrada Mare Abajo, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene
28791 **Strombus pugiloides** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 120, pl. 20, fig. 6
Rio Cana, near Cana on Guayubin to Mao Rd., Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger
26158 **Strombus** ? sp. indeterminate Brown & Pilsbry Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 223, pl. 20, figs. 15, 16
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
28343 **Stropheodonta mucronata** (Conrad) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 22, pl. 7, fig. 49
Old quarry on Six Mile Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian
28314 **Styliolina fissurella** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2. 1899, p. 19, pl. 5, fig. 7
Esty's Glen, near Ithaca, Tompkins Co., N.Y.
Geneseo Sh., Genessee Gr., Upper Devonian
27606 **Succinea gelida** F. C. Baker Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 243, pl. 17, figs. 15, 16
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

15020 **Succinea grosvenori** Lea Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 11
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene
27604 **Succinea grosvenori** Lea Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 241, pl. 17, figs. 10, 11
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene
15021 **Succinea grosvenori gelida** F. C. Baker Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, figs. 12a, 12b
Mound View Sec., Louisville, Jefferson Co., Ky.
Tazewell water deposited silt, Wisconsin Stage, Pleistocene
15022 **Succinea ovalis** Say Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 13
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene
29412 **Surcula camposi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 201, pl. 11, fig. 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
28625 **Surcula jaquensis** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 48, pl. 8, fig. 1
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
28626 **Surcula labiata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 49, pl. 8, fig. 2
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.*
Gurabo Fm., middle Miocene
28627 **Surcula riomaonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 49, pl. 8, fig. 3 not deposited by Cornell Univ., 1971
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene
29795, 29796 **Sycostoma (Sycostoma) jonesi** Adegoke Unfigured paratypes
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 146
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene
26339 **Syntomodrillia ? biconica** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 446, pl. 42, figs. 11, 12
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
25821 **Tagelus (Tagelus) affinis** (C. B. Adams) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 351, pl. 62, figs. 4, 4a
Fort Amador Beach, Panama Canal Zone Recent
25817 **Tagelus (Tagelus) dombeii** (Lamarck) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 351, pl. 62, figs. 1, 1a
Bayovar, Peru Recent
25822 **Tagelus (Tagelus) dombeii** (Lamarck) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 351, pl. 62, fig. 5
Paita, Peru Recent
25818 **Tagelus (Tagelus) peruanus** (Dunker) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 352, pl. 62, figs. 2-2b *preuanus* [*sic*]. Old Panama, Panama Recent
25819 **Tagelus (Mesopleura) peruvianus** Pilsbry & Olsson Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 353, pl. 62, fig. 3
Zorritos, Peru Recent

25820 **Tagelus (Mesopleura) peruvianus** Pilsbry & Olsson Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 353, pl. 62, figs. 3a, 3d
Figs. 3b, 3c not deposited, 1961
Santa Elena, Ecuador Recent

26819, 26820 **Tagelus plebeius** (Solander) [Lightfoot] Hypotypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 373, pl. 54, figs. 1-4
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

25823 **Tagelus (Mesopleura) politus** (Carpenter) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 352, pl. 62, figs. 7, 7a
Puerto Pizarro, Peru Recent

29574 **Tagelus whitei** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 367, pl. 20, fig. 1
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

20512 **Tarphypygus clarki** (Lambert) Hypotype
Durham, Calif. Univ., Publ. Geol. Sci., v. 31, 1955, p. 138, figs. 14b, 28a
Also Treat. Invert. Pal., GSA, Univ. Kansas Press, Part U (Echinodermata 3), v. 2, 1966, p. U471, fig. 339E
3 km. NW. of Carlos Rojas, Matanzas Prov., Cuba (See R. Palmer, B.A.P., v. 31, No. 128, 1948, p. 122, loc. 2138)
Upper Eocene

20513 **Tarphypygus clarki** (Lambert) Hypotypes
Durham, Calif. Univ., Publ. Geol. Sci., v. 31, 1955, p. 138, fig. 12e
Also Treat. Invert. Pal., GSA, Univ. Kansas Press, Part U (Echinodermata 3), v. 2, 1966, p. U471, figs. 343(1b), 362(3d)
2 mi. N. of Carretera Central on rd. to San Diego de los Baños, Pinar del Rio Prov., Cuba (loc. 1002 of R. Palmer)
Upper Eocene sandstone

26354 **Tectonatica antilleana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 249, pl. 43, figs. 22, 23
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26177 **Tectonatica venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 248, pl. 23, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26035 **Tegula (Agathistoma) maculostriata** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 75, pl. 5, figs. 17-19
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26034 **Tegula phalera** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 81, pl. 5, figs. 14-16
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26032 **Tegula (Agathistoma) puntagordana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 78, pl. 5, figs. 8-10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26033 **Tegula (Agathistoma) trilirata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 79, pl. 5, figs. 11-13
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26394 **Tegula (Agathistoma) trilirata** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 79
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26030 **Tegula (Agathistoma) viridula** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 76, pl. 5, fig. 5, operculum
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26029 **Tegula (Agathistoma) viridula** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 76, pl. 5, figs. 2-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26031 **Tegula (Agathistoma) viridula** (Gmelin) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 76, pl. 5, figs. 6, 7
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

26090 **Teinostoma (Pseudorotella) antilleanum** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 131, pl. 12, figs. 7-9 not PRI 26089 as in expl.
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

1105 **Teinostoma caroniense** Maury Syntype
Designated lectotype by Jung, B.A.P., v. 55, No. 247, 1969, p. 428
See Brann & Kent, p. 836

28862 **Teinostoma sandomingense** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 156, pl. 24, fig. 24
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm, lower Miocene

25865, 25865a **Tellidora burneti** (Broderip & Sowerby) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 381, pl. 69, fig. 1?
Figs. 1a, 1b not deposited, 1961. Unfigured hypotype = PRI 25865a
Fort Amador Beach, Balboa, Panama Canal Zone Recent

26788 **Tellina (Eurytellina) alternata** ? Say Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 342, pl. 49, figs. 11, 12
Quebrada Las Bruscas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29563 **Tellina celetes** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 357, pl. 19, fig. 7
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29016 **Tellina (Scissula) cercadica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 224, pl. 38, fig. 9
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29017 **Tellina cibaoica** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 223, pl. 38, fig. 10
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

26790 **Tellina (Merisca) cristallina** Spengler Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 343, pl. 50, figs. 1, 2
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26789 **Tellina (Merisca) cristallina** Spengler Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 343, pl. 49, figs. 13, 14
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29012 **Tellina (Merisca) crystallina** Spengler [**cristallina**] Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 223, pl. 38, fig. 4 broken before 1977
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

25862 **Tellina (Tellina) cumingii** Hanley Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 379, pl. 68, fig. 13
not PRI 26862; pl. 69, fig. 3
Pearl Islands, Panama Recent

29014 **Tellina islahispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 221, pl. 38, fig. 6
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29013 **Tellina maoica** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 223, pl. 38, fig. 5
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm, lower Miocene

26784- **Tellina (Eurytellina) nitens** C. B. Adams Hypotypes
26787 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 339, pl. 49, figs. 3-10
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27419 **Tellina (Eurytellina) paraguanensis** H. K. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 472 Unfigured hypotypes†
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26782 **Tellina (Eurytellina) punicea** Born Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 335, pl. 48, figs. 14, 15
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26783 **Tellina (Eurytellina) punicea** Born Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 335, pl. 49, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

29011 **Tellina riocanensis** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 220, pl. 38, fig. 3
Zone H, ford of Sabaneta to Cercado Rd., Rio Cana, Dominican Rep.*
Cercado Fm., lower Miocene

29018 **Tellina (Merisca) sanctidominici** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 224, pl. 38, fig. 11
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29019 **Tellina (Scissula) scitula** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 225, pl. 38, fig. 12 broken before 1977
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.*
Cercado Fm., lower Miocene

26781 **Tellina (Tellina ?)** sp. indeterminate Figured specimen
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 335, pl. 48, fig. 13
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29015 **Tellina waylandvaughani** Maury Syntypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 222, pl. 38, figs. 7, 8
Fig. 7 slightly broken prior to 1977
Zone G, Rio Gurabo, 2 mi. above Los Quemados, Dominican Rep.
Cercado Fm., lower Miocene

25856 **Tellinidella princeps** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 399, pl. 68, fig. 3
Puerto Chame, Panama Recent

25884 **Tellinidella princeps** (Hanley) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 399, pl. 72, fig. 1
El Lagartillo, Bahia Honda, Panama Recent

25885 **Tellinidella purpurea** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 399, pl. 72, fig. 2
Búcaro, Panama Recent
28337 **Tentaculites spiculus** Hall **Figured specimen**
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 37
Cascadilla Creek, Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian
26949 **Tenticospirifer keleticus** Crickmay **Holotype**
Crickmay, Jr. Pal., v. 26, No. 4, 1952, p. 603, pl. 73, figs. 10-13, 16-17
Mackenzie R., 8 mi. above mouth of N. Nahanni R., N. W. Terr., Can.
"*Leiorhynchus* Ls.", late Upper Devonian
25916, **Tenuicorbula tenuis** (G. B. Sowerby, I) Hypotype
25916a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 434, pl. 77, fig. 3 not deposited, 1961. Unfigured hypotype = PRI 25916a
Venado Beach, Panama Canal Zone Recent
25917, **Tenuicorbula tenuis** (G. B. Sowerby, I) Hypotype
25917a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 434, pl. 77, fig. 3a not deposited, 1961. Unfigured hypotype = PRI 25917a
Isla del Gallo, Colombia Recent
26439 **Terebra andrega** de Gregorio ?Unfigured syntypes
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 17, pl. 1, ? figs. 43, 44)
There are 3 broken specimens, but a positive identification with de Gregorios' figures cannot be made
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 947 as *Terebra mirula* de Gregorio ?(holotype lost)
28594, **Terebra berlinerae** Maury Syntypes
28595 Maury, B.A.P., v. 5, No. 29, 1917, p. 34, pl. 4, figs. 7, 8
Rio Cana, near Caimito, Dominican Rep.
Cercado Fm., lower Miocene
28581 **Terebra bipartita** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 23, pl. 3, fig. 14
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
See Jung, B.A.P., v. 49, No. 223, 1965, p. 584 as *T. sulcifera* G. B. Sowerby, II

Terebra bipartita G. B. Sowerby, II
See *T. sulcifera* G. B. Sowerby, II, PRI 1003, 20865, 20866

28587 **Terebra cambiarsoi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 27, pl. 3, fig. 20
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
26328 **Terebra (Hastula) cinerea** (Born) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 432, pl. 41, figs. 5, 6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent
26329 **Terebra (Hastula) cinerea** (Born) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 432, pl. 41, figs. 7, 8
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene
28584 **Terebra cirrus** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 25, pl. 3, fig. 17
Locality uncertain; Dominican Rep.
Cercado Fm., lower Miocene

29383 **Terebra clethra** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 199, pl. 10, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29384, 29396 **Terebra denotans** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 193, pl. 10, figs. 4, 17
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29385 **Terebra derbyi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 397, pl. 10, fig. 5
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29392 **Terebra estaciana** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 399, pl. 10, fig. 12
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28592 **Terebra gatunensis** Toula Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 31, pl. 4, fig. 5
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

26324 **Terebra (Strioterebrum) gatunensis kugleri** Rutsch Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 428, pl. 40, figs. 12, 13
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26377 **Terebra (Strioterebrum) gatunensis kugleri** Rutsch Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 428, pl. 45, figs. 24, 25
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28586 **Terebra gausapata laevifasciola** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 27, pl. 3, fig. 19
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28590 **Terebra haitensis** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 30, pl. 4, fig. 3
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene
See Olsson, "Some Tertiary Moll. . .", PRI, 1967, p. 15 as *Terebra (Oreoterebra) mauryae* Olsson, n. sp.

26330 **Terebra (Hastula) hastata mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 434, pl. 41, figs. 9, 10
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26331 **Terebra (Hastula) hastata mareana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 434, pl. 41, figs. 11, 12
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27491 **Terebra (Strioterebrum) hoffmeyeri** Abbott Paratypes
Abbott, Nautilus, v. 65, No. 3, p. 78 2 specimens, Mrs. W. J. Hamilton, Jr. donor
Pasay Beach, Manila Bay, Luzon Id., Philippines
Recent

27641 **Terebra (Strioterebrum) hoffmeyeri** Abbott Paratypes
Abbott, Nautilus, v. 65, No. 3, 1952, p. 78 3 specimens, Ruth A. Craine donor
Pasay Beach, Manila Bay, Luzon Id., Philippines
Recent

27448 **Terebra (Paraterebra) inaequalis** G. B. Sowerby, II
Jung, B.A.P., v. 49, No. 223, 1965, p. 581 Unfigured hypotype
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28589 **Terebra inaequalis** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 29, pl. 4, fig. 2
Zone D or E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

Terebra isaacpetiti Maury
See *T. petiti* Maury

Terebra mauryae Olsson
See *T. haitensis* Dall

Terebra mirula de Gregorio
See *T. andrega* de Gregorio

28585 **Terebra oligomitra** Dall Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 26, pl. 3, fig. 18
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

29390 **Terebra paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 197, pl. 10, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29393 **Terebra cf. T. paraensis** Maury Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 197, pl. 10, fig. 13
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29389, 29391, 29397 **Terebra peramabilis** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 195, pl. 10, figs. 9, 11, 18
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28591 **Terebra petiti** Maury, 1917 = **T. isaacpetiti** Maury, 1925
Maury, B.A.P., v. 5, No. 29, 1917, p. 31, pl. 4, fig. 4 Holotype
Zone A, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 184 (*T. petiti* preoccupied)
See Olsson, "Some Tertiary Moll. . .", PRI, 1967, p. 16, pl. 3, figs. 4, 4a

28588 **Terebra protexta** (Conrad) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 28, pl. 4, fig. 1
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

26326 **Terebra (Strioterebrum) quadrispiralis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 431, pl. 41, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26327 **Terebra (Strioterebrum) quadrispiralis** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 431, pl. 41, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27451 **Terebra (Strioterebrum)** sp. A Unfigured specimens
Jung, B.A.P., v. 49, No. 223, 1965, p. 590
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Terebra sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 66, pl. 10, fig. 2 not deposited by Cornell Univ., 1971. Presumed lost
Road south of Pitch Lake, Brighton, Trinidad
Yellow-brown marl, upper Miocene See Jung, B.A.P., v. 55, No. 247, 1969, as upper Morne l'Enfer Fm., lower Pliocene

28582, **Terebra spirifera** Dall Hypotypes
28583 Maury, B.A.P., v. 5, No. 29, 1917, p. 24, pl. 3, figs. 15, 16
Locality uncertain; Dominican Rep., Cercado Fm., lower Miocene

1003 **Terebra (Paraterebra) sulcifera** G. B. Sowerby, II
Jung, B.A.P., v. 49, No. 223, 1965, p. 584 for *T. bipartita* G. B. Sowerby, II, *in* Brann & Kent, p. 848

20865, **Terebra (Paraterebra) sulcifera** G. B. Sowerby, II
20866 Jung, B.A.P., v. 49, No. 223, 1965, p. 584 for *T. bipartita* G. B. Sowerby, II, *in* Brann & Kent, p. 848

27449 **Terebra (Paraterebra) sulcifera** G. B. Sowerby, II
Jung, B.A.P., v. 49, No. 223, 1965, p. 584 Unfigured hypotypes
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28580 **Terebra sulcifera** G. B. Sowerby, II Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 22, pl. 3, fig. 12
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene
See Olsson "Some Tertiary Moll. . .", PRI, 1967, p. 13, pl. 4, fig. 6 (incorrectly labeled as *T. inaequalis* G. B. Sowerby, I in plate)

Terebra sulcifera G. B. Sowerby, II
See *T. bipartita* G. B. Sowerby, II, PRI 28581

26325 **Terebra (Strioterebrum) trispiralis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 430, pl. 40, figs. 14, 15
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

27450 **Terebra (Strioterebrum) ulloa** Olsson Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 586
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28282 **Terebra unilineata** Tuomey & Holmes Hypotype
Emmons, B.A.P., v. 56, No. 249, 1969, Reprint (in part) N. Carolina Geol. Surv. Rept., 1858, p. 258(167), fig. 129?
Miocene marl beds of eastern N. Carolina

28593 **Terebra wolfgangi** Toula Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 33, pl. 4, fig. 6
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

196, **Terebralia dentilabris** (Gabb)
197 Hoerle, Tulane Stud. Geol., v. 10, No. 1, 1972, p. 20, for *Pyrazisinus harrisi* Maury *in* Brann & Kent, p. 761

28560, **Terebratula stantoni** Maury Holotype
28564 Maury, A.N.S.P., Jr., v. 15, 1912, p. 104, pl. 13, figs. 17, 18
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
G. A. Cooper of the Nat. Mus. Nat. Hist. (USNM) examined the figured specimen (PRI 28560) and three unfigured specimens (PRI 28564), and thinks, in a forthcoming paper on Cuban brachiopods, they are *Gryphus* ?

29040 **Teredo incrassata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 235, pl. 39, fig. 24
Locality and formation uncertain; Dominican Rep., Miocene

26449 **Teredo simplexopsis** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 8, 1890, p. 236, pl. 38, figs. 26a-b
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene

27154 **Textularia articulata** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 4, pl. 1, fig. 1
Well 3-N, 95', York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene

7000 **Textularia candeiana** d'Orbigny Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 223 *canadeiana* [*sic*]
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27214 **Textularia candeiana** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 4, pl. 1, fig. 3
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27253 **Textularia candeiana** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 4, pl. 1, fig. 2
0.7 mi. NE. of Benns Church, Isle of Wight Co., Va.
? Yorktown Fm., Miocene

29900 **Textularia candeiana** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 133, pl. 8, fig. 1
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7001 **Textularia eustisensis** McLean Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 223
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7002 **Textularia gramen** d'Orbigny Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 223
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29901 **Textularia gramen** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 133, pl. 8, fig. 2
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

7003 **Textularia mayori** Cushman Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 223
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

29902 **Textularia mayori** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 133, pl. 8, fig. 3
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

27316 **Textularia obliqua** Clapp Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 6, pl. 1, fig. 6
Offshore well A-11, 165', near Newport News, Va.
St. Marys Fm., Miocene

7005 **Textularia pseudobliqua** McLean Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 224
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27178 **Textularia pseudobliqua** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 7, pl. 1, fig. 5
Well 3-S, 135', York R., between Gloucester Pt. and Yorktown, York Co., Va.
Bottom of St. Marys Fm., Miocene

27192 **Textularia pseudobliqua** McLean, 1956 Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 7, pl. 1, fig. 4
Offshore well A-11, 185', near Newport News, Va.
Top of Choptank Fm., Miocene

7007 **Textularia** spp. Unfigured specimens
Sabol, B.A.P., v. 41, No. 191, 1960, p. 224
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27172 **Textularia** sp. A Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 7, pl. 1, fig. 7
Well 3-S, 95′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Top of St. Marys Fm., Miocene

27181 **Textularia** sp. A Figured specimen
McLean, Va., Div. Min. Res., RI No. 9, 1966, p. 7, pl. 1, fig. 8
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27255 **Textularia** sp. B Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 8, pl. 2, fig. 1
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

27210 **Textularia** sp. C Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 8, pl. 2, fig. 2
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

7004 **Textularia yorktownensis** McLean Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 224
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

7006 **Textularia yorktownensis** McLean Hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 224, pl. 27, figs. 1a, 1b
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

26209 **Thais (Stramonita) chocolata** (Duclos) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 303, pl. 27, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26208 **Thais (Stramonita) haemastoma** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 300, pl. 27, figs. 3, 4
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26207 **Thais (Stramonita) rustica** (Lamarck) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 299, pl. 27, figs. 1, 2
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25945, **Thracia colpoica** Dall Hypotypes
25945a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 458, pl. 83, fig. 7a
Fig. 7 not deposited, 1961. Unfigured hypotype = PRI 25945a
Tumbez, Peru Recent

26403 **Thuramminoides sphaeroidalis** Plummer Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 243
4.5 mi. SSE. of Stanford, Lincoln Co., Ky.
New Providence Fm., Lower Mississippian

7099, **Thyasira adoccasa** Van Winkle Syntypes
7100 Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 25, pl. 3, figs. 15, 16
1 mi. W. of Godineau R., shore of Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Tertiary
See *Unio* sp. indet. (PRI 28454)

29794 **Tibia (?Amplogladius) oppenheimi** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 132
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

Tingella timetea (Crickmay)
See *Warrenella timetea* Crickmay

25716 **Tivela (Pachydesma) argentina** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 270, pl. 44, fig. 1 *argenta* [*sic*]
Buenaventura, Colombia Recent

Tivela austeniana (Maury)
See *Mactra austeniana* Maury

25718 **Tivela (Tivela) byronensis** (Gray) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 267, pl. 44, fig. 3
San Pedro, near Manglaralto, Ecuador Recent

25722 **Tivela (Tivela) delessertii** (Deshayes in G. B. Sowerby, II) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 268, pl. 44, figs. 9, 9a
Acapulco, Mexico Recent

25719 **Tivela (Planitivela) hians** (Philippi) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 270, pl. 44, figs. 4-4b
Negritos, Peru Recent

26712, **Tivela (Tivela) mactroides** (Born) Hypotypes
26713 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 276, pl. 39, figs. 7-11
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

26714 **Tivela (Tivela) mactroides** (Born) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 276, pl. 39, figs. 12, 13
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

Tivela nasuta austeniana (Maury)
See *Mactra austeniana* Maury

25720 **Tivela (Planitivela) planulata** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 269, pl. 44, fig. 5
San Pedro, near Manglaralto, Ecuador Recent

25721 **Tivela (Planitivela) planulata** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E., Pacific, PRI, 1961, p. 269, pl. 44, fig. 5a
Boca Pan, Peru Recent

25717 **Tivela (Planitivela) undulata** (G. B. Sowerby, II) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 270, pl. 44, figs. 2, 2a
Charapota, Ecuador Recent

26715 **Tivela (Planitivela) venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 279, pl. 40, figs. 1, 2
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26677 **Tivela (Planitivela) venezuelana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 279, pl. 33, fig. 7
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26716 **Tivela (Planitivela) venezuelana** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 279, pl. 40, figs. 3, 4
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26417 **Tolypammina jacobschapelensis** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 303
1 mi. NW. of Jacobs Chapel Church, Floyd Co., Ind.
Rockford Ls., Lower Mississippian

26418 **Tolypammina tortuosa** Dunn Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 307
1 mi. NW. of Jacobs Chapel Church, Floyd Co., Ind.
Rockford Ls., Lower Mississippian

26185 **Tonna galea** ? (Linnaeus) Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 274, pl. 24, figs. 3, 4
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26186 **Tonna (Cadus) maculosa** (Dillwyn) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 275, pl. 24, figs. 5, 6
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26187 **Tonna (Cadus) maculosa catiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 277, pl. 24, figs. 7, 8
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28335 **Tornoceras peracutum** (Hall) Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 21, pl. 6, fig. 35
Ithaca, Tompkins Co., N.Y.
Ithaca Fm., Genessee Gr., Upper Devonian

29782 **Torquesia adabionensis** (Oppenheim) Unfigured hypotype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 91
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29784, **Torquesia oppenheimi** Adegoke Unfigured paratypes
29785 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 92
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

25672 **Trachycardium (Phlogocardia) belcheri** (Broderip & Sowerby)
Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 246, pl. 37, fig. 2
Esmeraldas, Ecuador Recent

25671 **Trachycardium (Trachycardium) consors** (G. B. Sowerby, I)
Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 245, pl. 37, fig. 1
Pearl Islands, Panama Recent

26691 **Trachycardium (Trachycardium)** cf. **T. isocardia** (Linnaeus)
Weisbord, B.A.P., v. 45, No. 204, 1964, Figured specimen
p. 253, pl. 35, fig. 9; pl. 36, fig. 1
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

29826 **Trachycardium mamillatum** Furon Unfigured hypotype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 272
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

26687, **Trachycardium (Dallocardia) muricatum** (Linnaeus) Hypotypes
26688 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 250, pl. 35, figs. 1-4
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26689 **Trachycardium (Dallocardia) muricatum** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 250, pl. 35, figs. 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26690 **Trachycardium (Dallocardia) muricatum** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 250, pl. 35, figs. 7, 8
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25673 **Trachycardium (Dallocardia) senticosum** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 246, pl. 37, fig. 3
Manta, Ecuador Recent
26724 **Transennella caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 283, pl. 41, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26725, **Transennella caboblanquensis** Weisbord Paratypes
26726 Weisbord, B.A.P., v. 45, No. 204, 1964, p. 283, pl. 41, figs. 3-6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26727 **Transennella caboblanquensis** Weisbord Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 283, pl. 41, figs. 7, 8
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene
25728 **Transennella modesta** (G. B. Sowerby, I) Hypotypes
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 280, pl. 46, figs. 4-4b
Búcaro, Panama Recent
25727 **Transennella pannosa** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 281, pl. 46, fig. 3
Bahia Lagunillas, Paracas Pen., Peru Recent
26728 **Transennella venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 285, pl. 41, figs. 9, 10 *Transennela* [*sic*]
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
8238 **Transovula (Oxycypraea) producta** Dockery Holotype
Dockery, Miss. State Geol. Surv., Bull. 120, 1977, p. 61, pl. 7, fig. 10
Ravine at Riverside Park, near Pearl R., Jackson, Hinds Co., Miss.
Moodys Branch Fm., Jackson Gr., upper Eocene
27520 **Trematooecia cheethami** Weisbord Holotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 106, pl. 9, figs. 1, 2
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm, lower Pliocene
27504 **Trematooecia cheethami** Weisbord Paratype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 106, pl. 2, figs. 12, 13; pl. 9, fig. 3
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
27504a **Trematooecia cheethami** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 106
About 300 m. WNW. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26422 **Trepeilopsis glomospiroides** Gutschick & Treckman
Conkin, B.A.P., v. 43, No. 196, 1961, p. 314 Unfigured hypotype
Bainbridge, Ross Co., Ohio
Cuyahoga Fm., Lower Mississippian
26423 **Trepeilopsis spiralis** Gutschick & Treckman Unfigured hypotype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 317
1 mi. NW. of Jacobs Chapel Church, Floyd Co., Ind.
Rockford Ls., Lower Mississippian
26048 **Tricolia affinis cruenta** Robertson Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 101, pl. 7, figs. 8, 9
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26386 **Tricolia depressa** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 106, pl. 47, figs. 19-21
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26052 **Tricolia fasciata** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 105, pl. 7, figs. 16, 17
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26053 **Tricolia maiquetiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 107, pl. 7, figs. 18-20
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26051 **Tricolia mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 104, pl. 7, figs. 14, 15
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26050 **Tricolia rubrica** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 102, pl. 7, figs. 12, 13
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26049 **Tricolia tessellata** (Potiez & Michaud) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 108, pl. 7, figs. 10, 11
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

29972 **Trifarina bradyi** Cushman Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 144, pl. 12, fig. 65
Well, 55-60', N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

28801 **Triforis calypsonis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 122, pl. 21, fig. 13
Locality and formation uncertain (given in errata)
Dominican Rep., Miocene

25675 **Trigoniocardia (Trigoniocardia) biangulata** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 251, pl. 37, figs. 6, 6a
Pearl Islands, Panama Recent

26692 **Trigoniocardia (Trigoniocardia) caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 256, pl. 35, figs. 10, 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26693, 26696 26697 **Trigoniocardia (Trigoniocardia) caboblanquensis** Weisbord Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 256, pl. 35, fig. 12; pl. 36, figs. 2-6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

25681, 25681a **Trigoniocardia (Trigoniocardia) granifera** (Broderip & Sowerby) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 251, pl. 38, fig. 3. Unfigured hypotype = PRI 25681a
Esmeraldas, Ecuador Recent

25678 **Trigoniocardia (Americardia) guanacastense** Hertlein & Strong Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 252, pl. 37, fig. 9. Fig. 9a not deposited, 1961
San Pedro, Santa Elena, Ecuador Recent

27423 **Trigoniocardia hannai** Olsson Unfigured hypotypes
Jung, B.A.P., v. 49, No. 223, 1965, p. 454
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Trigoniocardia maturensis Dall
See *Cardium carolinae* Maury

26698 **Trigoniocardia (Americardia) media** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 262, pl. 36, figs. 7, 8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26699 **Trigoniocardia (Americardia) media** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 262, pl. 36, figs. 9-12
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

25682, **Trigoniocardia (Apiocardia) obovale** (G. B. Sowerby, I)
25682a Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 253, Hypotype
pl. 38, fig. 4 not deposited, 1961. Unfigured hypotypes = PRI 25682a
Zorritos, Peru Recent

6068 **Trigonostoma (Emmonsella) betsiae** Olsson & Petit
Unfigured paratype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 544
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

6069 **Trigonostoma (Emmonsella) elizabethae** Olsson & Petit
Unfigured paratype
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 543
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

27540 **Trigonostoma (Extractrix) hoerlei** Olsson Unfigured paratype
Olsson, "Some Tert. Moll. . .", PRI, 1967, p. 24
Kissimmee, Osceola Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

27436 **Trigonostoma woodringi** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 557, pl. 76, figs. 1, 2
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

15027 **Triodopsis multilineata** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 22, figs. 5a, 5b
Blevin's Gap Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27594 **Triodopsis multilineata** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 220, pl. 16, figs. 19-21
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

26133 **Triphora (Cosmotriphora) caribbeana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 196, pl. 16, figs. 20, 21
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26132 **Triphora (Cosmotriphora) decorata** (C. B. Adams) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 194, pl. 16, figs. 18, 19
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27660- **Tripneustes cf. T. ventricosus** (Lamarck) Figured specimens
27663 Weisbord, B.A.P., v. 56, No. 252, 1969, p. 294, pl. 15, figs. 6-13
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

Tripterotyphis norfolkensis (Fleming)
See *Pterynotus norfolkensis* Fleming

28740, **Tritia golfoyaquensis** Maury Syntypes
28741 Maury, B.A.P., v. 5, No. 29, 1917, p. 92, pl. 15, figs. 24, 25
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26433 **Triton ? (Murotriton) grassator** de Gregorio Syntype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 97, pl. 7, figs. 41, 42
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 785 as *Murotriton grassator* de Gregorio

29797, **Tritonidea africana** Adegoke Unfigured paratypes
29798 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 151
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29338 **Tritonidea amazonica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 129, pl. 7, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29315 **Tritonidea arcana** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 129, pl. 6, fig. 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28783 **Trivia globosa** Gray Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 117, pl. 19, fig. 13
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28784 **Trivia islahispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 117, pl. 19, fig. 14?
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm, lower Miocene

26161, **Trivia pediculus** (Linnaeus) Hypotypes
26162 Weisbord, B.A.P., v. 42, No. 193, 1962, p. 226, pl. 21, figs. 5-8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26163 **Trivia pediculus** (Linnaeus) Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 226, pl. 21, figs. 9, 10
Playa Grande village, Cabo Blanco, Ven.
Abisinia Fm., Pleistocene

28785 **Trivia suffusa sanctidominici** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 117, pl. 19, fig. 15
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26425 **Trochammina ohioensis** Conkin Unfigured paratype
Conkin, B.A.P., v. 43, No. 196, 1961, p. 335
Armstrong, Wayne Co., Ohio
Cuyahoga Fm., Lower Mississippian

27304 **Trochammina** sp. Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 10, pl. 3, fig. 3
Well 3-N, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

28510, **Trophon progne**? White Figured specimens
28511 Maury, A.N.S.P., Jr., v. 15, 1912, p. 81, pl. 11, figs. 7, 8
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

Trophon tenuisculptus Carpenter
See *Boreotrophon tenuisculptus* (Carpenter)

29352 **Trophon (Boreotrophon) tropica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 145, pl. 8, fig. 15
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

27524 **Trypostega venusta** (Norman) Hypotype
Weisbord, B.A.P., v. 53, No. 237, 1967, p. 49, pl. 11, fig. 1
not PRI 26524 as in expl.
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

25555 **Tucetona strigilata** (G. B. Sowerby, I) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 107, pl. 11, fig. 3 *Tucetoma* [*sic*]
Viveros Is., Pearl Islands, Panama Recent

25785 **Tumbeziconcha thracoides** (Adams & Reeve) Hypotype
Olsson, Moll. Trop. E. Pacific, PRI, 1961, p. 333, pl. 56, fig. 3
Tumbez, Peru Recent

26917, **Turbinella angulata** (Solander) [Lightfoot] Hypotypes
26917a Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 62, pl. 3, figs. 2a, 2b
Harney Pond Canal spoil banks, Glades Co., Fla.
Caloosahatchee Fm., Pliocene

26914 **Turbinella chipolana** Dall Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 58, pl. 2, fig. 1c
Ten Mile Creek, about 1 mi. W. of Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

26918 **Turbinella dalli** E. H. Vokes Holotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 59, pl. 2, figs. 2a, 2b
Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

26919 **Turbinella dalli** E. H. Vokes Paratype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 59, pl. 2, fig. 2c
Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

26909 **Turbinella dodonaia** (Gardner) Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 50, pl. 1, fig. 2a
About .5 mi. below Four Mile Creek, Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

26910 **Turbinella dodonaia** (Gardner) Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 50, pl. 1, fig. 2b
Above Farley Creek, Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

26911 **Turbinella dodonaia** (Gardner) Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 50, pl. 1, fig. 2c
Chipola R., Calhoun Co., Fla.
Chipola Fm., lower Miocene

27482 **Turbinella falconensis** (H. K. Hodson) Unfigured hypotypes†
Jung, B.A.P., v. 49, No. 223, 1965, p. 544
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Turbinella praelaevigata E. H. Vokes
See *Xancus praeovoideus* Maury

26912 **Turbinella regina** Heilprin Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 55, pl. 3, fig. 3a
Spoil banks, Miami Canal, Palm Beach Co., Fla.
Caloosahatchee Fm. (not Unnamed u. Miocene Fm., as in expl.), Pliocene

26913 **Turbinella regina** Heilprin Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 55, pl. 3, fig. 3b
Harney Pond Canal spoil banks, Glades Co., Fla.
Caloosahatchee Fm., Pliocene

1116 **Turbinella riosecana** (H. K. Hodson)
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 53, for *Xancus praeovoideus* Maury (*praevoideus* [*sic*]) *in* Brann & Kent, p. 981

26915 **Turbinella scolymoides** Dall Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 61, pl. 3, fig. 1a
About 2 mi. W. of La Belle, Caloosahatchee R., Hendry Co., Fla.
Caloosahatchee Fm., Pliocene

26916 **Turbinella scolymoides** Dall Hypotype
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 61, pl. 3, fig. 1b
North New River Canal, 1 mi. S. of South Bay, Palm Beach Co., Fla.
Unnamed post-Caloosahatchee Fm., Pleistocene

24102 **Turbinella valida** G. B. Sowerby, II
Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 47 for *Xancus aviaguensis* H. K. Hodson *in* Brann & Kent, p. 980

26038 **Turbo caboblanquensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 84, pl. 6, figs. 4, 5
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28853 **Turbo crenulatoides** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 153, pl. 24, fig. 14
Locality and formation uncertain; Dominican Rep., Miocene

26040 **Turbo (Marmorostoma) crenulatus venezuelensis** Weisbord
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 87, pl. 6, figs. 8, 9 Holotype
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28854 **Turbo dominicensis laloi** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 154, pl. 24, fig. 15
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

26039 **Turbo (Taeniaturbo ?) marensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 86, pl. 6, figs. 6, 7
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26041 **Turbo** sp. "a" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 90, pl. 6, figs. 10, 11 operculum
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26042 **Turbo** sp. "b" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 92, pl. 6, figs. 12, 13 operculum
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26043 **Turbo** sp. "c" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 93, pl. 6, figs. 14, 15 operculum
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28875 **Turbonilla (Chemnitzia) cercadensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 148, pl. 25, fig. 13
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm, lower Miocene

28876 **Turbonilla (Strioturbonilla) dominicensis** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 148, pl. 25, fig. 14
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28877 **Turbonilla (Pyrgiscus) karlschmidti** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 149, pl. 25, fig. 15
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26363 **Turbonilla marella** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 471, pl. 44, figs. 17, 18
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28882 **Turbonilla (Mormula) nanniebellae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 150, pl. 25, fig. 20
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28873 **Turbonilla (Chemnitzia) ogilvieae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 147, pl. 25, fig. 11
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28878 **Turbonilla (Pyrgiscus) olssoni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 149, pl. 25, fig. 16
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26366 **Turbonilla (Nisiturris) pupapicula** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 473, pl. 45, figs. 2, 3; pl. 46, figs. 1, 2
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26364 **Turbonilla (Chemnitzia) pustulella** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 472, pl. 44, figs. 19, 20
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

26400 **Turbonilla (Chemnitzia) pustulella** Weisbord Unfigured paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 472
La Salina de Guaiguaza, W. of Puerto Cabello, St. of Carabobo, Ven.
Guaiguaza Clay, upper Pliocene

28880 **Turbonilla (Pyrgiscus) riomaoensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 150, pl. 25, fig. 18
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

26365 **Turbonilla (Chemnitzia ?) sp.** Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 473, pl. 45, fig. 1
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28881 **Turbonilla (Visma) turritelloides** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 150, pl. 25, fig. 19
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28879 **Turbonilla (Pyrgiscus) turritissima** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 149, pl. 25, fig. 17
Locality uncertain, Dominican Rep.
Cercado Fm., lower Miocene

28874 **Turbonilla (Chemnitzia) yaquensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 147, pl. 25, fig. 12
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene

28700, **Turricula (Costellaria) bullennewtoni** Maury Syntypes
28701 Maury, B.A.P., v. 5, No. 29, 1917, p. 77, pl. 12, figs. 6, 6a
Zone D or E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28632 **Turris albida antillarum** (Crosse) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 50, pl. 8, fig. 8
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

28629 **Turris albida barretti** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 50, pl. 8, fig. 5
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28628 **Turris albida haitensis** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 50, pl. 8, fig. 4
Locality and formation uncertain; Dominican Rep., Miocene

29407 **Turris albida paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 199, pl. 11, fig. 9
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28631 **Turris albida tellea** (Dall) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 50, pl. 8, fig. 7
Zone A, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep
Gurabo Fm., middle Miocene

28630 **Turris albida virgo** (Lamarck) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 50, pl. 8, fig. 6
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

29269 **Turritella agronomica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 393, pl. 3, fig. 6
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

7070, **Turritella** cf. **T. alticostata** Conrad Unfigured specimens
7080 Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

Turritella altilira tornata Guppy
See *T. tornata* Guppy

26438 **Turritella apita** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 123, pl. 11, fig. 8
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene

29277, **Turritella callizona** Maury Plastotype
29277A Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 85, pl. 3, fig. 15
Unfigured plastotype = PRI 29277A
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

Turritella carinata I. Lea
See *T.* mut. *tiga* de Gregorio

Turritella carlottae F. Hodson
See *T. tornata* Guppy

27425 **Turritella cocoditana** F. Hodson Unfigured hypotypes†
Jung, B.A.P., v. 49, No. 223, 1965, p. 481
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

Turritella ghigna de Gregorio
See *T. litripa* de Gregorio

28538 **Turritella humerosa elicitatoides** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 93, pl. 12, fig. 22
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

26441 **Turritella litripa** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 125, pl. 11, fig. 20
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 988 as *Turritella ghigna* de Gregorio

27426 **Turritella machapoorensis paraguanensis** F. Hodson
Jung, B.A.P., v. 49, No. 223, 1965, p. 482 Unfigured hypotype†
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

26079 **Turritella maiquetiana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 146, pl. 11, fig. 3
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

26080 **Turritella maiquetiana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 146, pl. 11, figs. 4-6
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26081-26086 **Turritella maiquetiana** Weisbord Paratypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 146, pl. 11, figs. 7-16
Quebrada Las Pailas, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26078 **Turritella maiquetiana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 146, pl. 11, figs. 1, 2
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

21492, 21493, 21496, 21497, 21577 **Turritella matarucana** F. Hodson
Woodring, U.S.G.S. Prof. Paper 306-A, 1957, p. 107 for *T. plebeia alowensi* F. Hodson *in* Brann & Kent, pp. 932, 933

21523 **Turritella matarucana** F. Hodson
Woodring, U.S.G.S. Prof. Paper 306-A, 1957, p. 107 for *T. plebeia alowensi* F. Hodson *in* Brann & Kent, p. 933

Turritella mauryae F. Hodson
See *T. planigyrata* Guppy

26442 **Turritella mela** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 127, pl. 11, fig. 40
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Upper Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 998 as *Turritella nasuta* Gabb variation

29268, 29274 **Turritella meunieri** Maury Plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 87, pl. 3, figs. 5, 12
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28539 **Turritella mortoni** Conrad Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 95, pl. 12, fig. 23
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28540 **Turritella mortoni** Conrad var.? Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 96, pl. 12, fig. 24
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

Turritella nasuta Gabb var.
See *T. mela* de Gregorio

28541 **Turritella nerinexa** Harris Hypotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 94, pl. 12, fig. 25
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29279 **Turritella paraensis** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 89, pl. 3, fig. 18
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29265 **Turritella pirabica**? Maury Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 87, pl. 3, fig. 2
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29273 **Turritella pirabica** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 87, pl. 3, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28820 **Turritella planigyrata** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 129, pl. 22, fig. 14
Bluff 2, 4 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
See Hodson, B.A.P., v. 11, No. 45, 1926, p. 30, pl. 23, fig. 11 as *Turritella mauryae* F. Hodson (holotype)

Turritella plebeia alowensi F. Hodson
See *T. matarucana* F. Hodson

Turritella robusta fredeai F. Hodson
See *T. trinitaria* Maury

28542 **Turritella soldadensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 96, pl. 12, fig. 26
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

26087 **Turritella** sp. Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 150, pl. 12, fig. 1
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

28822 **Turritella submortoni** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 130, pl. 22, fig. 16
Zone E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.*
Gurabo Fm., middle Miocene

Turritella supraconcava fredeai F. Hodson
See *T. trinitaria* Maury

26440 **Turritella** mut. **tiga** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 126, pl. 11, fig. 22
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 983 as *Turritella carinata* I. Lea

28821 **Turritella tornata** Guppy Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 130, pl. 22, fig. 15
Zone D or E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene
See Maury, B.A.P., v. 10, No. 42, 1925, p. 230 as *T. altilira tornata* Guppy
See Hodson, B.A.P., v. 11, No. 45, 1926, p. 43, pl. 27, fig. 11 as *Turritella carlottae* F. Hodson (holotype)
See also Brann & Kent, p. 905, PRI 21559

21405 **Turritella trinitaria** Maury
Vokes, Amer. Mus. Novitates, No. 988, 1938, p. 26 for *T. robusta fredeai* F. Hodson (holotype) *in* Brann & Kent, p. 936; and for *T. robusta fredeai* F. Hodson (paratypes) PRI Nos. 21390, 21392, 21395, 21398, 21400, 21404, 21418, and 21586 *in* Brann & Kent, p. 935, 936

22978, 22979 **Turritella trinitaria** Maury
Vokes, Amer. Mus. Novitates, No. 988, 1938, p. 26 for *T. supraconcava fredeai* F. Hodson *in* Brann & Kent, p. 938

26076, 26077 **Turritella variegata** (Linnaeus) Hypotypes
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 144, pl. 10, figs. 17-20
Beach, SE. of Higuerote, St. of Miranda, Ven.
Recent

6070 **Typhis (Typhinellus) carolinensis** Olsson & Petit
Unfigured paratypes
Olsson & Petit, B.A.P., v. 47, No. 217, 1964, p. 551
Crescent Beach Airport, Horry Co., S.C.
Waccamaw Fm., Pliocene

28756 **Typhis cercadicus** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 101, pl. 16, fig. 12
Bluff 1, 1 mi. above Cercado on Rio Mao, Dominican Rep.
Gurabo Fm., middle Miocene

Typhis costaricensis Olsson, 1942
See *Typhis olssoni* Keen

Typhis linguiferus Dall
See *T. sawkinsi* Mansfield

4064 **Typhis olssoni** Keen Holotype
Keen, Jr. Pal., v. 18, No. 1, 1944, p. 64 new name for *T. costaricensis* Olsson, 1942 *in* Brann & Kent, p. 942

1055, 1056 **Typhis (Laevityphis) sawkinsi** Mansfield
Jung, B.A.P., v. 49, No. 223, 1965, p. 525 for *T. linguiferus* Dall *in* Brann & Kent, pp. 942, 943. See also Keen, Jr. Pal., v. 18, No. 1, 1944, p. 67

29426 **Umbrella derbyi** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 219, pl. 12, fig. 10
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28452 **Unio** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 50, pl. 8, fig. 18
Shore, 1 mi. W. of Godineau R., Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Miocene
See Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 24 *Pleuropopsis* [*sic*] as *Pleurophopsis unioides* Van Winkle, middle Tertiary

28454 **Unio**? sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 50, pl. 9, fig. 1
Shore, 1 mi. W. of Godineau R., Gulf of Paria, Trinidad
Limestone lens in Lengua Fm., middle Miocene
See Van Winkle, B.A.P., v. 8, No. 33, 1919, p. 25 as *Thyasira adoccasa* Van Winkle, middle Tertiary

27027 **Utaratuia acupicta** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 5, pl. 2, figs. 1-4
Rainbow Arch, Carcajou R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27026 **Utaratuia laevigata** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 5, pl. 1, figs. 6-9; pl. 8, fig. 1
Rainbow Arch, Carcajou R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

27319 **Uvigerina auberiana** d'Orbigny Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 42, pl. 11, fig. 7
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Pleistocene

29965 **Uvigerina auberiana** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 58
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29967 **Uvigerina auberiana** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 60
Coastal well, 59-79′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7026 **Uvigerina calvertensis** Cushman Unfigured hypotype
Sabol, B.A.P., v. 41, No. 191, 1960, p. 229
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27204 **Uvigerina calvertensis** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 42, p. 11, fig. 8
Locality uncertain

27250 **Uvigerina calvertensis** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 42, pl. 11, fig. 9; pl. 12, fig. 1
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene or Pleistocene

29966 **Uvigerina canariensis** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 59
Coastal well, 60-65′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

27291 **Uvigerina carmeloensis** Cushman & Kleinpell Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 42, pl. 12, fig. 2
Well A-2, 90′, near Chesapeake Bay Bridge-Tunnel, Va.
St. Marys Fm., Miocene

27239 **Uvigerina** sp. A Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 43, pl. 12, fig. 5
Intersection of SR 628 and SR 678, Isle of Wight Co., Va.
Miocene, or Pleistocene

27221 **Uvigerina** sp. A Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 43, pl. 12, fig. 6
Pasture, 1 mi. N. of Beachland, SR 626, Surry Co., Va.
Miocene, or Pleistocene

29968 **Uvigerina subperegrina** Cushman & Kleinpell Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 61
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene

29969 **Uvigerina subperegrina** Cushman & Kleinpell Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 143, pl. 12, fig. 62
Coastal well, 59-79′, E. of Savannah, Chatham Co., Ga.
Duplin Marl, lower Pliocene

7027 **Uvigerina** cf. **U. tenuistriata** Cushman (not Reuss)
Sabol, B.A.P., v. 41, No. 191, 1960, p. 230 Unfigured specimens
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

27235 **Uvigerina** cf. **U. tenuistriata** Cushman (not Reuss)
Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 43, pl. 12, fig. 3
2.2 mi. N. of Beachland, SR 626, Surry Co., Va.
Pleistocene

27261 **Uvigerina** cf. **U. tenuistriata** Cushman (not Reuss)
Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 43, pl. 12, fig. 4
0.7 mi. NNE. of Benns Church, Isle of Wight Co., Va.
Yorktown Fm., Miocene

15019 **Vallonia albula** Sterki Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 10
Mound View Sec., Louisville, Jefferson Co., Ky.
Tazewell water deposited silt, Wisconsin Stage, Pleistocene

27582 **Vallonia albula** Sterki Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 257, pl. 15, figs. 9, 10
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene

27269 **Valvulineria floridana** Cushman Hypotype
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 47, pl. 14, fig. 2
Well A-1, 84′, near Chesapeake Bay Bridge-Tunnel, Va.
Pleistocene-Miocene (St. Marys Fm.) boundary

29980 **Valvulineria** sp. Figured specimen
Herrick, B.A.P., v. 70, No. 293, 1976, p. 145, pl. 13, fig. 73
Well, 55-60′, N. end of Hilton Head Is., Beaufort Co., S.C.
Duplin Marl, lower Pliocene

26983 **Vandergrachtella arcuum** Crickmay Holotype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 8, pl. 5, figs. 7-9; pl. 6, figs. 1, 2, 4, 5
48 mi. above mouth of Root R., N. W. Terr., Can.
Grumbler Fm., Upper Devonian

26984 **Vandergrachtella arcuum** Crickmay Paratype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 8, pl. 5, figs. 10, 11; pl. 6, fig. 3
48 mi. above mouth of Root R., N. W. Terr., Can.
Grumbler Fm, Upper Devonian

26985 **Vandergrachtella keenei** Crickmay Holotype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 8, pl. 3, figs. 11-15; pl. 5, fig. 1
8 mi. above mouth of Birch R., N. W. Terr., Can.
Grumbler Fm., middle Upper Devonian

26986-26988 **Vandergrachtella keenei** Crickmay Paratypes
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 8, pl. 5, figs. 2-5 and two unfigured specimens
8 mi. above mouth of Birch R., N. W. Terr., Can.
Grumbler Fm., middle Upper Devonian

26992 **Vandergrachtella kobayashii** Crickmay Holotype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 10, pl. 5, fig. 6; pl. 6, figs. 6-9
Lower rapids, 44 mi. above mouth of Liard R., N. W. Terr., Can.
Grumbler Fm., middle Upper Devonian

26993 **Vandergrachtella kobayashii** Crickmay Paratypes
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 10, pl. 4, figs. 9-13
Lower rapids, 44 mi. above mouth of Liard R., N. W. Terr., Can.
Grumbler Fm., middle Upper Devonian

26989 **Vandergrachtella radina** Crickmay Holotype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 9, pl. 4, figs. 1-4
Well, 5391', S. 6, T. 48, R. 24, W4, central Alberta, Can.
Upper Ireton Mbr. (Fm.), middle Upper Devonian

26990- **Vandergrachtella radina** Crickmay Paratypes
26991 Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 9, pl. 4, figs. 5-8
Well, 5391', S. 6, T. 48, R. 24, W4, central Alberta, Can.
Upper Ireton Mbr. (Fm.), middle Upper Devonian

26994 **Vandergrachtella scopulorum** Crickmay Holotype
Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 10, pl. 4, figs. 19-24
Third (uppermost) Falls of Trout R., N. W. Terr., Can.
Grumbler Fm., middle Upper Devonian

26995- **Vandergrachtella scopulorum** Crickmay Paratypes
26996 Crickmay, New Spirif. Dev. W. Can., Pub. by author, Imp. Oil Ltd., Calgary, 1953, p. 10, pl. 4, figs. 14-18, 25, 26
Third (uppermost) Falls of Trout R., N. W. Terr., Can.
Grumbler Fm., middle Upper Devonian

26136 **Vanikoro antillensis** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 205, pl. 17, figs. 5, 6; pl. 18, figs. 16, 17 Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

28708 **Vasum dominicense gurabicum** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 84, pl. 13, fig. 7
Zone D, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28707 **Vasum haitense** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 84, pl. 13, fig. 6
Zone A, B, or E, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

29377 **Vasum cf. V. haitense** (G. B. Sowerby, II)
Maury, Serv. Geol. Min. Brazil, Cast of figured specimen
Mon. 4, 1925, p. 157, pl. 9, fig. 18 *haitensi* [*sic*]
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

27536 **Vasum (Hystrivasum) horridum** Heilprin Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 5, No. 1, 1966, p. 23
Hendry Co. rockpit, 3 mi. W. of La Belle, Hendry Co., Fla.
Caloosahatchee Fm., Pliocene

28205, **Vasum (Hystrivasum) horridum** Heilprin Hypotypes
28206 Hollister, B.A.P., v. 58, No. 262, 1971, p. 290, pl. 36, figs. 1-6
Caloosahatchee R., W. of La Belle, Hendry Co., Fla.
Caloosahatchee Fm., lower Pliocene

27535 **Vasum (Hystrivasum) locklini** Olsson & Harbison Unfigured hypotype
Vokes, Tulane Stud. Geol., v. 5, No. 1, 1966, p. 23
Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28207 **Vasum (Hystrivasum) locklini** Olsson & Harbison Hypotype
Hollister, B.A.P., v. 58, No. 262, 1971, p. 291, pl. 36, figs. 2, 3
Spoil bank of Kissimmee R., near Brighton, Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

27532, 27533 **Vasum (Hystrivasum) olssoni** E. H. Vokes Unfigured paratypes
Vokes, Tulane Stud. Geol., v. 5, No. 1, 1966, p. 22
Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28208 **Vasum (Hystrivasum) olssoni** E. H. Vokes Hypotypes
Hollister, B.A.P., v. 58, No. 262, 1971, p. 294, pl. 39, figs. 1, 4
Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28209 **Vasum (Hystrivasum) olssoni kissimmense** Hollister Holotype
Hollister, B.A.P., v. 58, No. 262, 1971, p. 294, pl. 39, figs. 2, 3
not PRI 28243 as in text
Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28203 **Vasum (Hystrivasum) palmerae** Hollister Holotype
Hollister, B.A.P., v. 58, No. 262, 1971, p. 296, pl. 38, figs. 1, 4
Spoil bank of Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28202 **Vasum (Hystrivasum) schrinerae** Hollister Holotype
Hollister, B.A.P., v. 58, No. 262, 1971, p. 293, pl. 37, figs. 2, 3
Spoil bank of Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28201 **Vasum (Hystrivasum) squamosum** Hollister Holotype
Hollister, B.A.P., v. 58, No. 262, 1971, p. 292, pl. 37, figs. 1, 4
Spoil bank of Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28204 **Vasum (Hystrivasum) vokesae** Hollister Holotype
Hollister, B.A.P., v. 58, No. 262, 1971, p. 297, pl. 38, figs. 2, 3
Spoil bank of Kissimmee R., Highlands Co., Fla.
Pinecrest beds, Caloosahatchee Gr., upper Miocene

28531 **Veatchia carolinae** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 90, pl. 12, figs. 14-16
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29483 **Venericardia agriculturae** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 415, pl. 15, fig. 16
Estação Agronomica, between Bragança and Belém, St. of Pará, Brazil
Pirabas Fm.?, lower Miocene

28948 **Venericardia cerrogordensis** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 199, pl. 33, fig. 3
Rio Cana, near Cana on Cerro Gordo to Mao Rd., Dominican Rep.
Probably Gurabo Fm., middle Miocene or younger

29829 **Venericardia costagranosa** Adegoke Unfigured paratype
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 264
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

28448 **Venericardia crucedemaionis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 51, pl. 8, fig. 14
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

7064 **Venericardia granulata** Say Unfigured hypotypes
Sabol, B.A.P., v. 41, No. 191, 1960, p. 216
Cobhams Wharf, James R., Surry Co., Va.
Yorktown Fm., upper Miocene

28947 **Venericardia islahispaniolae** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 198, pl. 33, fig. 2
Zone B, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

29841 **Venericardia (Venericor) nigeriana** Adegoke
Adegoke, B.A.P., v. 71, No. 295, 1977, p. 260 Unfigured paratype
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

29486 **Venericardia perimetra** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 279, pl. 15, fig. 19
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29477 **Venericardia** cf. **V. perimetra** Maury Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 279, pl. 15, fig. 11
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28449, **Venericardia planicosta** Lamarck Hypotypes
28450 Maury, A.N.S.P., Jr., v. 15, 1912, p. 51, pl. 8, figs. 15, 16
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28946 **Venericardia scabricostata** (Guppy) Hypotypes
Maury, B.A.P., v. 5, No. 29, 1917, p. 198, pl. 33, fig. 1
Zone I, Orchid Gorge above Caimito on Rio Cana, Dominican Rep.
Cercado Fm., lower Miocene

28451 **Venericardia thalassoplekta** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 53, pl. 8, fig. 17
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

29484 **Venericardia thaleia** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 274, pl. 15, fig. 17
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

26635 **Venericardia (Glyptoactis) wendellwoodringi** Weisbord Holotype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 203, pl. 26, figs. 18, 19
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26636, **Venericardia (Glyptoactis) wendellwoodringi** Weisbord
26638 Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 203, pl. 27, figs. 1, 2, 5, 6
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26637, **Venericardia (Glyptoactis) wendellwoodringi** Weisbord
26640 Paratypes
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 203, pl. 27, figs. 3, 4, 9
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Upper Mare Fm., lower Pliocene

26639 **Venericardia (Glyptoactis) wendellwoodringi** Weisbord
Paratype
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 203, pl. 27, figs. 7, 8
100 m. W. of Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26641 **Venericardia (Glyptoactis) wendellwoodringi** Weisbord
Weisbord, B.A.P., v. 45, No. 204, 1964, p. 203, pl. 27, fig. 10 Paratype
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene
28469 **Venerupis atlantica** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 60, pl. 9, fig. 21
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
29261 **Vermetus (Petaloconchus?) subvarians** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 97, pl. 2, fig. 14
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene
27598 **Vertigo gouldi** (Binney) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 251, pl. 17, fig. 2
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene
27597 **Vertigo hubrichti** Pilsbry Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 253, pl. 17, fig. 1
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene
15012 **Vertigo modesta** (Say) Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 5
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene
27603 **Vertigo modesta** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 254, pl. 17, fig. 9
Near Smith Mills, Henderson Co., Ky.
Peoria loess, Wisconsin Stage, Pleistocene
15011 **Vertigo nylanderi** (Sterki) Hypotypes
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 4
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene
29957 **Virgulina punctata** d'Orbigny Hypotype
Herrick, B.A.P., v. 70, No. 293, 1976, p. 142, pl. 11, fig. 51
Altamaha R., Doctortown, Wayne Co., Ga.
Duplin Marl, middle Pliocene
26064 **Vitrinella mareana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 133, pl. 9, figs. 3, 4; pl. 12, figs. 10, 11 Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
26065 **Vitrinella mareana** Weisbord Paratype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 133, pl. 9, figs. 5, 6; pl. 12, figs. 12, 13 Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene
28861 **Vitrinella (Circulus) striata** (Gabb) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 156, pl. 24, fig. 23
Bluff 3, 5 mi. above Cercado on Rio Mao, Dominican Rep.
Cercado Fm., lower Miocene
26091 **Vitrinella (Striovitrinella) venezuelana** Weisbord Holotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 134, pl. 12, figs. 14-16
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene
26399 **Vitrinella (Striovitrinella) venezuelana** Weisbord
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 134 Unfigured paratype
Quebrada Mare Abajo, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27642 **Viviparus erronis** Allen Holotype
Allen, Tulane Stud. Geol., v. 8, No. 2, 1970, p. 70, pl. 1, figs. 1, 2
Below Montgomery Landing, Red R., Grant Par., La.
Moodys Branch Fm., Jackson Gr., upper Eocene

29588 **Voluta cantaurana** Gibson-Smith Unfigured paratype
Gibson-Smith, Geos, No. 20, 1973, p. 68
"Cantaure", Paraguana Pen., Ven.
Cantaure Fm., lower Miocene

26428 **Voluta cogitabunda** de Gregorio Syntype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 66, pl. 5, figs. 10b-c
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 561 as *Caricella doliata* (Conrad)

6081 **Voluta demarcoi** Olsson Paratype
Olsson, B.A.P., v. 49, No. 224, 1965, p. 662, pl. 81, figs. 7, 7a
About 105 mi. off Mesquital, Texas, in 100 fathoms
Recent

26322 **Voluta musica** Linnaeus Hypotype
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 396, pl. 40, figs. 7, 8
Beach of Playa Grande Yachting Club, Cabo Blanco, Ven.
Recent

26435 **Voluta (Caricella) pyruloides sita** de Gregorio Syntypes
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 67, pl. 5, figs. 15, 16
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 559 as *Caricella bolaris* (Conrad)

26426 **Voluta sayana ipnotica** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 64, pl. 5, figs. 1, 2
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 516 as *Athleta sayanus* (Conrad)

26432 **Voluta sayana mica** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 64, pl. 5, figs. 3, 4
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 516 as *Athleta sayanus* (Conrad)

26437 **Voluta teplica** de Gregorio Holotype
De Gregorio, Ann. Géol. Paléont., livr. 7, 1890, p. 65, pl. 5, fig. 7
Claiborne Bluff, Alabama R., Monroe Co., Ala.
Gosport Sd., uppermost Claiborne Gr., middle Eocene
See Palmer & Brann, B.A.P., v. 48, No. 218, 1966, p. 516 as ? *Athleta sayanus* (Conrad)

27487 **Voluta vautrini** Jung Cast of holotype
Jung, B.A.P., v. 49, No. 223, 1965, p. 545, pl. 74, figs. 7-9
"Cantaure", Mesa de Cocodite, Paraguaná Pen., St. of Falcón, Ven.
Cantaure Fm., upper middle Miocene

28489 **Volutilithes pariaensis** Maury Holotype
Maury, A.N.S.P., Jr., v. 15, 1912, p. 69, pl. 10, fig. 10
Bed 2, Soldado Rock, Gulf of Paria, Trinidad
Soldado Fm., Paleocene

28490 **Volutilithes** sp. indet. Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, p. 70, pl. 10, fig. 11
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene

29807, **Volutilithes (Afrovolutilithes) uniplicata** Furon
29808 Adegoke, B.A.P., v. 71, No. 295, 1977, p. 196 Unfigured hypotypes
Quarry at Ewekoro, 55 km. NW. of Lagos, Nigeria
Ewekoro Fm., Paleocene

Volvula cercadensis Van Winkle
See *V. cylindrica* Gabb

28573 **Volvula cylindrica** Gabb Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 16, pl. 3, fig. 5 broken before 1977
Locality uncertain; Dominican Rep., Cercado Fm., lower Miocene
= *V. cercadensis* Van Winkle *in* B.A.P., v. 8, No. 36, 1921, p. 6

26979 **Warrenella apodecta** Crickmay Holotype
Crickmay, Jr. Pal., v. 27, No. 4, 1953, p. 598, text-figs. 6-10
Upper W. slope of Roche à Perdrix, Alberta, Can.
Upper Flume Fm., early Upper Devonian

26980 **Warrenella apodecta** Crickmay Paratype
Crickmay, Jr. Pal., v. 27, No. 4, 1953, p. 598, text-figs. 11-15
Upper W. slope of Roche à Perdrix, Alberta, Can.
Upper Flume Fm., early Upper Devonian

27071 **Warrenella catacosma** Crickmay Holotype
Crickmay, Jr. Alberta Soc. Pet. Geol., v. 9, No. 11, 1961, p. 351, pl. 1, figs. 1-3, 8, 9
Well, 5535′, S. 35, T. 48, R. 22, W4, central Alberta, Can.
Cooking Lake Fm., Upper Devonian

27072 **Warrenella catacosma** Crickmay Paratype
Crickmay, Jr. Alberta Soc. Pet. Geol., v. 9, No. 11, 1961, p. 351, pl. 1, figs. 6, 7
Well, 5484′, S. 35, T. 48, R. 22, W4, central Alberta, Can.
Cooking Lake Fm., Upper Devonian

26977 **Warrenella eclectea** Crickmay Holotype
Crickmay, Jr. Pal., v. 27, No. 4, 1953, p. 596, text-figs. 1-5
Upper W. slope of Mt. Mackenzie, Alberta, Can.
Lower Cheviot Fm., early Upper Devonian

26978 **Warrenella eclectea** Crickmay Paratype
Crickmay, Jr. Pal., v. 27, No. 4, 1953, p. 596, text-figs. 16-19
Upper W. slope of Mt. Mackenzie, Alberta, Can.
Lower Cheviot Fm., early Upper Devonian

27053 **Warrenella labrecquei** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 17, pl. 9, figs. 18-22
6.5 mi. below Louise Falls, Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

27054- **Warrenella labrecquei** Crickmay Paratypes
27056 Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 17, pl. 9, figs. 23-28
6.5 mi. below Louise Falls, Hay R., N. W. Terr., Can.
Hay River Sh., Upper Devonian

27057 **Warrenella timetea** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 16, pl. 10, figs. 1-5
W. end of Carcajou Ridge, 65° 36′ N., 128° 15′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian
See *Reticulariopsis timetea* (Crickmay) *in* Crickmay, Disc. in Dev. West. Can., Pub. by author, Calgary, 1968, p. 8

27058 **Warrenella timetea** Crickmay Paratypes
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 16, pl. 10, figs. 6-9
W. end of Carcajou Ridge, 65° 36′ N., 128° 15′ W., N. W. Terr., Can.
Ramparts Fm., Middle Devonian
See *Reticulariopsis timetea* (Crickmay) *in* Crickmay, Disc. in Dev. West. Can., Pub. by author, Calgary, 1968, p. 8

26717 **Whiteinella archaeocretacea** Pessagno Unfigured paratypes
Pessagno, P. A., v. 5, No. 37, 1967, p. 298
Bouldin Creek, Austin, Travis Co., Tex.
South Bosque Fm., Eagle Ford Gr., Upper Cretaceous

Xancus aviaguensis H. K. Hodson
See *Turbinella valida* G. B. Sowerby, II

29328 **Xancus brasilianus** Maury Plastotype
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 155, pl. 7, fig. 3
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

29329, 29330 **Xancus brasilianus** Maury Unfigured plastotypes
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, p. 155 (two poor casts whose identification is questionable)
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28723 **Xancus praeovoideus** Maury Holotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 83, pl. 14, fig. 18 *proaevoideus* [*sic*], corrected in errata. Not deposited by Cornell Univ., 1971
Bluff 1 or 3, above Cercado on Rio Mao, Dominican Rep.
Formation uncertain, Miocene
See Vokes, Tulane Stud. Geol., v. 2, No. 2, 1964, p. 52 as *Turbinella praelaevigata* E. H. Vokes, *nom. nov.*

Xancus praeovoideus Maury
See *Turbinella riosecana* (H. K. Hodson)

29333 **Xancus** sp. indeterminate Cast of figured specimen
Maury, Serv. Geol. Min. Brazil, Mon. 4, 1925, pl. 7, fig. 6
Rio Pirabas, St. of Pará, Brazil
Pirabas Fm., lower Miocene

28706 **Xancus validus** (G. B. Sowerby, II) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 83, pl. 13, fig. 5
Dominican Rep. (Santo Domingo, Gabb Coll.), Miocene

28829 **Xenophora conchyliophora** (Born) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 133, pl. 23, fig. 7
Zone F, Rio Gurabo, about 2 mi. W. of Los Quemados, Dominican Rep.
Gurabo Fm., middle Miocene

28830 **Xenophora delecta** (Guppy) Hypotype
Maury, B.A.P., v. 5, No. 29, 1917, p. 134, pl. 23, figs. 8, 9
Locality uncertain, Dominican Rep.
Gurabo Fm., middle Miocene

27037 **Xystriphyllum hyperbolicum** Crickmay Holotype
Crickmay, Older Dev. Faunas N.W.T., Pub. by author, Calgary, 1960, p. 11, pl. 7, figs. 1, 2 *Xytriphyllum* [*sic*]
Gayna R., 1.5 mi. from confluence with Mountain R., N. W. Terr., Can.
Hume Fm., early Middle Devonian

7082 **Zanthopsis vulgaris** Rathbun Figured specimen
See Rathbun, U.S.N.M., Bull. 138, 1926, p. 48
E. L. Palmer, Fossils, D. C. Heath and Co., 1965, p. 4 (figured as "Crab")
Road cut at Porter, Grays Harbor Co., Wash.
Oligocene

15018 **Zonitoides arboreus** (Say) Hypotype
Browne & McDonald, B.A.P., v. 41, No. 189, 1960, pl. 21, fig. 9
Medora Sec., Louisville, Jefferson Co., Ky.
Tazewell loess, Wisconsin Stage, Pleistocene

27586 **Zonitoides arboreus** (Say) Hypotype
Browne & Bruder, B.A.P., v. 54, No. 241, 1968, p. 230, pl. 15, figs. 21-23
Henderson, Henderson Co., Ky.
Atherton Fm., Wisconsin Stage, Pleistocene

INCERTAE SEDIS

28367 Cystidean Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 26, pl. 13, fig. 120
Alfred, Allegany Co., N.Y.
Conneaut Gr., Upper Devonian

25356 Dike No. 1
B. Smith, Science, v. 30, No. 777, 1909, p. 724; N.Y. State Mus. Bull. 286, 1931, pp. 119-125, figs. 21, 22
Clintonville, Onondaga Co., N.Y.
In Hamilton Shale, Devonian

25357 Dike No. 2
B. Smith, Science, v. 30, No. 777, 1909, p. 724; N.Y. State Mus. Bull. 286, 1931, pp. 119-125, figs. 21, 22
Clintonville, Onondaga Co., N.Y.
In Hamilton Shale, Devonian

25358 Dike No. 6
B. Smith, Science, v. 30, No. 777, 1909, p. 724; N.Y. State Mus. Bull. 286, 1931, pp. 119-125, figs. 21, 22
Clintonville, Onondaga Co., N.Y.
In Hamilton Shale, Devonian

27683 Echinoid spine M602a Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 335, pl. 22, figs. 1, 2
Near Playa Grande Yachting Club Rd., Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27684 Echinoid spine H603a Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 335, pl. 22, figs. 3-5
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27685 Echinoid spine H603b Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 335, pl. 22, fig. 6
Punta Gorda anticline, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27686 Echinoid spine T603a Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 335, pl. 22, figs. 7, 8
Near mouth of Quebrada Las Pailas, Cabo Blanco, Ven.
Mare Fm., lower Pliocene

27687 Echinoid spine K604a Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 335, pl. 22, fig. 9
Near Playa Grande Yachting Club, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27688 Echinoid spine S610a Figured specimen
Weisbord, B.A.P., v. 56, No. 252, 1969, p. 335, pl. 22, fig. 10
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

26379 Incertae sedis "a" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 483, pl. 46, figs. 9, 10; pl. 47, figs. 10, 11
Quebrada Mare Abajo, Cabo Blanco, Ven.
Lower Mare Fm., lower Pliocene

26383 Incertae sedis "b" Figured specimen
Weisbord, B.A.P., v. 42, No. 193, 1962, p. 484, pl. 47, figs. 12, 13
Punta Gorda anticline, Cabo Blanco, Ven.
Playa Grande Fm., lower Pliocene

27165 Ostracod Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 75, pl. 23, fig. 6
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27174 Ostracod Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 75, pl. 23, fig. 7
Well 3-S, 115′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

27187 Ostracod Figured specimen
McLean, Va. Div. Min. Res., RI No. 9, 1966, p. 75, pl. 23, fig. 8
Well 3-S, 105′, York R., between Gloucester Pt. and Yorktown, York Co., Va.
St. Marys Fm., Miocene

28316 Plant fragment Figured specimen
Harris, Elem. Nat. Hist. Ser., No. 2, 1899, p. 20, pl. 5, fig. 9
Esty's Glen, near Ithaca, Tompkins Co., N.Y.
Geneseo Sh., Genessee Gr., Upper Devonian

25359 West Dike
B. Smith, Science, v. 30, No. 777, 1909, p. 724; N.Y. State Mus. Bull. 286, 1931, pp. 119-125, not fig.
Clintonville, Onondaga Co., N.Y.
In Hamilton Shale, Devonian

28561 worm tube? Figured specimen
Maury, A.N.S.P., Jr., v. 15, 1912, pl. 13, fig. 19
Bed 8, Soldado Rock, Gulf of Paria, Trinidad
Boca de Serpiente Fm., upper Eocene
See Jung, P. A., v. 8, No. 47, 1974, p. 41 and personal communication, 1977, as *Paraseraphs* sp.

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BRACHIOPODS AND MOLLUSCS OF THE LOWER PERMIAN ARCTURUS GROUP, NEVADA AND UTAH PART 1: BRACHIOPODS, SCAPHOPODS, ROSTROCONCHS, AND BIVALVES

By

THOMAS E. YANCEY

1978

Paleontological Research Institution
Ithaca, New York 14850, U.S.A.

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BRACHIOPODS AND MOLLUSCS OF THE LOWER PERMIAN ARCTURUS GROUP, NEVADA AND UTAH
PART 1: BRACHIOPODS, SCAPHOPODS, ROSTROCONCHS, AND BIVALVES

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ABSTRACT

The Arcturus Group, early Permian, of eastern Nevada and western Utah contains the Riepe Spring Formation at the base, Riepetown Formation, Pequop Formation, and Loray Formation at the top, and ranges in thickness from less than 1000 meters to greater than 2000 meters. The base of the Arcturus Group is early Wolfcampian in the western and northern parts of the area, and middle Wolfcampian in the center of the depositional area. Deposition of sediments continued without significant interruption until the late Leonardian. The Leonardian-Guadalupian boundary occurs in the overlying Kaibab Formation.

Normal salinity marine biotas are common throughout, and biotas representing hypersaline environments are present in the upper part of the Arcturus Group. Biotas representing hyposaline (brackish) and fresh-water environments are not recognized and are probably absent.

Arcturus Group biotas are dominated by brachiopods and molluscs. Brachiopod diversity and abundances are low, except for the genera *Squamaria, Costellarina,* and *Composita.* The small productacean *Costellarina* is common in shallow-water molluscan-dominated biotas and is the most common brachiopod in the Arcturus. Brachiopods described as new are *Costellarina kaasai,* n. sp., *Costellarina ptasi,* n. sp., *Costellarina carlstroemi,* n. sp., and *Wilberrya fragilis,* n. gen. and n. sp. The Costellarininae are transferred from the Strophalosiacea to the Productacea (Linoproductidae) on the basis of new information on the type genus *Costellarina.*

Mollusc diversity and abundance are high in almost all biotas. Scaphopods, rostroconchs, and bivalves of the superfamilies Ctenodontacea, Nuculanacea, Arcacea, Pinnacea, and Ambonychiacea are described in this part of the study. Molluscan taxa designated as new are the bivalves, *Quadratonucula stella,* n. sp., *Polidevcia arctura,* n. sp., and *Girtyana stellara,* n. sp., and *Meekopinna,* n. gen.

