IV.

TERTIARY MOLLUSKS FROM THE LEEWARD ISLANDS AND CUBA.

BY CHARLES WYTHE COOKE.

With sixteen plates.
TERTIARY MOLLUSCS FROM THE FRENCH ISLANDS AND CURAÇAO

TH. CHARLES HUTCH COOKE

- Plate containing figure -
TERTIARY MOLLUSKS FROM THE LEEWARD ISLANDS AND CUBA.

BY CHARLES WYTHE COOKE.

INTRODUCTION.

The object of this paper is to describe some little-known Cenozoic Mollusca from the West Indies and to determine their stratigraphic positions with respect to the standard section of the Atlantic and Gulf Coastal Plain of North America.

The great bulk of the material upon which this work is based was collected by Dr. T. Wayland Vaughan, in the islands of St. Bartholomew, Antigua, Anguilla, and Cuba, but several additional smaller collections made by various workers at scattered localities have also been studied. All of the fossils studied, except a small collection from Guajay, Cuba, are in the United States National Museum. The exceptions are in the American Museum of Natural History.

The writer wishes to express his appreciation of the many courtesies extended to him throughout the course of the work by Doctor Vaughan, to whom he is also indebted for assistance in the final preparation of the manuscript. He wishes to thank Dr. W. H. Dall and Miss Julia A. Gardner for aid in the identification of doubtful species. He is indebted to the authorities of the United States National Museum for the use of the facilities of that institution and to the Director of the United States Geological Survey for permission to carry on this investigation as part of his official duties.

FAUNAL SUMMARY.

The species of mollusks and brachiopods described, with the stations at which they were found, are enumerated in the following lists:

LIST OF STATIONS IN ST. BARTHOLOMEW. T. W. VAUGHAN, COLLECTOR.

6895. Spur on southeast side of bay northwest of St. Jean Bay, 170 feet above sea-level (aneroid reading).

6897. Anse Écalle side of point between Anse Écalle and Anse Lézard. From conglomerate and sandstone below upper limestone bed.

6897a. Point between Anse Écalle and Anse Lézard.

6897b. Point between Colombier Point and bay next to St. Jean Bay. From a conglomerate and shaly bed interbedded with limestone, below the main limestone and at top of the conglomerate series of beds.

6905. Northwest of St. Jean Bay, along scarp.

6919. Governors Bay, from limestone picked up on slope.

6924. Point on northwest side of St. Jean Bay, from bed of limestone at top of described section.

6925. Fossils mostly from conglomerate bed below limestone at top of section, partly from lower limestone bed or from just above conglomerate.

6926. Anse Lézard, basal bed.
Species from St. Bartholomew.

<table>
<thead>
<tr>
<th>Species</th>
<th>6865</th>
<th>6867a</th>
<th>6870b</th>
<th>6871a</th>
<th>6871b</th>
<th>6890</th>
<th>6893</th>
<th>6894</th>
<th>6895</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprea sp...</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Related to Ocala species.</td>
</tr>
<tr>
<td>Cerithium sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Jackson species.</td>
</tr>
<tr>
<td>Cerithium sp.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Hinnites now confined to Pacific fauna.</td>
</tr>
<tr>
<td>Ampullina sp.</td>
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<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Nerita? grandis, n. sp.</td>
<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Ostrea cf. O. trigonalis Conrad</td>
<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Pecten (Hinnites) aratus, n. sp.</td>
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<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spondylus sp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Nearest relative is a lower Eocene species.</td>
</tr>
<tr>
<td>Venericardia vaughani, n. sp.</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Related to the Eocene V. planicosta.</td>
</tr>
<tr>
<td>Venericardia globosa, n. sp.</td>
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<td>X</td>
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<td></td>
<td>X</td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>Venericardia sp.</td>
<td>X</td>
<td></td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Argyrothroca dalli, n. sp.</td>
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<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Liothyrina vaughani, n. sp.</td>
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<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

The species from these localities constitute a compact fauna whose closest affinities are in the upper Eocene (Jackson stage).

LIST OF STATIONS IN ANTIGUA. T. W. VAUGHAN, COLLECTOR.

<table>
<thead>
<tr>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>6854.  Rifle butts.</td>
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<tr>
<td>6858.  Wetherell Point.</td>
</tr>
<tr>
<td>6861.  Hodge's Bluff, upper bed.</td>
</tr>
<tr>
<td>6862.  Hodge's Bluff, lower bed.</td>
</tr>
<tr>
<td>6865.  Two hundred yards east of Jackass Point, St. Johns Bay.</td>
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<tr>
<td>6866.  Across street, north side of cathedral, St. Johns.</td>
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<tr>
<td>6869.  Long Island.</td>
</tr>
<tr>
<td>6874.  Blizzard Mill.</td>
</tr>
<tr>
<td>6855.  Base and western slope of Friar's Hill.</td>
</tr>
<tr>
<td>6875.  Friar's Hill, from white chalky limestone above the main coral-reef bed.</td>
</tr>
<tr>
<td>6881.  From bluffs on north side of Willoughby Bay.</td>
</tr>
<tr>
<td>6888.  Half a mile north of McKinnon's Mill.</td>
</tr>
</tbody>
</table>

The exposures at all of these localities are of the Antigua formation, except 6861, the upper bed at Hodge's Bluff.

The stratigraphic relations of the different fossiliferous exposures in Antigua can not satisfactorily be determined from the mollusks tabulated below, but according to Dr. Vaughan the corals indicate that all the stations in the table except one (station 6861) represent approximately the same horizon and that this is the equivalent of the coralliferous chert bed at Bainbridge, Georgia. The close relationship of the mollusks to the Tampa and Anguilla faunas is apparent. The single specimen of *Epitonium antiquense* from the upper bed at Hodge's Bluff (station 6861) probably represents a higher faunal horizon than the other mollusks in the table.

To the small fresh-water fauna described by Brown and Pilsbry from the tufts and shales underlying the main Antigua formation, the Vaughan collection adds one new species, *Hemisinus atriformis* Cooke. The resemblance of this species to a form inhabiting rivers in British

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Guiana is in accord with the similarity pointed out by Brown and Pilsbry between *H. antiquensis* and other South American species. The species now known from this fresh-water fauna are the following:

<table>
<thead>
<tr>
<th>Species from Antigua.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
</tr>
<tr>
<td>Epitonium antennae (Brown).</td>
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<tr>
<td>Turritella crocus, n. sp.</td>
</tr>
<tr>
<td>Turritella forresti Brown.</td>
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<tr>
<td>Ampullinopsis spenceri, n. sp.</td>
</tr>
<tr>
<td>Turbo antennae, n. sp.</td>
</tr>
<tr>
<td>Scapharca siliceus, n. sp.</td>
</tr>
<tr>
<td>Ostrea antiquensis Brown.</td>
</tr>
<tr>
<td>Pecten oxyonym Sowerby?</td>
</tr>
<tr>
<td>Pecten cf. P. oxyonym Bay</td>
</tr>
<tr>
<td>Pecten siliceus, n. sp.</td>
</tr>
<tr>
<td>Pecten latus, n. sp.</td>
</tr>
<tr>
<td>Pecten anguillensis Guppy</td>
</tr>
<tr>
<td>Pecten duplex, n. sp.</td>
</tr>
<tr>
<td>Pecten perdineatus, n. sp.</td>
</tr>
<tr>
<td>Pecten nodosissimus, n. sp.</td>
</tr>
<tr>
<td>Amusium antennae (Brown).</td>
</tr>
<tr>
<td>Spondylus bostrichites Guppy.</td>
</tr>
<tr>
<td>Lithophaga nigra (d'Orbigny)</td>
</tr>
<tr>
<td>Lithophaga sp.</td>
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<tr>
<td>Semel? sp.</td>
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<tr>
<td>Antigone caesarea var. anguillana, n. var.</td>
</tr>
<tr>
<td>Chione d'Orbigny</td>
</tr>
</tbody>
</table>

**List of Stations in Anguilla.**  T. W. Vaughan, Collector.

6893. Crocus Bay, hill, roadside, descent to Crocus Bay from valley.

6894. Crocus Bay, southwest side.

6904. Crocus Bay, southwest side; fossils from rubble above shore-line.

6905. Crocus Bay, southwest shore; fossils from lowest 10 to 15 feet of fossiliferous marls.

6906. Crocus Bay, southwest side, 30 to 50 feet above sea-level.

6907. Crocus Bay, bluff on southwest side, uppermost horizon, 125 feet above sea-level, mainly limestone.

6971. Slope about 100 feet above sea-level, between Little Harbor and Pelican Point.

The mollusks from all the localities in Anguilla, with the possible exception of station 9664, which is beach rubble, appear to represent a single geologic horizon. The fauna includes species common to formations of ages ranging from the middle Oligocene coral reef at Bainbridge, Georgia, to the Bowden marl of Jamaica, but the number of
species common to other formations is not great enough to justify using the statistical method of correlation. The fossil horizon of Anguilla is evidently intermediate in age between the Oligocene deposits at Bainbridge and the Bowden marl, and its stratigraphic position is probably not far from that of the Tampa limestone of Florida.

<table>
<thead>
<tr>
<th>Species from Anguilla.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
</tr>
<tr>
<td>Conus sp</td>
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<tr>
<td>Turris sp</td>
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<tr>
<td>Oliva, 2 sp</td>
</tr>
<tr>
<td>Lyria vaughani, n. sp.</td>
</tr>
<tr>
<td>Cassidea? sp.</td>
</tr>
<tr>
<td>Dolium? sp.</td>
</tr>
<tr>
<td>Cyprea anguillana, n. sp</td>
</tr>
<tr>
<td>Cyprea sp</td>
</tr>
<tr>
<td>Strombus sp.</td>
</tr>
<tr>
<td>Orthaulax pugnax (Heilprin)</td>
</tr>
<tr>
<td>Cerithium herculeanum, n. sp.</td>
</tr>
<tr>
<td>Cerithidea? anguillana, n. sp.</td>
</tr>
<tr>
<td>Turritella crocus, n. sp.</td>
</tr>
<tr>
<td>Turritella anguillana, n. sp.</td>
</tr>
<tr>
<td>Turritella dubiosa, n. sp.</td>
</tr>
<tr>
<td>Solarium sp.</td>
</tr>
<tr>
<td>Xenophora sp.</td>
</tr>
<tr>
<td>Ampullina anguillana, n. sp.</td>
</tr>
<tr>
<td>Ampullinopsis spenceri, n. sp.</td>
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<tr>
<td>Sinum chipolatum (Dall)</td>
</tr>
<tr>
<td>Seapharca anguillana, n. sp.</td>
</tr>
<tr>
<td>Pinna vaughani, n. sp.</td>
</tr>
<tr>
<td>Pecten perlatus, n. sp.</td>
</tr>
<tr>
<td>Pecten thetidis Sowerby.</td>
</tr>
<tr>
<td>Pecten perplexis, n. sp.</td>
</tr>
<tr>
<td>Pecten crocus, n. sp.</td>
</tr>
<tr>
<td>Pecten vaughani, n. sp.</td>
</tr>
<tr>
<td>Pecten anguillensis Guppy</td>
</tr>
<tr>
<td>Pecten gibbi Guppy</td>
</tr>
<tr>
<td>Pecten sp. cf. P. crucianus, n. sp.</td>
</tr>
<tr>
<td>Pecten clevi, n. sp.</td>
</tr>
<tr>
<td>Amsinum lyonii (Gabb)</td>
</tr>
<tr>
<td>Spondylus bostrichites Guppy</td>
</tr>
<tr>
<td>Metis trinitaria Dall</td>
</tr>
<tr>
<td>Cardium sp.</td>
</tr>
<tr>
<td>Lucina sp.</td>
</tr>
<tr>
<td>Phacoides (Here) sp.</td>
</tr>
<tr>
<td>Antigna cesarina var. anguillana, n. var.</td>
</tr>
</tbody>
</table>

Remarks:
- Related to Tampa and Chipola.
- Cuba.
- Antigua.
- Related to Tampa and Bainbridge.
- Cuba, related to Chipola.
- Cuba, Bowden, Santo Domingo.
- Costa Rica, related to Chipola.
- Cuba, Trinidad.
- Related to Tampa.
- Antigua, Bainbridge, Chipola (variety).
List of Stations in Cuba.

<table>
<thead>
<tr>
<th>Number</th>
<th>Station Description</th>
<th>Collector(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3192</td>
<td>One-half mile inland from the pier of the Juragúá Railroad on Santiago Bay or Harbor; Joseph Wilcox, collector.</td>
<td></td>
</tr>
<tr>
<td>3435</td>
<td>Hillside about 2 miles from Santiago, on road to Morro Castle; T. W. Vaughan, collector.</td>
<td></td>
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<tr>
<td>3436</td>
<td>South side of city of Santiago, along trocha in small escarpment separating Terrace 1 from Terrace 2 of coastal shelf, 20-foot level; material brownish yellowish marl with masses of pyrites; T. W. Vaughan, collector.</td>
<td></td>
</tr>
<tr>
<td>3439</td>
<td>Juragúá Railroad, La Cruz, below Terrace 3. First cutting on road; T. W. Vaughan, collector.</td>
<td></td>
</tr>
<tr>
<td>3440</td>
<td>Northeast portion of Santiago; fossils in marl on hillside; T. W. Vaughan, collector.</td>
<td></td>
</tr>
<tr>
<td>3441</td>
<td>East of La Cruz, near railroad crossing of road to Morro Castle; T. W. Vaughan, collector.</td>
<td></td>
</tr>
<tr>
<td>3443</td>
<td>Northeast portion of Santiago; marls at foot of hill; T. W. Vaughan, collector.</td>
<td></td>
</tr>
<tr>
<td>3446</td>
<td>First deep cutting on railroad east of La Cruz, near Santiago; T. W. Vaughan, collector.</td>
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<tr>
<td>3447</td>
<td>Trocha de Santiago de Cuba, second exposure on north side of trocha east from waterfront, stratum 3; T. W. Vaughan, collector.</td>
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</tr>
<tr>
<td>3468</td>
<td>Gorge of Yumuri River below Iglesia Mte. Serrato, Matanzas Province; T. W. Vaughan, collector.</td>
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<tr>
<td>3474</td>
<td>Trocha de Santiago de Cuba, second exposure on north side of trocha east from waterfront, stratum 3; T. W. Vaughan, collector.</td>
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<tr>
<td>3474</td>
<td>Trocha de Santiago de Cuba, second exposure on north side of trocha east from waterfront, stratum 3; T. W. Vaughan, collector.</td>
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<tr>
<td>3474</td>
<td>Trocha de Santiago de Cuba, second exposure on north side of trocha east from waterfront, stratum 3; T. W. Vaughan, collector.</td>
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<tr>
<td>3474</td>
<td>Trocha de Santiago de Cuba, second exposure on north side of trocha east from waterfront, stratum 3; T. W. Vaughan, collector.</td>
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</table>

Species from Cuba.