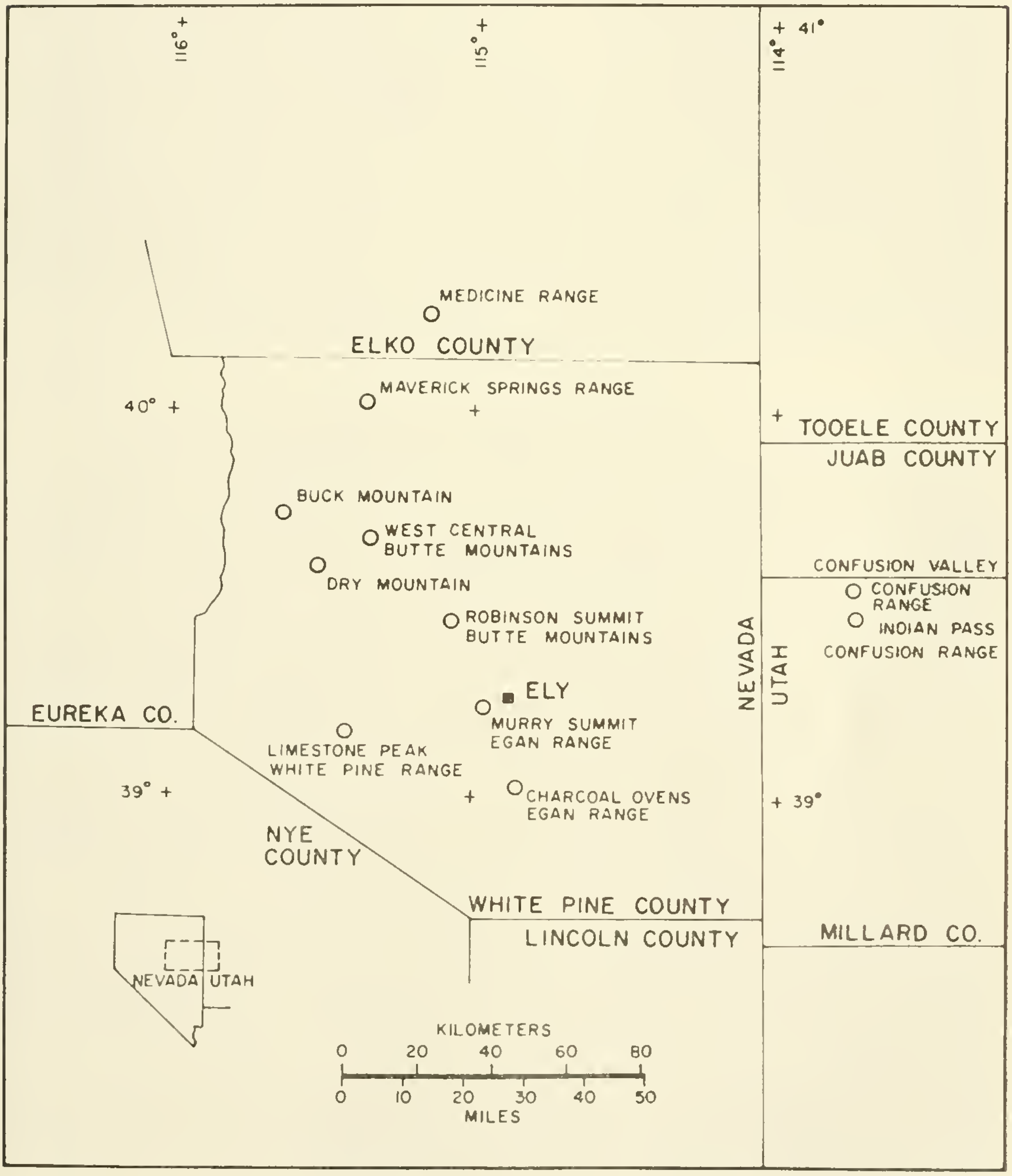
INTRODUCTION

In the eastern part of the state of Nevada there is a nearly complete stratigraphic section through most of the Permian System, recording continuous deposition from the base of the Wolfcampian Series up through most of the Guadalupian Series. It is the most complete stratigraphic sequence of Permian strata in North America outside the classic west Texas section and is richly fossiliferous in most parts of the sequence. The Nevada Permian biotas have a different aspect from the Texas biotas, having closer affinities to Permian biotas in the remainder of the Basin and Range Province, and the Colorado Plateau and Rocky Mountain regions. These areas contain other good lower Permian sequences, especially southern Nevada, southern Arizona, and Idaho-Utah-Wyoming, but only in eastern Nevada is the section continued up into a thick sequence of fossilferous upper Permian strata. The Nevada Permian biotas belong in a different biotic province from the tropical Texas Permian (Yancey, 1975), and most species appear to have longer time ranges than comparable species in Texas sections.

The lower Permian section in eastern Nevada contains common or abundant fusulinids, brachiopods, bivalves, and gastropods, and less common ammonites and corals. The fusulinids offer the greatest potential for correlation, and these have been described in publications by Knight (1956), Berge (1960), Slade (1961), Robinson (1961), Brill (1963), Bissell (1964), Stevens (1965), and Douglass (1975), which provide a good analysis of the lower Permian fusulinid biostratigraphy. Ammonoid faunas are present in parts of the Arcturus Group, but these need further description and study before they can be used for biostratigraphy. Corals have been studied from the Arcturus Group (Wilson and Langenheim, 1962; Stevens, 1967) and have been found to be useful for correlation, but their paleoecologic restrictions were similar to the fusulinids, and they tend to have similar distribution patterns. The brachiopods are poorly known, but they promise to be biostratigraphically useful due to the accumulating monographic knowledge of Permian brachiopods in the Texas area. Bivalves and gastropods are the most abundant and diverse fossils, but they have only been briefly described by Mayou (1967), Yancey (1969), and Yochelson and Fraser (1973), so the biostratigraphic potential of these groups has not yet been realized despite their abundance throughout the Permian.

Previous work on the Permian stratigraphy of eastern Nevada is scattered through a number of studies on the general stratigraphy or structure of the region, with a smaller number of studies being confined predominantly to either the Permian or to the structural basin centered in White Pine County, Nevada. The more relevant of the early publications were the reports on the paleontology of the Eureka district by Walcott (1884) and the report on the geology of the Robinson mining district (at Ely) by Lawson (1906). Walcott extensively investigated the Carboniferous deposits of the Eureka area and touched on the Permian. Lawson provided the first stratigraphic study of the Permian rocks of the region. Pennebaker (1932), Easton (1960), Steele (1960), Bissell (1962, 1964), Stevens (1965), and Barosh (1968) have published on the stratigraphy of Permian deposits in eastern Nevada, and Hose and Repenning (1959) and Brill (1963) have covered the stratigraphy in adjacent western Utah. Investigations on the sedimentary petrography have been made by Zabriskie (1970) and Marcantel (1975).

The area of study (Text-fig. 1) covers the areal extent of exposures of the Arcturus Group, which is exposed over most of White



Text-figure 1. Location map of the study area.

Pine County, the eastern parts of Eureka County, and the southern part of Elko County in Nevada, and adjacent parts of Utah (Millard, Juab, and Tooele counties). Collecting sites were selected to obtain the most complete stratigraphic sections over the geographic extent of the Arcturus Group and to include the most fossiliferous sequences. A greater number of sections are located in the central and northern areas where exposures are more favorable and where rapid facies changes occur. The collection sites are all within a large region centered on the town of Ely, Nevada, in White Pine County.

Collections of fossils were made from all stratigraphic horizons within the Arcturus Group except the Riepe Spring Formation. Fossil collections through the post-Riepe Spring portions of the group were made on stratigraphic sections at 11 sites. Three of these, in western White Pine County, were made by Calvin Stevens of California State University, San Jose, who graciously allowed the loan of those collections. The stratigraphic sections in western White Pine County are in a different facies of the Arcturus Group and contain a different biota from the eastern facies.

ACKNOWLEDGMENTS

Many people have given help in the pursuit of this work and preparation of this report. Particular thanks should go to W. B. N. Berry of the Paleontology Department, University of California, Berkeley, and Calvin Stevens of the Geology Department, California State University, San Jose, who provided valuable discussions and criticism. Calvin Stevens loaned the molluscan portions of his own collections of the Dry Mountain type lithologies and arranged for preparation of this collection. I am especially grateful to Leo Plas and Maurice Kaasa for their valuable assistance in doing field work during two seasons, and for a stimulating association which has contributed substantially to the progress of this work. Support for the first field season was provided jointly by Humble Oil Company, Denver Region, and the University of California, Berkeley, and support for the second field season was provided by the Geological Society of America under grant No. 1411-70. The National Science Foundation provided funds for the engraving of figures and photographic plates in this publication under NSF Earth Sciences Division Grant No. GA-24330, administered by Calvin Stevens, California State University, San Jose.

PALEOENVIRONMENTS

Paleoenvironments of the Arcturus Group sediments are similar throughout the group but are complex in local detail. The Arcturus Group was probably deposited entirely within about 200 meters of sea level, and most of the sediments were deposited under marine conditions. The total thickness of sediments deposited varies regionally from 1000 meters to greater than 2000 meters. Through most of the Arcturus Group there is a trend of eastward-increasing grain size in the sediments, reflecting an eastward increase in bottom energy conditions and a probable eastern sediment source. This sediment source was active throughout the deposition of the Arcturus Group and resulted in deltaic infilling of the basin, with the areas of thickest sediment accumulation in the center of the basin. During at least part of this time the Hamilton Basin was a topographic high projecting westward from a more persistent high area in west-central Utah (Zabriskie, 1970; Stevens, 1973; Marcantel, 1975). Marine waters occasionally covered it, but did not cover the Utah high area or the highs on the Antler Orogenic Belt during the early Permian.

A marine transgression into the center of the Hamilton Basin in early and middle Wolfcampian time over an unconformable surface (Dott, 1955; Bissell, 1964; Zabriskie, 1970) started from deeper areas to the north, and perhaps the west and south. During this time water depth increased towards the north, and perhaps the west and south. During the remainder of the Wolfcampian and the Leonardian, environments were locally complex and variable, but generally similar throughout the Arcturus Group with the exception of the highest stratigraphic horizons. Deposition was everywhere near sea level and shorelines undoubtedly fluctuated greatly. The greatest environmental differences were the facies changes from predominantly terrigenous deposition in the eastern and western parts of the Arcturus Group area to predominantly calcareous deposition in the northern areas. There were some topographic lows in the western areas, which were probably never deeper than 100-200 meters. An eastward-thickening unit at the top of the Arcturus contains abundant evaporite sediments and is probably time transgressive. During the late Leonardian (upper part of the Arcturus Group) hypersaline environments were common in the eastern areas, while more normal marine environments predominated elsewhere.

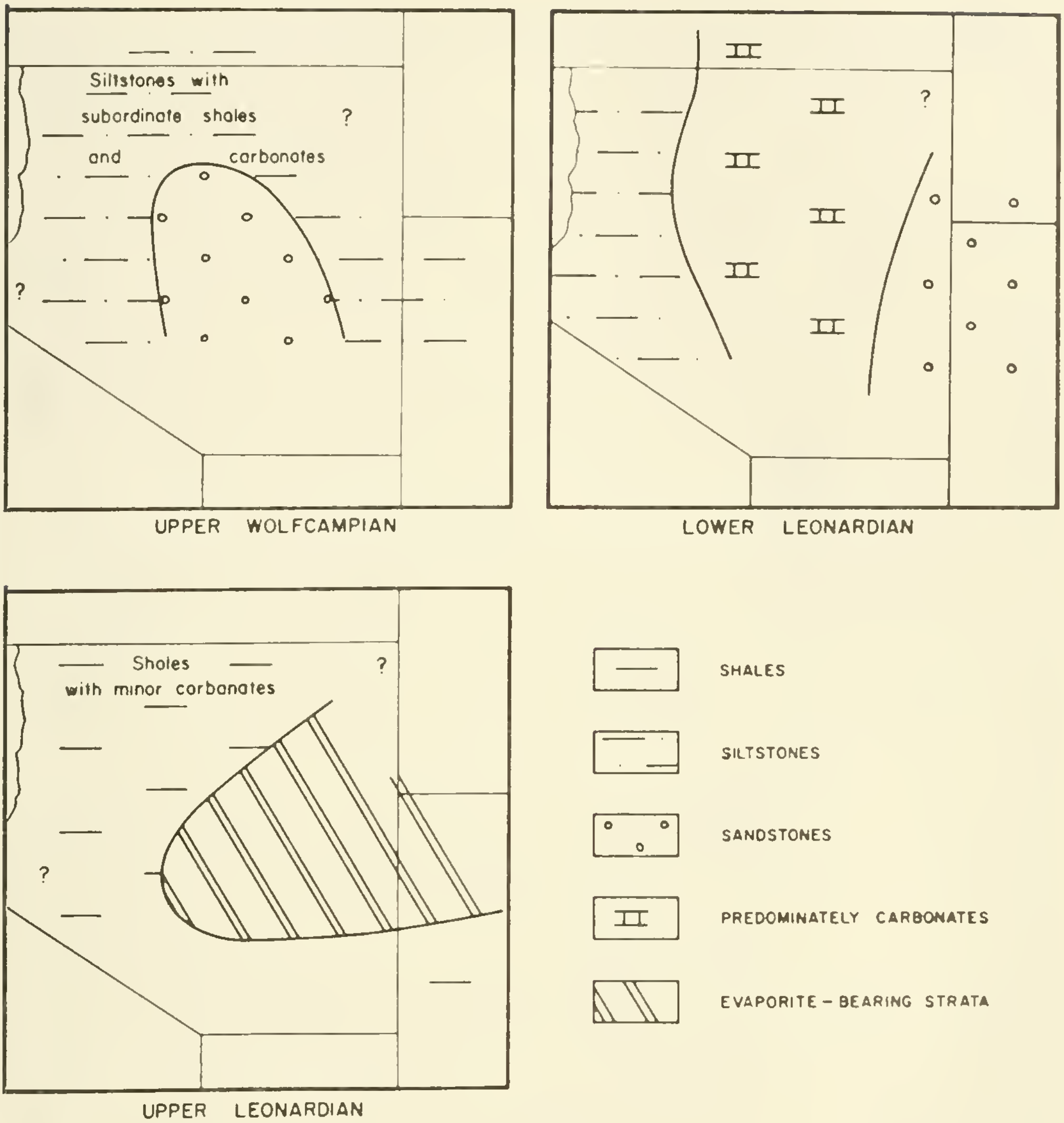
Environmental patterns were complex across the Hamilton Basin throughout the time of deposition. The basin contained many different environments which were inhabited by distinct biotic communities (Yancey and Stevens, 1971). There is no evidence of any brackish or freshwater deposition, but hypersaline and normal marine environments are fully represented. The reconstructions of the Arcturus Group environments in Text-figure 2 show probable spatial relations of environments within the Hamilton Basin at three arbitrary levels within the Arcturus Group.

PALEOCLIMATOLOGY

The paleoclimatic conditions of the Nevada area during the Permian can be deduced from lithologic and biologic data and give evidence of both the average paleotemperatures and paleorainfall conditions. In addition, it is assumed from regional stratigraphic and geologic relationships that the ocean areas were bordered on the east by a wide, low coastal plain that must have had a strong influence on the local climate.

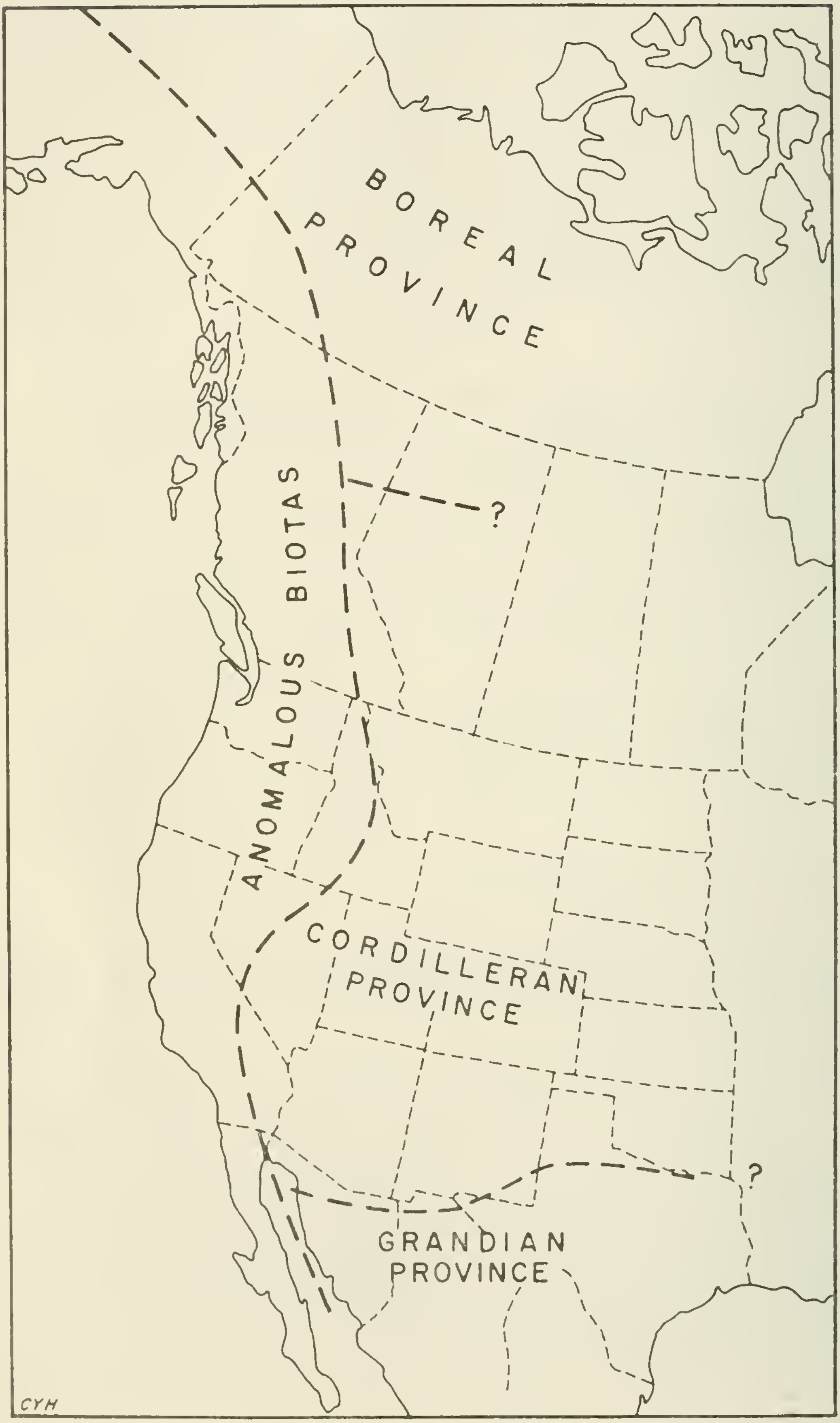
The average paleorainfall can be determined from the lithologic character of both the marine and nonmarine strata of Permian age and the marginal marine biotas. Within the Arcturus Group there are fairly extensive deposits of evaporites (Hose and Repenning, 1959; Steele, 1960) and associated sediments containing algal stromatolites and shrinkage cracks, especially in the upper part of the Arcturus. During the present study it was also found that hypersalinity was common in marginal marine environments and that these environments support distinctive biotic communities, but that hyposaline or brackish water environments are completely lacking. These factors indicate a persistent dry climate probably of widespread extent during the interval of time represented by the Arcturus deposits.

During the same interval of time, red beds, cross-bedded sandstones, and lesser amounts of evaporites are common and extensive in the western states and are usually interpreted to be indicators of dry climates. Brill (1963) showed the interfingering of Arcturus strata with strata on the Colorado Plateau which are usually interpreted to be desert deposits (Coconino-type sandstones — Poole, 1964). The Arcturus Group was deposited in a dry area that ex-



Text-figure 2. Sedimentary environments of deposition at three levels within the Arcturus Group, corresponding to levels near the bottom, middle and top of the group. Lithologies are generalized, and represent the predominant rock type present.

tended over the Colorado Plateau to New Mexico and Texas, and as far northeast as North Dakota (Maughan, 1966). Evaporite deposition over this entire area was commonest during the Leonardian, indicating that that portion of the North American continent was located in the middle latitudes. By comparison with modern climatic zones, it is clear that dry climates are the rule along the western edge of the American continents outside of the equatorial or the cold temperate to arctic zones.


BOREAL PROVINCE
ANOMALOUS BIOTAS
?
CORDILLERAN PROVINCE
GRANDIAN PROVINCE
?
CYH

Paleotemperature determinations by the oxygen isotope method have not been attempted, but the relative position on the Permian climatic-temperature gradient can be determined. Stehli (1964, 1971) and Rudwick and Cowen (1967) clearly demonstrated that Permian biotas were temperature controlled, similar to modern biotas, and that both a temperature gradient and a biotic diversity gradient existed during the Permian. In a traverse from the U.S.-Mexico border to the Arctic Ocean, Permian biotic diversity regularly decreases to the north. Three biotic provinces can be distinguished along this trend (Yancey, 1975). In the southern areas there is evidence of tropical temperatures with the common occurrence of large reefs and highly specialized and highly ornamented taxa. In the northern areas there is evidence of polar temperatures and glaciomarine sediments (Text-fig. 3). During the Permian the North American continental block was located mostly or entirely in the Northern Hemisphere (Smith, Briden, and Drewry, 1973) and covered an area from the paleo-equator to near the rotational pole.

The Arcturus biotas have intermediate diversity, lack the specialized genera characteristic of the tropical and arctic areas, and occupy the middle of the three North American biotic provinces. From both biotic and lithologic evidence, this is considered to be a temperate climatic province. Worldwide evidence supports the model of bipolar glaciations separated by temperate zones and an equatorial belt during the Permian, and the climates must have been similar to modern climates. The Arcturus biotas occur in the southern part of the Permian Northern Hemisphere temperate zone and probably had paleotemperatures similar to modern warm temperate climates.

TECTONIC SETTING

The Arcturus Group occurs within a wide north-south trending belt containing thick deposits of Carboniferous and Permian age in eastern Nevada and western Utah. Roberts and others (1965) identified this as a miogeosynclinal belt during the Paleozoic and most of the Triassic. It is bordered on the east by cratonal areas with high ancestral mountain ranges, and on the west by a belt

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Text-figure 3. Permian biotic provinces of North America (from Yancey, 1975).

containing siliceous and volcanic rocks of eugeosynclinal or ocean basin type. These tectonic belts extended along the western edge of the North American continental block, and Speed (1971), Silberling (1973), and Rogers and others (1974) identified the western edge of the miogeosynclinal belt as the margin of the continental block during the Permian and Triassic time.

On the miogeosyncline, sediments accumulated in many loosely connected, irregularly subsiding basins interspersed with local highs (Brill, 1963; Stevens, 1965), such as the Oquirrh Basin in Utah and the Bird Spring Basin in southern Nevada. The Arcturus Group was deposited in a broad subsiding area called the Ely Basin by Bissell (1962), the Hamilton Basin by Brill (1963), the Butte Basin by Stevens (1965), and the Arcturus Basin by Zabriskie (1970). This single tectonic feature has such an extraordinary diversity of names only because its geographic and time limits are inadequately known. Ely and Arcturus are stratigraphic names that apply to units which are not coextensive with the basin. Hamilton Basin has priority over Butte, and is used here.

The Hamilton Basin is centered on White Pine County in Nevada and extends from the highs of the Antler Orogenic Belt (Manhattan Geanticline) on the west to a high area called the West Central Utah Highland (Steele, 1960; Bissell, 1962; Zabriskie, 1970) on the east, and about an equal distance north and south where the boundaries are not so well-defined. Most of the boundaries occur where the stratigraphic record has been lost. The northern boundary (Northeast Nevada Highland) and southeast boundary (West Central Utah Highland) are believed to have been high areas during the Permian, but this needs further verification. The basin is most distinct during the lower Permian and may persist into the upper Permian, but post-Permian erosion has removed so much of the record in the southern part of the basin that its temporal existence cannot be determined. Formational units extend widely across the basin suggesting a similar tectonic history in most parts of the area. To the west the Antler Orogenic Belt (or Manhattan Geanticline) was a site of uplift and thrusting and a source of sediment that was shed into the adjacent low areas of the basin. The West-central Utah Highlands were not a significant source of sediment although a major source of sediment for the Hamilton Basin probably was to the east or southeast.

At the beginning of the Permian the center of the Hamilton Basin was high relative to adjacent areas to the north and west. Marine waters transgressed over the high parts by mid-Wolfcampian time. The basin subsided continuously through the lower Permian, with the thickest deposits accumulating in the center of the basin (especially in the Butte Mountains area).

STRATIGRAPHY OF THE ARCTURUS GROUP

The Arcturus Group is a thick stratigraphic unit, ranging from less than 1000 meters to more than 2000 meters in thickness which includes most lower Permian deposits. Its lower contact occurs either at the system boundary between the Carboniferous and Permian, in a conformable sequence in the northern and western parts of the basin, or at an unconformity at the base of the Permian in other parts of the basin. This unconformity is widespread in central eastern Nevada and adjacent areas (Bissell, 1964; Barosh, 1968; Zabriskie, 1970). In most areas it represents a time gap of most of the Missourian and Virgilian and the early Wolfcampian. The upper contact occurs at a major, sharp lithologic change from fine-grained terrigenous clastics with evaporites to massive limestones of the Kaibab Formation, the lowest unit of the Park City Group in the region.

The Arcturus Group is a mixed terrigenous and carbonate sedimentary sequence containing much more terrigenous clastic (as well as evaporite) rock than underlying and overlying sequences (Ely Group below and Park City Group above). It contains the deposits of a single major cycle of sedimentation, and contains well-defined smaller cycles of sedimentation that may in part be generated by fluctuating sea levels. The entire Arcturus Group appears to be a transgressive-regressive sequence; from a thin transgressive phase of pure carbonate deposition at the base, changing to a thick regressive sequence of more terrigenous clastic strata, and culminating in evaporite-rich strata at the top.

The Arcturus Group ranges in age from early Wolfcampian to late Leonardian, and possibly early Guadalupian. Age determinations are available principally from carbonate units deposited in normal marine environments. The basal transgression (Riepe Spring Formation) was completed over the center of the basin in mid-Wolfcampian time. Deposition of the Arcturus Group was terminated by the widespread transgressional deposition of carbonate of the overlying Kaibab Formation. The contact between the Arcturus and Kaibab is an approximately isochronous horizon formed by the flooding of the restricted, evaporitic Loray deposits. Dating of the Kaibab transgression has proved difficult. The best available determination correlates the Kaibab of the Hamilton Basin with the type Kaibab which is dated variously as upper Leonardian or lowermost Guadalupian.

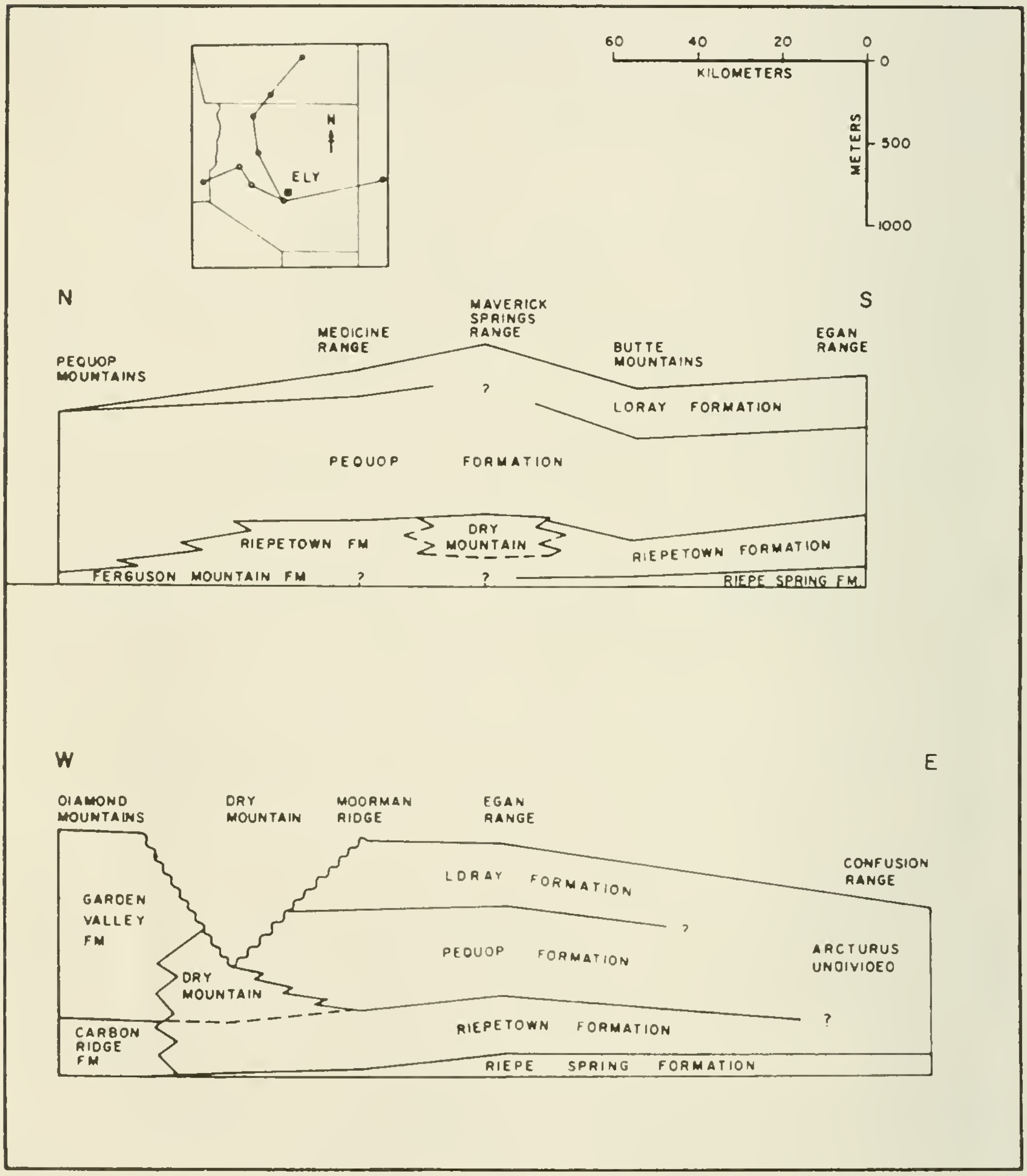
Formations within the Arcturus are poorly determined, but there is some uniformity in usage. The Arcturus Group was proposed to include the sequence of Permian units underlying the Kaibab Formation in the vicinity of Ely, Nevada. This sequence includes a basal carbonate unit, a lower sandstone unit, a middle carbonate unit, and a top evaporite-bearing unit. This sequence is typical of the central part of the Hamilton Basin and is exposed along the length of the Egan Range and Butte Mountains in White Pine County, Nevada. Units in this succession have been given the names Riepe Spring Formation, Riepetown Formation, Pequop Formation, and Loray Formation (oldest to youngest respectively) by Steele (1960). The Riepe Spring Formation and Riepetown Formation have type sections in the Egan Range near Ely, but the Pequop Formation and Loray Formation have type sections in Elko County, Nevada. As stated by Yochelson and Fraser (1973), there are problems in applying these names beyond their type areas. The two upper units have been the subject of much nomenclatural debate, and many workers have referred to them as lower Arcturus Formation and upper Arcturus Formation, but they are valid formational units satisfying the criteria of distinct lithology and mappability.

In the northern part of the basin (Elko County, Nevada; Tooele County, Utah) carbonate sediments are predominant throughout the sequence. Formations are different from the central part of the basin, with the Ferguson Mountain Formation at the base, the type Pequop Formation overlying this, and a more terrigenous Loray (?) Formation of variable thickness at the top.

In the western part of the basin there are rapid facies changes with fine-grained sediments (calcareous siltstones, marls, and silty limestones) predominating in the zone between the center of the basin and basin edge. Coarser-grained sediments with conspicuous chert pebbles and chert conglomerates predominate further west in Eureka County, Nevada. The sequence in the western part of the basin is divided into two formations, a lower unit of mostly carbonate with minor chert sands and conglomerate named the Carbon Ridge Formation, and an upper unit containing conspicuous chert conglomerates and other lithologies, the Garden Valley Formation (Nolan and others, 1956). The Carbon Ridge Formation is the approximate equivalent of the Riepe Spring Formation and Riepetown Formation, and the Garden Valley Formation is the approximate equivalent of the upper formations of the Arcturus Group (Barosh, 1964, unpub. Ph. D. thesis, Univ. Colorado). In the area between the western edge and central part of the Hamilton Basin, massive calcareous siltstone lithologies are common. Barosh noted that they are a transitional facies between the western conglomeratic and central typical parts of the Arcturus Group, and Stevens (1965) referred to them as the "Dry Mountain lithosome" (for exposures at Dry Mountain in White Pine County, Nevada). They appear to be a valid formational unit and are of special interest because they characteristically contain ammonites. In the Maverick Springs Range calcareous siltstones are present in the stratigraphic context of the central basin sequence, where they underlie massive carbonates of the Pequop Formation and are of late Wolfcampian and possibly early Leonardian age.

In the eastern part of the basin the Riepe Spring Formation is present (Barosh, 1968), but the other formations of the Arcturus cannot be distinguished. The post-Riepe Spring portion of the group is designated simply as the Arcturus Formation. The interval here referred to as Arcturus Formation is not lithologically equivalent to and is only partly time equivalent to the interval in the central basin area (Pequop and Loray units) called Arcturus Formation by various authors. Coarse-grained sediments predominate in all but the lowest parts of the sequence and sandstones are common. The area is transitional to the Colorado Plateau area which has thick quartzose sandstones of Early Permian age (Brill, 1963).

Cross sections showing the formational interrelationships are given in Text-figure 4. A comprehensive and detailed analysis of lower Permian formational relationships east-west across the Hamilton Basin is given in Barosh (1964, unpub. Ph. D. thesis, Univ. Colorado).



Text-figure 4. N-S and E-W cross sections of the Arcturus Group showing formational interrelationships.

Riepe Spring Formation: This formation consists mostly of massive limestones and forms a thin carbonate cover on top of the unconformable surface eroded in late Carboniferous and earliest

Permian time. This unconformity occurs within a sequence of massive limestones and does not correspond with a major change in lithology. The Riepe Spring Formation is less than 200 meters in thickness and is thin in proportion to the remainder of the Arcturus Group. It has been given a Wolfcampian age by Wilson and Langenheim (1962) and Bissell (1964) and is probably middle Wolfcampian in most areas.

Riepetown Formation: This unit is up to 1000 meters thick, and contains sandstones, siltstones, shales, limestones, and dolomites. It is coarser grained than the underlying and overlying formations and is characterized by quartzose sandstones. Massive, thick sandstones occur in some areas (*e.g.*, Murry Summit in the Egan Range), but the sandstones are normally thin and interbedded with other lithologies. The formation is most distinct in the type area in the central part of the basin and is less distinct to the west, north, and east. To the west it grades into predominantly fine-grained deposits of marl and calcareous siltstones.

The Riepetown Formation is mostly of Wolfcampian age (determined from fusulinids and ammonites in the Egan Range, White Pine Range, and Maverick Springs Range). Bissell (1964) recorded middle and late Wolfcampian fusulinids from the Riepetown in the type area, and Zabriskie (1970) recorded late Wolfcampian fusulinids from this unit in the Moorman Ranch area in the White Pine Range. Farther west in the Dry Mountain area, Stevens (1965) reported late Wolfcampian fusulinids in the Riepetown and early Leonardian fusulinids in the overlying calcareous siltstone lithologies (his Dry Mountain lithosome). In the Maverick Springs Range the late Wolfcampian fusulinid *Schwagerina linearis* Dunbar and Skinner, 1937 and the ammonite *Medlicottia vetusta* ? Ruzhentzev, 1949 were collected from the upper part of the formation. The ammonite was submitted to and identified by W. Furnish and B. Glenister, who stated that it can be used as an indicator of late Sakmarian age (pers. comm., 1971).

Pequop Formation: This formation is a thick sequence of carbonates and shales conformably overlying the Riepetown Formation. It is predominantly carbonate and varies in thickness from 300 to 1300 meters (Zabriskie, 1970). This interval is widely recognized within the middle part of the Arcturus Group as a distinctive carbonate and shale unit overlying sandstones and siltstones of the Riepetown Formation and underlying shales, evaporites, and thin carbonates of the Loray Formation. Although the Pequop is widely recognized and mapped, there is no uniformity in naming it, and many workers refer to it simply as lower Arcturus Formation (using Arcturus Formation in a distinctly different sense than Arcturus Group). The Pequop thickens to the north at the expense of the Riepetown Formation and Loray Formation and in the central Pequop Mountains completely replaces the Riepetown Formation and most of the Loray Formation. The Pequop Formation is not present in the easternmost part of the basin.

The Pequop Formation contains Leonardian age fusulinids in all stratigraphic sections; Robinson (1961) identified early, middle, and late Leonardian species in the richly fossiliferous type section. Wilson and Langenheim (1962) assigned a late Wolfcampian age to the lowest strata of the Pequop (lower Arcturus of their report) in the central Egan Range. A faunal collection in the middle of the Pequop in the Murry Summit section in the central Egan Range yielded the large gastropod *Omphalotrochus* [normally considered a Wolfcampian genus (Yochelson, 1961)], an evolutionarily primitive species of the fusulinid genus *Parafusulina*? (ident. by G. Wilde, 1971), and juvenile specimens of the ammonite *Crimites elkoensis* ? Miller, Furnish, and Clark, 1957 (ident. by Furnish and Glenister, pers. comm., 1971). The *Parafusulina*? sp. suggests a Leonardian age for this horizon, and a late Wolfcampian to early or middle Leonardian age is indicated for the Pequop Formation in the Murry Summit section. The formation is clearly older here than in the type section.

Loray Formation: This is the uppermost formation of the Arcturus Group, and is a sequence of evaporitic, terrigenous, and carbonate rocks with a mean thickness of about 300 meters. It has a sharp but conformable contact with the overlying Kaibab Formation and a gradational contact with the underlying Pequop Formation. The formational contact between the Pequop and Loray is arbitrarily placed at the base of the lowest redbed or evaporite horizon, or at the horizon where carbonates are no longer dominant in the stratigraphic section. Because of this gradational contact, many workers lump the two units together as one formation and refer to the upper unit simply as upper Arcturus Formation. This confusion should not obscure its validity as a formational unit.

The type section of the Loray Formation is in Elko County, north of the Hamilton Basin. On the north edge of the basin, in the central Pequop Mountains, it is thin and mostly replaced by the Pequop Formation (Yochelson and Fraser, 1973). In the central part of the Hamilton Basin it thickens and displays its typical characters, including evaporites and red beds.

The Loray Formation has yielded few fossils useful for age determination. The fusulinid *Pseudoreichelina* cf. *P. nevadaensis* Douglass and Nestell, 1974 has been found in the lower part of the Loray Formation (loc. UCMP D-5539) in the Murry Summit section. The fusulinid is believed to be the same as *P. nevadaensis* from Spruce Mountain, Elko County, described by Douglass and Nestell (1974), but because it has been recovered only in acid insoluble residues, an exact comparison with the thin-sectioned material from Spruce Mountain has not been made. *P. nevadaensis* occurs in the upper Pequop Formation of Spruce Mountain, of late Leonardian age and indicates a probable late Leonardian age for the lower part of the Loray Formation in the Murry Summit section. This agrees well with the late Wolfcampian to early or middle Leonardian age for the underlying Pequop Formation in the same section and further indicates the older age of the Pequop Formation here compared to its type section.

In the central Butte Mountains the Loray Formation contains members of the *Neostreptognathodus sulcoplicatus* — *N. prayi* conodont assemblage zone, including the species *N. prayi* Behnken, 1975 and *N. clinei* Behnken, 1975. Behnken called this interval upper Arcturus Formation, and placed this zone in the middle to latest Leonardian. He stated that *N. prayi* and *N. clinei* imply an "upper Leonardian to lower Wordian" correlation in Nevada, and placed the Loray Formation in the Leonardian. The lower part or all of the overlying Kaibab Formation and the uppermost part of the underlying Pequop Formation also contain conodonts of the *N. sulcoplicatus* — *N. prayi* zone (Behnken, 1975, p. 293). Therefore the Leonardian-Guadalupian boundary would occur well above the Loray Formation, and the Loray Formation in the Hamilton Basin would have to be entirely Leonardian in age.

FOSSIL COLLECTIONS AND DESCRIPTION OF LOCALITIES

All fossils used in this study were collected from stratigraphic sections where the biostratigraphic horizon of each sample could be determined accurately. Fossils were collected from stratigraphic sections throughout the Arcturus Group, although most collections were made from strata in the central part of the Hamilton Basin, and an emphasis was given to collection of samples from the upper part of the Arcturus Group which contains the more distinctive and lesser known biotas. Most of the Arcturus biotas are dominated by molluscs and brachiopods, so this study has concentrated on description and determinations of the biostratigraphic ranges of species in those two groups.

In addition to the fossils collected by the author, bivalves and gastropods from three sections in the post-Riepe Spring part of the Arcturus Group in western White Pine County, Nevada, were borrowed from collections of Calvin Stevens (California State University, San Jose). Collections of fossils from the Arcturus Group, made by the U.S. Geological Survey, were examined to check for completeness of collections but have not been otherwise utilized here. Collections of Arcturus Group fossils at Stanford University were examined for the same reason.

Because they include so many borrowed specimens, the molluscs studied are from a wider range of environments than are the brachiopods (which are entirely from shallow-water environments). All groups of molluscs were studied except the ammonoids and chitons. The ammonoids were sent to Dr. Furnish and Dr. Glenister, University of Iowa. The chitons were sent to the late Allyn Smith, California Academy of Science.

The localities of the fossil collections are given below. The locality descriptions for sample numbers with a letter prefix (D-5516, etc.) are recorded in the files of the University of California Museum of Paleontology (UCMP) at Berkeley, California. Sample numbers with a number prefix (1J-2, etc.) are those of C. H. Stevens, Department of Geology, California State University, San Jose, California.

Charcoal Ovens Section

SE1/4 of Section 3, T. 13 N., R. 63 E. Along the northeast bank of the Willow Spring branch of Williams Creek, east of Ward Mountain, 25 kilometers (16 miles) south of Ely, Nevada. Egan Range, White Pine County, Nevada. Loray Formation, Arcturus Group

UCMP No.	Horizon
D-5516	— from 286′ to 351′ (87 m to 107 m) below top of unit
D-5517	— 425′ (130 m) below top
D-5518	— 403′ (123 m) ” ”
D-5519	— 390′ (119 m) ” ”
D-5520	— 345′ (105 m) ” ”
D-5521	— 323′ (98 m) ” ”
D-5522	— 306′ (93 m) ” ”
D-5523	— from 310′ to 318′ (95 m to 97 m) below top of unit
D-5524	— 302′ (92 m) below top
D-5525	— 300′ (91 m) below top
D-5526	— from 293′ to 300′ (89 m to 91 m) below top
D-5527	— 298′ (91 m) below top
D-5528	— from 246′ to 286′ (75 m to 87 m) below top
D-5529	— from 211′ to 216′ (64 m to 66 m) below top
D-5530	— from 211′ to 216′ (64 m to 66 m) below top — float
D-5531	— from 194′ to 201′ (55 m to 57 m) below top
D-5532	— from 186′ to 194′ (57 m to 59 m) below top
B-6207	— general locality for 110′ to 425′ (33 m to 130 m) below top

Murry Summit Section

Section 34, T. 16 N., R. 62 E. North side of Murry Summit, along Nevada Highway Rt. 6, at the north end of Ward Mountain, 10 kilometers (6 miles) SW of Ely, Nevada. Egan Range, White Pine County, Nevada. Pequop and Loray Formations, Arcturus Group.

UCMP No.	Horizon
D-5534	— 720′ (220 m) below base of Loray Formation
D-5535	— 730′ (223 m) ” ” ”
D-5536	— 190′ (58 m) ” ” ”
D-5537	— 200′ (61 m) ” ” ”
D-5538	— 50′ (15 m) above base of Loray Formation
D-5539	— 240′ (73 m) ” ” ”
D-5540	— 600′ (183 m) below base of Loray Formation
D-5541	— 140′ (43 m) ” ” ”
D-5542	— 85′ (26 m) ” ” ”
D-5543	— 195′ (60 m) above base of Loray Formation
D-5544	— 127′ (39 m) ” ” ”
D-5545	— 220′ (67 m) ” ” ”
D-5546	— 240′ (73 m) ” ” ”
D-5547	— 245′ (75 m) ” ” ”
D-5548	— 320′ (98 m) ” ” ”
D-5549	— 220′ (67 m) ” ” ”
D-5550	— 240′ (73 m) ” ” ”
D-5551	— 295′ (90 m) ” ” ”

D-5552 — 307′ (94 m) above base of Loray Formation
D-5553 — 395′ (120 m) " " "
D-5554 — 365′ (111 m) " " "
D-5555 — base of Loray Fm.
D-5556 — middle of Loray Fm.
D-5557 — near top of Loray Fm.
D-5563 — 800′ (244 m) below base of Loray Fm.
D-5650 — 360′ (110 m) above base of Loray Fm.

Murry Summit Section — Dead Horse Wash Area

Sec. 2 & 3, T. 15 N., R. 62 E. North side of Dead Horse Wash, near Murry Summit, south of Nevada Highway Rt. 6, northwest side of Ward Mountain, 11 kilometers (7 miles) SW of Ely, Nevada. Egan Range, White Pine County, Nevada.

UCMP No. — Horizon

D-5558 — near top of Loray Fm.
D-5559 — 50′ (15 m) below D-5558
D-5560 — 100′ (30 m) " "
D-5561 — 150′ (46 m) " "
D-5562 — 250′ (76 m) " "
D-5564 — 260′ (79 m) " "
D-5565 — 280′ (85 m) " "
D-5566 — Pequop Fm.

Ward Mountain Area

From outcrops of the Arcturus Group between the Murry Summit Section and the Charcoal Ovens Section, in the vicinity of Ward Mountain, SW of Ely, Nevada. Egan Range, White Pine County, Nevada.

UCMP No. — Location

B-6217 — Ely #3 Quadrangle, Pequop Fm.
B-6222 — W1/2 of Sec. 34, T. 14 N., R. 63 E., Pequop Fm.
B-6230 — Ely #3 Quadrangle, Riepetown Fm.
B-6273 — SW1/4 of Sec. 4, T. 13 N., R. 63 E., Riepetown Fm.
B-6281 — SE1/4 of Sec. 12, T. 15 N., R. 62 E., Pequop Fm.

Confusion Section

Section 36, T. 16 S., R. 17 W. From outcrops of the Arcturus Formation between Chevron Ridge and Plympton Ridge, 1 kilometer (1/2 mile) south of Indian Pass, Confusion Range, Willard County, Utah. Arcturus Formation.

UCMP No. — Horizon

D-5567 — 100′ (30 m) below top of Arcturus Fm.
D-5568 — 250′ (76 m) " " "

D-5569 — 300′ (91 m) below top of Arcturus —midway between Bed A and Bed B of Hose and Repenning (1959)
D-5570 — 310′ (95 m) " " "
D-5571 — 320′ (98 m) " " "
D-5572 — 375′ (114 m) " " " —Bed A of Hose and Repenning (1959)
D-5573 — 450′ (137 m) " " "
D-5574 — 600′ (183 m) " " "
D-5575 — 650′ (198 m) " " "
D-5576 — 1000′ (305 m) below top of Arcturus Fm.
D-5584 — 50′ (15 m) above base of Arcturus Fm.
D-5585 — 300′ (91 m) below top of Arcturus Fm.
D-5586 — 250′ (76 m) below top of Arcturus Fm.

Confusion Section — Desolation Anticline area

Section 15, T. 15 S., R. 17 W.

UCMP No. Horizon

D-5587 — 80′ (25 m) below top of Arcturus Fm. —Bed D of Hose & Repenning (1959)
D-5588 — 80′ (25 m) " " " "
D-5651 — 100′ (30 m) " " "

Butte Mountains Section

Section 34, T. 21 N., R. 59 E. North side of large unnamed canyon on the west side of the Central Butte Mountains, 32 kilometers (20 miles) north of U.S. Highway Rt. 50 on the Long Valley Road. Butte Mounains, White Pine County, Nevada. Loray Formation, Arcturus Group.

UCMP No. Horizon

D-5590 — 100′ (30 m) below top of Arcturus Group
D-5591 — 105′ (32 m) " " "
D-5592 — 95′ (29 m) " " "
D-5593 — 200′ (61 m) " " "
D-5594 — 425′ (130 m) " " "
D-5595 — 500′ (152 m) " " "
D-5596 — 625′ (191 m) " " "
D-5597 — 650′ (198 m) " " "
D-5598 — 850′ (259 m) " " "
D-5599 — 950′ (290 m) " " "
D-5600 — 900′ (275 m) " " "
D-5601 — 1050′ (320 m) " " "
D-5602 — 1250′ (381 m) " " "
D-5603 — 1260′ (384 m) " " "
D-5604 — 1400′ (427 m) " " "
D-5605 — 1375′ (419 m) " " "
D-5606 — 1450′ (442 m) " " "
D-5607 — 1500′ (457 m) " " "
D-5608 — 1550′ (473 m) " " "

Robinson Summit Section — Butte Mountains

Section 29, T. 19 N., R. 61 E. On ridge east of 30 Mile Road, east side of Butte Mountains, south end of range, 8 kilometers (5 miles) north of U.S. Highway Rt. 50. Loray Formation, Arcturus Group.

UCMP No.	Horizon
D-5609	— lower part of section of Loray Fm.
D-5610	— 50′ (15 m) above D-5609
D-5611	— 100′ (30 m) " "
D-5612	— 110′ (34 m) " "
D-5613	— top of Loray Fm. section

Medicine Range Section

Section 12, T. 27 N., R. 60 E. West slope of High Bald Peak area of the Medicine Range, north end of Butte Valley, Elko County, Nevada. Pequop Formation, Arcturus Group.

UCMP No.	Horizon
D-5614	— top of Pequop Fm.
D-5615	— 25′ (8 m) below top of Pequop Fm.
D-5616	— 100′ (30 m) " " "
D-5617	— 200′ (61 m) " " "
D-5618	— 210′ (64 m) " " "
D-5619	— 215′ (66 m) " " "
D-5620	— 250′ (76 m) " " "
D-5621	— 300′ (92 m) " " "
D-5622	— 500′ (153 m) " " "
D-5623	— 510′ (156 m) " " "
D-5624	— 800′ (244 m) " " "
D-5625	— 1000′ (305 m) " " "
D-5626	— 1200′ (366 m) " " "
D-5627	— 1400′ (427 m) " " "
D-5628	— 1800′ (549 m) " " "

Maverick Springs Section

Section 30, T. 25 N., R. 59 E. Beside Murry Canyon Road, on north side of canyon leading up to Mountain Spring from Ruby Valley, at the south end of Ruby Valley. Maverick Springs Range, White Pine County, Nevada. Riepetown — Loray Formations, Arcturus Group.

UCMP No.	Horizon
D-5629	— middle of Loray Fm. — *Derbyia* bed
D-5630	— base of exposed Riepetown Fm.
D-5631	— 25′ (8 m) above base of Riepetown Fm.
D-5632	— 35′ (11 m) " " " —near base of Dry Mountain
D-5633	— 200′ (61 m) " " " "lithosome"

D-5634 — 250′ (76 m) above base of Riepetown Fm.
D-5635 — 300′ (92 m) " " "
D-5636 — 425′ (130 m) " " "
D-5637 — 430′ (131 m) " " "
D-5638 — 470′ (143 m) " " "
D-5639 — 465′ (142 m) " " "
D-5640 — 450′ (137 m) " " "
D-5641 — 470′ (143 m) " " "
D-5642 — 485′ (148 m) " " "
D-5643 — 490′ (149 m) " " "
D-5644 — 510′ (156 m) " " "
D-5645 — 530′ (162 m) " " "
D-5646 — 555′ (169 m) " " "
D-5647 — 600′ (183 m) " " "
D-5648 — 480′ (146 m) " " "
D-5649 — 450′ (137 m) " " "
D-5652 — middle of Loray Fm. — just below *Derbyia* bed

Buck Mountain Section

Section 5, T. 20 N., R. 57 E. to Section 31, T. 21 N., R. 57 E. On south end of Buck Mountain, at the south end of the Ruby Range, west side of Long Valley, White Pine County, Nevada. Dry Mountain "lithosome", Riepetown Formation, Arcturus Group.

CHS No. — Horizon

1J-2 — near base of section
1J-3 — near middle of section
1J-6 — near top of section

Dry Mountain Section

Section 23 & 24, T. 20 N., R. 57 E. On Dry Mountain, west side of Long Valley, between the south end of the Ruby Range and the north end of the White Pine Range, White Pine County, Nevada.
Riepetown Formation (including Dry Mountain "lithosome"), Arcturus Group.

CHS No. — Horizon

1K-5 — about 1000′ (300 m) above base of formation
1K-7 — base of Dry Mountain "lithosome", about 1200′ (365 m) above base of formation
1K-8 — about 1400′ (425 m) above base of formation
1K-9 — about 2000′ (600 m) above base of formation

Limestone Peak Section

Section 21 & 22, T. 15 N., R. 59 E. On Limestone Peak, on the southwest side of Jakes Valley, along the east side of the White Pine Range, White Pine County, Nevada. Riepetown Formation (including Dry Mountain "lithosome") and Pequop (?) Formation, Arcturus Group.

CHS No.	Horizon
1X-1	— base of section, lower member, Riepetown Fm.
1X-3	— middle of lower member, Riepetown Fm.
1X-8	— near base of Dry Mountain "lithosome", Riepetown Fm.
1X-9	— lower part of Pequop (?) Fm.
1X-12	— middle part of exposed Pequop (?) Fm.

SYSTEMATIC PALEONTOLOGY

Phylum BRACHIOPODA
Class INARTICULATA Huxley, 1869
Order LINGULIDA Waagen, 1885

Superfamily **LINGULACEA** Menke, 1828
Family **LINGULIDAE** Menke, 1828
Genus **LINGULA** Bruguiere, 1792

Lingula cf. **carbonaria** Shumard, 1858 Pl. 1, fig. 1

cf. *Lingula carbonaria* Shumard, 1858, St. Louis Acad. Sci., Trans., vol. 1, p. 215.
cf. *Lingula umbonata* White, 1884, Indiana Dept. Geol. & Nat. Hist. Surv., 13th Ann. Rept., p. 120, pl. 25, fig. 14.
cf. *Lingula carbonaria* Shumard, Dunbar & Condra, 1932, Nebraska Geol. Surv., 2d. Ser., Bull. 5, pp. 31-33, pl. 1, figs. 1, 2.
cf. *Lingula carbonaria* Shumard, Hoare, 1961, Univ. Missouri Stud., vol. 36, p. 21, pl. 1, figs. 1, 2.

Description. — Small, elliptical, biconvex shells; half as wide as long, with maximum width about 6 mm; greatest width near midline; of slight to moderate inflation; beaks slightly produced and inflated; exteriors smooth with a few concentric growth lines irregularly placed, and a few fine radial striae; interior with a few indistinct muscle scars about the midline but their pattern cannot be discerned; interior probably without a median ridge; other internal characters unknown.

Discussion. — This small brachiopod is similar to *L. carbonaria* of the mid-continent region in all details except the smaller size and the modest inflation of the beak. The Arcturus specimens are about half the size of most upper Paleozoic *Lingula* specimens and appear to be juveniles. At loc. UCMP D-5591 about 15 specimens were collected on one bedding plane. These specimens are from 4-6 mm in length, and appear to be juveniles of a single year class. Partial specimens collected from nearby locality UCMP D-5592 are larger but still probably juveniles. The small size of *Lingula* at these locations may partly be caused by stunting from high salinity water. This species was described from upper Carboniferous strata, where it is widespread, and appears to be long ranging.

Occurrence.—Loray Formation, loc. UCMP D-5591, D-5592, Butte Mountains, Nevada.

Class ARTICULATA Huxley, 1869
Order ORTHIDA Schuchert & Cooper, 1932
Suborder ORTHIDINA Schuchert & Cooper, 1932

Superfamily **ENTELETACAE** Waagen, 1884
Family **RHIPIDOMELLIDAE** Schuchert, 1913
Genus **RHIPIDOMELLA** Oehlert, 1890

Rhipidomella transversa King, 1930 Pl. 1, fig. 2

Rhipidomella transversa King, 1930, Univ. Texas Bull., No. 3042, p. 44, pl. 1, figs. 12-13.
Rhipidomella transversa King, McKee, 1938, Carnegie Inst. Washington, Pub. 492, p. 222, pl. 43, figs. 1-1c.

Description.—Small, well-inflated rhipidomellid brachiopod; wider than long, with greatest width at midlength; width, 8 mm; length, 6 mm; with a slight fold and sulcus developed over the middle 1/3 of shell width; strongly developed ribbing consisting of thick hollow costellae in the middle part of the valve; inner margin of the valve finely corrugated with short, sharp grooves, corresponding to the ends of the hollow costellae; other characters not known.

Discussion.—This species is identical in size and shape to the holotype of the species described and illustrated by King (1930). It has a characteristic greater width than length, and has coarse ribs over the median area of the valve. The high, narrow ventral cardinal area described by King (1930) cannot be seen on this material because of poor preservation but probably is present.

Occurrence.—Upper part of the Riepetown Formation, loc. UCMP D-5636, Maverick Springs Range, Nevada.

Order STROPHOMENIDA Öpik, 1934
Suborder STROPHOMENIDINA Öpik, 1934

Superfamily **DAVIDSONIACEA** King, 1850
Family **MEEKELLIDAE** Stehli, 1954
Subfamily **MEEKELLINAE** Stehli, 1954
Genus **MEEKELLA** White & St. John, 1867

Meekella attenuata Girty, 1909 Pl. 1, fig. 3

Meekella attenuata Girty, 1908(1909), U.S. Geol. Surv., Prof. Paper 58, pp. 205-206, pl. 24, figs. 7-9a, pl. 25, figs. 4-4d.
Meekella attenuata Girty, King, 1930, Univ. Texas Bull., No. 3042, pp. 52-53, pl. 5, figs. 2-7.
Meekella attenuata Girty, Stehli, 1954, Amer. Mus. Nat. Hist., Bull., vol. 105, Art. 3, pp. 304-305, pl. 18, figs. 6-11.
Meekella attenuata Girty, Cooper & Grant, 1974, Smithson. Contr. Paleobiology, No. 15, pp. 354-356, pl. 103, figs. 1-34; pl. 104, figs. 11-20.

Description. — Well-inflated small to medium size *Meekella* with a large attenuated beak on the ventral valve and 15-20 major costae. Two sets of ribbing on the adult portion of the shell: a set of fine costellae covering the shell, increasing by intercalation and in some adult individuals having a costa of slightly larger size in the bottom of the interspace between major costae, and a set of coarse costae beginning at about 1/4 to 1/3 of the shell length from the beak and consisting of 15 to 20 costae covering the central and most of the lateral parts of the shell but not the lateral extremities along the hingeline; fine costellae tending to converge toward the crest of major costae; length of hingeline a little more than 1/2 of the total shell width. Ventral valve — exterior: ornament as above; shape an asymmetrical cone with midline of shell from beak to commissure straight or slightly curved. Ventral valve — interior: with large dental plates separate and subparallel on attachments to valve and gradually divergent on attachments to interarea, projecting into hingeline as two strong sharp teeth. Dorsal valve — exterior: domed and strongly inflated; ornament as above. Dorsal valve — interior: cardinalia of strong high cardinal process supported by high and short, diverging crural plates which enclose adductor muscle scars, cardinal process of two gradually diverging bifid teeth, high and strongly recurved.

Discussion. — This species is distinguished by the numerous large costae and the large attenuated beak of the ventral valve. The species is widespread and abundant in the American Southwest and has an age range from Wolfcampian to Guadalupian. It was gregarious in its life habits and is often found in peri-reefal situations (Stehli, 1954).

Occurrence. — Upper part of Pequop Formation, loc. UCMP D-5540, Egan Range, Nevada.

Family **ORTHOTETIDAE** Waagen, 1884

Subfamily **DERBYIINAE** Stehli, 1954

Genus **DERBYIA** Waagen, 1884

Derbyia sp. Pl. 1, figs. 4-5

Discussion. — Incomplete shells of the genus *Derbyia* are present at a few localities in the Arcturus Group. These specimens show the characters of the genus, a simple median septum in the ventral valve and large, bifid cardinal process with crural plates in the dorsal valve, but they are not complete enough to be specifically identifiable. The material from loc. UCMP D-5629 was recovered from a thin layer composed mostly of *Derbyia* shells that are layered one on top of the other, and appear to result from a shell bank habit of growth, similar to modern oyster banks in warm temperate waters. All growth stages are present in the sample and the species grew to large size in maturity. Attachment of the shell appears to have occurred, but only at the tip of the beaks of juveniles, and in most cases the attachment was broken in later life.

Occurrence. — Upper part of Riepetown Formation, loc. UCMP D-5639, lower part of the Loray Formation, loc. UCMP D-5629, in the Maverick Springs Range, Nevada; upper part of Pequop Formation, loc. UCMP D-5535, Egan Range, Nevada.

Suborder CHONETIDINA Muir-Wood, 1955

Superfamily **CHONETACEA** Bronn, 1862

Family **CHONETIDAE** Bronn, 1862

Subfamily RUGOSOCHONETINAE Muir-Wood, 1962
Genus LISSOCHONETES Dunbar & Condra, 1932

Lissochonetes sp. Pl. 1, fig. 6

Chonetes sp., McKee, 1938, Carnegie Inst. Washington, Pub. 492, pp. 230-231, pl. 44, fig. 13.

Description. — Adult shell subquadrate, with sides narrowing toward the front, and slightly auriculate at the hingeline; twice as wide as long with no sinus developed on front margin, and a small and depressed beak projecting a short distance over hingeline; about seven spine bases present on either side of beak, with spines projecting at a high angle from the hingeline; well-developed fold and sulcus; interior of ventral valve with many pustules arranged in radial rows from the beak; other characters unknown.

Discussion. — This species of *Lissochonetes* is represented by a single valve in the present collections, although it is more abundant in collections from this interval made by members of the U.S. Geological Survey. The species is distinguished by width twice as great as length, moderately inflated folds bordering sulcus, and straight, converging sides with small ears slightly developed. It is similar to *Lissochonetes geinitzianus* (Waagen) in these features but is not discernably mucronate, and has larger pustules. It may represent a new species, but the types of *Chonetes platynotus* White should be examined first to determine the possibility of synonymy.

Three chonetid species groups are present in strata of the Arcturus Group and correlative formations of the southwestern United States. *Lissochonetes* sp. of this report and *Chonetes* sp. of McKee (1938) are of one species group representing *Lissochonetes sensu stricto,* including species close to the type species. *Chonetes kaibabensis* McKee (1938) and the closely related *Chonetes ostiolatus* Girty (1910) are in another species group, also in the genus *Lissochonetes.* A third group includes *Chonetes subliratus* of McKee (1938) and belongs in the genus *Dyoros.* Members of all three species groups may be found in Arcturus Group strata.

Occurrence. — Upper part of the Riepetown Formation, loc. UCMP D-5644, Maverick Springs Range, Nevada.

Suborder PRODUCTIDINA Waagen, 1883

Superfamily **PRODUCTACEA** Gray, 1840

Family **ECHINOCONCHIDAE** Stehli, 1954

Subfamily **ECHINOCONCHINAE** Stehli, 1954

Genus **BATHYMYONIA** Muir-Wood & Cooper, 1960

Bathymyonia nevadensis (Meek), 1877 Pl. 1, fig. 7

Productus nevadensis Meek, 1877, U.S. Geol. Explor. of 40th Parallel, Part 1, p. 64, pl. 8, figs. 2-2e.
Pustula nevadensis (Meek), Branson, 1930, Univ. Missouri Studies, vol. 5, No. 2, p. 31, pl. 8, figs. 1-8.
Bathymyonia nevadensis (Meek), Cooper & Grant, 1975, Smithson. Contr. Paleobiology, No. 19, p. 1041, pl. 352, figs. 1-19, pl. 353, figs. 12-18.

Discussion. — Small juvenile specimens of this species are present in the upper part of the Riepetown Formation. These show the characteristic growth lamellae and spine arrangement of the genus and the short hingeline. The brachial valve interiors have lateral ridges diverging from the median ridge at angles of about 70°, and the visceral disc bears an anterior marginal rim.

Occurrence. — Upper part of Riepetown Formation, loc. UCMP D-5639, Maverick Springs Range, Nevada.

Family **MARGINIFERIDAE** Stehli, 1954

Subfamily **COSTISPINIFERINAE** Muir-Wood & Cooper, 1960

Genus **ECHINAURIS** Muir-Wood & Cooper, 1960

Echinauris subhorrida (Meek), 1877 Pl. 1, fig. 8

Productus subhorrida Meek, 1877, U.S. Geol. Explor. of 40th Parallel, Part 1, p. 75, pl. 7, figs. 3-3b.
Pustula subhorrida (Meek), Branson, 1930, Univ. Missouri Studies, vol. 5, No. 2, p. 32, pl. 8, figs. 9-11.
Avonia dorsoconcava McKee, 1938, Carnegie Inst. Washington, Pub. 492, pp. 244-245, pl. 46, figs. 9-10.
Avonia subhorrida newberryi McKee, 1938, Carnegie Inst. Washington, Pub. 492, pp. 245-247, pl. 46, fig. 11.
Echinauris subhorrida (Meek), Cooper & Grant, 1975, Smithson. Contr. Paleobiology, No. 19, pp. 1015-1016.

Description. — Shell small, subquadrate and elongate with slightly rounded sides; small, sharp, prominent and highly incurved beak; ventral valve strongly arched throughout, but convexity decreasing during later growth; shallow, wide sulcus developed over most of the length of the ventral valve, increasing in prominence during growth; ventral and dorsal valves covered with well-developed costae except on umbo; costae increasing in size with growth of valve; six to nine (approximate count) on visceral disc area — costation not determined on flanks; one set of spines on ventral valve, of large size and projecting from valve at a high angle; a dense set of laterally projecting halteroid spines on either side of the beak along the hingeline, of slightly larger size than the body spines; other features unknown.

Discussion. — Incomplete shells of this species occur in a few localities and appear to be conspecific with Meek's original material collected in Nevada, and with Phosphoria Formation material (Branson, 1930). *Echinauris subhorrida* is more strongly sulcate and has much stronger costae than the type species, *Echinauris lateralis* Muir-Wood and Cooper but otherwise is closely related. The type specimens of the species *Avonia subhorrida newberryi* McKee and *Avonia dorsoconcava* McKee were examined and they do not appear to be specifically distinct from each other, nor from juveniles of *Echinauris subhorrida.* McKee (1938) separated the two species on the basis of size and shallower median sulcus. Both of these are growth related characters. He acknowledged that populations of these species were variable, and that the new species were established on extremes in the morphological variations. These extremes are not distinct enough to justify such a separation.

Occurrence. — Upper part of Riepetown Formation, loc. UCMP D-5637, D-5639, D-5643, D-5644, Maverick Springs Range, Nevada.

Family **DICTYOCLOSTIDAE** Stehli, 1954

Subfamily **DICTYOCLOSTINAE** Stehli, 1954

Genus **SQUAMARIA** Muir-Wood & Cooper, 1960

Squamaria ivesi (Newberry), 1861 — Pl. 1, figs. 9-11

Productus ivesi Newberry, 1861, *in* Ives, Report upon the Colorado River of the West, U.S. 36th. Congress Ex. Doc. 90, Part 3, p. 122, pl. 2, figs. 1-8.
Productus (Dictyoclostus) ivesi Newberry, McKee, 1938, Carnegie Inst. Washington, Pub. 492, p. 238, pl. 45, figs. 3-7.
Bellaclathrus spinosus Winters, 1963, Geol. Soc. America, Mem. 89, pp. 26-27, pl. 1, figs. 4-8.

Description. — Ventral valve-exterior; large, well-inflated dictyoclostid with trail; fine cancellate sculpture over visceral area, with rugae disappearing anteriorly, where fine costae enlarge on trail to moderate size; fold and sulcus well developed in maturity; small triangular ears covered with large spines; ginglymus developed; umbo tapering, slightly projecting beyond hingeline. Ventral valve-interior: covered with small endospines; ears separated from body mass by large ear baffles; adductor muscle scars well built up on median line of valve. Dorsal valve-exterior: same ornament as ventral valve, except covered by sparse small spines. Dorsal valve-interior: trilobate cardinal process supported by thickened hinge margins and a short tapering median ridge, succeeded anteriorly by a tall thin breviseptum; dense small endospines on anterior edge of visceral disc; ear chambers well demarked by ear baffles.

Discussion. — This species is distinguished by its cancellate to costate sculpture and by the small but distinct ears. The ear chambers are distinct and set off by ear baffles in both valves. The species *Squamaria spinosus* (Winters) is identical to young specimens of *Squamaria ivesi* found in the Arcturus Group, and is synonymized. This species group is abundant in the Permian formations of the western states. Further work is needed to see if other species can be defined among the extensive populations available for study. *Squamaria ivesi* is abundant in the Arcturus Group and is the largest brachiopod commonly found. It is characteristic of shallow water deposition in areas of normal salinity and diverse fauna and is found in mixed carbonate and terrigenous sediments.

Occurrence. — Upper part of Riepetown Formation, loc. UCMP D-5637, D-5647, Maverick Springs Range, Nevada; Pequop Formation, loc. UCMP D-5540, Egan Range; loc. UCMP D-5614, D-5617, D-5618, D-5622, D-5625, D-5626, D-5627, Medicine Range, Nevada; Arcturus Formation, loc. UCMP D-5586, Confusion Range, Utah.

Superfamily **PRODUCTACEA** Waagen, 1883

Family **LINOPRODUCTIDAE** Stehli, 1954

Subfamily **COSTELLARININAE** Muir-Wood & Cooper, 1960 (as Costellariinae)

Diagnosis. — Characterized by a simplified bilobed cardinal process, ventral valve with small interarea having delthyrium, and cicatrix terminating umbo. Ventral valve costellate and having elongate, suberect spines; brachial valve without spines.

Discussion. — *Costellarina* is the only genus in the subfamily Costellarininae and is distinct enough to justify placement in a separate subfamily. However, its basic affinities are to the Productacea, and it is here transferred from the Aulostegidae to the Linoproductidae. Its linoproductid affinities are best seen in the external features of costellation and spination but are also shown by the simplified cardinalia and breviseptum. The modified cardinal process appears to have evolved by simplification as a result of the small size of *Costellarina,* producing a convergence in form to the cardinal process of the productellids. The attached habit of most individuals is interpreted to be an adaptation from free-living ancestors, a characteristic occasionally seen in *Juresania* (Muir-Wood & Cooper, 1960, p. 48, pl. 79). *Costellarina* probably had both attached and free-living niches.

Free-living *vs.* attached life habits and cardinal processes are the most important characters used in classification at the suborder Most of these are valid, but attachment does occur among some productaceans, just as the free-living habit occurs in some strophalosiaceans (see discussion of *Lyttonia* in Rudwick and Cowen, 1967) and the cardinal process is more variable in form within species and genera than has been recognized. Illustrations by Grant (1966) of a single species of *Waagenoconcha* show considerable variation of the cardinal process.

Genus **COSTELLARINA** Cooper & Muir-Wood, 1967, emended herein

Costellaria Muir-Wood & Cooper, 1960 (non Swainson, 1840 = Mollusca)

Type species: *Costellaria costellata* Muir-Wood & Cooper, 1960.

Description. — *Emended.* Ventral valve: Strongly inflated, weakly to strongly costellae, rugae variably developed, often present only near the beak. Having a single set of long body spines which are regularly distributed and curve anteriorly parallel to the curvature of the valve. Ears small, densely covered with spines slightly larger than body spines and extending posteriorly over the hingeline and laterally. Valves without fold or sulcus, maintaining a smoothly expanding growth curve throughout life, without flares. Umbo terminated by a cicatrix; short interarea with delthyrium closed by cardinal process of dorsal valve. Body spines having tubular extensions (atrial tunnels) on the valve interior that extend anteriorly from the spine base a short distance and terminate before reaching a new spine.

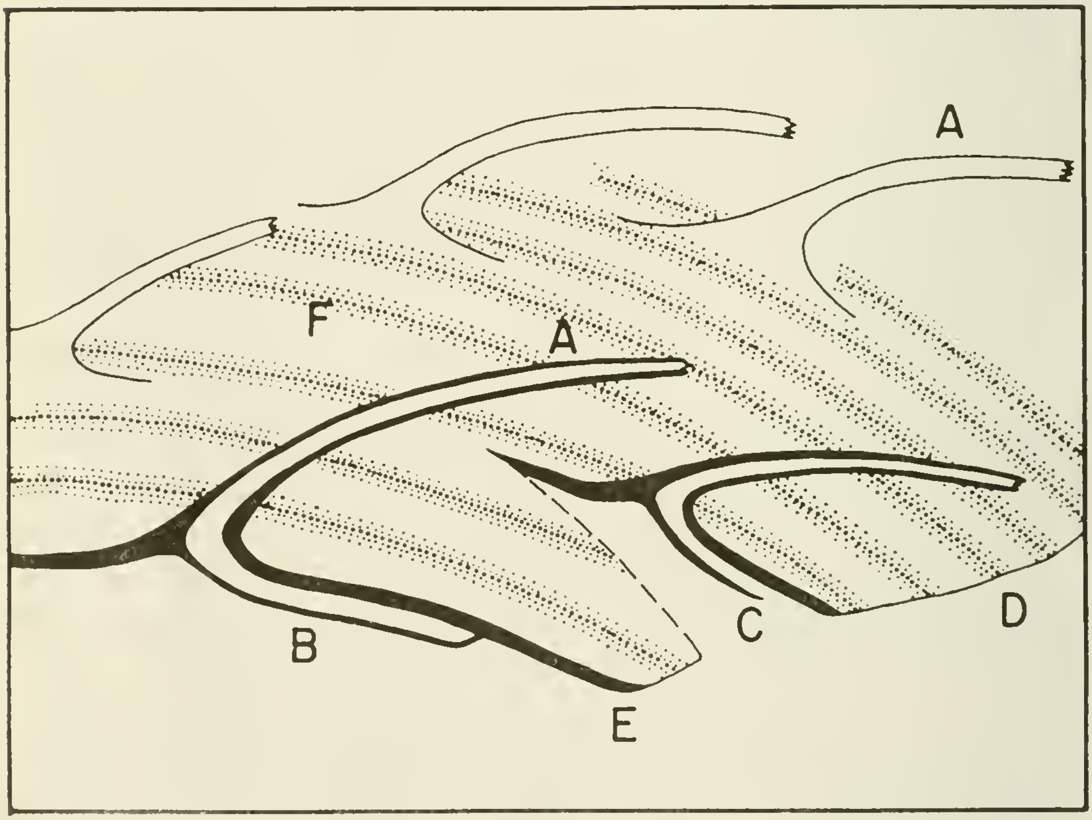
Dorsal valve: Flattened on younger portions, then assuming growth shape of ventral valve, containing few or many short endospines on anterior part of valve but without external spines. Cardinal process small with strongly diverging lobes which bear a median slit and recurve over the hingeline, and supported by widely diverging lateral ridges that merge with thickened hinge line ridges. Breviseptum small, located near center of visceral disc. Adductor muscle field poorly defined.

Spine bases: The body spines in *Costellarina* are often perched on small nodes which are usually elongate in the direction of growth. The hollow interior of the spine continues into the visceral cavity. Where it emerges on the interior of the shell it bends sharply anteriorly and is continuous with the atrial ridge (Text-fig. 5). The atrial ridge is a hollow extension of the spine in the form of a tunnel on the inner surface of the valve and extends anteriorly, parallel to the line of growth of the spine. The atrial ridge is about the same thickness as the spine, and appreciably thickens the shell wall. It extends a varying distance forward from the base of the spine and tapers abruptly on the anterior end.

Within a uniformly short distance after the termination of the atrial ridge a new spine is formed. There is obviously a functional relationship between the atrial ridge and the production of new spines. While the old spine is being maintained and is growing, the atrial ridge is being lengthened. When this ceases the atrial tunnel is sealed off and a new spine is grown anterior to the old one. The atrial tunnels contain lobes of mantle tissue which are separated from the expanding visceral tissue by the roof of the tunnel. The spines on the lateral ears of the pedicle valve are not closed off at maturity as are the body spines. It is probable that they continue growing throughout the life of the individual. Atrial ridges have been noticed by Grant (1966) and Waterhouse (1971), but the reconstruction of Grant (1966) is made on the assumption that they remain open to the interior long after the spine is first formed and as the shell is thickened. This is doubtful, even for *Waagenoconcha,* and the atrial tunnel and ridge indicate a relatively short life for the growth of the spines.

Discussion. — The emended description of this genus corrects the description of the spines which are typically productacean and consist of only one type although they are slightly larger on ears than on the body, and are not rhizoid, nor are there any prostrate spines. The body spines do have anteriorly directed tubular extensions (atrial ridges) on the interior of the valve. The reference to lack of elytridium is removed, since that feature is normally present only in the Strophalosiacea.

Costellarina is a small, simplified genus that lacks close relations. It is closest to *Cancrinella* but differs from that genus in its modified cardinalia. Although Muir-Wood and Cooper (1960) classified it in the Aulostegidae, the cardinal process (which they use as



Text-figure 5. Drawing of the characters of spines and atrial ridges in *Costellarina,* based mostly on a young specimen of *C. kaasai* paratype UCMP 14303.
A — spines, B — atrial ridge with the anterior end sealed off, showing shell (black) and open space (white), C — hollow atrial ridge with anterior end open, and presumably filled with a tissue lobe extending into spine from mantle edge, D — anterior edge of ventral valve, E — shell wall in cross section, F — fine ribs (costellae) of shell. Magnification approx. × 20.

a prime character in classification) is not similar to typical aulostegid cardinal processes. It is simplified, lacks a shaft, and is similar to the productellid type (a fact also noted by Muir-Wood and Cooper) which is normally bilobed and supported by short diverging lateral ridges. In external features the genus is most similar to *Cancrinella* and the Linoproductidae, so much so that it was described as a homeomorph of *Cancrinella*. Some features of the cardinalia also suggest relationship to *Cancrinella*. It is probable that *Costellarina* evolved from *Cancrinella* by modifications resulting from prolonged period of attachment. The presence of a relatively large cicatrix of attachment was the major justification for assignment to the Strophalosiacea (Aulostegidae).

Species presently placed in *Costellarina* are *C. costellata* (the type species), and *C. kaasai*, n. sp., *C. plasi*, n. sp. and *C. carlstroemi*, n. sp. In addition, the species *Terrakea arctica*, described by Waterhouse (1971), probably belongs in this genus. The holotype and paratypes of *T. arctica* are clearly related to *Costellarina*, but the hypotypes illustrated in the same article are not and belong in different genera. Since Waterhouse's reconstruction of the cardinalia of *T. arctica* was based on hypotype specimens, this feature of the species is still unknown. The other features of size, shape, costellation, spination, and atrial ridges of the primary types all indicate relationship to *Costellarina*.

Costellarina is usually found in a matrix of terrigenous limestone or calcareous clastic rocks, indicating an originally muddy substrate with varying dominant grain size. The greatest abundances of individuals are found in rocks of the finest grain size. *Costellarina* is abundant in depositional environments where sedimentation rates were probably high, and in stratigraphic sequences containing many shallow-water indicators such as redbeds, evaporite deposits, and stromatolites. It occurs commonly in restricted, mollusc-dominated faunas. The known distribution of *Costellarina* broadly parallels the distribution of abundant terrigenous limestones in the lower Permian, and conclusions on the paleogeographic range of the genus must take into account the presence or absence of this rock type.

Life habits. — *Costellarina* is a unique productid in that it was capable of living attached or free. The cicatrix of attachment shows that individuals were attached to a substrate as young. The size of the cicatrix varies considerably and for most it is too small for an animal that was attached throughout life. They probably detached upon reaching maturity. The attachment surface is almost always smooth and flat, and only rarely is it small or found to have attached to a strongly curved surface. The brachiopod must have been attached to another organism because the sea floor substrate was soft sediment, but often no suitable form is preserved. The most likely substrate for attachment was blades of seaweed, as suggested by Stevens (1966). There is no direct evidence of seaweed in the strata now, but Elias (1937) demonstrated the presence of abundant fleshy seaweed in the lower Permian of Kansas. Attachment spines are rare. It appears that attachment by shell cementation was weak enough to allow the shell to fall to the bottom when it grew large enough.

Costellarina has several shell features which suggest a free-living adult habit. The adult shell is well inflated and has halteroid lateral spines and abundant long curved body spines. These shell characters, and the common occurrence of individuals in clusters, suggest a free-living habit of the adult form similar to the life habits of *Waagenoconcha, Marginifera,* and *Echinauris* (Grant, 1966, 1968), which lived nearly buried in sediment with the brachial valve and anterior margin exposed, and were supported in the sediment by the spines. Articulated individuals of *Costellarina* containing geopetal accumulations of clay and spar-filled areas under the beak, similar to geopetal orientations of *Waagenoconcha* and *Marginifera,* have been found in collections of the genus from the Colina Formation in Arizona.

Variation. — Collections of *Costellarina* from Arizona, Utah, and Nevada containing hundreds of individuals, show that variation within a cluster of individuals (here considered to be a population, and henceforth called a population) is limited. The most variable feature within a population is the shape of the shell. The major variation in the species is in differences between populations, so that the species contains a large number of distinct populations which are part of an intergradational series. A single population does not include morphologic forms representative of the entire species, and only by examining several large populations can the full range of variation be indicated.

Within a population the shell shape varies from quadrate to elongate but this variation is greater in some populations than in others. The amount of shell inflation, and the degree of rugation near the beak is less variable. The size, density, and curvature of the body spines is nearly constant within a population. The strength of ribbing is a nearly constant character within a population, but varies between populations, and is variable enough to cause some difficulty in species discrimination when only limited samples are available.

Costellarina kaasai, n. sp. Pl. 2, figs. 1-11

Heteralosia sp., Stevens, 1966, Geol. Soc. America, Bull., vol. 77, p. 1126.
Costellaria costellata Muir-Wood & Cooper, Mayou, 1967, Brigham Young Univ., Geol. Studies, vol. 14, p. 110, pl. 1, figs. 4, 6, 7, 9.
Grandaurispina sp., Collinson, 1968, Earth Science Bull., Wyoming Geol. Assoc., vol. 1, No. 4, p. 29.

Description. — Ventral valve: Small, well-inflated *Costellarina* with a single set of spines sparsely and regularly scattered over the ventral valve, about 2 mm apart on the anterior margin, leaving the shell at an angle of 30-40 degrees and subsequently curving toward the shell surface to become parallel to it at several mm from the shell surface; ribbing consisting of a few or many weak costellae, rarely none, and weakly developed rugation on the beak area; large individuals becoming slightly elongate; other features as for genus. Dorsal valve: Cardinalia as for genus; small endospines usually present on the anterior margin of the visceral disc, variable in number; other features as for genus.

Discussion. — This species is distinguished by the loose, open arrangement of the spines and the weak ribbing of the ventral valve. It is variable in its ribbing and rugation, because in some populations the ribbing is nearly obsolete while in others there are many well-developed small costellae. A weakly ribbed condition is normal for the species. The spines are openly curved and extend some distance away from the surface of the valve. This common species has probably been confused with other small productids, or considered to be juveniles of known species by other workers. It is similar to illustrations of *Avonia dorsoconcava* as described and illustrated by McKee (1938), but examination of the types of *A. dorsoconcava* shows that it is a synonym of *Echinauris subhorrida. Costellarina kaasai* can be distinguished from *E. subhorrida* by the presence of a cicatrix, absence of a pointed beak, subcircular shape, and absence of a sulcus. *C. kaasai* is most similar to *C. carlstroemi* but differs from that species in having more abundant and more slender spines. *C. kaasai* is similar to *Costellarina arctica* (Waterhouse), but *C. arctica* can be distinguished by its larger ears and greater width/length ratio.

Costellarina kaasai occurs in a wide range of nearshore shallow-water environments. It is most often found in marginal marine situations with a biota of limited diversity, indicating semi-restricted conditions. It is especially characteristic in mollusc-dominated biotas but is also found in more diversified normal marine biotas having abundant brachiopods, bryozoans, and echinoderms. It is found in a variety of lithologies but most often in a sandy mud. This is the most abundant brachiopod species in the Arcturus Group of Nevada-Utah and is widespread in the lower Permian.

Occurrence. — Throughout the Riepetown Formation, Pequop Formation, and Loray Formation of the Arcturus Group in Nevada and Utah, and in correlative strata in west central Utah. Ranging in age from late Wolfcampian (in Riepetown Formation) to late Leonardian (in Loray Formation).

Numbered specimens and material examined. — Holotype UCMP 14270, paratypes UCMP 14271 - 14300, all from the same population from loc. UCMP B-6207, Loray Formation, Egan Range, Nevada; paratypes UCMP 14301 - 14303, loc. UCMP D-5530, Loray Formation, Nevada; paratype UCMP 14304, loc. UCMP D-5608, Loray Formation, Butte Mountains, Nevada.

Also, many hundreds of specimens were examined from numerous localities in the Arcturus Group, Nevada - Utah.

Etymology. — Named for Maurice Kaasa, of the University of California, Berkeley.

Costellarina plasi, n. sp. Pl. 3, figs. 1-5

Description. — Ventral valve: Small, well inflated; with a single set of long spines regularly scattered over the ventral valve, spaced about 2 mm apart on the anterior margin, leaving the shell at a low angle and immediately bending sharply to become parallel to the shell within a millimeter or two of the shell surface, forming a tight cover over the shell; ribbing consisting of numerous weak to strongly defined costellae; costellae never completely lacking; shape subquadrate to subrounded; anterior shell margin straightened and elongated in some individuals; weakly developed rugation near beak; other features as for genus. Dorsal valve: Features as for genus.

Discussion. — This species is distinguished from other species in the genus by the tight curvature of the spines over the shell, and by spines that are slightly smaller in diameter than in the other species. The species is slightly smaller than *C. kaasai* and much less strongly costellate than *C. costellata.* When the curvature of the spines cannot be determined, the stronger costellation is a useful means of separating *C. plasi* from *C. kaasai.*

Costellarina plasi occurs in more open marine environments than *C. kaasai,* and is found in biotas of high diversity. It probably lived in less turbid conditions and in slightly higher energy conditions than *C. kaasai.*

Occurrence. — Pequop Formation, loc. UCMP D-5535; lower part of Loray Formation, loc. UCMP D-5539, Egan Range, Nevada; upper part of the undifferentiated Bird Spring Formation, Clark County, Nevada. Early Leonardian (Pequop Formation and ? upper Bird Spring Formation) to middle (?) Leonardian (lower part of Loray Formation).

Numbered specimens. — Holotype UCMP 14305, paratypes UCMP 14306-14310 all from the same population, loc. UCMP D-5535, Pequop Formation; paratype UCMP 14311 from loc. UCMP D-5539, Loray Formation, Egan Range, Nevada.

Etymology. — Named for Leo Plas, formerly of the University of California, Berkeley.

Costellarina carlstroemi, n. sp. Pl. 3, figs. 6-10

Description. — Ventral valve: Small to medium-sized, well inflated; with a single set of robust spines scattered over the ventral valve, spaced from 2-4 mm apart along margin, leaving the shell at an angle of about 30-40 degrees and curving towards shell; ribbing of numerous small, broad costellae; shape subquadrate to subrounded; rugation lacking or weak; other features as for genus. Dorsal valve: Features as for genus.

Discussion. — This species is distinguished from other species in the genus by the relatively large, robust spines which are less numerous, both on the ears and body of the shell than in any other species known in the genus. It is most similar to *C. kaasai* which has a similar shape and a similar curvature of spines. *C. carlstroemi* can be separated from both *C. kaasai* and *C. plasi* by the less numerous, but larger and more robust spines.

This species is described here for comparison with the Arcturus species, and is of interest because it is the most southerly known species in the genus, and probably lived in subtropical climates.

Occurrence. — Colina Formation, loc. UCMP B-2978, Pedregosa Mountains, Cochise County, Arizona.

Numbered specimens. — Holotype UCMP 14312, paratypes UCMP 14313-14334, all from the same population from loc. UCMP B-2978, Colina Formation, Pedregosa Mountains, Arizona.

Etymology. — Named for Philip Carlstroem of San Francisco, California.

Order RHYNCHONELLIDA Kuhn, 1949

Superfamily **RHYNCHONELLACEA** Gray, 1848
Family **PONTISIIDAE** Cooper & Grant, 1976
Genus **PONTISIA** Cooper & Grant, 1969

Pontisia sp? Pl. 4, figs. 1-4

Description. — Small shell with strong fold and sulcus which is strongly plicate, with plications limited to anterior half of shell; subtriangular in outline, well inflated; ventral valve projecting beyond dorsal valve, with deltidial plates leaving free oval foramen; internal characters not seen; fold bearing two strong plications, and sides of fold and sulcus converging dorsally; lateral slopes bearing one or two smaller plications, these extending about a quarter of distance to beak.

Discussion. — Cooper and Grant (1976) revised the Texas Permian rhynchonellids, described many new genera, and changed the basis for classification of this group. Details of the interior of this species are unknown, and it cannot be identified to genus with certainty. Furthermore, this is a bidentate form, which is possibly a variant of a tridentate species, as discussed by Cooper and Grant (1976, p. 1951) for *Wellerella bidentata* Girty. More individuals are needed for identification of this species.

Occurrence. — Pequop Formation, loc. UCMP D-5617, Medicine Range, Nevada.

Family **CAMAROTOECHIIDAE** Schuchert & LeVene, 1929
Genus **BRYORHYNCHUS** Cooper & Grant, 1969

Bryorhynchus ? weeksi (Girty), 1908 Pl. 4, figs. 5-7

Pugnax weeksi Girty, 1908, U.S. Nat. Museum, Proc., vol. 34, p. 296.
Pugnax weeksi Girty, Girty, 1910, U.S. Geol. Surv., Bull., No. 436, p. 31, pl. 3, figs. 1-4.

Description. — Small, well inflated, with distinct but weakly developed plications on a moderately high fold and sulcus, and an oval to subrounded outline; plications extending about a third of length of shell; three plications present on fold, and a single weak plication on lateral slopes; margins of fold and sulcus converging rapidly dorsally; internal features not seen.

Discussion. — This species is readily distinguished on the basis of its oval to subcircular outline, and weakly developed plications. The number of plications on the fold and lateral slopes is variable, but a triplicate condition is typical. Until the internal characters are known from etched specimens, the generic assignment is uncertain.

Occurrence. — Riepetown Formation, loc. UCMP B-6217; Pequop Formation, loc. UCMP D-5540, Egan Range, Nevada.

Order SPIRIFERIDA Waagen, 1883
Suborder ATHYRIDIDINA Boucot, Johnson & Staton, 1964

Superfamily **ATHYRIDACEA** McCoy, 1844
Family **ATHYRIDIDAE** McCoy, 1844
Subfamily **ATHYRIDINAE** McCoy, 1844
Genus **CLEIOTHYRIDINA** Buckman, 1906

Cleiothyridina ciriacksi Cooper & Grant, 1976 Pl. 4, figs. 8-10

Cleiothyridina ciriacksi Cooper & Grant, 1976, Smithson. Contr. Paleobiology, No. 21, part 4, pp. 2135-2136, pl. 650, figs. 1-18.

Description. — Small, well-inflated form with ventral beak overhanging the dorsal valve a short distance; shells subquadrate or subcircular in outline, with slightly greater length than width; fold and sulcus not developed, and shell margin slightly squared off on anterior margin; shell ornamented with characteristic overlapping fimbriate lamellae of small size; greatest width in central part of shell; beaks rounded, not attenuated; interior unknown.

Discussion. — This species is close to the types of *C. ciriacksi* described by Cooper and Grant (1976) from upper Permian Franson member of the Park City Formation in Montana. It is similar in inflation of valves, and the slight folding of the plane of commissure, but differs in being slightly longer than wide instead of wider than long, and being slightly larger than the types of *C. ciriacksi.* These minor differences are probably due to population variation. The Arcturus specimens are from an older horizon (Leonardian) than the types (probable Guadalupian). The possibility of evolutionary change within the species needs to be examined when further material is available, but the range of variation within a species of the genus may be as great as in the genus *Composita* with which it is closely related. The genus occurs in conditions of normal marine environment with a diverse biota.

Occurrence. — Pequop Formation, loc. UCMP D-5535, D-5546, Egan Range, and loc. UCMP D-5626, Medicine Range, Nevada.

Genus **COMPOSITA** Brown, 1849

Composita mexicana (Hall), 1857 Pl. 4, figs. 11-16

Terebratula mexicana Hall, 1857, Emory's Rept. U.S. & Mex. Boundary Surv., vol. 1, pl. 20, fig. 2.
Composita mexicana (Hall), Girty, 1908 (1909) U.S. Geol. Surv., Prof. Paper 58, pp. 389-390.
Composita parva Branson, 1930, Univ. Missouri Studies, vol. 5, No. 2, p. 38, pl. 9, figs. 8-11.
Composita mexicana (Hall), King, 1930, Univ. Texas Bull., No. 3042, pp. 128-129, pl. 43, figs. 1-11.
Composita arizonica McKee, 1938, Carnegie Inst. Washington, Pub. 492, pp. 257-260, pl. 48, figs. 10-16.
Composita mexicana (Hall), Grinnell & Andrews, 1964, Jour. Paleont., vol. 38, No. 2, pp. 236-237.

Description. — Shell small to medium size (up to 12 mm wide), of ovoid shape, as wide as long; well inflated, with widest part close to mid part of shell; beak of ventral valve prominent and overhanging; fold and sulcus well developed on later-formed half of valve and slightly more than half as wide as the valve; on most adult shells the articulation line of fold and sulcus having a characteristic tonguelike shape on the plane of commissure — wide and low, with short steep sides, and gently curving along top of fold — changing to a high sinusoidal curve having height about equal to width at largest growth stage of shell; on large shells fold and sulcus bordered by a lesser sulcus on either side, which are appressed to the shell, fold and sulcus tongue thus projecting anteriorly; sulcus usually marked with a shallow well-defined groove along the median line; interior characters as for genus.

Discussion. — The wide and nearly flat-topped fold and the well-developed shallow groove on the sulcus of most large individuals are the characteristic features for these populations of the species. However, the groove on the sulcus is not always present on all individuals. The fold and sulcus changes shape during ontogeny, developing a tonguelike shape at maturity, and changing to a high sinusoidal curve at largest growth size. Individuals with the high sinusoidal fold and sulcus are few, since the majority of individuals in each sample are juveniles and small adults.

The species *Composita parva* and *Composita arizonica* are placed in synonymy with *Composita mexicana* because of their overall similarity of form, similarity in development of fold and sulcus, and similar ages of occurrence. *C. mexicana* is variable, as are all *Composita* species, but it is closely related to *Composita subtilita* (Hall), differing mostly in its smaller size and more projecting fold and sulcus tongue. The Arcturus populations are closest to the morphological form described as *Composita arizonica* by McKee (1938), in the shape, size, and amount of anterior projection. The description by McKee (1938) does not indicate a median sinus or groove on the sulcus, but this is probably an oversight, due to poor preservation of material. As suggested by McKee (1938) and Grinnell and Andrews (1964), *C. arizonica* may be transitional between *Composita subtilita* and *Composita mexicana,* and a part of an evolutionary continuum between the two species. However, because of the variability of species in the genus, this form is not consistently separable from *C. mexicana,* and is best regarded as *C. mexicana* proper.

Occurrence. — Pequop Formation, loc. UCMP D-5534, D-5535, D-5540, Egan Range; loc. UCMP D-5614, D-5615, Medicine Range, Nevada.

Composita plana Branson, 1930 Pl. 5, figs. 1-3

Composita plana Branson, 1930, Univ. Missouri Studies, vol. 5, No. 2, p. 40, pl. 10, figs. 25-27.

Description. — Shell large, subcircular, and flattened; beak prominent and overhanging with large foramen; fold and sulcus poorly developed on young parts of shell — later development not known; hingeplate of subquadrate shape, and supported by diverging crural plates; low narrow median septum, bordered by long, slightly impressed muscle scars developed on mature specimens.

Discussion. — This species is distinguished by its large size and flattened form. The available material of this form is incomplete but can be recognized by the flat form of even the juvenile shells. This species was collected in strata of the uppermost part of the Arcturus Group and is the earliest appearance of this large species of *Composita* which is more abundant in the overlying Park City Group strata.

Occurrence. — Upper part of Arcturus Formation, loc. UCMP D-5567, Confusion Range, Utah.

Composita sp. Pl. 5, figs. 4-7

Partim Composita subtilita (Hall), Branson, 1930, Univ. Missouri Studies, vol. 5, No. 2, p. 38, pl. 9, fig. 11.

Description. — Shell elongate, with greatest width about 3/5 distance from beak and equal to about 2/3 of the length; moderately to highly inflated; beak of ventral valve prominent and overhanging, with open foramen; shape tending to a pentagonal outline, with slightly projecting fold and sulcus that is squared off in front; fold and sulcus slightly developed, and wide; greatest size 9 mm by 11 mm; internal characters not known.

Discussion. — This species is similar to *Composita elongata,* but is less inflated and rotund, and not so narrow as the types of the species, which are nearly parallel sided. They are close in all characters except size to *C. emarginata affinis* of King (1930) and are similar to one specimen of *C. subtilita* (Branson, 1930, plate 9, figure 11). These authors did not distinguish this form from other species of the genus. It lacks a name but seems characteristic of the middle Permian. The Arcturus Group specimens are small and are probably juveniles. The growth series and range of characters in populations of this species are not known. This species appears to be descended from *Composita elongata.*

Occurrence. — Pequop Formation, loc. UCMP D-5535, Egan Range, Nevada.

Suborder SPIRIFERIDINA Waagen, 1883

Superfamily **CYRTIACEA** Frederiks, 1919 (1924)

Family **AMBOCOELIIDAE** George, 1931

Genus **WILBERRYA**, n. gen.

Type species: *Wilberrya fragilis*, n. sp.

Description. — Small, thin-shelled, and rounded in shape; well inflated; ventral valve larger than dorsal valve, and more inflated; hingeline short and poorly defined, with two tooth processes on each valve; interarea present but poorly defined on ventral valve; shell has a weakly developed fold and sulcus; ornament consists of small, weakly developed costellae. Ventral valve: Strongly inflated valve with overhanging but not prominent beak; interarea containing an open delthyrium bounded by low ridges which project as tooth processes.
Dorsal valve: Moderately inflated valve with slightly projecting beak; with well-formed tooth sockets having inner socket ridges elevated and expanded to form large toothlike projections; containing long thin crura connected to the base of the tooth sockets; crura elevated above the floor of the valve and not connected to it, and projecting anteriorly, curved parallel to the floor of the valve.

Discussion. — This genus is characterized by its form, weakly costellate ornament, short indistinct hingeline, and simple cardinalia with long thin crura; features which distinguish it from all other common smooth late Paleozoic ambocoeliids It is closely related to *Crurithyris*. It also superficially looks like *Phricodothyris* or *Martinia* (of the Reticulariacea) but can be distinguished from them by the absence of concentric lamellae and by the internal features (lack of crural plates or dental plates or median septum). It differs from *Crurithyris* and other ambocoeliids by the short, indistinct hingeline, by the much more equivalved and more rounded form, and by the presence of costellae (the only other ambocoeliid known to possess costellae is the Devonian genus *Ladjia*).

The cardinalia of *Crurithyris,* described and illustrated by Brunton and Champion (1974) for British Isles species, shows definite relationship to *Wilberrya.* Internal characters of the two genera differ primarily in the development of stronger tooth processes and the absence of even a rudimentary cardinal process in *Wilberrya* (Text-fig. 6). In British species of *Crurithyris* these characters show progressive changes through time, with the youngest

Text-figure 6. Cardinalia of *Wilberrya fragilis* showing character of tooth processes and crural bases. A — ventral valve, B — dorsal valve. Drawn from specimens shown in fig. 8, Plate 5, and fig. 13-14, Plate 5.

species most similar to *Wilberrya.* Furthermore, there is a progressive reduction of the crural bases in *Crurithyris* approaching the condition found in *Wilberrya.* These morphologic progressions indicate that *Wilberrya* is a direct descendant of *Crurithyris.*

Wilberrya is uncommon in the biotas in which it is found. It occurs in predominantly molluscan faunas in the Arcturus Group, and appears to have been tolerant of nearshore environmental conditions (periodic high turbidity and high energy). Brabb and Grant (1971) illustrated a larger unnamed species of this genus (listed as *Martinia* sp. undet.) from the Tahkandit Formation of Alaska which contains an arctic type fauna. Gobbett (1963) and Bamber and Waterhouse (1971) illustrated specimens of "*Martinia* sp." which may well belong in this genus, but the internal features of these forms are not known.

Etymology. — Named for W. B. N. Berry, of the Dept. of Paleontology, University of California, Berkeley.

Wilberrya fragilis, n. sp. Pl. 5, figs. 8-19

Description. — Ventral valve: Small, thin-shelled, wider than long, with greatest width just anterior to the hingeline; hingeline short; valve well-inflated, with slight fold and sulcus developed and a broad low fold on each lateral slope at maturity; beak overhanging, not prominent, and strongly incurved; interarea low, containing an open delthyrium bounded by low ridges which project as tooth processes, diverging from each other at an angle of about 40 degrees and high standing; tooth processes as curved plates; dental plates and septum lacking; ornament consisting of subdued costellae. Dorsal valve: Small, well-inflated, thin-shelled, with beak slightly projecting; fine costellae covering the valve; juvenile form elongate, becoming wider than long at maturity, and also less inflated; containing well-formed tooth sockets in the cardinalia enclosing a small triangular notothyrium, with the inner socket ridges elevated and expanded on their extremities to form large toothlike projections, these diverging from each other at an angle of about 45 degrees and high standing; containing long thin crura connected to the bases of the tooth sockets, elevated above the floor of the valve and not connected to it; crural bases projecting anteriorly and curving parallel to the floor of the valve (Text-fig. 6).

Discussion. — The presence of costellae and absence of concentric plications, and the small size of this species distinguish it from other ambocoeliid or reticulariacean species. The specimens at hand show variation in the strength of the fold and sulcus and accessory folds and in the strength of costellae on the valves. All folds are broad and low and become stronger with maturity, so considerable variation in the strength of folds can be expected. Nonetheless, among the specimens examined there is a correlation of stronger ribbing associated with weaker folding of the plane of commissure. This appears to be intraspecific and indicates a moderate range of variation within the species.

The globose, highly inflated shell, open delthyrium and fragile shell indicate a probable epifaunal habit. The shells were probably attached to arborescent taxa living above the bottom sediments, either sea weed, sponges, bryozoans or crinoids.

Occurrence. — Upper Pequop Formation, loc. UCMP D-5540; lower part of Loray Formation, loc. UCMP D-5539, UCMP D-5546, UCMP D-5550, UCMP D-5555, Egan Range; Loray Formation, loc. UCMP D-5609, Butte Mountains, Nevada.

Numbered specimens. — Holotype UCMP 14344, loc. UCMP D-5546; paratype UCMP 14345, loc. UCMP D-5546; paratype UCMP 14346, loc. UCMP D-5550, paratypes UCMP 14347-14350, loc. UCMP D-5539; paratypes UCMP 14351-14352, loc. UCMP D-5540.

Superfamily **SPIRIFERINACEA** Davidson, 1884

Family **RETICULARIINIDAE** Cooper & Grant, 1976

Genus **RETICULARIINA** Frederiks, 1916

Reticulariina sp? Pl. 6, figs. 1-3

Description. — Ventral valve: Small, wide shells with rounded cardinal extremities; fold and sulcus deep and narrow with four strong lateral plications; shell punctate; beak incurved, enclosing high interarea with large delthyrium; margin of delthyrium thickened and projecting down as teeth; dental plates extending from margins and angling toward median plane, then dipping straight to floor of valve; high median septum.

Dorsal valve: Cardinalia with strong sockets and thickened inner socket ridges; low cardinal process united with crural plates by narrow shelf; a short raised median line on interior bordered by elongate impressed muscle scars; character of spines not known, large spines lacking.

Discussion. — This species is tentatively assigned to *Reticulariina* on the basis of its relatively large size and greater width than most spiriferinacean species. The available material is inadequate for specific identification.

Order TEREBRATULIDA Waagen, 1883

Suborder TEREBRATULIDINA Waagen, 1883

Superfamily **DIELASMATACEA** Schuchert, 1913

Family **DIELASMATIDAE** Schuchert, 1913

Subfamily **DIELASMATINAE** Schuchert, 1913

Genus **DIELASMA** King, 1859

Dielasma phosphoriensis Branson, 1930 Pl. 6, figs. 4-6

Dielasma phosphoriensis Branson, 1930, Univ. Missouri Studies, vol. 5, No. 2, pp. 34-35, pl. 2. figs. 21-25.

Dielasma phosphoriensis Branson, McKee, 1938, Carnegie Inst. Washington, Pub. 492, p. 263, pl. 48, figs. 21-22.

Description. — Shell elongate, strongly inflated, greatest width just anterior to mid point and about 3/4 of length; strong fold and sulcus on mature portions of shell; anterior margin projecting and rounded; internal characters unknown.

Discussion. — The strong fold and sulcus is the best diagnostic character for this species but is variable in its development. The material from the Arcturus Group has a well-developed fold and sulcus, as does material from the Kaibab Formation described by McKee (1938).

Occurrence. — Pequop Formation, loc. UCMP D-5617, Medicine Range, Nevada.

Phylum MOLLUSCA
Class SCAPHOPODA Bronn, 1862
Order DENTALIOIDA Palmer, 1974

Family **DENTALIIDAE** Gray, 1847

Discussion. — This family includes the two common genera of Paleozoic scaphopods, *Prodentalium* and *Plagioglypta,* in which nearly all Paleozoic scaphopods are placed. *Prodentalium* includes the commonest species of scaphopods in Carboniferous and Permian strata, and includes species with large heavy shells that have longitudinal ribbing [such as *P. raymondi* Young and *P. canna* (White)]. Most of the species that were previously placed in *Plagioglypta* should be transferred to *Prodentalium* (Yancey, 1973 a,b), but there are some small species with strong concentric ornament that are retained in *Plagioglypta* [such as *P. meekiana* (Geinitz)]. Another generic group is represented by long, slender thin-shelled scaphopods with smooth surfaces which are fairly common in Carboniferous strata. These compare closely with modern *Dentalium (Laevidentalium)* and are represented in the Paleozoic by *D. (L.) venustum* Meek & Worthen and related forms. Scaphopods with strong and widely spaced ribs are placed in the newly described *Dentalium (Paleodentalium)* (Gentile, 1974), which occurs uncommonly in upper Carboniferous strata.

Scaphopods are a common element in molluscan faunas of both shallow- and deep-water environments of the upper Paleozoic. *Prodentalium* is common in shallow-water molluscan communities, where it attains great size and has an adult shell of considerable mass. It is one of the largest molluscs living in those communities.

Genus **PRODENTALIUM** Young, 1942

Type species: *Prodentalium raymondi* Young, 1942.

Description. — Long, gently curved scaphopods with a thick shell, having longitudinal ribbing consisting of many small ribs, these reduced in size anteriorly; ribs slightly zigzag or offset in alignment; growth lines oblique; some species very large; shell wall thick.

Discussion. — The main characters for distinguishing *Prodentalium* are its small longitudinal ribs, gentle curvature, and its thick shell wall. Most of the common species of Carboniferous and Permian scaphopods belong in the genus *Prodentalium,* and nearly all of the larger species of these periods belong to this genus. Some of these are species which lived in large populations in shallow, nearshore environments, and often grew to large size. These, and other species of the genus, were originally described as *Dentalium,* and the longitudinally striate character was noted. When the genus *Plagioglypta* was defined, the striae were ignored and all forms which appeared to have an annulated character were assigned to *Plagioglypta.* This was a mistake, based on observations of worn individuals. It was not corrected until the new generic name *Prodentalium* was established on Paleozoic material and better observations and descriptions were made on known material.

Species presently assigned to *Prodentalium* are:

Prodentalium raymondi Young — the type species
Dentalium semicostatum Girty
Dentalium canna White — the commonest and most widely cited scaphopod species of the Permian
Dentalium mexicanum Girty
Dentalium indianum Girty
Dentalium sublaeve Hall
Plagioglypta monolineata Branson

This is not a complete listing of species in the genus, but it includes all of the upper Carboniferous and Permian species known in North America. The species *Prodentalium belcheri* Nassichuk and Hodgkinson, 1976, is not a species of *Prodentalium,* and probably not a scaphopod. *Prodentalium* has a thick shell wall, with shell layers angled to the outer surface, *P. belcheri* has a thin shell wall with shell layers nearly parallel to the outer surface. *Prodentalium* increases regularly in diameter and has a regular rate of curvature, *P. belcheri* is irregularly curved and increases in diameter irregularly. The aperture of *P. belcheri* is irregularly constricted, and it is probable that it is not a molluscan species, but a calcareous worm tube.

Some of these nominal species are synonyms of other species due to their original descriptions being based on fragmentary material. As noted by Miller (1949) the type species of *Prodentalium* is variable in both size and irregularities of ornament. This variability is similar to that occurring in modern species of scaphopods. There is a characteristic progression in ornamentation during ontogeny in *Prodentalium,* and this feature is probably the best means of distinguishing species. Characters used to discriminate species are size of ribs, density of ribbing, ontogenetic change in ribbing, adult size of shell, and curvature of shell.

The density of ribbing is a major character of differentiation between species. A comparison of the density of ribbing on the type specimens of the species listed above follows:

Prodentalium sublaeve (plastotypes)	— 3	ribs/mm on 3.5 mm	diameter	shell
" " (same lot)	— 2-3	ribs/mm on 12 mm	"	"
P. raymondi paratype)	— 4±	ribs/mm on 10 mm	"	"
" (paratype)	— 3	ribs/mm on 25 mm	"	"
P. canna (type lot)	— 5-6	ribs/mm on 6+ mm	"	"
P. canna (comparison lot)	— 5	ribs/mm on 5 mm	"	"
" (same lot)	— 3-4	ribs/mm on 10 mm	"	"
P. mexicanum (holotype)	— 4	ribs/mm on 2.5 mm	"	"
P. semicostatum (holotype)	— 4-5	ribs/mm on 5 mm	"	"
P. indianum (holotype)	— 4-5	ribs/mm on 2.5 mm	"	"
" (same specimen)	— 4	ribs/mm on 4 mm	"	"

In addition, ribbing densities of a large lot of *Prodentalium canna* from the Arcturus Group in eastern Nevada are given for comparison. Except for *Prodentalium raymondi,* the ribbing density measurements for all the types were made by me on type specimens at the U.S. National Museum (including plastotypes of *Dentalium sublaeve*).

Four species, based on ribbing densities, can be recognized within this group. Suggested diagnoses and synonymies of species are given as follows:

1) *Prodentalium sublaeve* (Hall), 1858 — having about 3 ribs/mm as a juvenile and about 2-3 ribs/mm as an adult (12 mm diameter); the species is distinguished by low density of ribbing; Carboniferous in age.

Synonyms. — *Dentalium acutisulcatum* Gurley, 1883 — placed in synonymy by M. L. Cooper in an unpublished MS thesis (Kent State, 1972). This lower Carboniferous species has a ribbing density similar to *P. sublaeve.*

2) *Prodentalium raymondi* Young, 1942 — large as adults, attaining a diameter of 30 mm and length of 30 cm on some individuals; having about four ribs/mm on middle diameter (10 mm diameter) and about three ribs/mm on full grown adult shells (25 mm diameter); species distinguished by its large size and high density of ribbing. *P. raymondi* is restricted to the upper Carboniferous (Pennsylvanian) (pers. comm., E. L. Yochelson, 1971) and is probably the ancestor of the Permian species *P. canna.*

3) *Prodentalium canna* (White), 1874 — large scaphopods; having a ribbing density of 5-6 ribs/mm on a small diameter (5 mm diameter) and 3-4 ribs/mm on a large diameter (10 mm); species distinguished from *P. raymondi* primarily by its smaller size and more regular shape but has a similar ribbing pattern. *P. canna* is probably descendent from *P. raymondi* and is restricted to the Permian.

Synonyms. — *Plagioglypta monolineata* Branson, 1930 — a subjective junior synonym (Yancey, 1973b); *Dentalium mexicanum* Girty, 1909 — probably a junior synonym.

4) *Prodentalium semicostatum* (Girty), 1915 — has a ribbing density of 4-5 ribs/mm on small diameter (diameters of 2.5 to 5 mm), ribs small and low in profile; distinguished by an intermediate ribbing density between *P. sublaeve* and *P. raymondi* — *P. canna.* Without more complete material there is no way to determine conclusively if this represents a distinct species, or juveniles of *P. raymondi,* but the different ribbing density suggests that it is a separate species.

Synonyms. — *Dentalium indianum* Girty, 1915 — both *P. semicostatum* and *P. indianum* descriptions are based on small shell fragments but are apparently of the same species; *P. semicostatum* has page priority over *P. indianum.*

Prodentalium canna (White), 1874 — emended Yancey, 1973
Pl. 6, figs. 7-11

Dentalium canna White, 1874, Explor. and Surv. West 100th Merid., Prelim. Rept. Invert. Fossils, p. 23.

Dentalium canna White, White, 1877, Rept. U.S. Geograph. Surv. West 100th Merid. (Wheeler), Part IV, Paleontology, p. 156, pl. 12, figs. 6a-6b.

Plagioglypta canna (White), Girty, 1910, U.S. Geol. Surv., Bull. 436, p. 44, pl. 6, fig. 14.

Plagioglypta monolineata Branson, 1930, Missouri Univ. Studies, vol. 5, No. 2, p. 58, pl. 15, fig. 7.

Plagioglypta canna (White), Chronic, 1952, Geol. Soc. America, vol. 63, No. 2, p. 153.
Prodentalium canna (White), Yancey, 1973, Jour. Paleont., vol. 47, No. 6, p. 1126.

Description. — Large scaphopods probably attaining total length of 20-25 cm for complete mature forms; shell diameter about 2 cm in mature forms, with shell wall thickness in midreaches ranging up to 4-6 mm; shell greatly curved on young portion and nearly straight on adult portion; ornament consisting of longitudinal ribs, slightly zigzag, strongly raised on juvenile portion of shell, becoming lower, weaker, and wider during growth, new ribs added by intercalation; rib density about 5/mm on juvenile shell (up to 5 mm diameter) changing to 3-4/mm on adult shell (10 mm in diameter); ribbing obsolete or lost on apertural areas of large shells.

Discussion. — This species was well described by Yancey (1973b). It is closely related to *P. raymondi* and is clearly a descendent of that species. It differs from *P. raymondi* in its smaller adult size, but the ribbing and general form are the same. At the present time the adult size is the only meaningful character by which to separate the two species. Partly this is due to a lack of knowledge of the juvenile portions of *P. raymondi.*

Prodentalium canna lived in a range of environments from fully normal marine to marginal marine, variable salinity conditions. It has not been found in definitely deeper water environments, and appears to have inhabited shallow waters nearly exclusively. It is present in diverse normal marine biotas but is most common in restricted marginal marine biotas, where it is often present in large numbers. Populations which inhabited marginal marine conditions produced the largest individuals.

Occurrence. — Very common in the Riepetown, Pequop and Loray formations in the Egan Range, Butte Mountains, Maverick Springs Range and Medicine Range, Nevada; common in Arcturus Formation, Confusion Range, Utah.

Order SIPHONODENTALIOIDA Palmer, 1974

Family **SIPHONODENTALIIDAE** Simroth, 1894

Genus **CALSTEVENUS** Yancey, 1973

Type species: *Calstevenus arcturus* Yancey, 1973.

Description. — Small, short scaphopods, with rapid width expansion; curvature of shell relatively strong; growth lines oblique to axis of shell, at an angle of about 75 degrees to axis; apex simple, without notch or lobes, with earlier apical areas not present, and presumably resorbed; ornamentation consisting only of weak growth lines; shell wall thin.

Discussion. — This genus includes only one described species, which is the only definite pre-Cretaceous species of the siphonodentalids known. Its simple form and small size suggest that it is part of the original evolutionary stock of the siphonodentalids. *Calstevenus arcturus* is similar in size and shape to *Plagioglypta meekiana* (Geinitz) although differing greatly in surface features. These two species clearly belong in different genera, but the similarities between them suggest that *P. meekiana* might have siphonodentalid affinities. Further study on *P. meekiana* is needed to verify this.

Calstevenus arcturus Yancey, 1973 Pl. 6, figs. 12-14

Calstevenus arcturus Yancey, 1973, Jour. Paleont. vol. 47, No. 6, p. 1063, text-figs. 1a-1f.

Description. — Shell small, 1.0-1.5 cm long for adults, 1.0 mm in diameter at apex and 2.0 mm in diameter at aperture; shell thickness 0.2 mm for adults; curved, with greatest curvature in apical regions; growth lines oblique, at an angle of about 75 degrees to axis; ornamentation consisting only of numerous faint growth lines; rapid increase in diameter with growth, increase continuous throughout life of individual; apical areas truncated and apparently resorbed.

Discussion. — This species is known only from the calcareous siltstones of the Dry Mountain "lithosome" of the Riepetown Formation and appears to have lived only in muddy substrates in low energy environments in probably deeper waters. It is common in this environment, although unknown elsewhere in the Arcturus Group. It normally occurs with a molluscan fauna including ammonites, taxodont bivalves, and thin-shelled bivalves.

Occurrence. — Dry Mountain "lithosome" of Riepetown Formation, loc. 1J-2 (type locality), 1J-6 at Buck Mountain, 1K-8 at Dry Mountain, 1X-1, 1X-3, 1X-8 at Limestone Peak, White Pine Range, Nevada; also from about the middle of Dry Mountain "lithosome" at Maverick Springs Range, Nevada.

Class ROSTROCONCHIA Pojeta, Runnegar, Morris & Newell, 1972
Order CONOCARDIOIDA Neumayr, 1891

Superfamily **CONOCARDIACEA** Miller, 1889
Family **CONOCARDIIDAE** Miller, 1889
Genus **ARCEODOMUS** Pojeta & Runnegar, 1976

Arceodomus Pojeta & Runnegar, 1976, U.S. Geol. Surv., Prof. Paper 968, p. 70, pl. 42, figs. 8-10; pl. 43, figs. 1-3, 7-12.

Type species: *Conocardium glabratum* Easton, 1962.

Description. — Shell large, greatly inflated, with rounded and smooth central body portion; prominent curved beaks nearly touching at hingeline; ornament of weak growth lines and weak, smoothed ribs over most of shell; strongly differentiated anterior portion of shell, with shell wall there about three times as thick as on remainder of shell, and with strong radial ribs; small, nearly obsolete posterior rostral tube which may have thickened shell wall; hingeline long and straight; shell wall containing radial rods, rods most distinct in beak areas, forming subdued ribbing; large internal shelf on inside of anterior portion of each valve, with secondary shelves in large individuals.

Discussion. — *Arceodomus* includes several species which are distinct from other conocardiids in the lack of external ribbing on the body of the shell. This part of the shell has internal ribbing that is not exposed unless the shell has been eroded. In addition to the type species *Conocardium glabratum* Easton, 1962, the species *C. japonicum* Nishida, 1968, *C. ouralicum* Verneuil, 1845 (discussion in Wilson, 1970), and *C. langenheimi* Wilson, 1970 can be referred to the genus *Arceodomus*. The first three species are of Carboniferous age and are similar in general form, being more elongate and more strongly ribbed than the Permian species *A. langenheimi*. These differences suggest an evolutionary change from the Carboniferous to Permian species involving reduction in size of anterior snout, and shortened length of shell. Short, highly inflated species appear to have evolved in the Permian, and to be confined to that period.

Arceodomus langenheimi (Wilson), 1970 — Pl. 7, figs. 1-3

Conocardium langenheimi Wilson, 1970, Los Angeles Co. Mus. Nat. Hist., Contr. Sci. No. 184, 14 pp., figs. 1-34.
Arceodomus langenheimi (Wilson), Pojeta & Runnegar, 1976, U.S. Geol. Surv., Prof. Paper 968, p. 71, pl. 43, figs. 13-15.

Description. — Shell large, greatly inflated and rounded, up to 7 cm in length, with height about 2/3 of length and width about 1/2 of length; ventral margin subparallel to hingeline; posterior shell surface smooth with occasional growth lines and faint smoothed ribs on beak areas; valves tightly articulated and denticulate on inner margin, except at rostrum and anterior portion; strongly differentiated anterior snout projection with shell wall 2-3 mm in thickness, about three times as thick as the other shell wall, and strongly ribbed, ribs sharp and high, separated by flat spaces about two-three times rib width; anterior gape; complexly shaped internal shelf on middle of inside of anterior projection, which projects normal to the shell wall in juveniles but is angled downward in adults, a secondary shelf below the first shelf in larger individuals; shell wall of major part of valve containing radial rods, rods creating a slight ribbing on the outside of valve, and fairly strong ribbing on the inside of juvenile and young valves; small and short rostrum present on posterior end of hingeline, rostrum having a partly thickened shell wall.

Discussion. — This species can be easily recognized among the conocardiids by the large, smooth, rounded posterior portion of the shell, the relatively high beak areas, and the equilaterally triangular shape of the anterior snout projection. In many external features (except the anterior snout projection) it resembles a well-inflated edmondacean rather than a conocardiid, and in shape, beaks and degree of inflation it closely resembles *Edmondia subtruncata* from the Gaptank Formation (Bird, 1968). No relationship is suggested by making this comparison, but it is possible that many individuals of this species or related species have been misidentified as *Edmondia,* if the anterior projection of the shell is not preserved.

Occurrence. — Pequop Formation, loc. D-5535, Egan Range, Nevada; undiff. Arcturus Formation, 2270′ above base, loc. 1I-8, NW corner Sec. 19, T. 17 N., R 55 E., Pancake Range, White Pine Co., Nevada.

Family **BRANSONIIDAE** Pojeta & Runnegar, 1976

Bransonia sp? Pl. 7, fig. 4

Discussion. — This large species is identified as a conocardiid by the shell structure, consisting of radial rods embedded within the shell wall of the valve, a unique conocardiid feature. Other features are not well preserved, and it is tentatively assigned to *Bransonia* on the basis of shape and probable lack of a hood, although hippocardiid affinities cannot be ruled out. This species is larger and more trigonal in form than *A. langenheimi,* and appears to be definitely ribbed, although weathering may have emphasized the strength of ribbing on exposed surfaces. Details of rostrum, anterior projection and interior are not known, but rostrum and anterior projection are probably relatively small. The shell is large, with a height and minimum length of 5 cm, and inflation of 4.5 cm, which makes this one of the largest species of conocardiids known.

Occurrence. — Riepetown Formation, loc. UCMP B-6273, Ward Mountain, Egan Range, Nevada.

Class BIVALVIA Linné, 1758
Subclass PALAEOTAXODONTA Korobkov, 1954
Order NUCULOIDA Dall, 1889

Superfamily **CTENODONTACEA** Wohrmann, 1893
Family **CTENODONTIDAE** Wohrmann, 1893
Genus **CLINOPISTHA** Meek & Worthen, 1870

Clinopistha Meek & Worthen, 1870, Philadelphia Acad. Nat. Sci., Proc. for 1870, p. 44.
Clinopistha, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 20-21, pl. 4, figs. 1-16.

Type species: *Clinopistha levis* (as *Clinopistha radiata levis*) Meek & Worthen, 1870.

Diagnosis. — Medium-sized, subquadrate forms with an elongate anterior margin and a prominent external ligament on the short posterior margin.

Discussion. — The type species of *Clinopistha* is similar to *Nuculopsis* in external form, particularly to the type species of *Nuculopsis, N. girtyi.* Both species are enlarged and elongated in one direction with umbonal areas offset from the center of the shell, both are well inflated, and both have a nearly smooth exterior with irregular fine growth lines. The two differ in that *Clinopistha* has an external ligament which is often preserved and when found is a diagnostic character to separate the two genera. *Clinopistha* has a larger shell which is not so extremely inflated as *Nuculopsis* and has a thin shell wall. The shell wall of *Clinopistha* is about 1/3 to 1/2 the thickness of the shell wall of *Nuculopsis* and is the easiest means of separating the two genera.

Clinopistha is placed in the family Ctenodontidae on the basis of its external form and the possession of an external ligament. Presumably the shell has taxodont dentition, but this has not been demonstrated with undoubted *Clinopistha*. The many illustrations of the type lot of *Clinopistha* that McAlester (1968) presented provide no evidence of this. Most of the type lot are tightly articulated shells showing no dentition.

Clinopistha levis Meek & Worthen, 1870 Pl. 7, fig. 5

Clinopistha radiata levis Meek & Worthen, 1870, Philadelphia Acad. Nat. Sci., Proc. for 1870, pp. 44-45.
Clinopistha levis, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 20-21, pl. 4, figs. 1-16.

Description. — Medium-sized, well-inflated, sub-rectangular shells; anteriorly elongate with a smoothly rounded extremity; flattened dorsal margin; sharply and smoothly rounded posterior margin; large and raised external ligament on posterior slope; umbos prominent but not inflated; shell wall thin; ornament of fine concentric growth ridges and furrows; and a few faint radial ribs on the posterior portion of the shell; dentition and hinge unknown.

Discussion. — This species agrees in all observed characters with the type lot of the species (illustrated by McAlester, 1968) which is upper Carboniferous. The faint radial rib ornament is present, as in the type lot of the species, but is not as strongly developed. The specimen described here is slightly longer than the average of the type lot but falls within the range of variation of the lot. This occurrence extends the range of the species and of the genus into the Permian, well up in the Wolfcampian Series. Ciriacks (1963) illustrated a more elongate, undescribed species of this genus as "*Nuculopsis* sp. a", from a geologic horizon younger than the Arcturus Group.

Occurrence. — Dry Mountain "lithosome", Riepetown Formation, loc. 1J-2, Dry Mountain, Nevada.

Superfamily **NUCULACEA** Gray, 1824

Family **NUCULIDAE** Gray, 1824

Discussion. — Nuculids are common in late Paleozoic faunas, but their taxonomy is unsettled because of the description of many new taxa since Schenck (1934) revised the family Nuculidae. Following Schenck, the diagnosis of the family is: small, trigonal bivalves with taxodont dentition and a resilifer, lacking a pallial sinus, and beaks posterior with a well-developed pseudo-lunule and poorly defined escutcheon. None of the Paleozoic forms are known to have a truly denticulate ventral margin.

Upper Paleozoic species of the nuculids belong in the genera *Nuculopsis, Nuculavus,* and *Quadratonucula.* Both *Nucula* and *Palaeonucula,* which have been used by past workers for upper Paleozoic species, are post-Paleozoic. Small trigonal nuculids, which include most of the upper Paleozoic species in the family, belong in the genus *Nuculavus* (Chernyshev, 1947). The genus *Nuculanella* proposed by Tasch (1953) is clearly a synonym of *Nuculavus. Nuculopsis* (Girty, 1911) includes a small group of distinctive species with elongate form and thick shell wall. *Quadratonucula* (Dickens, 1963) is a small subquadrate form that is definitely a nuculid, although McAlester (1969) placed it in the family Malletiidae. This genus has been overlooked in previous studies and is probably fairly common. However, the majority of upper Paleozoic nuculid species belong in *Nuculavus,* which probably can be split into subgeneric groups.

The recognized genera of upper Paleozoic nuculids, *Nuculopsis, Nuculavus,* and *Quadratonucula,* differ greatly from each other and clearly belong in different phylogenetic stocks within the family, as well as being different from most younger genera within the family. Possible subdivision within the family was discussed by Dickens (1963), but he chose to follow Schenck's (1934) informal groupings of genera. Difficulties in intrafamily classification are compounded by uncertain family limits as genera are shuffled from one family to another. Characters of importance in family classification are the nature of the resilifer, presence or absence of denticulate margins, shell thickness, and shell microstructure. Because a subdivision of the family for upper Paleozoic genera does not work well for groups of lower Paleozoic and post-Paleozoic genera, family subdivision is not attempted. The informal groupings of Schenck (1934) do not work well for upper Paleozoic genera in the family.

Genus **NUCULAVUS** Chernyshev, 1947

Nuculavus Chernyshev, 1947, Akad. Nauk Ukrayins'koyi RSR (Kiev), Instytut Geol. Nauk. Zbornyk prats' z paleo. ta stratygrafiyi, vol. 1, p. 5, pl. 1, figs. 11-13.
Nuculanella Tasch, 1953, Jour. Paleont., vol. 27, p. 395.
Nuculanella Tasch, emended, Dickens, 1963, Australia Bur. Min. Resources, Geol. & Geophys., Bull. 63, pp. 30-31.
Nuculanella Tasch, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 35-36, pl. 13, figs. 1-5.
Nuculavus Chernyshev, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 36-37, pl. 12, figs. 1-9.

Type species: *Nuculavus minuta* Chernyshev, 1947.

Diagnosis. — Small, trigonal nuculids with concentric ornament of fine irregular growth lines, beak located a short distance posteriorly, resilifer small, open, shallow, and triangular.

Discussion. — This genus includes the most common taxodont species of the upper Paleozoic. Species of this genus have been reported under the generic names *Nucula* and *Palaeonucula* which are post-Paleozoic genera and do not extend into the Paleozoic. Chernyshev's (1947) description of *Nuculavus* as a new genus is the first available name for the group. There are many named species in this genus, whose relationships to each other remain to be worked out. Species of *Nuculavus* lived primarily in shallow environments, and usually in populations with great numbers of individuals. The genus is common in upper Carboniferous and lower Permian strata, but its older and younger limits have not been determined. Presumably it ranges through most or all of the Carboniferous and Permian.

Nuculavus levatiformis (Walcott), 1884 Pl. 7, figs. 6-10

Nucula levatiforme Walcott, 1884, U.S. Geol. Surv., Mon. 8, p. 241, pl. 22, fig. 1, 1a.
Nucula levatiformis Walcott, Girty, 1909, U.S. Geol. Surv., Bull. 389, p. 74, pl. 10, fig. 7-8a.
Palaeonucula levatiformis (Walcott), Chronic, 1952, Geol. Soc. America, Bull. 63, p. 138, p. 6, figs. 4-9.
Palaeonucula levatiformis (Walcott), Winters, 1963, Geol. Soc. America, Mem. 89, p. 49, pl. 6, figs. 4-7a.
Palaeonucula levatiformis (Walcott), Yancey, 1969, Paleobios, No. 8, p. 6, figs. 18-20.

Description. — Small, subtriangular shells, averaging about as high as long, with beaks situated posterior of center of hingeline; beak in some specimens close to posterior margin of shell, close to midpoint in others; outline of shell variable, imperfectly equilaterally triangular; well inflated with thickest part about 1/3 height below beaks; ornamentation subdued, consisting of many low concentric ribs, some individuals having a few irregular growth constrictions superimposed over these; pseudolunule sharply defined and large, enclosing a flattened area below the beaks and extending to ventral margins, with slight outward bulge midway between beaks and margins; taxodont dentition with about 12-15 anterior teeth and 9-10 posterior teeth including the small teeth under the beak; resilifer small but distinct, of triangular shape, shallow and flat in form with only a slight curvature on the ventral edge; individuals reaching 7 mm in height and 7 mm in length in Arcturus populations.

Discussion. — The variation in external form in this species is large, and the height-length ratio ranges from 1:1.5 to 1.5:1. This is the most variable specific character, and variations in the other characters appear to be dependent upon the changes in dimension of the shell. The species is characterized by a moderately inclined beak which may be strongly inclined in a small proportion of individuals in a population.

This species can be differentiated from most other species of *Nuculavus* by its subdued, less prominent beak, moderate inflation of the valves, and rounded extremities. In the available material, there are consistent regional differences within the species. Populations from the Arcturus Group of the Ely area tend to have more elevated beaks, and, therefore, have a greater height-length ratio than others. In the populations from the Maverick Springs Range, the more elevated beaks are lacking and the concentric ornament is weak. All of the Arcturus populations differ from the Colorado Plateau populations in having a smaller average size and in having weaker concentric ornament. Also, the Colorado Plateau individuals tend to have slightly heavier, thicker shells. These are all infraspecific variations and do not deserve formal designation. They indicate a trend of southward increase in size and thickness of shell, and increase in strength of concentric ornament.

Nuculavus levatiformis is common in lower Permian strata of the western states and is the commonest taxodont species in those rocks. It occurs characteristically with biotas of shallow-water marine environments, including marginal marine environments, and preferred muddy substrates.

Occurrence. — Many localities in the Pequop Formation and Loray Formation, Egan Range, Butte Mountains, Maverick Springs Range and Medicine Range, Nevada, and Arcturus Formation, Confusion Range, Utah.

Nuculavus sp. A — Pl. 7, figs. 11-14

Description. — Small to medium size, moderately to strongly inflated shells; beak and resilifer at highest point on tooth row; beak well elevated and slightly incurved; margins nearly straight on anterior and posterior slopes, and with sharply curved anteroventral and dorsoventral extremities; tooth rows short but large, with about 10 teeth in the posterior row and 12 or more in the anterior row, some larger; resilifer dish-shaped with a rounded ventral margin, and projects ventrally into the shell; shell wall thick; adductor muscle scars and pallial line deeply impressed on large shells; ornament consisting of closely and regularly spaced concentric ribs; size reaching 11 mm in length and 10 mm in height.

Discussion. — This species is larger and more robust than *N. levatiformis*. Adult shells have nearly straight lateral margins rather than curved ones, and a thicker shell wall. *N.* sp. A also has stronger tooth rows and larger dish-shaped resilifer, and a higher degree of inflation. It is clearly a distinct species from *N. levatiformis,* but the indifferent preservation of the available material and the lack of a growth series prevents a complete comparison. The shells of large individuals are readily distinct by virtue of their more prominent beaks, straighter lateral margins, and more angular extremities, but small shells occurring with them are hard to distinguish from small *N. levatiformis*.

This species appears to be conspecific with specimens illustrated by Ciriacks (1963) as *Nuculopsis* sp. C. The specimen illustrated by him has a more rounded anterior margin but is otherwise similar.

Occurrence. — Loray Formation, loc. UCMP D-5611, D-5612, Robinson Summit area, Butte Mountains, Nevada.

Nuculavus sp. B — Pl. 7, figs. 15-17

Discussion. — Two lots of poorly preserved specimens from the Murry Summit section in the Egan Range are similar to specimens described by Girty (1915) as *N. wewokana.* This is an extremely inflated species which has strongly incurved beaks and a trigonal outline. Not enough specimens are available for study, but it does not appear to intergrade with *N. levatiformis.* The interiors and hinge are not known. There are a large and well-defined pseudolunule and an escutcheon on the dorsal margin. The posterior area contains a small pair of inner escutcheon ridges curving from the beaks to the hingeline just below the beaks. This species differs from *N. wewokana* of the Wewoka Formation in having no earlike projections within the pseudolunule and escutcheon (noticeable on the specimens Girty illustrated), and has more rounded beaks.

This species is closely related to *N. wewokana* and is part of a distinctive stock within *Nuculavus.* Both the Arcturus specimens and *N. wewokana* appear to have inner escutcheon ridges. These ridges are best developed in species of *Polidevcia* and are only occasionally present in species of *Nuculavus.*

Nuculavus sp. B is found in shallow-water, normal marine deposits.

Occurrence. — Pequop Formation, loc. UCMP D-5535; Loray Formation, loc. UCMP D-5539, Egan Range, Nevada.

Genus **QUADRATONUCULA** Dickens, 1963

Quadratonucula Dickens, 1963, Australia Bur. Min. Res., Geol. & Geophysics, Bull. 63, p. 32, pl. 1, figs. 16-24.
Quadratonucula Dickens, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 49-50, pl. 14, figs. 1-9.

Type species: *Quadratonucula australiensis* Dickens, 1963.

Description. — Small to medium size, subquadrate to ovoid; moderately inflated; dorsal margin more flattened than arched, with beaks nearly centrally located, and umbos slightly incurved towards the tooth rows; tooth rows short and containing 5-10 small teeth, with one tooth row shorter than the other; a small resilifer present under the beak; two large adductor muscle scars, near the anterior and posterior extremities, and about four small muscle scars in the beak area; shell may be slightly flexed; shell nearly symmetrical in two planes, one plane between the valves and the other cutting from the dorsal to ventral margins at 90 degrees to the first plane.

Discussion. — The presence of a resilifer in the shell is demonstrated here, though both Dickens (1963) and McAlester (1968) described the genus as lacking one. It is small, directly underlies the beak, and has a dish shape. Both adductor muscle scars are present on the Arcturus Group material and are both slightly impressed and rounded. Determining the orientation of this nuculid is especially difficult, and Dickens and McAlester chose opposite directions in their descriptions of the genus. Bradshaw and Bradshaw's (1971) method of using dentition to determine orientation cannot be applied because of similar tooth size in both rows. A comparison with *Deceptrix* (which has similar form) suggests that the shorter tooth row of the hinge is anterior, which agrees with the orientation of McAlester (1968). There is a slight anterior inclination of the beak, and the anterior end is slightly shorter than the posterior.

The shell features of this genus are typically nuculid, and it belongs in the Nuculidae without doubt. The assignment of *Quadratonucula* to the family Malletiidae in the "Treatise of Invertebrate Paleontology, Part N," by McAlester (1969) is hereby changed. The unique symmetrical proportions of the shell are derived by slight changes in the geometry of the shell and not by the loss or addition of characters. The differences in appearance from many other nuculids are more apparent than real, as a result of the symmetry imposed on the valves, although this symmetry is not perfect. It is similar to the Devonian genus *Deceptrix,* to which it may be related.

Quadratonucula stella, n. sp. Pl. 8, figs. 1-6

Description. — Small, nearly symmetrical nuculids; reaching 15 mm in length and 12 mm in height; moderately inflated — perhaps not more than 3-4 mm per valve; slightly, but not always, produced on the posterior margin; beak moderately incurved, often inclined slightly towards the anterior, this inclination more pronounced on the inner surface of the beak (as seen on the internal molds) than on the external surface; two tooth rows of nearly equal length, with about six teeth on the anterior row, and eight teeth on the posterior row; small resilifer of dish shape located directly under the beaks; adductor muscle scars of ovoid shape and impressed on adult shells, located half way up the height of the shell; about four tiny muscle scars impressed on the inner surface of the beak; pallial line nonsinuate; ornament of closely set, weak irregular concentric growth ridges only.

Discussion. — This species is different from the type species in a number of details of shape and tooth rows. It differs in having a more nearly symmetrical beak, in being more rounded in form, and in having nearly equal tooth rows, with fewer teeth in them. It is also much larger. The average size of specimens examined is about 10 mm in length, about twice the size of *Q. australiensis.* Both species are known only from silty sediments which probably accumulated in the same general environment — one of quiet, deeper water deposition.

Occurrence. — Dry Mountain "lithosome" of Riepetown Formation, loc. 1J-2, Buck Mountain, Nevada.

Numbered specimens. — Holotype USNM 245150, paratypes USNM 245151-245163, from loc. 1J-2, Buck Mountain, Nevada.

Etymology. — *stella,* Latin, for star. Arcturus is one of the better known stars in the heavens.

Genus **NUCULOPSIS** Girty, 1911

Nuculopsis Girty, 1911, New York Acad. Sci., Annals, vol. 21, p. 133.
Nuculopsis Girty, Girty, 1915, U.S. Geol. Surv., Bull. 544, pp. 115-116.
Nuculopsis Girty, Schenck, 1934, Mus. Royal d'Hist. Nat. Belgique, Bull., vol. 10, No. 20, p. 29-30.
Nuculopsis Girty, Dickens, 1963, Australia Bur. Min. Resources, Geol. & Geophys., Bull. 63, pp. 28-29.
Nuculopsis Girty, McAlester, 1968, Geol. Soc. America, Mem. 105, p. 39, pl. 12, figs. 10-18.

Type species: *Nuculopsis girtyi* Schenck, 1934 (= *Nucula ventricosa* Hall, 1858).

Diagnosis. — Small to large nuculids that tend to have a subquadrate form, thick shells, and a smooth ventral margin and lack definite concentric ribs.

Discussion. — Girty (1911) erected this genus for nuculids which he believed to have an external ligament and anteriorly directed beaks. Schenck (1934) negated these two assumptions but retained the genus and placed it securely within his newly revised Nuculidae. He retained the genus for Paleozoic nuculids with smooth ventral margins lacking definite concentric ribs. They tend to be elongate or subquadrate, and to have thickened shell walls, characters also noted by Girty (1915).

Nuculopsis is similar in external form to the genus *Clinopistha* which is not a nuculid. *Clinopistha* possesses a true external ligament, has a thin shell wall, and is easily separated from *Nuculopsis* on these characters.

Nuculopsis girtyi Schenck, 1934 Pl. 8, figs. 7-10

Nucula ventricosa Hall, 1858, Iowa State Geol. Surv., vol. 1, part 2, p. 716, pl. 29, figs. 4-5.
Nuculopsis ventricosa (Hall), Girty, 1915, U.S. Geol. Surv., Bull. 544, pp. 117-120, pl. 15, figs. 1-8.
Nuculopsis girtyi Schenck, 1934, Mus. Royal d'Hist. Nat. Belgique, Bull., vol. 10, No. 20, pp. 29-30, pl. 2, fig. 19; pl. 4, figs. 2-2b.
Nucula (Nuculopsis) girtyi Schenck, Hoare, 1961, Univ. Missouri Stud., vol. 36, pp. 101-102, pl. 13, figs. 7-8.
Non *Nuculopsis girtyi* Schenck, Bird, 1968, Bull. Amer. Paleont., vol. 54, No. 240, p. 137, pl. 13, fig. 4.

Description. — Small, equivalved taxodonts, well inflated, with a roughly rectangular shape formed by the parallel alignment of the dorsoanterior margin and ventral margin; beaks prominent and projecting slightly posteriorly; escutcheon well formed just below beaks, short and wide; faint pseudolunule developed anterior to beaks on well-preserved individuals; true lunule lacking; dentition taxodont; each valve thick walled, about 1.0-1.5 mm in thickness for full grown individuals; ornamentation lacking except for fine growth lines, and faint semiregular but occasional growth constrictions; posterior margin produced, with protruding extremity small and rounded; anterior extremity large and widely rounded; interior characters not seen.

Discussion. — The Arcturus Group specimens appear identical to typical *N. girtyi,* especially as illustrated by Girty (1915). The diagnostic characters include the ventricose shape, the nearly parallel top and bottom margins, and the sharply rounded posterior extremity that is sometimes set off from the ventral margin by a slight groove on the shell. *Nuculopsis girtyi* is similar to *Nucula gibbosa* Fleming, 1828, from the Carboniferous of Scotland. Schenck (1934) suggested that these two may be conspecific, and if this proves to be true the species will bear Fleming's earlier name.

Occurrence. — Dry Mountain "lithosome", Riepetown Formation, loc. UCMP D-5644, D-5645, Maverick Springs Range, loc. 1J-6, Buck Mountain, loc. 1K-5, Dry Mountain, Nevada.

Nuculopsis cf. **N. darlingensis** Dickens, 1963 Pl. 8, figs. 11-12

Nuculopsis (Nuculopsis) darlingensis Dickens, 1963, Australia Bur. Min. Res., Geol. & Geophys., Bull. 63, pp. 29-30, pl. 1, figs. 1-6.

Description. — Small, subquadrate taxodonts; well inflated with prominent beaks inrolled towards the hinge and projecting posteriorly; shell wall relatively thick; anterior dentition consisting of many small teeth; posterior dentition not seen; posterior margin produced, with a tightly rounded extremity; anterior margin widely rounded; irregular growth constrictions on shell, but surface ornament unknown; other features unknown.

Discussion. — Individuals questionably assigned to this species are close to the types of *Nuculopsis darlingensis* (in outline and inflation), but they are not well enough preserved for positive identification. On portions of the hingeline where the teeth can be observed, the teeth are identical both in size and number with those of the types of the species. The greatest difference is the stronger posterior projection of the beaks of the Arcturus specimens. The Arcturus specimens and Australian specimens are closely related, and further collecting to determine the character of the hinge and the average position of the beak is needed to clarify the identification. The thick shell wall clearly places the species in the genus *Nuculopsis*. Dickens (1963) noted that *Nuculopsis darlingensis* was found commonly in yellowish brown clayey matrix, similar to that of the Arcturus Group specimens.

Occurrence. — Dry Mountain "lithosome", Riepetown Formation, loc. 1J-2, Buck Mountain, Nevada.

Superfamily **NUCULANACEA** Adams & Adams, 1858
Family **MALLETIIDAE** Adams & Adams, 1858

Discussion. — There is a fairly large group of Paleozoic taxodont bivalves similar to *Palaeoneilo* which form a natural family grouping and are placed in the family Malletiidae. The Paleozoic genera are usually elongate, often with one or two radial grooves in the shell, have taxodont dentition with one tooth row much shorter than the other, and lack a resilifer. It is assumed that they have an external ligament, but this is yet to be proven. The Paleozoic genera are unlike modern genera in the family and do not appear to be closely related.

Genus **ANTHRACONEILO** Girty, 1911

Anthraconeilo Girty, 1911, New York Acad. Sci. Annals, vol. 21, p. 131.
Anthraconeilopsis Tasch, 1953, Jour. Paleont., vol. 27, p. 391.
Anthraconeilo Girty, McAlester, 1968, Geol. Soc. America, Mem. 105, p. 16, pl. 18, figs. 1-6; pl. 19, figs. 1-11.

Anthraconeilopsis Tasch, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 16-17, pl. 20, figs. 1-17.

Type species: *Anthraconeilo taffiana* Girty, 1911 (= *Leda oweni* McChesney, 1859).

Description. — Small, thin-shelled taxodont bivalves of ovoid shape; having a raised and incurved beak, pointed towards the shorter end, located near the short end of the valve; shells inequilateral; margins smoothly rounded; dentition consisting of many small chevron-shaped taxodont teeth, about 20-30 on the long tooth row and about 10 on the short tooth row; ornament consisting of fine, regular, concentric ribs developed parallel to the growth lines; other features unknown.

Discussion. — There is much discussion on the relationships and nature of this genus, largely because many critical characters are not adequately known. Girty (1915), in his description of the genus noted that an internal resilifer was not seen but was expected to be found. Unfortunately, no evidence of attachment for an internal or external ligament has been found, nor has this feature been determined in any of the closely related genera. Murphy (1966), after looking at many specimens of the genus, concluded that it lacked a resilifer, and that it possessed external grooves for a ligament, but did not illustrate any external grooves. On all specimens I have examined referable to the genus there is no evidence of an escutcheon, and no trace of external grooves. The hinge is thickened under the beak and along the short tooth row, but the teeth do not extend completely across the thickening, leaving a flat, barren shelf along the ventral margin of the hinge. This can be seen on internal molds as paired grooves parallel to the hingeline. This shelf may have functioned as a resilifer.

Murphy (1966) suggested that *Anthraconeilo* and *Palaeoneilo* are synonymous, but this is doubtful, and *Anthraconeilo* is retained as a separate genus.

Anthraconeilo mcchesneyana Girty, 1910 Pl. 8, figs. 13-15

Yoldia mcchesneyana Girty, 1910, U.S. Geol. Surv., Bull. 436, pp. 39-40, pl. 4. figs. 4-6.
Palaeoneilo mcchesneyana (Girty), Ciriacks, 1963, Amer. Mus. Nat. Hist., Bull., vol. 125, Art. 1, p. 37, pl. 4, figs. 12-16.

Description. — Small to moderate size taxodont bivalves of nearly oval shape, having a small beak located closer to the posterior end of the shell than the midpoint; beak incurved and slightly pointed posteriorly; moderately inflated; lacking radial grooves; anterior end of shell slightly elongated; hingeline consisting of many small, chevron-shaped teeth, with about 20-30 teeth on the anterior tooth row, and 5-10 on the posterior row; posterior teeth at least as large as the anterior teeth, and located on a wide hingeline plate that has a smooth extension on the ventral side of the tooth row; open space, developed below beak, consisting of a smooth area on the hingeline plate; shell wall thin to medium thickness; ornament of fine, regular concentric ribs.

Discussion. — The hinge structure of the species is well displayed on one individual, where the strong character of the teeth on the posterior tooth row is shown. The tooth row is also unusual in that there is a smooth rim of material on the ventral side of the tooth row where the teeth are not developed beneath the anterior tooth row. This smooth surface on the hinge plate extends under the beak where it is wider because of the narrowing tooth rows at this point, and the result is a triangular depressed space between the tooth rows. This may have functioned as a resilifer.

This species is known from the Riepetown Formation of late Wolfcampian age and from the Meade Peak Formation and Grandeur Formation of the Park City Group of Leonardian age.

Occurrence. — Dry Mountain "lithosome", Riepetown Formation, loc. 1K-7, 1K-8, 1K-9, Dry Mountain, loc. 1X-8, Limestone Peak, White Pine Range; loc. UCMP D-5644, and loc. 1V-18, about 1450′ above base of exposed section, Maverick Springs Range, Nevada.

Anthraconeilo sp. ? Pl. 8, fig. 16

Description. — Small, ovoid shells with a nearly terminal beak, and a short, straight hingeline; extremity away from the beak rounded or somewhat angulate on the ventral border; dentition unknown; thin shell wall; ornament consisting of fine, regular, concentric ribs.