<table>
<thead>
<tr>
<th>Species</th>
<th>3355</th>
<th>3336</th>
<th>3340</th>
<th>3364</th>
<th>3344</th>
<th>3346</th>
<th>3348</th>
<th>3350</th>
<th>3352</th>
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</thead>
<tbody>
<tr>
<td>Scaphander sp.</td>
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<tr>
<td>Cassidea sulcifera (Sowerby)?</td>
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<td>☑</td>
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<tr>
<td>Malea camara Guppy</td>
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<tr>
<td>Cyprea sp.</td>
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<tr>
<td>Strombus sp.</td>
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<tr>
<td>Orthotaxion inornatus Gabb</td>
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<tr>
<td>Ampulla anguillana, n. sp.</td>
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<tr>
<td>Turbo sp.</td>
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<tr>
<td>Ostrea haitensis Sowerby</td>
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<tr>
<td>Pecten thetidis Sowerby</td>
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<td>Pecten ventonensis, n. sp.</td>
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<tr>
<td>Pecten crucianus, n. sp.</td>
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<tr>
<td>Pecten vaughani var. flabellum n. var.</td>
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<tr>
<td>Pecten gardnerae, n. sp.</td>
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<tr>
<td>Pecten iacobianus, n. sp.</td>
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<tr>
<td>Pecten waylandi, n. sp.</td>
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<td>Pecten decorus, n. sp.</td>
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<tr>
<td>Pecten pittiarii Dall.</td>
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<tr>
<td>Pecten articulosus, n. sp.</td>
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<tr>
<td>Plicatula densata Conrad</td>
<td></td>
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Remarks:

- Bainbridge, Santo Domingo.
- Bowden, Santo Domingo.
- Gatum. Anguilla.
- Tampa, Santo Domingo.
- Anguilla, aff. Chipola.
- Haiti, Bowden, Chipola, Oak Grove.
- Anguilla, Bowden, Santo Domingo.
- Related to Anguilla.
- Costa Rica.
- Tampa, Chipola, Oak Grove, Miocene of New Jersey.
- Tampa Chipola, Trinidad, Recent.
- Tampa to Recent.
- Santo Domingo.
- Like Recent species.
- Trinidad.
- Aff. Tampa and Chipola.
The greater number of collections from Cuba appear to have come from a single geologic horizon which is exposed at numerous localities in the vicinity of Santiago. The fauna, which is characterized by a profusion of pectens, bears a close resemblance to those of Tampa and Anguilla, but may be a little younger. The fossils from Consolacion del Sur (station 3474), among which is Orthaulax inornatus, have not been found elsewhere in Cuba, but tie up with the Tampa and Anguilla faunas. The small collections from Calabazar (station 4291) and Guajay probably are of nearly the same age. The fossils from Havana (station 4292) may be somewhat younger than the others, but the evidence is inconclusive.

Interesting collections were obtained by Wiebusch (stations 3652, 5312) from the asphalt beds at the Angela Elmira mine near Bejucal. These include both fresh-water and marine species which may have been derived from beds of different ages. The fossils are referred doubtfully to the Oligocene. The list follows:

**Fossils from the Asphalt Beds near Bejucal.**

- Levisus? angelicus, n. sp.
- Cypraea semen, n. sp.
- Hemisinus bituminifer, n. sp.
- Hemisinus costatus, n. sp.
- Elmira cornu-arietis, n. gen. et sp.
- Unio bitumen, n. sp.
- Margarita naticoides, n. sp.
- Solemya sulcifera, n. sp.
- Myrtea? asphaltea, n. sp.

**Descriptions of Species.**

**Scaphander species.**

A well-preserved cast of a species of *Scaphander* measuring 28 mm. in altitude and 16.4 mm. in diameter was collected by T. H. Wren in Cuba.

*Localities.*—Calabazar, Cuba, station 4291.

*Geologic horizon.*—Oligocene.

**Conus species.**

(Plate 1, Figures 5 a, b, 6 a, b.)

Casts of the interior of a species of *Conus* having a high, apparently bulbous nucleus and with deeply channeled sutures were obtained at Crocus Bay, Anguilla. The smaller whorls are rounded on top, but the more mature whorls are angulated at the periphery.

Another species of *Conus* occurs in the Miocene of Santiago, Cuba, station 5255, and a third in the upper Eocene of St. Bartholomew, station 6897a.

*Localities.*—Crocus Bay, Anguilla, stations 6894, 6966, Vaughan.

*Geologic horizon.*—Oligocene.

*Figured specimens.*—U. S. Nat. Mus., Nos. 166947, 166948.

**Turris species.**

From Crocus Bay, Anguilla, there is a fragment of a pleurotomoid shell which resembles *Turris albida* (Perry) in general appearance. The major sculpture, as in the species cited, consists of three prominent spiral threads; the secondary sculpture of spiral threads is lacking on
our specimen; the growth lines, unlike those of *T. albida*, are not prominent; the notch coincides in position with the middle thread.

It may not be out of place to remark here that *Pleurotoma cochlearis* Conrad, from Vicksburg, Mississippi, which has been placed in the synonymy of *Turris albida* by several writers, is clearly distinct from that species and probably belongs to a different section. Although the sculpture of the mature whorls is so similar that decollated specimens can scarcely be distinguished from *T. albida*, the protoconchs of the two are unlike.

**Locality.**—Crocus Bay, Anguilla, station 6894, Vaughan.

**Geologic horizon.**—Oligocene.

**Oliva species.**

(Plate 1, Figure 1.)

In the lower bed at Crocus Bay, Anguilla, occur two species of *Oliva*, one of which is figured. It is a plump, low-spired shell with a thick aperture. The other is higher spired and proportionately more slender.

**Locality.**—Crocus Bay, Anguilla, station 6965, Vaughan.

**Geologic horizon.**—Oligocene.

**Figured specimen.**—U. S. Nat. Mus., No. 166953.

**Lyria vaughani**, new species.

(Plate 1, Figure 4.)

The following is a description of this species:

Shell volutiform, spire high; nucleus small, succeeded by 5 whorls with high narrow axial costae, about 9 on the body whorl, near the anterior extremity of which are several oblique threads; aperture wide, about two-thirds the length of the shell; pillar lip with 3 basal folds and apparently several indistinct folds and an elliptical node at the posterior end; anterior canal short, with an oblique fasciole.

Alt. 22; diam. 12.5; alt. of body whorl 15 mm.

This species resembles *Lyria musicina* Heilprin, but is smaller, has a smaller nucleus, sharper and closer ribs, fewer columellar folds, and more prominent basal fasciole.

**Locality.**—Crocus Bay, Anguilla, station 6965, Vaughan.

**Geologic horizon.**—Oligocene.

**Type.**—U. S. Nat. Mus., No. 166955.

**Levifusus? angelicus**, new species.

(Plate 1, Figures 2, 3 a, b.)

The following is a description of this species:

Shell thin, rapidly expanding; spire low; whorls about 4½, shouldered, with narrow axial costae, about 16 to the whorl, extending from suture to suture on the spiral whorls but obsolete on the body whorl or reduced to low nodes on the carina; shoulder with many faint, simple, revolving threads and, near the suture, one stronger thread forming nodes at the intersections with the axial ribs; periphery of whorls nearly cylindrical, set with 5 or more strong,
raised threads which increase in number and decrease in relative size on the body whorl; base of whorl to end of canal covered with flat threads; canal short, straight; inner lip smooth, with a thin deposit of callus; outer lip thin, broken, with no traces of internal lira, but inner surface of shell very minutely, closely, spirally lined; aperture broad, semilunate.

Alt. of smaller fragment, spire lacking, 12.5 mm.; diam. of body whorl, 9.5 mm.; alt. of larger specimen, end of canal lacking, 17.4 mm.; diam. of body whorl, 13.5 mm.

The larger of the two specimens of this species has lost nearly all of the superficial layers of shell from the whorls of the spire, which have thus acquired an unnatural rotundity. The tip of the spire of the smaller shell is broken, but the lower whor's show the shape and sculpture very well.

Owing to the absence of the protoconch and nepionic whorls, it is impossible to determine with certainty the precise generic relationships of this shell. It appears rather close to *Levifusus*, to which I have provisionally referred it, but is less acutely carinate and tuberculate than the type of that genus and appears to have a broader aperture and a shorter canal.

**Locality.**—Angela Elmira asphalt mine, near Bejucal, Cuba, station 3652, Wiebusch.

**Geologic horizon.**—Oligocene? asphalt beds.

**Type.**—U. S. Nat. Mus., No. 166957.

*Epitonium (Sthenorhytis) antiquense* (Brown).

(Plate 1, Figure 8.)


The following is the original description of this species:

"Shell turbinate, of about five whorls, rapidly enlarging; the suture impressed, whorls rounded, crossed by about sixteen varices which are acute edged and rise abruptly from the whorl. The intervarical spaces are crossed by five raised revolving cords with a secondary sculpture of fine, somewhat irregularly spaced revolving lines and crossed by radial lines parallel to the varices. This secondary sculpture which covers the varices also, is best observed with a lens. From the excavated form of the base of the shell, it is probable that the mouth was circular, but this portion of the shell is imperfect. Alt. 30 mm., diam. 19 mm. From the Hodge's Hill limestone (Antigua formation), Hodge's Bay, Antigua. Oligocene."

This species probably has more than 5 whorls, but from the single specimen at hand, a crushed fragment of 3 whorls, it is impossible to determine the number. The varices are curved gently away from the mouth.

**Locality.**—Upper bed at Hodge's Hill, station 6861, Vaughan.

**Geological horizon.**—Oligocene?

**Type.**—Philadelphia Academy, No. 1645.

**Figured specimen.**—U. S. Nat. Mus., No. 166958.
The following is the original description of this species:

"Testa ovato-trigona, crassiuscula, anfractibus senis, longitudinaliter sulcatis, ultimo seriebus duabus ad tribus tuberculorum ornato, serie postica eminentiore; apertura lata; margine interne labii externi dentato, dentibus paucis distantibus; labio interno transverse costellifero; costellis anticis prominentioribus."

The Cuban specimens, which are doubtfully referred to this Dominican species, are preserved as casts only. They attained a size considerably larger than was customary for *Cassidea sulcifera*, but resemble it in shape and general appearance, and are unlike any other described species from this region with which I am acquainted. The largest specimen at hand measures 9 cm. in length and 7.5 cm. in maximum width.

*Locality.*—Calabazar, Province of Habana, Cuba, station 4291, Wren. Sowerby's type was collected by Heneken in Santo Domingo and the species has recently been obtained by Vaughan, Mansfield, and Cooke from the base of the Chattahoochee formation at Red Bluff, near Bainbridge, Georgia.

*Geologic horizon.*—Oligocene.

*Type.*—British Museum.

**Cassidea? species.**

Indeterminable casts of a medium-sized species with a high spire were found at Crocus Bay, Anguilla. They attained an altitude of about 5 cm.

*Locality.*—Crocus Bay, Anguilla, station 6966, Vaughan.

*Geologic horizon.*—Oligocene.

**Dolium species.**

An internal cast which resembles *Malea camura*, but appears to be a little more cylindrical than that species. The impression of the inner lip is obliterated, so that the specific characteristics can not be made out.

Alt., 36 mm.; diam., 26 mm.

*Locality.*—Crocus Bay, Anguilla, station 6894, Vaughan.

*Geologic horizon.*—Oligocene.

**Malea camura Guppy.**

*Malea ringens* Conrad, Pacific R. R. Repts., vol. 6, p. 72, plate 5, fig. 22, 1857.


The following is Guppy's description of this species:

"Shell ovate, ventricose; whorls 6-7, destitute of varices, zoned by about 16 low spiral ridges; spire short, conic; aperture rather narrow, outer lip thickened, dentate; inner lip sinuate, dentate; columella tortuous, irregularly folded or plaited; callus thin."

This species is very closely related to Malea ringens Swainson, living in the Pacific Ocean, with which it was confused by Conrad. It appears to have attained adult characters at a somewhat smaller size and to have more delicate sculpture than the recent species, but in other respects to be almost indistinguishable from it. It is interesting to find this type of shell surviving with such slight modifications in the Pacific Ocean, but now quite extinct in the Antillean region, where it was once so widely distributed.

Malea camura is represented in the Cuban collections by only one cast of the interior, but there can be little doubt of the correctness of the identification.

Localities.—Near Havana, Cuba, station 4292, Wrenn, collector; also Bowden, Jamaica; Haiti; Pontou, Santo Domingo; and Gatun, Panama.

Geologic horizon.—Oligocene.

Types.—U. S. Nat. Mus., Nos. 115506 and 115507.

Cypraea anguillana, new species.

(Plate 1, Figures 9 a, b.)

The following is a description of this species:

Shell subellipsoidal, smooth, polished; spire mammiform, with sutures obliterated; aperture narrow; outer lip closely dentate with about 20 tubercles; inner lip obsoletely dentate well within the aperture; inner and outer lips pinched or flattened at the anterior end.

Alt., 25 mm.; diam., 14.5 mm.

Locality.—Crocus Bay, Anguilla, station 6894; the cast of a larger specimen, probably C. anguillana, was found at station 6893, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus., No. 166963.

Cypraea semen, new species.

(Plate 1, Figures 10 a, b.)

The following is a description of this species:

Shell small, rotund; surface smooth and polished, but inner layers of shell exhibiting faint, distantly spaced lirations transverse to the axis; outer lip with 22 or 23 evenly spaced denticulations placed well within the aperture; inner lip with 5 denticulations on the anterior half and several obsolescent denticulations on the posterior half; canals short, nearly equal.

Length, 8.5 mm.; diameter, 5.8 mm.

Locality.—Angela Elmira asphalt mine near Bejucal, Cuba, station 3652; Wiebusch, collector.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus., No. 166965.
TERTIARY MOLLUSCA.

Cypræa species.

Besides Cypræa anguillana, two species of Cypræa occur at Crocus Bay, Anguilla. One is represented in the collection by a single crushed specimen with an ornamentation of raised spiral lines resembling the sculpture of Ovula multicularinata Dall. It was found at station 6967. The other, a large globose form preserved only as casts, is abundant and occurs also in Cuba.

Localities.—Crocus Bay, Anguilla, stations 6893, 6894, 6966, 6971, Vaughan; Consolacion del Sur, Vento, and Calabazar, Cuba, stations 3474, 4290, 4291, Wren.

Geologic horizon.—Oligocene.

Cypræa, indeterminate species.

One indeterminable cast.

Locality.—Northwest side of St. Jean Bay, St. Bartholomew, station 6925, Vaughan.

Geologic horizon.—Upper Eocene.

Strombus species.

(Plate 2, Figures 5 a, b.)

Casts of a huge species of Strombus with a moderately high spire have been found at Crocus Bay, Anguilla. The largest specimen exceeded 20 cm. in altitude and 15 cm. in diameter. Smaller specimens about 8 cm. in altitude, have a very low spire and long tubercles and probably represent a different species. The figured specimen, measuring 38 mm. in altitude, probably belongs to a third species.

A Strombus occurs in the Oligocene of Santiago, Cuba, station 5255.

Locality.—Crocus Bay, Anguilla, stations 6894, 6965, Vaughan.

Geologic horizon.—Oligocene.

Figured specimen.—U. S. Nat. Mus. No. 166983.

Orthaulax pugnax (Heilprin).

(Plate 2, Figures 3, 4.)


Orthaulax pugnax Dall, Trans. Wagner Inst., vol. III, p. 170, plate 8, figs. 5, 8, 1890.


The following is the original description of this species.

"Shell irregularly oval, obconical, flattened, the flattened appearance being due to three irregular swellings or knobs, one of which immediately adjoins the anteriorly-directed fissure of the aperture; aperture narrow, projected forward (in its upper course) as a closely compressed fissure, which in a crescential curve ascends to within a comparatively short distance of the apex of the spire; outer lip? (broken in specimen); inner lip largely developed, completely concealing the whorls of the spire, and duplicating for a very considerable extent the outer lip; spire freely enclosed in a pointed superstructure, or dome, built over it by an extension of the mantle; surface covered with longitudinal lines of growth, which extend continuously from the apex to the base.