Discussion. — This species is too poorly preserved to identify properly, and not enough of the hinge is known to properly assign it generically. The closest comparison is to the species *Edmondia* ?

phosphatica Girty, illustrated and described by Girty (1910) and Ciriacks (1963). However, *E.* ? *phosphatica* is more elongate and has a more prominent beak. Inasmuch as the hinge of this species and that of *E.* ? *phosphatica* are not known, a proper evaluation of their relationships cannot be made.

Occurrence. — Dry Mountain "lithosome", Riepetown Formation, loc. 1J-2, Ruby Range, Nevada.

Family **NUCULANIDAE** Adams & Adams, 1858

Diagnosis. — Nuculoid bivalves with elongate form, long tooth rows with resilifer beneath the beak below the juncture of the tooth rows; most genera having regular strong concentric ornament, often at a slight angle to the growth lines.

Discussion. — A large and diverse group of genera that appear to represent several stocks of taxodonts are presently assigned to the family Nuculanidae. In the upper Paleozoic there is a fairly distinct group of nuculanids, including the genera *Polidevcia, Phestia, Girtyana,* and *Glyptoleda* belonging in one stock, and questionably including the genus *Paleyoldia.* Many genera in the group possess the characteristic ornament pattern so well-developed on some modern species of *Nuculana* and *Yoldia.* This consists of a series of concentric step ribs, regular and sharp in form, developed at an angle to the growth lines, with the crest inclined towards the beak. Each step rib has a sharp crest, and a short steep dorsal slope and a longer, lower ventral slope (Pl. 9, fig. 9, as well as illustrations in Chronic, 1952, and McAlester, 1968).

Subfamily **PHESTIINAE** Logan, 1967

Diagnosis. — Well-inflated nuculanids with a slightly to greatly produced posterior margin, commonly with umbonal ridges on the posterior portion of the dorsal margin; having well-defined escutcheon; short to long tooth rows with many teeth, and a triangular or dish-shaped resilifer; having regular, sharp concentric ribbing developed at a slight angle to the growth lines, often becoming obsolete on posterior portion of shell; an entire pallial line; most genera have an internal thickened ridge extending ventrally from beak.

Discussion. — There has been considerable discussion on the validity and limits of Paleozoic genera in the family Nuculanidae. Such problems can only be resolved by further work, but my experience has been that all genera proposed are valid. Logan (1967), presented a good summary of the problems associated with classification of the taxodonts. Lintz (1958) and Logan (1967) discussed the characteristics of nuculanids that belong in the Phestiinae.

This subfamily is characterized by an elongate form, a triangular or dish-shaped resilifer, and an entire pallial line. The typical nuculanid ornament is known to be present in *Polidevcia, Phestia,* and *Paleyoldia,* and the internal ridge is known to be present in *Polidevcia, Phestia,* and *Girtyana* but is not present in *Paleyoldia.*

Genus **PHESTIA** Cherynshev, 1951

Phestia Chernyshev, 1951, Akad. Nauk Ukrain. SSR, Inst. Geol. Nauk Trudy, Ser. Strat. i Pal., No. 2, p. 15, pl. 1, fig. 10.
Phestia Chernyshev, Logan, 1967, Palaeontog. Soc., Mon., No. 518, vol. 121, p. 43-44.
Phestia Chernyshev, McAlester, 1968, Geol. Soc. America, Mem. 105, p. 43, pl. 34, figs. 3-6.

Type species: *Leda inflatiformis* Cherynshev, 1939.

Diagnosis. — Small nuculanids with a slightly to moderately produced posterior extremity; having a height nearly equal to length; beaks incurved but not projecting lengthwise; having typical nuculanid ornament over most of the valve; triangular resilifer; posterior tooth row half as long as anterior row; lacking or having a small inner escutcheon ridge on escutcheon.

Discussion. — This genus is poorly known from its original descriptions and little information has disseminated to English speaking workers about the characteristics of this Russian genus. It appears to be far more common in the eastern European areas than in the Americas or Australia where mollusc-dominated normal marine faunas are common. In these areas, and in Europe, the name *Phestia* has been haphazardly applied to material known only from internal molds. Most of the species described by Chernyshev are small, and the genus can be typified by small taxa.

Because of the difficulty in separating species of *Phestia* from species of *Polidevcia,* many workers place the two genera in synonymy. Logan (1967) summarized in English the differences between *Phestia* and *Polidevcia* from Chernyshev's original description. Except for the presence of a resilifer in *Polidevcia,* the original diagnosis is still the best published guide to separating the two genera.

They can be clearly separated in the American species as well as the Russian species. Species of *Phestia* are smaller, with little posterior elongation, have a much shorter posterior row of teeth, and a triangular resilifer. Although not conspicuous, a short subdued pair of inner escutcheon ridges may be present. *Polidevcia* has rows of teeth of subequal length, and a dish-shaped resilifer. Other features are similar between the two genera. There are enough differences in characters to justify separating the two forms, with *Phestia* including mostly species of small size, and *Polidevcia* including species with an elongate posterior extremity. The best characters for separating the genera are the length of the tooth rows, and the shape of the resilifer.

Phestia perumbonata (White), 1880 Pl. 9, figs. 1-5

Nucula perumbonata White, 1880, U.S. Geol. Surv., 12th Ann. Report, Contr. Pal., No. 6, p. 136, pl. 34, figs. 7a-b.

Description. — Small nuculanids with a height almost equal to length, and slightly produced posterior extremities; beak located centrally on the dorsal margin, and slightly directed posteriorly; moderately inflated; outline broadly and smoothly rounded everywhere except on the posterior extremity which is sharply rounded; typical nuculanid ornament of many concentric ribs set at an angle to the growth lines; ribs closely spaced; well-defined escutcheon with a slightly protruding central portion consisting of the escutcheon ridges; tooth rows continuous and composed of chevron-shaped teeth, about five on the posterior row and 10 on the anterior row; resilifer present below the beaks and of triangular shape and directed anteriorly; inner thickening ridge below the beak of the shell; pallial line entire.

Discussion. — This species has been unreported since the first description of it, and has undoubtedly been overlooked because it was confused with juveniles of *Polidevcia* or with *Nuculavus*. White's description was short and based on a single articulated specimen, so many characters of the shell were never described. In particular, the internal characters have not been recorded, and the nuculanid-type ornament has not been described. White (1880) gave two diagramatic drawings of the articulated holotype. Etched valves are illustrated here to show the internal and external features.

White's illustration of the holotype shows a greater resemblance to *Nuculavus* than the species has. The drawings probably show the beaks to be higher than they are. I have not examined the holotype, but the biota of the Kaibab Formation includes a small species of *Phestia* that compares closely with the specimen White described as *Nucula perumbonata,* and there is good reason to use his name for it. No nuculanid species of this size has been otherwise reported in North America.

The species is known only from the Loray Formation of middle or late Leonardian age, and the Kaibab Formation of late Leonardian or earliest Guadalupian age.

Occurrence.—Loray Formation, loc. UCMP D-5539, Egan Range, Nevada; comparative specimens from the Kaibab Formation, loc. UCMP A-4271, near Rimmy Jim Tank, 20 miles northeast of Flagstaff, Arizona.

Genus **POLIDEVCIA** Chernyshev, 1951

Polidevcia Chernyshev, 1951, Akad. Nauk Ukrain. SSR, Inst. Geol. Nauk Trudy, Ser. Strat. i Pal., No. 2, p. 25.
Culunana Lintz, 1958, Jour. Paleont., vol. 32, No. 1, pp. 106-107 (subjective synonym — type species: *Leda bellistriata* Stevens, 1858).
Culunana Lintz, McAlester, 1968, Geol. Soc. America. Mem. 105, p. 25, pl. 34, figs. 7-13.
Polidevcia Chernyshev, McAlester, 1968, Geol. Soc. America, Mem. 105, pp. 43-44, pl. 34, figs. 1-2.

Type species: *Polidevcia karagandensis* Chernyshev, 1941.

Diagnosis.—Large, elongate nuculanids with a strongly produced posterior margin; a long well-defined escutcheon with a strong set of inner escutcheon ridges; long tooth rows of subequal length, continuous over a rounded dish-shaped protruding resilifer.

Discussion.—Both Chernyshev (1951) and Lintz (1958) proposed a new generic name for taxodonts of the same type which had previously been referred to as *Nuculana* in upper Paleozoic deposits. Chernyshev's description is earlier, and although Lintz (1958) made a distinction between the two generic proposals on the basis of Chernyshev's statement that the type species of *Polidevcia* lacks a chondrophore (resilifer), this appears to be an unwarranted guess on the part of Chernyshev, and the two genera have been synonymized by later workers.

In the description of *Culunana,* Lintz (1958) separated *Culu-*

nana from *Nuculana* on the basis of a continuous row of teeth over the resilifer which *Nuculana* often doesn't have, and the presence of rectangular teeth on the posterior tooth row. The statement about tooth form was a mistake, and as far as is known all nuculanids have chevron-shaped teeth. A better means to distinguish the two genera is the shape and size of the resilifer, and the fact that *Polidevcia* has more strongly incurved beaks.

The reason for Lintz's mistake about the tooth form in *Polidevcia bellistriata* is that the teeth in this species have an unequal chevron shape, with one arm of the V much longer than the other. In poorly preserved material the teeth could appear to be rectangular rather than chevron-shaped. On the anterior tooth row, the lengthened arm is ventral and the bend of the V is near the outer surface of the shell, while on the posterior tooth row the lengthened arm is dorsal and the bend of the V is near the inner edge. This characteristic tooth form is also present in *Polidevcia obesa,* but in that species the tooth is closer to a true V-shape.

It is a common characteristic that in etched silicified collections containing nuculids and nuculanids, the species of *Polidevcia* are consistently more poorly preserved than the species of *Nuculavus.* Often when *Nuculavus* is excellently preserved, the *Polidevcia* are present as broken fragments or partly silicified internal molds with pieces of shell adhering to them. Because these come from the same sample it is clear that the two groups have been altered differently during diagenesis, and probably had different shell structure (Newell & Boyd, 1970, pp. 239-241, reviewed this problem in bivalves). *Polidevcia* appears to have been less stable and probably had a shell structure with large amounts of aragonite.

Polidevcia obesa (White), 1879 Pl. 9, figs. 6-9

Nuculana obesa White, 1879, U.S. Geol. & Geogr. Surv. Terr., Bull. (Hayden), vol. 5, p. 216.
Nuculana obesa White, White, 1880, U.S. Geol. Surv., 12th Ann. Rept., Contr. to Pal., No. 6, pp. 136-137, pl. 34, figs. 2a-c.
? *Leda obesa* (White), Girty, 1910, U.S. Geol. Surv., Bull. 436, pp. 40-41, pl. 4, figs. 7-8.
Nuculana obesa White, Chronic, 1952, Geol. Soc. America, Bull., vol. 63, pp. 137-138, pl. 6, figs. 1a-3.
Polidevcia obesa (White), Ciriacks, 1963, Amer. Mus. Nat. Hist., Bull., vol. 125, Art. 1. p. 42, pl. 4, fig. 1-3.

Discussion.—This species has been well described by other authors. Excellent descriptions are given in White (1880) and Chronic (1952), especially the account by Chronic (1952) who gave measurements on a growth series of a population that was collected from a locality geographically and stratigraphically close to the type locality of the species. Her illustrations of adult forms of the species are excellent.

P. obesa is distinguished from other species in the genus by its strongly attenuated and elongated posterior extremity, which is usually slightly to moderately upturned, and the subcentral location of the beaks. The beaks are conspicuously directed posteriorly and nearly centrally located. In addition, the posterior part of the dorsal margin is moderately concave and the ventral margin is smoothly convex. The species is similar to *P. pandoraeformis* of the lower Carboniferous (Driscoll, 1966) and appears to be descended from it, although upper Carboniferous specimens of this lineage are not known. *P. obesa* differs from *P. pandoraeformis* principally in its lower height relative to length. It can be distinguished from *P. bellistriata* by its more elongate posterior extremity and distinctly posteriorly directed beaks.

Within the species there is definite variation in morphology from one population to another, mostly among smaller specimens. This variation is expressed in the amount of upward inclination of the posterior extremity, and the curvature of the ventral margin. These are interrelated characters, and a small variation in the position of the posterior extremity produces a greater difference in profile. Smaller specimens with a less curved posterior extremity can be confused with other species, but the more centrally located beak reveals their identity. These develop typical form upon maturity.

P. obesa has been reported from the upper part of the Arcturus Group, Kaibab Formation, San Andres Formation, and throughout the Phosphoria Group. This gives a geologic range from the base of the Leonardian Series (Riepetown Formation, Maverick Springs Range) to well within the Guadalupian Series (Phosphoria Group). The species appears to be restricted to the middle Permian. It is known only from deposits of shallow-water environments and inhabits a variety of environmental conditions.

Occurrence. — Many localities in the Arcturus Group (Riepetown, Pequop and Loray formations) of the Egan Range, Butte

Mountains, Maverick Springs Range; Medicine Range, Nevada; Arcturus Formation, Confusion Range, Utah, but most abundant in the Loray Formation.

Polidevcia bellistriata (Stevens), 1858 Pl. 9, figs. 10-13

Leda bellistriata Stevens, 1858, Amer. Jour. Sci., 2d Ser., vol. 25, pp. 261-262.
Leda bellistriata Stevens, Girty, 1915, U.S. Geol. Surv., Bull. 544, pp. 122-125, pl. 14. figs. 1-9.
Leda bellistriata Stevens, Morse, 1931, Kentucky Geol. Surv., Ser. 6, vol. 36, pp. 315-316, pl. 50, figs. 8-15.
Culunana bellistriata (Stevens), Lintz, 1958, Jour. Paleont., vol. 32, No. 1, pp. 107-108, pl. 16, figs. 16-17.
Polidevcia bellistriata (Stevens) ?, Ciriacks, 1963, Amer. Mus. Nat. Hist., Bull., vol. 125, Art. 1, p. 41, pl. 4, figs. 4-6.
Polidevcia bellistriata (Stevens), Driscoll, 1966, Sbornik Narodniho Muzea v Prague, vol. 22, Ser. B, No. 1, pp. 2-7; pl. 1, figs. 1-15; pl. 2, figs. 1-12.
Culunana bellistriata (Stevens), McAlester, 1968, Geol. Soc. America, Mem. 105, p. 25, pl. 34, figs. 7-13.

Discussion. — This species has been well described by Girty (1915), Lintz (1958), and Driscoll (1966), and the reader is referred to these sources for a complete description. The species is common in the upper Carboniferous and lower Permian of the North American midcontinent. Its occurrence in most lower Permian deposits of the western states has been overlooked because *P. obesa* is normally the most abundant *Polidevcia* in these horizons.

Polidevcia bellistriata is distinguished from *P. obesa* and all other species in the genus by its rounded and blunt posterior extremity which is not much produced. Its beaks are conspicuously incurved and only slightly pointed posteriorly. It has a more compact shape than other species.

The internal structures of the species are poorly known. Both Lintz (1958) and Driscoll (1966) described the species as having rectangular rather than chevron-shaped teeth on at least part of the anterior tooth row. However, illustrations of the type of the species by McAlester (1968) show the tooth row to be composed of chevron-shaped teeth, the normal condition in all nuculoid bivalves. On the illustrations of Driscoll (1966) it is clear that the portion of the tooth row near the beak has elongate teeth that are unequal chevrons (see discussion of tooth shape under genus description). Descriptions of rectangular teeth appear to have been based on observations on weathered, leached specimens; well-preserved material shows modified chevron tooth form.

The stratigraphic ranges of *P. bellistriata* and *P. obesa* are separate, and within the Arcturus Group overlap only in the Riepetown Formation in the Maverick Springs Range. *P. bellistriata* ranges from the lower Atokan Series of the upper Carboniferous through the Wolfcampian Series of the lower Permian (Driscoll, 1966). The highest occurrence in the Arcturus Group is in the Riepetown Formation in the zone of *Schwagerina linearis,* approximately Wolfcampian-Leonardian boundary in age.

P. bellistriata inhabited both deep and shallow environments, preferring a fine-grained substrate and quiet water conditions. On the average it inhabited deeper waters and quieter water conditions than *P. obesa.*

Occurrence. — Riepetown Formation, loc. UCMP D-5632, D-5633, D-5643, D-5644, D-5645, Maverick Springs Range; loc. UCMP B-6223, Egan Range; loc. 1K-9, Dry Mountain; 1J-6, Buck Mountain, Ruby Range, Nevada.

Polidevcia arctura, n. sp. Pl. 9, figs. 14-15

Description. — *Polidevcia* of medium-size with pointed and moderately upturned posterior elongation; ventral margin straight beneath beaks, and upturned on the posterior extremity; anterior margin steep and little curved, curving sharply to join the ventral margin; beak located near the anterior extremity, strongly incurved, and slightly curved posteriorly; escutcheon large, containing pair of large, long inner escutcheon ridges, and an inner ridge formed by upturned edges of valves; well inflated; with typical nuculanid ornament; reaching 3 cm long, 1.5 cm high, and 1 cm thick; internal features unknown.

Discussion. — This species can be easily separated from *P. obesa* and *P. bellistriata* by the position of the beak near the anterior end of the shell and can be further distinguished by the nearly straight ventral margin in the anterior end, and the shape of the posterior elongation, which is neither as pointed nor as upturned as in *P. obesa.* Also, the inner escutcheon ridges are stronger than in *P. obesa.*

P. arctura is uncommon, but occurs in the same quiet water environment as *P. bellistriata.* The character of the posterior extremity is approximately intermediate between *P. obesa* and *P.*

bellistriata, but the position of the beak differs greatly from either species.

Occurrence. — Dry Mountain "lithosome", Riepetown Formation, loc. 1J-6, Buck Mountain, Nevada.

Numbered specimens. — Holotype USNM 245175, from loc. 1J-6, Buck Mountain, Nevada.

Etymology. — Named for the Arcturus Group which received its name from an old mining claim near Ely, Nevada.

Genus **GIRTYANA** Elias, 1956

Girtyana Elias, 1956, Pet. Geol. S. Oklahoma, Amer. Assoc. Pet. Geol., p. 127, pl. 6, figs. 1-3.
Girtyana Elias, McAlester, 1968, Geol. Soc. America, Mem. 105, p. 29, pl. 35, figs. 1-7.

Type species: *Girtyana honessi* Elias, 1956.

Description. — Medium-sized nuculanids with coarse concentric ribs extending over most of valves; short posterior elongation having a blunt and openly rounded termination; valves about 2/3 as high as long; moderately inflated as in most nuculanids; anterior three-quarters of valves possessing thin, high concentric ribs separated by narrow or wide flat spaces; sharp, raised ribs stopping short of postero-dorsal surface; spacing of sharp, raised ribs variable; anterior and posterior tooth rows containing about 10 and 15 teeth respectively, teeth of chevron shape, and large throughout tooth rows; small dish-shaped resilifer present under the beaks; strong adductor muscle scars and single internal ridge extending from the umbo.

Discussion. — This genus is distinct and can be easily separated from *Polidevcia, Phestia,* and *Glyptoleda* on the basis of the strong, sharp, raised ribs on the anterior portions of the valve that do not extend onto the posterior end of the valve. In shape it can be confused with young specimens of other nuculanids, but the ornament is distinctive. The dentition, resilifer, and internal ridge are diagnostic of the nuculanids. The outline of *Girtyana* is close to that of some species of *Phestia* (such as the type species), but the characteristic ornament will reliably separate the two genera. Also, *Girtyana* has large teeth and may lack an escutcheon.

Girtyana stellara, n. sp. Pl. 10, figs. 1-4

Description. — Medium-sized nuculanids with a moderately produced and bluntly rounded posterior extremity; incurved beak without significant turning of the beak anteriorly or posteriorly; moderately inflated; taxodont dentition, with about 15 teeth on the posterior row, anterior row unknown, and a small resilifer directly below the beak; external ornament of large, sharp, raised ribs separated by a small space, extending almost but never completely to the posterior extremity of the valve or on the postero-dorsal surface; a conspicuous boundary between the ribbed and non-ribbed surfaces running diagonally from the beak to the postero-ventral margin; sharp ribs running slightly oblique to growth lines; shell wall thin; other features unknown.

Discussion. — This species can be distinguished from the type species by its more closely spaced sharp concentric ribs and its blunter posterior extremity. Morse (1931) illustrated two species of *Girtyana* (as *Leda arata* and *L. jillsoni*) that demonstrate a considerable range of variation in the development of the ornament in the genus. The ornament may be strong and of few ribs or be dense and more subdued. *G. stellara* differs considerably from the type species, *G. honessi,* in having a much thinner shell wall and smaller teeth, as well as more numerous concentric ribs.

Girtyana stellara is known from the early Permian of Nevada (Riepetown Formation — upper Wolfcampian Series). It has been collected only from fine-grained shales. The species lived in quiet waters perhaps with considerable depth range.

Occurrence. — Dry Mountain "lithosome", loc. 1J-2, Buck Mountain, Nevada.

Numbered specimens. — Holotype USNM 245176, paratypes USNM 245177-245180, all from loc. 1J-2, Buck Mountain, Nevada.

Etymology. — Refering to the star Arcturus in the constellation Boötes.

Subclass PTERIOMORPHA Beurlen, 1944
Order ARCOIDA Stoliczka, 1871

Superfamily **ARCACEA** Lamarck, 1809

Family **PARALLELODONTIDAE** Dall, 1898

Diagnosis. — Elongate, well-inflated arcids with beaks located nearer to anterior end of shell; broad diverging ligamental area containing duplivincular ligament; simple arcid dentition of few or several small oblique teeth on anterior end of hinge and long laterals subparallel to hingeline on posterior end of hinge.

Discussion. — This is primarily a Mesozoic family. During the Mesozoic the group diversified and included a large number of genera, which have been combined into two subfamilies containing several "groups" of genera. Permian species are similar to Mesozoic species but show much less diversity, while pre-Permian species show considerable variation from the Mesozoic types. Newell (1969) suggested that the Parallelodontidae were derived from the Cyrtodontidae during the Paleozoic, and pre-Permian species appear to include forms transitional between the two families. Species of *Parallelodon* from the lower Carboniferous Marshall Formation illustrated by Driscoll (1961) have parallelodontid dentition but are transitional to the cyrtodontids in shape and other characters.

Nearly all Permian species in the family have been referred to the genus *Parallelodon* which is given a geologic range extending from the Ordovician to the Jurassic (Newell, 1969). However, most of them do not belong in the genus *Parallelodon s.s.*, and should be reassigned to the *Grammatodon* group of genera and subgenera. Recent reviews of this family by Driscoll (1961) and Logan (1967) recognized the need for revision of the family, especially the Paleozoic species.

Genus **GRAMMATODON** Meek & Hayden, 1861
Subgenus **COSMETODON** Branson, 1942

Beushausenia of Arkell, 1930 (*non* Cossmann, 1897), Geol. Mag., vol. 67, p. 303.
Cosmetodon Branson, 1942, Jour. Paleont., vol. 16, No. 2, p. 248.

Type species: *Arca keyserlingii* d'Orbigny, 1850.

Description. — Shell elongate and trapezoidal; strongly inflated, and without byssal gape; beak located near anterior end of shell, and incurved; ligamental area smooth and wide with duplivincular ligament; hinge consisting of several anterior teeth of small size radiating upward and laterally from a point under the beak, including two small but strong teeth on anterior end of hinge, and two or three long lateral teeth along posterior part of hinge; point of greatest projection of valve on postero-ventral corner.

Discussion. — *Grammatodon (Cosmetodon)* is the best name for most if not all Permian arcid-type clams, and the use of the name *Parallelodon* should be discontinued. The hinges of Permian species contain a radial array of teeth under the beak which is a character of *Grammatodon (Cosmetodon)* and related subgenera and not of *Parallelodon.*

Parallelodon can be distinguished as a separate genus on the basis of having a nearly terminal beak and many large inclined teeth [Arkell (1930), included illustrations of the type species]. I have reservations about accepting the interpretation that the anterior teeth of *Parallelodon* all converge to a point slightly above and ahead of the beak, being more or less *en echelon* alignment, but the genus is valid on the basis of other characters.

Grammatodon (Cosmetodon) politus (Girty), 1909 Pl. 10, figs. 5-9

Parallelodon politus Girty, 1908 (1909), U.S. Geol. Surv., Prof. Paper 58, p. 424, pl. 9, fig. 25.
Grammatodon politus (Girty), Chronic, 1952, Geol. Soc. America, Bull., vol. 63, No. 2, pp. 140-141, pl. 7, figs. 1a-1b.
Parallelodon anaklastum Winters (in part), 1963, Geol. Soc. America, Mem. 89, pp. 51-52, pl. 6, figs. 10a-b (not 8-9c).

Description. — Elongate and trapezoidal arcids; well inflated; without byssal gape; anterior margin nearly perpendicular to dorsal and ventral margin, and rounding smoothly into ventral margin; ventral margin slightly curved except for short straightening in the middle; posterior margin directed back towards anterior end, with slight sinus; no posterior ear developed; growth lines prominent and regular; unworn shells covered with fine radial ribs, at least on the posterior portion of the shells, ribs of constant strength throughout growth of shell; hinge containing several tiny and curved teeth radiating out from a point directly below beak, with some stronger and nearly horizontal on anterior end of hinge, and with two or three long horizontal lateral teeth on posterior end of hingeline; ligamental area smooth and wide with a duplivincular ligament; beaks located near anterior end of shell and incurved; slight groove on crest of inflated beak area on young specimens.

Discussion. — This species is common in Permian deposits of the western states, and was well described by Chronic (1952). The only important character not mentioned in her description is the presence of faint radial ribs on the shell, which stay the same strength throughout growth. These apparently are easily eroded off during the lifetime of the animal, or before burial, and ordinarily are not seen on fossil material.

G. (C.) politus can be distinguished from other species in the genus by the faint radial ribs of constant strength, by the straight or nearly straight posterior margin, and by the anterior margin that is nearly perpendicular to the dorsal and ventral margins.

The species is known fom the Capitan Formation and Delaware Mountains Formation of Guadalupian age, and the Kaibab Formation and Fort Apache Member of the Supai Formation of Leonardian age, and the Loray Formation of Leonardian age. The species occurs in a variety of shallow-water substrates in fully normal marine conditions. It probably was an exposed nestler or an epifaunal form, because it often shows evidence of abrasion and abrupt growth stoppages in the shell, probably due to periods of rough water conditions.

Occurrence. — Arcturus Formation, loc. UCMP D-5586, Confusion Range, Utah; Loray Formation, loc. UCMP D-5518, D-5535, D-5539, D-5545, D-5546, D-5550, D-5555, Egan Range, Nevada.

Order MYTILOIDA Ferussac, 1822

Superfamily **PINNACEA** Leach, 1819
Family **PINNIDAE** Leach, 1819

Diagnosis. — Elongate, trigonal shells with pointed beak and smoothly rounded posterior extremity; mostly equivalved; large posterior gape; hinge edentulous, ligament subinternal and extending along entire hinge margin; shell wall generally thin, and with nacreous layer developed in part; shell wall moderately flexible when thin; two well-developed muscle scars in anterior half of shell; ornament various.

Discussion. — This family has been common in shallow marine environments since the Carboniferous Period and has changed little in shell features or life habits since that time. The large size of the shells of many species, and their relative fragility (which results in crushing during burial) makes collecting them difficult and keeps them from being adequately studied.

Genus **MEEKOPINNA,** new genus

Type species: *Aviculopinna americana* Meek, 1867.

Description. — Generally small, elongate, narrow pinnids; hinge line thickened on each valve by roll of shell material; beaks subterminal but located close to anterior end; shell with characteristic narrow, sharp regular growth lamellae; growth lines nearly parallel to ventral margin and becoming straightened or slightly flexed on posterior margin, there joining hingeline at nearly a right angle; shell moderately inflated and thin shelled.

Discussion. — Arcturus pinnid species belong in two species groups: one type has small, sharp, regular growth lamellae, and the other type has a smooth shell without significant ornament. These two types are common in Carboniferous and Permian strata in North America and are generically distinct but have been placed together in *Aviculopinna,* an all encompassing genus. Meek (1864) erected *Aviculopinna,* with "*Pinna prisca* Munster = *Avicula pinnaeformis* Geinitz" as type species, for pinnids with subterminal beaks. The type referred to by Meek has a strongly subterminal beak and faint radial striae. Meek later (1867) described *Aviculopinna americana* and contrasted it to *A. pinnaeformis* by stating that *A. americana* possessed sharp, regular growth lamellae, had no trace of radial striae, and had a beak that was more nearly terminal in position. Pinnids with narrow elongate shells having regular, sharp growth lamellae lack a suitable generic name, and *Meekopinna* is proposed here to include this group.

The generic name *Pteronites*, (a genus distinct from *Aviculopinna,* despite the synonymy by Cox and Hertlein, 1969), is not available for *americana*-type pinnids. *Pteronites* is based on a lower Carboniferous species that differs greatly from *Meekopinna* in shell form, having a strongly curved ventral margin, and much less elongate shape. *Pteronites* is almost transitional to pteriacean shell form. It does have regularly spaced concentric shell ornament and may be related to *Meekopinna* but is distinct.

Species of the genus *Meekopinna* occur mostly in fine-grained sediments, usually of terrigenous or partly terrigenous composition, and rarely occur in coarse-grained sediments or in high energy environments. This preferred association with fine-grained terrigenous sediments occurs consistently through the Carboniferous and Permian.

Meekopinna sagitta (Chronic), 1952 Pl. 10, figs. 10-11

Aviculopinna sagitta Chronic, 1952, Geol. Soc. America, Bull., vol. 63, No. 2, p. 141, pl. 6, fig. 10.
Aviculopinna sp. b, Ciriacks, 1963, Amer. Mus. Nat. Hist., vol. 125, Art. 1, p. 46, pl. 5, figs. 3-4.

Description. — Narrowly elongate shells with steady small increase in width throughout length of shell; angle formed by dorsal and ventral margin about 15 degrees; hinge line straight and thickened on each valve by curled roll of shell material containing ligament and projecting above regular cylindrical body of shell; moderately inflated; growth lines passing from nearly parallel to dorsal margin to perpendicular to it, past perpendicular, then joining dorsal margin at about a 70 degree angle, inclined towards the anterior; growth lines smoothly curved on postero-ventral margin; shell ornamented with small, sharp, regular growth lamellae spaced about 1-2 mm apart; radial ornament lacking; beak apparently subterminal; shell wall thin; greatest height about 2 cm, on projected length of 10 cm; other characters unknown.

Discussion. — This species is similar to *M. americana,* in having a small size with low angle of increase in height, and regular external growth lamellae. *M. sagitta* can be distinguished from *M. americana* by the angle of the growth lines as they join the hingeline. The angle of approach is approximately 90 degrees in *M. americana,* and is about 70 degrees in *M. sagitta,* with the growth line inclined toward the beak. For a discussion and description of *M. americana* see Meek (1872) and Girty (1915).

The specimens found in the Arcturus Group differ somewhat from the holotype collected in the Kaibab Formation in being less elongate. Chronic (1952) described them as having a slightly thickened cardinal margin (hingeline), but in the Arcturus specimens this appears to be mostly a folding of the shell wall along the hingeline to form a groove, presumably to contain the ligament, and the hinge is only slightly thickened. The holotype does not show any evidence of growth lamellae, but this feature appears to be characteristic of the group and can be expected on topotype material.

M. sagitta is known from the Loray Formation of the Arcturus Group of Leonardian age, from the Kaibab Formation of latest Leonardian or earliest Guadalupian age, and from the Tosi Formation and Ervay Formation of the Park City Group of Guadalupian age.

The species is found in fine-grained shaly substrates and lived in quiet water areas.

Occurrence. — Loray Formation, loc. UCMP D-5606, D-5608, D-5609, D-5612, D-5617, Butte Mountains, Nevada.

Genus **AVICULOPINNA** Meek, 1864

Type species: *Avicula pinnaeformis* Geinitz, 1848.

Description. — Elongate, narrow pinnids with markedly subterminal beak; having subdued, non-regularly spaced ornament; thin shell wall.

Discussion. — Arcturus pinnids lacking regularly spaced growth lamellae are provisionally placed in this genus, as a catch-all for species that do not fit into better defined genera. *Pteronites* is inapplicable to Permian species, and they do not fit into *Pinna.*

Aviculopinna peracuta (Shumard), 1858 ? Pl. 10, figs. 12-13

Aviculopinna sp., Winters, Geol. Soc. America, Mem. 89, p. 52, pl. 7, figs. 1a-b.

Description. — Large pinnid bivalves with rate of expansion of about 15 degrees, having a thin but strong shell wall; long and straight cardinal margin (hingeline), with curved roll of shell extending few mm above main body of shell from each valve, holding ligament; well inflated, forming near circular cross section; shell externally smooth except for growth lines, these sinusoidal, curving from parallel to ventral margin around posterior margin to position about perpendicular to dorsal margin, and curving posteriorly while appoaching hingeline at angle of about 60 degrees, inclined away from the beak.

Discussion. — This is a distinctive species with smooth, unornamented surface, a strong, thickened hingeline, and a strongly inflated shell, nearly circular in cross section for diameters of a few cm. Only fragmentary material is available, and details of the hinge and ontogenetic changes in growth lines are not known. It is within the prevailing concept of *Pinna peracuta* Shumard, 1858, but that is such a poorly described and poorly illustrated species that an exact comparison is not possible. Furthermore, a number of similar pinnid species have been described without definite knowledge of population variation or ontogenetic changes, so definite identification of the

Arcturus and Bird Spring species is not now possible. Among the unresolved problems is the nature of *Pinna consimilis* Walcott, 1884, from the Eureka district.

A. peracuta ? is usually found in sediments deposited in moderate energy environments, where wave or current action was present intermittently. It occurs in rocks with fine- and medium-grained sand size sediments and is most common in limestones. In most occurrences it is found in an upright position with the beak projecting downward in the sediment. Under favorable conditions they were common and occurred in clam fields showing life orientation, usually with few other fossils.

A. peracuta ? is moderately common in the Arcturus Group and strata of equivalent age in the western states. It is known from the Pequop Formation and Loray Formation of the Arcturus Group, and the Fort Apache Member of the Supai Formation, all of Leonardian age, and from the Bird Spring Formation of Clark County, Nevada, in a horizon believed to be late Wolfcampian in age (Plas, 1972).

Occurrence. — Pequop Formation, loc. UCMP D-5540 and Loray Formation, loc. UCMP D-5527, Egan Range, Nevada; Pequop Formation, loc. UCMP D-5614, D-5623, Medicine Range, Nevada; Arcturus Formation, loc. UCMP D-5576, Confusion Range, Utah.

Aviculopinna sp. Pl. 10, fig. 14

Description. — Small pinnid with moderately rapid posterior expansion of shell; moderate inflation, thin shell wall; and numerous small corrugations of the shell wall perpendicular to the hingeline.

Discussion. — This is represented by one specimen but appears to be distinct from other pinnid species. The shell wall is intensely corrugated with small scale folds that do not appear to be due to crushing. The shell is too small and incomplete to make a good comparison with other species.

Occurrence. — Loray Formation, loc. UCMP D-5606, Butte Mountains, Nevada.

Order PTERIOIDA Newell, 1965

Suborder PTERIINA Newell, 1965

Superfamily **AMBONYCHIACEA** Miller, 1877

Family **MYALINIDAE** Frech, 1891

Diagnosis. — Heavy shelled ambonychiids normally with strongly produced beak; slightly inequivalved; edentulous or with cardinal tooth beneath beak on right valve and furrow on left valve; pallial line entire.

Discussion. — These massive shells are among the best known of upper Paleozoic bivalves. The genera *Myalina* and *Eurydesma* are widely distributed, typical examples of the family. The hinge area is often broadened with many ligamental grooves.

Genus **MYALINA** de Koninck, 1842

Myalina de Koninck, 1842, Description des animaux fossiles qui se trouvant dans le terrain carbonifere de Belgique, p. 125.
Myalina de Koninck, Newell, 1942, Geol. Surv. Kansas, vol. 10, part 2, pp. 45-46.

Type species: *Myalina goldfussiana* de Koninck, 1842.

Diagnosis. — Heavy thick shells with terminal beaks and heavy hinge area containing few to numerous ligamental grooves running oblique to the hingeline, having tendency toward quadrate shape.

Discussion. — This genus has been extensively monographed by Newell (1942), who gave full descriptions of the genera in the family Myalinidae.

Myalina sp. Pl. 10, fig. 15

Discussion. — Juveniles of an undetermined species of *Myalina s.l.* are present in the Arcturus Group. They are all small and where adequately preserved show regular lamellar ornament. This type of ornament is present in several subgenera of *Myalina* but is most characteristic of *Septimyalina.* However, present material is inadequate to determine if the Arcturus specimens should definitely be placed in that subgeneric group, or if they can be identified with any of the species described by Newell (1942). A similar form was described by Walcott (1884), as *M. congeneris* Walcott for material from eastern Nevada, but the horizon of its occurrence is not certain and not enough features are known to permit identification to Newell's taxa, although it is probably a *Myalina (Septimyalina).* Therefore, the material bearing this name must be further studied, and compared with midcontinent material before the name can be used.

Occurrence. — Riepetown Formation, loc. UCMP D-5637, Maverick Springs Range; Pequop Formation, loc. UCMP D-5626, Medicine Range; Loray Formation, Egan Range, Nevada.

Genus **SELENIMYALINA** Newell, 1942

Selenimyalina Newell, 1942, Geol. Surv. Kansas, vol. 10, part 2, p. 63, fig. 19.

Type species: *Myalina meliniformis* Meek & Worthen, 1866.

Diagnosis. — Smoothly rounded shells of ovoid to subquadrate shape, not developing an ear; thin shell; with light hinge containing simple tooth and socket; ligament attachment area slightly curved and not much thickened; beak terminal.

Discussion. — This genus is different from *Myalina* in its ovoid shape and lighter hinge and shell. In its shape it resembles modern *Mytilus,* but the ligamental features are different, and it is placed in the Myalinidae rather than the Mytilidae.

Selenimyalina sp. Pl. 10, figs. 16-17

Discussion. — Abundant small individuals, probably mostly juveniles, of an undetermined species of this genus are present at one locality. They are ovate as juveniles and the margins are not curved, but with further growth the ligamental and anterior margins become curved. These individuals are similar in outline to *Promytilus retusus* Chronic, 1952 but are clearly not in the genus *Promytilus.* Because *P. retusus* Chronic is described only from internal molds, the generic assignment of that species is open to question, so the Arcturus specimens might be conspecific.

This species occurs with a restricted molluscan fauna that includes many chiton plates. It is probable that it lived epiphytically along with the chitons, on organisms that grew above the substrate, such as seaweed.

Occurrence. — Pequop Formation, loc. UCMP D-5536, Egan Range, Nevada.

? **Selenimyalina** sp. Pl. 10, fig. 18

Description. — Small, elongate myalinids, with high inflation and produced beaks; other features unknown.

Discussion. — Poorly preserved specimens from one locality in the Arcturus Group can only questionably be assigned to this genus. They are a little more than 1/2 cm in length, half the size of the smallest described myalinids, and are highly inflated. The beaks are protruding and terminal, and in some individuals are widely spaced. The character of the beaks suggests a relationship to *Liebea* (Newell, 1939), but ligamental grooves are not apparent, and the specimens are too poorly preserved to be identified specifically.

Occurrence.—Pequop Formation, loc. UCMP D-5535, Egan Range, Nevada.

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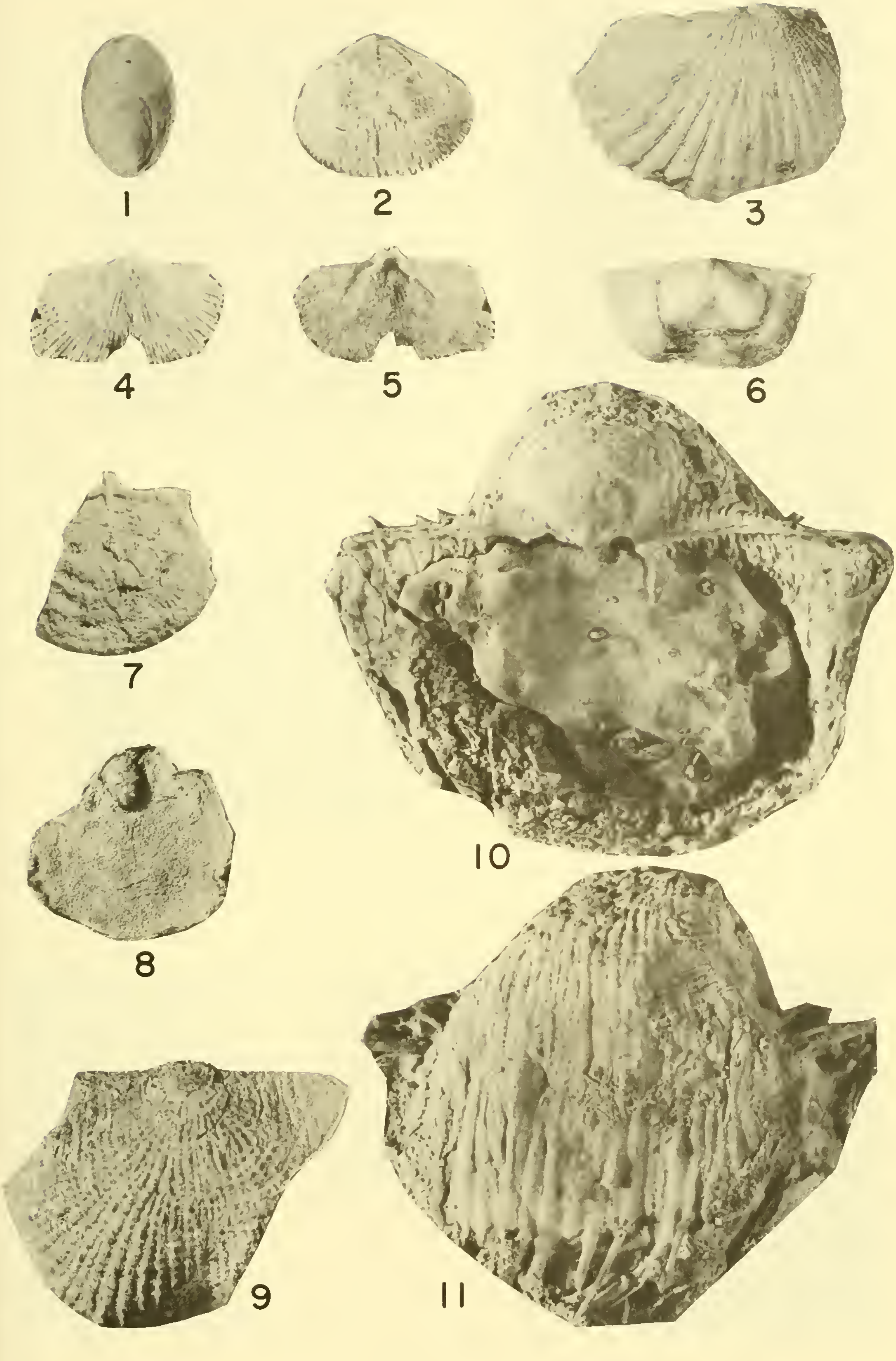
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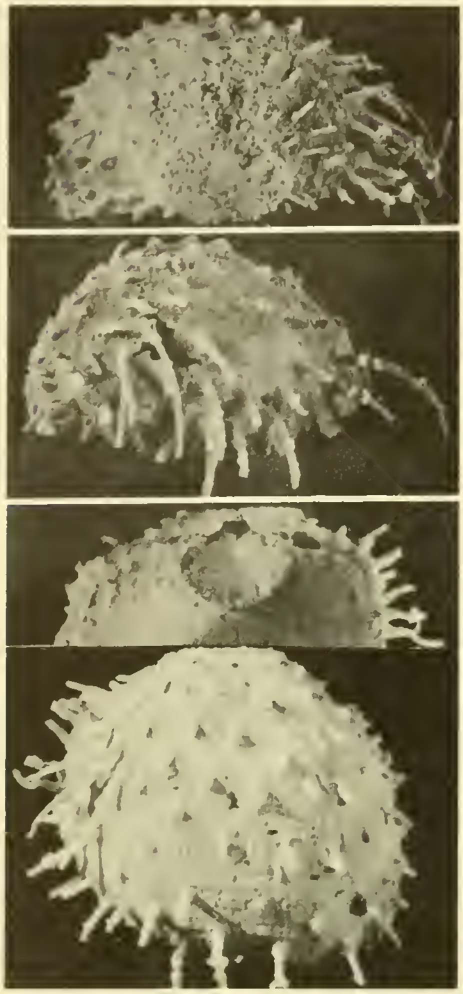

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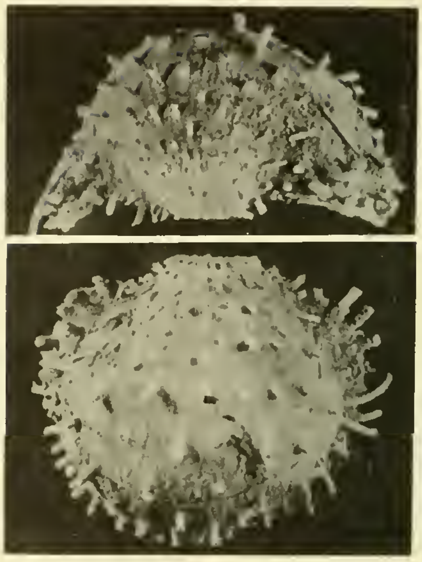

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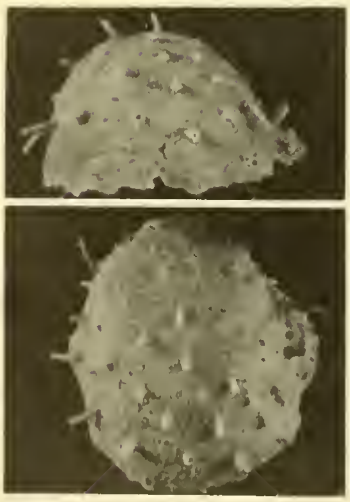

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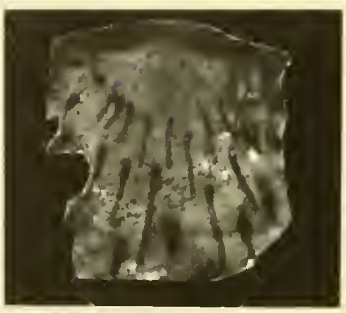

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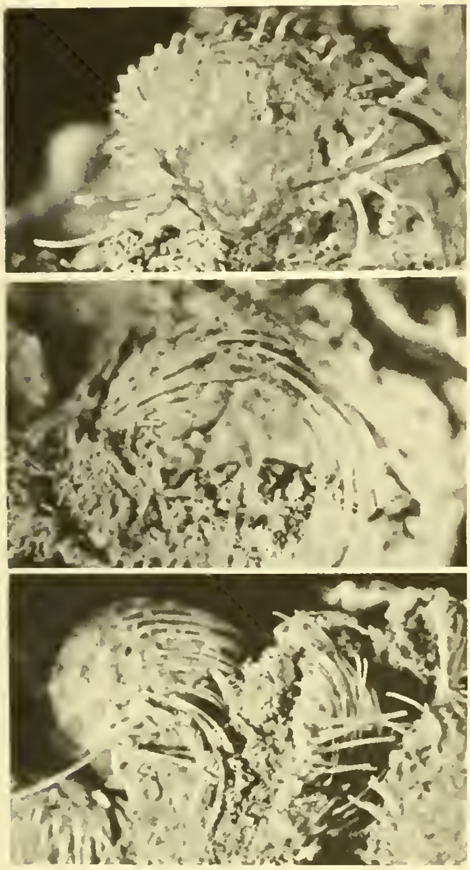

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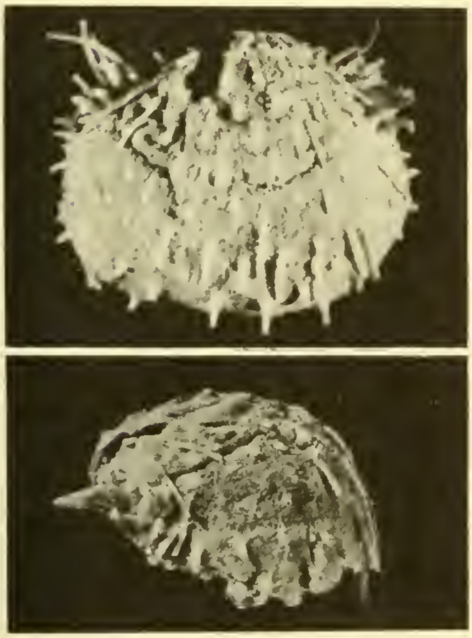

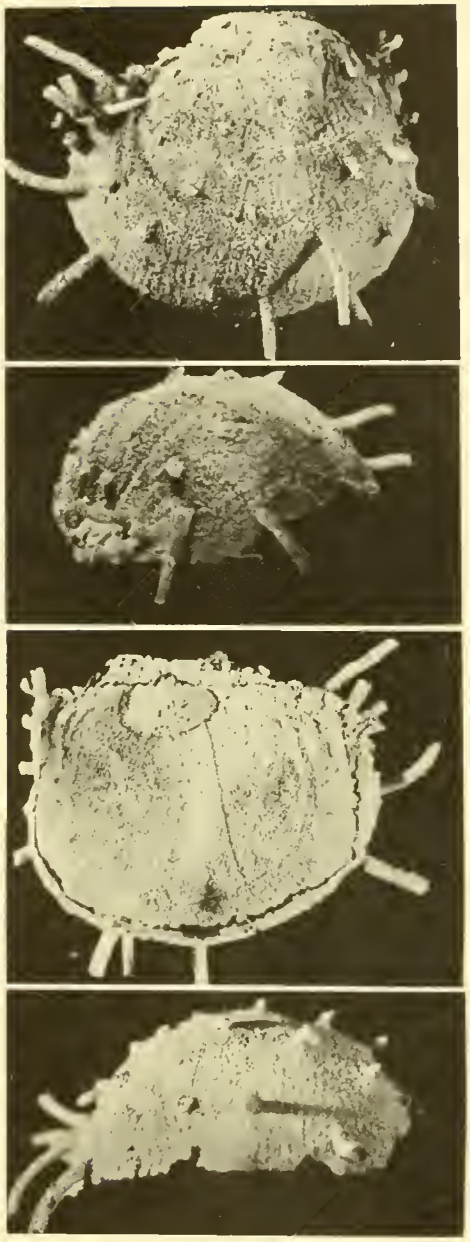

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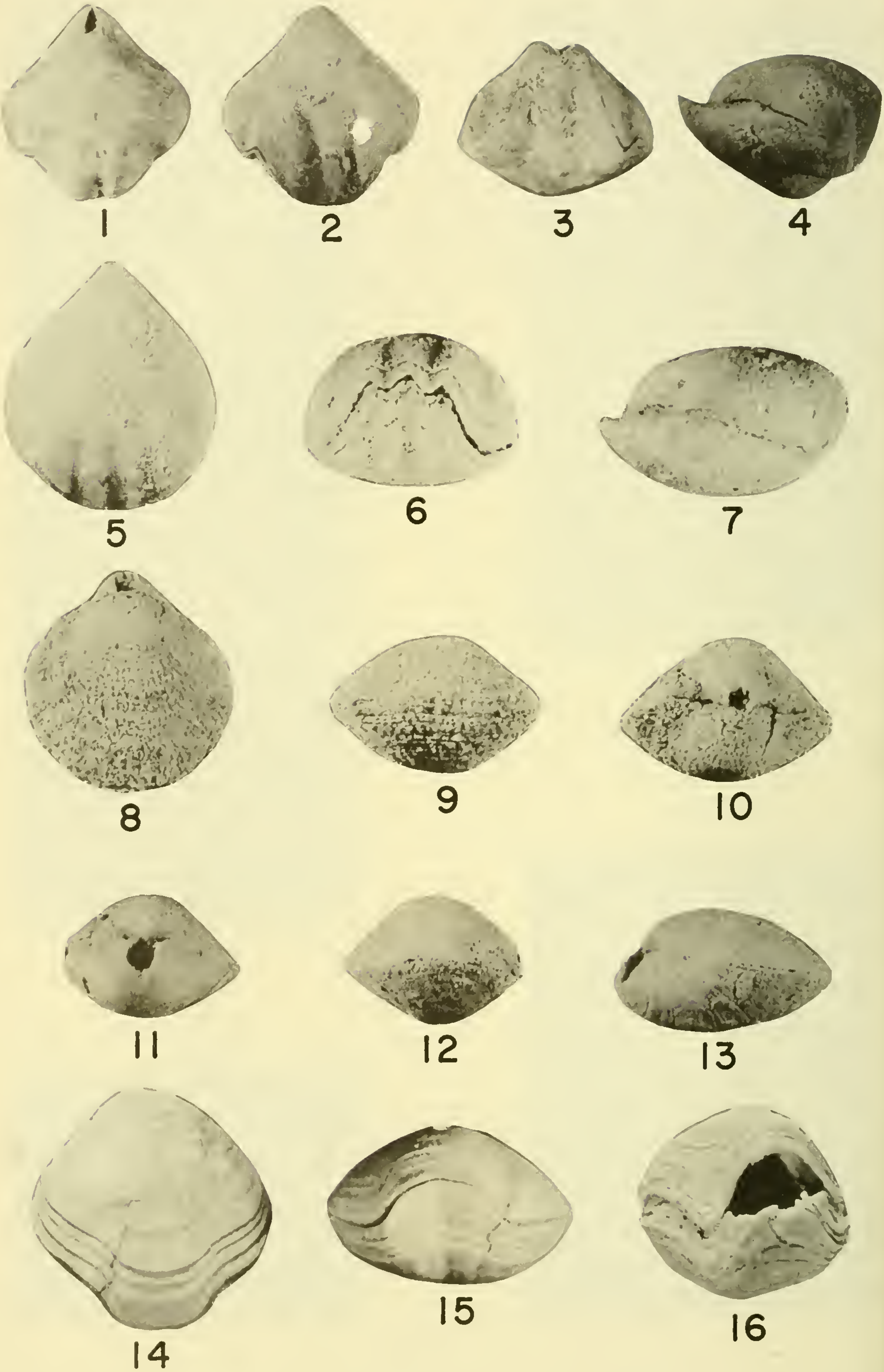
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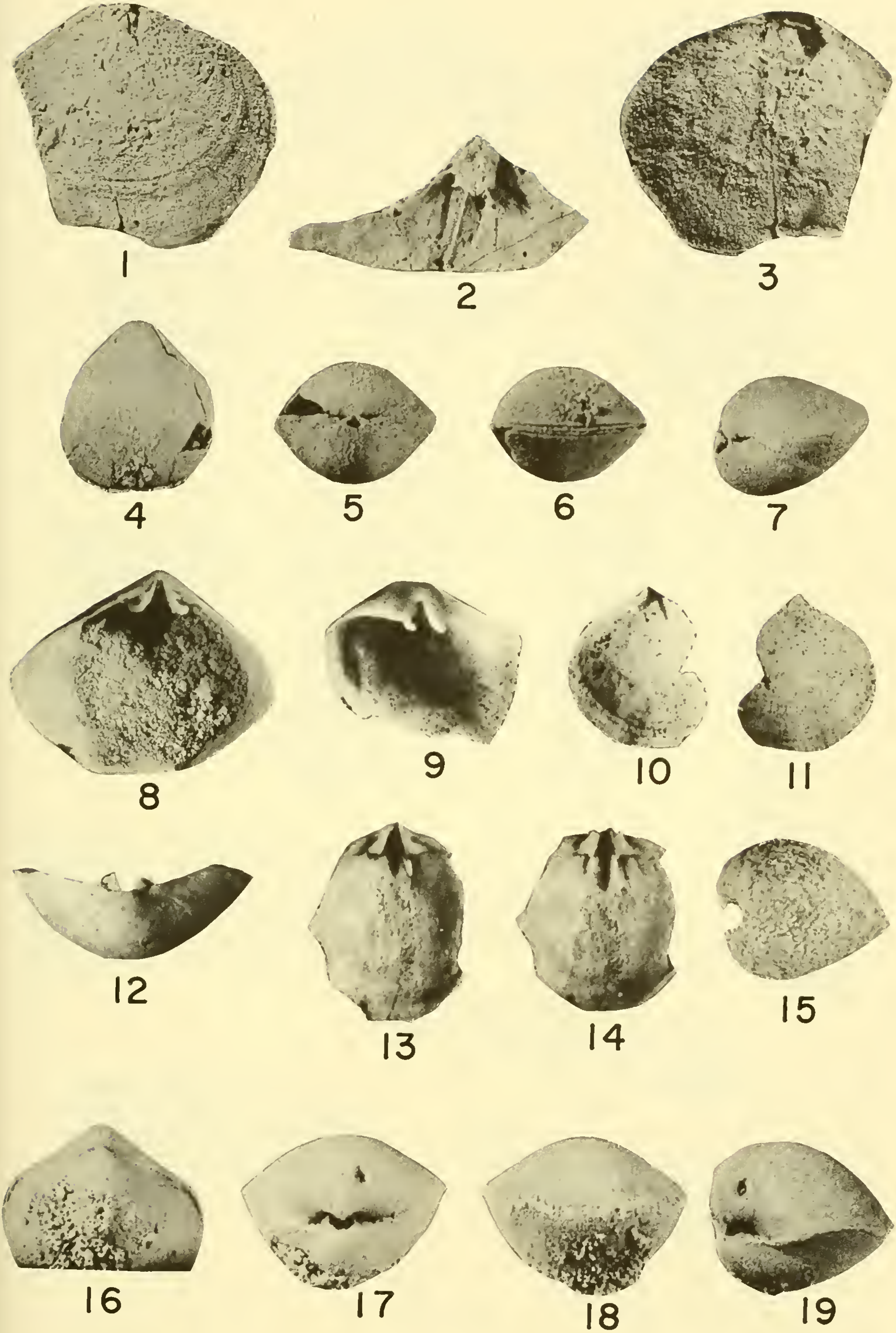
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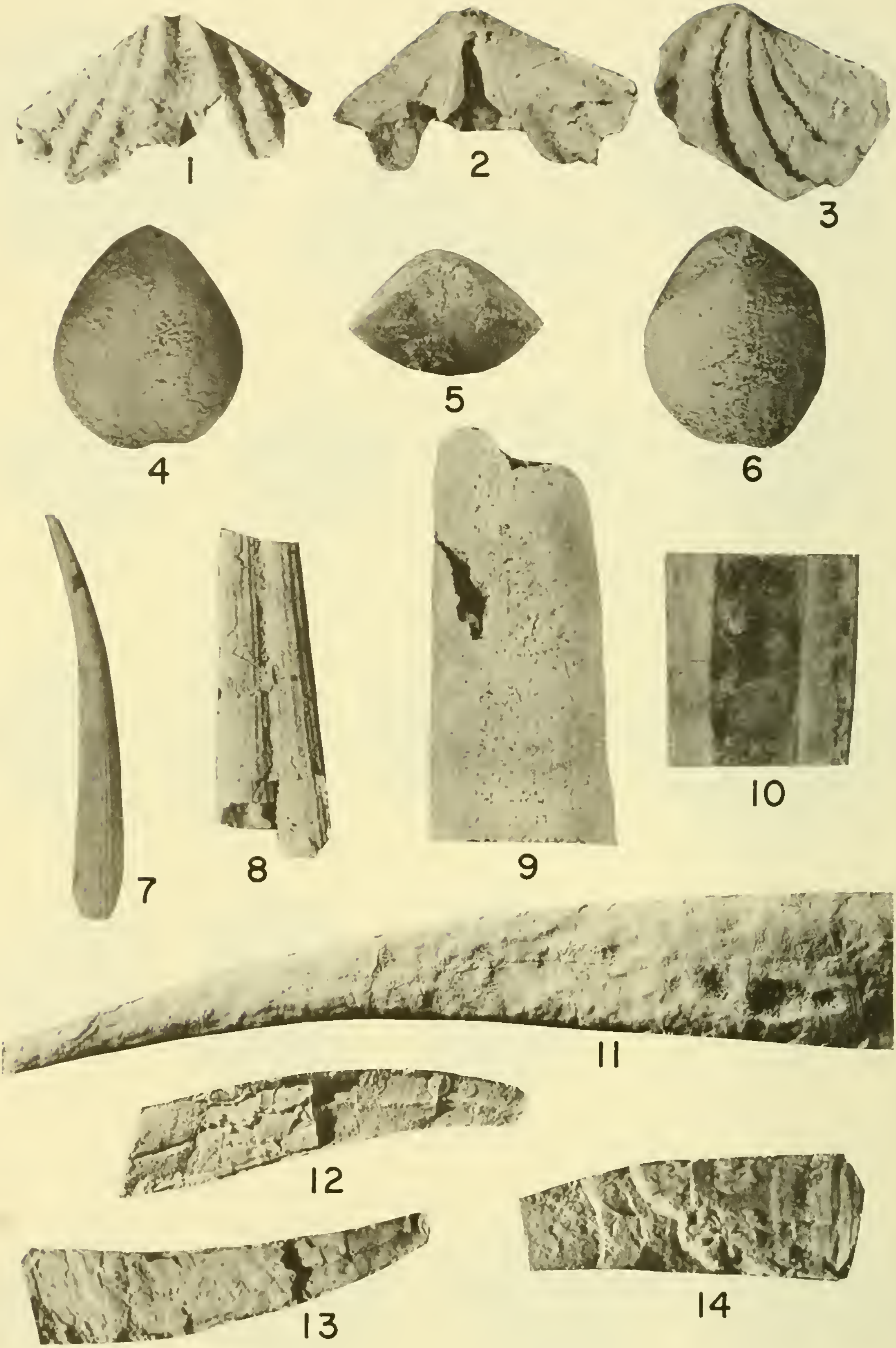

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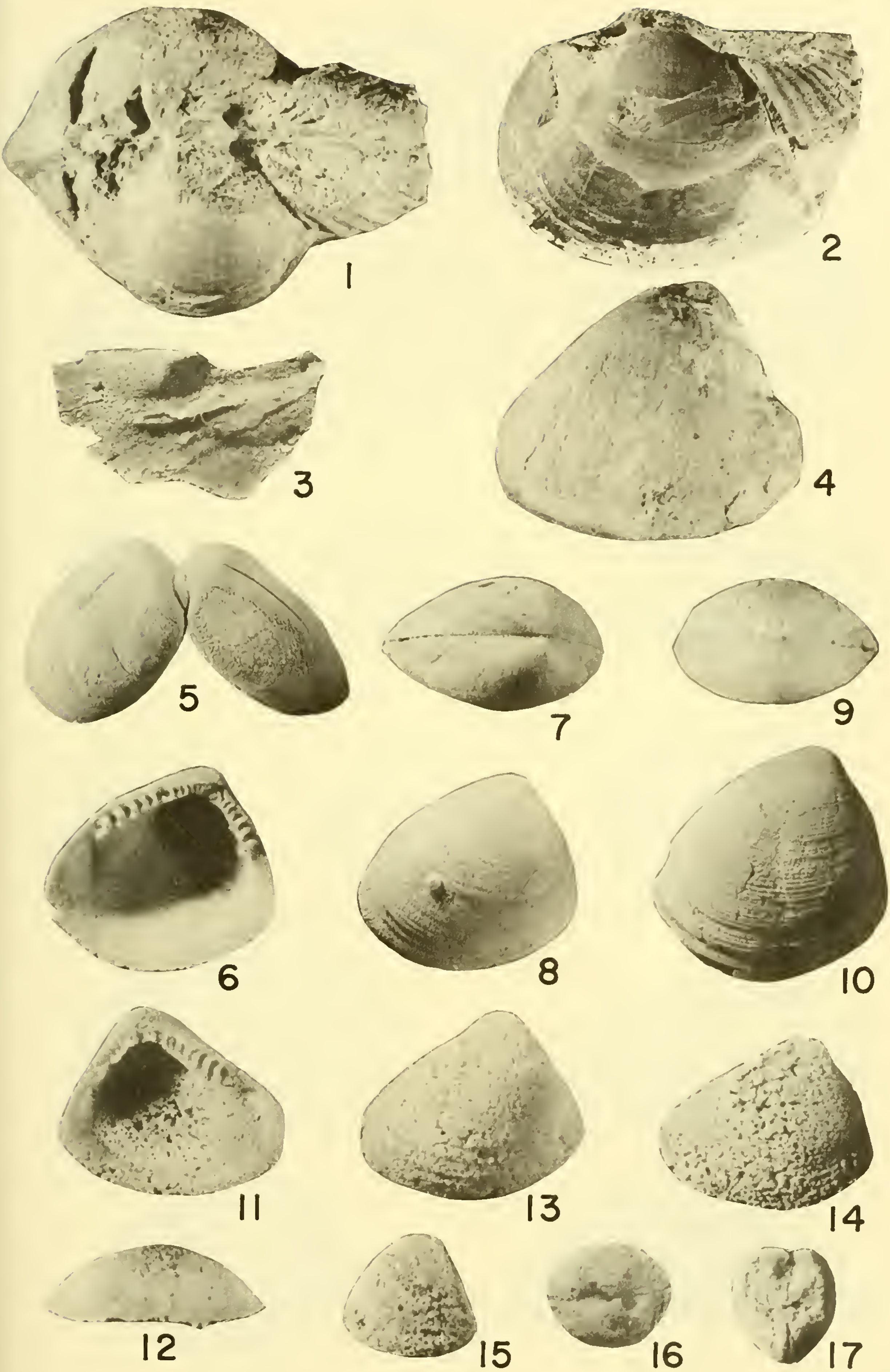
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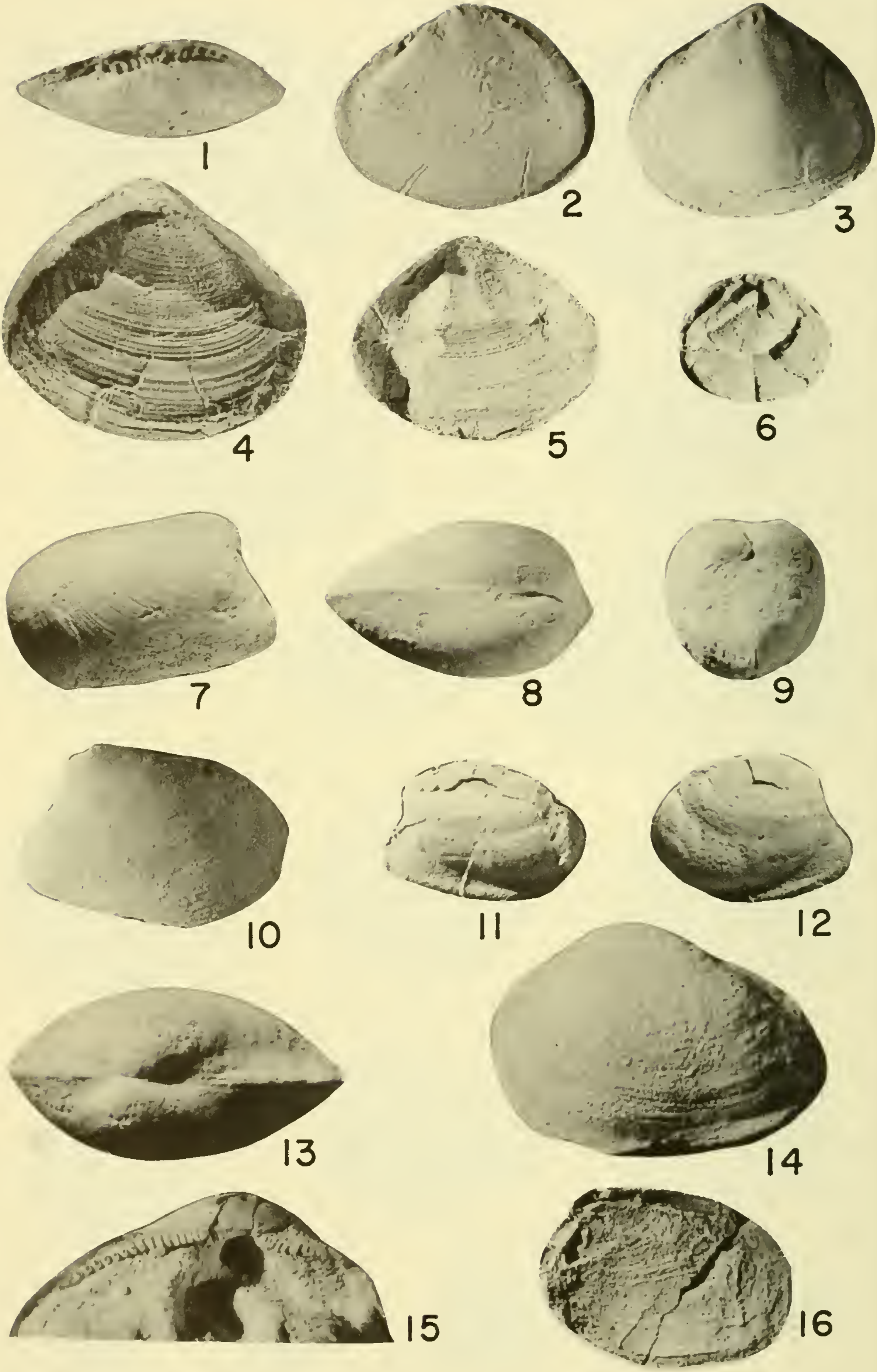
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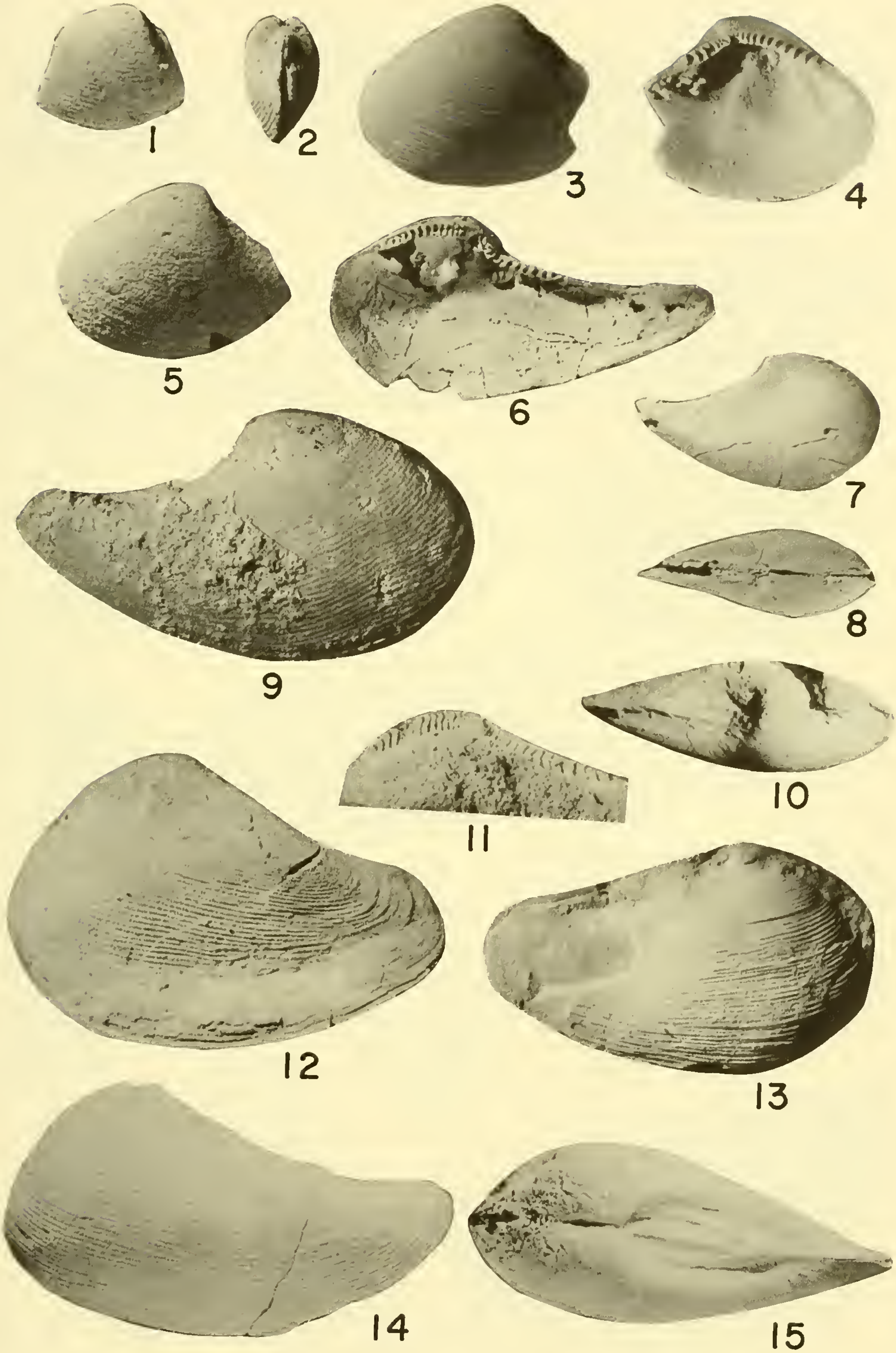
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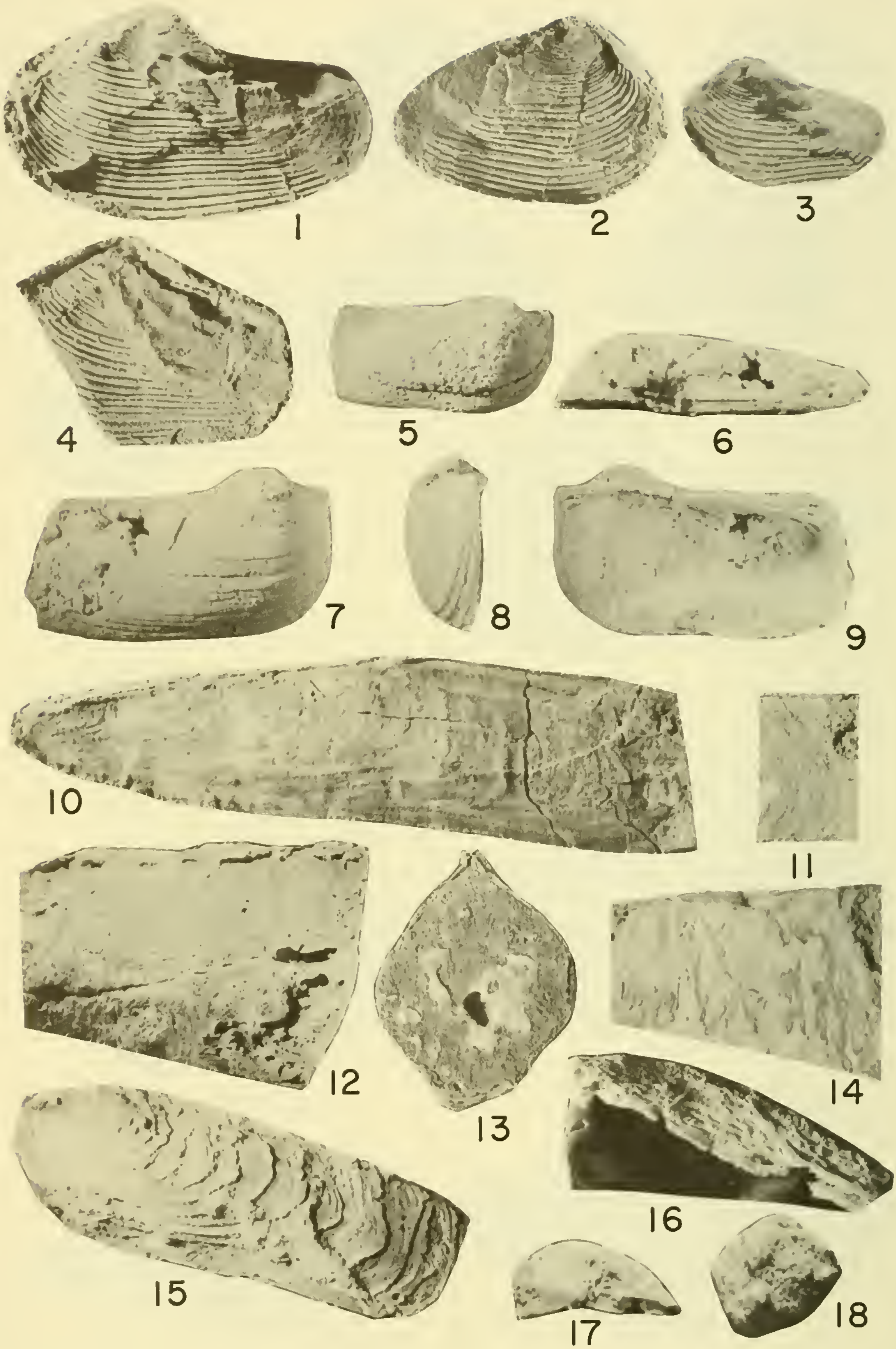
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PREPARATION OF MANUSCRIPTS

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Authors are requested to enclose $10 with each manuscript submitted, to cover costs of postage during the review process.