"Length (of imperfect specimens, lacking probably upward of an inch), 2.7 inches; width, 1.75 inches."
5901, Vaughan. 

Localities.—Antigua, Spencer; Crocus Bay, Anguilla (sta. 6965), Vaughan. Occurs also at Bainbridge, Tampa, and Canal Zone (sta. 5901, 2 miles south of Mitchellville, P. R. R.).

Geologic horizon.—Oligocene.

Type.—Wagner Institute, Philadelphia.

Figured specimens.—U. S. Nat. Mus. Nos. 166982, 166984.

Orthaulax inornatus Gabb.

(Plate 2, Figures 1, 2.)


The following is Gabb's description of this species (1873):

"Shell broadly rounded-fusiform. Young shell with the spire a little shorter than the aperture, suture impressed, whorls numerous, nuclear whorls three, the subsequent ones showing faint traces of occasional thickenings disposed like the varices of Triton; surface smooth; anterior end of body whorl marked by a few faint revolving lines, no posterior canal. Adult shell more distinctly fusiform, the spire covered with a longitudinally striated incrustation covering the sutures and extending to the extreme apex. Aperture elongated, acute behind and prolonged into a very narrow posterior canal running straight to the apex; in advance it is gradually narrowed, the anterior notch broad and shallow; inner lip thinly encrusted; outer lip thin in all my specimens, and apparently thin, straight and entire in the perfect adult. Size of largest specimen, length 3.75 inches, width 1.5 inches."

Two broken specimens, much larger than any previously figured, were obtained in Cuba. As one would expect of shells of this type, the apical angle of the adult shell is much more obtuse than that of the immature specimen. The faint revolving lines on the anterior end extend posteriorly to the position of maximum diameter of the whorl. In other respects, the Cuban fossils resemble those from Santo Domingo and Florida.

Localities.—Consolacion del Sur, Pinar del Rio, Cuba, station 3474, the Alcalde, coll.; Santo Domingo; Tampa; Bainbridge.

Geologic horizon.—Oligocene.

Type.—Philadelphia Academy.

Figured specimens.—U. S. Nat. Mus. No. 166980.

Cerithium herculaneum, new species.

(Plate 1, Figure 7.)

The following is a description of this species:

Shell large, broad at the base; decollated, 10 subsequent whorls; spiral sculpture from anterior to posterior as follows: 1 inconspicuous thread adjacent to the suture; 1 row of nodes becoming acuminate on the larger whorls; 2 low,
simple threads; 1 row of high, pointed nodes convex anteriorly, concave posteriorly, forming a coronation adjacent to the suture. Outer lip and canal broken.

Length of fragment of 10 whorls, apex and part of anterior canal missing, 85 mm.; diam. at decollation 7 mm.; diam. of body whorl, 37 mm.

This species is readily distinguishable from others of the mid-American region by its large size and peculiar sculpture.

Locality.—Crocus Bay, Anguilla, station 6965, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 166985.

Cerithium species.

Casts of a large Cerithium were obtained by Vaughan on the northwest side of St. Jean Bay, St. Bartholomew, at stations 6905 and 6925. A smaller species retaining the silicified shell, which shows imperfectly the original sculpture, was collected at station 6897, a point between Anse Écaille and Anse Lézard.

Geologic horizon.—Upper Eocene.

Cerithidea? anguillana, new species.

(Plate 3, Figures 10 a, b, 11, 12 a, b.)

The following is a description of this species:

Shell slender; axial sculpture of numerous small, rounded ribs, about 15 to the whorl, extending across the whorl, and feeble varices at intervals of about three-fourths of a whorl; spiral sculpture of fine and coarser rounded threads, thickened a little on top of the ribs; middle portion of whorl nearly flat, with 3 or 5 coarse threads separated by two or more finer ones; margins of the whorls sloping to the moderately impressed suture and covered with fine threads, with one coarser thread adjacent to the suture.

Length of fragment of about 6 whorls, 19.5 mm.; width of largest whorl, 8.2 mm.

Two young shells, probably of this species, show that the axial costæ do not extend to the base of the body whorl, which is ornamented with fine, impressed, revolving lines.

Locality.—Crocus Bay, Anguilla, station 6965, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 166991.

Hemisinus costatus, new species.

(Plate 3, Figures 1 a, b.)

The following is a description of this species:

Shell long, slender; whorls moderately convex; suture deeply channeled. Sculpture of strong axial or slightly protractive costæ, 14 per whorl, terminating abruptly at the first spiral line behind the suture, and 9 or 10 fine revolving threads on whorls of spire and 3 additional strong threads and several finer ones on base of body-whorl. Whorls coronated by a row of weak nodes at the intersections of the most posterior thread with the costæ. Aperture oval; peristome incipiently channeled anteriorly.

Length of fragment of 3½ whorls, 20.6 mm.; length of body-whorl, 10.6 mm.; diameter of body-whorl, 7.5 mm.; length of aperture, 5.3 mm.
Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, station 5312, Wiebusch.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 166994.

Hemisinus bituminifer, new species.

(Plate 3, Figure 2)

The following is a description of this species:

Whorls convex, obsoletely shouldered; suture impressed; costae terminating abruptly close behind the suture, retractive in posterior quarter of the shell, protective in anterior three-quarters, 22 on penultimate whorl, 27 on body-whorl; shoulder nearly smooth; about 10 low, spiral threads on whorls in front of the shoulder; base of body-whorl with numerous fine, even, spiral threads. Aperture broadly oval; inner lip with a thin callus.

Length of a fragment of about 1¾ whorls, 21.7 mm.; altitude of body-whorl, 16.8 mm.; diameter of body-whorl, 18 mm.; length of aperture, about 10 mm.

Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, station 3652, Wiebusch.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 166993.

Hemisinus atriformis, new species.

(Plate 3, Figures 4, 5)

The following is a description of this species:

Shell stout, of about 8 or 10 whors, 5½ remaining on the decollated type; whorls cylindrical to convex, twice as wide as high. Axial sculpture of numerous close, slightly protractive ribs rendered strongly nodose by close impressed revolving lines. The axial sculpture is dominant at first, but is exceeded in strength on the large whors by the spiral sculpture. Aperture crushed in all the specimens at hand, but apparently broadly oval and flattened in front. Inner lip callous, arcuate; outer lip thin.

Alt., 15.5 mm.; diam. of body-whorl, 8 mm.

The sculpture of this shell is strikingly similar to that of plicate varieties of Doryssa atra inhabiting rivers in British Guiana.

This species, much broader than H. siliceus, with which it is associated, possesses nearly the same proportions as the cast from the same locality which has been unrecognizably figured by Brown and Pilsbry under the name of H. latus.¹

Locality.—Dry Hill Point, Antigua, station 6867, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 166996.

Hemisinus antiguenensis Brown and Pilsbry.

(Plate 3, Figures 6, 7, 8, 9)

The following is the original description of this species:

"The shell is slender, diameter contained nearly three times in the length; whorls rather numerous, probably at least fifteen in a perfect shell, as a young one 12.5 mm. long has twelve whorls, the upper part of the spire being very slender. Whorls convex, sculptured with many rounded ribs, as wide as their intervals, somewhat curved, the concavity forward and somewhat protractive. There are about 25 ribs on a whorl. Above the lower suture of each whorl there are two or three spiral cords, the lowest one strongest. On the last whorl the ribs extend to the periphery, where they disappear, the peripheral region and the base having numerous spiral cords. The aperture is but rarely preserved, but in the best examples the peristome seems to be somewhat effuse at the base of the columella.

"Length 16.5, diam. 6 mm., 8 whors remaining.
" 19.5, " 6.4 " ""

"The sculpture of longitudinal ribs with basal spirals is characteristic. The same type of sculpture occurs in various South American species of Hemisinus. It could readily be matched also in Melania and related forms or in the Pleuroceratidae.

"There seems to be variation in the development of the spirals. Many specimens show weak traces of impressed spirals over the ribs throughout, and this seems to be the normal condition; but in some examples the ribs appear to be smooth except near their lower ends.

"This species, like the associated forms, has the basal sinus or notch obsolete, as in part of the recent species."

The revolving threads on the posterior part of the whorl are coarser and more persistently present than one would infer from the description.

Locality.—Dry Hill Point, Antigua (station 6867), Vaughan.
Geologic horizon.—Oligocene.
Type.—Philadelphia Academy.
Figured specimen.—U. S. Nat. Mus. No. 166995.

Hemisinus siliceus Brown and Pilsbry.
(Plate 3, Figure 3.)


The following is the original description of this species:

"The shell is Melaniiform, regularly tapering, the diameter of last whorl contained about 2½ times in the total length. The whorls are convex, and apparently without any sculpture except growth-lines. The last whorl has fine, reversed sigmoid growth striae, which retract somewhat below the suture, then advance, as in H. cubiana. In the type specimen a former peristome, indicating a period of growth arrest, appears as a sigmoid varix on the last whorl. This indicates a more strongly sigmoid outer lip than in the recent Antillean species.

"Length 26 mm., about six whors remaining, the summit lost; diam. 10.8 mm.

"No entirely perfect aperture was found on the slabs collected, but so far as we can judge, it seems to be much like that of Hemisinus cubanianus (Orb.). It is not unlikely that H. siliceus is ancestral, or at least a collateral species
not far removed from the ancestral stock of the smooth Antillean species of *Hemisinus*.

“There is, of course, a possibility that this Antigua species belongs to the genus *Pachycheilus*, which is represented in the recent fauna of Cuba by *P. conicus* (Orb.) and *P. violaceus* Prest.; but the straighter columella does not, in our opinion, favor this view.

“The type has lost the shell from the spire by conversion into flint, but the surface has been preserved in perfection on the last whorl.”

*Locality.*—Dry Hill Point, Antigua, station 6867, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—Philadelphia Academy.


*Turritella anguillana*, new species.

(Plate 4, Figures 1, 2, 3.)

The following is a description of this species:

Shell long, slender; whorls medially constricted, with two prominent spiral cords on the anterior quarter, the cord adjacent to the suture usually the smaller; remainder of the whorl with fine spiral threads; finer details of sculpture obliterated on specimens at hand.

A fragment of 4 whors tapers from 11.5 to 8 mm. in 25.5 mm. length.

This species appears to be intermediate between *T. mississippiensis* Conrad from Vicksburg and *T. systoliata* Dall from the Tampa silex bed, resembling the former in that the posterior of the two prominent cords is the larger, and resembling the latter in the constriction of the whors.

*T. anguillana* is closely related to *T. halensis* Dall from Bainbridge, but in *T. halensis* the constriction is limited to the middle third of the whorl.

*Locality.*—Crocus Bay, Anguilla, station 6894, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167008.

*Turritella dubiosa*, new species.

(Plate 4, Figure 4.)

The following is a description of this species:

Shell conic, rapidly expanding; whors nearly flat or very slightly convex, with a low, sharp, spiral thread at the anterior quarter and a finer thread adjacent to the suture; median portion smooth; posterior third with two or more low, spiral threads; suture very little impressed.

Length of fragment of about 5 whors, 26 mm.

This species is represented in the collection by a single slightly crushed fragment. The figure is from a photograph of the broader side.

*Locality.*—Crocus Bay, Anguilla, station 6965, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167009.
Tertiary Mollusca.

Turritella forresti Brown.

(Plate 4, Figures 5, 6, 7.)


The following is the original description of this species:

"Shell elongate, slowly tapering, of many whorls, with a raised sculpture of three major spiral ridges, of which the one towards the apex is double and beaded, the next one is at first single, but later becomes double and beaded, while the third is, in the younger stage, not beaded. Between these major revolving spiral ridges are finer revolving spirals, about five between the first and second major spirals, and the same number between the second and third spirals, with a like number from the third spiral to the suture. These secondary spirals may become knotty and beaded when crossed by the diagonal growth lines, and the doubling of the major spirals comes from one of these minor spirals becoming enlarged on that side of the major spiral towards the apex. The suture becomes depressed by the shell being excavated above the suture or on the basal side of the whorl. A fragment of 14 mm. tapers from 4 mm. to 2 mm. in six whorls. A larger fragment tapers from 6 mm. to 4 mm. in a length of 13 mm."

**Localities.**—North of the cathedral, St. Johns, Antigua, station 6866, Vaughan; Willoughby Bay, Antigua, Brown.

**Geologic horizon.**—Oligocene.

**Types.**—Philadelphia Academy, No. 1644.

**Figured specimens.**—U. S. Nat. Mus. No. 167005.

*Turritella crocus*, new species.

(Plate 4, Figure 8.)

The following is a description of this species:

Shell acute-conic; whorls nearly twice as wide as high, with 2 strong, high, revolving ribs separated by a deep, evenly concave depression; anterior rib round to acutish, with concave slope to the suture; posterior rib round, with flattish posterior slope to the suture; suture deeply impressed; obscure traces of revolving, impressed lines on median depression and on posterior rib; base nearly flat; aperture oval or subquadrangular.

Alt. of decollated specimen, 4 whorls remaining, 28 mm.; diam. of body-whorl, 11.9 mm. The body-whorl of a larger specimen measures 18.5 mm. in diameter.

The median groove of this species recalls *T. ambulacrum* Sby., but comparison shows the latter to be entirely distinct.

A very closely related, if not identical, species occurs in limestone at "E-1 Salts," Chiapas, Mexico, in the area marked as Pliocene by Böse.

**Localities.**—Upper bed at Crocus Bay, Anguilla, stations 6967 (type), 6894, and 6893. A fragment, apparently of *T. crocus*, was found at Willoughby Bay, Antigua, station 6881, and another, possibly of the same species, near Jackass Point, St. Johns Bay, Antigua, station 6865.

**Geologic horizon.**—Oligocene.

**Type.**—U. S. Nat. Mus. No. 167000.
From Crocus Bay, Anguilla, there are two specimens of Solarium. The smaller, which is figured, is a fragment of 3\frac{1}{2} whorls from station 6965. The upper surface is ornamented with a sculpture of radiating and revolving lines, as in S. bellastriatum; the lower surface is embedded in a matrix of hard, yellow limestone. The larger specimen is 23 mm. in diameter. The sculpture, except for prominent revolving lines on the upper surface, is obliterated. The suture is deeply impressed.

*Locality.*—Crocus Bay, Anguilla, stations 6965 and 6967, Vaughan.

*Geologic horizon.*—Oligocene.


*Bythinella antiquensis* Brown and Pilsbry.


The following is the original description of this species:

"The shell is oblong, pupiform, smooth; outlines of the spire convex, the apex conspicuously obtuse. Whorls 4, very convex, aperture vertical, shortly ovate, its length contained 2\frac{1}{2} times in that of the shell; peristome in one plane, thin.

"Length 1.8, diam. 1.1, length of aperture 0.7 mm.

"This very minute form is not rare. It has the very obtuse summit and the pupiform shape of the species usually referred to *Bythinella*, rather than the shape of *Paludestrina*, if, indeed, the two groups are distinct. Of course, any generic reference of a minute Amnicoloid shell of this sort is purely provisional, unless it is from a region where the recent fauna and its antecedents are well known."

*Locality.*—Dry Hill, Antigua, Brown.

*Type.*—Philadelphia Academy.

*Xenophora species.*

A species of *Xenophora* with very convex, closely appressed whorls showing few scars of attachment is abundant in the Oligocene of Crocus Bay, Anguilla (stations 6893, 6894, 6966, 6967). An indeterminable cast of a *Xenophora* was collected from the upper Eocene on the northwest side of St. Jean Bay, St. Bartholomew, station 6925, Vaughan, collector.

*Genus ELMIRA,* new genus.

The following is a description of this genus:

Shell rapidly increasing in size; whorls few, rapidly descending; holostome; imperforate.

*Genotype.*—*Elmira cornu-arietis* Cooke, n. sp.

This genus appears to belong to the Paludinidae, but has fewer whorls and is much more rapidly expanding than the other members of that family.
Elmira cornu-arietis, new species.

(Plate 5, Figures 9 a-e.)

The following is a description of this species:

Shell corniform, imperforate, thin, rapidly increasing in size, with 2 evenly convex rapidly descending whorls; suture deeply impressed; aperture entire, circular; inner lip and part of the convex base concealed by a thin callus; surface malleated and with obscure broad revolving grooves crossed by rugose, undulating growth-lines.

Axial elevation, 32 mm.; diameter, 34 mm.

As the shell is broken away at the apex, the apparent fewness of volutions may be due, in part, to the obliteration of the sutural impressions in the asphalt of which the cast is composed.

Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, stations 3652, 5312.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 167036.

Ampullina anguillana, new species.

(Plate 4, Figures 9 a, b.)

The following is a description of this species:

Shell globose, of about 5½ whorls, striated in accordance with the lines of growth at intervals on the body-whorl of about 0.6 mm.; spire low; base covered with a broad, convex callus.

Alt., 43 mm.; diam., 42.5 mm.

This shell resembles A. fischeri Dall, which has a flatter and proportionately much narrower callus. The shape of the whorls and the elevation of the spire are about as in A. fischeri.

Localities.—Crocus Bay, Anguilla, station 6965 (type), 6966, 6893?, 6894, Vaughan, collector; also in the form of casts at Consolacion del Sur, Cuba, station 3474, the Alcalde, collector.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 167021.

Ampullina (?), indeterminate species.

An indeterminable cast.

Locality.—Between Colombier Point and bay next to St. Jean Bay, St. Bartholomew, station 6897b, Vaughan.

Geologic horizon.—Upper Eocene.

Ampullina (Ampullinopsis) spenceri, new species.

(Plate 5, Figures 1-3.)

The following is a description of this species:

Shell large, thick, of about 7 whorls; the entire body-whorl, except the base and sutural channel, ornamented with close, evenly spaced, indistinct, impressed punctate revolving lines, visible only on well-preserved specimens; apex small, pointed; spire moderately low; suture deeply excavated; whorls angulated at the sutural channel; greatest convexity below the middle of the whorl; base flat or slightly convex, separated from the remainder of the body-
whorl by a distinct, sometimes impressed line; callus turgid, of variable width, usually concealing much of the umbilicus.

Dimensions—Alt., 38 mm.; diam., 39 mm.; length of body-whorl at aperture, 35.5 mm.

38.5
37
53.5
39
35
55

This species closely resembles A. amphora Heilprin, but the spire is less elevated than in that species.

Locality.—The two cotypes were collected by J. W. Spencer in Antigua; a larger but less perfect specimen was obtained by Vaughan at the bluff on the north side of Willoughby Bay, Antigua (station 6881). Casts of a similar, perhaps identical, species were collected at Crocus Bay, Anguilla (station 6894).

Geologic horizon.—Oligocene, Antigua formation.

Types.—U. S. Nat. Mus. No. 167031.

Sinum chipolanum (Dall) (Plate 5, Figures a, b.)


Sinum chipolanum Dall, U. S. Nat. Mus. Bull. 90, p. 109, plate 12, fig. 29; plate 16, fig. 1, 1915.

The following is the original description of this species:

"Shell solid, rather thick, varying in rotundity with age, the young ones as a rule being more naticoid in shape, while the more advanced are relatively flatter, and the fully mature specimens again are more rotund; whorls four or five, sculptured with rather fine, flattish, revolving threads of varying size, separated by channelled interspaces, varying in width and minutely undulated or reticulated by the sharp, close-set, fine incremental lines; aperture large, oblique; base somewhat flattened, periphery rounded; pillar lip arched, broad, flattened somewhat and sometimes excavated, with a narrow sulcus behind it, running up to the imperforate umbilical region; callus on the body moderate, lip not reflected. Max. lon. of adult 33; diam. 27 mm.; lon. of young shell 16.5; axial elevation 11; diam. 15 mm.

"This species is most nearly related to S. declivis, from which it may be separated by its closed umbilicus and the absence of the emargination of the pillar, which is the most characteristic feature of declivis. It also recalls S. bilix var. mississippiensis, which has a perforate umbilicus and is more rotund. The sculpture may be close or sparse; it varies in this respect in nearly all the species."

The specimen from Anguilla is more depressed and much less rotund than is customary for S. chipolanum, but comes well within the range of variability of that species in those respects. It is very much less rotund than the form from the Tampa "silex" bed, which may be specifically distinct from S. chipolanum.

The dimensions of the figured specimen are as follows: max. lon., 16.9 mm.; axial elevation, 10 mm.; diam., 11 mm.

Localities.—Crocus Bay, Anguilla, station 6894, Vaughan; also Chipola.

Geological horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 112967.

Figured specimen.—U. S. Nat. Mus. No. 167033.
Turbo antiquensis, new species.

(Plate 5, Figures 4 a–c.)

The following is a description of this species:

Spire moderately elevated, imperforate; whorls convex, with greatest diameter below the middle of the whorl; suture impressed; surface covered with revolving rows of nodules, about 20 on the body-whorl; on the body-whorl the nodules of the 3 or 4 rows nearest to the suture are elongated obliquely and fused with those of the adjacent rows, producing falsely protractive ribbing; remaining nodular rows alternating in size; secondary sculpture of fine revolving threads within the internodular and interfilar spaces on the base, but not crossing the nodes.

Alt., 23 mm.; diam., 24 mm.

This species resembles in shape and size Turbo crenorugatus Heilprin from the Tampa "silex" bed, but is differently sculptured; it is probably related to the unfigured T. dominicensis Gabb from Santo Domingo.

Locality.—Rifle Butts, Antigua, station 6854, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 167034.

Turbo species.

The following is a partial description of this species:

One mold of a Turbo with a high spire. The sculpture of the whorls above the carina is indistinct, but several revolving threads are visible. The base of the shell is ornamented with 4 or 5 strong revolving threads between which are several smaller beaded threads. The basal fasciole is rather large and prominent.

Alt., about 23 mm.; diam., about 20 mm.

This species is quite distinct from T. antiquensis and T. crenorugatus and appears to be undescribed.

Locality.—Consolacion del Sur, Cuba, station 3474, the Alcalde, collector.

Geologic horizon.—Oligocene.

Margarita naticoides, new species.

(Plate 5, Figures 5 a, b.)

The following is a description of this species:

Shell naticoid, polished, pearly within, smooth except for fine growth-lines; whorls 3½, strongly convex anteriorly, but flattened or slightly concave in front of the suture; suture distinct; spire low; base convex; aperture circular; outer lip attenuated, inner lip incrassated; umbilicus rudimentary.

Alt., 10.5 mm.; width, 11.4 mm.; length of aperture, 8 mm.

Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, stations 3652, 5312, Wiebusch, collector.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 167028.
Neretina? grandis, new species.
(Plate 5, Figures 7, 8.)

The following is a description of this species:

Shell large, rapidly expanding; younger whorls shouldered, older whorls rounded; spire very low, largely covered by body-whorl; suture not impressed; inner walls resorbed.

Alt., about 32 mm.; width, 35 mm.

The generic position of this species is puzzling. The resorption of the inner walls of the shell, as shown in casts of the interior, ally it with the Neritidæ rather than with the Naticidæ, to which it bears a superficial resemblance. The young shell shows a rather close resemblance in shape and size to some of the species of Neritina living on the west coast of America, but the mature shell attained a length of nearly 8 cm., much larger than any of the known species of that genus. In size and general appearance the species is not unlike the genus Velates of the Eocene of the Paris Basin, but appears to lack the superficial shelly layers which conceal the suture in that genus.

The columellar lip in all the specimens at hand is concealed by the hard matrix.

Localities.—Anse Lézard and St. Jean Bay, St. Bartholomew, stations 6926 (type) and 6925, Vaughan. A cast of a species resembling this in size and shape was obtained recently by me from the Ocala limestone at the Holder phosphate mine, 5 miles southwest of Inverness, Florida.

Geologic horizon.—Upper Eocene.
Type.—U. S. Nat. Mus. No. 167038.

Planorbis siliceus Brown and Pilsbry.


The following is the original description of this species:

"This is a species of the section Tropicorbis. The shell is rather thick, with the periphery rounded, more convex towards the right side. The two sides are about equal in width of the concavity, but that on the right side penetrates more deeply, being vortex shaped. The last whorl is rounded on this side. On the left side the last whorl is subangular and the cavity is less infundibuliform.

"Diameter 3.5, greatest alt. 1.7 mm.
" 5 " 2.1 "

"This species belongs to a widely spread group of the modern tropical American fauna."

Locality.—Dry Hill Point, Antigua, station 6867, Vaughan.
Geologic horizon.—Oligocene.
Type.—Philadelphia Academy.
Scapharca (Scapharca) anguillana, new species.

(Plate 5, Figures 10 a, b.)

The following is a description of this species:

Shell of moderate size, inequilateral, with elevated prosocelous beaks situated at the anterior third; right valve with 31 rounded ribs separated by flat interspaces of equal width, the ribs on the anterior end set with erect rounded, disk-like tubercles with longer axis parallel to the lines of growth and separated by narrower spaces; on the remaining ribs the tubercles are replaced by low nodes which become obsolete near the posterior end of the shell; left valve unknown; cardinal area with a raised margin, high, with about 8 wavy grooves; hinge-line short, with about 58 teeth, small and vertical mesially, larger and oblique distally.

Alt., 30 mm.; lon., 32 mm.; diam. of right valve, 8 mm.; length of hinge, 22 mm.

This species is very closely related to A. chiriquiensis Gabb from Chiriquí, Panama, from which it can be distinguished by the smaller size and much greater number of tubercles on the Anguillan species.

Locality.—Crocus Bay, Anguilla, station 6964, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 167044.

Scapharca willlobiana, new species.

(Plate 5, Figures 11 a, b.)

The following is a description of this species:

Shell of moderate size, elliptical, with low beaks situated at the anterior third. Valves with about 35 ribs with fine, regular, concentric beading, except on the posterior slope, where the ribs are almost smooth; near the margin the ribs are flattened and some of them show an incipient channeling which probably becomes more pronounced on larger shells. Hinge line long, straight. Both ends of shell rounded, the anterior with shorter radius than the posterior. Spaces between the ribs nearly equal in width to the ribs and crossed by evenly spaced, raised lines continuous with the beads on the ribs. Cardinal area long and narrow.

Long., 23 mm.; alt., 15 mm.; diam., 9 mm.

The type is a young specimen which has been crushed in the umbonal region but is otherwise well preserved.

This species may be distinguished from Scapharca hypomela Dall by its much more elliptical outline, rounded margins, and fewer ribs.

Locality.—North side of Willoughby Bay, Antigua, station 6881, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 167040.

Pinna vaughani, new species.

(Plate 9, Figures 4 a, b.)

The following is a description of this species:

Shell rapidly expanding, valves mesially carinate; sculpture of longitudinal riblets about 7 on dorsal area and about 5 below the carina, lower half of ventral area smooth, except for growth lines.

Length of fragment, 58 mm.; height, 37 mm.; depth, 28 mm.
A single fragment was collected by Dr. Vaughan, in whose honor the species is named. It is broken at both ends and has been rendered somewhat unsymmetrical by pressure, which has also increased the acuteness of the carinal angles.

This species is not unlike *P. carneae* Gmelin, but that species has rudimentary riblets on the lower part of the ventral area.

*Locality.*—Crocus Bay, Anguilla, station 6894, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167047.

**Ostrea antiquensis** Brown.

(Plate 6, Figures 1 a, b, 2 a, b.)


The following is the original description of this species:

"Shell ovate or nearly orbicular, thick and dense, externally radially plicate or sometimes nearly smooth, the plications on the lower, deep valve begin at the beak and are usually seven in number, of which a group of five ridges is separated from the other two by a broad depression; the ridges sharp and spinose or obtuse and even, the furrows or depressions smooth and rounded. Hinge moderate, the shell rapidly widening beyond the end of the hinge line, the plications usually dying away as the margin of the adult shell is reached, and this margin in the lower valve being turned up abruptly for one-half inch or more, making a cup-shaped valve. The muscle impression is distinct, more strongly impressed in the case of the deep valve; situated on the left and nearer to the beak than to the opposite margin. The lower valve is more or less excavated internally, the upper valve is flat. When strongly plicate and even spinose, this species closely resembles *O. gatunensis* B. and P., except that this latter species has not the heavy shell of *O. antiquensis* nor has it the turned-up margin. *O. haitensis* Sowb. has the rugose exterior of this species in its strongly plicate form, but while the shell is heavy, it lacks the upturned edge of *O. antiquensis*. Length 85 mm., alt. 80 mm., depth of lower valve 30 mm.

"In size and plication *O. antiquensis* varies largely, but of the specimens collected the longest shells do not run far from 90 mm. in altitude. As regards plication, some are nearly smooth and some are strongly rugose, even in some cases spinose, but all may be distinguished by the broad furrow which runs across the exterior of the lower valve about opposite to the muscle impression and which divides the rugae into a group of five and one of two. The species differs also from all other closely related American species by the upturned margin of this lower valve and the correspondingly reflexed margin of the upper or flat valve."

This is a heavy, massive species, resembling, in that respect, *O. podagrina* Dall. The broad depression on the lower valve, although usually present, is not a constant feature, but is occasionally absent, even on plicate individuals. A rather persistent character is a long, crescent-shaped excavation on the interior of the lower valve, extending practically the entire length of the shell. The upturning and reflexing of the margins, mentioned by Professor Brown, is not a noticeable feature of the specimens in the Vaughan collection.
Localities.—Rifle Butts, Wetherell Point, Hodge’s Bluff, Long Island, Blizzard Mill, and, doubtfully, 0.5 mile north of McKinnon’s Mill, and Friar’s Hill, Antigua, stations 6854, 6858, 6862, 6869, 6874, 6888, 6856, 6875, Vaughan.

Types.—Philadelphia Academy of Sciences, Nos. 1653 and 1655.

Figured specimens.—U. S. Nat. Mus. No. 167055.

Ostrea species, cf. O. trigonalis Conrad.

(Plate 9, Figure 1.)


This large, massive species resembles Ostrea trigonalis in the character of its hinge, which is broad, straight, and separated into thirds by a deep triangular pit in each valve. In front of the hinge the shell continues at about the width of the hinge-line for about 1 cm., beyond which it is rapidly expanding. The lower valve is very highly inflated and broadly plicate, much as in O. podagrina and in the plicate forms of O. trigonalis and O. vicksburgensis, all three of which appear to be closely related and may be merely varieties of one species.

Localities.—Northwest side of St. Jean Bay, St. Bartholomew, stations 6924 and 6925. Fragments, probably of the same species, were obtained at station 6895 and at Governor’s Bay, station 6919, Vaughan.

Geologic horizon.—Upper Eocene.

Figured specimen.—U. S. Nat. Mus. No. 167056.

Ostrea haitensis Sowerby.

(Plate 7, Figures 1, 2; Plate 8, Figure 1.)