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James C. Brower and Julia Veinus

Heroy Geological Laboratory
Syracuse University
Syracuse, New York 13210
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PREFACE

Textual citations of illustrations in *Bulletins of American Paleontology* are coded. Citations of illustrations within the paper have initial capitals (e.g., Plate, Text-figure); citations of illustrations in previous works appear in lower-case letters (e.g., plate, text-figure).

The *Occurrence* sections under *Systematic Paleontology* in this paper include both stratigraphic horizons and geographic localities. Horizons at a single locality are separated by semicolons, as are localities representing a single horizon. Horizons are separated from localities by colons. Periods end individual entries.

MIDDLE ORDOVICIAN CRINOIDS FROM THE TWIN CITIES AREA OF MINNESOTA

By

James C. Brower and Julia Veinus

ABSTRACT

Two major crinoid faunas are known from the Middle Ordovician of the Twin Cities in Minnesota. The lower fauna occurs in the Hidden Falls Member of the Platteville Limestone which represents a quiet water habitat. The fauna, including *Cremacrinus arctus* Sardeson, *Cupulocrinus gracilis* (Hall), an unidentified camerate crinoid, and lichenocrinid holdfasts, is characterized by strong dominance and low diversity. *Cremacrinus arctus* was a calceocrinid with reduced hinge mobility, and arms that spread horizontally near the substrate to form a collecting bowl. Both features are considered adaptations to a rheophobic habit.

Several specimens of *Cupulocrinus jewetti* (E. Billings) have been found in the Carimona Member of the Platteville Limestone. The depositional environment of these beds was similar to that of the overlying Decorah Formation.

The most diversified and equitable crinoid assemblages occur in the Decorah Shale, which has yielded fourteen species with six types of holdfasts. Unlike their Hidden Falls counterparts, the water conditions in the Decorah depositional environments were alternately agitated and quiet, although the former probably predominated. Current agitation produced a shifting and unstable substrate. The species present are *Archaeocrinus* sp., *Glyptocrinus tridactylus,* n. sp., *Pycnocrinus sardesoni,* n. sp., *P. multibrachialis,* n. sp., *Periglyptocrinus spinuliferus,* n. sp., *Cupulocrinus jewetti* (E. Billings), *C. canaliculatus,* n. sp., *Grenprisia billingsi* (Springer), *Carabocrinus dicyclicus* (Sardeson), *C. magnificus* Sardeson, *Palaeocrinus angulatus* (E. Billings), *Porocrinus pentagonius* Meek and Worthen, *Isotomocrinus tenuis* (E. Billings), and *Cremacrinus punctatus* Ulrich. Based on abnormalities of anal plate structure in living and fossil crinoids and on statistical considerations, the holotype of *Strophocrinus dicyclicus* Sardeson is shown to be an abnormal *Carabocrinus* with extra plates. Accordingly, *Strophocrinus* is suppressed and becomes a synonym of *Carabocrinus.* Thus, *Strophocrinus dicyclicus* Sardeson is properly termed *Carabocrinus dicyclicus* (Sardeson). Statistics also denote that *C. conoideus* Sardeson is a synonym of *C. dicyclicus* (Sardeson). Six types of holdfasts are present, the most common of which are attached to solid objects like ramose bryozoans. The form genus *Podolithus* that Sardeson erected for primitive discoid holdfasts is suppressed on morphological and nomenclatural grounds. *Carabocrinus dicyclicus* was adapted to a low-level niche. The disk-shaped holdfast was cemented directly to the sea floor, and a short, narrow and flexible stem was present. Carabocrinids have an extremely low food gathering capacity (i.e., ratios of number of food-catching tube-feet to tissue volume, and length of food gathering system to tissue volume) because they have a large thin-plated cup in conjunction with non-pinnulate arms. Clearly the arms could not have formed a full mucus-net for trapping small food particles as in most pinnulate crinoids (e.g., living comatulids). Probably carabocrinids caught large food particles directly with the tube feet. Relative to most low-level crinoids, *C. dicyclicus* (Sardeson) exhibited a low bulk density that suggests it was not fully adapted to this mode of life.

Several cupulocrinids had long narrow stems which were attached to ramose bryozoans by small lobate or digitate holdfasts. This may also have been true for *Grenprisia springeri* and perhaps some other crinoids. *Cremacrinus punctatus,* in contrast to *C. arctus* of the Platteville, exploited the normal calceocrinid mode of life with a recumbent stem and fully functional hinge.

Study of variation in arm branching patterns in cupulocrinids and cremacrinids from the Twin Cities shows that the number of plates in proximal series of brachials is less variable than in more distal parts of the arms. Wider brachial series exhibit more branches than narrower ones. The presence of spear-shaped axillaries allows the development of more arm branches than if the axillaries had parallel lateral margins. Indices developed from network theory are useful in the characterization of arm branching patterns.

INTRODUCTION

Over a period of about fifty years ranging from 1892 to 1940, F. W. Sardeson produced almost one hundred papers dealing with the geology of the Twin Cities area. About sixty percent of these dealt with Ordovician stratigraphy and paleontology (see Melone and Weis, 1951, pp. 52-56, for a complete bibliography of Sardeson). During this interval, Sardeson collected numerous crinoid specimens, including about fifty crowns and dorsal cups, several thousand isolated plates, and numerous stem and attachment devices, from the Platteville Limestone and the Decorah Shale of the Twin Cities area.

Despite this mass of material, only a few papers were written about the Ordovician crinoids of the Twin Cities area. In 1897, Ulrich (*in* Winchell and Ulrich, p. cxiii) listed crinoid species present in the Platteville, Decorah and Galena Formations of the Twin Cities. These names were published without description or illustration; some were new and represent *nomina nuda*. Although we have examined both the collections of the National Museum of Natural History and the University of Minnesota, where the Sardeson collection is housed, we were not able to find any of Ulrich's labels. Probable assignments of Ulrich's names are listed below:

Species listed by Ulrich *in* Winchell and Ulrich (1897)	Most likely assignment
Dendrocrinus n. spp.	*Cupulocrinus jewetti* (E. Billings), *C. gracilis* (Hall), *C. canaliculatus*, n. sp.
Merocrinus laxus	no equivalent species
Paleocrinus articulosus Ulrich	*P. angulatus* (E. Billings)
Glyptocrinus	Any one or more of *Glyptocrinus tridactylus*, n. sp., *Pycnocrinus sardesoni*, n. sp., *P. multibrachialis*, n. sp., or *Periglyptocrinus spinuliferus*, n. sp.
Porocrinus	*Porocrinus pentagonius* Meek and Worthen
Carabocrinus magnificus Ulrich	*C. magnificus* Sardeson
Cremacrinus punctatus Ulrich	*C. punctatus* Ulrich
Lichenocrinus crateriformis Hall and varieties	Lichenocrinid holdfasts
Lichenocrinus affinis Miller	Lichenocrinid holdfasts

Sardeson published five papers on Middle Ordovician crinoids from the Twin Cities area, all of which are discussed in detail under Systematic Paleontology. The carabocrinids were described in 1899, 1908, 1925, and 1939. Although Sardeson's taxonomy is now partially obsolete, his work was innovative. He speculated on the evolution of carabocrinids at a time (1899) when most writers were concerned with descriptive taxonomy. Sardeson believed, incorrectly, that carabocrinids formed a link between cystoids and crinoids. It is now known that crinoids (carabocrinids are bonafide crinoids) and cystoids are not closely related (Ubaghs, 1967).

In 1939, Sardeson reconstructed dorsal cups of carabocrinids from isolated plates. This was, to the best of our knowledge, the first published reconstruction of a Paleozoic crinoid. In 1928, Sardeson described calceocrinids from the Twin Cities area, and gave a detailed analysis of the living habits and paleoecology of *Cremacrinus arctus* and *C. punctatus*. In the 1928 paper, when discussing the phylogeny of the calceocrinids, Sardeson also outlined a mechanism for the transition from dicyclic to monocyclic crinoids. This theory has been largely ignored, and has never been adequately tested. In 1908, Sardeson proposed a novel form of classification for crinoid holdfasts. Primitive discoidal roots were placed in the "genus" *Podolithus*. "Species" were named according to the genus to which the holdfast belonged. For example, the holdfast of *Dendrocrinus* was termed *Podolithus dendrocrinus*. Although ingenious, this classification has not been adopted by subsequent authors. One problem is that the Sardeson nomenclature is not acceptable under the current rules of The International Commission on Zoological Nomenclature. In the Twin Cities area, holdfasts and complete stems have not been seen attached to dorsal cups or crowns. In our opinion, the main significance of Sardeson's 1908 paper is that he clearly realized the importance of detailed studies of crinoid holdfasts, and that he attempted to match holdfasts with crowns based on frequency of association and morphological criteria.

Several other authors have briefly described Twin Cities crinoids. Ulrich (1886) proposed *Cremacrinus punctatus*, while Fenton (1929a,b) illustrated a cincinnaticrinid and numerous lichenocrinid holdfasts from Minneapolis and St. Paul.

ACKNOWLEDGMENTS

We thank the following institutions and individuals for the loan of specimens: University of Minnesota, Sardeson Collection and other materials (UM), R. E. Sloan and D. Wallace (now Curator emeritus) (D. Wallace has also allowed us access to his personal collections, catalogued under UM numbers); National Museum of Natural History (NMNH) and Springer Collection (NMNH, S), F. Collier, P. M. Kier and Mary Lawson; Geological Museum, University of Cincinnati (UCM), D. L. Meyer; Geological Survey of Canada (GSC), T. Bolton; Field Museum of Natural History (UC), M. Nitecki; and Royal Ontario Museum (ROM), Janet Waddington. R. E. Sloan originally suggested that we undertake this study and furnished information on the stratigraphic occurrence of many of the crinoids. Lance Grande, a graduate student in paleontology at the University of Minnesota, provided localities for many of the crinoids. Lance Grande and R. E. Sloan guided one of us (J. C. B.) to several collecting sites. Prof. G. Ubaghs of the University of Liege in Belgium kindly provided copies of the generic diagnoses of glyptocrinids to be published in the *Treatise on Invertebrate Paleontology*. John M. Warn of the University of Cincinnati identified the specimen of *Isotomocrinus tenuis* (E. Billings). R. V. Harris, formerly of Syracuse University, measured the carabocrinid plates and performed some preliminary statistical analyses on the data. The cost of engraving the illustrations has been defrayed by Syracuse University.

The restorations of the crinoids in Text-figures 3 and 8 and the graphs of Text-figures 2 and 7 are by Mindy Morton and Vijay Singh of Syracuse University, respectively. Deborah Blose, also of Syracuse University, typed the manuscript.

COMPOSITION OF CRINOID FAUNAS IN THE TWIN CITIES AREA

Most of the crinoids for this study are either from the Sardeson collection at the University of Minnesota, or from material collected by E. O. Ulrich and his associates at the National Museum of Natural History. Sardeson and Ulrich did not provide detailed localities for most of their specimens. Most locality labels simply give the stratigraphic horizon, and either "Minneapolis" or "St.

Paul", although precise labels accompany some specimens. Sardeson, however, did combine specimens found at a single collecting site. Mr. Lance Grande, a paleontology graduate student at the University of Minnesota who has collected fossils in the Twin Cities area for many years, examined many of the crinoids and provided precise geographic localities for many of them. Many of the roots and holdfasts were collected by Mr. D. Wallace, curator emeritus of the Geology Department at the University of Minnesota. Over the years, geology students and faculty of the University of Minnesota have added specimens to the collections. Some of the lichenocrinids described by Fenton (1929a) are located in the Geology Museum at the University of Cincinnati.

For this study, we have examined about one hundred crowns and dorsal cups, several hundred holdfasts, several thousand isolated plates, and an uncounted number of stem segments.

Sardeson used "Beds 1 to 6" as stratigraphic horizons for crinoid-bearing strata in the Twin Cities area. These fit into the current formal stratigraphy given with the following faunal lists (R. E. Sloan, personal communication). Reviews of the Ordovician stratigraphy and paleoecology of the Twin Cities area may be found in Stauffer and Thiel (1941), Agnew (1956), Weiss and Bell (1956), Austin (1972), and Webers (1972).

Platteville Limestone, Hidden Falls Member
(Beds 1 and 2 of Sardeson)

Cremacrinus arctus Sardeson
Cupulocrinus gracilis (Hall)
Unknown camerate crinoid
Lichenocrinid holdfasts

The table above indicates that the Hidden Falls crinoid fauna is characterized by low diversity. The fauna is dominated by *Cremacrinus arctus* and the lichenocrinid holdfasts that account for over 95 percent of all specimens known. Both *Cupulocrinus gracilis* and *Cremacrinus arctus* are present in the Platteville Formation of Wisconsin and Illinois. The former species is also found in the Trenton Group of New York. Thus the Hidden Falls fauna is most similar to the Platteville assemblages of adjacent areas in Wisconsin and Illinois.

PLATTEVILLE LIMESTONE, CARIMONA MEMBER

Cupulocrinus jewetti (E. Billings)

This crinoid is a widely ranging protean form which occurs in the Dunleith Formation (Galena Group) of Illinois, the Ottawa Formation of Ontario and the Curdsville Limestone Member of the Lexington Group of Kentucky.

LOWER THIRD OF DECORAH SHALE (Bed 3 of Sardeson)

Lichenocrinid holdfasts

MIDDLE THIRD OF DECORAH SHALE (Bed 4 of Sardeson)

Carabocrinus dicyclicus (Sardeson)
Cremacrinus punctatus Ulrich
Cupulocrinus jewetti (E. Billings)
Grenprisia billingsi (Springer)
Palaeocrinus angulatus (E. Billings)
Periglyptocrinus spinuliferus, n. sp.
Porocrinus pentagonius Meek and Worthen
Lichenocrinid holdfasts
Lobate and digitate holdfasts cemented to bryozoans

MOST OF UPPER THIRD OF DECORAH SHALE (Bed 5 of Sardeson)

Carabocrinus dicyclicus (Sardeson)
Carabocrinus magnificus Sardeson
Cremacrinus punctatus Ulrich
Cupulocrinus canaliculatus, n. sp.
Cupulocrinus jewetti (E. Billings)
Grenprisia billingsi (Springer)
Isotomocrinus tenuis (E. Billings)
Pycnocrinus multibrachialis, n. sp.
Pycnocrinus sardesoni, n. sp.
Lichenocrinid holdfasts
Lobate and digitate holdfasts cemeted to bryozoans
Stem with grasping cirri on bryozoan
Tree stump-like cirrus root

LOWER *Receptaculites* ZONE, UPPERMOST DECORAH SHALE (Bed 6 of Sardeson)

Carabocrinus magnificus Sardeson
Glyptocrinus tridactylus, n. sp.
Pycnocrinus sardesoni, n. sp.
Massive conical attachment-disk

The affinities of the Decorah Shale crinoids contrast greatly with those of the Hidden Falls Member of the Platteville Formation.

Of the five previously described species that occur in the Twin Cities area, *Cupulocrinus jewetti* (E. Billings), *Grenprisia billingsi* (Springer), *Palaeocrinus angulatus* (E. Billings), *Porocrinus pentagonius* (Meek and Worthen), and *Isotomocrinus tenuis* (E. Billings), four are shared with the Ottawa Limestone of Ontario and Quebec, two with the Curdsville Limestone of Kentucky, two with the Galena Dolomite of Illinois, and one with the Platteville Limestone of Illinois. Three other species, *Carabocrinus dicyclicus* (Sardeson), *C. magnificus* Sardeson, and *Cremacrinus punctatus* Ulrich, are mainly confined to the Twin Cities area and adjacent parts of Wisconsin. However, the closest relatives of these forms are from the Ottawa Limestone of Canada (three species), and the Curdsville Limestone of Kentucky (two species). For the five new species in the Twin Cities, *Glyptocrinus tridactylus,* n. sp., *Pycnocrinus sardesoni,* n. sp., *P. multibrachialis,* n. sp., *Periglyptocrinus spinuliferus,* n. sp., and *Cupulocrinus canaliculatus,* n. sp., the most similar crinoids are from the Ottawa Limestone of Canada (five species), the Curdsville Limestone of Kentucky (one species), the Galena Formation of Illinois (one species), and the Platteville Limestone of Illinois (one species). Thus the Decorah Shale crinoids from the Twin Cities are most closely linked to Canadian assemblages, and have less affinity with the faunas of neighboring areas in the United States.

PALEOECOLOGY

Introduction

The Twin Cities area provides a unique opportunity to study two contrasting crinoid faunas, an older low diversity assemblage from a quiet water environment, and a stratigraphically younger suite of crinoids which lived in a more agitated environment. For previous discussion of the paleoecology of the crinoid habitats, see Sardeson (1899, 1908, 1926, 1928).

Fauna of the Hidden Falls Member of the Platteville Limestone

The crinoids and associated organisms were probably collected from a single bedding plane in the Johnson Street Quarry in Minneapolis. The crinoids are dominated by *Cremacrinus arctus* with fewer lichenocrinid holdfasts, and specimens of *Cupulocrinus gracilis*. The crinoids are associated with the starfish *Protopalaeaster narrawayi* Hudson, edrioasteroids, cystoids, articulate brachiopods such as *Dinorthis deflecta* (Conrad) and *Rafinesquina minnesotensis* (Winchell), graptolites, bryozoans, and some molluscs. The enclosing rock is soft, yellow to buff, fine-grained dolomitic limestone. Specimens are commonly preserved in living position. Some orthid brachiopods are found with the interarea pressed down on the seabed to which they were probably attached by a short pedicle (Sardeson, 1929). *Cremacrinus arctus* lived with the dorsal cup partially buried in the sediment. The arms were spread horizontally to form a bowl for collecting a vertical rain of either or both plankton and organic detritus (Sardeson, 1928; see Text-figure 8, and discussion of *C. arctus* herein). The starfish were partially buried in the sediment with the disk exposed, the food grooves down, and the tips of the arms under the substrate. This probably represents the original living position (see illustrations in Kesling, 1962).

Predominantly quiet water conditions in the habitat occupied by the crinoids are indicated by the fine-grained sedimentary rocks and by the preservation of brachiopods, crinoids, and starfish in their original living positions. This is also consistent with the collecting-bowl food-net of *Cremacrinus arctus* which probably evolved to catch a vertical rain of food particles. Some current activity was necessary to assure the predominant filter feeding organisms an adequate food supply and to remove waste products. Sedimentation rates were probably slow when the animals were alive. The preservation of many complete crinoid crowns, and brachiopods and starfish in living position also suggests rapid to catastrophic burial. Thus the Platteville assemblage in the Johnson Street Quarry is interpreted as a consensus assemblage where preserved specimens include both individuals that were buried alive as well as shells and disarticulated skeletons of organisms which had died earlier.

Normal marine conditions are denoted by the crinoids as well as the diverse articulate brachiopods.

Decorah Shale Crinoids

The crinoids, cystoids, and some other echinoderms occur in a bioclastic limestone or calcareous shale. The fossil material mainly consists of echinoderm debris, broken bryozoans, and brachiopod shells. The bryozoans include ramose and sheetlike forms that were probably erect and rigid during life. Some encrusting species and rare hemispherical colonies were also found. The detrital constituents of the rock vary from sand-sized calcite, mostly of organic origin, to clay-sized material. The bedding surfaces are almost always irregular. This indicates a rough and hummocky substrate during life of the fauna. Commonly, the ramose bryozoans are aligned. The water was probably strongly agitated at times. This is denoted by the aligned bryozoans, the bryozoan colony types present, the nature of crinoid burial, and the chaotic texture of the sediment. Sardeson (1928, p. 46) reached similar conclusions. He visualized the habitat as just offshore in the zone of tidal currents, alluding to features such as ridged-up long windrows of shell rock. Certainly, the substrate was uncohesive, and fossil debris and sediment particles were actively transported during agitated intervals. The fine-grained sediment was deposited during quieter water conditions. Thus the habitat was variable with respect to wave and current agitation.

Most of the crinoids are represented by isolated plates and stem segments, and complete dorsal cups and crowns are comparatively rare. With rapid burial, the crinoid would be covered with sediment before much disintegration and breakage took place (e.g., Brower, 1973, pp. 269-271). The main breakage would have been associated with collapse of the dying animal onto the seabed. The burial process could be augmented by the pressing of the crinoid down into the sediment. Relatively complete specimens would be preserved under rapid burial conditions. With slow burial, disintegration and breakage, due to scavengers and decomposition, would be completed. The result would be isolated calyx, arm, and column plates. With intermediate burial rates one would expect to find calyces or dorsal cups, perhaps with arm and stem segments, isolated columnals, and brachials. It should be realized that the absolute sedimentation rate would vary depending on the environment. With high agitation as in the Decorah habitats, the time required for burial would be shorter than in a quiet water area. Slow crinoid burial rates may imply that the agitated intervals predominated.

Normal marine salinity is indicated by the groups present and by their diversity. Associated with the crinoids in the Decorah beds are numerous bryozoans, brachiopods and some cystoids. Approximately fourteen crinoid species are known, along with six types of holdfasts. Living crinoids are restricted to normal marine salinity.

Almost the entire fauna consists of epifaunal filter feeders. The frequent agitation would have assured these forms an adequate and continuous supply of dissolved oxygen and food. The currents also served to transport sperm from male to female crinoids and to remove waste products such as carbon dioxide and fecal material.

The uncohesive substrate presented the crinoids with attachment problems. Most of the Twin Cities crinoid root forms fall into the following categories.

1) Small lobate or digitate holdfasts usually cemented to ramose bryozoans and, rarely, to crinoid stems (Pl. 25, figs. 1-5). In most cases, these roots only occur on one side of the bryozoan. This suggests that they became attached after the dead bryozoan colony was broken up and the pieces scattered about on the seafloor. In a few instances, the roots are found on all sides of the bryozoan, and the crinoids may have fixed their disks to a live bryozoan. The small size of the attachment devices suggests small adult or immature crinoids.

2) Lichenocrinid holdfasts are most often observed attached to strophomenid brachiopods. Many are located on the interior of one of the valves, and obviously the larvae settled on a dead shell. Others were seen on the exterior of articulated valves; perhaps these were present when the strophomenid was alive. Some specimens are also found on broken fragments of ramose bryozoans.

3) The large disk-shaped holdfasts of *Carabocrinus* (Pl. 23) have been seen cemented directly to the substrate, to corrosion surfaces or hardgrounds, and to ramose bryozoans.

4) A similar massive conical attachment-disk was attached to a receptaculitid pebble on the seabed (Pl. 25, fig. 7).

5) Stem segment with cirri wrapped around a bryozoan (Pl. 24, fig. 19).

6) Large tree-stump-like cirrus roots may belong to adult glyptocrinids (Pl. 25, fig. 6). These are similar to the *Barycrinus* roots shown by Wachsmuth and Springer (1897, p. 46, pl. 1, figs. 4 and 5).

Of the above root types, the first three are common, whereas the last three are comparatively rare. Of the common types, only one of the three was ever attached to uncohesive substrate; the others were joined to solid objects. The carabocrinids solved the problem of uncohesive substrates by cementing the root to an area that was large compared to the size of the crinoid. The only other soft substrate attachment device, Type 6, probably fixed itself within the shifting sediment by deep root penetration. The distribution of the substrate-attached versus other root types was probably related to substrate stability. For general discussions on crinoid roots, see Ehrenberg (1929) and Brower (1973, pp. 281-283).

Isolated columnals recovered alone or in association with either or both roots and calyces are of several different types (Pl. 24, figs. 9-14), but cannot confidently be identified with any of the crinoid species reported here.

Summary

Generally the Platteville crinoid assemblages are characterized by low diversity and the strong dominance of *Cremacrinus arctus* and the lichenocrinid holdfasts. This dominance-diversity relationship suggests the Platteville was a marginal and perhaps stressed environment for crinoids. Quiet water was the most probable limiting factor.

In contrast, the overlying Decorah contains a much more diverse and equitable fauna. Strongly agitated conditions alternated with the intervals of quiet water during which fine-grained sediments were deposited. On an unstable and shifting substrate, bryozoans provided suitable attachment surfaces for Twin Cities crinoids with lobate, digitate and other types of holdfasts. The disk-shaped roots of carabocrinids were cemented to hardgrounds, pebbles on the substrate, bryozoan colonies, and directly to fossil debris on the seafloor. Several root types were cemented to or rooted within the substrate. This agitated habitat provided a more favorable environment for crinoid species than did the underlying Platteville.

STATISTICAL STUDIES OF TWIN CITIES CARABOCRINIDS

Introduction

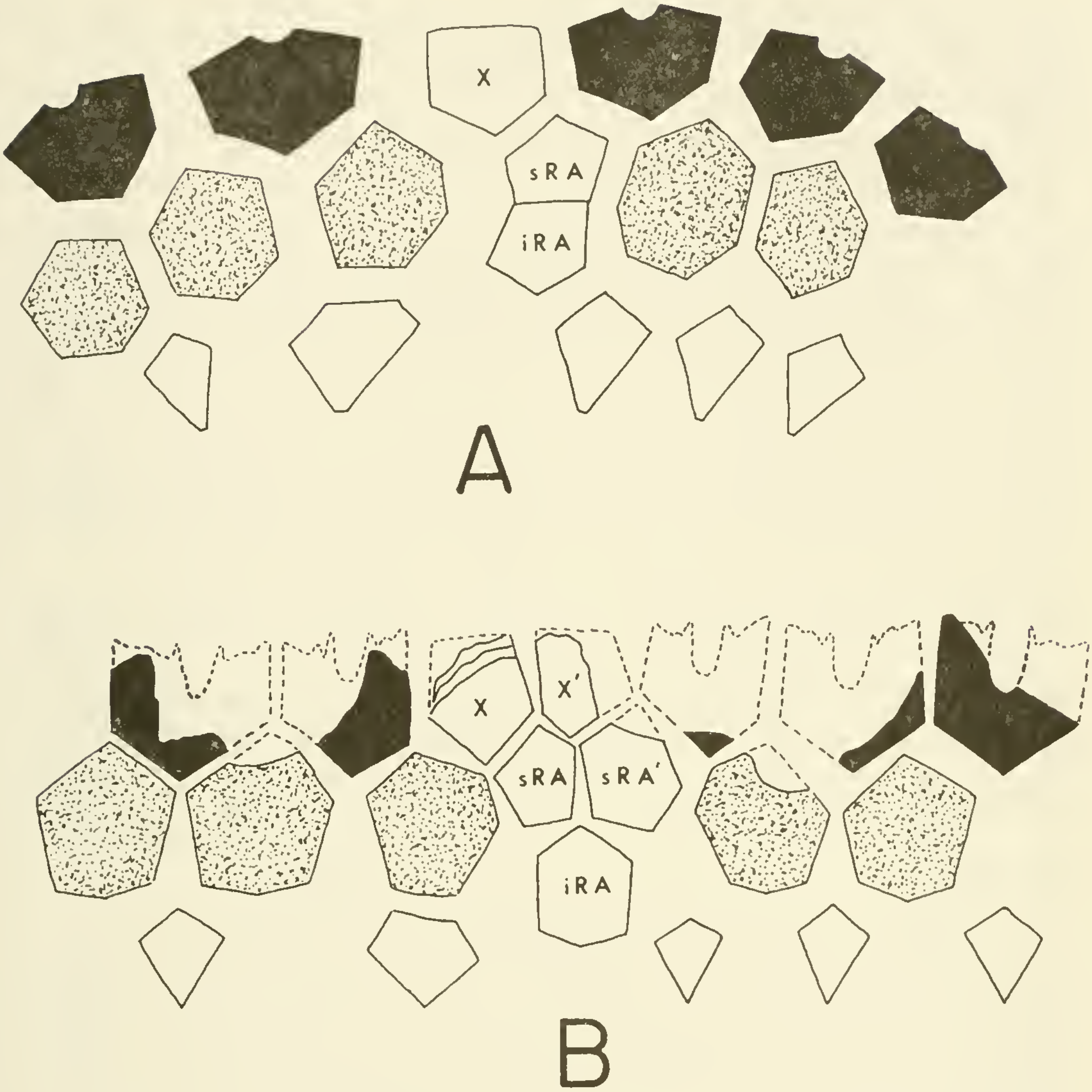
Carabocrinids are by far the most abundant crinoids in the

Twin Cities area; over 1000 plates of these animals were available for study. The nomenclature of these carabocrinids is complex and confused, mainly because most of the material is preserved as disarticulated plates. Accordingly statistics were used to aid in establishing a correct taxonomy.

PREVIOUS WORK

Sardeson (1899, p. 264, pl. 12, figs. 1-17, text-figs. 1, 2) proposed *Strophocrinus* based on *S. dicyclicus,* the type and only known species, from the Decorah Shale of St. Paul. The form was based on a partial, flattened dorsal cup with the distal parts of some radials broken off (see Pl. 20, figs. 10, 12, 13; Text-fig. 1). Although not so stated, this crinoid was obviously considered the holotype. Sardeson also studied isolated plates and holdfasts which he believed were conspecific with *S. dicyclicus.* He clearly separated *Strophocrinus* from *Carabocrinus* and allied crinoids. Sardeson published three different plate diagrams of the holotype of *Strophocrinus dicyclicus* at various times (1899, text-figs. 1, 2; 1925, pl. 5, figs. 1, 3; 1939, pl. 2, fig. 3). The 1899 figures depict 21 plates but only 20 appear in the later drawings. No explanation is given for this discrepancy. We consider the later figures to be correct, and the 20-plate version is reproduced in Text-figure 1. The holotype has 20 plates in the dorsal cup: five infrabasals, five basals, five radials, one inferradial, two superradials, and two plates in the anal X position. The radial facets are narrow and horseshoe-shaped. Several unbranched primibrachs occur in one ray. Typical calyx plates are highly ornamented with many round and slightly elongate nodes. In some specimens the nodes are either or both aligned into stellate ridge type patterns and in rows paralleling the plate margins. Commonly the nodes exhibit no consistent pattern.

According to Sardeson (1899, p. 270; 1925, p. 60; 1939, p. 29), *Strophocrinus* differed from *Carabocrinus* (E. Billings, 1857, p. 275) in having more anal plates; the extra superradial and supplemental anal X of *Strophocrinus* are not known in normal carabocrinids (Text-fig. 1). The two crinoids are otherwise identical. This led some authors to treat *Strophocrinus* as a synonym of *Carabocrinus* (e.g., Bassler, 1915, p. 182; Foerste, 1924, p. 349). Although these authors did not discuss their reasoning, *Strophocrinus dicyclicus* was probably considered as an abnormal *Carabocrinus.* Other



Text-figure 1. — Schematic plate diagrams for Twin Cities carabocrinids.
A — Typical species of *Carabocrinus.*
B — Holotype of *Strophocrinus dicyclicus* Sardeson, redrawn from Sardeson, 1925, pl. v, fig. 1.
Symbols: radials — black, basals — stippled, infrabasals — blank, anal X — X, extra anal X — X′, infraradianals — iRA, superradianals — sRA, extra superradianal — sRA′.

writers found no difficulty in accepting *Strophocrinus* as a valid genus (e.g., Bather, 1900, p. 172; Springer, 1913, p. 217; Moore and Laudon, 1943, p. 690; Ubaghs, 1953, p. 750). Sardeson (1925, 1939) continued to maintain *S. dicyclicus* either as the type species of *Strophocrinus* or as a species of *Carabocrinus.* Sardeson's (1925) discussion of the problem of differing numbers of anal plates between species was partly stimulated by the comments of Bassler (1915,

p. 182) and Foerste (1924, p. 349). This was the main basis for separating *Carabocrinus* from *Strophocrinus*. Sardeson (1925, pp. 63, 64) cited the views of Bather and Springer that

. . . these azygous (anal) plates were introduced to the dorsal cup from the tegmen, or ventral top of the body.

Because of his colleagues' dubious acceptance of *S. dicyclicus*, Sardeson briefly entertained the idea that the crinoid was a sport (abnormal form) of *Carabocrinus*. Sardeson (1925, p. 64) immediately dismissed this thought, along with his friends, with the comment

In reviewing my fossil collections and the evidence as a whole in this case, I have even tried to find that my type specimen was a sport merely of some good species of *Carabocrinus*. The evidence found is yet still to the contrary, so that I am constrained to treat the evidence and my friends with equal favor.

Sardeson (1939, p. 30), in response to Bassler's (1915, pp. 182, 1225) and Foreste's (1924, p. 349) citations of *Strophocrinus dicyclicus* as *Carabocrinus dicyclicus*, stated that *Strophocrinus dicyclicus* could be a pathologic or abnormal individual of *Carabocrinus*. Sardeson's only concession at this point was to say that if *Strophocrinus dicyclicus* is a *Carabocrinus*, then it is a species yet to be described.

Later in the same paper, Sardeson wrote (1939, pp. 30, 32)

After the proposed *Strophocrinus dicyclicus* Sardeson appeared to have been recognized authoritatively, the species was again found in a list of fossils, not as *Strophocrinus*, but as *Carabocrinus dicyclicus* (Sardeson), by R. S. Bassler, in Bulletin of the U.S. National Museum, No. 92, page 182, and page 1225 (1915). Again it appeared as *Carabocrinus dicyclicus* Sardeson as given by Dr. August Foerste, in Iowa Geological Survey, Volume XXIX page 349 (1924). Explanation for such mental confusion appeared not to be that those authors extend the definition for the genus *Carabocrinus* to include my type-specimen of *Strophocrinus*. In fact no explanation appeared. Rather possibly the National Museum has a different form labeled under that name.

Carabocrinus dicyclicus Sardeson (1925, p. 61, pl. 5, fig. 5) was based on isolated plates collected from the Decorah Formation of St. Paul and Kenyon, Minnesota, and Ellsworth, Wisconsin (see Pl. 20, fig. 11 for "holotype" plates; Sardeson reillustrated these plates in 1939 [pl. 2, fig. 5]). As of 1925, complete cups and crowns were unknown, although several poorly preserved examples were collected subsequently. Sardeson (1925, p. 61) contrasted *C. dicyclicus* and *Strophocrinus dicyclicus* as follows:

1. The carabocrinid dorsal cup is probably ovoid rather than hemispherical as in *Strophocrinus*.
2. Smaller mature plates occur in *Carabocrinus dicyclicus*.

3. The carabocrinid plates bear sharper ridges and fewer nodes.
4. *Strophocrinus* exhibits more anal plates with different shapes.

By 1939, Sardeson had constructed dorsal cups of *Carabocrinus* from isolated plates, using the following procedure (pp. 33, 34). The plate circlets were selected from loose material to correspond to the structure of *Carabocrinus*. Wet clay balls of almost the right size were made. Plates were superimposed on the clay lumps, and the clay balls molded until the plates fitted together. The clay balls were then cast in plaster and the plates were permanently stuck on. Four cups from St. Paul and one cup from Ellsworth, Wisconsin were so restored (Sardeson, 1939, pl. 2, fig. 6; see Pl. 19, figs. 3, 5, 6; Pl. 21, fig. 14). Sprinkle (1973) used the same method for Ordovician hybocrinids.

C. conoideus Sardeson (1925, p. 62, pl. 5, fig. 4; see Sardeson, 1939, pl. 2, fig. 4; Pl. 20, fig. 9) was based on a small dorsal cup about 18 mm high from the Decorah of St. Paul. The predominant plate ornamentation consists of fine ridges. Sardeson considered that the crinoid was easily separated from *Strophocrinus dicyclicus* and *Carabocrinus dicyclicus* by differences in cup shape and ornamentation.

Sardeson (1939, pp. 33, 34, pl. 2, fig. 6; Pl. 19, figs. 3, 5, 6; Pl. 21, fig. 14) restored dorsal cups of *C. dicyclicus* and realized that *C. conoideus* was an immature *C. dicyclicus* (1939, pp. 36, 38). Accordingly *C. conoideus* was placed in the synonymy of *C. dicyclicus*.

C. magnificus first appeared in Winchell and Ulrich (1897, p. 123) without description. The name was simply a *nomen nudum* and was free to be used later. Sardeson formally described *C. magnificus* in 1939 (p. 33) based on approximately 400 loose plates. Several dorsal cups were built using the method mentioned for *C. dicyclicus* (Sardeson, 1939, pp. 33, 34, pl. 2, figs. 1, 2; Pl. 19, figs. 1, 2, 4). Specimens are rare at Ellsworth, Wisconsin, fairly common at St. Paul, Minnesota and ubiquitous in the Decorah Shale at Cannon Falls, Minnesota. Sardeson (1939, p. 34) cited ornamentation as the main difference between *C. magnificus* and *C. dicyclicus*. *C. magnificus* has fewer, and more continuous stellate ridges in contrast to the more numerous pimple-studded ridges of *C. dicyclicus*. Also according to Sardeson, the posterior basal is larger than the right posterior basal in *C. dicyclicus;* the reverse is true in *C. magni-*

ficus. In *Strophocrinus dicyclicus,* these plates are about the same size, but are compensated for by extra anal plates. As discussed in the subsequent text, the plate and dorsal cup shapes of the two carabocrinids are easily distinguished.

Sardeson (1939, p. 34) also recognized developmental changes in *C. magnificus*. Young plates are thin and smooth, but single stellate ridges are soon acquired. The stellate ridges become rounded with increasing age, and new stellate ridges form parallel to the older ones. These growth trends cannot be fully confirmed. Since Sardeson's work in 1939, the thin and young plates have been lost from the University of Minnesota paleontological collections. However, larger plates do tend to add stellate ridges during ontogeny (Pl. 22).

Sardeson (1899, pp. 268, 269, pl. 12, figs. 15-17; Pl. 23) noted holdfasts that were associated with *Strophocrinus dicyclicus*. He clearly grouped the attachment devices with the crinoids. The disk-shaped holdfasts exhibit pentameral symmetry. Sardeson believed this holdfast to have one, two, or possibly three layers of plates. Material in his collection shows two distinct layers. The basal layer, cemented to the substrate, bears a series of radiating ridges that show a more or less well-developed four- or five-fold symmetry (Pl. 23, figs. 1-3, 5, 6). Some of these ridges are hollow and it is possible that these were derived from cirri, as suggested by Sardeson. Sardeson thought the basal layer was multi-plated. Although several specimens exhibit ill-defined plate sutures (Pl. 23, fig. 2), no traces of plate sutures can be found in most (Pl. 23, figs. 1, 3, 5, 6). Clearly the lower layer was functionally a single solid plate. The overlying smooth layer is made up of a series of regular plates; the plate sutures are obscure but can be seen under water or alcohol. A small round or obscurely pentagonal stem scar is visible.

In 1908 (p. 242) Sardeson coined the form genus *Podolithus* for various crinoid holdfasts with the following diagnosis:

> Primitive discoid or conical Crinoidal root structures with more or less lobate margins and with a fixing-plate. Region about the stem-scar not depressed.

These holdfasts have created other sources of confusion. For example Westphal (1974, p. 79, pl. 1, figs. 1, 2, text-fig. 1) described a lower layer of one of these holdfasts as *Disconia pentamerus,* interpreting the specimen as a discoidal anthozoan coral with pentameral symmetry. This confusion is not unreasonable because Westphal had not seen complete holdfasts that were associated with crinoids. By itself, the lower layer of one of these holdfasts bears little resemblance to an attachment device of a pelmatozoan and the specimen could easily be placed in another phylum.

Various "species" of *Podolithus* were described and named; the specific names consisted of the genus to which the holdfast was assigned. For example, *Strophocrinus dicyclicus* roots were named *Podolithus strophocrinus.* Also proposed were *P. schizocrinus, P. anomalocrinus, P. eucheirocrinus* and *P. dendrocrinus* (Sardeson, 1908, pp. 242-248; see later discussion of crinoid attachment devices). Subsequent authors have not followed this form genus concept, and the Sardeson classification is not acceptable under the current rules of the International Commission on Zoological Nomenclature. Typically *P. strophocrinus* is listed as a synonym of *Strophocrinus dicyclicus* (e.g., Bassler, 1915, p. 182; Foerste, 1924, p. 349; Bassler and Moodey, 1943, p. 690). Biologically, this is appropriate. Whenever possible, a holdfast should be placed with the crinoid that constructed it. Form genera are applicable where the attachment devices cannot be assigned to specific crinoids. It is notable that Sardeson never mentioned *Podolithus* after 1908.

A similar problem exists for crinoid stems. Russian workers (e.g., Yeltysheva, 1955, 1956, 1959) commonly use form classifications. Usually, the stems cannot be assigned to a single crinoid. Moore and Jeffords (1968) employ a biological system. If possible, the stem is grouped with the appropriate crinoid species, e.g., *Iocrinus subcrassus* (Meek and Worthen) (Moore and Jeffords, 1968, p. 32, pl. 1, fig. 3). Some new species based on the column (e.g., *Gilbertsocrinus vetulus*), were placed in well-established genera (Moore and Jeffords, 1968, p. 38, pl. 3, fig. 1). Some new taxa [like *Hyperexochus* Moore and Jeffords (1968, p. 33)] are based only on stems. It seems likely that taxa based upon columns will present nomenclatural problems in the future.

As of 1939, Sardeson's views were as follows. Although suspect, *Strophocrinus dicyclicus* was a valid species. Two species of *Carabocrinus, C. dicyclicus* and *C. magnificus* were retained. *C. conoideus* was thought to be conspecific with *C. dicyclicus. Podolithus strophocrinus* was placed in synonymy with *Strophocrinus dicyclicus.* Sardeson (1899, 1925, ?1939) considered *Strophocrinus* as a surviving species of a transitional form between rhombiferan cystoids and true crinoids such as *Carabocrinus* and other dicyclic inadunates (see 1899, p. 273).

Statistical Techniques

Two methods were used for sample comparison. In one instance, a one-way analysis of variance with one variable served to treat the data (see Sokal and Rohlf, 1969, pp. 175-252 for outline of the technique); computations were done with the APL program ANOVA2 (documentation available from the University of Alberta). Most pairs of samples were analyzed by generalized discriminant analysis (explanation in Seal, 1964, pp. 123-152). Three types of information have been considered: 1) Probabilities that the groups were drawn from the same statistical population. 2) Coefficients that indicate the contribution of each variable to the contrasts between the groups. 3) Discriminant functions. The discriminant function may be used to identify or classify individuals. Here two types of identification or classification are involved. Consider a specimen originally allocated to Group A. If discriminant function analysis assigns the specimen to Group A, then the classification or identification is correct. An incorrect identification occurs if the discriminant function places the individual in Group B. The same reasoning holds for individuals originally located in other groups. In this study, the specimens were allocated to groups by the discriminant function procedure based on the minimum value of Mahlanobis D^2 between that particular individual and the centroids of the groups. This ensures that each specimen has equal *a priori* probability of being assigned to any one group and that each specimen will be placed in the closest group. The correct and incorrect classifications by the discriminant functions are summarized in a matrix for all of the groups. The number of discriminant function misclassifications relative to the total number of animals is useful because it increases with greater intergroup overlap. This information aids greatly in evaluating the test statistics. The computer program used for the analyses was BMD 07M (Dixon, 1973, pp. 233-253).

Statisticians often use the 0.05 probability level to accept or reject the hypothesis that the two groups compared were drawn from the same statistical population. However statistical and biological populations do not necessarily follow the same probabilities.

Paleobiological species should either be defined in terms of their inferred reproductive structure or by their distinctiveness in a phyletic chain. The 0.05 statistical probability cannot be related directly to either potential interbreeding or evolutionary position. The approach followed here is to combine test statistics with the number of discriminant function misclassifications. These data (tabulated below) suggest that the 0.01 probability level is satisfactory to define the forms studied here. Certainly the 0.05 level results in too many misclassifications to yield meaningful species. Testing of various Paleozoic crinoids shows that 0.01 may be suitable in many instances as it results in an operational taxonomy. This level may also be applicable to other groups.

MEASUREMENTS

Virtually all of the crinoids are represented by isolated plates. A few poorly preserved cups are available (e.g. types of *C. conoideus* and *Strophocrinus dicyclicus*). Also examined were the "model" *Carabocrinus dicyclicus* and *C. magnificus* constructed by Sardeson. In consequence of the lack of large numbers of cups, only isolated plates were studied quantitatively. The implied reasoning is that if the plates are statistically identical, the dorsal cups must also be identical. The basals are by far most abundant. Radials are moderately common but not abundant enough for statistical study of all localities. A few were tested, and yield similar results to those obtained from the basals. The infrabasals and anals are too rare for any meaningful statistical treatment. Due to the distribution of material, the statistical treatment focuses on the basals.

Three variables were examined: plate height, plate width, and surface ornamentation. Experiments indicated that it was impractical to measure ornamentation elements on a continuous scale. Consequently, ornamentation is grouped into five discontinuous categories (see Pls. 19-22, 24):

1. Plates having less than 10 stellate ridges, with ridge thickness greater than 1.0 mm.
2. Plates bearing more than 10 stellate ridges, with ridge thickness greater than 1.0 mm.
3. Plates showing numerous fine ridges (commonly more than 15), with ridge thickness less than 0.8 mm.
4. Plates with fine ridges and nodes, discontinuous ridges, or a combination thereof.
5. Plates with only nodes, commonly in a geometric configuration outlining the plate edge.

Smooth plates are produced by either or both weathering and erosion, and were omitted from the statistics.

Samples Examined

As previously discussed, *C. conoideus, C. dicyclicus,* and *C. magnificus* supposedly differ in dorsal cup shape, plate shape, and plate ornamentation. All three crinoids have the same plate structure. The differences, if any, between the three "species" should be fully characterized by measurements of the isolated plates. *Strophocrinus dicyclicus* supposedly may be separated from the other "forms" by dorsal cup shape, plate shape, plate ornamentation and number of anal plates. Only the first three differences would be reflected in isolated plates. The difference in number of anal plates must be treated separately.

The following samples of basal plates were measured (number of plates in [ ]). 1. *Carabocrinus magnificus* Sardeson; Cannon Falls, Minnesota [84]. 2. *C. magnificus* Sardeson; St. Paul [11]. 3. *C. dicyclicus* Sardeson; Cannon Falls [5]. 4. *C. dicyclicus* Sardeson; St. Paul [76]. 5. *C. conoideus* Sardeson; St. Paul [4]. 6. *Strophocrinus dicyclicus* Sardeson; St. Paul [5 plates from the holotype and 3 other plates attributed to this form by Sardeson].

Analyses and Results

We have chosen to attack the statistical problem through a series of systematic comparisons of pairs of samples. The results are annotated below and in Table 1.

One-way Analysis of Variance

Carabocrinus conoideus Sardeson was compared to *C. dicyclicus* Sardeson, using only the smaller plates with Type 3 ornamentation (see Pl. 21) from St. Paul. Because the basals on the type of *C. conoideus* are much smaller than those of *C. dicyclicus,* it was necessary to analyze the height-to-width ratios of the basals. The ANOVA2 program returned an F-ratio of 3.85 with 1 and 11 numerator and denominator degrees of freedom. The probability of a larger F-ratio lies between 0.05 and 0.10 and the null hypothesis is accepted. It is concluded statistically that *C. conoideus* and *C. dicyclicus* belong to the same species or population. The sizes of the plates of *C. conoideus* suggest that they are from an immature in-

Table 1

Discriminant functions for Twin Cities carabocrinids

Group 1	Group 2	F-ratio and degrees of freedom for numerator and denominator	Probability of larger F-ratio	Discriminant function coefficients			Percentage of misidentifications
				Height	Width	Ornamentation	
Carabocrinus dicyclicus Sardeson N=5, Cannon Falls	*Carabocrinus dicyclicus* Sardeson N=76, St. Paul	0.531 (3,77)	Greater than 0.10	-5.48	6.36	0.455	23.4
Strophocrinus dicyclicus Sardeson N=8, St. Paul	*Carabocrinus dicyclicus* Sardeson N=52, St. Paul and Cannon Falls	4.77 (2,57)	Between 0.025 and 0.01	-0.68	Not entered	1.60	26.7
Carabocrinus magnificus Sardeson N=11, St. Paul	*Carabocrinus magnificus* Sardeson N=84, Cannon Falls	2.57 (2,92)	Between 0.10 and 0.05	Not entered	2.74	1.38	40.0
Carabocrinus dicyclicus (Sardeson) N=89, St. Paul and Cannon Falls (all 3 variables)	*Carabocrinus magnificus* Sardeson N=95, Cannon Falls and St. Paul (all 3 variables)	258.3 (3,180)	Less than 0.005	-2.63	2.00	1.62	1.08
Carabocrinus dicyclicus (Sardeson) N=89, St. Paul and Cannon Falls (height and width only)	*Carabocrinus magnificus* Sardeson N=95, Cannon Falls and St. Paul (height and width only)	53.3 (2,181)	Less than 0.005	-4.89	6.90	—	22.3

dividual of *C. dicyclicus,* as postulated by Sardeson (1939, pp. 36, 38).

Discriminant Function Analyses

The height and width provide a measure of the overall size of the plate. The nature of the ornamentation is correlated with the size of the plates in some samples but not in others. The size range of the *Strophocrinus dicyclicus* basals is less than in *Carabocrinus dicyclicus* and *C. magnificus.* If all of the data were tested, two sources of contrast would be present: size distribution differences between the two samples, and morphological differences between plates of the same size and relative age. The difference in size distribution is due to variables such as collecting bias, differential time-size growth rates, and mortality rates, rather than inherent genetic differences between the crinoids. To eliminate the differences in size-frequency distribution in comparisons where *Strophocrinus dicyclicus* is involved, the size ranges of *Carabocrinus dicyclicus* and *C. magnificus* were adjusted to that of *Strophocrinus dicyclicus.* In this way only morphological differences between crinoids of comparable size are tested by the discriminant function analyses.

Carabocrinus dicyclicus (Sardeson) from St. Paul
vs.
Carabocrinus dicyclicus (Sardeson) from Cannon Falls

The probability of a larger F-ratio exceeds 0.1 and, presumably the two samples are conspecific. This is consistent with the numerous misclassifications by the discriminant function analysis (29 out of 81 plates were misclassified). Of the Cannon Falls basals, the function misclassified two plates. Of the 76 basals from St. Paul, 27 were misidentified. It is therefore concluded that the St. Paul and Cannon Falls plates were drawn from the same population.

Strophocrinus dicyclicus (Sardeson)
vs.
all *Carabocrinus dicyclicus* (Sardeson)

As mentioned earlier, the size range of the *C. dicyclicus* basals was restricted to correspond to that of the smaller *S. dicyclicus* plates. The probability of a larger F-ratio is less than 0.025, but greater than 0.01, and it is believed that the basals of *S. dicyclicus* and *C. dicyclicus* belong to a single population. Of the eight *S. dicyclicus* basals the discriminant function analysis misclassifies only one, but 15 of the 52 *C. dicyclicus* plates were assigned to the wrong sample. The 16 misidentifications in 60 plates indicate major morphological overlap between the basals of *C. dicyclicus* and *S. dicyclicus.*

The basals of *C. dicyclicus, C. conoideus,* and *S. dicyclicus* are statistically the same, suggesting that only a single species is present, and *C. conoideus* is considered a synonym of *C. dicyclicus.* As mentioned above, *S. dicyclicus* and *C. dicyclicus* also allegedly differ in the number of anal plates. There are two possible interpretations. The difference in anal plates may be real, and a valid taxonomic character. Alternatively, the extra anals of *S. dicyclicus* may be abnormal. The latter alternative is suggested by the following observations.

1. The basals of *C. dicyclicus* and *S. dicyclicus* are identical. Only one specimen with the extra anal plates, the holotype of *S. dicyclicus,* is known. All other specimens which can be or have been reconstructed have the normal carabocrinid numbers of anals. The rarity of the *S. dicyclicus* anal plate configuration suggests that it is abnormal.

2. Extra anal plates represent a common developmental abnormality in dicyclic inadunate crinoids from various families and horizons (see Strimple, 1963, pp. 10-13 for review). We have also seen extra anal plates in specimens of *C. treadwelli* Sinclair from the Bromide Limestone of Oklahoma.

3. Study of the developmental sequences of plates in living and fossil crinoids suggests that the extra anal plates could easily be explained as an ontogenetic abnormality.

All of these considerations justify the recombination of *C. dicyclicus* (including *C. conoideus*) and *S. dicyclicus.* The species *S. dicyclicus* Sardeson, 1899, has nomenclatural priority; the other two trivial names were published in 1925. As *Carabocrinus* E. Billings (1857, p. 275) has generic priority, the current name of the Twin Cities form becomes *Carabocrinus dicyclicus* (Sardeson). A full synonymy is given under *Carabocrinus.*

Carabocrinus magnificus Sardeson from Cannon Falls
vs.
Carabocrinus magnificus Sardeson from St. Paul

The probability of a larger F-ratio falls between 0.10 and 0.05 and 38 out of 95 plates were misassigned by discriminant function analysis. Clearly, there are no statistically significant differences between the specimens of *C. magnificus* from Cannon Falls and St. Paul, and the samples are considered conspecific.

Carabocrinus dicyclicus (Sardeson)
vs.
Carabocrinus magnificus Sardeson

The probability of a larger F-ratio value is much less than 0.005. Obviously two different species are present. All three variables contribute to separating the two species, although plate ornamentation provides the highest degree of contrast (see discriminant function coefficients in Table 1). Only two misidentifications out of 184 plates shows that there is little morphological overlap between the two samples. Clearly, they represent separate species.

We also attempted to differentiate the basals of *C. dicyclicus* (Sardeson) from those of *C. magnificus,* based only on height and width. The probability of a larger F-ratio equals much less than 0.005, a statistically significant difference. However, a large morphological overlap between the two species is suggested by the misclassification of 41 of 181 plates by the discriminant function analysis. Generally, at any given size, the plates of *C. magnificus* are more slender than those of *C. dicyclicus* (Sardeson) (Text-fig. 2). The misidentification data and the regression coefficients indicate that the smaller plates are similar in height and width, but the plates

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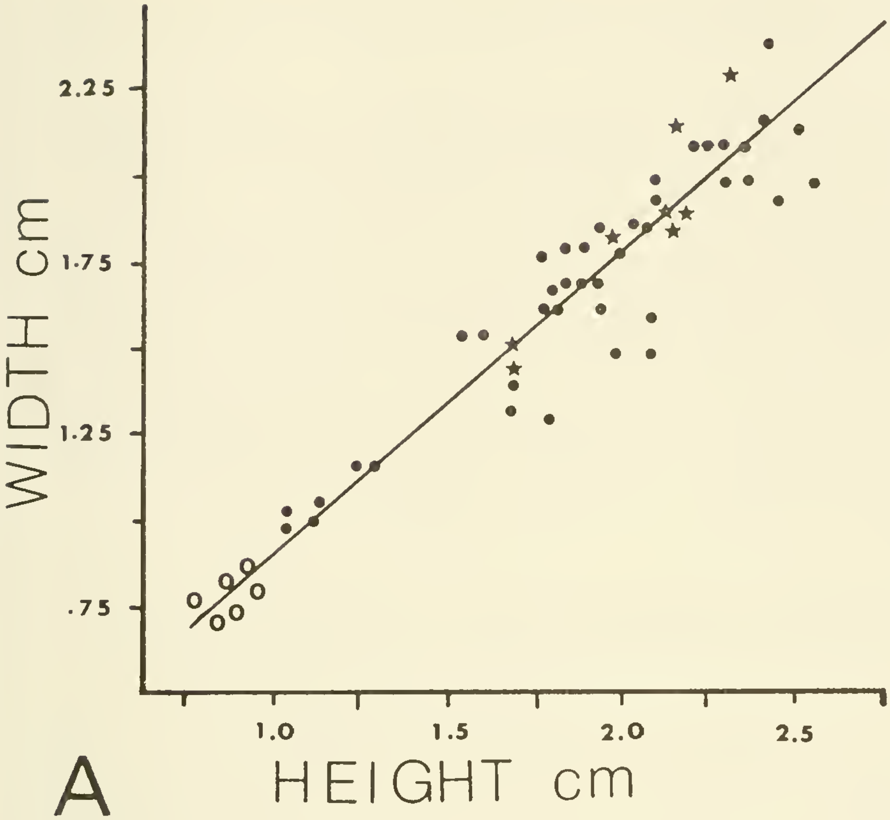
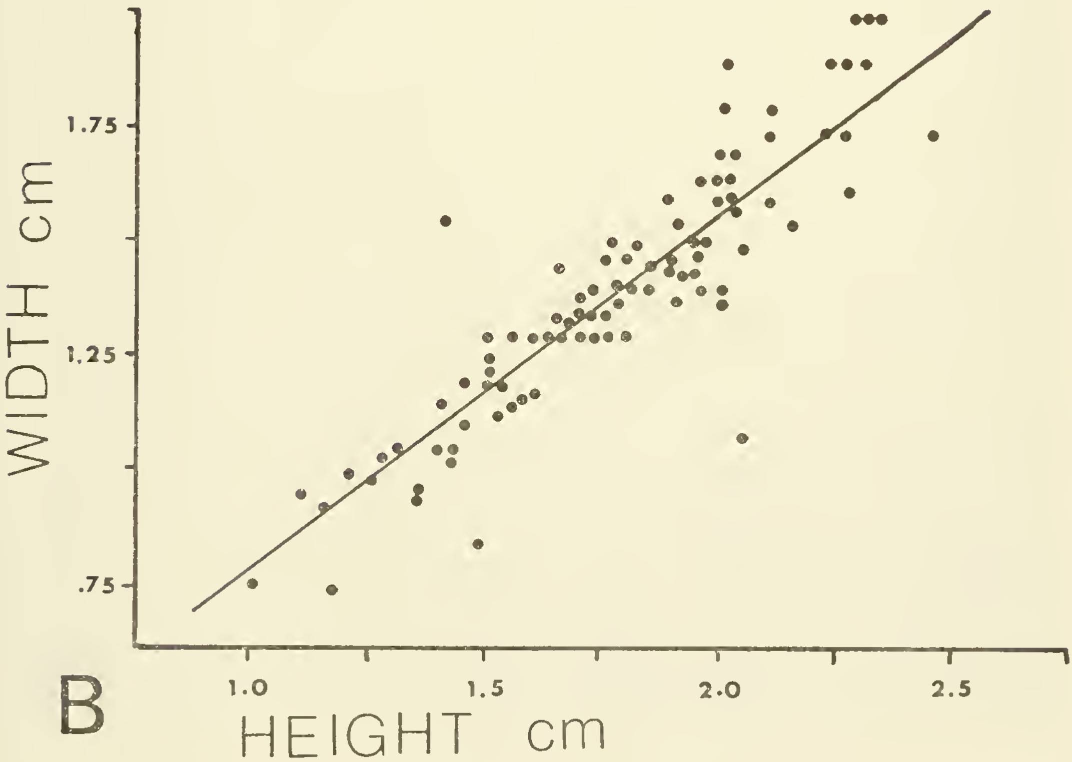
Text-figure 2. — Bivariate graphs for height and width of basals in Twin Cities carabocrinids. Regression lines fitted by the least squares method.

A. — *Carabocrinus dicyclicus* (Sardeson)
Symbols: Open circles, holotype of *C. conoideus* Sardeson; black dots, specimens from St. Paul and Cannon Falls labeled *C. dicyclicus* by Sardeson, stars, specimens assigned to *Strophocrinus dicyclicus* by Sardeson. Equation data: Width $=$ 0.00986 $+$ (0.892 $\times$ Height). Standard error for slope $=$ 0.032.

B. — *Carabocrinus magnificus* Sardeson.
Equation data based on all specimens: Width $=$ –0.0108 $+$(0.798 $\times$ Height). Standard error for slope $=$ 0.0436.


2.25
1.75
1.25
.75
WIDTH cm
1.0
1.5
2.0
2.5
HEIGHT cm

A


1.75
1.25
.75
WIDTH cm
1.0
1.5
2.0
2.5
HEIGHT cm

B

gradually diverge with increasing age so that the basals of adults are easier to distinguish.

In summary, two species of *Carabocrinus* lived in the Twin Cities area, *C. dicyclicus* (Sardeson) and *C. magnificus* Sardeson; the former dominated the Decorah fauna at St. Paul whereas the latter was most abundant at Cannon Falls. The two forms are most easily distinguished by the ornamentation. *C. magnificus* possesses a small number of simple and heavy stellate ridges whereas the ornamentation of *C. dicyclicus* (Sardeson) is more complex, commonly aligned nodes with or without stellate ridges (see Pls. 19-23, 24). In addition, the plates and dorsal cup of *C. magnificus* are more slender with respect to overall size than in *C. dicyclicus* (Sardeson) (see Text-fig. 2, Pls. 19-22, 24).

FUNCTIONAL MORPHOLOGY OF *CARABOCRINUS DICYCLICUS* (SARDESON)

Bulk Density and Basic Geometry

The calyx of *C. dicyclicus* (Sardeson) is typical of carabocrinids (see restoration in Text-fig. 3). The dorsal cup is large, ovoid and consists of a small number of plates. In calculating the following volumes and bulk densities, we have adopted the methods of Brower (1973, pp. 283-286); the estimated densities of the soft parts and the endoskeleton are 1.07 and 1.73 gm/cc, respectively. The endoskeleton of living crinoids is covered with a thin epidermis which has been ignored in determination of the volumes and densities because this layer is thin and commonly incompletely developed in many living crinoids. The dorsal cup outline of *C. dicyclicus* is closely approximated by half of an ellipse of rotation. Although the tegmen is unknown, it is thought to be nearly flat, as in other carabocrinids with similar calyces. The volume has been computed rather than measured directly by immersion because of the obvious hazards of "dunking" the "plaster-based model-cups" constructed by Sardeson, and because no complete and uncrushed cups are available. The dorsal cup volume of a mature carabocrinid equals 46.0 cc, assuming that the outline is half of a prolate ellipse of rotation. The dorsal cup plates average 0.2 cm thick. The volume of the thin shell of plates consists of 9.6 cc, and the volume of tissue in the dorsal cup is 36.4

cc. Because the plates are thin, the volume of tissue is large relative to the cup volume. Consequently the density of the dorsal cup is only 1.22 gm/cc.

Narrow radial facets support uniserial and non-pinnulate arms. Judging from the available specimens, the arms branch isotomously and heterotomously above the dorsal cup. The total length of brachials in all rays is 364 cm; there are 2265 plates in all the rays. These figures are relatively small compared to the pinnulate Ordovician camerates reported by Brower (1973, pp. 319-323; 1974, pp. 33-40), mainly because of the lack of pinnules in *C. dicyclicus* (Sardeson). The number of food-catching tube-feet can also be estimated for a carabocrinid. We assume that the arrangement of the tube feet is the same as in the pinnules of *Antedon bifida,* in which one long food-catching tube-foot is present in each triad or set of tube feet (Nichols, 1960), and that a carabocrinid brachial bears nine sets of tube feet. The total number of food-catching tube-feet would be about 20,200 for a mature carabocrinid. Because of the lack of pinnules, carabocrinids are characterized by fewer tube-feet than camerate crinoids of the same size (see figures in Brower, 1973, p. 323; 1974, p. 39). In determining the volume of the rays, the arms were approximated by summing the volumes of a series of tapering rod-like segments with elliptical cross sections; as in living crinoids, the soft tissues of the food grooves are estimated to occupy 45 percent of the volume of the arms — the plated structures occupy the rest. Total volume of all rays is 25.8 cc, of which 14.2 and 11.6 cc are taken up by the brachials and soft parts, respectively. The density of the arms is 1.43 gm/cc. This is significantly higher than in the calyx, because of the predominance of plates over soft parts. Compared to most Ordovician crinoids, the arms of *C. dicyclicus* are short and small, compared to the dorsal cup.

Holdfasts are commonly associated with crushed calyces and loose plates of *C. dicyclicus*. Based on the frequency and consistency of association, these attachment devices clearly belong to this species, as stated by Sardeson (1899, p. 268). The holdfast of *C. magnificus* Sardeson is unknown. However, the close morphological similarity between *C. dicyclicus* (Sardeson) and *C. magnificus* may indicate that the two forms had similar attachment structures. The holdfast of *C. dicyclicus* (Sardeson) is flat and disk-shaped (Pl. 23). The device is composed of upper and lower layers, and a narrow interspace. Presumably, this space was occupied by tissue during life of the animal. The lower layer is a solid disk in which traces of plate sutures are visible in a few specimens (Pl. 23, fig. 2). The lower layer must have functioned as a single plate. Prominent ridges are located on top of the lower layer. The five largest ridges are predominant and radiate outward from the central area where the stem was attached; these ridges give rise to numerous branched smaller ridges which increase in number toward the periphery. This pattern was dictated by the roughly circular plan of the lower layer so that new ridges originated as the size of the structure increased. Sardeson (1899, p. 269) interpreted the ridges as branched cirri. Four of the main ridges arise at one level and probably represent the cirri which grew from one columnal. The fifth main ridge appears slightly distal to the others and probably developed from a lower stem plate. Some of the main ridges are hollow and may be homologous with the axial canals in the cirri of many crinoids (Pl. 23, fig. 5). The adjacent ridges are joined together and no traces of the original plate sutures can be found in most specimens. For all practical purposes, the lower layer is a solid plate. Most of the holdfasts were cemented directly to the sea floor although several small specimens were attached to ramose bryozoan fragments that probably lay on the substrate.

The upper layer of the holdfast is gently arched and consists of many small, irregular, smooth and obscure plates (Pl. 23, fig. 4). It begins at the beveled margin of the lower layer (Pl. 23, fig. 3). The upper plate extends to its junction with the stem. The upper layer commonly is not preserved, but its presence may be denoted by a beveled edge on the lower plate. It is possible but not likely that some of the holdfasts lacked upper layers. The upper layers may be missing for either of two reasons: 1) The upper layer is much thinner than the lower, and more susceptible to weathering. 2) Burial in the habitat was usually slow. Consequently, the plated upper layer fell apart after the crinoid died, but prior to burial. Following decomposition and disintegration, the plates were scattered about the sea floor by wave and current action.

Compared to the size of the crown, the holdfast is small, with a total volume of 5.7 cc. The shape of the holdfast was approximated as follows: lower layer as a circular disk with a diameter of 4.7 cm and a thickness of 0.2 cm; soft tissues between upper and lower layers as a cone 4.7 cm in diameter and 0.3 cm high; upper layer as a conical shell with a thickness of 0.1 cm and height and diameter of 0.4 cm and 4.7 cm, respectively. A small amount of tissue, 0.71 cc, accounted for 12.5 percent of the volume of the holdfast. The plates represent 87.5 percent of the holdfast. Because of the low ratio of tissue to plates, the holdfast is the most dense part of the crinoid, with a density of 1.65 gm/cc.

The stem is poorly known. Two columnals with a diameter of 0.34 cm are attached to the holotype of *Strophocrinus dicyclicus* Sardeson [cup width is 5.0 cm; Pl. 20, figs. 10, 12, 13; as mentioned earlier, *S. dicyclicus* Sardeson is now termed *Carabocrinus dicyclicus* (Sardeson)]. These columnals are round or obscurely pentagonal with a pentalobate axial canal. Except for these two plates, the stem of *Carabocrinus dicyclicus* (Sardeson) is unknown. Although numerous dorsal cup plates and holdfasts are available, no stem type is consistently associated with the species. Basically *C. dicyclicus* (Sardeson) was a large crinoid attached to stem of extremely small diameter. This suggests that the column was short, and the dorsal cup may have been attached almost directly to the holdfast. It is believed that a long thin stem could not have supported and elevated the crinoid above the sea floor. Probably a short stem consisting of a few columnals was present. The column was omitted from computations of density and volume because of its presumed small size.

The bulk density of the entire carabocrinid can now be estimated. The volumes and densities are:

Part of crinoid	Volume in cc	Volume of tissue in cc	Density in gm/cc
Dorsal cup	46.0	36.4	1.22
Arms	25.8	11.6	1.43
Crown	71.8	48.0	1.29
Holdfast	5.70	0.71	1.65
Entire crinoid	77.5	48.7	1.32

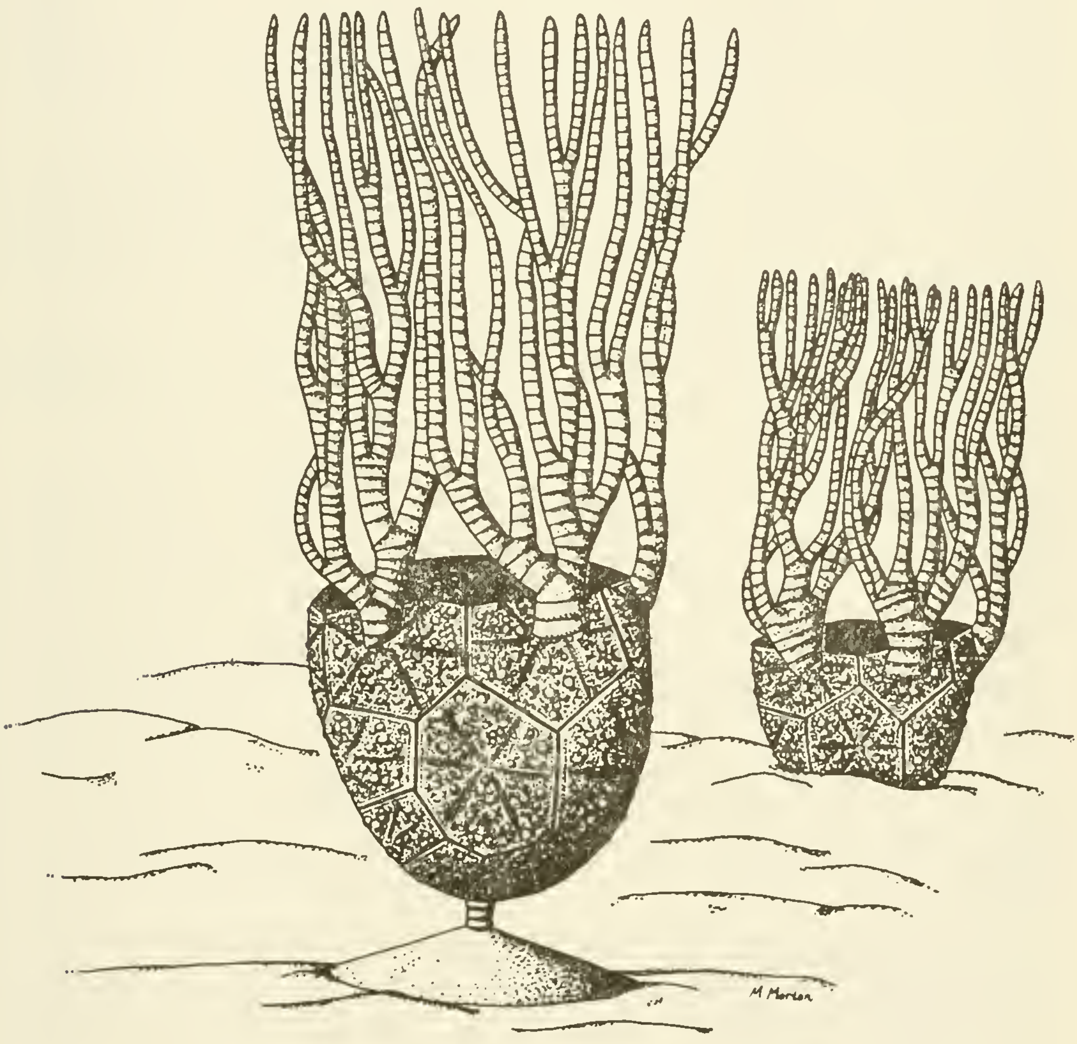
The bulk density of 1.32 gm/cc is within the range for extant crinoids. For 16 species of comatulids, the densities range from 1.11 to 1.39 gm/cc with a mean of 1.26 gm/cc (Brower, 1973, p. 284). Densities of fossil crinoids are only available for a few species of Ordovician camerates, for which Brower (1973, p. 284) determined a crown density of 1.41 gm/cc. The higher density of camerates reflects the large volume and mass in the pinnulate arms. The nonpinnulate arms of *C. dicyclicus* (Sardeson) dictate a lower density. For the carabocrinid, the crown is supported by the holdfast and stem. Inasmuch as the crinoid is partially supported by the surrounding sea water, the total densities are somewhat misleading. The portion of the weight of the entire crinoid that must be supported by the substrate depends upon the effective density [bulk density minus density of sea water (1.03 gm/cc)]. For the crown alone this is the weight borne by the holdfast and stem. The effective densities of the crown and entire crinoid of *C. dicyclicus* (Sardeson) are 0.26 and 0.29 gm/cc, respectively.