O. virginica var. californica Marcou, Geol. N. Amer., 1855.


O. veatchii Gabb, Pal. Cal., vol. 2, p. 34, plate 11, fig. 59; plate 17, fig. 21, 1869.


The following is the original description of this species:

"Testa oblonga, crassa, plicata, plicis paucis (senis ad septenis), magnis, undulatis, subsquamosis, squamis nonnumquam subtubulosis; limbo interno omnino glabro."

Two forms of this species are known from Cuba. The first is a large, heavy shell with close, acute, angular plicæ. The number of plicæ is variable; some specimens have 12 or more. The other form, which is probably the young of the same species, is much smaller, usually not
plicate, with a long, narrow, usually curved hinge. The valve margins from the tip of the hinge to about the middle of the shell are dentate in the upper valve and correspondingly punctate in the attached valve.

Localities.—East of La Cruz and northeast of Santiago, Cuba, stations 3441, 3443, and 5255. A large specimen, probably of this species, comes from the gorge of Yumuri River, Cuba, station 3454, Vaughan. Guajay, Cuba, Barnum Brown.

Type.—British Museum?

Figured specimens.—U. S. Nat. Mus. Nos. 167059, 167061, 167062.

Unio bitumen, new species.

(Plate 9, Figures 3 a-c.)

The following is a description of this species:

Shell elongate, moderately inflated, inequilateral; beaks high, apparently smooth; posterior ridge high near the umbones, becoming broad and low distally. A broad depression extends from the umbones to the middle of the ventral margin, producing a concavity in the ventral margin. Anterior margin acutely rounded; posterior margin broadly rounded; dorsal margin arcuate. Hinge unknown. Ligament external, preserved in the type.

Length, 68 mm.; diameter, 29.5 mm.

The name Unio is here used in the broad sense, the material at hand being insufficient to determine the precise generic position of this species.

Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, station 3652, Wiebusch, collector.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 167063.

Pecten (Pecten) ventonensis, new species.

(Plate 12, Figures 1 a, b.)

The following is a description of this species:

Shell large, equilateral, inequivalve; right valve convex, with 23 to 25 rather high ribs, flattened on top, usually medially furrowed and closely transversely grooved or granulate, and separated by equal concave interspaces; left valve concave, with 23 or 24 narrow, even, rounded ribs, becoming obsolete towards the lateral margins, separated by wider, nearly flat interspaces; right submargins small, plane to convex, nearly smooth; left submargins strongly convex, narrow, nearly smooth; ears subequal, nearly straight, with a few narrow, obsolescent riblets, strongest on the right anterior ear; byssal notch shallow; both valves grooved internally in accordance with the external ribbing; secondary sculpture of fine, close, raised, concentric lamellae, extending over disk and ears alike, but very faint on the submargins and usually eroded from the ribs of the convex valve.

Alt., 39 mm.; lat., 42 mm.; diam., 11 mm.

This species is closely related to Pecten medius Lam., living off the southern Atlantic and Gulf coasts of the United States, from which it differs as follows: On the right valve the ribs of the fossil extend nearer
to the beak, are higher, narrower, and more rugose than in *P. medius*; the number of ribs is within the range of variation of *P. medius*, but is less by one or two than the average for specimens of the same size. On the left valve the ribs are a little closer together and the lateral margins are less flaring than in *P. medius*. The right ears are about as in *P. medius*, but the left ears lack the two strong ribs which are nearly always present near the hinge line on each left ear of the living species.

*Localities.*—One-half mile inland from the pier of the Juraguá Railroad, Santiago Bay, Willcox; Juraguá Railroad, La Cruz, first cutting on road, Vaughan; Vento, province of Havana, Wren; stations 3192, 3439, 4290, 5255.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167102.

**Pecten perlatus, new species.**

(Plate 13, Figure 3.)

The following is a description of this species:

Shell small, suborbicular, tumid; ribs 16, simple except near the margin, where each contains 3 ribs; interspaces as wide as the ribs; concentric sculpture of raised, widely spaced growth lines, apparently confined to the interspaces; submargins with close radial ribs which form an uninterrupted series with those on the ears; ears large, equal, finely radially ribbed, scarcely differentiated from the submargins.

Alt., 11 mm.; lat., 12 mm.

*Locality.*—Crocus Bay, Anguilla, station 6966, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167068.

**Pecten (Chlamys) waylandi, new species.**

(Plate 7, Figures 4 a, b.)

The following is a description of this species:

Shell medium-sized, nearly equilateral, equivalent, with about 30 low ribs with equal interspaces becoming obsolete towards the depressed submargins; posterior ears small, oblique, with 4 or 5 faint radial ribs; anterior ears much larger, with about 12 faint ribs on left ear and 5 or 6 somewhat coarser ribs on right ear; byssal notch about one-half the length of the ear; inner margin fluted in accordance with the external ribbing in channels which probably extend well towards the center of the disk.

Alt., 32.3 mm.; lat., 29 mm.; diam., 12.5 mm.

Although the single specimen upon which this species is founded has lost so much of the external part of the shell that it is impossible to make out the details of sculpture, the ears, as well as the outline and major sculpture of the shell, are so well preserved that it seems worth while to describe it. The species is not apt to be confused with any other of this region. It is named in honor of Dr. T. Wayland Vaughan.

*Locality.*—Santiago, Cuba, station 3440, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167121.
Pecten (Chlamys) anguillensis Guppy.

(Plate 10, Figures 1 a, b, 2.)


The following is Guppy's original description of this species, December 1867:

"Shell fan-shaped, ornamented with radiate muricate striae, and about 10 or 11 prominent rounded ribs, which are crossed by concentric striae, the concave interstices broader than the ribs. Upper valve nearly flat, lower one gently concave.

"Miocene, Anguilla. Allied to P. peedeensis Tuomey and Holmes, North America."

The following diagnosis was made from one of Guppy's specimens which agrees perfectly in size and shape with the published figure of P. anguillensis and is probably the type specimen. If such is the case the figure is very bad. The Guppy collection contains two other specimens, one an internal cast which shows that the shell is grooved internally in accordance with the external ribbing. A fourth specimen in the same lot belongs to a different species (Pecten perplexus).

Shell oblique; right valve the more convex, with 12 or 13 ribs, left valve flatter with 11 ribs; ribs high, round, with equal or slightly wider interspaces; ribs and interspaces covered with radiating threads; submargins narrow, steep, apparently smooth; ears small, unequal, with radiating riblets, anterior the larger.

Alt., 32.8 mm.; lat., 30 mm.; diam., 11 mm.

Pecten anguillensis appears to be much more abundant in Antigua than in Anguilla. The Antiguan specimens have as many as 15 ribs and are somewhat variable in convexity and in the shape and elevation of the ribs. The ribs are broader and not so high as in the specimens from Anguilla, and the radiating threads are wider spaced and more elevated; the latter character may be due to the better state of preservation of the Antiguan specimens.

Localities.—Anguilla, Guppy; Crocus Bay, Anguilla; Hodge's Bluff, Willoughby Bay, and Friar's Hill, Antigua, Vaughan, stations 6893, 6862, 6881, 6856. Professor Brown records the species also from Wetherell's Bay, Antigua.

Geologic horizon.—Oligocene.

Type.—Probably the specimen figured in this paper (figs. 1 a, b).

Figured specimens.—U. S. Nat. Mus. Nos. 115532 (type), 167097.

Pecten clerei, new species.

(Plate 10, Figures 3, 4.)

The following is a description of this species:

Left valve gently convex, with about 21 small concave ribs, somewhat variable in size, with nearly equal interspaces; concentric sculpture of minute
growth-lines visible on submargins and interspaces but eroded on ribs and ears; 2 or 3 posterior ribs have distant curved imbricating lamellae convex towards the beak; submargins convex, without ribs, not sharply differentiated from the ears; ears depressed below the plane of the disk; left anterior ear large, acutely oblique, with 4 strong, smooth ribs; left posterior ear small, obtusely oblique, with 2 or 3 faint riblets.

Right valve equilateral, gently convex, with about 20 regular convex ribs, with nearly equal interspaces, in each of which appears a single thread; ribs and threads of anterior end with distant, curved lamellae like those on the left valve; minute, close growth-lines visible in interspaces of anterior end, but eroded from the remainder of the valve.

Long. of right valve, 30 mm.

The right and left valves have been described separately because of the possibility that they may prove to belong to different species. The left valve is the type.

**Locality.**—Crocus Bay, Anguilla, stations 6894 and 6965 (type), Vaughan.

**Geologic horizon.**—Oligocene.

**Type.**—U. S. Nat. Mus. No. 167094.

*Pecten willobianus*, new species.

(Plate 11, Figures 1, 2, 3.)

The following is a description of this species:

Shell equivalle, nearly equilateral, with 18 or 19 smooth, rounded ribs with equal interspaces; interspaces with low riblets peripherally; submargins smooth, convex, sharply delimited from the ears; ears large, smooth, except the right anterior ear, which is radially ribbed; internal ventral margins with short flutings in harmony with the radial sculpture.

Alt., 30 mm.; lat., 29 mm.; diam., 10 mm.

**Locality.**—Willoughby Bay, Antigua, station 6881, Vaughan.

**Geologic horizon.**—Oligocene.

**Types.**—U. S. Nat. Mus. No. 167119.

*Pecten vaughani*, new species.

(Plate 8, Figures 2, 3, 4.)

The following is a description of this species:

Shell small, compressed, equivallate, equilateral, with 14 or 15 smooth, rounded ribs on right valve, 15 to 17 on left, separated by nearly equal, rounded interspaces; microscopic sculpture of fine, close, concentric lines; submargins smooth, steep; ears of left valve nearly equal, smooth, ears of right valve unequal, anterior ear with about 5 radiating, scabrous riblets; byssal notch one-half the length of the ear; posterior ear smooth.

Alt., 16 mm.; lat., 16 mm.; diam., about 5 mm.

**Locality.**—Crocus Bay, Anguilla, stations 6894 (type), 6893, 6965, 6967, Vaughan.

**Geologic horizon.**—Oligocene.

**Type.**—U. S. Nat. Mus. No. 167084.
The following is a description of this variety:

Shell small, equivale, depressed, polished, with 15 round, radiating ribs, rarely extending to the beaks, separated by equal concave interspaces; submargins narrow, smooth, convex, usually separated from the body of the shell by an angulation; concentric sculpture of close, fine growth-lines, usually obliterated; ears large, subequal; posterior ears smooth except for fine growth-lines; left anterior ear with obscure radiating riblets, right anterior ear with about 6 strong scabrous riblets; byssal notch about one-half the length of the ear; interior of the disk grooved in accordance with the ribbing.

Alt., 22 mm.; lat., 22 mm.; diameter of joined valves, about 7 mm.

_Pecten vaughani_ closely resembles this variety, but is usually a little smaller, the ribs are narrower and generally extend to the beak, and the submargins are flatter and more acutely angulated than those of the Cuban form. In general appearance typical _Pecten vaughani_ is neater and more clean-cut than the variety _flabellum._

_Localities._—La Cruz and Santiago, Cuba, stations 3192, 3439, 3441, 3446, and 5255 (types); Vaughan, Black.

_Geologic horizon._—Eocene.

_Type._—U. S. Nat. Mus. No. 167089.

The following is a description of this species:

Right valve inflated, with 15 round ribs a little wider than the interspaces; submargins slightly convex, steep; anterior ear with about 6 radiating riblets, byssal notch one-half the length of the ear; posterior ear large, nearly rectangular; sculpture of close, minute growth-lines over entire shell.

Alt. of right valve, 21 mm.; lat., 21.5 mm.

Left valve flatter, with about 16 even, rounded ribs a little narrower than the interspaces; submargins convex, steep; anterior ear acutely oblique, with two or three very faint, broad, radiating riblets; posterior ear rectangular; concentric sculpture of minute, elevated, very close-set lines extending over entire shell, but on the disk grouped into bands or growth stages about 0.3 mm. wide.

Alt. of left valve, 22.6 mm.; lat., 22.3 mm.

The right valve is much more convex and appears less spreading than the left, and the concentric sculpture is much less distinct. This last feature is probably due to the better state of preservation of the left valve. I have described the valves separately on account of the possibility that they may belong to different species.

_Pecten gardnerae_ has closer, higher, and more strongly convex ribs than _P. vaughani_ and the ribs, in the specimens at hand, extend to the beaks. The secondary sculpture is very different.
This species closely resembles the figure of *P. cercadica* Maury from Cercado de Mao, Santo Domingo, but seems to be a little less spreading and to have differently shaped ears. In the description of *P. cercadica*, a left valve, no mention is made of any grouping of the growth-lines on the disk.

This species is named in honor of Miss Julia Gardner, whose monographs (unfortunately delayed in publication) on the Miocene Mollusca of Virginia and North Carolina and of the Alum Bluff formation constitute an important contribution to American paleontology.

*Locality.*—Santiago, Cuba, station 3440, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167113 (right valve).

*Figured specimen.*—U. S. Nat. Mus. No. 167114 (left valve).

**Pecten crocus, new species.**

(Plate 9, Figures 2 a, b; Plate 11, Figure 9.)

The following is a description of this species:

Shell equivale, inequilateral, moderately convex; about 22 round ribs, separated by slightly narrower interspaces; surface of the ribs with curved imbricating spines, convex towards the umbones, and with very faint radiating striae; interspaces with sculpture of fine, close-set, concentric striae; near the ventral margin a small thread appears in each interspace; submargins depressed, ornamented with small radial threads and fine concentric striae; ears moderately large, subequal, with radial, nodose riblets.

Alt., 39 mm.; lat., 36 mm.; diam., 14 mm.

*Locality.*—Roadside, descent to Crocus Bay, Anguilla, station 6893, also 6894 and 6965, Vaughan.

*Geologic horizon.*—Oligocene.

*Type.*—U. S. Nat. Mus. No. 167079.

**Pecten (Lyropecten) pittieri** Dall.

(Plate 13, Figure 5.)


The following is the original description of this species:

"Shell large, nearly equivale, suborbicular, coarsely sculptured; left valve moderately convex, with ten strong rounded ribs, obsolete distally, with shallow rounded interspaces at first narrower, afterwards wider than the ribs; submargins wide, subequal, radially sculptured with coarse, somewhat irregular threads, about ten in number, which when perfect have a fine, concentric, imbricate sculpture; similar radial sculpture covers both valves, the threads coarser and more regular on the right valve; of the major ribs on the left valve, five alternating ones bear on their proximal halves six to ten prominent, thin evenly spaced, vaulted scales, resembling those of *P. imbricatus* Gmelin; similar scales are wanting in the right valve; ears subequal, with about half a dozen radial threads and dense, concentric sculpture; margin of the valve wavy, not sulcate; interior with ten deeply channelled, wide sulci corresponding to the external ribs, the angles of the interspaces emphasized near the valve margin; hinge with a deep subtriangular pit for the resilium, a strong
anterior ridge and two marked posterior grooves with a ridge between them. Adductor scar large, with a rather ragged margin. Right valve with eleven stronger ribs, each carrying five or six riblets, with two or three similar riblets in the interspaces; the proximal halves of the ribs are slightly undulated but not scaly; ears subequal, rudely imbricate on the dorsal margin and on the four or five radial threads of the anterior ear; ctenolium with about 16 spines, byssal notch narrow, angular; hinge-line grooved reciprocally to that of the left valve. Height 132; length of shell 152; of hinge-line 82; max. diameter omitting spines 46 mm.

"This fine and remarkable species is somewhat intermediate between _Lyropecten_ and _Nodipecten_, and when young must have the aspect of a _Chlamys_ much like _C. imbricatus._"

The figured specimen, a right valve from the gorge of Yumurí River, Cuba, is smaller than the type and has higher ribs. It measures 68 mm. in altitude and 72 mm. in latitude. A fragment of a left valve measuring 190 mm. in altitude has been obtained near the mouth of Macambo River, Cuba.

**Localities.**—Moin Hill, near Port Limon, Costa Rica, niveau a Pittier (type); gorge of Yumurí River below Iglesia Mont Serrato, Matanzas, Cuba, station 3468, Vaughan (figured specimen); Santiago, Cuba, station 5255, Black; near mouth of Macambo River, Cuba, station 7533, Meinzer.

**Geologic horizon.**—**Oligocene.**

**Type.**—U. S. Nat. Mus. No. 214368.

**Figured specimen.**—U. S. Nat. Mus. No. 167123.

_Pecten_ (Nodipecten) _articulosus_, new species.

(Plate 7, Figures 7, 8.)

The following is a description of this species:

Shell moderately large, nearly equivallate, slightly oblique, convex; sculpture of 8 to 11 large round ribs with equal concave interspaces, smooth except for close, faint, radial striations which appear distally on both ribs and interspaces of large specimens; ribs on right valve obscurely nodular, ribs on left valve prominently nodular, the undulations affecting the whole of the disk as in _P. condylomatus_; submargins rather wide, compressed in the umbonal region but expanding distally, smooth, except for close faint radial striae on the distal portion; ears small, subequal, the surface faintly radially threaded. Alt. of right valve (type) 55 mm., lat. 61 mm., diam. 19 mm.; alt. of left valve 55 mm., lat. 58 mm. (edge broken), diam. 19 mm.

This species resembles _Pecten condylomatus_ Dall in shape and size, but is more nearly equivallate, has larger and fewer ribs, and lacks the secondary sculpture. It is represented in the collection by 3 right valves and 4 left valves.

**Locality.**—Disintegrated limestone in a quarry near asylum near Guajay, 15 miles southwest of Havana, Cuba, Barnum Brown, collector.

**Geologic horizon.**—**Oligocene.**

**Type.**—American Museum of Natural History.
Pecten (Æquipecten) decorus, new species.

(Plate 13, Figures 8 a, b.)

The following is a description of this species:

Shell small, equi-ante, moderately convex, slightly oblique, with about 25 ribs, of which one or two are obsolescent; hinge-line three-fifths the entire length of the shell; submargins narrow, with obsolete ribs, merging with the disk; ears large, equal, with 8 or 9 scaly radiating riblets, posterior ears rectangular, byssal notch about one-half the length of the ear; secondary sculpture of scaly riblets, 3 on each rib and 3 in each interspace, scales spaced 3 or 4 per millimeter, concave towards the umbones, erect or inclined toward the margin.

Alt. 30 mm., lat. 29 mm., diameter of united valves 15 mm.

The type, a specimen with united valves, is unique.

Locality.—Disintegrated limestone in quarry near the asylum near Guajay, 15 miles southwest of Havana, Cuba, Barnum Brown, collector.

Geologic horizon.—Oligocene.

Type.—American Museum of Natural History.

Pecten (Æquipecten) oxygonum Sowerby?

(Plate 8, Figure 5.)


The following is the original description of this species:

"Testa suborbicularis, subobliqua, tumida, costellis radiantibus 19, superne acutangulis, interstititiisque aequalibus lineis incrementi concinme decussatis; auribus inaequalibus, laevisibus, radiatim costellatis, costellis tenuissimis."

The following is a new description of this species:

Shell suborbicular, slightly convex, with 19 or more low, rounded, radiating ribs, separated by equal, shallow interspaces; secondary sculpture of numerous narrow, radiating threads. Length, 35 mm.

We possess of this species only two fragments which it would be unsafe to identify without material for comparison; there can be little doubt, however, that they represent the species reported by A. P. Brown from the same locality and identified by him from specimens from Santo Domingo, where the type of Pecten oxygonum was collected.

Locality.—Lower bed at Hodge's Bluff, Antigua, station 6862, Vaughan; Santo Domingo, Bowden.

Geologic horizon.—Oligocene.

Type.—British Museum?

Figured specimen.—U. S. Nat. Mus. No. 167065.

(Plate 10, Figure 7.)


The following is a description of this species:

Shell with many low, nearly obsolete ribs, each of which consists of 3 or more radial threads with concentric, scabrous growth-lines.

This is probably the species referred by Professor Brown to P. oxygonum optimum Brown and Pilsbry. The single specimen in the National Museum has very much lower ribs than are shown in the figure of the Panamanian form.

Locality.—Willoughby Bay, Antigua, station 6881, Vaughan.

Geological horizon.—Oligocene.

Figured specimen.—U. S. Nat. Mus. No. 167066.

Pecten (Æquipecten) perplexus, new species.

(Plate 8, Figures 8, 9, 10.)

The following is a description of this species:

Shell equivalve, equilateral, with 19 or 20 simple ribs with narrower interspaces; minute sculpture of V-shaped spines arranged in longitudinal rows on ribs and interspaces, those in the interspaces concave above and ventrally inclined; submargins narrow, smooth or with a few radial threads; Camptonectes striation present; ears large, subequal, with fine radial ribs, coarser and nodose on right anterior ear; byssal notch one-half the length of the ear; inner margin crenulated in accordance with the external ribbing.

Alt., 28.5 mm.; lat., 26.5 mm.

The spines are very easily eroded, leaving the shell either perfectly smooth or with a single row of minute scales on the sides of the ribs.

Localities.—Crocus Bay, Anguilla, stations 6893, 6894, 6966, 6967, 6971, Vaughan.

Geologic horizon.—Oligocene.

Types.—U. S. Nat. Mus. No. 167076.

Pecten (Æquipecten) thetidis Sowerby.

(Plate 11, Figures 4, 5, 6.)

Pecten thetidis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 52, 1850. (Date of imprint, 1849.)


Pecten (Æquipecten) thetidis Maury, Bull. Amer. Pale., vol. 5, p. 349, plate 60, fig. 6, 1917.

The following is the original description of this species:

"Testa orbicularis, tumida, radiatim costata, costarum marginibus quadratis, ad utrumque latus squamuliferis, squamulis minutissimis, interstitiis rugulosis; auribus inaequalibus, radiatim costatis, costellis squamulosis."
The following is a new description of this species:

Shell orbicular, tumid, with 19 radiating ribs, simple to about 10 mm. from the beak, but each with two lateral riblets on the mature part of the shell; spaces between the ribs deep, concave, a little narrower than the ribs, set with riblets near the periphery; surface covered with concentric imbrications which are produced into blunt spines on top of the ribs and riblets; submargins with numerous radiating riblets; ears rather large, with radiating threads and concentric imbrications.

Alt., 21 mm.; lat., 23 mm.; diam., about 5 mm.

Localities.—Crocus Bay, Anguilla, stations 6965 and 6967, Vaughan; Santiago, Cuba, station 5255, Black; Santo Domingo, Bowden.

Geologic horizon.—Oligocene, Mocene.

Type.—British Museum, from Santo Domingo.

Figured specimens.—U. S. Nat. Mus. Nos. 167069, 167070, 167071.

_Pecten_ (Equipecten) jacobianus, new species.

(Plate 11, Figures 7 a, b, 8.)

The following is a description of this species:

Shell equivallate, slightly oblique, moderately convex, with about 16 low, broad, radiating medial ribs and several additional obsolete distal ribs; additional radial sculpture of raised threads, usually one on summit and one or more on each side of every rib and one or two in the interspaces, increasing in number by interpolation towards the periphery; concentric sculpture of low, wavy lamelle, crossing ribs, threads, and interspaces; _Camptonectes_ striation present; posterior ears oblique, with faint radiating threads crossed by fine lamelle; anterior ears the larger, with coarser threads; byssal notch about one-half the length of the ear; ctenolium present; inner margin grooved in accordance with the external ribbing, but grooves do not extend over the medial portion of the disk.

Alt., 29 mm.; lat., 27.5 mm.; diameter, 9 mm.

Localities.—Santiago, Cuba, stations 3436, 3440 (type), 3443, 3447, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 167115.

_Pecten_ (Plagioctenium) crucianus, new species.

(Plate 10, Figures 8, 9 a, b.)

The following is a description of this species:

Shell suborbicular, slightly oblique, moderately convex, with nearly equal valves and 20 to 22 convex ribs with equal interspaces, each containing 1 riblet; near the periphery 1 riblet is developed on the summit of each rib; submargins faintly ribbed; entire disk covered with minute, close, concentric, raised lamelle, fused on the summits of the riblets into evenly spaced, raised, transversely elongate nodes; anterior ears the larger; right anterior ear with about 5 strong riblets, other ears with many fine riblets; posterior ears oblique; byssal notch deep; internal surface channeled in harmony with the external ribbing.

Alt., 35.4 mm.; lat., 35.4 mm.; diam. of left valve, 7.4 mm.
Localities.—La Cruz and Santiago, Cuba, stations 3439, 3440 (type), 3441, Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 167108.


Fragments differing slightly in sculpture from *P. crucianus*, but apparently closely related to it, were found at Crocus Bay, Anguilla. These fragments show no fusion of the concentric lamellae—a characteristic of *P. crucianus*.

Localities.—Crocus Bay, Anguilla, stations 6893 and 6967.

Geologic horizon.—Oligocene.

Pecten (*Plagioctenium*) gabi Dall.

(Plate 12, Figure 8.)


The following is the original description of this species:

"Shell broad, compressed, oblique, inequilateral, with nearly equal valves and about nineteen concentrically scabrous, longitudinally striated ribs, with narrow interspaces, each filled with one imbricated riblet.

"Alt. 48, lat. 52, diam. 13 mm."

The type of this species is said to have come from Antigua. A specimen from Anguilla resembles the type in shape, size, and number of ribs, but has lost the outer layers of shell carrying the secondary sculpture.

Localities.—Antigua, Spencer; Crocus Bay, Anguilla (station 6894), Vaughan. Professor Brown reports this species from Willoughby Bay, Antigua.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 107753.

Figured specimen.—U. S. Nat. Mus. No. 167101.

Pecten (*Patinopecten*) duplex, new species.

(Plate 11, Figures 10 a, b.)

The following is a description of this species:

Shell equilateral, large; right valve gently convex, left valve nearly flat; ribs 20, each with a shallow groove on top; ears large, subequal; surface sculpture of close-set, concentric, raised lines nearly straight in the interspaces but convex towards the beaks on the ribs.

Alt., 52 mm.; diam., 11 mm.

This species, although represented by a single broken specimen, should be easily recognized. Its closest relative seems to be *P. healeyi* Arnold from the Pliocene of California, which is a much larger species and lacks the grooves on the ribs of the flat valve.
Locality.—Long Island, Antigua, station 6869, Vaughan.
Geologic horizon.—Oligocene.
Type.—U. S. Nat. Mus. No. 167107.

Pecten nodosissimus, new species.
(Plate 7, Figure 3.)

The following is a description of this species:

Right valve nearly flat, equilateral, with 15 ribs equal in width to the interspaces. Each rib has 3 lines of bead-like nodes, 1 median line and 2 lateral lines. Submargins strongly convex, apparently smooth and sharply differentiated from the ears. The ears are broken, but appear to have been rather large; the left posterior ear had several faint radiating threads.

Altitude, 25 mm.

The sculpture of this shell is so peculiar that I have ventured to describe it in spite of its fragmentary condition.

Locality.—Willoughby Bay, Antigua, station 6881, Vaughan.
Geologic horizon.—Oligocene.
Type.—U. S. Nat. Mus. No. 167131.

Pecten perlineatus, new species.
(Plate 10, Figure 5.)

The following is a description of this species:

Left (?) valve flat, equilateral, with 16 round ribs with wider shallow, concave interspaces; radial sculpture of fine, close-set, raised lines covering both ribs and interspaces; submargins convex; ears much depressed below the plane of the disk.

Alt., 35 mm.; lat., about the same.

Locality.—Willoughby Bay, Antigua, station 6881, Vaughan.
Geologic horizon.—Oligocene.
Type.—U. S. Nat. Mus. No. 167130.

Pecten nugenti Brown?
(Plate 10, Figure 6.)


The following is the original description of this species:

“Shell inequivalve, oval in outline, with 17 distinct rounded radial ribs (and probably 2 additional less distinct ones) separated by narrower interspaces, the whole exterior surface covered by concentric growth lines which are raised and produce a nearly microscopic sculpture extending equally over ribs and interspaces. Internally smooth, except near the margin, where raised ribs are seen, occupying the intervals between the raised external ribs. On the flatter valve, externally the raised ribs are equal in width with the intervals between them, and the concentric sculpture, while extending over ribs and interspaces, is stronger in the intervals between the ribs. Ears moderate, apparently not ribbed. The specimens vary considerably in size; the one figured, a small specimen, measures: Length 41 mm. by height 36 mm. Others were much larger, attaining a length of 55 mm. or more.”
One poorly preserved specimen is doubtfully referred to *P. nugenti*.

Locality.—Hodge’s Bay, Antigua, station 6862, Vaughan.

Geologic horizon.—Oligocene.

Cotypes.—Phila. Acad., No. 1656.

Figured specimen.—U. S. Nat. Mus. No. 167067.

Pecten species.

(Plate 13, Figure 4.)

The Vaughan collection contains a fragment of a *Pecten*, probably new, which is very convex and when entire had probably about 25 round ribs with equal interspaces. It has a concentric sculpture of close raised lines. The margin is fluted within in accordance with the external ribbing and set with paired raised lines corresponding to the interspaces. These raised lines end abruptly at a distance of about 2 mm. from the margin, but are continued on the inner layers of the shell.

Locality.—Willoughby Bay, Antigua, station 6881, Vaughan.

Geologic horizon.—Oligocene.

Figured specimen.—U. S. Nat. Mus. No. 167132.

*Pecten* (Amusium) *lyonii* (Gabb.)

(Plate 13, Figures 1 a, b, 2.)

*Pecten mortoni* Guppy, Geol. Mag., Dec. 2, vol. 1, p. 443. 1874. (Not of Ravenel.)


The following is a description of this species:

Shell orbicular, thin, compressed; nepionic shell with about 24 small rounded ribs which disappear on the adult shell; ears large, equal; right valve a little more inflated than the left, evenly convex, smooth; left valve nearly flat, with a broad, shallow, radial depression from beak to margin at the posterior quarter and a very faint corresponding depression at the anterior quarter; left valve with concentric sculpture of fine, impressed lines, between which the shell is sometimes slightly convex; hinge-line nearly straight; submargins very narrow; interior of the shell with low, equidistant ribs; paired peripherally.

Alt., 54 mm.; lat., 56 mm.; diam., 13.5 mm.

This shell is very like *Amusium precursor* Dall, from the Chipola Oligocene, but that species lacks the nepionic ribbing, which appears to be a constant feature of the Anguillian form. *A. mortoni* Ravenel is quite distinct, being proportionately higher and having a smooth nepionic shell.

This species is referred to *A. lyonii* on the authority of Dr. W. H. Dall, who has identified a right valve in the Guppy collection with Gabb’s shell. It is possible, however, that comparison of the left valve, which possesses more identifiable characteristics than the right, will show this species to be distinct from the Costa Rican form. A left valve from 70 km. west of the terminal of the Tehuantepec Railway,
identified by Dr. Dall as *A. lyonii*, is distinct from the Anguillan species, having on the nepionic shell distinct flattened ribs with shallow, channeled interspaces crossed by concentric, evenly spaced, not crowded, elevated lines. If this is the true *A. lyonii*, the Anguillan fossil must receive a different name.