Mode of Life and Adaptations

Two possible habits are envisioned for *Carabocrinus dicyclicus* (Sardeson). In the more probable one, the holdfast was cemented to the substrate and the crown was attached to the holdfast by a stem consisting of a few plates (Text-fig. 3). The segmented column would have allowed flexibility so that the crinoid could sway to and fro in the currents. If the crinoid were attached directly to the holdfast, the animal would have been rigidly fixed in place. Extremely strong current or wave action could have detached the crinoid from its root. Such a situation probably would have proved fatal.

A less likely scenario postulates a partially buried existence in which the embryonic crinoid was attached to some object on the sea floor. As the crinoid grew, currents deposited fossil debris and sediment which eventually buried the holdfast and the base of the cup. This alternative seems less likely for several reasons. All holdfasts are attached to surfaces like bedding planes that were probably exposed to the overlying water column during life of the crinoid. The holdfasts and lower parts of the calyces exhibit no evidence of deformation or warping that might be explained by partial burial. Such deformation and warping are common in pentamerid and other brachiopods which have a partly buried mode of life (see Johnson, 1977; Rudwick, 1970, pp. 91-94). The low bulk and effective densities of the carabocrinids are reasonable adaptations for a substrate-dwelling existence where the crown was supported by the holdfast and stem. Higher densities are probably more useful for a partially-buried life style. For example, brachiopods that are partly buried are commonly thick shelled forms in which the buried region of the shell is greatly thickened for increased stability (Rudwick, 1970, pp. 91-94). This feature is conspicuously absent in *C. dicyclicus* (Sardeson). For these reasons, the Twin Cities carabocrinid is thought to be a substrate dweller rather than a partially-buried species. Both possibilities are shown in Text-figure 3.

The carabocrinids lived in an environment that was highly agitated periodically. Some crowns may have been detached from their holdfasts by either or both wave and current action. This leads to



Text-figure 3. — Restorations of Twin Cities carabocrinids. The specimen in the foreground shows the most probable mode of life with the holdfast cemented directly to the seafloor. A less likely orientation with the holdfast and part of the dorsal cup buried in the sediment is sketched in the background. The crown is mainly reconstructed from NMNH 43008, which has a height of about 10 cm. The holdfast and stem are schematic.

speculation about what might have happened to such a detached animal.

The ecology of living crinoids is pertinent (see Fell, 1966 for summary). Extant young comatulids have a stem that is attached to the seabed or some other object during the pentacrinid ontogenetic phase. Like most Paleozoic crinoids, these are rooted filter feeders. At maturity, the animal sheds the column and assumes a semi-free existence. The animal commonly is attached to the seafloor or some object by the cirri on the calyx base. The crinoids move periodically: some by swimming (e.g., *Antedon*), and others (like the comasterids) by crawling along the substrate. The arms grasp, pull, and lever the animal along during crawling. In swimming, the pinnules are extended on the down or propulsion stroke; this provides a large surface area in contact with the water. The upward or return stroke is slower and the pinnules come together over the ventral sides of the arms to minimize the water resistance. Typically, the arms operate in two groups, half at a time. Variations in the power strokes of different arms allow directed swimming.

A detached individual of *Carabocrinus dicyclicus* (Sardeson) could not have exploited this modern crinoid mode of life for several reasons.

1. There are no grasping cirri on the calyx base. The position of the center of gravity is obviously critical to a detached carabocrinid crown. If the arms were held vertically, the center of gravity would lie along the distal part of the dorsal cup. Spreading the arms would displace the center of gravity into the radial circlet. Thus the crown center of gravity is located so that a detached animal would lie on its side. None of the specimens exhibit any evidence (such as asymmetry) of this living orientation. Clearly this was not the normal life attitude although a few traumatic or fatal accidents may have occurred.

2. Swimming was probably not possible. This conclusion is based on two lines of evidence. First, the carabocrinid arms are short and non-pinnulate. Those of swimming comatulids are longer and pinnulate. The ratio of arm surface area to mass in carabocrinids seems too small to make swimming a mechanical possibility. Second, living crinoid arms are characterized by muscular articulations which permit the rapid movements necessary for swimming. The brachials are

hinged, and flexed by ligaments and muscles. The difference between crinoid muscles and ligaments is obscure but both can contract when stimulated by the nervous system. Strictly ligamental articulations as in the cirri react more slowly than do muscular articulations that possess both ligaments and muscles. Swimming comatulids have better developed muscular articulations, with larger muscles and ligaments, than do crawling types (Gislén, 1924, pp. 56, 57, 62-64). Like all early Paleozoic crinoids, the arm articulations of *C. dicyclicus* (Sardeson) are ligamental (see Van Sant and Lane, 1964, pp. 34-37, for summary on articulation in Paleozoic crinoids). The ligaments of carabocrinids are also short and a distinct transverse ridge is lacking. *C. dicyclicus* (Sardeson) could have moved the arms, but certainly not rapidly enough to swim.

3. The possibility of crawling is more difficult to refute. Crawling requires flexible arm tips which can provide leverage and grasp objects on the seafloor. Judging from the few preserved examples, the carabocrinid arms may have been flexible enough for slow crawling. This is consistent with the ligamental articulations seen in isolated brachials.

The suggested life style of *C. dicyclicus* (Sardeson) is as follows. The disk-shaped holdfast was cemented directly to the seafloor and the crown was attached to the holdfast by a short stem. The approximate elevations of an adult above the substrate are: base of calyx, less than one cm; top of dorsal cup, about five cm; arm tips, roughly 10 cm (Text-fig. 3). Detachment of the crown from the stem was probably fatal although a detached individual may have been able to crawl to a place of refuge.

Similar Adaptations in Other Crinoids

Numerous crinoids have exploited a filter-feeding mode of life at low levels. Their adaptations are varied and can be divided into the following types. No attempt is made to list all species in each category: a few well-illustrated forms are tabulated. The categories range from the most (Types 1 and 2) to the least sedentary (Type 6).

1. The simplest solution to the problem is to shorten the stem between the calyx and holdfast. Examples are *Carabocrinus dicyclicus* (Sardeson), *Euspirocrinus spiralis* Angelin from the Silurian (see Ubaghs, 1953, p. 721, fig. 112; Springer, 1913, p. 174, fig. 267),

Eugeniacrinus caryophyllatus Miller from the Jurassic (Ubaghs, 1953, p. 764, fig. 161; Springer, 1913, p. 240, figs. 345a, b), *Torynocrinus granulatus* (Jaekel) from the Cretaceous (Ubaghs, 1953, p. 709, fig. 79), *Hemicrinus* spp. from the Mesozoic (Arendt, 1974, p. 45, text-fig. 5), and *Phyllocrinus sabaudianus* Pictet and Loriol from the Mesozoic (Arendt, 1974, p. 52, text-fig. 52). Most of these crinoids are massive, thick-plated types with heavy stems that lived in agitated environments. Although also found in a rough water habitat, *Carabocrinus dicyclicus* (Sardeson) is an exception, with its thin-plated calyx and narrow stem. The thin-plated calyx was dictated by the small stem. The carabocrinid probably was not fully adapted to life in agitated waters.

2. Other crinoids went one step further. The stem was lost, and the calyx base was cemented directly to the seafloor or some object. Examples are *Cyathidium holopus* Steenstrup from the Cretaceous (Ubaghs, 1953, p. 724, figs. 113a, b; Müller, 1963, p. 393, figs. 533a, b), *C. depressum* Sieverts from the Cretaceous (Müller, 1963, p. 393, figs. 531, 532), *Hemibrachiocrinus manesterensis* Arendt from the Cretaceous (1974, p. 54, text-figs. 10a, b), *Brachimonocrinus simplex* Arendt from the Cretaceous (1974, p. 54, text-figs. 10c, d), *Dibrachiocrinus solovjevi* Arendt from the Cretaceous (1974, p. 54, text-figs. 10d, e), *Holopus rawsoni* Gray and *H. rangii* d'Orbigny, both Recent (Ubaghs, 1953, pl. 764, fig. 165; Springer, 1924, pls. 1-3), and *Edriocrinus holopoides* Springer from the Devonian (see Springer, 1920, pp. 443-452, pl. 76, figs. 22, 23). Some of these crinoids are comparatively high and erect, like *E. holopoides,* while others present very low profiles (e.g., *Cyathidium depressum*). In all, the arms are short and massive, and the dorsal cup is low and heavy. In some, plates are fused together (*Edriocrinus*). Other forms probably fail to develop certain plates during ontogeny (*Cyathidium* and *Holopus*). Springer (1920, pp. 443-452) surveyed the available data on the life of *Edriocrinus.* All young animals were cemented to the seabed. Some, like *E. holopoides,* retained this habit throughout life, and adults of these taxa show obvious evidence of cementation. Other *Edriocrinus,* e.g. *E. sacculus* Hall and *E. pocilliformis* Hall (see Goldring, 1923, pl. 58, figs. 1-15), lost all vestiges of ornamentation and developed rounded bases as adults (see discussion below).

3. The recumbent stemmed calceocrinids of the Paleozoic were studied by Brower (1966) and Kesling and Sigler (1969) (see *Cremacrinus punctatus* Ulrich and *C. arctus* Sardeson here). The stem in these forms serves as a runner along the seabed. In the resting position, the hinge is closed and the crown lies parallel to the stem. For feeding, the hinge is opened, which elevates the crown so that the arms are roughly at a right angle to the stem. Breimer and Webster (1975) thought that calceocrinids with long stems might have been lifted into the water by currents when the arms were opened so that the crown operated as a "submarine kite."

4. Several Ordovician hybocrinids may have also had recumbent stems, either embedded in the substrate or running along the surface. Examples are *Hybocystis problematicus* Wetherby and *Hybocrinus tumidus* E. Billings (see Strimple, 1975) and the specimen of *H. punctatus* (Miller and Gurley) figured by Brower and Veinus (1974, p. 33, pl. 5, fig. 2).

5. Some Paleozoic crinoids were probably "bottom sitters." Two examples are *Agassizocrinus lobatus* Springer (Ettensohn, 1975) and *Cryphiocrinus* Kirk (Strimple, 1977). Juveniles of both forms possessed stems that were lost in the adult stages. Mature specimens of *Edriocrinus sacculus* Hall and adult *E. pocilliformis* Hall also belong to this category (see Springer, 1920, pp. 443-452 for mode of life; Goldring, 1923, pl. 58, figs. 1-15 for drawings). Young animals were cemented to the substrate but the older individuals have rounded bases and no trace of a stem scar. The proximal part of the calyx is mostly solid calcite; this must have displaced the center of gravity downward and increased the stability. The crinoids are visualized as sedentary, with the cup base either on the surface or partly buried in the sediment. Kirk (1911, pp. 99, 107, 113, 114) believed that these forms were partly eleutherozoic. Probably the animals possessed some ability to move by swimming or crawling. The latter seems more likely due to the predominantly or wholly ligamental arm articulations that would result in slow arm movements. These are thick-plated species with arm surface area to mass ratios too small for effective swimming.

6. Living comatulids have attained a high degree of mobility. Adult individuals shed the larval column and assume a more or less free existence. Most of these crinoids are attached by cirri along the

cup base. Some cling to the substrate or nest in cracks and crevices. Others prefer to grasp upright objects like sea-fans. Periodically the animals move from place to place by swimming or crawling (see Fell, 1966 for summary of their ecology; Clark, 1921, pls. 6-11, 22, 52-54; 1915, figs. 76-125 for illustrations).

These various adaptations were commonly results of convergent evolution. Similar adaptations are found in lineages of Paleozoic and post-Paleozoic crinoids belonging to many different families and orders.

Food gathering is obviously critical to a crinoid, and Magnus (1967) estimated that a living comatulid spends over half of its lifetime in this activity. Unfortunately, many of the variables which affect feeding in crinoids, such as the amount of plankton in the water and metabolic rates, cannot be measured for fossil forms (Brower, 1973, pp. 318, 319; 1974a, pp. 33, 34). Probably the most important morphological parameters are the amount of tissue that must be supplied with food, the number of food-catching tube feet and the area covered by the food gathering system. For *C. dicyclicus* (Sardeson) the first character is estimated by the total volume of soft parts, which would include both soft tissues and fluid-filled coelomic spaces; the number of tube feet was previously worked out. Owing to geometrical complexity, it is impractical to measure the area covered by the arms or food-gathering system and the length of the arms is given instead. The values for *C. dicyclicus* (Sardeson) equal:

Total volume	77.5 cc
Volume of soft parts	48.7 cc
Length of arms	364 cm
Number of food-catching tube feet	20,200

Two simple ratios, one dealing with the tube feet and the other with size of the food-gathering system, can be derived which will provide rough estimates of the food-gathering capacity for the carabocrinid:

Ratio of length of arms to volume of soft parts	7.47
Ratio of number of food-catching tube-feet to volume of soft parts	415

Few data are available on the food-gathering capacities of fossil crinoids. Brower (1973, pp. 319-323; 1974a, pp. 33-40) treated ratios of length of food-gathering system to calyx volume for some Ordovician camerate crinoids. These data cannot be compared with the carabocrinid figures because the calyx volume was used rather than the volume of tissue. The most appropriate data were presented by Gislén (1924, pp. 282-286) who measured the length of the food-gathering system and total volume for 16 species of extant comatulids. Because the comatulids are pinnulate, the length of the food-gathering system is the sum of the lengths of the arms and pinnules. The arms of *C. dicyclicus* (Sardeson) lack pinnules so that the length of the food-gathering system is the same as that of the arms. We computed the ratio of food-gathering system length in cm to total volume in cc from these data. The summary statistics for the comatulids are listed below.

Variable	Range	Mean	Standard deviation
Total volume in cc	0.47-73.1	13.9	21.0
Length of food gathering system in cm	195-10,300	2740	2790
Ratio of length of food gathering system to total volume	121-1000	398	256

The equivalent figures for *C. dicyclicus* (Sardeson) are: total volume, 77.5 cc; length of arms, 364 cm; and ratio of length of arms or food-gathering system to total volume, 4.70. For the comatulid data, these parameters are dependent on size with the following regression lines and correlation coefficients:

$$\text{Length of food gathering system} = 454\ (\text{Volume})^{0.775}$$

$$\text{Correlation coefficient} = 0.894$$

and

$$\text{Ratio of length of food gathering system to volume} = 662\ (\text{Volume})^{-0.463}$$

$$\text{Correlation coefficient} = -0.662$$

Thus the ratios decrease in progressively larger comatulids. Most of the volumes of the comatulids are considerably smaller than those of the carabocrinid. In order to minimize the effect of size, only the data for the four largest comatulids are tested against those of *C. dicyclicus* (Sardeson). The summary statistics for the ratio of length of food gathering system to total volume for the comatulids are:

Mean	Range	Standard deviation	Standard error of mean
149	121-196	32.8	16.4

The 95% and 99% confidence limits for the mean for this ratio in the four comatulids are from 96.8 to 201 and from 53.2 to 245, respectively. The ratio of 4.70 for *C. dicyclicus* (Sardeson) lies well below the confidence belts of the largest comatulids. Clearly, as far as food-gathering capacity is concerned, the comatulids and the carabocrinid belong to different statistical populations. This suggests to us that comatulids and *C. dicyclicus* (Sardeson) did not exploit the same feeding strategies.

Several recent papers have discussed feeding in living and fossil crinoids (Breimer, 1969; Lane and Breimer, 1974; Meyer and Lane, 1976). Most living species form dense filtration networks and exploit what Lane and Breimer (1974) termed full or partial mucus-net feeding. The filtration network or fan is constructed by arms and pinnules that secrete a mucus net. Small food particles (about 0.4 mm or less in diameter, according to Meyer and Lane, 1976) that impinge on the filtration fan are trapped by the mucus and tube feet and eventually conveyed along the food grooves to the mouth by the tube feet and cilia. In addition to living crinoids, camerates, all of which have pinnules, and pinnulate inadunates were probably mucus-network feeders (Lane and Breimer, 1974; Meyer and Lane, 1976). In agitated environments, most of the food supply travels parallel to the substrate and the filtration net is held vertically (Breimer, 1969; Lane and Breimer, 1974; Meyer and Lane, 1976). Under still water conditions the food consists of a vertical rain of plankton and organic detritus. Crinoids in these habitats probably spread their arms horizontally to form a collecting bowl (Breimer, 1969). Some crinoids which lived in alternating quiet water and agitated environments may have used both feeding postures (Brower, 1973, pp. 269-271, 283-290).

Lane and Breimer (1974) thought that many flexibles and non-pinnulate inadunates were limited mucus-net feeders, but Meyer and Lane (1976) postulated that feeding in these crinoids was analogous to that of Recent basketstars. Basketstars dwell in agitated areas where they erect parabolic filtration nets (Meyer and Lane, 1976, pl. 1, fig. 1; Macurda, 1976, fig. 1). The basketstar net is an open mesh-work in contrast to the much denser network of extant crinoids. Currents carrying food particles flow through the arms of basket-stars. Tube feet and mucus do not function in feeding of basketstars.

Instead large food particles (10 to 30 mm long) are caught by the flexible ramules of the arms and impaled on hooks on the arms (Meyer and Lane, 1976; Macurda, 1976, fig. 1). The food particles are transferred to the mouth by bending the arms and pulling them through the oral papillae. Living crinoids and basketstars can coexist without competing for food because the food particles eaten by the two groups are not the same size (about 0.4 mm and smaller for the crinoids, and 10-30 mm for basketstars).

As mentioned above, the low ratio of food gathering system length to total volume of *C. dicyclicus* (Sardeson) suggests that the animal utilized a different feeding strategy than do full mucus-net feeders like pinnulate living and fossil crinoids. This is suggested by the non-pinnulate arms, which could not have formed a complete mucus-bearing network. This is because the gaps between the arms would have been too large for the mucus strands to be maintained in the agitated environment where the carabocrinids are found.

Four observations suggest that *C. dicyclicus* (Sardeson) and basketstars did not possess the same feeding habits. The arm branches of the carabocrinids were not flexible enough to wrap around and trap food particles. Hooks are lacking in the arms of the Twin Cities crinoid. Carabocrinids bear food grooves and tube feet which were suitable for food gathering; the tube feet of basketstars are not involved in feeding. It is difficult to see how large food particles could be carried to the subtegminal mouth of most Paleozoic crinoids.

The main analogy that we draw between basketstars and the carabocrinids is based on the coarse meshwork of the arms. This homeomorphy suggests that, like basketstars, carabocrinids probably ate larger food particles than did comatulids with their densely-packed filtration networks. *C. dicyclicus* probably trapped large food particles directly with the tube feet, as suggested by Lane and Breimer (1974) for some small inadunate crinoids with nonpinnulate and unbranched arms. Although the food particles of *C. dicyclicus* (Sardeson) probably were larger than the 0.4 mm and smaller particles eaten by crinoids with full filtration networks, it is doubtful that these reached the 10 to 30 mm size range preferred by basketstars, because the food grooves of *C. dicyclicus* are not wide enough to transport such large material. We visualize food particles up to about 1.0 to 2.0 mm in diameter for the Twin Cities form. However, it is misleading to consider food particles in terms of linear dimensions, because volume or mass is involved in the amount of nourishment contained in a piece of food. A small increase in the diameter of a food particle can result in a large change of volume. For example, a spherical food particle with a diameter of 1.0 mm has 15.6 times the volume of a particle 0.4 mm in diameter whereas the volume for a particle of 2.0 mm diameter is 125 times larger than the 0.4 mm one. We believe that many nonpinnulate flexible and inadunate crinoids used the feeding strategy outlined here for carabocrinids.

SYSTEMATIC PALEONTOLOGY

Subclass CAMERATA Wachsmuth and Springer, 1885
Order DIPLOBATHRIDA Moore and Laudon, 1943

Family **ARCHAEOCRINIDAE** Moore and Laudon, 1943
Genus **ARCHAEOCRINUS** Wachsmuth and Springer, 1881

Archaeocrinus sp. Pl. 13, fig. 6; Text-fig. 4

Remarks. — Two partial crowns that are poorly preserved and embedded in matrix are tentatively placed in *Archaeocrinus.* Because many calyx plate sutures are not visible, the reconstructed plate diagrams in Text-figure 4 are conjectural. The calyx structure indicates the crinoids should be assigned to *Rhaphanocrinus* (Wachsmuth and Springer, 1885, p. 98(320)) or *Archaeocrinus* (Wachsmuth and Springer, 1881, p. 189(363)). The arms of the Twin Cities crinoids are biserial and branched as in *Archaeocrinus* rather than uniserial and unbranched like in *Rhaphanocrinus.* Consequently, the two specimens are assigned to the former genus. The most similar archaeocrinids occur in the Trenton of Canada; these include *A. lacunosus* (E. Billings) (1857, p. 261; see Wachsmuth and Springer, 1897, p. 255, pl. 10, fig. 1) and *A. microbasalis* (E. Billings) (1857, p. 264; see Wachsmuth and Springer, 1897, p. 256, pl. 10, figs. 2a-c). Both of the Canadian animals possess stellate plates rather than the smooth plates of the Twin Cities crinoids. The Twin Cities specimens probably belong to an undescribed taxon, but a new species is not proposed because the available material is poorly preserved.

Figured specimens. — UM 9265.

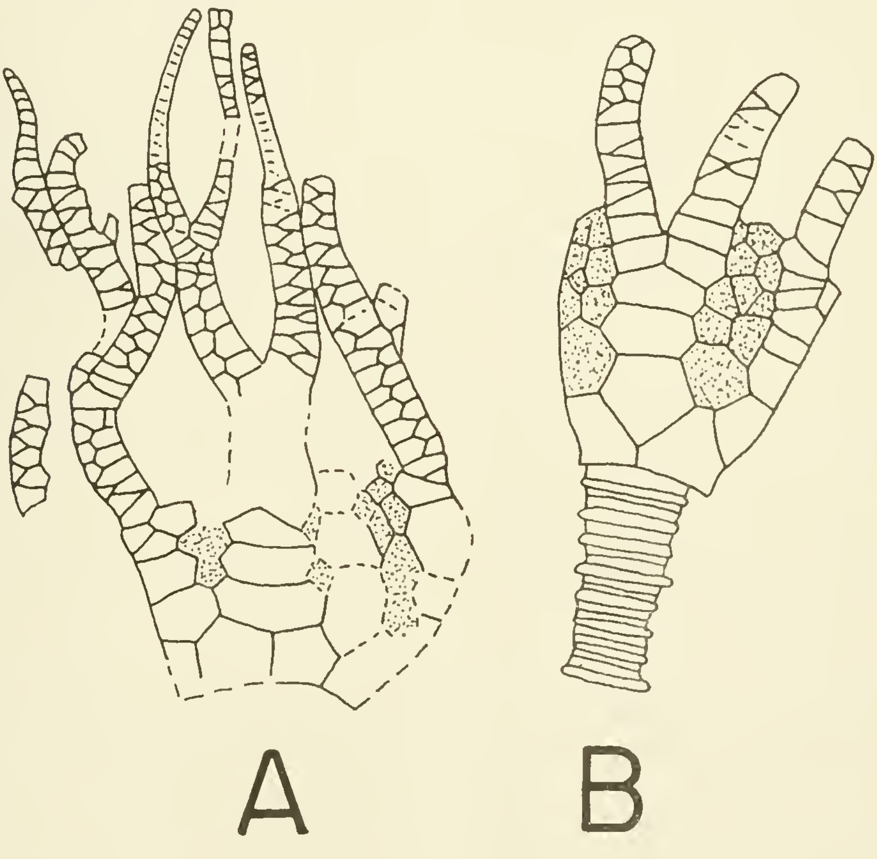
Occurrence. — Decorah Shale, Bed 4: Twin Cities Brick Plant, St. Paul.

Order MONOBATHRIDA Moore and Laudon, 1943
Suborder GLYPTOCRININA Moore, 1952

Family **GLYPTOCRINIDAE** Zittel, 1879

Remarks. — At present, we are investigating glyptocrinids, and are using multivariate statistics to determine conservative characters, meaningful groups of species, and the evolution of the family. As in the forthcoming volume on crinoids in the *Treatise on Invertebrate Paleontology,* we recognize three genera of glyptocrinids (Ubaghs, personal communication). The following generic diagnoses are preliminary and slightly different from those to be published in the Treatise.

Glyptocrinus Hall (1847, p. 281). Type species, *G. decadactylus* Hall. Arms unbranched, composed of uniserial or cuneiform brachials; arms ranging from two to four per ray; secundibrach *2* is axillary in



Text-fig. 4 — Plate diagrams for *Archaeocrinus* sp.
Figured specimens, UM 9265, plate diagrams conjectural, both specimens × 3.5, Decorah Shale, Bed 4 of Sardeson, Twin Cities Brick Plant, St. Paul.

A. — Specimen with arms on left side of slab.

B. — Dorsal cup with stem and small part of arms.

Interbrachial plates stippled.

rays with more than two arms; a prominent pinnule is located on the interray side of secundibrach *2* in arms where this plate is not axillary.

Pycnocrinus Miller (1883, p. 219). Type species, *G. dyeri* Meek. (*Glyptocrinus shafferi* Miller was originally designated as type species but *G. shafferi* represents a junior synonym of *G. dyeri* Meek, as discussed below.) Arms consisting of uniserial or cuneiform brachials; arms with prominent pinnule located on interray side of secundibrach *2*; arms branching once or twice above the calyx; axillary secundibrach ranges from a minimum of *4* to about *20* in most species; some forms have arms which branch again on the tertibrachs; total number of arm branches varies from four to eight in each ray.

Periglyptocrinus Wachsmuth and Springer (1897, p. 277). Type species, *P. billingsi* Wachsmuth and Springer. Arms biserial, two or four unbranched arms in each ray; if four arms occur in a ray, secundibrach *2* is axillary.

Genus **GLYPTOCRINUS** Hall, 1847

Glyptocrinus tridactylus, n. sp. Pl. 12, fig. 5; Text-fig. 5E

Diagnosis. — A species of *Glyptocrinus* with three arms in each ray; axillary brachials comprising primibrach *2* and secundibrach *2* of one of the half-rays; within a single ray, one half-ray with two arms, the other bearing only a single arm and a large pinnule; arms uniserial and unbranched. Calyx ornamentation of stellate and median-ray ridges. Arms covered with fine sinuous ridges.

Description. — Calyx globose with rounded sides and basal flange, height/width 1.0. Calyx ornamentation of median-ray and stellate ridges. Unweathered portions of arms characterized by fine sinuous ridges.

Basal circlet low, with five pentagonal basals; height/width of basals equals 0.3. Radials large, hexagonal, height/width 0.8. Primibrachs almost as large as radials. Primibrach *1* hexagonal, height/width 0.7. Primibrach *2* axillary, septagonal, height/width 0.7. In each ray, one half-ray remaining unbranched, other branching on secundibrach *2*. Distal fixed-brach consisting of secundibrach *1* or *2*. Fixed-secundibrachs roughly equidimensional; height/width ranging from 0.9 to 1.0.

Interbrachials of lateral interrays not strongly depressed, plates regular, one large plate in proximal range, roughly equidimensional; two plates in each of the three distal ranges; height/width ranging from 1.5 to 2.0; interbrachial *2* range ending at level of primaxil. Intersecundibrachials not present, but proximal margins of secundibrachs *1* of the same ray are joined.

Arms three per ray, not completely known, unbranched, composed of uniserial pinnulate brachials. Brachials with protuberant pinnule facets; height/width varying from 1.0 to 1.5. Pinnules long, heavy relative to size of arms.

Stem facet round with circular axial canal.

CD interray, tegmen, stem and rooting device unknown.

Remarks. — This form is only known from a single specimen, a young crown with a calyx height of about 3.0 mm. Three rays are visible, each with three arms. Despite the immaturity of the holotype, *G. tridactylus,* n. sp. can easily be separated from all glyptocrinids by the presence of three unbranched uniserial arms in each ray. The axillaries consist of primibrach *2* and secundibrach *2* of one half-ray; the other half-ray remains unbranched. The holotype could be an abnormal specimen of a glyptocrinid with two or four unbranched arms in a single ray. However, this seems unlikely because the number of arms per ray is a stable character in most large populations of glyptocrinids which we have examined, such as *G. decadactylus* Hall and *Pycnocrinus dyeri* (Meek). Consequently *Glyptocrinus tridactylus,* n. sp. is thought to be a separate and distinct form. This crinoid provides a morphological link between glyptocrinids with two unbranched arms in each ray and those with four unbranched arms in a ray where secundibrach *2* is the axillary. Species with two arms per ray are: *G. pustulosis* Kolata (1975, p. 50, pl. 9, fig. 8, text-fig. 15) and *G. charltoni* Kolata (1975, p. 49, pl. 9, figs. 2-4, 6, 7) [Black River forms]; *G. ornatus* E. Billings (1857, p. 269; see E. Billings, 1859, p. 60, pl. 9, fig. 2a; Wachsmuth and Springer, 1897, p. 274, pl. 20, figs. 6a, b) and *G. circumcarinatus* Parks and Alcock (1912, p. 43, pl. 4, figs. 2, 3) [Trenton taxa]. In *G. circumcarinatus,* one arm seems to branch on secundibrach *2* although this is probably an abnormality; the calyx ornamentation of *G. circumcarinatus* can easily be distinguished from that of *G. tridactylus,* n. sp.. Bassler and Moodey (1943, p. 602) treated *G.*

mercerensis Miller and Gurley (1894, p. 28, pl. 2, fig. 23) as a synonym of *Periglyptocrinus priscus* E. Billings. According to the original illustration, *G. mercerensis* has uniserial arms. We have examined the two types, UC 603, which are poorly preserved silicified specimens from Mercer County, Kentucky. The proximal parts of the arms are uniserial as in both *Glyptocrinus* and *Periglyptocrinus* but the structure of the distal part of the arms cannot be determined. Thus, *G. mercerensis* could be placed in either *Glyptocrinus* or *Periglyptocrinus*. UC 603 contains two specimens. The better of the two was illustrated by Miller and Gurley. This crinoid has a rounded cup base and a basal concavity; the calyx shape is different from that of *P. priscus* and this specimen is not conspecific with *P. priscus*. The second specimen in UC 603 is a long and slender calyx with indeterminate plate structure which we regard as unidentifiable. Consequently, we designate the specimen figured by Miller and Gurley as lectotype of *Glyptocrinus*? *mercerensis*.

The only glyptocrinid with four unbranched arms in each ray where secundibrach *2* is axillary, is *G. decadactylus* Hall (1847, p. 281, pl. 77, figs. 1a-f; pl. 78, figs. 1a-u; see Meek 1873, p. 30, pl. 2, figs. 5a, b; Wachsmuth and Springer, 1897, p. 270, pl. 6, fig. 12; pl. 20, figs. 4a-e; pl. 21, figs. 4a, b) from the Upper Ordovician. However, this configuration is also found in primitive species of *Alisocrinus* which were derived from *G. decadactylus* (Brower, 1973, pp. 432-438).

Specific name. — *tridactylus,* in allusion to the three arms of each ray.

Holotype. — UM 9261.

Occurrence. — Decorah Shale, Bed 6 of Sardeson: Twin Cities Brick Plant, St. Paul.

Genus **PYCNOCRINUS** Miller, 1883

Pycnocrinus sardesoni, n. sp. Pl. 11; Text-figs. 5A-C

Diagnosis. — A species of *Pycnocrinus* with four arms in each ray; axillary brachial usually secundibrach *6,* arms uniserial and unbranched. Calyx ornamentation of median-ray ridges and fine

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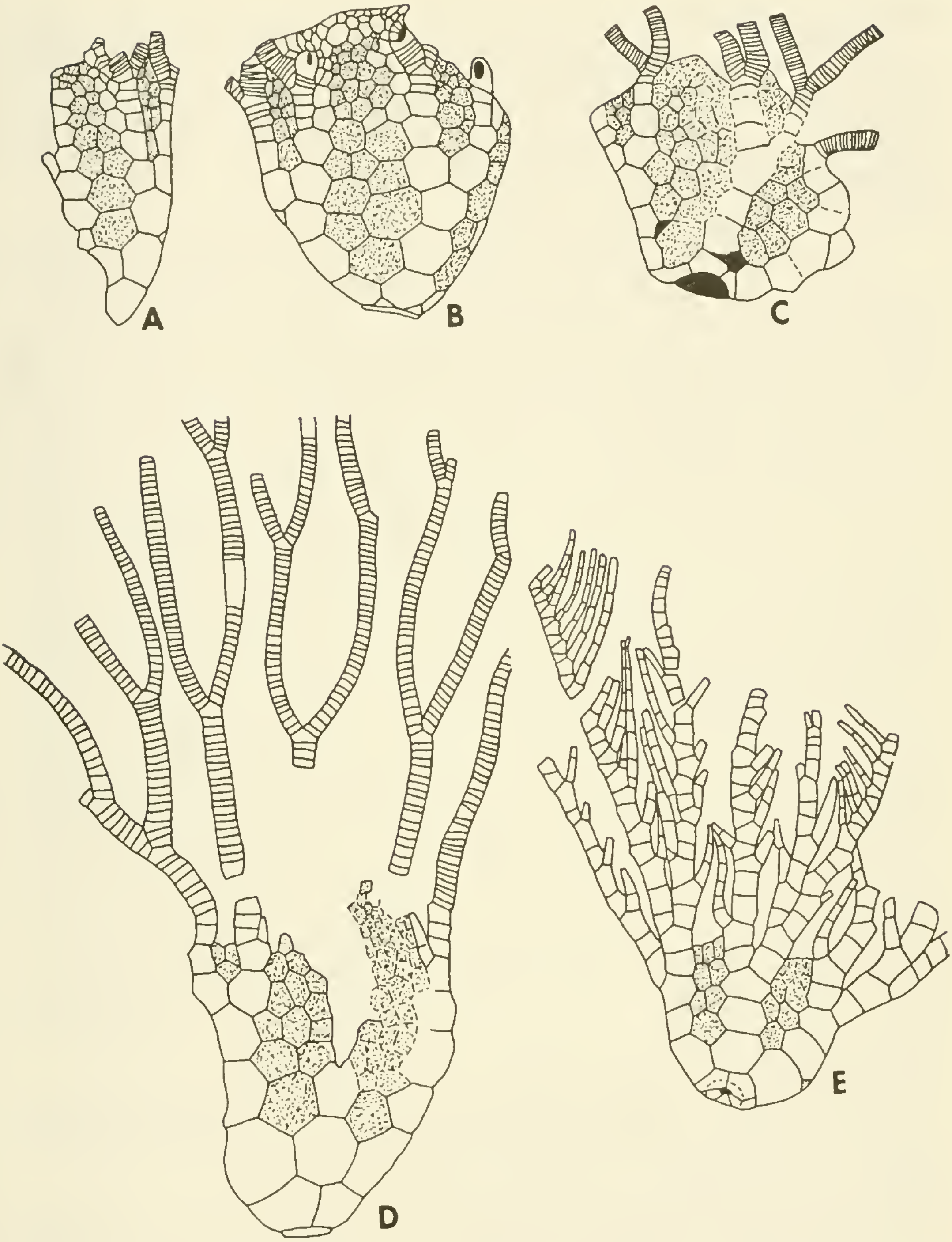
Text-figure 5. — *Glyptocrinids* from the Twin Cities area.
A-C. — *Pycnocrinus sardesoni.* n. sp., Decorah Shale, Bed 6 of Sardeson, Twin Cities Brick Plant, St. Paul.



A, B. — Holotype, UM 9263, views of CD interray and B and C rays respectively, × 0.85.

C. — Paratype, UM 3489, lateral view, × 1.2.

D. — *Pycnocrinus multibrachialis,* n. sp., E ray view of holotype, NMNH 42146, × 2, Decorah Shale, St. Paul.

E. — *Glyptocrinus tridactylus,* n. sp., lateral view of holotype, UM 9261, × 5, Decorah Shale, Bed 6 of Sardeson, Twin Cities Brick Plant, St. Paul.

Interbrachial plates stippled.

nodes or small ridges; marginal rims not present on the calyx plates.

Description. — Calyx conical with rounded sides, height/width 1.2. Ornamentation of median-ray ridges; calyx plates covered with either or both small nodes and short ridges, some specimens with fine short ridges located on margins of calyx plates; ridges oriented at right angles to plate sutures.

Basals pentagonal, short, height/width 0.4. Radials large, hexagonal, height/width 0.9. Two primibrachs present, almost as large as radials, height/width 0.9; primibrach *1* hexagonal; primibrach *2* axillary with six or seven sides. Distal fixed-brachial variable, usually a proximal tertibrach. Number of secundibrachs commonly six, less commonly four or five; two proximal plates, large, with six or seven sides, height/width about 1.2; distal four secundibrachs much smaller and wider relative to height, with five to eight sides, height/width ranging from 0.4 to 0.6; secundibrach *6* generally axillary, pentagonal, height/width about 0.5. From three to 11 tertibrachs may be fixed into the calyx; fixed tertibrachs similar to distal secundibrachs, height/width varying from 0.3 to 0.1.

Lateral interrays with eight or nine ranges of interbrachs; interbrachial areas slightly depressed compared to rays, plates regular; plates smaller in distal direction; height/width of plate ranging from about 1.0 to 0.7; proximal range with one plate; second range of two plates, terminating at level of primaxil or secundibrach *1;* third range with two or three smaller plates ending at proximal secundibrach level; next two higher ranges of interbrachs with two or three plates; higher ranges bearing from five to seven plates, gradually merging into tegmen; prominent fixed pinnule on secundibrach *2;* other fixed brachials may also have fixed pinnules.

Intersecundibrachial areas depressed below adjacent rays, proximal range with one plate at the secundibrach *1* level; about five higher ranges present, each with two or three plates.

CD interray partially known, primanal between primibrachs *1* of C and D rays; primanal followed by about seven large basically hexagonal anal series plates; anal series not strongly differentiated from the adjacent CD interray interbrachs. CD interray interbrachs large, regular; one large plate in the two proximal ranges, higher ranges with two or three plates each.

Tegmen partly preserved, composed of numerous plates, not strongly lobate. Ambulacrals numerous, polygonal, regular, arranged in rows of two plates, smaller than interambulacrals.

Arms four per ray, consisting of uniserial, cuneiform, and immature biserial brachials. Brachials much wider than high; height/width averages about 0.2 or less; pinnule facets small, not strongly protuberant. Pinnules closely spaced, long and slender, consisting of elongate pinnulars.

Column facet round. Stem only definitely known from a poorly preserved imprint associated with UM 3489; column round, with nodose columnals. Stem segments that probably belong to this species are round, individual columnals with sharp protuberant ridges that frequently have crenulate or nodose edges, columnals with fine horizontal striae that probably represent growth lines.

Attachment device not known.

Remarks. — This species is based on two more or less well-preserved calyces and a crushed crown. The crown is interesting because of the unusual type of preservation. The shape of the slab with the crinoid indicates that it was found in the sediment that filled the living chamber of a large straight nautiloid. Obviously the animal did not live there and it must have been transported with essentially no disarticulation. Rapid decapitation, transportation, and burial are denoted by the nearly intact crown. The probable sequence of events began with breakage of the stem, perhaps by a storm. Subsequently the crinoid was washed into the living chamber of the cephalopod where it was deposited. Perhaps the sediment originated as a mudflow that decapitated, transported, and buried the crinoid.

Several stem segments may belong to this form. Unfortunately the only direct trace of the stem is the imprint seen below the crown (UM 3489). This imprint is round with nodose columnals. The only stem segments that possess these features are those of UM 9266, and 9370-9372. Although these were not found with the calyces and crown, the similarity of morphology suggests that the stem fragments belong to *P. sardesoni*, n. sp.

The new species is most similar to *P. marginatus* (E. Billings) (1857, p. 260; 1859, p. 59, pl. 9, fig. 1a; see Wachsmuth and Springer, 1897, p. 275, pl. 20, fig. 2) from the Trenton of Canada. Both species possess four arms in each ray in which secundibrach

6 is usually axillary and the shapes of the calyx plates are similar. The presence of rims along the margins of the calyx plates separates the Canadian crinoid from *P. sardesoni,* n. sp.

P. dyeri (Meek) and allied forms from the Maysville of the Cincinnati area also show four arms in each ray. The synonymy of these crinoids is complex and in need of revision. *P. dyeri* was established by Meek (1872, p. 314; 1873, p. 32, pl. 2, figs. 2a, b). Many similar taxa from the same horizon were subsequently proposed by other workers, some of which represent juvenile crinoids; these are *P. shafferi germanus* (Miller) (1880, p. 233, pl. 7, figs. 2, 2a) and *P. shafferi* (Miller) (see 1880, p. 233, pl. 7, figs. 3a-c). Wachsmuth and Springer (1897, pp. 271-273, pl. 20, figs. 1a-c; pl. 21, figs. 3a-f, 6) studied many glyptocrinids from the Maysville and concluded that *P. shafferi* and *P. shafferi germanus* were growth variants of *P. dyeri.* These findings were confirmed by the statistical studies of Brower (1974b, p. 13, fig. 3). Accordingly *P. shafferi* and *P. shafferi germanus* are placed in the synonymy of *P. dyeri.* Subspecies based on adult crowns that are also similar to *P. dyeri* include *P. dyeri sublaevis* (Miller) (1878, p. 103, pl. 3, fig. 2) and *P. dyeri subglobosus* (Meek) (1872, p. 316; 1873, p. 34, pl. 2, fig. 2c). These crinoids occur with *P. dyeri* and may not constitute valid subspecies, although they have not been examined statistically. Like *P. sardesoni,* n. sp., the *P. dyeri* species group bears four arms in each ray. In the Twin Cities crinoid, secundibrach *6* is axillary; the axillary of the Cincinnati forms ranges from secundibrach *9* to *15.*

The Canadian *P. ramulosus* (E. Billings) (see Wilson, 1946, p. 28) and *P. ottawaensis* (Wilson) (1946, p. 27) are easily distinguished by their arm branching pattern. Four arms are present in each ray of *P. sardesoni,* n. sp., but the arms of the Canadian taxa branch repeatedly, producing roughly eight arms in each ray.

The Cincinnatian species *Glyptocrinus decadactylus* (see Wachsmuth and Springer, 1897, p. 270, pl. 6, fig. 12; pl. 20, figs. 4a-e; pl. 21, figs. 4a, b) also exhibits four arms in a ray but the arms bifurcate on secundibranch *2* in contrast to secundibrach *6* in *Pycnocrinus sardesoni,* n. sp.

Specific name.—*sardesoni* in honor of F. W. Sardeson, who contributed greatly to knowledge about Middle Ordovician crinoids from the Twin Cities area.

Types. — Holotype, UM 9263. Paratypes, UM 9262, 3489.

Other material. — Stem segments tentatively assigned to this species, UM 9266, 9370-9372.

Occurrence. — Decorah Shale, Beds 5 and 6 of Sardeson: most of the specimens are from the Twin Cities Brick Plant and one or more unknown localities in St. Paul; UM 3489 was collected by W. Hiller and E. Ericson from the Brick Plant, St. Paul.

Pycnocrinus multibrachialis, n. sp. Pl. 12, fig. 6; Text-fig. 5D

Diagnosis. — A species of *Pycnocrinus* with two main arms in each half-ray; half-rays branch isotomously several times; proximal branch located on secundibrach *11* to *24;* distal axillary varies from tertibrach *8* to *32*; roughly eight arms in each half-ray. Dorsal cup with sharp median-ray ridges; sharp ridges also link the adjacent radials; interray plates and lateral margins of ray plates with sharp nodes.

Description. — Calyx not completely known, elongate, with conical base and straight sides, height/width 1.3. Ornamentation of sharp median-ray ridges on basals, radials, and primibrachs; adjacent radials linked by strong sharp ridges; CD interray with sharp ridge located on primanal and anal series; sharp ridges also connecting primanal with adjacent C and D ray radials and proximal primibrachs; interray plates and lateral margins of ray plates bearing sharp nodes, plates somewhat swollen.

Basal circlet high, with five pentagonal basals; height/width of basals is 0.6. Radials large, hexagonal, height/width about 1.0. Primibrachs nearly as large as radials. Primibrach *1* hexagonal, height/width about 1.2. Primibrach *2* axillary, with seven or eight sides. Distal fixed-brachial probably secundibrach *2* or *3*. Proximal secundibrachs large, with six or seven sides, height/width about 1.0. More distal secundibrachs smaller and wider relative to height; height/width ranging from 0.7 to 0.5.

Interbrachials of lateral interrays not fully preserved, depressed, plates regular. Proximal range with one large hexagonal plate, height/width 1.0. Second range has two hexagonal or septagonal plates that terminate at the primaxil level; plates smaller than interbrachial *1,* height/width approximately 0.9. Higher ranges of about three plates each, plates with five to eight sides; height/width varying from 1.0 to 1.8.

Intersecundibrachs strongly depressed compared to adjacent rays, proximal range including one plate that ends at the secundibrach *2* level; second range of two plates; higher ranges not seen.

Only proximal portion of CD interray known. Primanal in glyptocrinid position between the primibrachs *1* of the C and D rays, primanal large, septagonal, followed by a central anal series plate and two smaller CD interray plates on the flanks. Anal series plates large and hexagonal. Other details of CD interray not observed.

Tegmen not known.

Arms two per ray, pinnulate, consisting of unserial and cuneiform brachials; each half-ray branching several times isotomously; proximal branch from secundibrach *11* to *24*; distal axillary from tertibrach *8* to *32*. Brachials variable, mostly uniserial and pinnulate. Uniserial brachials slightly wedge-shaped, extending across the entire arm, height/width about 0.3 or 0.4. Cuneiform brachials pinching out before reaching the side of the arm opposite the pinnule facet; those brachials immature biserial. Pinnule facets protuberant; face of facet oriented vertically. Pinnules long, slender, with round backs; proximal parts of pinnules widely separated; pinnulars from equidimensional to elongate plates with height/width about 2.0.

Column facet round with pentalobate axial canal; column and root not preserved.

Remarks. — This species is represented by one fairly well-preserved crown. The pattern of arm branching denotes that *P. multibrachialis*, n. sp. is allied to the Canadian Ordovician species *P. ottawaensis* (Wilson) (1946, p. 27; see E. Billings, 1859, p. 57, pl. 7, fig. 2a; Wachsmuth and Springer, 1897, p. 273, pl. 20, figs. 5a, b) and *P. ramulosus* (E. Billings) (see Wilson, 1946, p. 28; E. Billings, 1859, p. 57, pl. 8, fig. 1a). All taxa have two main arms in each ray that bifurcate repeatedly so that about eight arm branches are present in each ray. According to Wilson, although the two Canadian taxa are closely related, *P. ottawaensis* is distinguished from *P. ramulosus* by larger size and the presence of five or six secundibrachs rather than four. The Twin Cities form can be separated from the Canadian crinoids by the ornamentation. *P. multibrachialis*, n. sp. possesses sharp median-ray ridges, sharp ridges connecting the adjacent radials and prominent nodes on the plates. *P. ottawaensis* and *P. ramulosus* show smooth plates and broad median-ray ridges. Although all Canadian specimens that we have seen are flattened, the calyx shape of *P. multibrachialis,* n. sp. is probably narrower than in the Canadian crinoids.

The calyx morphology of the new species resembles that of the *P. dyeri* (Meek) species group. As stated in the discussion of *P. sardesoni,* n. sp., the *P. dyeri* group is characterized by four arms in each ray where the axillary ranges from secundibrach *9* to *15.* In *P. multibrachialis,* n. sp., each main arm branches several times so that approximately eight arms are found in each ray.

Specific name. — *multibrachialis,* in reference to the many brachials as a result of the repeated arm branching.

Holotype. — NMNH 42146.

Occurrence. — Decorah Shale: St. Paul.

PERIGLYPTOCRINUS Wachsmuth and Springer, 1897

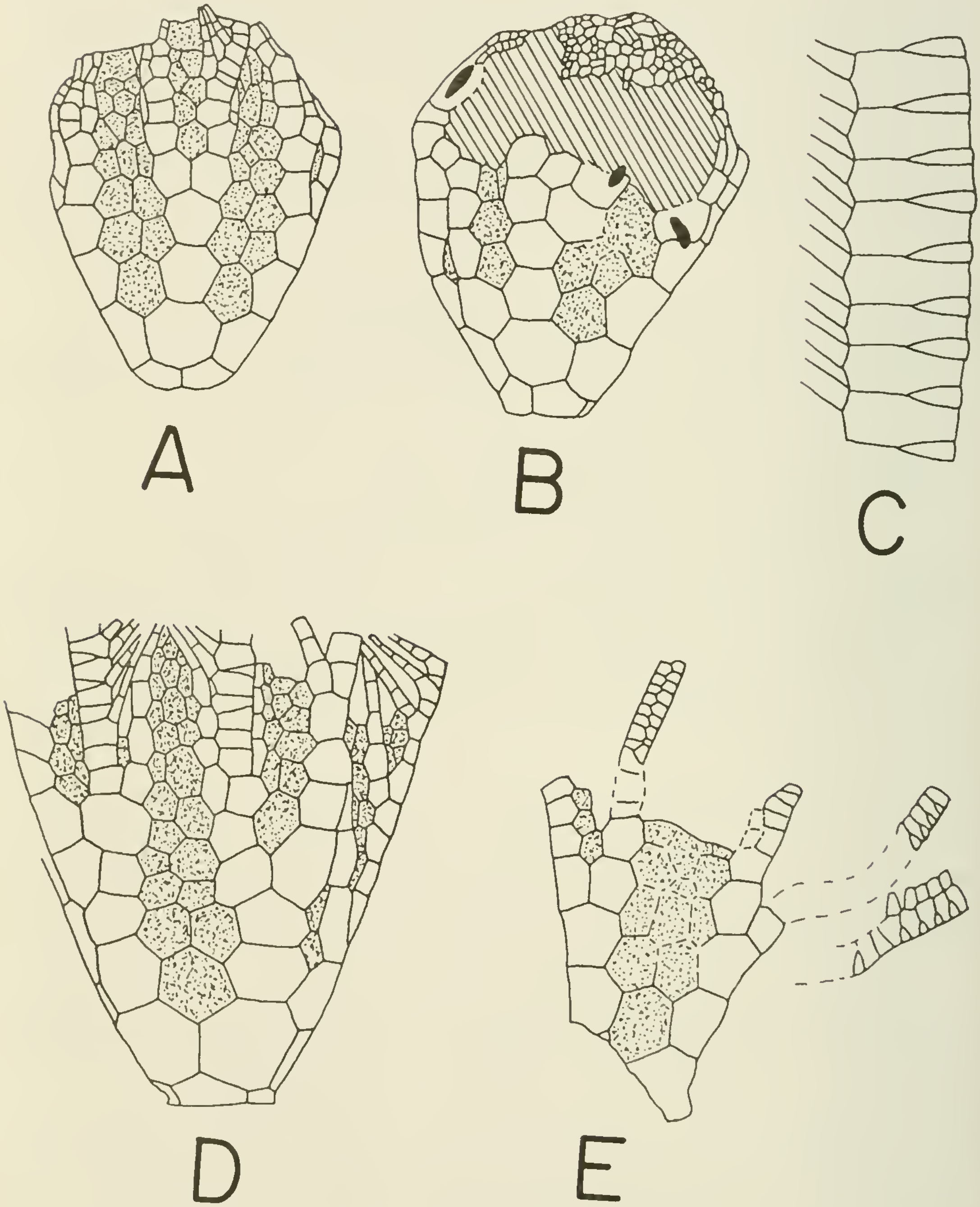
Periglyptocrinus spinuliferus, n. sp. Pl. 12, figs. 1-4; Text-fig. 6

Diagnosis. — A species of *Periglyptocrinus* with two biserial arms in each ray; dorsal cup ornamentation of median-ray ridges, stellate ridges, and small nodes on plates; pinnules bearing small spines or nodes.

Description. — Calyx conical, with slightly rounded sides, height/width 1.0. Ornamentation of sharp median-ray ridges; strong stellate ridges located on proximal part of cup up to level of primibrachs; scattered nodes also at this level; stellate ridges lacking on distal part of calyx, but many nodes present.

Basals pentagonal, height/width 0.8. Radials large, hexagonal, height/width 0.9. Primibrachs two, nearly as large as radials; primibrach *1* hexagonal, height/width 1.0; primibrach *2* with six or seven sides, axillary, bearing secundibrachs, height/width 1.0. Distal fixed-brachial from secundibrach *4* to *8.* Proximal two secundibrachs irregularly hexagonal; height/width from 0.8 to 0.9. Distal secundibrachs shorter and wedge-shaped, height/width about 0.4. Long and prominent fixed pinnule on interray side of secundibrach *2,* differentiated from other pinnulars by larger size and strong median-ray ridge. Higher fixed pinnules smaller, common on most fixed-secundibrachs.

Interbrachials of lateral interrays depressed, regular, height/



Text-figure 6. — Plate diagrams for *Periglyptocrinus spinuliferus*, n. sp. Decorah Shale, Bed 4 of Sardeson: south St. Paul and Twin Cities Brick Plant, St. Paul.

A, B. — Paratype, UM 9260b, views of A and C rays respectively, × 2.2.

C, D. — Holotype, UM 9260a; view of arm fragment showing immature biserial brachials, × 17.4; D and E rays, × 4.2.

E. — Figured specimen tentatively placed in this species, UM 9260c, lateral view, × 1.8.

Interbrachial plates stippled.

width of all plates about 1.0, one plate in proximal range; next two ranges of two plates each, ending at secundibrach *1* level; higher ranges with two to four less regularly arranged plates; interbrachial areas continuing into tegmen.

Intersecundibrachial areas depressed; proximal range with one plate at secundibrach *2* level; distal ranges from one to three plates each, ending at secundibrach *8* level.

CD interray not fully known. Primanal in glyptocrinid position between proximal primibrachs of C and D rays, primanal septagonal, followed by three plates; central plate part of anal series; the two flanking plates are CD interray interbrachials. Anal series with strong median-ray ridge, consisting of large hexagonal plates. CD interray interbrachials smaller than adjacent anal series plates, one plate in proximal ranges, one or two plates in more distal ranges.

Tegmen consisting of numerous plates, strongly lobate with raised ambulacral areas and depressed interambulacrals. Ambulacrals nodose, arranged in rows of two plates. Interambulacrals generally smooth, sometimes bearing small nodes, larger than ambulacrals.

Arms two per ray, long, slender, composed of immature biserial or mature biserial plates. Immature biserial plates with curved, convergent proximal and distal margins. Mature biserial brachials with parallel proximal and distal margins; inner margins sharply separated from proximal and distal ones, converging sharply, producing chevron or zig-zag suture between brachials on opposite sides of arms; height/width of brachials about 1.3 to 1.5. Pinnules long and slender, separated by wide gaps; pinnules with many small nodes or short spines.

Stem facet round; column and rooting device unknown.

Remarks. — Two specimens are definitely assigned to this new species. The holotype, UM 9260a, is a complete crown whereas the paratype, UM 9260b, is a dorsal cup. A third crinoid, UM 9260c, a poorly preserved partial crown in matrix, may also belong to this species. *P. spinuliferus*, n. sp. is most closely related to *P. priscus* (E. Billings) from the Middle Ordovician of Ontario. Both forms show two biserial arms in each ray and similar dorsal cups with the same type of ornamentation. Some confusion exists about the ornamentation of *P. priscus.* E. Billings (1857, p. 257; 1859, p. 56, pl. 7, figs. 1a-f) described and illustrated the holotype, GSC 1522, as if the plates were smooth except for median-ray ridges. Wachsmuth and Springer (1897, pp. 278, 279, pl. 21, fig. 2) pictured the type with smooth plates but their description listed median-ray ridges and pustulose plates. Parks (1909) described a specimen (ROM 649T) from another locality in the Middle Ordovician of Ontario, in which the complete ornamentation consists of median-ray ridges and stellate ridges in conjunction with small nodes on the plates. As mentioned above, this is the same type of ornamentation as in the Twin Cities crinoid. *P. spinuliferus,* n. sp. may be separated from the Canadian form in several ways. The dorsal cup of *P. spinuliferus* is wider relative to its height, and *P. priscus* lacks the small nodes or spines on the pinnules that are characteristic of *P. spinuliferus.* The arms of *P. priscus* are heavier compared to size of the calyx. In addition, the brachials of *P. priscus* are mature biserial whereas those of the Twin Cities species are immature biserial; however, this feature may be of ontogenetic rather than taxonomic significance because specimens of *P. priscus* commonly are larger than those of *P. spinuliferus.*

P. billingsi Wachsmuth and Springer (1897, p. 277, pl. 21, figs. 1a, 1b) also from the Middle Ordovician of Canada differs from both *P. priscus* and *P. spinuliferus,* n. sp. in having four instead of two arms in each ray.

Specific name. — *spinuliferus,* in allusion to the small spines or nodes on the pinnules.

Types. — Holotype, UM 9260a. Paratype, UM 9260b.

Other material. — UM 9260c is tentatively placed in this species.

Occurrence. — Decorah Shale, Bed 4 of Sardeson: Twin Cities Brick Plant and an unknown locality in South St. Paul.

Subclass INADUNATA Wachsmuth and Springer, 1885

Order CLADIDA Moore and Laudon, 1943

Suborder DENDROCRININA Bather, 1899

Family **CUPULOCRINIDAE** Moore and Laudon, 1943

Genus **CUPULOCRINUS** d'Orbigny, 1849

Cupulocrinus gracilis (Hall) Pl. 13, figs. 5, 7

1847. *Poterocrinus gracilis* Hall, Palaeont. of New York, vol. 1, p. 84, pl. 28, figs. 2a, b.
1879. *Dendrocrinus gracilis* (Hall), Wachsmuth and Springer, Rev. Paleocrinoidea, Pt. 1, p. 76 (299).
1889. *Dendrocrinus gracilis* (Hall), Miller, North American Geol. and Paleont., p. 238.
1915. *Dendrocrinus gracilis* (Hall), Bassler, United States National Mus. Bull. 92, p. 396.
1943. *Dendrocrinus gracilis* (Hall), Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 414.
1975. *Cupulocrinus gracilis* (Hall), Kolata, Paleont. Soc. Mem. 7, p. 37, pl. 7, figs. 6-8.
1961. Not *Cupulocrinus gracilis* Ramsbottom, Palaeontographical Soc. Mem., vol. 114, p. 13, pl. 5, figs. 6, 7.

Diagnosis. — A species of *Cupulocrinus* characterized by a conical dorsal cup with a narrow base, dorsal cup walls straight, dorsal cup plates smooth, sutures not deeply incised; arms moderately slender with several irregular isotomous branches; primibrachs four or more, secundibrachs numerous for *Cupulocrinus;* brachials with round backs, height/width moderate; stem round, proximal part of column tapering gently, columnals not strongly nodose.

Description. — Dorsal cup conical with straight sides, base of cup narrow, height/width 0.9; dorsal cup plates smooth with slightly incised sutures.

Five infrabasals, pentagonal, truncated at juncture with column, relatively large, about 30 percent of cup height; height/width averages 1.1. Basals five; lateral basals hexagonal, height/width 1.2; CD interray basal largest of basals, septagonal, distally truncated for reception of anal X, height/width about 1.5; basal circlet about 40 percent of cup height. Lateral radials four, pentagonal, height/width about 0.7, radials about 30 percent of cup height; radial facets slightly curved, wide, about 70 percent of total width of radial. Radianal pentagonal, located in primitive position below the C ray R, radianal equidimensional. Anal X not completely known, presumably hexagonal, slightly wider than radianal, located above CD interray basal and between C and D ray radials. C ray radial pentagonal, slightly smaller than other radials, height/width is 1.0.

Fragment of anal sac preserved. Anal series plates in single vertical row, plates basically hexagonal, height/width 1.1; anal series doubly flanked by row of hexagonal plates; these roughly half as large as anal series plates.

Arms uniserial, nonpinnulate, branching isotomously, branches irregular; each half-ray branching two to four times. Brachials round-backed, smooth; sutures of typical cupulocrinoid type, primibrachial sutures with gaping lip of moderate size; secundibrachs with small gape; tertibrachs and higher brachials without gape and with straight sutures; articular surfaces unknown. Number of brachials variable in all arm segments. Non-axillary brachials quadrangular; height/width as follows: primibrachs, 0.48; secundibrachs, 0.6; tertibrachs, 0.8; quartibrachs, 0.6; quintibrachs, 0.7; hexibrachs, 1.0. Axillary brachials pentagonal, height/width as follows: primaxil, 0.6; secundiaxil, 1.0. Arm branching formula irregular; variation in branching pattern increasing distally. At least five primibrachs. Branched secundibrachial series of six or seven plates. Tertibrachial series branched or unbranched, branched series with seven to nine plates; unbranched series of at least 20 plates. Quartibrachial series branched or unbranched, eight plates in branched series, up to 27 in unbranched series. Nine quintibrachs in only known branched series; single, incompletely preserved unbranched series with 15 plates. Hexibrachial series not fully known, at least nine plates present.

Column incompletely known, round, with pentalobate axial canal occupying about one-third of stem diameter. Columnals not nodose, three orders of plates present; heights as follows: Order 1, 0.4 mm; Order 2, 0.15 mm; Order 3, 0.08 mm. Complete order formula: 1-3-2-3-1.

Remarks. — *C. gracilis* (Hall) is represented in the Twin Cities fauna by four partial specimens and several arm fragments. Two specimens (UM 9292 and 9295) are dorsal cups. Although the number of primibrachs is uncertain, at least four or five plates must have been present in the A and E rays of UM 9295. The other specimens, UM 9293 and 9294, are detached sets of arms, and the dorsal cups are not known. The arms and the dorsal cups are considered conspecific for two reasons. First, the dorsal cups and arms were collected from the same bed at the same locality. Second, both the arms and dorsal cups are typical of cupulocrinids.

Although *C. gracilis* was originally described by Hall (1847), the form was emended by Kolata (1975) who had examined the type material. The Twin Cities crinoids differ slightly from the Illinois specimens figured by Kolata (1975, pl. 7, figs. 6-8) in having brachials that are wider relative to their heights. This is attributed to age rather than taxonomy because the Twin Cities specimens are larger than those from Illinois; in most crinoids the width/height ratio of the brachials increases in older animals (e.g. Brower, 1974a, pp. 26-29).

C. gracilis is easily separated from all other cupulocrinids by the nature of the stem, shape of the dorsal cup, ornamentation of the dorsal cup, shape of the arms, and the arm branching formula. In general, *C. gracilis* has fewer arm branches and more secundibrachs than most other species. As in other cupulocrinids (see discussion of *C. jewetti*), there is no significant correlation between the number of secundibrachs and tertibrachs; based on nine observations, the correlation coefficient is only –0.16.

In *C. gracilis* the dorsal cup plates are smooth and the sutures are not strongly depressed. The following species either have plates with rugose stellate ridges or swollen and nodose plates with depressed sutures: *C. jewetti* (E. Billings) (1859, p. 43, text-fig. 13; see Springer, 1911, p. 28, pl. 1, figs. 10-12; pl. 3, figs. 5-7), *C. jewetti kentuckiensis* Springer (1911, p. 32, pl. 3, figs. 8, 9), *C. polydactylus* (Shumard) (see Meek, 1873, p. 22, pl. 3*bis*, fig. 9), *C. heterobrachialis* Ramsbottom (1961, p. 12, pl. 5, figs. 1-5), *C. sepulchrum* Ramsbottom (1961, p. 14, pl. 4, figs. 8, 9), *C. angustatus* (Meek and Worthen) (see Meek and Worthen, 1875, p. 492, pl. 23, fig. 8), and *C. minimus* Springer (1920, p. 88, pl. 75, figs. 6a, b). In addition, *C. jewetti, C. jewetti kentuckiensis, C. polydactylus,* and *C. angustatus* exhibit brachials that are much wider relative to their height. *C. sepulchrum* and *C. heterobrachialis* are also characterized by pentagonal columns which differ from the round stem of *C. gracilis.* The plates of *C. erraticus* (Miller) (1881, p. 316, pl. 8, figs. 1, 1a) are smooth but the sutures are depressed, whereas *C. gracilis* possesses smooth sutures.

Like *C. gracilis, C. conjugans* (E. Billings) (1857, p. 268; 1859, pp. 41, 44, pl. 3, figs. 8a, b; pl. 4, figs. 1, 2) and its synonym *C. cylindricus* (E. Billings) (see Springer, 1911, p. 37) shows smooth dorsal cup plates and sutures. *C. conjugans* has a dorsal cup that is wider relative to its height, the proximal part of the column tapers more rapidly, and the radial facets are much narrower.

C. gracilis is most closely allied to *C. humilis* (E. Billings)

(1857, p. 270; see 1859, p. 39, pl. 3, fig. 4; Springer, 1911, p. 28, text-fig. 2, pl. 1, figs. 8, 9; pl. 3, figs. 1-4), *C. latibrachiatus* (E. Billings) (1857, p. 270; see 1859, p. 39, pl. 3, figs. 5a-c), *C. drummuckensis* Kolata (1975, p. 38; see Ramsbottom, 1961, p. 13, pl. 5, figs. 6, 7), and *C. heterocostalis* (Hall) (1847, p. 85; pl. 28, figs. 3d, e, possibly figs. 3c, f; not figs. 3a, b; see Springer, 1911, p. 30, text-fig. 3). *C. heterocostalis* exhibits a wider cup with basals that are shorter compared to the overall size of the cup. Also the primibrachial series is more slender than in the Twin Cities form. *C. humilis* and *C. latibrachiatus* are closely related. Both species are characterized by relatively wider dorsal cups with rounded walls that contrast with the straight-walled and more slender cup of *C. gracilis*. Also the brachials of *C. gracilis* are more slender relative to their height. *C. drummuckensis* possesses slender arms with equidimensional brachials (height equals the width) compared to the heavier arms with relatively wider brachials of *C. gracilis*.

Figured specimens. — UM 9292 and 9293.

Other material. — UM 9294-9296.

Occurrence. — Platteville Limestone, upper part of Hidden Falls Member, Bed 2 of Sardeson: Johnson Street Quarry, Minneapolis.

Cupulocrinus jewetti (E. Billings) Pl. 14; Pl. 15, fig. 4

1859. *Dendrocrinus jewetti* E. Billings, Canadian Organic Remains, Dec. 4, p. 43, text-fig. 13.
1879. *Dendrocrinus jewetti* E. Billings, Wachsmuth and Springer, Rev. Paleocrinoidea, Pt. 1, p. 76.
1883. *Dendrocrinus jewetti* E. Billings, W. R. Billings, Ottawa Field Nat. Club, Trans. vol. 1, No. 4, p. 51, figs. on unnumbered plate.
1889. *Dendrocrinus jewetti* E. Billings, Miller, North American Geol. and Palaeontology, p. 238, fig. 283.
1911. *Cupulocrinus jewetti* (E. Billings), Springer, Canadian Geol. Surv. Mem. 15-P, p. 28, pl. 1, figs. 10-12, pl. 3, figs. 5-7.
1915. *Cupulocrinus jewetti* (E. Billings), Bassler, U.S. Nat. Mus. Bull. 92, p. 315.
1920. *Cupulocrinus jewetti* (E. Billings), Springer, Crin. Flexibilia, p. 88, pl. 75, figs. 2-4.
1943. *Cupulocrinus jewetti* (E. Billings), Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 387.
1944. *Cupulocrinus jewetti* (E. Billings), Moore and Laudon, North American Index Fossils, p. 155, pl. 53, fig. 12.
1970. *Cupulocrinus jewetti* (E. Billings), Bolton, Geol. Surv. Canada, Bull. 187, p. 63, pl. 13, fig. 12.
1973. *Cupulocrinus jewetti* (E. Billings), Webster, Geol. Soc. America, Mem. 137, p. 93.
1975. *Cupulocrinus jewetti* (E. Billings), Kolata, Paleontological Soc. Mem. 7, p. 38, pl. 7, figs. 4, 5.

Diagnosis. — A species of *Cupulocrinus* with either or both nodose and stellate dorsal cup plates; sides of cup expanding more rapidly than in most cupulocrinids; proximal brachials wide relative to height; arms stouter than in many species.

Description of adult. — Dorsal cup broadly conical with rounded walls, height/width about 0.7; ornamentation variable, typically with more or less well-defined stellate ridges; stellate ridges of some specimens covered with four or five smaller ridges made up of fine nodes, plate surfaces granular.

Infrabasals five, pentagonal, height/width approximately 0.9; infrabasals about 33 percent of cup height. Basals five, lateral interray basals hexagonal, height/width roughly 1.0; CD interray basal septagonal, distally truncated for anal X; basal circlet about 50 percent of the cup height. Radials pentagonal; height/width of lateral radials averaging 0.6; C ray radial slightly smaller than lateral radials, height/width 0.5; radial circlet less than one-third of dorsal cup height. Radianal pentagonal, height/width about 1.0, radianal in primitive position below C ray radial. Anal X hexagonal, height/width 1.0, above CD interray basal and between radials of C and D rays. Radial facets occupying entire width of radials; articular surface crescent-shaped with narrow dorsal ligament pit, pit separated by longitudinal ridge from ventral ligament pit.

Anal sac only partly known, of typical cupulocrinoid type, consisting of central range of large hexagonal anal series plates flanked by much smaller plates. Anal series plates with median-ray ridge, height/width roughly 1.0. Facet on proximal part of first anal series plate, with one central and two flanking ligament pits separated by shallow ridges.

Arms uniserial, nonpinnulate, branching isotomously at about four levels. Brachials with round backs. Proximal brachials often nodose, distal brachials with smoother outlines; surfaces of proximal brachials commonly covered with small nodes or granules, distal brachials granulose or smooth. Non-axillary brachials rectangular, with following height/width ratios: primibrachs, 0.2; secundibrachs, 0.4; tertibrachs, 0.6; quartibrachs, 0.7; quintibrachs, 1.0; hexibrachs, 1.1. Axillaries pentagonal, height/width ratios: primaxil, 0.3; secundiaxil, 0.3; tertiaxil, 0.5; quartiaxil, 0.8; quintiaxil, 1.0. Variation of arm branching structure discussed under Remarks.

Column known only in young specimen, round, with pentalobate axial canal, tapering distally. Several orders of plates present, most nodose, some with straight sides. Attachment device probably a small lobate or digitate holdfast that was cemented to a bryozoan.

Remarks. — About seven well-preserved crowns from the Twin Cities and a number of partial crowns, cups and arm fragments are definitely placed in this species. Six specimens, UM 5942, occur on a single slab of granular Platteville Limestone (Carimona Member) from an unspecified locality in Fillmore County. Three crowns and one arm fragment, UM 9278, 9279 and 9282, were collected at the Twin Cities Brick Plant in St. Paul from Bed 5 of the Decorah Shale. The last crown, UM 9283, is a juvenile with a complete stem from Bed 4 of the Decorah Shale. The stem was probably attached to a large ramose bryozoan. The attachment device is buried underneath the bryozoan but probably was a small lobate or digitate holdfast that was cemented to the surface of the bryozoan. The orientation of the attachment device indicates that bryozoan was probably erect when the crinoid was alive. The entire crinoid is about 45 mm long. All of the other specimens from Bed 5 and from the Platteville are associated with large ramose bryozoans and these individuals could have been attached to bryozoans like the Bed 4 specimen.

Comparison of UM 9283 and 9278 illustrates some ontogenetic changes. The calyx widths of the two specimens equal about 8.0 and 15 mm. The most striking change with growth is a decrease in the height/width ratios of the calyx plates and brachials. This shows that the width of these plates was growing more rapidly than the height.

Several of the Twin Cities specimens preserve the articular surfaces of the radials and brachials. On the primibrachs, the central parts of the sutures are depressed which denotes a strong "patelloid" process. Proceeding distally, the "patelloid" processes become progressively less prominent and the sutures between the quartibrachs and quintibrachs are straight or almost so. The distal articulating surface of fully preserved primibrachs and secundibrachs has an outer lip or rim which encloses a longitudinal trough or dorsal ligament pit with its long axis parallel to the width of the brachials. When the rim is weathered or broken, a crescent-shaped depression appears; this represents the dorsal ligament pit. In several tertibrachs, the rim is replaced with small supplementary plates; during the life of the crinoid these were probably joined by an integument to form a more or less rigid pavement. The ventral ligament pits are poorly defined, only being known in a few tertibrachs. These ligament pits are represented by vague depressions flanking the food grooves, and they grade into the dorsal ligament pits along the margins of the brachials.

The food grooves of the brachials are visible in UM 9278 where the sides of several distal series of brachials are exposed, disclosing four longitudinal rows of small plates. The two central rows of smaller plates are lappets, which are set at an angle to the two outer rows of the larger side-covering plates. There is one lappet to each covering plate, and four-and-one-half pairs of covering plates to each brachial. Every fifth covering plate is shared by two continguous brachials. The lateral walls of the brachials are somewhat raised above the level of the covering plates. Assuming that the tube foot arrangement of *C. jewetti* is the same as in the Recent *Antedon* (Nichols, 1960, p. 107), each lappet would have been associated with three food-catching tube feet.

The variation in ornamentation in the Twin Cities specimens exceeds that known in crinoids from Kirkfield, Ontario (Springer, 1911, p. 28, pl. 1, figs. 10-12; pl. 3, figs. 5-7). The typical Kirkfield individuals possess vaguely defined single stellate ridges on the dorsal cup. The primibrachs and secundibrachs are nodose or swollen, but distally the brachials gradually become smooth with shelf-like projections on their lateral margins. The dorsal cup ornamentation of the Twin Cities material ranges between two extremes. First are crinoids that resemble typical Kirkfield animals such as UM 5942. The other extreme includes specimens like UM 9278; this calyx shows vague single stellate ridges, but a series of about four fine nodose ridges is superimposed on the stellate ridges. All specimens can be arranged into the following gradational sequence: UM 5942, 9279, probably 9281, 9283, 9282, and 9278. Some of the primibrachs and secundibrachs of the Twin Cities individuals are nodose, as in the Kirkfield material, *e.g.*, UM 5942, 9278, 9282; in several, the nodose or swollen brachials exhibit a row of small distal nodes. The nodose primibrachs and secundibrachs grade into smooth plates in UM 9283 and 9279. The distal brachials of the Twin Cities crinoids are sometimes nodose with small nodes covering the surface, *e.g.*, UM 9278. Other brachials are simply nodose, but most of the distal brachials bear smooth surfaces and margins, *e.g.*, UM 9283, 5492. The shelf-like projections found in the typical Kirkfield specimens are conspicuously absent. However some Kirkfield examples possess smooth-sided brachials like the Twin Cities forms. This discussion shows that the Twin Cities specimens have ornamentation which differs somewhat from that of typical Kirkfield crinoids. Nevertheless, the ornamentation of the two groups of animals overlaps and the specimens are considered conspecific with no doubt.