**Localities.**—Crocus Bay, Anguilla, stations 6893, 6966, 6967, Vaughan; Anguilla, Guppy; Sapote, Costa Rica, Gabb.

**Geologic horizon.**—Oligocene.

**Type.**—Philadelphia Academy.

**Figured specimens.**—U. S. Nat. Mus. No. 167136.

**Pecten (Amusium) antiguensis Brown.**

(Plate 13, Figures 6, 7.)


The following is the original description of this species:

"Inequivalve, shell orbicular, rather thin, convex; the surface covered with a fine concentric sculpture, following the growth-lines; with about 13 radial ribs running from the beaks, where they are very pronounced, and, in one valve, apparently disappearing towards the margin, but in the other valve continued as undulations of the shell to the margin. The interior of the shell has radial ribs extending to the margin, where the adjacent pairs of ribs contract and are then seen to be paired, but otherwise seeming to be equally spread as in *P. (Amusium) lyonii* Gabb, from which this species differs in having a strong concentric sculpture (wanting in *P. lyonii*), and also in the external radial ribbing being continued for a greater distance from the beak than in Gabb's species. The species is also related to *P. sol* B. and P., but this latter has shorter radial external ribs and the internal ribs are paired. The ears are separated from the rest of the valve by a depression, as in the case of *P. sol*. Length and height about equal—70—75 mm.

"Hodge's Bay and Wetherill's Bay in the Antigua limestone, with * Orbitoides*, etc., Oligocene."

The Vaughan collection contains several well-preserved fragments of this species.

**Locality.**—Station 6862, lower bed at Hodge's Bluff, Antigua, Vaughan.

**Geologic horizon.**—Oligocene.

**Types.**—Philadelphia Academy, No. 1648.

**Figured specimen.**—U. S. Nat. Mus. No. 167139.

**Pecten (Hinnites) aratus, new species.**

(Plate 12, Figures 2 a, b, 3, 4, 5, 6, 7.)

The following is a description of this species:

Shell large, convex, equilateral, flabelliform or suborbicular, inequivalve; ribs 38, close-set, rounded, in mature specimens flattened distally, crossed by fine, concentric, imbricate lamellae with spinose projections on the sides of the ribs; interior narrowly channeled in harmony with the external ribbing; mar-
gin fluted within; posterior ears oblique, with imbricating growth-lines and one simple radiating rib adjacent to the abruptly sloping submargins. 

Alt. about 46 mm.; lat., about 45 mm.; alt. of largest specimen about 70 mm.

This species, which is curiously intermediate between *Pecten* and *Spondylus*, probably belongs to the subgenus *Hinnites*. The sculpture and ears are distinctly pectiniform, but the discrepancy in the shape and size of the valves is like that of *Spondylus*.

**Localities.**—Northwest of St. Jean Bay, point between Anse Écaille and Anse Lézard, and point between Colombier Point and bay next to St. Jean Bay, St. Bartholomew (stations 6897, 6897a, b, 6905, 6924), Vaughan.

**Geologic horizon.**—Eocene. Near top of the conglomerate series and beneath the main limestone bed.

**Type.**—U. S. Nat. Mus. No. 167124.

*Spondylus bostrychites* Guppy.

(Plate 11, Figures 11 a, b.)


The following is Sowerby's description of this species, 1849:

"Testa subregularis, rotundata, ventricosa, margine latiusculo, valide denticulato; extus radiatim costata, costis 5 ad 6 spiniferis; area cardinali alterius valvae angustissima, alterius latiori."

The shell is orbicular, pectiniform, nearly equivalent, with very small submargins. The spineless ribs are separated by numerous finer, spineless ribs bearing minute, close-set (2 or 3 per mm.), erect scales. The short submargins and more rotund form distinguish *S. bostrychites* from *S. dumosus*.

Guppy's collection, now in the National Museum, contains 4 specimens labeled types—2 specimens from Jamaica and 2 from Anguilla. The Jamaican forms have coarser intermediate ribs than those from Anguilla and perhaps other differences might be detected if a larger suite of specimens were available for comparison. I have not seen Guppy's description and consequently do not know which form is the true *S. bostrychites*. Sowerby's type is from Santo Domingo.

**Localities.**—Crocus Bay, Anguilla, stations 6894, 6965, 6967; Friar's Hill, Long Island, and Willoughby Bay, Antigua, stations 6856, 6869, 6881, Vaughan; also at Pontou, Santo Domingo; Bowden, Jamaica; Tampa, Florida.

**Geologic horizon.**—Oligocene.

**Types.**—U. S. Nat. Mus. Nos. 115522 or 115523.

**Figured specimen.**—U. S. Nat. Mus. No. 167140.
Spondylus species.

In the Vaughan collection are numerous specimens of a species of *Spondylus* which I have been unable to identify with any described species. It appears to be more rotund than *S. dumosus* and *S. scotti*, but less so than *S. bostrychites*. The ribs are uniform or slightly alternating in size and set with the spines customary to the genus. The finer sculpture, which is of much more diagnostic value than the coarser, is entirely obliterated in the specimens at hand.

**Localities.**—Northwest side of St. Jean Bay and point between Anse Écaille and Anse Lézard, St. Bartholomew, stations 6897, 6897 a, b, 6924, Vaughan.

**Geologic horizon.**—Eocene, near top of the conglomerate series and beneath the main limestone bed.

*Plicatula densata Conrad.*

(Plate 11, Figures 12 a, b.)


*Plicatula densata Conrad*, Foss. of the Medial Tertiary, p. 75, plate 43, fig. 6, 1845.

*Spondylus inornatus* Whitfield, Miocene Pal. N. J., p. 34, plate 5, figs. 1, 2, 1895.


The following is Conrad’s description of this species, 1845:

“Ovate, thick, profoundly and irregularly plicated; inferior valve ventricose; ribs acute, with arched spiniform scales; cardinal teeth large, curved, laterally striated, crenulated on the margins; larger cardinal tooth in each valve slightly bifid, broad; muscular impressions prominent.


“The valves have about 10 folds, and the lower valve closely resembles a variety of *Ostrea virginiana*.”

The Cuban form seems indistinguishable from the continental.

**Localities.**—Santiago, Cuba, stations 3436, 3447, Vaughan; also at Tampa, Chipola, and Oak Grove, Florida, and in the Miocene of New Jersey.

**Type.**—Philadelphia Academy?

**Figured specimen.**—U. S. Nat. Mus. No. 167150.

*Modiolus (Botula) cinnamomeus* (Lamarck).

(Plate 14, Figures 4, 5.)


The following is Lamarck’s description of this species:

“M. testa subcylindrica, ventricosa, arcuata, utraque extremitate retusa; natibus subprominisul.

“Habite les mers de l’Isle de France. Coquille de couleur marron, ayant l’aspect d’un gland arqué; à valves très concave. Longueur, 37 mm.”
The Cuban specimens are well grown, being considerably larger than most of the fossils from Florida, but agreeing well with mature living shells. They are preserved only as casts.

**Localities.**—Near Santiago, Cuba, stations 3192, 5255, Wilcox, Black; Tampa, Chipola, Caloosahatchee River, Florida; Trinidad.

**Geologic horizon.**—Oligocene.

**Figured specimens.**—U. S. Nat. Mus. No. 167153.

**Lithophaga nigra** (d'Orbigny).

(Plate 14, Figure 6.)


*Lithodomus niger* d'Orbigny, idem (French edition), vol. 2, p. 331, plate 28, figs. 10, 11, 1847.


The following is the original description of this species:

"**Lithodomus** testa oblongo-elongata, recta, epidermide nigrescente; latere buccale angustiore, obtuso; latere anali elongatissimo subterque rotundato, regione ligamenti subecompresso, regione palleali transversim striato; natibus mediocribus, contortis intus; latere anali incrassato, albido."

This species may readily be recognized by the fact that its sriae cease abruptly at an imaginary line drawn from the beak to a point near the posterior extremity of the ventral margin, leaving the dorsal portion of the shell smooth.

**Localities.**—Friar's Hill, Antigua; La Cruz and Santiago, Cuba, stations 6856, 3441, 5255, Vaughan, Black; Tampa "silex" bed; living in the Antillean region and adjacent areas.

**Geologic horizon.**—Oligocene, *Miocene*.

**Type.**—(?)

**Figured specimen.**—U. S. Nat. Mus. No. 167156.

**Lithophaga species.**

The Vaughan collection contains one specimen of this genus which retains traces of ribbing on the dorsal portion of the valve. As the outer layers of the shell are absent from the remainder of the valve, the specific determination must await additional collections. The species may prove to be *L. antillarum* (d'Orbigny).

**Locality.**—One-half mile north of McKinnon's Mill, Antigua, station 6888, Vaughan.

**Geologic horizon.**—Oligocene.

**Teredo species.**

A large species of *Teredo* was abundant in the Oligocene of Cuba. The valves have never been found, but tubes of all sizes up to 38 mm. in external diameter are common. The tubes are divided towards the smaller ends by a partition into two unequal chambers in the manner shown in the figure of *Kuphus incrassatus* Gabb.*

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Localities.—Santiago, Wilcox, Vaughan; Consolacion del Sur, the Alcalde; and Vento, Cuba, Wren, Black, stations 3192, 3435, 3474, 4290, 5255.

Geologic horizon.—Oligocene.

Specimens.—U. S. Nat. Mus.

Panope species.

An internal cast of a large Panope was collected by T. H. Wren at Vento, Cuba. The dimensions are: Alt., 68 mm.; long., 115 mm.; diam., 46 mm.

Locality.—Vento, near Havana, Cuba, station 4290, Wren.

Geologic horizon.—Oligocene.

Specimen.—U. S. Nat. Mus. No. 167164.

Solemya sulcifera, new species.

(Plate 14, Figure 3.)

The following is a description of this species:

Shell elongate-elliptical; beaks situated near the posterior quarter; umbonal region moderately inflated; a broad, shallow depression extends from the beaks to the middle of the ventral margin; surface ornamented with about 15 broad, shallow, radiating, irregularly spaced grooves separated by slightly broader flat ribs.

Length of fragmentary specimen, about 67 mm.; altitude, about 31 mm.

Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, station 3652, Wiebusch.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 167165.

Tellina species.

The cast of a left valve which closely resembles the living Tellina interrupta Wood.

Alt., 29 mm.; long., 55 mm.

Locality.—Near Santiago, Cuba, station 5255, Black.

Geologic horizon.—Oligocene.

Specimen.—U. S. Nat. Mus. No. 167166.

Semele? species.

(Plate 14, Figure 1.)

From Antigua come fragments of two left valves, each of which has lost the posterior end. The shell is striated in accordance with the lines of growth, but is otherwise smooth. The hinge of one specimen is partly exposed, showing two cardinal teeth, but not sufficiently to establish positively the generic position.

Locality.—Willoughby Bay, Antigua, station 6881, Vaughan.

Geologic horizon.—Oligocene.

Figured specimen.—U. S. Nat. Mus. No. 167167.
Metridia trinitaria Dall.
(Plate 14, Figures 2 a, b.)


The following is the original description of this species:

"Shell anteriorly elongated and dorso-ventrally attenuated, the anterior dorsal slope rapid, the anterior end rounded; the disk mesially constricted, the posterior end short, high, blunt, strongly folded; beaks high, surface sculptured with numerous small, sharp, slightly elevated concentric lamelle, which are closer towards the ends of the shell; interior with the pallial sinus larger and higher in the left valve, about half confluent below, deep and rounded in front. Lon. 52, alt. 41, diam. 19 mm., but reaching twice this size.

"The peculiar anterior elongation and arcuate form of this species distinguish it clearly from the other American species. Guppy erroneously identified it with a Miocene and also with a Pleistocene species, from both of which comparison shows it perfectly distinct." (Dall, 1900.)

Localities.—Santiago, La Cruz, and Vento, Cuba, stations 3192, 3441, 3439, 4290, and 5255, Willcox, Vaughan, Black; also Trinidad; Crocus Bay, Anguilla, stations 6894, 6966, Vaughan.

Geologic horizon.—Oligocene, Miocene.

Figured specimen.—U. S. Nat. Mus. No. 115660.

Cardium species.

The genus Cardium is represented in the Anguillan fauna by casts which I have been unable to identify with any described species.

Locality.—Crocus Bay and Sandy Hill, Anguilla, stations 6894, 6963, 6967, Vaughan; also (probably different species) Calabazar, Cuba, station 4291, Wren.

Geologic horizon.—Oligocene.

Lucina species.

Large globose lucinas appear to have been rather abundant in the Tertiary seas, but are preserved chiefly as casts which exhibit few characters suitable for specific discrimination. Some of the localities are given below.

Localities.—Quarries west of Smithfield Mill, Friedericksted, St. Croix, station 6937; dimensions, alt., 100 mm.; long., 120 mm.; diam., 86 mm.; Vaughan. Crocus Bay, Anguilla, stations 6894, 6966; dimensions, alt., 75 mm.; long., 84 mm.; diam., 60 mm.; Vaughan. Calabazar, Cuba, station 4291; dimensions, alt., 103 mm.; long., 110 mm.; diam., 70 mm.; Wren. Also Vento, "E. C. A.," Fort Cabañas, Cuba, stations 4290, 4292, 3465; Wren, Vaughan.

Geologic horizon.—Oligocene.
Myrtaea(?) asphalitica, new species.

(Plate 14, Figures 7 a, b, 8, 9 a–c.)

The following is a description of this species:

Shell large, robust, transversely elliptical, lucinoid; anterior and ventral margins rounded, posterior margin truncated; beaks full, situated a little in front of the middle; surface sculpture of rough, crowded, concentric growth-lines and, on the umbones, equidistant, concentric ridges, becoming obsolete distally; dorsal areas obsolete; inner margins entire; anterior adductor scar lucinoid but rather short; lunule broadly lanceolate; escutcheon linear or narrowly lanceolate, depressed, bordered by a sharply angular keel; hinge with 1 right and 2 left cardinal teeth, 1 right and 2 left anterior laterals, and the same number of posterior laterals; left laterals feeble; ligament external but deeply depressed, preserved in the types.

Alt. of a medium-sized specimen, 40 mm.; length, 49 mm.; diam., 25 mm.
A larger specimen measures 57 mm. in altitude and 39 mm. in diameter.

This exceedingly interesting species, undoubtedly a member of the family Lucinidae, is closely related to Myrtaea, but is very much larger than any hitherto described American species of that genus, and has weaker sculpture than is customary. It is separated at once from Lucina by its dentition and escutcheon; from Loripes by the escutcheon, external ligament, and dentition; and from the greater number of Phacoides by the absence of dorsal areas.

Locality.—Angela Elmira asphalt mine, near Bejucal, Cuba, stations 3652, 5312, Wiebusch.

Geologic horizon.—Oligocene?

Type.—U. S. Nat. Mus. No. 167186.

Phacoides (Miltha) aff. Phacoides hillsboroensis (Heilprin).

(Plate 15, Figures 3 a, b.)

This species, which is known only from casts of the interior, resembles rather closely Miltha hillsboroensis, from which it differs in its more depressed posterior dorsal areas.

Alt., 62 mm.; lat., 62 mm.; diam., 26 mm.

Localities.—Near Santiago, Cuba, stations 3192 and 5255, Willecox, Black.

Geologic horizon.—Oligocene.

Figured specimen.—U. S. Nat. Mus. No. 167189.

Phacoides (Here) species.

(Plate 15, Figure 2.)