C. jewetti is somewhat similar to a series of cupulocrinids with calyx plates bearing either or both nodose and stellate ridge ornamentation. These species are *C. jewetti kentuckiensis* Springer (1911, p. 32, pl. 3, figs. 5-7), *C. polydactylus* (Shumard) (see Meek, 1873, p. 22, pl. 3bis, fig. 9), *C. heterobrachialis* Ramsbottom (1961, p. 12, pl. 5, figs. 1-5), *C. sepulchrum* Ramsbottom (1961, p. 14, pl. 4, figs. 8, 9), *C. angustatus* (Meek and Worthen) (see Meek & Worthen, 1875, p. 492, pl. 23, fig. 8) and *C. minimus* Springer (1920, p. 88, pl. 75, figs. 6a, b).

As implied above, populations of *C. jewetti* show some variation of ornamentation. For example, the Kirkfield specimens have plates that vary from nodose to stellate (Springer, 1911, pl. 1, figs. 10-12; pl. 3, figs. 5-7). However, some individuals in every local population that we have seen exhibit definite stellate ridges. Thus *C. jewetti* differs from the other taxa in having more pronounced stellate ridges (in some crinoids), a more widely expanding dorsal cup and generally stouter arms.

The variability in arm branching pattern is tabulated below.

Series	Average number of plates	Range	Coefficient of variation	Number of specimens
Primibrachs	3.4	3-5	20%	22
Secundibrachs	4.0	3-7	24%	22
Tertibrachs	7.1	4-17	38%	30
Quartibrachs	9.6	6-20	48%	13
Quintibrachs	10.1	8-13	19%	9

There are two main patterns. First, the average number of plates in the different series increases distally. Second, with the exception of the quintibrachs, the coefficient of variation [(standard deviation/mean) $\times$ 100] is augmented distally. The correlation coefficients between the number of plates in adjacent series are listed below.

Series	Correlation coefficient (r)	Degrees of freedom	Critical value of r at 0.05 probability level
Primibrachs vs. secundibrachs	0.048	20	0.42
Secundibrachs vs. tertibrachs	0.024	28	0.36
Tertibrachs vs. quartibrachs	−0.025	11	0.55
Quartibrachs vs. quintibrachs	−0.550	7	0.67

The critical correlation coefficients are values that significantly exceed zero correlation. If the magnitude of the observed correlation exceeds the critical value, the observed correlation was drawn from a population with a correlation that is greater or less than zero. Comparing the observed correlations with the critical figures at the 0.05 probability level indicates that the number of plates in the adjacent brachial series are not significantly correlated, and these characters are believed to be independent of one another with respect to the genetic programming of the crinoid.

The distribution of height and width of the brachials was investigated within the arms of several specimens, especially UM 9278 (Pl. 14, fig. 3). Each arm series branches isotomously four or five times. The most striking patterns are as follows.

1. Both height and width decline distally but width decreases more rapidly. These differences were analyzed statistically. Graphs were plotted for Order of brachial (X) *vs.* width of axillary or non-axillary brachial (Y) (Text-figs. 7B, C, E, F). Simple power functions or allometric equations were fitted to the data and the differences between the slopes or exponents were tested statistically by Student's t. In all cases, the slopes for non-axillary brachials have greater negative values than those of axillary brachials, subject to the 0.05 risk level. This indicates that the width of the axillary brachials decreases more slowly than the non-axillary brachials.

2. For any one order of brachials *e.g.*, primibrachs or secundibrachs, the axillaries are larger than the non-axillary brachials. The primaxils and primibrachs are characterized by nearly the same width but the axillary is higher (Text-figs. 7A, D). For the other

Text-figure 7. — Graphs and sketches showing size and shape of brachials in *Cupulocrinus jewetti* (E. Billings). X axes of all graphs horizontal; Y axes vertical. Equations are fitted by the reduced major axis technique. The S_b and S_a denote standard errors for the slope and initial intercept, respectively. Duplicate points not shown on graphs.

A-C. — Graphs for half-ray with axillary quintibrach.

A. — Plot of width *vs.* height for axillary and non-axillary brachials. Brachial orders numbered. Axillary plates circled. Equation data: Axillary brachials — $Y = 1.24X^{0.228}$; $S_b = 0.0395$, $S_a = 0.0130$; $N = 5$. Non-axillary plates — $Y = 0.918X^{0.228}$; $S_b = 0.048$, $S_a = 0.0127$; $N = 42$.

B. — Axillary order *vs.* width of axillaries. Equation data: $Y = 4.93X^{-0.752}$; $S_b = 0.129$, $S_a = 0.0163$; $N = 5$.

C. — Brachial order *vs.* width of non-axillary plates. Equation data: $Y = 5.62X^{-1.02}$; $S_b = 0.0672$, $S_a = 0.039$; $N = 42$.

D-F. — Graphs for half-ray with axillary quartibrach.

D. — Plot of width *vs.* height for all brachials. Symbols as in A. Equation data: Axillary brachials — $Y = 1.01X^{0.377}$; $S_b = 0.0880$, $S_a = 0.0283$; $N = 4$. Non-axillary plates — $Y = 0.973X^{0.162}$; $S_b = 0.0223$, $S_a = 0.00744$; $N = 42$.

E. — Axillary order *vs.* width of axillaries. Equation data: $Y = 4.77X^{-0.746}$; $S_b = 0.0976$, $S_a = 0.0285$; $N = 4$.

F. — Brachial order *vs.* width of non-axillary plates. Equation data: $Y = 6.78X^{-1.30}$; $S_b = 0.0774$, $S_a = 0.0496$; $N = 42$.

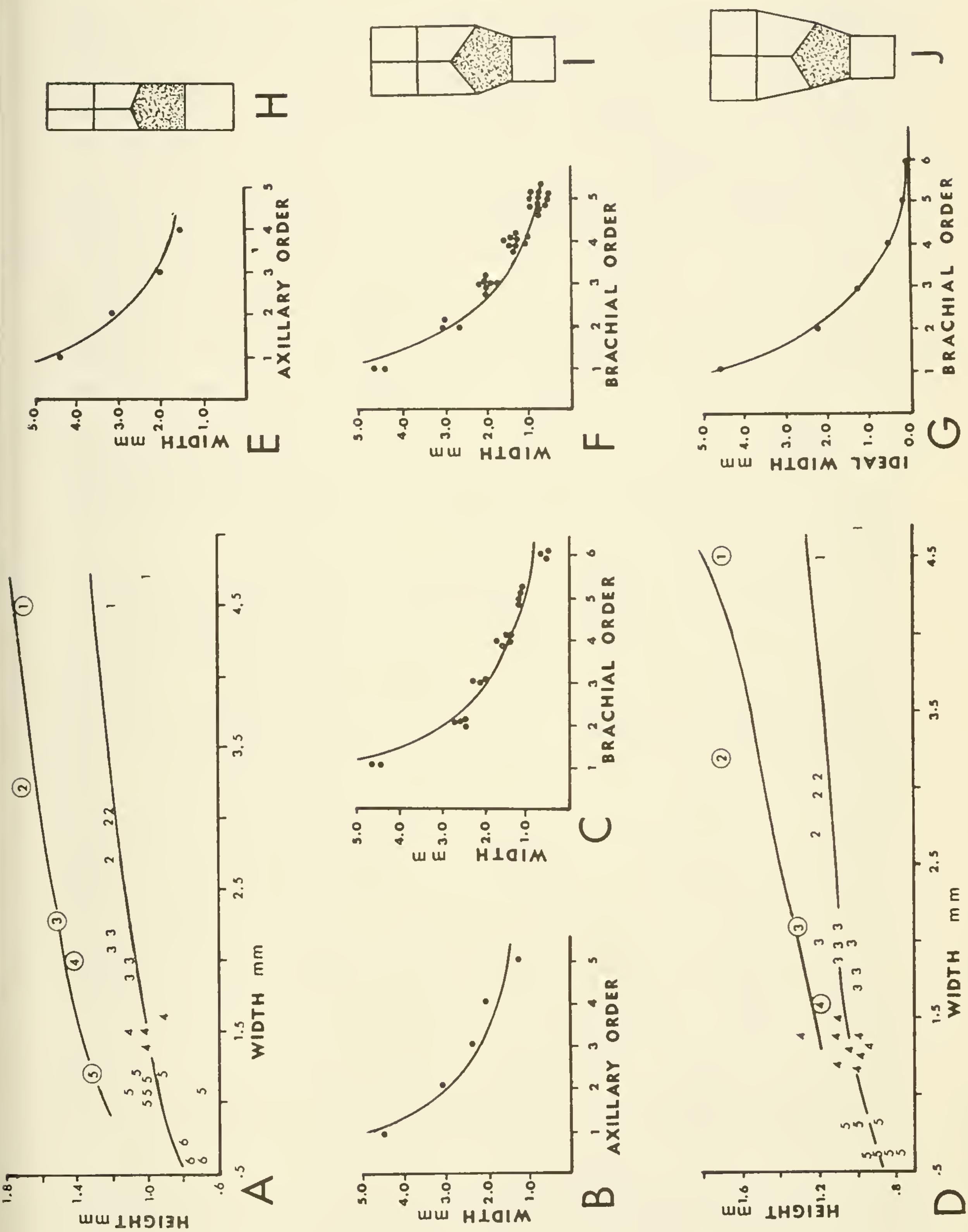
G. — Graph for brachial order *vs.* ideal width of non-axillary brachials. Calculation of ideal width assumes each higher order brachial is half as wide as the underlying brachials. Equation data: $Y = 6.81X^{-1.96}$; $S_b = 0.202$, $S_a = 0.110$; $N = 6$.

H-J. — Schematic sketches for brachials formed in various ways. Not to scale, axillaries stippled.

H. — Axillaries with parallel sides, width of non-axillary brachials decreases by 50 percent each time arms branch.

I. — Axillaries pentagonal with expanding sides, all non-axillary brachials with parallel sides. Width decreases by less than 50 percent on each bifurcation.

J. — Axillaries pentagonal as in I but sides of proximal non-axillary brachials also expand. This configuration, seen in *C. jewetti*, results in minimum rate of width decrease in each arm branch.


A
HEIGHT mm
WIDTH mm
B
WIDTH mm
AXILLARY ORDER
C
WIDTH mm
BRACHIAL ORDER
D
HEIGHT mm
WIDTH mm
E
WIDTH mm
AXILLARY ORDER
F
WIDTH mm
BRACHIAL ORDER
G
IDEAL WIDTH mm
BRACHIAL ORDER
H
I
J

plates, the axillaries are both higher and wider than non-axillary brachials of the same order. This is related to the shape of the axillaries. The secundiaxils and higher axillaries are spear-shaped because the lateral margins expand distally so that the distal width exceeds the proximal width. The lateral margins of the primaxil are almost parallel and the two widths are equal. Comparison of axillary and non-axillary brachials was also done statistically. Simple power functions were calculated for both types of plates and the slopes and intercepts of the lines were compared with Student's *t* tests. Explanations of these statistics are available in Simpson, Roe, and Lewontin (1960, pp. 213-257, 373-420), Sokal and Rohlf (1969, pp. 404-548), and Imbrie (1956). In all cases, the initial intercepts of the lines for axillary brachials are significantly greater than those of non-axillary brachials at the 0.01 significance level. Thus axillary brachials are significantly higher than non-axillary plates with the same widths. The slopes for axillary and non-axillary brachials may or may not differ (compare Text-figs. 7A and 7D).

3. One could design an "idealized" crinoid with isotomously branching arms where the width of the brachials decreased 50 percent each time the arms branched. Beginning with primibrachial widths of 4.5 mm, this would yield widths of: primibrachs, 4.5 mm; secundibrachs, 2.25 mm; tertibrachs, 1.12 mm; quartibrachs, 0.56 mm; quintibrachs, 0.28 mm; hexibrachs, 0.14 mm (Text-figs. 7G). The widths of the successively higher arms branches would decline rapidly. This would, in turn, severely limit the number of arm branchings because the branches would quickly become too fragile to withstand current agitation; also, the food grooves might not be wide enough to function effectively. In *C. jewetti* from the Twin Cities, the decline of width is much less rapid than in the "idealized" model (compare Text-figs. 7B, C, E, F, with 7G). We also measured these differences statistically. The slope of the line for the "ideal" crinoid was treated as a hypothetical population parameter which was tested against the observed slopes for both axillary and non-axillary brachials. For all tested equations of Order of brachials (X) *vs.* width of brachials (Y), the hypothetical slope has a larger negative value than that of the observed slope at the 0.01 risk level. The conclusion drawn is that the widths of the brachials of the observed crinoids decrease less rapidly in the distal direction than those of the "ideal" crinoid. Consequently each arm series in the Twin

Cities crinoid was able to branch four or five times; in an equivalent idealized crinoid, the arms would only branch about three times before the terminal width was attained. The contrast between the patterns of *C. jewetti* and the ideal case is partially due to the shape of the axillaries because these spear-shaped plates expand distally. Also the brachial above the axillaries expands distally (see Text-figs. 7H, I, J which schematically illustrate the possible configurations; compare with Pl. 14, fig. 3).

4. In *C. jewetti,* some arm series branch four times but others branch five times. Comparing the two types shows that the non-axillary quartibrachs and quintibrachs are wider in the arms that branched most often (compare Text-figs. 7A, C with 7D, F). This holds true for the axillary width but to a lesser extent (Text-figs. 7B, C). Although few data are available, the tentative conclusion is that wider brachial series branch more frequently than narrower ones. The contrasts between the slopes for the equations of the brachial series that branches four times *vs.* the one that bifurcates five times were also ascertained by Student's *t*. These differ at the 0.01 significance level. For Order of brachials (X) *vs.* width of non-axillary brachials (Y), the slope for the series with five branches exhibits a smaller negative value that that with only four branches. In the case of Width (X) *vs.* height of non-axillary brachials (Y), the positive slope is larger for the more extensively branched arms. The statistics support the previous suggestion that the wider brachial series branch more often and possess more branches than narrower ones. However more data are required before this hypothesis can be fully confirmed. The wider brachial series were produced by larger width growth vectors for the brachials relative to overall size of the crinoid, given initially-formed brachials of about the same size and shape; although this cannot be shown for *C. jewetti,* this model is reasonable based on knowledge of the ontogeny of living and fossil crinoids (Brower, 1974a). This suggests that the genetic programming of arm branching is dictated by the same genetic package that programs the development of width. Note that these conclusions are tentative because they are based on a small number of specimens of only a few species. Further work on more specimens from many species is required before a definitive hypothesis can be formulated.

We have also found it useful to characterize the arm branching patterns of crinoids in terms of network parameters (see Haggett and Chorley, 1974, pp. 1-105 for summary). As in streams and road patterns, the arms of crinoids may be visualized as networks. Streams serve to carry water and sediment; transportation networks are used for transfer of people and materials. The arms or networks of crinoids mainly function in trapping food and conveying the accepted food particles to the mouth; also the gonads are located on the arms and the arms perform some respiration. Strictly speaking the arms of crinoids comprise minimally connected planar graphs in which a single distal node is only linked to one proximal node. The nodes or vertices represent the tips of the arms or the points where the arms branch. The edges or links between the adjacent nodes are formed by the brachial series. Taking the D ray arm of UM 9278 as an example, there are 26 nodes and 25 edges. This ray can be classified as an Order 4 "stream" (Strahler type) with an average bifurcation ratio of 2.39. The relatively low bifurcation ratio reflects the repeated isotomous branchings and regular bush-like pattern of the arms of *C. jewetti;* for comparison, an infinite topologically random channel network, similar to random walk graphs, theoretically produces a bifurcation ratio of 4.0.

For the D ray of *C. jewetti,* the Cyclomatic number (V-E-G) equals zero. In the formula, V denotes the number of nodes on the graph, E refers to the number of edges, and G is the number of subgraphs. The Beta index (E/V) is 0.96 whereas the Alpha index [(Cyclomatic number / (2V-5)) times 100)] is nil. The low values of Cyclomatic number, Alpha index and Beta index show that the arms of *C. jewetti* constitute a simple network. The arm branching patterns of other crinoids are being investigated in the same fashion.

If the arms are completely preserved, other parameters that are analogous to the drainage density and stream frequency of physical geography can also provide useful information.

Figured specimens.—UM 9278, 9282, 9283, 9368, 9369 and 5942.

Other material.—UM 9279, 9281, 9368, 9369 and 5942. UM 9288 is questionably assigned here and the bases in UM 9284 may also belong to this species.

Occurrence.—Decorah Shale, Beds 4 and 5 of Sardeson: Twin Cities Brick Plant, St. Paul; Pink house locality, about 4 km south of Cannon Falls. Platteville Limestone, Carimona Member: Fillmore County.

Cupulocrinus canaliculatus, n. sp. Pl. 15, figs. 1-3, 5, 6; Pl. 16, fig. 5

Diagnosis. — A species of *Cupulocrinus* with characteristic longitudinally grooved or scalloped stem; distal portions of arms branching heterotomously; dorsal cup conical, with smooth plates.

Description. — Dorsal cup conical with straight walls, height/width about 1.0; dorsal cup plates smooth, with slightly incised sutures.

Infrabasals five, pentagonal, height/width roughly 0.9; infrabasal circlet less than one-third dorsal cup height. Basals five; lateral interray basals six-sided, height/width averaging 1.1; CD interray basal larger than lateral interray basals, septagonal, distally truncated for anal X; basal circlet almost half cup height. Lateral radials four, pentagonal, height/width 0.8; radial circlet 33 percent of cup height. Radial facets occupying entire plate width; facets otherwise unknown. Radianal pentagonal, in primitive position below C ray radial, pentagonal, height/width 0.9. Anal X large, hexagonal, located above CD interray basal and between C and D ray radials. C ray radial, pentagonal, smaller than other radials, height/width 0.6. Anal sac not known.

Arms uniserial; branching pattern isotomous up to secundibrachs or tertibrachs, higher branches heterotomous, arms broad with round backs. Brachials smooth; unweathered sutures between adjacent brachials straight; some weathered sutures with small gape indicating presence of patelloid process; some brachials with distal lips on dorsal surfaces. Non-axillary brachials quadrangular, with following height/width ratios: primibrachs, 0.3; secundibrachs, 0.46; tertibrachs, 0.55; quartibrachs, 0.58; quintibrachs, 0.81; hexibrachs, 1.0; and septibrachs, 1.1. Axillaries pentagonal, height/width ratios: primaxil, 0.3; secundaxil, 0.55; tertiaxil, 0.87; quartaxil, 0.68; quintiaxil 0.90; hexiaxil, 0.85. Number of brachials variable. Primibrachs from four to five; five to seven secundibrachs present; branched tertibrachial series with four to six plates; higher branched series with four or five plates.

Column not completely known, basically round with numerous longitudinal grooves or scallops on each columnal; scallops less prominent distally. Axial canal pentalobate. Proximal part of stem with two orders of columnals; orders 1 and 2 0.20 and 0.15 mm high, respectively; orders alternating in proximal part of column, columnals with crenulate sutures.

Remarks. — This species is founded on seven crinoids which consist of whole or partial crowns with or without attached stem segments. Several of the specimens, the holotype UM 9286 and a paratype UM 9280, are complete crowns so that variation in arm structure can be studied in detail. Portions of the stem are attached to several of the crowns, such as paratype UM 9285.

The number of primibrachs ranges from four to five plates with a mean of 4.6 and a coefficient of variation of 11.2 percent. Slightly more variation is observed in the secundibrachs which have a coefficient of variation of 12.8 percent. The mean equals 5.5 plates and from five to seven plates may be present. The variation of height and width for the brachials in *C. canaliculatus,* n. sp. is essentially the same as in *C. jewetti.*

The network statistics were determined for a heterotomous arm of *C. canaliculatus,* n. sp. which has seven levels of branching. Some of the values are either identical or nearly the same as those of the isotomous arms of *C. jewetti.* The Cyclomatic number and Alpha index are both zero, and the Beta index is 0.93 (*vs.* 0.96 in *C. jewetti*). However, the arms of *C. jewetti* form a fourth order Strahler "stream", but *C. canaliculatus,* n. sp. only reaches the third order. The average bifurcation ratios of *C. jewetti* and *C. canaliculatus,* n. sp. equal 2.39 and 4.5, respectively. The contrasts in bifurcation ratios and "stream" orders between the two crinoids are caused by the differences in arm branching, *C. jewetti* being isotomous with a moderate number of branches whereas *C. canaliculatus,* n. sp. is characterized by more extensive heterotomous branching.

C. canaliculatus, n. sp. is related to many cupulocrinids with smooth plates. These forms are *C. conjugans* (E. Billings) (see 1859, pp. 41, 44, pl. 3, figs. 8a, b; pl. 4, figs. 1, 2), *C. humilis,* (E. Billings) (see Springer, 1911, p. 28, text-fig. 2, pl. 1, figs. 8, 9; pl. 3, figs. 1-4), *C. drummuckensis* Kolata (1975, p. 38; see Ramsbottom, 1961, p. 13, pl. 5, figs. 6, 7 under *C. gracilis* Ramsbottom), *C. heterocostalis* (Hall) (1847, p. 85, pl. 28, figs. 3d, e, possibly figs. 3c, f, not figs. 3a, b; see Springer, 1911, p. 30, text-fig. 3), *C. gracilis*

(Hall) (see Kolata, 1975, p. 37, pl. 7, figs. 6-8), *C. molanderi* Kolata (1975, p. 39, pl. 8, figs. 6, 7, text-fig. 11), *C. plattevillensis* Kolata (1975, p. 39, pl. 7, figs. 1-3, 9), and *C. latibrachiatus* (E. Billings) (see 1859, p. 39, pl. 3, figs. 5a-c; see also *C.* cf. *latibrachiatus* Kolata, 1976, p. 450, pl. 1, figs. 1-5). *C. canaliculatus* may be separated from these taxa by the characteristic grooved column, the heterotomous arms, and shape of the dorsal cup.

C. sepulchrum Ramsbottom (1961, p. 14, pl. 4, figs. 8, 9) and *C. heterobrachialis* Ramsbottom (1961, p. 12, pl. 5, figs. 1-5) also exhibit heterotomous branching but these British forms differ in possessing deeply incised plate sutures and in lacking the characteristic column of *C. canaliculatus* n. sp.

The dorsal cup plates of *C. canaliculatus* are smooth and the sutures are not markedly incised. These plates are easily separated from the either or both stellate and nodose plates with depressed sutures seen in *C. jewetti* (E. Billings) [*q.v.*], *C. jewetti kentuckiensis* Springer (1911, p. 32, pl. 3, figs. 8, 9), *C. polydactylus* (Shumard) (see Meek, 1873, p. 22, pl. 3bis, fig. 9), *C. angustatus* (Meek and Worthen) (see Meek & Worthen, 1875, p. 492, pl. 23, fig. 8), and *C. minimus* Springer (1920, p. 88, pl. 75, figs. 6a, b).

Specific name. — *canaliculatus,* in allusion to the external grooves of the column.

Types. — Holotype, UM 9286, Paratypes, UM 9280, 9285, 9287, 9289-9291.

Non-type material. — UM 9298 is also placed in this species.

Occurrence. — Decorah Shale, Bed 5 of Sardeson: Twin Cities Brick Plant, St. Paul.

Family **DENDROCRINIDAE** Bather, 1890

Genus **GRENPRISIA** Moore, 1962b

Grenprisia billingsi (Springer) Pl. 13, figs. 1-4

1911. *Ottawacrinus billingsi* Springer, Canadian Geol. Surv. Mem. 15-P, p. 40, pl. 4, figs. 1-4.
1915. *Ottawacrinus billingsi* Springer, Bassler, U.S. Nat. Mus. Bull. 92, p. 926.
1943. *Ottawacrinus billingsi* Springer, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 577.
1944. *Ottawacrinus billingsi* Springer, Moore and Laudon, Index Fossils of North America, p. 158, pl. 53, fig. 23.
1962b. *Grenprisia billingsi* (Springer), Moore, Univ. Kansas Paleont. Contrib., Echinodermata Art. 5, p. 38.
1973. *Grenprisia billingsi* (Springer), Webster, Geol. Soc. America, Mem. 137, p. 143.

Diagnosis. — A species of *Grenprisia* characterized by stellate plates in the anal sac; margins of brachials angular and sharp.

Description of adult. — Dorsal cup conical with moderately wide base, sides straight, expanding distally, height/width about 0.67; dorsal cup plates smooth with depressed sutures.

Infrabasals five, roughly pentagonal with slightly curved proximal margins fitting into the proximal pentameres of the stem, height/width 0.8. Lateral basals four, hexagonal, usually slightly wider than high, height/width 0.8. CD interray basal largest in dorsal cup, septagonal, distally truncated for reception of anal X. Lateral radials four, generally pentagonal, height/width about 0.7; radial facets almost as wide as radials; nature of facets not seen. Small interbrachials in lateral interrays; interbrachial *1* hexagonal, largest interbrachial; about five irregular second and third interbrachials, two or three plates in each range; all interbrachials located at level of primibrach *1*. CD interray much wider than lateral interrays. Radianal pentagonal, in primitive position below C ray radial and obliquely above CD and BC interray basals, height/width 0.8. C ray radial roughly hexagonal, located above radianal, height/width approximately 0.7. Anal X smaller than other CD interray plates, septagonal, lying above CD interray basal and between radianal, C and D ray radials, height/width 0.96.

Anal sac partially preserved, large, high, not balloon-shaped; proximal two or three ranges of plates smooth with depressed sutures; these grading distally into plates with sharp stellate ridges. Proximal plates large and regular; plates smaller distally. Distal plates in anal sac in vertical rows; relatively little intercalation of new plates. Proximal plates in the anal sac mostly "axillaries"; new vertical rows of plates intercalated into anal sac above these "axillaries"; most intercalation of new plates probably confined to proximal five or so ranges of anal sac plates.

Arms incompletely known in adult specimen. Four primibrachs in all known rays with primibrach *4* axillary. Non-axillary primibrachs uniserial, wider than high; height/width from roughly 0.6 to 0.8; sides of brachials angular, with spinose and shelf-like projections; these interlocking arms in closed position. Primaxil pentagonal, height/width 0.65, branching isotomously. Higher brachials not known in mature specimen; in smallest crinoid, seven secundibrachs in each half-ray with the last plate axillary; secundibrach *7* giving rise to poorly known heterotomous branches.

Proximal portion of column pentagonal with large pentagonal axial canal occupying most of the column, all sutures crenulate. All columnals nodose, but thinner plates less nodose than thicker ones; columnals divided into five pentameres; sutures oriented radially, lying in depressed part of column; small pores at the suture between pentameres of adjacent columnals in one specimen. Three columnal orders present, with the following heights: Order 1, 0.4 mm; Order 2, 0.2 to 0.3 mm; Order 3 averaging 0.17 mm. Complete order formula: 1-3-2-3-1. Fourth order perhaps present in distal part of column in largest crinoid.

Remarks. — Three crinoids from the Twin Cities are referred to *G. billingsi.* One specimen, UM 9268 is an adult calyx with part of the stem and most of the anal sac preserved. The second animal, UM 9269, consists of a submature dorsal cup with a portion of the column attached. The only known crown is the smallest specimen, UM 9271.

The Twin Cities specimens differ from the Kirkfield examples described by Springer in slight details of the arm branching. Kirkfield crinoids show either three or four primibrachs in each ray; the mean equals 3.5 plates with a coefficient of variation of 15 percent. All six rays that could be tabulated for the Twin Cities material bear four primibrachs. Student's t tests indicate that the 99 percent confidence level for the Kirkfield specimens ranges from 2.7 to 4.3 plates, which includes the 4.0 figure for the Twin Cities crinoids. Consequently the difference is not considered statistically significant, and it is concluded that both the Kirkfield and Twin Cities specimens belong to the same interbreeding or potentially interbreeding population. The number of secundibrachs in the nine half-rays that could be tabulated for the Canadian specimens ranges from three to ten plates with an average of 6.2 plates; the coefficient of variation constitutes 40 percent. As in the cupulocrinoids discussed above, the variability in arm branching increases distally. The number of secundibrachs could only be counted in two half-rays of the smallest crinoid from the Twin Cities, both of which exhibit seven plates.

All three specimens from the Twin Cities disclose the pentameres of the column. However, the pores between the adjacent pentameres and adjacent columnals are only clearly visible on UM 9269.

G. billingsi is easily separated from *G. springeri* Moore (1962b, p. 38; see illustrations in Springer, 1911, p. 37, pl. 4, figs. 5-7, where the species is listed as *Ottawacrinus typus* W. R. Billings) by the nature of the anal sac. *G. springeri* has smooth plates but those of *G. billingsi* have sharp stellate ridges. In addition, the brachial margins of *G. billingsi* are much more angular than in the other species.

Figured specimens. — UM 9258, 9269, and 9271; the latter specimen is in the collection of D. Wallace.

Occurrence. — Middle Ordovician, Kirkfield fauna: Kirkfield, Ontario, Canada. Decorah Shale, Bed 4 of Sardeson: West St. Paul. Decorah Shale, Bed 5 of Sardeson: Twin Cities Brick Plant, St. Paul.

Suborder CYATHOCRININA Bather, 1899

Family **CARABOCRINIDAE** Bather, 1899

Genus **CARABOCRINUS** E. Billings, 1857

Carabocrinus dicyclicus (Sardeson) Pl. 19, figs. 3, 5, 6; Pls. 20, 21, 23; Pl. 24, figs. 1-8; Text-figs. 1B, 3

1899. *Strophocrinus dicyclicus* Sardeson, American Geologist, vol. 24, p. 264, pl. 12, figs. 1-17, text-figs. 1, 2.
1908. *Podolithus strophocrinus* Sardeson, Jour. Geol., vol. 16, p. 242, figs. 8-10.
1915. *Carabocrinus dicyclicus* (Sardeson), Bassler, U.S. Nat. Mus. Bull. 92, pp. 182, 1017, 1225.
1925. *Strophocrinus dicyclicus* Sardeson, Sardeson, Pan-American Geologist, vol. 43, p. 55, pl. 5, figs. 1-3.
1925. *Carabocrinus dicyclicus* Sardeson, Pan-American Geologist, vol. 43, p. 61, pl. 5, fig. 5.
1925. *Carabocrinus conoideus* Sardeson, Pan-American Geologist, vol. 43, p. 62, pl. 5, fig. 4.
1928. *Carabocrinus conoideus* Sardeson, Sardeson, Pan-American Geologist, vol. 49, p. 37, pl. 2, figs. 11, 12.
1939. *Strophocrinus dicyclicus* Sardeson, Sardeson, Pan-American Geologist, vol. 71, p. 29, pl. 2, fig. 3.
1939. *Carabocrinus dicyclicus* Sardeson, Sardeson, Pan-American Geologist, vol. 71, p. 32, pl. 2, figs. 4-6.
1943. *Carabocrinus conoideus* Sardeson, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 355.
1943. *Carabocrinus dicyclicus* Sardeson, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, pp. 355, 636.
1943. *Strophocrinus dicyclicus* Sardeson, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 690.
1974. *Disconia pentamerus* Westphal, Jour. Paleont., vol. 48, No. 1, p. 79, pl. 1, figs. 1, 2, text-fig. 1.

Diagnosis. — A species of *Carabocrinus* with roughly hemispherical dorsal cup. Plate ornamentation dominated by variously arranged nodes; fine stellate ridges may be present.

Description of adult. — Dorsal cup almost hemispherical, with rounded walls and base; height/width of mean cup is 0.913. Dorsal cup ornamentation variable; nodes present on most plates; some nodes randomly distributed, others aligned parallel to plate margin, some nodes grading into fine stellate ridges; smooth plates common but apparently produced by either or both weathering and transportation; fine stellate ridges abundant to absent. Dorsal cup plates thin; interiors of some plates smooth, others with growth lines; traces of aboral nervous system not seen.

Infrabasal circlet low, of five plates; D ray infrabasal with five sides, distally truncated for reception of CD interray basal; other basals basically four-sided, shaped like spearheads, sides of infrabasals expanding rapidly; height/width of average infrabasal is 1.08. Basal circlet high, bearing five basals and the two radianals; BC and CD interray basals with seven sides with two-sided margin along the CD interray, these basals slightly larger than others; remaining three basals hexagonal; height/width of typical basal equals 1.11. Radials five, subequal in size, outline of radials basically pentagonal; distal margins of some radials bearing traces of goniospires? but these generally absent. Radial facets narrow, horseshoe-shaped, sloping outward with deep groove for axial canal; narrow, sharp transverse ridge present; radial facets with vertical scar showing migration of axial canal during plate ontogeny; dorsal and ventral ligament pits concave; outside of facet bordered by marginal rim. Inferradianal pentagonal, with apex oriented proximally, inferradianal located between lower parts of BC and CD interray basals, height/width 0.965. Superradial pentagonal with apex directed distally; superradial above inferradial; height/width of average plate = 0.896. Anal X pentagonal with scalloped distal margin; anal X between C and D ray radials and obliquely above radianal, height/width = 0.871.

Posterior area of tegmen partially preserved in a crushed crown; about six ranges of plates above anal X; area for anal opening large, elliptical with long axis vertical; anal area above third range of plates.

Arms uniserial, non-pinnulate, cup large relative to size of arms, arms branching isotomously and heterotomously. Depth of brachials exceeding width, depth/width approximately 1.5; food grooves deep with U-shaped plan-view; face of brachial with scar showing trace of movement of axial canal during brachial growth; brachials without transverse ridges; ligament pits gently concave, not strongly differentiated. Arm branching formula as follows: Two or three primibrachs, these branching isotomously. Secundibrachs four or five; arms branching isotomously. Outer arms borne by unbranched secundibrachs, or branching once on one of the tertibrachs. Inner arms on secundibrachs branching heterotomously four times in the only known complete ray; about six to nine plates in each branched series. Non-axillary branchials with rectangular outlines; height/width ratios: primibrachs, 0.42; secundibrachs, 0.47; tertibrachs, 0.57; quartibrachs, 0.71; quintibrachs, 0.68; hexibrachs, 0.75. Axillary brachials with spearhead-like outlines; height/width ratios: primaxils, 0.46; secundiaxils, 0.53; tertiaxils, 0.56; quartiaxils, 0.78; quintiaxils, 0.80; hexiaxils, 0.80.

Column only known from columnals; stem diameter small; columnals either round or obscurely pentagonal with pentalobate axial canal.

Remarks. — The complex nomenclature of *C. dicyclicus* (Sardeson) is reviewed under "Statistical studies of Twin Cities carabocrinids." The available material includes several poorly preserved crowns, roughly five dorsal cups and fragments thereof, a series of "model cups" constructed by Sardeson from loose plates, numerous isolated calyx plates and some brachials, and about 10 holdfasts.

C. dicyclicus (Sardeson) is similar to *C. magnificus* Sardeson which is also found in the Decorah Shale of Minnesota. Comparison of these two forms is discussed in the statistical section on Twin Cities carabocrinids and under *C. magnificus.*

Virtually all species of *Carabocrinus* are characterized by stellate ridge ornament which differs from the more complex ornamentation of *C. dicyclicus* (Sardeson). In the latter species, the basic ornamentation consists of nodes with or without stellate ridges. Also, the approximately hemispherical cup of *C. dicyclicus* (Sardeson) is not the same as that of most other carabocrinids.

The poorly known *C.? tuberculatus* E. Billings (1859, p. 33, pl. 10, figs. 2a-c) also has the plates covered with nodes but these are heavier than the nodes of *C. dicyclicus* (Sardeson). The dorsal cup of *C.? tuberculatus* is more conical and the arms are larger in proportion to the cup than in *C. dicyclicus* (Sardeson).

C. ovalis Miller and Gurley (1894, p. 25, pl. 2, figs. 20, 21) possesses smooth plates that contrast with the ornamented plates of *C. dicyclicus* (Sardeson).

Primary types. — The type specimens of *Strophocrinus dicyclicus* Sardeson become those of *Carabocrinus dicyclicus* (Sardeson). Sardeson considered the dorsal cup with the extra anal plates, UM 9187, as the holotype of his *Strophocrinus dicyclicus.* The other material discussed in his 1899 paper was treated as paratypes of *S. dicyclicus* (UM 9188 - 9199). Primary types of forms that are synonyms of *Carabocrinus dicyclicus* (Sardeson) are the holotype of *C. conoideus* Sardeson (UM 9205), the holotype plates of *C. dicyclicus* Sardeson (UM 9207), and the holotype of *Disconia pentamerus* Westphal, University of Wisconsin (UW 1561/3).

Other specimens figured by Sardeson. — Figured as *Strophocrinus dicyclicus* Sardeson, 1925, pl. 5, fig. 2 (UM 9204). Figured as *Carabocrinus dicyclicus* Sardeson, 1939, pl. 2, fig. 6 (UM 9212).

Specimens figured here. — UM 9187-9189, 9191-9201, 9205, 9207, 9212-9214, 9248, 9249, 9252, 9254, 9259; some specimens from the following UM collections, 9234-9237, 9239, 9255. NMNH 43008 served as the basis for the reconstruction in Text-fig. 3.

Non-type material. — UM 9202, 9203, 9206, 9215, 9216, 9225-9227, 9232, 9233, 9238, 9244-9246, 9250, 9251, 9253, 9256, 9258, 9362, 9363, 9365; parts of the following lots are also non-type specimens, UM 9234-9237, 9239, 9255.

Occurrence. — Decorah Shale: Twin Cities Brick Plant, St. Paul; Motel foundation near south end of Mendota Bridge, Dakota County, Minnesota; one or more unknown localities in St. Paul and Cannon Falls, Minnesota; Ellsworth and near Fennimore, Wisconsin.

Carabocrinus magnificus Sardeson Pl. 19, figs. 1, 2, 4; Pl. 22

1897. *Carabocrinus magnificus* Ulrich *in* Winchell and Ulrich, *nomen nudum,* Geol. Surv. Minnesota, vol. 3, pt. 2, p. *cxxiii.*
1939. *Carabocrinus magnificus* Sardeson, Pan-American Geologist, vol. 71, p. 33, pl. 2, figs. 1, 2.
1943. *Carabocrinus magnificus* Sardeson, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 356.

Diagnosis. — A species of *Carabocrinus* with moderate height to width ratio of dorsal cup; cup outline roughly half an ellipse; maximum width at distal margin of cup. Goniospires absent or weakly developed. Ornamentation of large and heavy stellate ridges; plates otherwise smooth.

Description of adult. — Dorsal cup broadly conical with rounded walls; outline of cup resembling half an ellipse; maximum width at distal margins; height/width of average cup equals 1.03. Dorsal cup plate ornament of variable number of stellate ridges; basals with from five to 22 ridges, plates otherwise smooth.

Structure of dorsal cup like that of *C. dicyclicus* (Sardeson) except for different shapes of plates. Height/width ratios of average plates: infrabasals, 1.26; basals, 1.28; radials, 0.81; inferradials, 1.08; superradials, 0.917; anal X, 1.1.

Arms, column, and holdfast unknown.

Remarks. — Sardeson described *C. magnificus* from several hundred isolated plates from the Decorah of Cannon Falls and St. Paul, Minnesota and Ellsworth, Wisconsin (see discussion above for history of nomenclature). Plates are common at the Cannon Falls locality but rare at the other two. Complete dorsal cups, crowns, columns, and holdfasts are unknown although Sardeson reconstructed cups from isolated plates. Sardeson did not formally designate types, but obviously considered all well-preserved plates as cotypes or syntypes. Type nomenclature for isolated plates of echinoderms presents problems. We designate the "collection" of plates on the "model cup" of UM 9208 as lectotype; paralectotypes are UM 9209-9211, 9217-9221, and 9240-9243.

C. magnificus is closely related to *C. dicyclicus* (Sardeson), also from the Decorah Shale of Minnesota as outlined under "Statistical Studies." The two forms are easily distinguished by their ornamentation. *C. magnificus* has a few large and heavy stellate ridges on plates that are otherwise smooth. *C. dicyclicus* exhibits plates with numerous nodes or pimples, either with or without stellate ridges. Also the height/width ratios of the plates and presumably the cups are larger in *C. magnificus* than in *C. dicyclicus*.

C. magnificus is similar to various Middle Ordovician carabocrinids from North America, especially *C. vancortlandi* E. Billings, (1859, p. 32, pl. 2, fig. 4) and *C. huronensis* Foerste (1924, p. 345, pl. 31, figs. 11, 13; see Sinclair, 1945, pl. 2, fig. 17). The cup of *C.*

magnificus is wider relative to its height and there are fewer and more prominent stellate ridges than in the other two crinoids. In addition, an egg-shaped cup is seen in *C. vancortlandi* in contrast to the half-elliptical outline of the Twin Cities taxon. *C. geometricus* Hudson (1905, p. 282, pl. 1, figs. 1, 2; text-fig. 7) and *C. treadwelli* Sinclair (1945, p. 715, pl. 2, figs. 14-16) have more conical cups with smaller height/width ratios, and more fine stellate ridges on those cups. The goniospires of *C. treadwelli* are much more prominent than those of *C. magnificus,* in which the goniospires are either lacking or poorly developed. The same type of ornamentation is found in *C. slocomi* Foerste, *C. slocomi costatus* Foerste (1924, pp. 350-353, pl. 31, figs. 1-10, pl. 32) and *C. magnificus,* but *C. slocomi* and its subspecies are characterized by elongate and angular dorsal cups in contrast to the wider and more elliptical cup of the Twin Cities crinoid.

C. stellifer Brower and Veinus (1974, p. 61, pl. 2, figs. 7, 10) and *C. oogyi* Kolata (1975, p. 29, pl. 5, figs. 3, 7) are poorly known but the ornamentation of these taxa is similar to that of *C. magnificus.* However the dorsal cup of the Twin Cities crinoid is both larger and more elongate than in the other two taxa.

Specimens of *C. magnificus* are easily separated from *C. esthonus* Jaekel (1918, p. 50, fig. 38), *C. radiatus* E. Billings (see 1859, p. 31, pl. 2, figs. 3a-e), *C.? tuberculatus* E. Billings (1859, p. 33, pl. 10, figs. 2a-c), *C. micropunctatus* Brower and Veinus (1974, p. 64, pl. 2, figs. 8, 9), and *C. ovalis* Miller and Gurley (1894, p. 25, pl. 2, figs. 20, 21) by the ornamentation and shape of the plates and dorsal cup.

Type specimens.—Lectotype, UM 9208. Paralectotypes, UM 9209-9211, 9217-9221, 9240-9243.

Other material.—UM 9222-9224, 9233, 9257.

Occurrence.—Decorah Shale: Cannon Falls and St. Paul, Minnesota; Ellsworth, Wisconsin.

Family **PALAEOCRINIDAE** Bather, 1899

Genus **PALAEOCRINUS** Billings 1859

Palaeocrinus angulatus (E. Billings) **Pl. 16, fig. 3**

1857. *Dendrocrinus angulatus* E. Billings, Geol. Surv. Canada, Rep. Prog. for 1853-1856, p. 269.
1859. *Palaeocrinus angulatus* (E. Billings), E. Billings, Geol. Surv. Canada, Canadian Organic Remains, Dec. IV, p. 45, pl. 3, figs. 6a, b.

1879. *Cyathocrinus angulatus* (E. Billings), Wachsmuth and Springer, Rev. Palaeocrinoidea, Pt. I, p. 308 (85).
1889. *Palaeocrinus angulatus* (E. Billings), Miller, North American Geol. and Palaeontology, p. 267.
1911. *Palaeocrinus angulatus* (E. Billings), Springer, Canadian Geol. Surv. Mem. 15-P, p. 41.
1915. *Palaeocrinus angulatus* (E. Billings), Bassler, U.S. Nat. Mus. Bull. 92, p. 935.
1943. *Palaeocrinus angulatus* (E. Billings), Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 585.
1946. *Palaeocrinus angulatus* (E. Billings), Wilson, Geol. Surv. Canada, Bull. 4, p. 40, pl. 6, figs. 1a, b.
1973. *Palaeocrinus angulatus* (E. Billings), Webster, Geol. Soc. America, Mem. 137, p. 189.

Diagnosis. — A species of *Palaeocrinus* characterized by conical dorsal cup with a few sharp stellate ridges, brachials sharp-backed with sharp spine-like projections along lateral margins, anal tube present, column pentagonal.

Description. — Dorsal cup conical with straight sides and narrow base, height/width about 0.66; dorsal cup plate ornament of single sharp stellate ridges; ridge width from 0.2 to 0.5 mm; some shorter supplementary ridges, parallel to main ridges, also present on basals and radials; interbrachial *1* ornamented with nodes.

Infrabasals five, pentagonal, height/width 0.9. Basals five; CD and BC interray basals with seven sides, truncated for reception of radianal and anal X; other basals hexagonal; all basals roughly equidimensional, height/width 0.9. Lateral radials four, basically pentagonal with narrow horseshoe-shaped facets, height/width 0.8; radial facets not seen. Small hexagonal interbrachial *1* plates in lateral interrays, higher interbrachials not present. CD interray widest. Radianal quadrangular, lying obliquely between CD and BC interray basals, anal X, and C ray radial. Anal X large, hexagonal, between C and D ray radials and obliquely above radianal, height/width 0.9. Anal series of large hexagonal and stellate plates; anal sac not seen.

Arms partially known, branching isotomously three times. Brachials uniserial, non-pinnulate, with sharp backs; sides of brachials with spiny shelf-like lateral margins; articular surfaces poorly preserved; food grooves, deep, V-shaped. Two or three primibrachs; nonaxillary brachials with rectangular outlines, height/width about 0.38; axillary brachials pentagonal, height/width roughly 0.47. Three secundibrachs, height/width approximately 0.7. Tertibrachs, three to six, height/width 0.8. Several quartibrachs known, height/width 0.9.

Only proximal portion of column preserved, pentagonal; axial canal obscure, round or pentagonal; all sutures crenulate. Columnals nodose, two orders of plates probably present.

Remarks. — This species is represented by four specimens. Only one, UM 9272, a partial crown with a short segment of the column attached, is well preserved. The other three specimens, UM 9273, consist of a badly weathered crown in matrix and two arm fragments. The Twin Cities specimens closely resemble the Ottawa crinoids assigned to this species in most respects, including the dorsal cup shape, small number of sharp stellate ridges, pentagonal stem, and sharp-backed arms that branch isotomously. The Twin Cities animals differ in several minor features. Some of the single stellate ridges have one shorter ridge lying beside them. According to the descriptions and illustrations presented by E. Billings (1857, p. 269; 1859, p. 45, pl. 3, figs. 6a, b) and Wilson (1946, p. 40, pl. 6, figs. 1a, b), the Ottawa material only shows single stellate ridges. The Twin Cities specimens seem to have longer spinose projections on the sides of the brachials. The published descriptions indicate that the Ottawa crinoids bear three or four primibrachs whereas the Twin Cities specimens have only two or three primibrachs. However, most dicyclic inadunate crinoids show wide variation in both arm branching formula and ornamentation, and the Ottawa and Twin Cities crinoids are considered conspecific.

P. angulatus is most similar to *P. pulchellus* E. Billings (1859, p. 46; see Wilson, 1946, p. 40, pl. 6, fig. 3) and *P. rhombiferus* E. Billings (1859, p. 45; see Wilson, 1946, p. 40, pl. 6, fig. 2). *P. pulchellus* has a round column and broader and less distinct stellate ridges in contrast to the pentagonal column and sharp stellate ridges of *P. angulatus*. *P. rhombiferus* is also characterized by broad stellate ridges; in addition, the arms are much more slender than those of *P. angulatus*.

The type species of the genus, *P. striatus* E. Billings (1859, p. 25, pl. 1, figs. 5a, b; best illustrated in Hudson, 1911, pp. 217-246, text-figs. 4-19, pls. 5-7), is characterized by numerous and ill-defined stellate ridges. An anal tube is present in *P. angulatus* but the anus of *P. striatus* is located on the tegmen surface. *P. chapmani*

(E. Billings) (1858, p. 71) is probably a synonym of *P. striatus* (Hudson, 1911, pp. 244-246, text-fig. 20).

Figured specimen. — UM 9272.

Other material. — Three specimens catalogued under UM 9273.

Occurrence. — Middle Ordovician, Cobourg Beds: Ottawa, Canada. Kirkfield fauna: Kirkfield, Ontario, Canada. Decorah Shale, Bed 4 of Sardeson: West St. Paul.

Family **POROCRINIDAE** Miller and Gurley, 1894

Genus **POROCRINUS** E. Billings, 1857

Porocrinus pentagonius Meek and Worthen — Pl. 16, fig. 2

1865. *Porocrinus pentagonius* Meek and Worthen, Acad. Nat. Sci., Philadelphia, Proc. 1865, p. 146.
1868. *Porocrinus pentagonius* Meek and Worthen, Meek and Worthen, Illinois Geol. Surv. vol. 3, p. 332, pl. 1, fig. 3.
1889. *Porocrinus pentagonius* Meek and Worthen, Miller, North American Geol. and Palaeontology, p. 273.
1915. *Porocrinus pentagonius* Meek and Worthen, Bassler, U.S. Nat. Mus. Bull. 92, p. 1024.
1943. *Porocrinus pentagonius* Meek and Worthen, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 637.
1975. *Porocrinus pentagonius* Meek and Worthen, Kolata, Paleontological Soc. Mem. 7, p. 28, pl. 4, figs. 1-3.

Diagnosis. — A species of *Porocrinus* characterized by a relatively wide dorsal cup with moderately wide base; cup walls slightly rounded, expanding upward rapidly. Ornament of single sharp stellate ridges; surface between ridges granular, punctate on distal surface of radials; minute punctae on brachials. Goniospire areas large, with rounded outlines, not strongly depressed; individual slits of goniospires long and slender. Stem rounded pentagonal, rapidly tapering. Arms relatively short.

Description. — Dorsal cup conical with rounded sides expanding upward rapidly, base of cup moderately wide, height/width of cup about 0.80; dorsal cup plate ornament of single sharp stellate ridges; area between ridges granular, large punctae on distal surface of radials, minute punctae on brachials, plate sutures not depressed; goniospire areas rounded, moderately large, covering about half the plates; goniospire areas not strongly depressed; individual slits of goniospires fine, numerous; goniospire slits along single sutures in largest specimen distributed as follows: radial-radial, seven or eight; radial-basal, seven; basal-basal, six to eight; basal-infrabasal, seven or eight.

Infrabasals five, pentagonal, height/width 0.49. CD and BC interray basals largest plates on dorsal cup, septagonal, truncated for reception of radianal and anal X; other basals hexagonal; basals almost equidimensional, height/width about 0.97. Lateral radials four, pentagonal, height/width 0.81; radial facets narrow, horseshoe-shaped, inclined outward, with deep ambulacral groove. Radianal quadrangular, almost equidimensional, located between CD and BC interray basals, anal X, and C ray radial. Anal X larger than radianal, hexagonal, located between C and D ray radials and obliquely above radianal, height/width 1.1. C ray radial smaller than other radials, height/width 0.64, located between anal X and B ray radial.

Arms partially known, unbranched, sharp-backed with brachials compressed laterally. About ten primibrachs preserved on B ray arm and seventeen on A ray arm. Brachials uniserial, nonpinnulate, height/width 0.7; brachials about 25 percent deeper than wide.

Proximal part of column preserved, cross-section round or pentagonal with rounded margins; observed part of column tapering rapidly. Columnals much wider than high, characteristic scalloped and crenulate columnals seen in most species of *Porocrinus;* only one order of colmnals observed; columnals higher distally.

Remarks. — Three Twin City specimens are placed in this species. The best, UM 9276, is a crown preserving part of the arms and stem. The two specimens in UM 9277 are a calyx with an attached stem segment and an isolated stem fragment. Species of *Porocrinus* are defined on the basis of calyx shape, ornamentation, nature of the goniospires, including number and thickness of the goniospire slits, their spacing and length, size and shape of the goniospire groups, and whether the goniospire groups are depressed or not, the shape of the column, and the length of the arms. Because of poor material and, in some, poor illustrations, not all of these characters can be evaluated for all species.

However, *Porocrinus pentagonius* can be distinguished from the other described porocrinids as follows. It differs from *P. conicus* E. Billings (1857, p. 279; see 1859, p. 34, pl. 2, figs. 5a-d; Kesling and Paul, 1968, p. 26, text-figs. 11, 12, pl. 6, figs. 1-5; pl. 7, figs. 1-5) in having sharp stellate ridges, larger goniospires and a higher cup. *P. shawi* Schuchert (see Kesling and Paul, 1968, p. 31, text-fig. 14, pl.

4, figs. 1-4) has expanded stellate ridges and goniospires which are coarser than in *P. pentagonius.* The goniospires of *P. crassus* Meek and Worthen (see 1868, p. 330, pl. 4, figs. 2a, b, text-figs. a, b) and *P. scoticus* Ramsbottom (1961, p. 17, pl. 5, fig. 8) are deeply depressed. *P. smithi* Grant (1881, p. 42, unnumbered pl., figs. 1-8) is characterized by a more conical cup with deeply sunken and trilobate goniospires. The stem of *P. smithi* is round, which distinguishes it from the rounded-pentagonal column of *P. pentagonius.* The goniospires of *P. pyramidatus* Kesling and Paul (1968, p. 25, text-fig. 10, pl. 5, figs. 1-6; pl. 6, figs. 6, 7) are pyramid-shaped whereas those of *P. fayettensis* Slocum (1924, p. 333, pl. 29, figs. 14-22; pl. 30, fig. 14) are small and round.

P. elegans Kesling and Paul (1968, p. 25, pl. 3, figs. 1-8; pl. 4, figs. 7-9) is also from the Decorah or Galena of South St. Paul. *P. pentagonius* is easily separated from *P. elegans* by its wider cup and larger goniospires.

Figured specimen. — UM 9276.

Other material. — Two specimens in UM 9277.

Occurrence. — Decorah Shale, Bed 4 of Sardeson: Brick Yard, St. Paul.

Order DISPARIDA Moore and Laudon, 1943

Superfamily **CINCINNATICRINACEA** Warn and Strimple, 1977

Family **CINCINNATICRINIDAE** Warn and Strimple, 1977

Genus **ISOTOMOCRINUS** Ulrich, 1924

Isotomocrinus tenuis (E. Billings) Pl. 16, fig. 4

Remarks. — This species is represented by a single specimen, UM 9274, which is a crown with a short stem segment. John M. Warn (1973, personal communication) kindly identified the crinoid. Warn and Strimple (1977) have recently completed a study on cincinnaticrinids, formerly termed heterocrinids and homocrinids. The morphology and nomenclatural problems of *I. tenius* are fully discussed in their monograph (Warn and Strimple, 1977, pp. 61-66, pl. 8, text-fig. 15).

Fenton (1929a, p. 492, pl. 36, fig. 4) figured a juvenile cincinnaticrinid from the Black River (probably Platteville) of St. Paul. Inasmuch as features that are generically and specifically diagnostic in adults are not well developed in immature specimens, the identity of the crinoid is not certain (Warn, 1973, personal communication) and it could belong to *Heterocrinus, Isotomocrinus* or some other genus.

Figured specimens. — *I. tenuis,* UM 9274. Unknown cincinnaticrinid, NMNH 42115.

Occurrence. — *I. tenuis,* Decorah Shale, Bed 5 of Sardeson: West St. Paul. Unknown cincinnaticrinid, Black River (probably Platteville Formation): St. Paul.

Superfamily **HOMOCRINICAE** Ubaghs, 1953

Family **CALCEOCRINIDAE** Meek and Worthen, 1869

Genus **CREMACRINUS** Ulrich, 1886

Cremacrinus arctus Sardeson — Pl. 16, fig. 1; Pl. 17; Text-fig. 8

1928. *Cremacrinus arctus* Sardeson, Pan-American Geologist, vol. 49, p. 41, pl. ii, figs. 1-5.
1943. *Cremacrinus arctus* Sardeson, Bassler and Moodey, Geol. Soc. America, Spec. Paper 45, p. 375.
1962a. *Cremacrinus arctus* Sardeson, Moore, Univ. Kansas, Paleont. Contrib., Echinodermata, Art. 4, p. 21.
1963. *Cremacrinus arctus* Sardeson, Strimple, Oklahoma Geol. Surv., Bull. 100, p. 49, text-fig. 12.
1966. *Cremacrinus arctus* Sardeson, Brower, Jour. Paleont., vol. 40, p. 622.
1973. *Cremacrinus arctus* Sardeson, Webster, Geol. Soc. America, Mem. 137, p. 86.
1974. *Cremacrinus arctus* Sardeson, Westphal, Jour. Paleont., vol. 48, p. 81, pl. 1, figs. 3-7, text-fig. 4.
1975. *Cremacrinus arctus* Sardeson, Kolata, Paleontological Soc., Mem. 7, p. 20, pl. 3, figs. 3-9, 11-13.

Diagnosis. — A large species of *Cremacrinus* characterized by nodose dorsal cup plates; anal tube bearing strong median ridge; all plates with moderately coarse punctae; E ray arm long, slender and unbranched; B ray arm nearly as large as A and D ray arms; A, B and D ray arms having numerous branches with alternate brachials axillary; axil arms with knuckle-like enlargements at bases of axillaries.

Description. — Crown large with heavy arms. All calyx plates covered with moderately coarse punctae, diameters averaging about 0.15 mm in mature crinoid; dorsal cup plates nodose; axil arms with knuckle-like swellings where the ramules are given off.

Basal series triangular, of four plates; stem facet shared by all plates.

E ray inferradial rectangular, height/width about 1.5; superradial almost rectangular, height/width about 0.8. E ray arm unbranched, composed of uniserial and nonpinnulate brachials; height/width averaging about 1.4.

A and D ray radials undivided, largest plates in dorsal cup. Two main axil series, each commonly consisting of two plates; one or three plates rare.

Non-axillary plates quadrangular with height/width approximately 0.4; axillaries pentagonal, height/width about 0.8. Axil arms branching in typical cremacrinid pattern; arms commonly branching on alternate plates; first or third plate axillary in some specimens; axil arms of large crinoids branching from 12 to 15 times. Axil arms strongly geniculate, with knuckle-like swellings at branchings; axillaries pentagonal, swollen distally, height/weight of proximal plates about 0.8, distal plates approximately equidimensional; non-axillaries with trapezoidal outline becoming more narrow distally, height/width about 0.7. Articular surfaces of brachials not observed; many sutures between distal surface of non-axillary brachials and proximal surfaces of axillary brachials partially fused in the proximal parts of the axil arms; such sutures showing no traces of fusion in the distal parts of the arms. Ramules long, slender, consisting of elongate plates with height/width about 1.6 to 2.0.

B and C rays compound. Inferradials small, triangular, height/width nearly 1.0; B and C ray inferradials not in lateral contact. B ray superradial large, height/width about 1.0. B ray axil arm exactly as in A and D rays. C ray superradial slightly smaller than B ray radial, equidimensional, distally bearing anal X.

Height/width of anal X is 1.0; anal X nearly as large as C ray radial. Anal tube, large, straight, consisting of nodose plates with median ridge.

Column not completely known; proximal parts consists of nodose columnals, height/width of columnals about 0.35. Distal portion of stem and attachment device not seen.

Remarks. — *C. arctus* is known from about 50 specimens, most of which are dorsal cups with short fragments of the arms attached. Some of the crinoids represent crowns which were buried in a compressed version of the living orientation. When describing *C. arctus,* Sardeson did not formally designate type specimens. Reading Sardeson's paper makes it obvious that he considered most of his well-preserved specimens as syntypes. In order to stabilize the types of *C. arctus,* we designate UM 9306 as lectotype and UM 9300-9305, UM 9307-9318, and NMNH (S) 2181 as paralectotypes. Sardeson figured the specimens on his Plate ii as follows: UM 9305, figs. 1, 2; UM 9308, figs. 3, 4; and UM 9304, fig. 5.

The large suite of specimens allows statistical investigation of variation in arm branching structure. Most of the raw data are given in Brower (1966, table 2); summary statistics are listed in Table 2. Scrutiny of the table denotes that the branching structure of the proximal parts of the axil arms is subject to low variation. In fact, the observed variation is much lower than in roughly contemporary species of *Anulocrinus* from the Bromide Limestone of Oklahoma (see Brower 1966, table 1; Brower, 1977). This reveals that the arm structure of *Cremacrinus* is essentially stabilized whereas that of *Anulocrinus* was subject to more variation, presumably genetic in nature.

The specimens also provide information about ontogeny, most of which is similar to that reported by Kolata (1975, pp. 21, 23). Throughout the observed growth, the dorsal cup plates become more nodose, suggesting that most calcite accretion involves thickness of the plates. Roughly analogous changes in the axil arms are the result of predominant thickness and width growth of the brachials. Height of the brachials remains more constant. Development of the brachials is adjusted so that the knuckle-like joints become more pronounced with age.

When discussing the origin of the Calceocrinidae, Sardeson (1928, pp. 36-40) also speculated on the relations of dicyclic and monocyclic crinoids. He believed that monocyclic crinoids such as *Heterocrinus* could be derived from dicyclic forms by rotating the radial circlet relative to the basal circlet so that the radials line up directly over the basals (see Sardeson, 1928, pl. ii, figs. 9-11). Fusion of the radials with the underlying basals would produce a monocyclic crinoid with two circlets of plates. The upper circlet of the monocyclic form would represent the radials which are homologous with both the radials and basals of a dicyclic crinoid. The lower circlet of the monocyclic form would be called the basals, the plates of which would match up with the infrabasals of dicyclic crinoids.

Sardeson thought that dicyclic forms were generally ancestral to monocyclic ones. Sardeson viewed monocylic inadunate crinoids with two or three compound radials, such as *Heterocrinus* and *Ectenocrinus* (see Moore, 1962b for review of calyx structure in these crinoids), as intermediate steps. The large or undivided radials of these monocyclic inadunates would consist of the fused basals and radials of the ancestral dicyclic crinoid. In the compound or divided radials of the monocyclic inadunate, the infraradials are equivalent to the basals of dicyclic crinoids and the superradials of the monocyclic crinoid would be homologous with the radials of the dicyclic ancestor. This idea is geometrically intriguing and reasonable. Although the Sardeson hypothesis certainly deserves further study, it has been ignored by most crinoid specialists (e.g., Moore and Laudon, 1943; Ubaghs, 1953; Warn, 1975). The reasons for this are probably two-fold. First, Sardeson's work was and still is not well known. Second, most crinoid workers view the radials as the basic plates of all crinoids, and the homologies of the other plates are designated with respect to the radials. Thus the radials are considered as static and unchanging elements. The Sardeson hypothesis treats the radials as more dynamic elements with different homologies in monocyclic *vs.* dicyclic crinoids. Our plea is simply that the Sardeson hypothesis on the relations of monocyclic and dicyclic crinoids should be exhumed and evaluated. Sardeson pictured the evolution from dicyclic to monocyclic in terms of adult crinoids. The studies of Brower (1974a) on plate development sequences in camerate and living crinoids show that these divergences could be introduced more easily into the ontogeny of embryonic crinoids.

Turning to the ancestry of the Calceocrinidae, Sardeson (1928) followed Springer (1926, pp. 88-104) and suggested that calceocrinids were descended from a "heterocrinid" with compound radials in the B, C and E rays (at that time both true heterocrinids with two compound radials and homocrinids with three compound radials were commonly lumped together under the term heterocrinids). This view has been accepted by all subsequent workers (e.g. Moore, 1962a; Brower, 1966; Kesling and Sigler, 1969). Sardeson further noted that in 1928, *C. arctus* was the oldest known calceocrinid and thus was critical to the evolution of the group. Since 1928, additional calceocrinids have been discovered. At present, the oldest calceo-

Table 2.

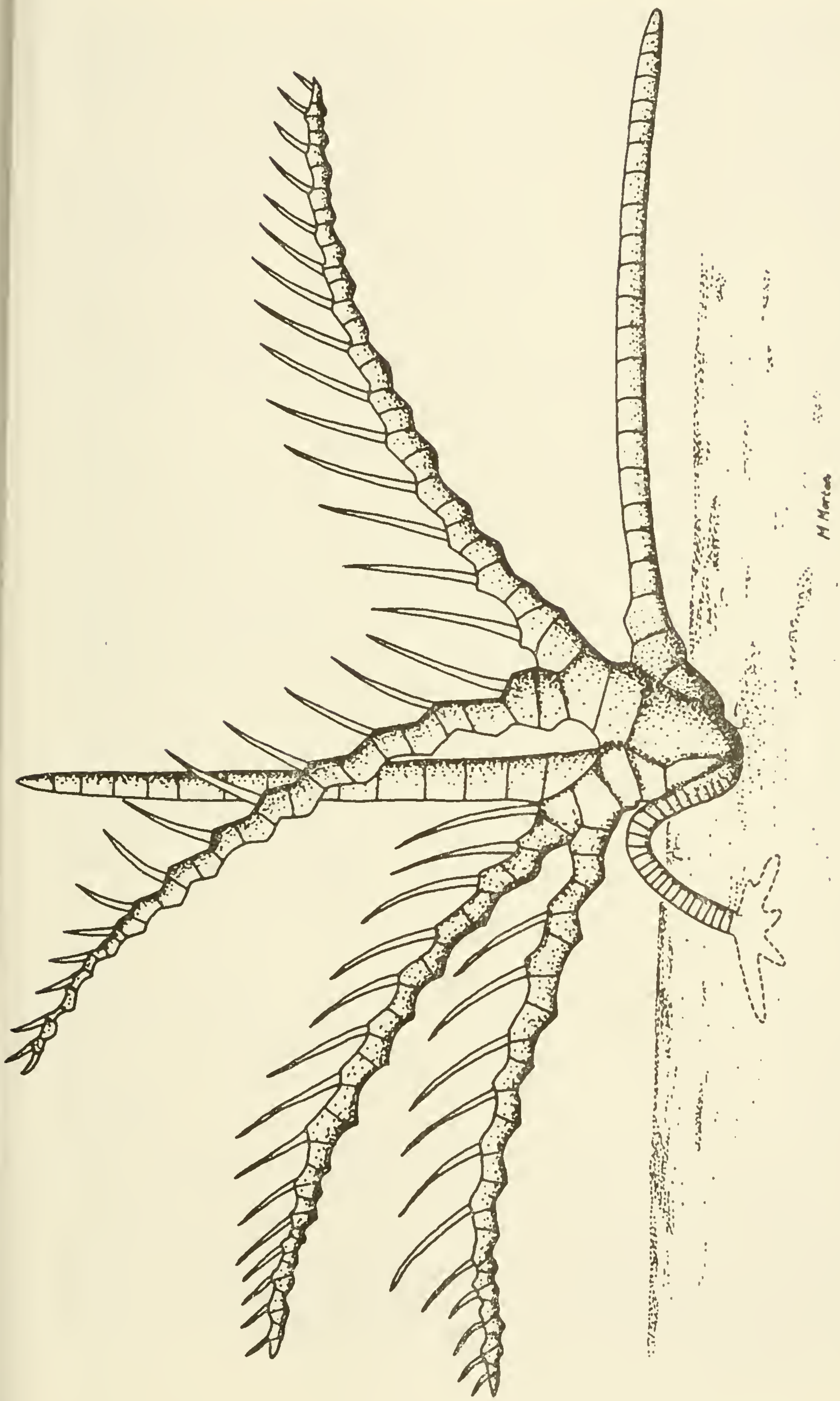
Variation of arm branching structure in *Cremacrinus arctus* Sardeson

Location of brachial series	Mean	Range	Number of Examples	Standard deviation	Coefficient of variation
Primaxils of A and D rays	1.98	1-3	43	0.27	13.5%
Alphabrachs of primaxil arm in A and D rays	2.05	2-3	20	0.22	10.9%
Betabrachs of primaxil arm in A and D rays	2.00	1-3	16	0.36	18.2%
Gammabrachs of primaxil arm in A and D rays	1.94	1-2	16	0.25	12.9%
Secundiaxils of A and D rays	2.08	2-3	13	0.28	13.4%
Alphabrachs of secundiaxil arm in A and D rays	1.91	1-2	11	0.30	15.8%
Betabrachs of secundiaxil arm in A and D rays	1.86	1-2	7	0.25	20.4%
Gammabrachs of secundiaxil arm in A and D rays	2.00	2-2	8	0.00	0.0%
Primaxils of B ray	2.11	2-4	26	0.43	20.4%

crinid is an undescribed cremacrinid-like genus from the Mountain Lake Member of the Bromide Formation which is probably Late Chazyan (Middle Ordovician) in age (Cooper, 1956, p. 123). Slightly younger species of *Cremacrinus, Anulocrinus* and *Calceocrinus* occur in Black River units such as the Pooleville Member of the Bromide Formation and the Platteville of the Twin Cities area.

Sardeson (1928, pp. 43-46) suggested that *C. arctus* lived in a quiet water environment that was only swept by gentle currents. The fine-grained sedimentary rocks in which the crinoids are found seem to support this contention. Quiet water is also indicated by epifaunal brachiopods such as *Dinorthis deflecta* (Conrad) that are found in living orientation with the interarea pressed down on the substrate. Specimens of *Cremacrinus arctus* also occur in living position. The cremacrinids are preserved on the lower surfaces of bedding planes with individuals of *Cupulocrinus gracilis,* an unidentified camerate crinoid, and various brachiopods. Most of the crinoids were collected from the same place and presumably are the remains of a single large colony.

The dorsal cup was mostly buried in the sediment (Text-fig. 8). Sardeson (1928, p. 43) thought that the hinge was closed, but most individuals exhibit a slightly open hinge. The stem is not completely known but the preserved part of the stem is recurved with its distal end set in the sediment around the calyx. Sardeson (1928, pp. 45, 46) believed that the stem was broken during life of the crinoid and he speculated that the young animals were anchored to seaweeds. With progressive age, the crinoid became larger and eventually the stem broke when it was too weak to support the crinoid. After this traumatic experience, the cremacrinids fell to the seafloor where some animals continued to prosper. According to Sardeson's interpretation (1928, p. 45), the common fucoidal markings in the Upper Platteville of the Twin Cities represent traces of the seaweeds. We propose an alternate idea. As mentioned above, most of the specimens are found on lower bedding surfaces of sedimentation units. In most, stems and roots were probably present but were buried in the sedimentation unit below the crinoid. Probably the distal parts of the stems and the roots broke when the specimens were collected. Thus we envision *C. arctus* as exploiting a bottom-dwelling niche throughout life.



Text-figure 8. — Restoration of *Cremacrinus arctus* Sardeson; note rheophobe or collecting-bowl orientation of the arms and partially-buried dorsal cup. The sketch is schematic.

Judging from the orientations of the arms of preserved specimens, the A, B and D rays were spread upward and outward to form a collecting bowl just above the substrate. This would be a substrate-level version of the rheophobe feeding posture (Breimer, 1969) that is thought to characterize many crinoids that lived in quiet waters. It does not seem likely that any of the arms of *C. arctus* rested on the seabed, as suggested by Ettensohn (1975, pp. 1052-1058, text-fig. 8) for *Agassizocrinus lobatus* Springer, a dicyclic inadunate of Mississippian age. Resting the arms on the substrate would present the obvious hazard of sediment fouling the food grooves. The proximal parts of the main arms of *Cremacrinus arctus* are straight or slightly curved, but the distal portions are commonly more curved. This suggests that the proximal parts of the arms were held relatively rigid but that the distal tips were more flexible. This is confirmed by the brachial sutures in the proximal arms. The sutures between the axillary brachials and the underlying non-axillary brachials are almost fused in most specimens; some movement was possible along the sutures between the axillaries and the overlying non-axillary brachials. In the distal parts of the arms, none of the sutures show traces of fusion. The long thin ramules were also probably rigid, with most movement occurring along the suture between the axillary brachial and the ramule.

The slender E ray arm is commonly curved and may have been more flexible than the axil arms of the A, B, and D rays. The E ray may have served any of three functions: food gathering; bracing against the seafloor; or grasping some object on the substrate, as implied by Sardeson (1928, pp. 44, 45).

Sardeson (1928, pp. 44, 45) postulated that the hinge of *Cremacrinus arctus* was non-functional because the calyx was partially buried. The hinges of the available specimens range from fully closed to partly open. This shows that although the hinge was used, its range of movement was restricted relative to other Ordovician cremacrinids (see discussion of *C. punctatus* Ulrich). Thus Sardeson's conclusion was basically correct. We think that the hinge of *C. arctus* was functional but not in the usual fashion. When the hinge was open, the arms were spread to form a collecting bowl. Closure of the hinge may have been associated with closure of the arms. During the resting or non-feeding orientation, the arms were probably almost vertical with respect to the substrate rather than horizontal and parallel to the seabed as in most calceocrinids (see Brower, 1966; Kesling and Sigler, 1969).

Burial positions denote that the anal tube was rigid and held at a steeper angle than the arms when the crinoids were feeding. Kesling and Sigler (1969, text-figs. 2, 3, 11, 12) restored their calceocrinids in the same way. The vertical anal tube would allow fecal material to be carried "down stream" by the gentle currents in the area.

In summary, *C. arctus* was a quiet water crinoid that lived with the calyx partly buried in the sediment; when feeding, the arms were spread horizontally to form a collecting bowl. *C. arctus* did not maintain a vertical filtration net as did most calceocrinids that are found in rocks representing more agitated environments (e.g., compare Text-fig. 8 with text-fig. 13 of Kesling and Sigler, 1969). Our ongoing studies of calceocrinid phylogeny indicate that *C. arctus* was descended from calceocrinids with normal hinge mobility. Therefore, the restricted movement on the hinge of *C. arctus* constitutes specialization. We consider that this character was adaptative to partial burial of the dorsal cup in the seabed and to exploitation of a rheophobe, or collecting-bowl feeding orientation. Other crinoids, exemplified by *Agassizocrinus lobatus,* developed a similar substrate-dwelling life style. However, *A. lobatus* and other crinoids with roughly equivalent life habits were produced by convergent evolution in unrelated stocks (Calceocrinids were derived from monocyclic homocrinids, whereas *Agassizocrinus* is a dicyclic form).

As noted by Sardeson (1928, pp. 40, 41), the characteristic features of *C. arctus* are the moderately coarse punctate surface, anal tube with strong median ridge, nodose dorsal cup plates, long slender unbranched E ray arm, and long and heavy A, B and D ray arms with knuckle-like enlargements of the arms where the ramules originate.

C. punctatus Ulrich (1886, pp. 106, 107, fig. 1; see Springer, 1926, pl. 28, figs. 16-20; herein) occurs in the overlying Decorah of the Twin Cities. *C. punctatus* differs from *C. arctus* in having coarser punctation and in lacking the knuckle-like axillaries in the A, B and D ray arms. The E ray arm of *C. punctatus* is much heavier and a ridge is absent on the anal tube.

Most other Middle Ordovician species of *Cremacrinus,* namely *C. articulosus* (E. Billings) (1859, p. 51, pl. 4, fig. 8; see Springer, 1926, p. 108, pl. 28, figs. 9-13; Wilson, 1946, p. 35, pl. 6, fig. 5), *C. billingsianus* (Ringueberg) (1889, p. 394, pl. 10, figs. 3a-c), *C. furcillatus* (W. R. Billings) (1887, p. 51, unnumbered fig.; see Ringueberg, 1889, p. 393, pl. 10, figs. 1a, b), *C. inaequalis* (E. Billings) (1859, p. 51, pl. 4, fig. 7a; see Wilson, 1946, p. 35, pl. 5, figs. 4a, b), *C. rugosus* (W. R. Billings) (1887, p. 53, unnumbered figs.; Ringueberg, 1889, p. 393, pl. 10, fig. 2), *C. kentuckiensis* (Miller and Gurley) (see Springer, 1926, p. 109, pl. 28, figs. 14, 15) and *C. guttenbergensis* Kolata (1975, p. 23, pl. 3, figs. 10, 14, text-fig. 6), are easily separated from *C. arctus.* Typically these forms are smaller and possess more slender crowns than in *C. arctus.* In addition, fewer arm branches occur and there are more brachials between the adjacent branches of the axil arms in *C. articulosus* and the other forms; commonly the third or fourth brachial is axillary in most Middle Ordovician cremacrinids but alternate brachials are axillary in *C. arctus.* The E ray arm of some of these forms such as *C. furcillatus* and *C. kentuckiensis* is branched in contrast to the unbranched arm of *C. arctus.* In *C. arctus,* the E ray arm is more slender than in the other taxa, the other forms also lack strongly nodose dorsal cup plates and a prominent ridge on the anal tube.

C. lucifer Bolton (1970, p. 62, pl. 13, figs. 2, 3) from the Middle Ordovician of Ontario is a massive animal with a partial crown that is 42 cm high; this specimen is the largest known calceocrinid. *C. lucifer* is characterized by heavier arms with fewer and more widely spaced branches which lack the knuckle-like joints of *C. arctus.*

Smooth plates, non-nodose arms, and relatively small B rays are observed in the Silurian species *C. decatur* Springer (1926, p. 107, pl. 28, fig. 7), *C. tubuliferus* Springer (1926, p. 106, pl. 28, figs. 3-6), and *C. ulrichi* Springer (1926, p. 105, pl. 28, figs. 1, 2), all of which are features not known in *C. arctus.*

Types. — Lectotype, UM 9306, Paralectotypes, UM 9300-9305, UM 9307-9318, NMNH (S) 2181.

Occurrence. — Platteville Limestone, upper part of Hidden Falls Member, Bed 2 of Sardeson: Johnson Street Quarry, Minneapolis.

Cremacrinus punctatus Ulrich Pl. 18

1886. *Cremacrinus punctatus* Ulrich, Geol. Surv. Minnesota, Ann. Rept. 14, p. 106, fig. 1.
1897. *Cremacrinus punctatus* Ulrich, Ulrich *in* Winchell and Ulrich, Geol. Minnesota, vol. 3, pt. 2, p. *cxxiii.*
1915. *Cremacrinus punctatus* Ulrich, Bassler, U.S. Nat. Mus. Bull. 92, p. 289.
1926. *Cremacrinus punctatus* Ulrich, Springer, American Silurian Crinoids, p. 110, pl. 28, figs. 16-20.
1928. *Cremacrinus punctatus* Ulrich, Sardeson, Pan-American Geologist, vol. 49, p. 35, pl. ii, figs. 6-8.
1943. *Cremacrinus punctatus* Ulrich, Bassler and Moodey, Geol. Soc. America Spec. Paper, 45, p. 376.
1962a. *Cremacrinus punctatus* Ulrich, Moore, Univ. Kansas Paleont. Contrib., Echinodermata, Art. 4, p. 21, pl. 1, figs. 3a, b.
1973. *Cremacrinus punctatus* Ulrich, Webster, Geol. Soc. America, Mem. 137, p. 86.

Diagnosis. — A species of *Cremacrinus* with coarse punctae on all plates; E ray arm unbranched as far as known; B ray arm large relative to those in the A and D rays; axillaries moderately nodose.

Description. — Crown slender. Calyx plates coarsely punctate with punctae diameter from 0.1 to 0.4 mm; dorsal cup plates slightly nodose; axillaries with weakly developed knuckle-like areas at ramular bases; axillaries twisted, ramules not fully visible laterally.

Basal series triangular, of four plates; stem facet on all four plates.

E ray inferradial rectangular with central constriction, height/width almost 2.0; superradial rectangular, height/width from 0.5 to 0.7. Surface of superradial facet partly known, with transverse ridge and narrow dorsal ligament pit. E ray arm not fully preserved, non-pinnulate, uniserial; up to 14 unbranched brachials with smooth articular surfaces.

A and D ray radials not compound, largest plates in calyx. Radial facets with sharp transverse ridge and distinct dorsal ligament pit; ventral ligament pits broad, not well-defined. Two main axil series, generally two plates in each series; proximal plate rectangular, non-axillary, height/width 0.5; distal plate axillary, pentagonal, height/width 0.6. Axil arms structured as in most cremacrinids. Alphabrachs, commonly two, rarely three; two or three betabrachs; gammabrachs and higher brachs commonly of three, rarely four, plates; axil arms of largest specimen branching at least six times. Axil arms somewhat geniculate, with axillaries slightly twisted, ramules not fully visible with arms closed. Non-axillaries rectangular; height/width from 0.75 to 0.9. Axillaries asymmetrically pentagonal; height/width from 0.7 to 1.0. Articular surfaces of non-axillary brachials smooth. Proximal ramules long, slender, of at least 20 plates; ramulars rectangular, with height/width about 1.0 to 1.3.

B and C rays with compound radials. Inferradials triangular, not joined; height/width ranges from 0.7 to 1.0. B ray supperradial larger than inferradial, height/width from 0.8 to 1.0. B ray axil arm structured like arms in A and D rays except more narrow. C ray superradial height/width ranging from 0.7 to 1.0. Anal X supported by C ray radial, larger than C ray superradial, height/width 0.7. Only proximal portion of anal tube preserved, consisting of large rectangular plates; distal part of anal tube tucked inside the closed arms. B and C ray superradials grooved for reception of column when the crown is in the closed position.

Column not fully known, round, made up of slightly nodose columnals; stem at least as long as crown is high. Distal portion of stem and attachment device not preserved.

Remarks. — Nineteen specimens can be placed in this species; most of the material consists of dorsal cups with short parts of the arms attached. The best specimen is the holotype, NMNH 89879, a nearly complete crown. Almost all specimens have the hinge closed or nearly so; these crinoids apparently were buried in the resting orientation (See Brower, 1966; Kesling and Sigler, 1969 for living habits in calcocrinids). A long stem segment attached to UM 9321 indicates that the stem length exceeded the crown height in this form. Some calceocrinid stems are shorter than the crown, for example "*Calceocrinus*? n. sp." from the Middle Ordovician Bromide Limestone of Oklahoma (Brower, 1966, pl. 75, fig. 24, text-fig. 1k). One specimen in the NMNH (S) 2156 suite of crinoids exhibits an open hinge; the animal may have died while feeding. As mentioned above, *C. arctus* was a rheophobe cremacrinid that was specialized for living in quiet water. Conversely, *C. punctatus* is found in coarse-grained sedimentary rocks in association with much bioclastic debris made up of bryozoans, crinoids, etc. This denotes that the habitat of *C. punctatus* was agitated and probably formed in shallow water close to shore (Sardeson, 1928, p. 46). Thus *C. punctatus* was obviously adapted to a rheophile existence (see Breimer, 1969 for general discussion of rheophobe and rheophile life habits in crinoids). One of the major adaptations to this life habit may have been the fully functional hinge of *C. punctatus* (compare the partially functional hinge of *C. arctus*).

C. punctatus is similar to many other Middle Ordovician cremacrinids which are punctate and have similar types of arms. Some of these taxa may eventually have to be placed in synonymy, but we have not examined any of the type material, and nomenclatural changes are not proposed here. The problem is complicated by the loss of types for *C. billingsianus* (Ringueberg) and *C. furcillatus* (W. R. Billings) (Wilson, 1946, p. 35). The species that are most closely allied to *C. punctatus* are *C. articulosus* (E. Billings) (see Springer, 1926, p. 108, pl. 28, figs. 9-13; Wilson, 1946, p. 35, pl. 6, fig. 5), *C. billingsianus* (Ringueberg) (1889, p. 394, pl. 10, figs. 3a-c), *C. inaequalis* (E. Billings) (see Wilson, 1946, pl. 5, figs. 4a, b), *C. rugosus* (W. R. Billings) (see Ringueberg, 1889, p. 393, pl. 10, fig. 2), and *C. kentuckiensis* (Miller and Gurley) (see Springer, 1926, p. 109, pl. 28, figs. 14, 15). The punctae of *C. punctatus* are coarser than in the other crinoids. In addition, *C. punctatus* has a smaller B ray arm and axillaries and dorsal cup plates with shapes that are different from those in the taxa listed above.

The comparison between *C. arctus* and *C. punctatus* was given above. *C. furcillatus* (W. R. Billings) (1887, p. 51, unnumbered fig.) possesses an E ray which branches several times near the calyx, *vs.* the unbranched E ray of the Twin Cities species. *C. lucifer* Bolton (1970, p. 62, pl. 13, figs. 2, 3) is a much larger animal with a more robust dorsal cup and heavier arms, and finer punctae with respect to size of the crown.

C. guttenbergensis Kolata (1975, p. 23, pl. 3, figs. 10, 14, text-fig. 6) and *C. punctatus* are both coarsely punctate. However, less nodose axillaries, a smaller cup, and a relatively smaller B ray arm are seen in the former species.

All Silurian cremacrinids, *C. decatur* Springer (1926, p. 107, pl. 28, fig. 7), *C. tubuliferus* Springer (1926, p. 106, pl. 26, figs. 3-6) and *C. ulrichi* Springer (1926, p. 105, pl. 28, figs. 1, 2) lack the punctae that are diagnostic of *C. punctatus*.

Types. — Holotype, NMNH 89879. Figured specimens, NMNH (S) 2156, UM 9319 and 9324.

Other material. — Several specimens in NMNH (S) 2156, UM 9320-9323, 9325, 9326, 9366 and 9367.

Occurrence. — Decorah Shale, Beds 4 and 5 of Sardeson: Ford Plant, St. Paul; Twin Cities Brick Plant, St. Paul; unknown locality or localities in St. Paul; Finn's Glen, Minneapolis; unknown locality or localities in Minneapolis.

CRINOID ATTACHMENT DEVICES

Remarks. — By 1908, Sardeson had evolved an ingenious system for the classification of crinoid attachment devices found in the Twin Cities area. The basic idea was a marriage of non-biological or form nomenclature with a formal biological classification. Sardeson (1908, p. 242) grouped all primitive discoid or conical crinoid root structures with more or less lobate margins and a basal fixing plate where the area about the stem scar is not depressed, into the form genus *Podolithus.* Incidentally the generic name, which means "stone foot," seems highly appropriate. The trivial names for podolithids were derived from the genera to which the roots belonged. For example, *P. dendrocrinus* included roots which belonged to various dendrocrinids; roots of *Strophocrinus* were placed in *P. strophocrinus* and so on. Previous to 1908, Sardeson had collected large suites of holdfasts of various types, stems and a smaller number of calyces. Although Sardeson did not systematically label most of the crinoids by exact locality (most labels read "St. Paul" or "Minneapolis"), he did keep together specimens which were obtained from the same locality. Thus Sardeson knew which holdfasts were found with which calyces. As of 1908 Sardeson had identified most of the Twin Cities calyces to the generic level except for carabocrinids, which were treated at the species level. In associating holdfasts with crinoids, Sardeson used two criteria. The morphology of the base had to be compatible with the calyx, e.g. small holdfasts probably did not belong to large crowns, and so on. Sardeson also reasoned that the holdfasts most likely belonged to the crowns with which they occurred; thus information on associations was clearly recognized (see Brower, 1973 for the same methods on Upper Ordovician crinoids). Although ingenious, Sardeson's type of nomenclature has not been adopted by any other crinoid specialists. There are several obvious reasons for this. First, one cannot usually match holdfasts with crowns. As practiced by him, Sardeson's classification system assumed that the roots could be associated with the calyces. However, this is not inherent in the *Podolithus* scheme; any "species" that fitted the morphological criteria could be placed in *Podolithus*. Second, most crinoid specialists have shown little interest in attachment devices and stems; crinoid literature deals almost exclusively with calyces. Third, the Sardeson system is not allowed under the current rules of the International Commission on Zoological Nomenclature.

When proposing *Podolithus,* Sardeson described five "species": *P. strophocrinus* [for roots of *Carabocrinus dicyclicus* (Sardeson), discussed above], *P. schizocrinus, P. anomalocrinus, P. eucheirocrinus* and *P. dendrocrinus*. The type material for *P. strophocrinus, P. anomalocrinus,* and the stem for *P. dendrocrinus* are in the Sardeson collection, but the other specimens have been lost. Nevertheless, Sardeson's descriptions and illustrations are sufficiently detailed that one can reconstruct his conceptions of the "species" of *Podolithus*.

One of the most striking aspects of the Twin Cities holdfasts and roots is that the sediments were not suitable for the attachment of crinoids. Judging from the material assembled by Sardeson, D. Wallace of the University of Minnesota, and others, virtually all of the crinoids were attached to brachiopod shells and bryozoan colonies. The two most common attachment devices are the lobate and digitate holdfasts that were cemented to bryozoans, and the lichenocrinid holdfasts found on brachiopod shells and bryozoans. Holdfasts rooted in or cemented to the substrate are less abundant. The most common are the bases of *Carabocrinus,* that were cemented directly to the seabed.

LICHENOCRINID HOLDFASTS Pl. 24, figs. 15-18

1897. *Lichenocrinus affinis* Miller, Ulrich *in* Winchell and Ulrich, Geol. Minnesota, vol. 3, pt. 2, p. *cxxiii*.
1897. *Lichenocrinus crateriformis* Hall and varieties, Ulrich *in* Winchell and Ulrich, Geol. Minnesota, vol. 3, pt. 2, p. *cxxiii*.
1929b. *Lichenocrinus nodosus* var. *minnesotensis,* Fenton, Amer. Midl. Natur., vol. 11, p. 495, pl. 37, fig. 1.
1929b. *Lichenocrinus nodosus* aff. *minnesotensis,* Fenton, Amer. Midl. Natur., vol. 11, p. 495, pl. 37, figs. 2, 3.
1929b. *Lichenocrinus austini* Fenton, Amer. Midl. Natur., vol. 11, p. 495, pl. 37, fig. 4.
1929b. *Lichenocrinus* aff. *crateriformis* Hall, Fenton, Amer. Midl. Natur., vol. 11, p. 496, pl. 37, figs. 5-8.

1929b. *Lichenocrinus ornatus* Fenton, Amer. Midl. Natur., vol. 11, p. 496, pl. 37, fig. 9.
1929b. *Lichenocrinus spp.* Fenton, Amer. Midl. Natur., vol. 11, p. 497, pl. 37, figs. 10, 11.
1929b. *Lichenocrinus* aff. *ashmani* Faber, Fenton, Amer. Midl. Natur., vol. 11, p. 498, pl. 37, fig. 12.
1943. *Lichenocrinus austini* Fenton, Bassler and Moodey, Geol. Soc. America Spec. Paper 45, p. 536.
1943. *Lichenocrinus nodosus minnesotensis,* Fenton, Bassler and Moodey, Geol. Soc. America Spec. Paper 45, p. 536.
1943. *Lichenocrinus ornatus* Fenton, Bassler and Moodey, Geol. Soc. America Spec. Paper 45, p. 537.

Remarks. — Lichenocrinid bases are common in the Twin Cities area. We have examined over 50 examples from the Platteville and Decorah attached to different substrates. Hall (1866, p. 9) proposed the genus *Lichenocrinus* believing that it consisted of the "bodies" of parasitic crinoids which were usually attached to the shells or skeletons of other animals. However, almost all subsequent workers considered *Lichenocrinus* as bases or holdfasts of crinoids (see Warn and Strimple, 1977, pp. 49-52 for review; Faber, 1929, for morphological details). Warn and Strimple (1977, p. 30) aptly observed that *Lichenocrinus* represents an *omnium gatherum* for multi-plated discoidal bases of Ordovician crinoids belonging to the juvenile Cincinnaticrinacea, Homocrinacea and possibly some allied groups. Several complete specimens of either or both cincinnaticrinids and homocrinids with lichenocrinid holdfasts, collected by G. M. Austin, C. L. Faber, G. Ashman, and A. Albers in and around Cincinnati, Ohio, have been reported in the literature, but this material has been lost (according to Warn and Strimple, 1977, p. 51). Fenton (1929a) reviewed some of this material and commented that lichenocrinids were commonly associated with cincinnaticrinids and homocrinids. Based on morphology and association, Warn and Strimple suggested that small and adult individuals of *Cincinnaticrinus varibrachialis* Warn and Strimple (1977, p. 41, pls. 3-5, text-fig. 8), small specimens of the homocrinid *Ectenocrinus simplex* (Hall) (see Warn and Strimple, 1977, p. 84, pls. 12-14, text-fig. 20), and possibly some related crinoids possessed lichenocrinid attachment disks. We accept the consensus of most crinoid specialists that most lichenocrinids are probably the holdfasts of cincinnaticrinids, homocrinids, and similar forms.

The Twin Cities lichenocrinids are not associated with any specific crinoids as far as we can determine. It is notable that only two cincinnaticrinid specimens, *Isotomocrinus tenuis* and a form of unknown affinities, have been found in the Twin Cities area. The abundance of lichenocrinids, the rarity of cincinnaticrinids, and the absence of homocrinids in the Twin Cities fauna implies that other crinoids may have had lichenocrinid bases.

The basic construction of a lichenocrinid is simple (details in Faber, 1929). The basal or floor plate is cemented to the substratum; this plate is typically round with a series of radiating ridges. The roofing or overlying layer is polyplated and contains a crater or depression in the center where the column is attached. All of the distal columns or column scars that we have seen are pentagonal or pentalobate in outline.

The Twin Cities material varies in height relative to diameter, size of the depression or crater, size and regularity of the plates, and ornamentation. Fenton (1929b) listed seven species and subspecies from the Twin Cities area. We have not been able to identify these taxa consistently, as they show some morphological overlap. Following Warn and Strimple (1977, p. 51), we will not recognize *Lichenocrinus* and species described under the genus until complete specimens are available for establishment of a definitive taxonomy. Therefore, we lump all of the Twin Cities forms in the informal category of lichenocrinid holdfasts.

The Twin Cities specimens are cemented to various objects as follows. Most holdfasts are attached to the outside of brachiopod shells (74%) and bryozoans (15%). A few bases are found on the seafloor (5.7%), on the interior of brachiopod shells (3.8%), and on a carbonate pebble on the seabed (1.9%). Of the lichenocrinids located on organic objects, those on the interior of brachiopod shells obviously settled on dead shells, but the lichenocrinids adhering to the exterior of brachiopod shells or bryozoans could have attached during or after the life of the host organism.

Specimens figured herein.—UM 9327, 9329, 9330, 9373, and 9334. The last specimen is in the collection of D. Wallace.

Types of specimens described by M. A. Fenton.—UCM 599, 600, 669, 875 and 881; NMNH 42077, 42080, 42090, 50052, 50053, 42115, 80099 and 80100.

Other material.—Numerous specimens in the National Museum of Natural History. UM 9328, 9331, 9332, 9333, 9336 and 9337.

Occurrence. — Platteville Limestone, top of Hidden Falls Member, Bed 2 of Sardeson: Minneapolis. Decorah Shale, Beds 3, 4, and 5 of Sardeson: various localities in Minneapolis and St. Paul; Twin Cities Brick Plant, St. Paul.

MASSIVE CONICAL ATTACHMENT-DISK Pl. 25, fig. 7

1908. *Podolithus anomalocrinus* Sardeson, Jour. Geol., vol. 16, p. 246, figs. 18, 19.
1915. *Podolithus anomalocrinus* Sardeson, Bassler, U.S. Nat. Mus. Bull. 92, p. 1017.
1943. *Podolithus anomalocrinus* Sardeson, Bassler and Moodey, Geol. Soc. America Spec. Paper 45, p. 636.

Remarks. — Only one Twin Cities specimen of this root form is known. Sardeson observed that the disk was apparently cemented to a pebble comprised of the inside of a receptaculitid. The layer overlying the fixing plate is polyplated and grades upward into a large stem with a pentalobate axial canal. The surfaces of the plates bear small canals that form pores along the sutures between the plates of the upper layer and the column. A rigid suture was probably formed. Sardeson thought that this attachment device belonged to *Anomalocrinus* because Meek (1873, p. 18, pl. 2, figs. 6d, e) found similar structures which were attributed to *Anomalocrinus incurvus* (Meek and Worthen). However, anomalocrinids have not been found in the Twin Cities area and the attachment device may represent part of another crinoid.

Figured specimen. — UM 9360, which is also the type of *Podolithus anomalocrinus* Sardeson.

Occurrence. — Decorah Shale, Bed 6 of Sardeson: below Mantorville, Minnesota.

TREE-STUMP-LIKE CIRRUS ROOT Pl. 25, fig. 6

Remarks. — Several incomplete specimens of this root type appear on a small slab from the Twin Cities Brick Plant. Although the distal end of the root is not visible, several large cirri that were buried in the substrate may be seen. The sediment is a mixture of fossil debris and sand- and silt-sized particles. The stem is round and the columnals have crenulate articular surfaces. The sutures between the distal columnals probably were rigid, so that the stalk could be flexed against a rigid base. An unusual feature is the apparent lack of an axial canal in the distal part of the stem. The animals with this type of rooting device are not known but the size of the root is consistent with a large crinoid. Almost any large form, such as *Pycnocrinus sardesoni*, n. sp., known to occur at the Twin Cities Brick Plant, could have developed this root form.

Figured specimen. — UM 9345, in the collection of D. Wallace.

Occurrence. — Decorah Shale, Bed 5 of Sardeson: Twin Cities Brick Plant, St. Paul.

Stem with Grasping Cirri on Bryozoan Pl. 24, fig. 19

Remarks. — This root form is represented by a single specimen. The stem is round and gives off a series of long, round cirri that are wrapped around a broken broyozoan colony. The species with this attachment device is unknown.

Figured specimen. — UM 9354.

Occurrence. — Decorah Shale, Bed 5 of Sardeson: St. Paul.

Lobate and Digitate Holdfasts cemented to Bryozoans Pl. 25, figs. 1-5

Remarks. — This attachment device is the most common one in the Decorah fauna. Although the types of the holdfasts described by Sardeson as *Podolithus schizocrinus* (1908, p. 244, figs. 11-17) and *P. dendrocrinus* (1908, p. 248, figs. 24-25) are lost, both are probably synonymous with our lobate and digitate forms. *P. dendrocrinus* resembles UM 9341, 9342 and 9344, and specimens such as UM 9338 and 9339 fall into the *P. schizocrinus* category. All or virtually all of these holdfasts are cemented to broken branches or ramose bryozoans. Portions of some of these attachment devices appear to penetrate the zooecia of the bryozoans and probably formed after death of the host. Other specimens may have grown on bryozoan colonies that were alive and erect.

These holdfasts exhibit great variation in outline. The number of branches ranges from four or five to about 20. Some branches are long and slender but these grade into short and stubby ones. Some holdfast branches remain unbranched whereas others bifurcate one or more times. All variations seem to intergrade.

Inasmuch as the lobate and digitate holdfasts are the most common type of attachment device in the Decorah Shale, it is probable that several crinoid species were characterized by these structures.

Two crowns are probably directly associated with this device. The young specimens of *Cupulocrinus jewetti* (UM 9283), and *Grenprisia billingsi* (UM 9271), are both found on bryozoans. The first has a complete stem that disappears under a ramose bryozoan; the column probably attached to a lobate or digitate holdfast on the underside of the bryozoan. The young *G. billingsi* is lying on a bryozoan that it may have used as a substrate during life. Many other crinoids from the Decorah of the Twin Cities area are associated with bryozoans; these may also have exploited this means of fixation.

Figured specimens. — UM 9338, 9339, 9341, 9342, and 9344, all in the collection of D. Wallace.

Other material. — UM 9335, 9340, 9341a, 9342a, 9343, 9345a, 9346, 9347, and some specimens in 9348, all in the collection of D. Wallace; UM 9374.

Occurrence. — Decorah Shale, Bed 5 of Sardeson: Twin Cities Brick Plant, St. Paul; 2.25 miles southeast of Cannon Falls, Minnesota.

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PLATES

EXPLANATION OF PLATE 11

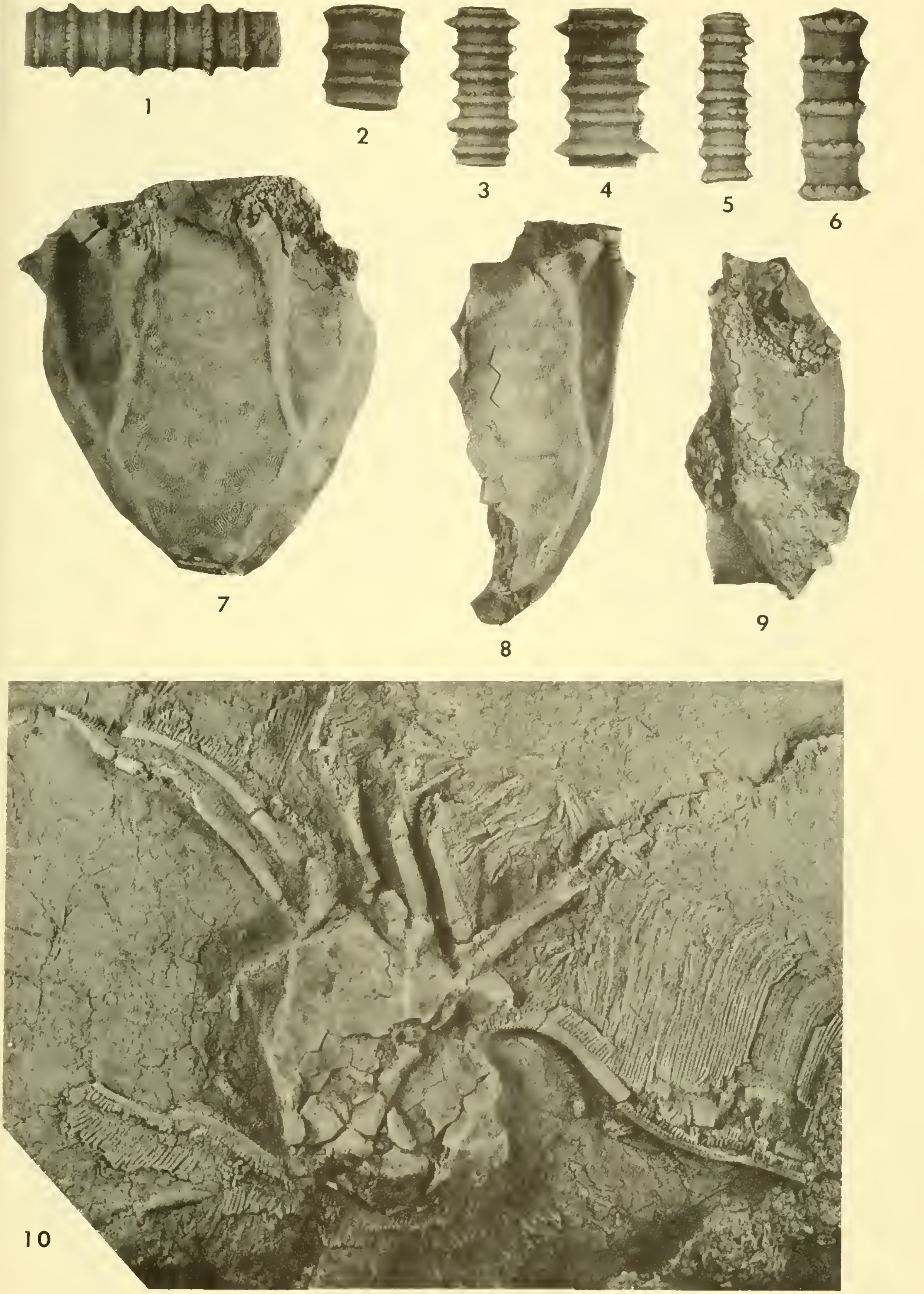
Figure		Page
1-10.	**Pycnocrinus sardesoni,** n. sp.	416

Decorah Sh., Bed 6 of Sardeson, Twin Cities Brick Plant, St. Paul.

1-6. Figured stem segments tentatively assigned to this species, UM 9266, column round with nodose columnals, × 1.4.

7-9. Holotype, UM 9263, well-preserved calyx with fine ridges along plate margins oriented at right angles to plate sutures; B and C ray view, C ray view, tegmen view; × 1.3.

10. Paratype, UM 3489, lateral view of crown preserved inside living chamber of orthocone; note arms and short uniserial brachials with long pinnules, imprint of the nodose column is below calyx; specimen lacks ridges along plate margins; × 1.1.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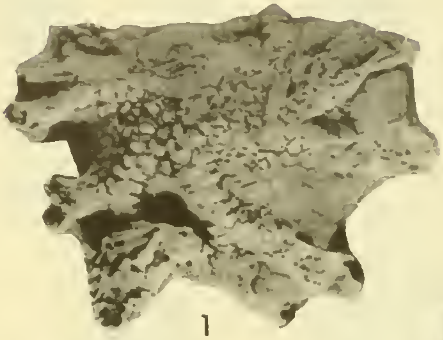
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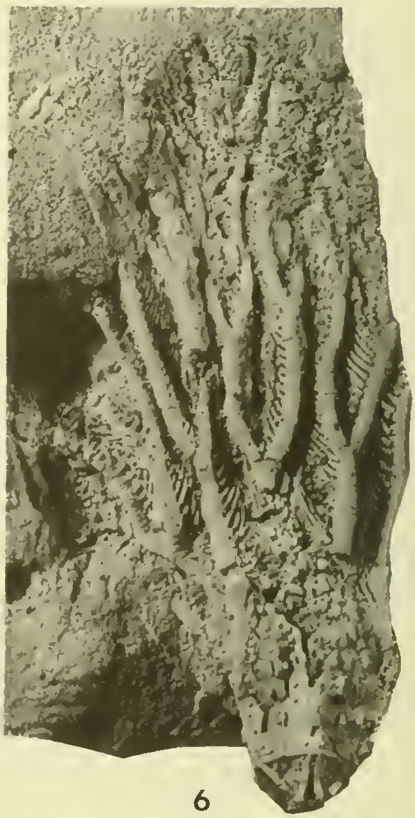
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EXPLANATION OF PLATE 12

Figure | Page

1-4. **Periglyptocrinus spinuliferus,** n. sp. 423

Decorah Sh., Bed 4 of Sardeson, south St. Paul.

1-3. Paratype, UM 9260b; ornamentation of median-ray ridges, stellate ridges on proximal plates and nodes on distal plates, tegmen plates nodose; views of tegmen, C ray, and D and E rays; × 3.1.

4. Holotype, UM 9260a; note two biserial arms in each ray, pinnules bearing small nodes or spines; D ray view, × 1.7.

5. **Glyptocrinus tridactylus,** n. sp. 414

Holotype, UM 9261; note presence of three unbranched arms in each ray wherein axillary is secundibrach *2*, plates ornamented with stellate ridges; lateral view of juvenile crown, × 4.3, Decorah Sh., Bed 6 of Sardeson, Twin Cities Brick Plant, St. Paul.

6. **Pycnocrinus multibrachialis,** n. sp. 421

Holotype, NMNH 42146; arms extensively branched, ornamentation of sharp median-ray ridges and nodes; E ray view, × 1.3, Decorah Sh., St. Paul.

Explanation of Plate 13

Figure Page

Decorah Sh., Beds 4 and 5 of Sardeson.

1. Figured specimen, UM 9271 (D. Wallace collection); lateral view of young specimen with partial arms, crown lying on bryozoan to which it may have been attached when alive; × 5.2, Twin Cities Brick Plant, St. Paul.

2, 3. Figured specimen, UM 9268, B and D ray views of partial calyx showing anal sac and arm fragment with angular margins on brachials, × 1.7, West St. Paul.

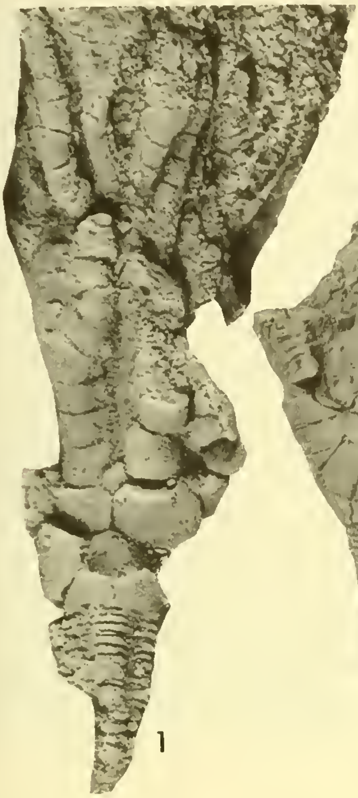
4. Figured specimen, UM 9269, lateral view of small specimen with interbrachial plates and pores along stem, × 3.5, Twin Cities Brick Plant, St. Paul.

Platteville Ls., top of Hidden Falls Mbr., Bed 2 of Sardeson, Johnson Street Quarry, Minneapolis.

5. Figured specimen, UM 9292, lateral view of dorsal cup and stem segment, × 2.6.

7. Figured specimen, UM 9293; view of D ray arm immersed in xylene, note anal tube to right of arm exhibiting median row of plates, and flanking plates on left side; × 2.6.

Figured specimens, UM 9265; specimen on right shows calyx, stem and proximal part of arms, crinoid on left consists of arms and lower part of cup; × 1.7, Decorah Sh., Bed 4 of Sardeson, Twin Cities Brick Plant, St. Paul.



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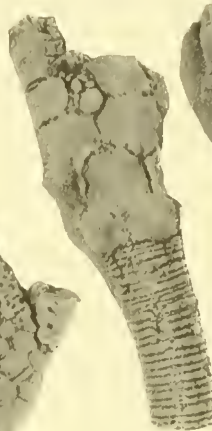

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Explanation of Plate 14

Figure | Page

1-4. Cupulocrinus jewetti (E. Billings) 430

2. Figured specimen, UM 5942, CD interray view of crown with simple stellate ridges, × 1.7, Platteville Ls., Carimona Mbr., Fillmore Co., Minnesota.

1, 3, 4. Figured specimens from Decorah Sh., Beds 4 and 5 of Sardeson, Twin Cities Brick Plant, St. Paul.

1. UM 9282, D ray view of adult crown, × 1.5.
3. UM 9278, D ray view of almost complete crown; ornament composed of fine nodose ridges located on top of heavy stellate ridges, covering plates preserved in central parts of the arms; × 1.7.
4. UM 9283, lateral view of juvenile crown; stem complete, attached to underside of ramose bryozoan; note relatively narrow brachials and cup plates, ornament of simple stellate ridges; × 1.5.

EXPLANATION OF PLATE 15

Figure | Page

1-3, 5, 6. **Cupulocrinus canaliculatus,** n. sp. 441

Decorah Sh., Bed 5 of Sardeson, Twin Cities Brick Plant, St. Paul.

1. Paratype, UM 9289, B ray view of partial crown, × 1.7.

2, 3. Holotype, UM 9286, D and E ray views of almost complete crown; note abnormal structure of D ray, arms branching heterotomously above tertiaxillary, cup conical with smooth plates; × 1.3.

5, 6. Paratype, UM 9285; note characteristic longitudinally-grooved and scalloped column, enlarged view of stem, × 4.3; lateral view of crown with attached column; × 1.3.

4. **Cupulocrinus jewetti** (E. Billings) 430

Figured specimen, UM 5942, CD interray view of crown with simple stellate ridges, × 1.7, Platteville Ls., Carimona Mbr., Fillmore Co., Minnesota.

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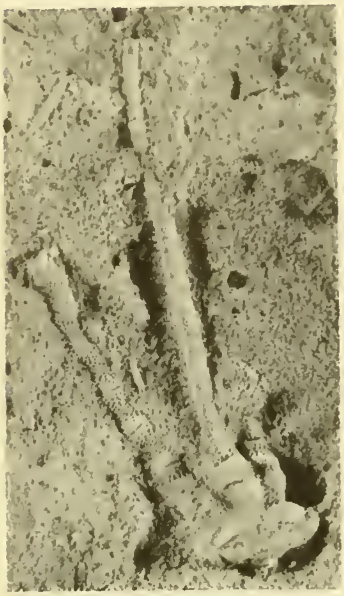

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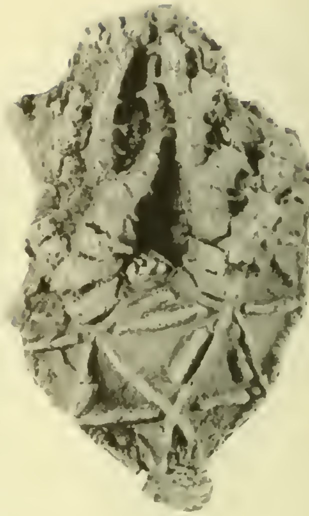

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Explanation of Plate 16

Figure		Page
1.	**Cremacrinus arctus** Sardeson — Paralectotype, UM 9301, E ray view of young specimen coated with ammonium chloride, plates less nodose than in adults, × 1.7, Platteville Ls., top of Hidden Falls Mbr., Bed 2 of Sardeson, Johnson Street Quarry, Minneapolis.	457
2.	**Porocrinus pentagonius** Meek and Worthen — Figured specimen, UM 9276, C ray view of crown; note wide cup, short basals, single stellate ridges, large goniospires with rounded outline, short arms, and characteristic column; × 1.3, Decorah Sh., Bed 5 of Sardeson, Twin Cities Brick Plant, St. Paul.	454
3.	**Palaeocrinus angulatus** (E. Billings) — Figured specimen, UM 9272, B and C ray view of partial crown with sharp stellate ridges and brachials with spinose projections on the lateral margins, × 3.5, Decorah Sh., Bed 4 of Sardeson, West St. Paul.	451
4.	**Isotomocrinus tenuis** (E. Billings) — Figured specimen, UM 9274, lateral view of crown with E ray in center, × 3.5, Decorah Sh., Bed 5 of Sardeson, West St. Paul.	456
5.	**Cupulocrinus canaliculatus,** n. sp. — Paratype, UM 9280, D ray view of nearly complete crown, note conical cup with smooth plates and long arms, × 1.3, Decorah Sh., Bed 5 of Sardeson, Twin Cities Brick Plant, St. Paul.	441

EXPLANATION OF PLATE 17

Figure | Page

1-4. **Cremacrinus arctus** Sardeson 457

Specimens immersed in xylene; note punctate surface, knuckle-like joints in axil arms, nodose calyx plates; B ray arm almost same size as in A and D rays, E ray arm long slender and unbranched, specimens buried in living position; Platteville Ls., top of Hidden Falls Mbr., Bed 2 of Sardeson, Johnson Street Quarry, Minneapolis.

1. Paralectotype, UM 9300, E ray view of large adult with strongly nodose plates, $\times$ 1.7.
2. Paralectotype, UM 9302, B ray view of another large adult with highly nodose plates, $\times$ 1.5.
3. Lectotype, UM 9306, B ray view of nearly complete crown, note proximal-distal gradient of mature through juvenile brachials, $\times$ 1.5.
4. Paralectotype, UM 9301, E ray view of small crown with less nodose brachials than in adults; compare this view (specimen in xylene) with same specimen coated with ammonium chloride (Pl. 16, fig. 1), $\times$ 1.7.

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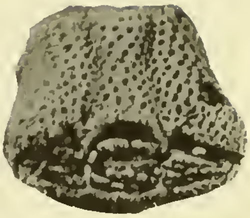
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EXPLANATION OF PLATE 18

Figure	Page

1-10. **Cremacrinus punctatus** Ulrich 467

Note heavily punctate ornamentation, Decorah Sh.

1-3,
8-10. Figured specimens, NMNH (S) 2156, Minneapolis.

1. E ray view of hinge of small specimen showing supplementary plates, $\times$ 3.5.

2, 3. B and C ray, and A and B ray views of dorsal cup; note groove in posterior plates for reception of column, A ray abnormal, has four rather than two primaxils, B ray normal; $\times$ 3.5.

8. A and B ray view of partial crown, $\times$ 3.5.

9. D ray view of specimen with open hinge, crown roughly at right angle to stem, $\times$ 3.5.

10. B and C ray view of weathered specimen, note that weathering has removed most punctae, $\times$ 2.6.

4. Holotype, NMNH 89879, D ray view of most complete crown known, note numerous branches in secundiaxil arm, $\times$ 2.4, Minneapolis.

5. Figured specimen, UM 9324, E ray view, note unbranched arm in E ray, $\times$ 3, St. Paul.

6, 7. Figured specimen, UM 9319, D ray, and B and C ray views of crown, note branching pattern of arms and groove along B and C rays where column fits when hinge is closed, $\times$ 2.6.

EXPLANATION OF PLATE 19

Figure Page

1, 2, 4. **Carabocrinus magnificus** Sardeson 449

"Model crinoids" constructed by Sardeson, parts of the plaster "cores" visible above cups and along some plate boundaries, note relatively slender dorsal cup and simple ornamentation, mostly of stellate ridges, × 1.3, Decorah Sh., Bed 5 of Sardeson, Cannon Falls.

1, 2. Lectotype collection of plates, UM 9208, "A and B rays", and "CD interray" views.

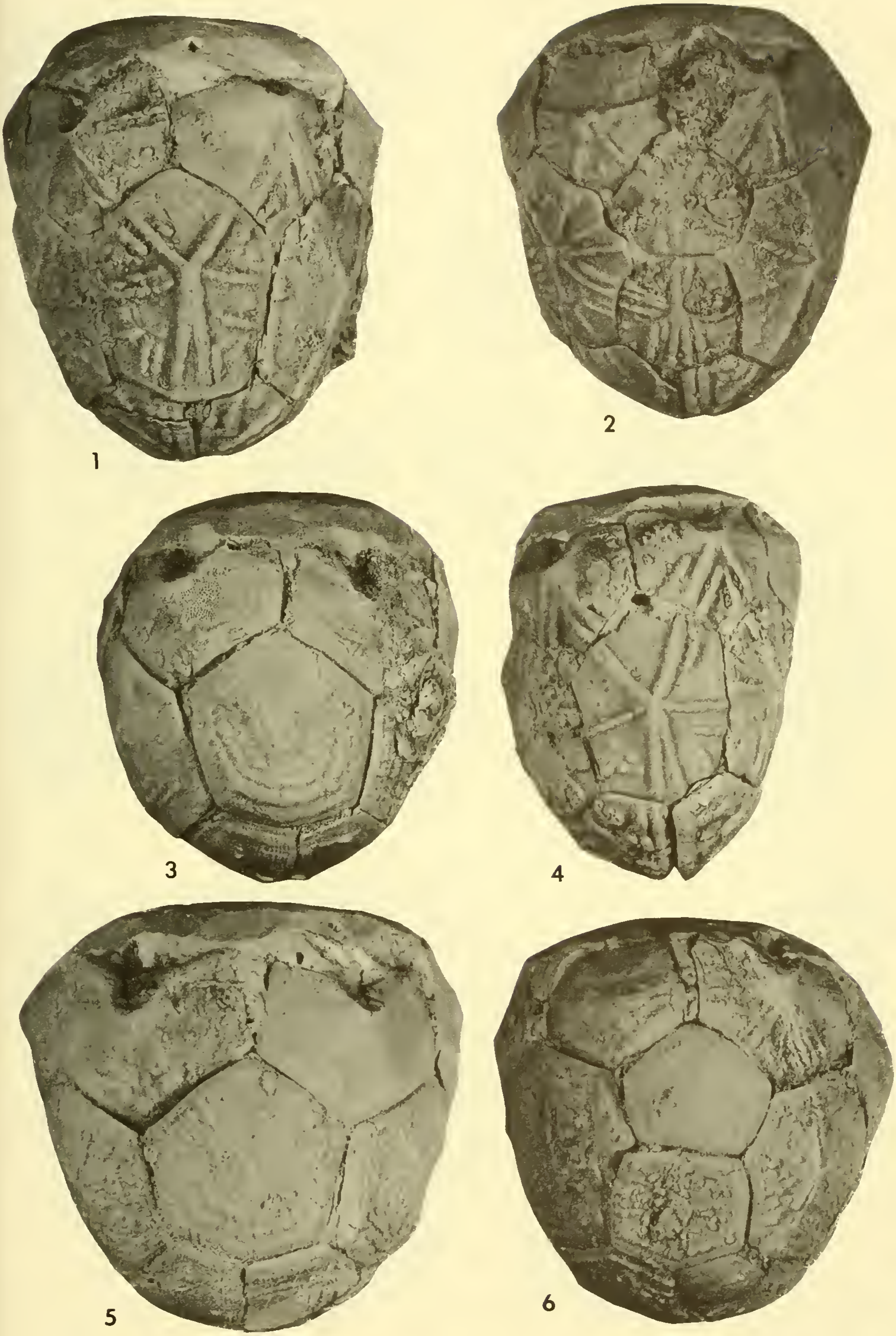
4. One of the paralectotype collections of plates, UM 9209, view of "A and E rays".

3, 5, 6. **Carabocrinus dicyclicus** (Sardeson) 446

Figured specimens of "model crinoids" made by Sardeson; note relatively wide cup and plates with complex ornamentation dominated by nodes and stellate ridges, × 1.3, Decorah Sh.

3. "Lateral" view of UM 9213, St. Paul.

5, 6. "A and B rays" and "CD interray" views of UM 9212, Cannon Falls.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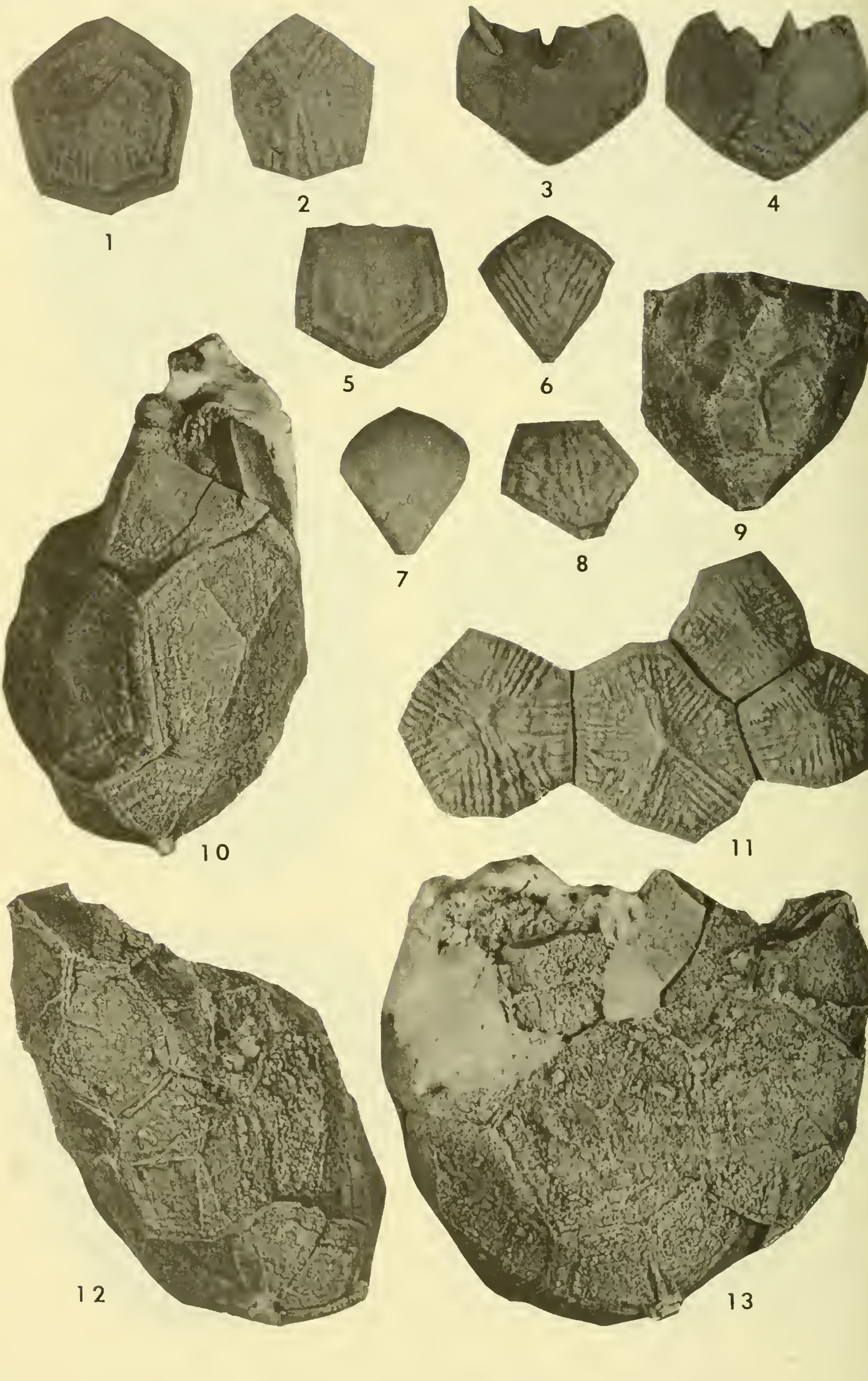
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EXPLANATION OF PLATE 20

Figure | Page

1-13. Carabocrinus dicyclicus (Sardeson) 446

Decorah Sh., × 1.3 unless otherwise stated.

1, 4-8. Paratypes of *C. dicyclicus* (Sardeson) (Sardeson considered these paratypes of *Strophocrinus dicyclicus*; compare Pls. 9, 11 and 14); St. Paul.

1. Basal with nodes parallel to plate margins, UM 9199.

4. Radial with nodes; note horseshoe-shaped radial facet with deep axial canal and transverse ridge, traces of goniospires on upper right; UM 9192.

5. Anal X plate with concentric nodes and scalloped distal margin where plate articulates with tegmen, UM 9188.

6, 7. Lateral ray infrabasals; first plate with stellate ridges, second plate smoothed by weathering or abrasion; UM 9193 and 9196.

8. Posterior infrabasal with ridges, UM 9194.

2, 3. Isolated plates assigned to *Strophocrinus dicyclicus* by Sardeson but apparently not considered as type specimens by him, St. Paul.

2. Basal with relatively prominent stellate ridges, UM 9259.

3. Radial with relatively smooth surface and well developed facet, UM 9255.

10, 12, 13. Holotype of *C. dicyclicus* (Sardeson) (originally described as type of *Strophocrinus dicyclicus* by Sardeson; compare Pls. 9, 11 and 14); UM 9187; A ray view, note brachials and ornamentation of nodes and fine stellate ridges; CD interray with extra plates and narrow columnals; D and E rays showing "plaster reconstruction" and narrow stem; Twin Cities Brick Plant, St. Paul.

9. Figured specimen of *C. dicyclicus* (Sardeson) (originally described as holotype of *C. conoideus* Sardeson); juvenile with simple stellate ridges; UM 9205, D ray view, × 1.7, Bed 4 of Sardeson, West St. Paul.

11. Figured plates of *C. dicyclicus* (Sardeson) (originally described as type of *S. dicyclicus* Sardeson; compare Pls. 9, 11 and 14); UM 9207, view of basals and radianals, Bed 4 of Sardeson, Twin Cities Brick Plant, St. Paul.

EXPLANATION OF PLATE 21

Figure | Page

1-17. **Carabocrinus dicyclicus** (Sardeson) 446

Decorah Sh., figured specimens, × 1.3 unless otherwise noted.

1. Inferradianal, UM 9234, note ornament of nodes and stellate ridges, Cannon Falls.

2, 3. Superradianals, UM 9237, ornamentation as in fig. 1, St. Paul.

4, 5. Interiors of basals, UM 9239 and 9232, growth lines in first plate, lacking in second; from St. Paul and Cannon Falls, respectively.

6-13. Basals from UM 9232; note variation in shape and ornamentation, stellate ridges and nodes vary in number and strength; Cannon Falls.

6-10, 13. Lateral interray basals.

11, 12. Basals associated with the CD interray.

14. "Model cup," UM 9214; small specimen, compared to larger specimens; cup relatively slender, with prominent stellate ridges; Bed 5 of Sardeson, St. Paul.

15. Partial crushed calyx, UM 9249, note fragments of arms and relatively prominent stellate ridges, Bed 4 of Sardeson, Twin Cities Brick Plant, St. Paul.

16. Isolated brachials and columnal, UM 9254; note deep food groove and scar on brachials showing migration of axial canal; columnal with pentalobate axial canal; × 3.5, Twin Cities Brick Plant, St. Paul.

17. Weathered radial with associated arm fragment, UM 9252, Twin Cities Brick Plant, St. Paul.


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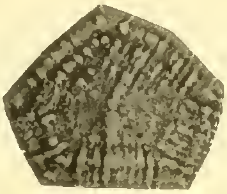
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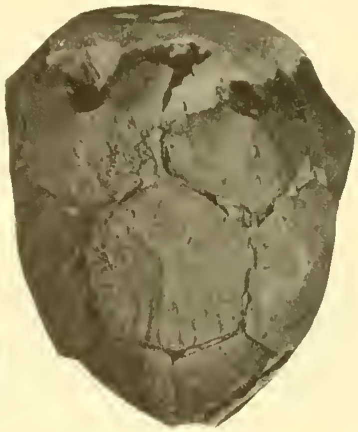
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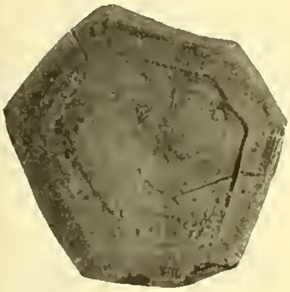
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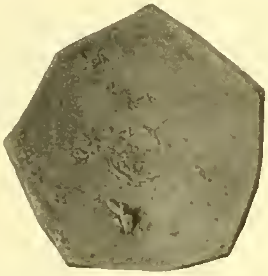
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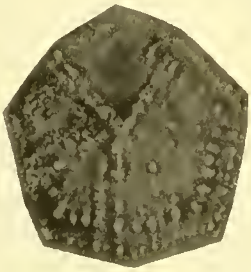
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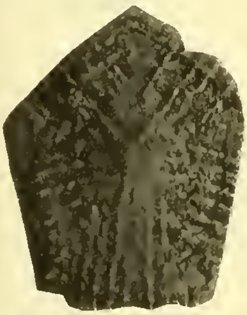
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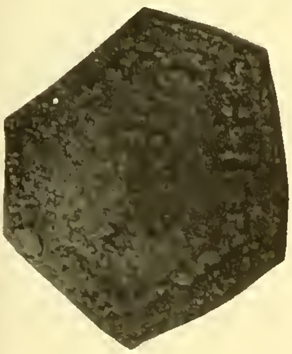
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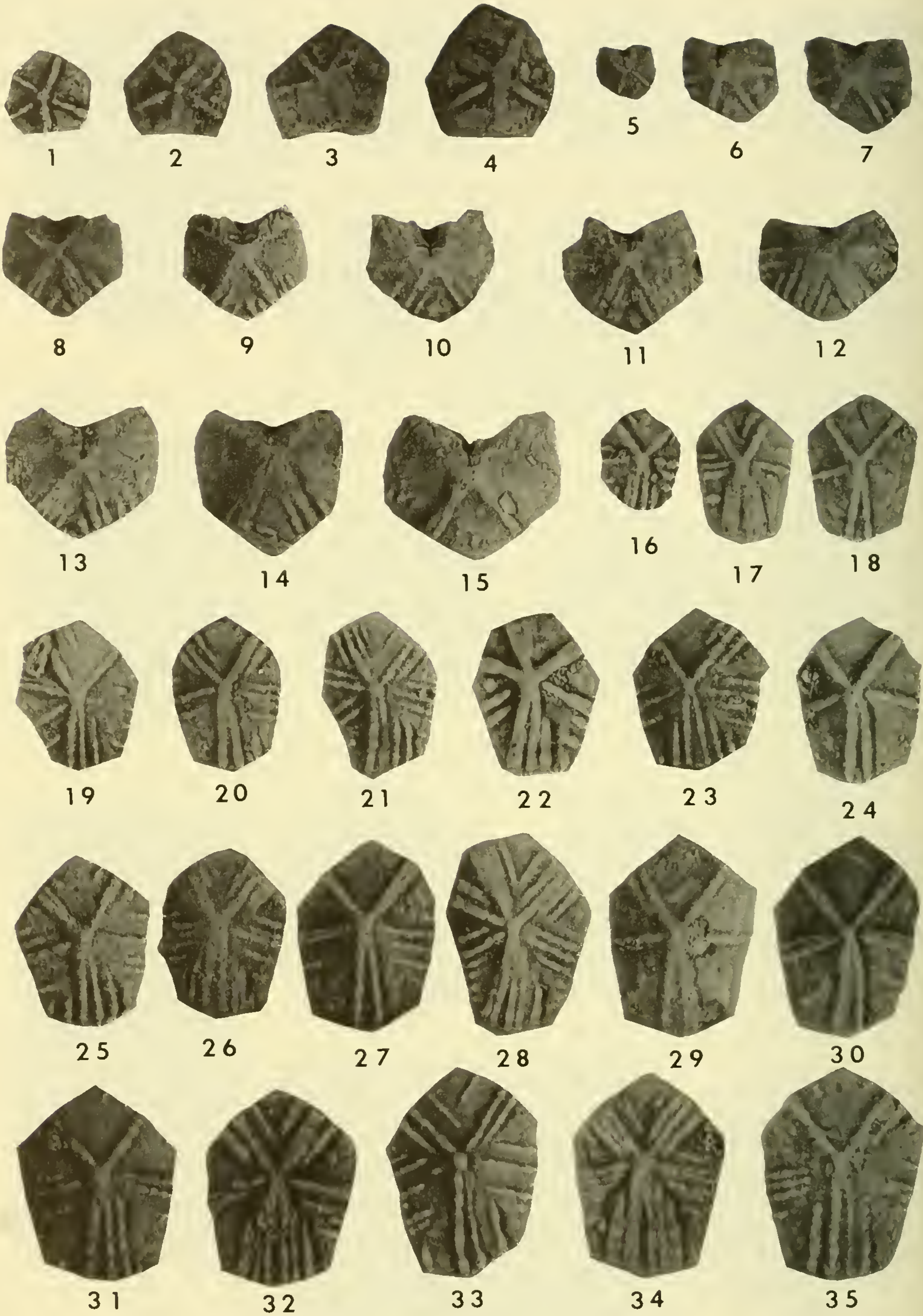

EXPLANATION OF PLATE 22

Figure | Page

1-35. **Carabocrinus magnificus** Sardeson 449

Paralectotypes, × 1.3, Decorah Sh., Bed 5 of Sardeson, Cannon Falls.

1-4. Growth series of superradials, UM 9220, note simple ornamentation.

5-15. Growth series of radials, UM 9217; note narrow radial facets with strong transverse ridge; several plates, e.g., figs. 9, 13, have traces of goniospires; number and strength of stellate ridges varies within growth stages.

16-35. Growth series of basals, UM 9218; as in radials, stellate ridges vary within growth stages.

16-18, 20, 22-27, 29-35. Basals of lateral interrays.

19, 21, 28. Basals associated with CD interray.

EXPLANATION OF PLATE 23

Figure | Page

1-6. **Carabocrinus dicyclicus** (Sardeson) **446**

Holdfasts, Decorah Sh.

1, 2, 4, 6. Paratypes (described by Sardeson as *Strophocrinus dicyclicus* and *Podolithus strophocrinus*), Bed 4 of Sardeson, Twin Cities Brick Plant, St. Paul.

1. Lower layer of small specimen cemented to bryozoan, UM 9201, × 1.7.
2. Large lower layer cemented to substrate; note traces of plate sutures and well-developed ridges, UM 9198, × 1.7.
4. Upper layer of specimen attached to substrate, irregular traces of plate sutures present, UM 9197, × 1.7.
6. Basal layer with roughly pentagonal outline and prominent pentameral symmetry, UM 9195, × 1.7.

3. Figured specimen tentatively placed in this species, UM 9200; basal plate with parts of upper layer along margin; basal plate ridge pattern has less well-developed pentameral symmetry than most specimens; specimen cemented to bedding plane that was probably smooth and, perhaps somewhat weathered, when the animal was alive; × 1.6, Bed 4 of Sardeson, St. Paul.

5. Figured specimen, UM 9248; part of basal plate covered by a bryozoan, indicating that the basal plate was exposed prior to burial; some main ridges hollow; × 1.3, about 4 m above motel foundation near south end of Mendota Bridge, Dakota Co., Minn.

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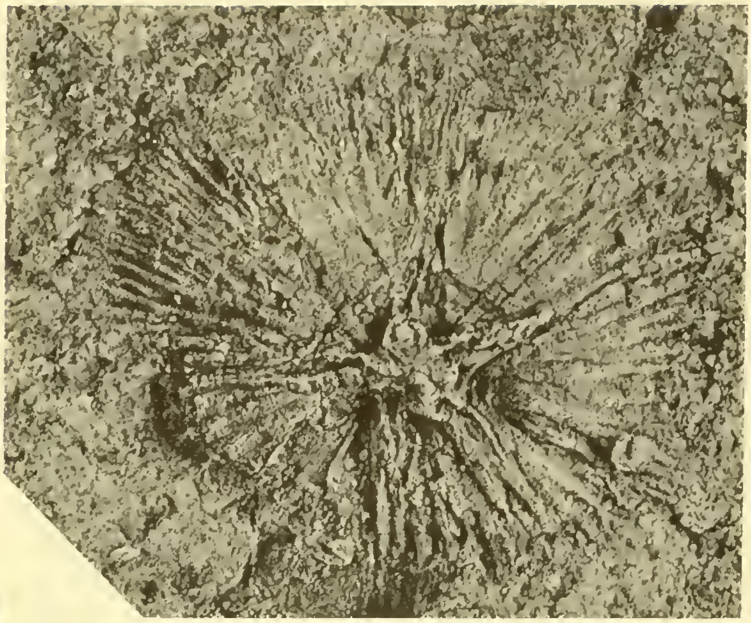

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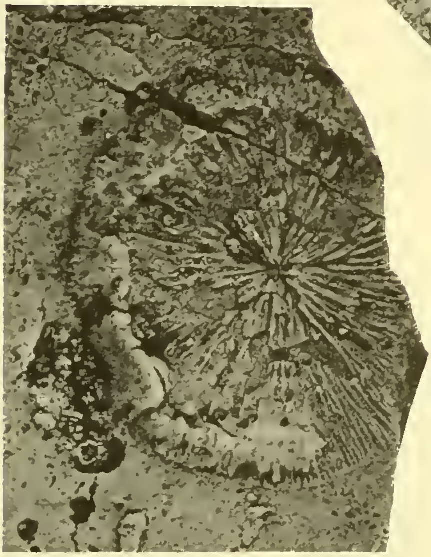

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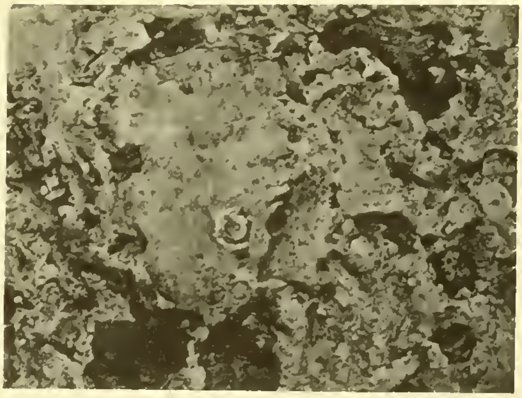

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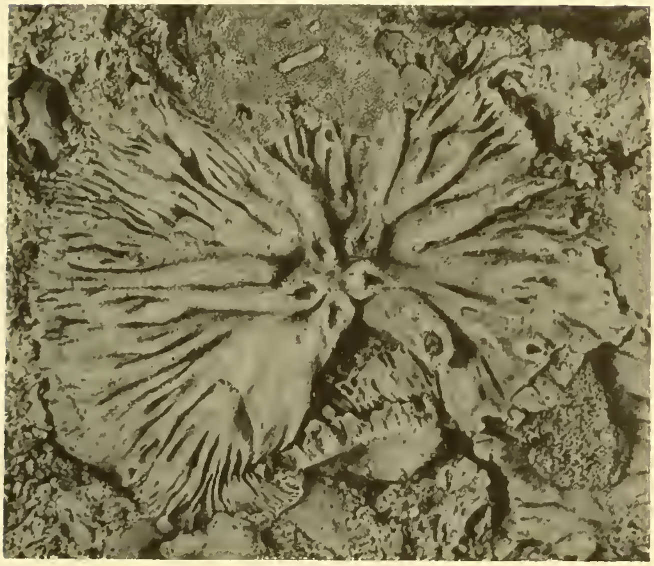

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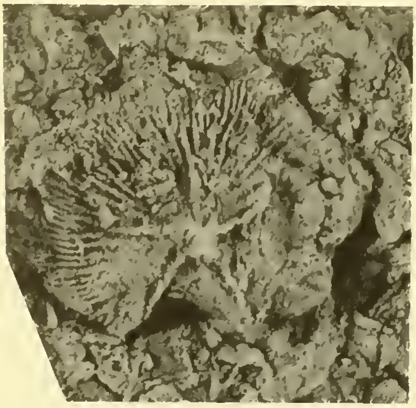

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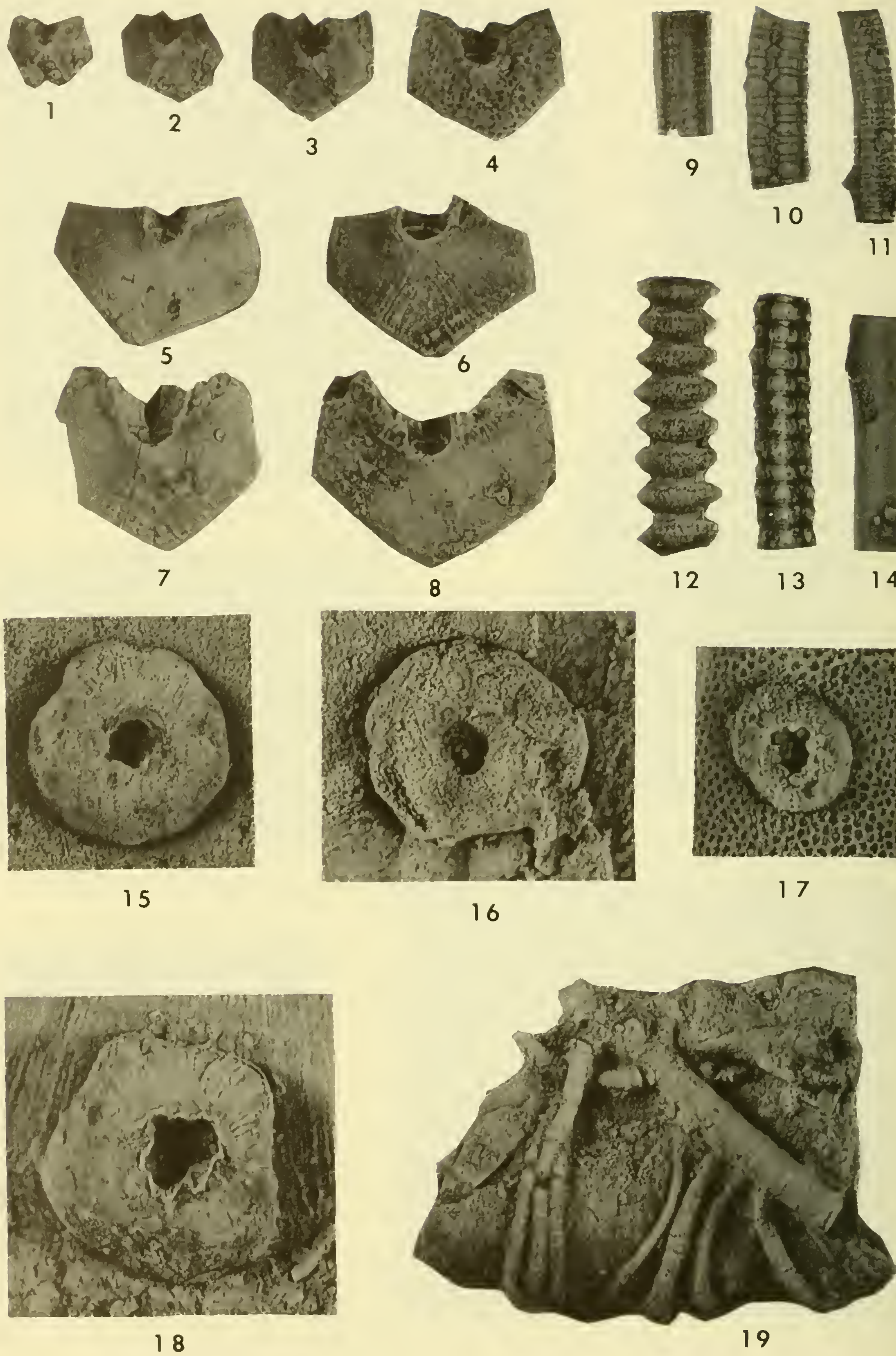

EXPLANATION OF PLATE 24

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1-8. **Carabocrinus dicyclicus** (Sardeson) 446

Figured growth series of radial plates, UM 9235; figs. 3-5 and 8 are either or both weathered and abraded plates; note well-preserved radial facets and traces of goniospires on figs. 7 and 8; × 1.3, Decorah Sh., Bed 4 of Sardeson, St. Paul.

9-14. FIGURED COLUMNALS OF VARIOUS UNKNOWN CRINOIDS FROM THE TWIN CITIES AREA 383

Note wide variation of morphology, × 1.7, Decorah Sh.

9. Round column with pentameres, UM 9351, Bed 5 of Sardeson, St. Paul.
10. Pentagonal stem with three orders of columnals; largest order strongly nodose, sutures between adjacent columnals crenulate; UM 9356, Bed 5 of Sardeson, St. Paul.
11. Pentagonal column with fine ridges on columnals, UM 9358, Bed 6 of Sardeson, St. Paul.
12. Round stem with strongly nodose columnals, UM 9355, Bed 5 of Sardeson, St. Paul.
13. Pentagonal column with one order of nodose and one order of non-nodose plates, UM 9349, Bed 4 of Sardeson, Minneapolis or St. Paul.
14. Round stem with smooth plates and crenulate sutures; one articular surface figured by Sardeson (1908, fig. 26) as *Podolithus dendrocrinus*; UM 9350, Bed 5 of Sardeson, St. Paul.

15-18. LICHENOCRINID HOLDFASTS 471

Figured specimens from the Decorah Sh.

15. Smooth specimen with indeterminate plate structure, found cemented to a carbonate pebble on the sea floor, UM 9327, × 6, Bed 3 of Sardeson, Minneapolis.
16. Convex example with round crater and poorly defined plate sutures, located on inside of strophomenid shell, UM 9330, × 3.5, Bed 4 of Sardeson, Minneapolis.
17. Poorly preserved convex specimen cemented to a bryozoan, UM 9334 (D. Wallace collection) × 6, Bed 5 of Sardeson, Twin Cities Brick Plant, St. Paul.
18. Convex specimen with pentalobate crater found on outside of strophomenid shell, UM 9329, × 4.3, Bed 4 of Sardeson, Minneapolis or St. Paul.

19. STEM WITH GRASPING CIRRI ON BRYOZOAN 475

Figured specimen, UM 9354, × 2.6, Bed 5 of Sardeson, St. Paul.

EXPLANATION OF PLATE 25

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1-5. LOBATE AND DIGITATE HOLDFASTS CEMENTED TO BRYOZOANS **475**

Figured specimens in D. Wallace collection, × 5.2, Decorah Sh., Bed 5 of Sardeson, Twin Cities Brick Plant, St. Paul.

1. Specimen with branched and unbranched lobes, UM 9341.
2. Holdfast with long slender and unbranched digitations; note exposed canals that may have housed axial nerve cords and associated soft parts, UM 9342.
3. Example with stem and five short branches; stem with pentameres; specimen resembles *Podolithus dendrocrinus* of Sardeson; UM 9344.
4. Holdfast with many branches similar to *P. schizocrinus* of Sardeson; note how the branches wrap around the bryozoan and penetrate the tubes of the colony, UM 9338.
5. Specimen with few thick branches, UM 9339.

6. TREE-STUMP-LIKE CIRRUS ROOT **474**

Figured specimen, UM 9345 (D. Wallace collection) cirri presumably rooted into the substrate, root in middle of slab obviously in growth position, two flanking specimens either in growth position with the distal part of stem parallel to seabed or perhaps uprooted; × 2.6, Decorah Sh., Bed 5 of Sardeson, Twin Cities Brick Plant, St. Paul.

7. MASSIVE CONICAL ATTACHMENT-DISK **474**

Figured specimen, UM 9360; note plated upper surface with pores, column with large pentalobate axial canal, articular surfaces of columnals with small canals, holdfast cemented to receptaculitid fragment; specimen originally described by Sardeson as *Podolithus anomalocrinus*; × 1.5, Decorah Sh., Bed 6 of Sardeson, below Mantorville, Minnesota.

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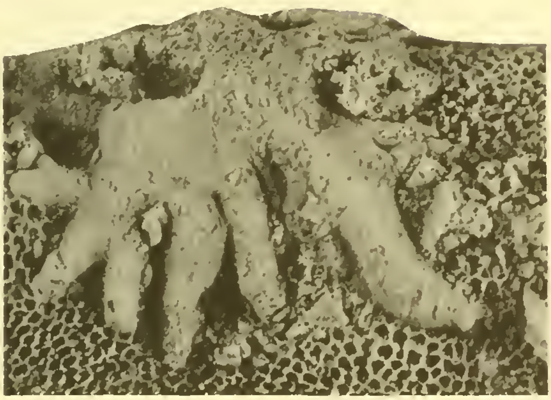

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PREPARATION OF MANUSCRIPTS

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Authors are requested to enclose $10 with each manuscript submitted, to cover costs of postage during the review process.

Collinson, J.
1962. *Size of lettering for text-figures*. Jour. Paleont., v. 36, p. 1402.