The following is a partial description of this species:

Right valve resembling P. waccissanus Dall but with straighter dorsal margin and more deeply impressed sulcus, which extends with undiminished depth to the beak; left valve with shallower sulcus.

The specimens probably represent an undescribed species, but are too fragmentary to furnish a complete diagnosis.

Locality.—Crocus Bay, Anguilla, stations 6965, 6894, Vaughan.

Geologic horizon.—Oligocene.

Figured specimen.—U. S. Nat. Mus. No. 167190.
Antigona cæsarina var. anguillana, new variety.

(Plate 16, Figures 4 a, b.)


The following is a description of this variety.

Shell orbicular, convex; sculpture of numerous low, flat, narrow, radial riblets, separated by slightly wider interspaces, and of elevated, reflexed, crenulated, concentric lamellæ; lunule broad, cordate, extended anteriorly; escutcheon long, wider in the right valve, defined on each valve by a deep sulcus.

Length of the specimen figured (broken at the posterior end), 53 mm.; height, 52 mm.; diameter of joined valves, 30.5 mm.

The radial riblets are more prominent in the variety anguillana than in the typical A. cæsarina and the lunule is more extended in front. Perfect specimens might show other distinguishing characters.

Antigona anguillana resembles A. larquinia (Dall) from the Tampa "silex" bed, from which it may readily be distinguished by its more orbicular shape, greater inflation of the umbones, closer concentric lamellæ, and much broader, cordate lunule. Its sculpture, as well as can be determined from the specimens at hand, is like that of the Recent and Pleistocene A. lusteri (Gray), from which it differs in the greater inflation of the posterior dorsal slopes, which, in the latter species, are flat or even slightly concave. A very closely related, perhaps identical, form from the base of the Chattahoochee formation near Bainbridge, Georgia, has been listed as A. (aff.) cæsarina by Dall.

Localities.—Crocus Bay, Anguilla, station 6893; Blizzard Mill, Antigua, station 6874; Vaughan. A fragment with similar sculpture is from the chert interbedded with tuffs at St. Johns, Antigua, station 6855. The type of A. cæsarina is from the Chipola Miocene at station 2212, Ten Mile Creek, Calhoun County, Florida.

Geologic horizon.—Oligocene.

Type of A. cæsarina Dall.—U. S. Nat. Mus. No. 114754.
Type of variety anguillana Cooke.—U. S. Nat. Mus. No. 167192.

Chione spenceri, new species.

(Plate 15, Figures 1 a, b.)

The following is a description of this species:

Shell ovate, moderately convex, with low, prosogyrate beaks and a sharply defined, lozenge-shaped lunule with imbricating growth-lamellæ; escutcheon lanceolate, flat or slightly concave, and with fine growth-lines; radial sculpture of minute, close, low, rounded ridges becoming obsolete at the anterior and posterior ends; concentric sculpture of erect, evenly spaced lamellæ, 24 on the type specimen, smooth on the dorsal surface and on the upper part of the ventral surface, but with a row of beads, contiguous to the radial ribbing, at the base of the ventral surface.

Length, 26 mm.; height, 23 mm.; diameter of joined valves, 15.5 mm.

Localities.—Antigua, Spencer (type); Willoughby Bay, Antigua, station 6881; Vaughan.

Geologic horizon.—Oligocene.

Type.—U. S. Nat. Mus. No. 163352.
The following is a description of this species:

Shell orbicular, highly inflated; ribs more than 20, with nearly equal interspaces; beaks medial, low; margins crenulated within.

Alt., 33.5 mm.; lon., 35.5 mm.; diam. of left valve, 19 mm.

The species grew to be at least twice as large as the specimen measured.

All the specimens of this species are so badly worn as to prevent accurate determination of the sculpture; 20 ribs can be counted on the type specimen, and it is probable that at least 5 more were originally present. Where the ribs have been partly eroded they present a peculiar cellular structure, beneath which may be discerned concentric sculpture of close, wavy threads.

This species, remarkable for its inflation, can not be confused with any other known American species. Venericardia bulla, which, perhaps, is as close to this species as any other, is less inflated, much longer, and has higher beaks.

Localities.—Point between Colombier Point and bay next to St. Jean Bay and point between Anse Écaillé and Anse Lézard, St. Bartholomew (stations 6897b and 6897), Vaughan.

Geologic horizon.—Eocene.

Type.—U. S. Nat. Mus. No. 167196.

Venericardia vaughani, new species.

The following is a description of this species:

Shell subquadrate; beaks high, prosogyrate, situated near the anterior quarter; ribs about 17, broad, separated by nearly equally wide interspaces; ribs on the anterior third set with transversely elongated nodes, other ribs rounded, flattened, or acutish.

Alt., 45 mm.; lon., 47 mm.; diameter, about 30 mm.

Locality.—Point between Anse Écaillé and Anse Lézard, St. Bartholomew, station 6897, Vaughan.

Geologic horizon.—Eocene.

Type.—U. S. Nat. Mus. No. 167195.

Venericardia species.

A fragment of the left valve of a large species of Venericardia was found at station 6897, St. Bartholomew. It appears to be related to Venericardia planicosta, but possesses nodules on the anterior ribs and its lunule is not erect as in that species.

Locality.—Point between Anse Écaillé and Anse Lézard, St. Bartholomew, station 6897a, Vaughan.

Geologic horizon.—Eocene.

Figured specimen.—U. S. Nat. Mus. No. 167197.
Argyrotheca dalli, new species.

(Plate 16, Figures 5 a–c.)

The following is a description of this species:

Shell minutely punctate, with many simple, rounded ribs increasing in number by intercalation; dorsal valve flat; ventral valve inflated; cardinal areas high, triangular in ventral valve, linear in dorsal valve; delthyrium (probably) triangular; median septum of dorsal valve high in front, nearly meeting the opposite valve, very low at beak.

Alt. of ventral valve, 13.3 mm.; alt. of dorsal valve, 10 mm.; width, 12.5 mm.; diam., 7 mm.

Guppy lists Argiope clevei Davidson from St. Bartholomew, but I have been unable to find any other reference to that species. It may be the form here described.

Localities.—Point between Anse Écaille and Anse Lézard and point between Colombier Point and bay next St. Jean Bay, St. Bartholomew, stations 6897 a, b, Vaughan.

Geologic horizon.—Upper Eocene.

Type.—U. S. Nat. Mus. No. 167201.

Liothyrina vaughani, new species.

(Plate 16, Figures 1 a–c.)

The following is a description of this species:

Shell large, inflated, glabrous; dorsal valve suborbicular, ventral valve ovate, occasionally prolonged in a linguiform projection filling a corresponding emargination in the dorsal valve; beak closely incurved; foramen small, circular.

Length, 43 mm.; breadth, 36 mm.; thickness, 18.5 mm.

This species was identified as Terebratula carneoides Guppy by Cleve, but the beak of Liothyrina vaughani is more closely incurved than that of any previously described species from the American Tertiary.

Locality.—Northwest side of St. Jean Bay, St. Bartholomew, station 6924, Vaughan.

Geologic horizon.—Upper Eocene.

Type.—U. S. Nat. Mus. No. 167202.

BRACHIOPODS FROM TRINIDAD.

For the sake of completeness, references are included to 3 species of Liothyrina from San Fernando, Trinidad. The types are in the collection of the U. S. National Museum.


Terebratula carneoides Guppy, loc. cit., p. 296, plate 19, fig. 2, 1866.

Terebratula lecta Guppy, loc. cit., p. 296, plate 19, fig. 3, 1866.

DESCRIPTION OF PLATES.

PLATE 1.

Fig. 1. Olita sp. Ventral view. Crocus Bay, Anguilla. × 1.5. Page 111.

Figs. 2, 3 a-b. *Lerista?* angelicus, n. sp. (2) Dorsal view. Bejucal, Cuba. × 1.5. (3a) Ventral view of smaller individual from same locality. × 3. (3b) Dorsal view of same specimen. × 3. Page 111.

Fig. 4. *Lyria vaughani*, n. sp. Dorsal view. Crocus Bay, Anguilla. × 1.5. Page 111.

Figs. 5 a-b, 6 a-b. *Conus* sp. (5a) Apical view of cast. Crocus Bay, Anguilla. × 1.5. (5b) Ventral view of same specimen. × 1.5. (6a) Apical view of cast of another individual, Crocus Bay. × 1.5. (6b) Ventral view of same specimen. × 1.5. Page 110.

Fig. 7. *Cerithium herculanus*, n. sp. Ventral view. Crocus Bay, Anguilla. × 1.5. Page 116.

Fig. 8. *Epytiostium* (Sibenerythia) *antiquum* (Brown). Dorsal view. Hodge's Bluff, Antigua. × 1.5. Page 112.

Figs. 9 a, b. *Cypraea angullana*, n. sp. (9a) Ventral view. Crocus Bay, Anguilla. × 1.5. (9b) Dorsal view of same specimen. × 1.5. Page 114.

Figs. 10 a, b. *Cypraea semen*, n. sp. (10a) Ventral view. Bejucal, Cuba. × 3. (10b) Dorsal view of same specimen. × 3. Page 114.

PLATE 2.


Figs. 5 a, b. *Strombus* sp. (5a) Ventral view of young individual. Crocus Bay, Anguilla. × 1.

(5b) Dorsal view of same specimen. × 1. Page 115.

PLATE 3.

Figs. 1 a, b. *Hemisinus costatus*, n. sp. (1a) Ventral view of type. Bejucal, Cuba. × 3. (1b) Dorsal view of same specimen. × 3. Page 117.

Fig. 2. *Hemisinus bituminifer*, n. sp. Ventral view of type. Bejucal, Cuba. × 3. Page 118.

Fig. 3. *Hemisinus siliceus* Brown and Pilsbry. Ventral view. Dry Hill Point, Antigua. × 1.5. Page 119.


(5) Ventral view of another individual from same locality. × 2. Page 118.

Figs. 6, 7, 8, 9. *Hemisinus antiquum* Brown and Pilsbry. (6) Ventral view of smoother variety. Dry Hill Point, Antigua. × 1.5. (7) Ventral view. Dry Hill Point, Antigua. × 5.

(8) Ventral view of young specimen. Dry Hill Point, Antigua. × 5. (9) Fragment from same locality. × 5. Page 118.

Figs. 10 a, b, 11, 12 a, b. *Ceriithidea anguillana*, n. sp. (10a) Ventral view of young individual. Crocus Bay, Anguilla. × 5. (10b) Dorsal view of same specimen. × 5. (11) Dorsal view of type. Same locality. × 5. (12a) Dorsal view of young individual. Same locality. × 5. (12b) Ventral view of same specimen. × 5. Page 117.

PLATE 4.

Figs. 1, 2, 3. *Turritella anguillana*, n. sp. (1) Fragment. Crocus Bay, Anguilla. × 1.5. (2) Fragment from same locality. × 1.5. (3) Fragment from same locality. × 1.5. Page 120.

Fig. 4. *Turritella dubiosa*, n. sp. View of type specimen. Crocus Bay, Anguilla. × 1.5. Page 120.


Fig. 8. *Turritella crocea*, n. sp. Ventral view of type. Crocus Bay, Anguilla. × 1.5. Page 121.

Figs. 9 a, b. *Amphulla anguillana*, n. sp. (9a) Ventral view of type. Crocus Bay, Anguilla. × 1.5. (9b) Dorsal view of same specimen. × 1.5. Page 123.

Fig. 10. *Solarium* sp. Fragment. Crocus Bay, Anguilla. × 5. Page 122.
PLATE 5.


PLATE 6.

Figs. 1 a, b, 2 a, b. *Ostrea antiqua* *vueniens* Brown. (1a) Exterior of upper valve. Rifle Butts, Antigua. X 0.75 (1b) Exterior of lower valve. Same locality. X 0.75 (2a) Exterior of lower valve. Same locality. X 0.75 Page 128.

PLATE 7.


Fig. 3. *Pecten nodostominus*, n. sp. Right valve. Willoughby Bay, Antigua. X 1.5. Page 141.

Figs. 4 a, b. *Pecten waylandi*, n. sp. (4a) Left valve of type. Santiago, Cuba. X 1.5. (4b) Right valve of same individual. X 1.5. Page 131.


PLATE 8.

Fig. 1. *Ostrea haitensis* Sowerby. Exterior. La Cruz, Cuba. X 0.5. Page 129.


Fig. 5. *Pecten ozypponum* Sowerby? Right valve. Hodge's Bluff, Antigua. X 1.5. Page 137.

Figs. 6 a, b, 7. *Pecten vaughani* var. *flabellum*, n. var. (6a) Left valve of type. Santiago, Cuba. X 1.5. (6b) Right valve of type. X 1.5. (7) Right valve. La Cruz, Cuba. X 1.5. Page 134.


PLATE 9.

Fig. 1. *Ostrea cf. O. trigonalis* Conrad. Upper valve. St. Jean Bay, St. Bartholomew. X 0.75. Page 129.


Figs. 3 a-c. *Unio bitumen*, n. sp. (3a) Right valve. Bejucal, Cuba. X 0.75. (3b) Left valve of same individual. X 0.75. (3c) Dorsal view of same individual. X 0.75. Page 130.

DESCRIPTION OF PLATES.

PLATE 10.


Fig. 5. Pecten perlineatus, n. sp. Type. Willoughby Bay, Antigua. X 1.5. Page 141.


Figs. 8, 9 a, b. Pecten crucianus, n. sp. (8) Right valve. La Cruz, Cuba. X 1.5. (9a) Interior of left valve (type). Santiago, Cuba. X 1.5. (9b) Exterior of type. X 1.5. Page 139.

PLATE 11.

Figs. 1, 2, 3. Pecten willibbianus, n. sp. (1) Right valve. Willoughby Bay, Antigua. X 0.9. (2) Right valve. Willoughby Bay, Antigua. X 0.9 (3) Left valve. Willoughby Bay, Antigua. X 0.9. Page 133.


Figs. 7 a, b. Pecten jacobianus, n. sp. (7a) Right valve of type. Santiago, Cuba. X 0.9. (7b) Left valve of the same specimen. X 0.9. (8) Detail of sculpture of left valve. Santiago, Cuba. X 3. Page 139.

Fig. 9. Pecten crocus, n. sp.? Left valve. Crocus Bay, Anguilla. X 0.9. Page 135.

Figs. 10 a, b. Pecten duplex, n. sp. (10a) Left valve. Long Island, Antigua. X 0.9. (10b) Right valve of same specimen. X 0.9. Page 140.

Figs. 11 a, b. Spondylus bostrychites Guppy. (11a) Lower valve. Crocus Bay, Anguilla. X 0.9. (11b) Upper valve of same individual. X 0.9. Page 144.

Figs. 12 a, b. Plicatula densea Conrad. (12a) Interior. Santiago, Cuba. X 0.9. (12b) Exterior of same specimen. X 0.9. Page 145.

PLATE 12.

Figs. 1 a, b. Pecten ventonensis, n. sp. (1a) Right valve. Santiago, Cuba. X 0.9. (1b) Left valve of same individual. X 0.9. Page 130.


Fig. 8. Pecten gabbi Dall. Left valve. Crocus Bay, Anguilla. X 0.9 Page 140.

PLATE 13.

Figs. 1 a, b. 2. Amusium ionii (Gabb). (1a) Left valve. Crocus Bay, Anguilla. X 0.9. (1b) Right valve of same individual as fig. 1. X 0.9. (2) Left valve, from same locality. X 3. Page 142.

Fig. 3. Pecten perlatus, n. sp. Right valve. Crocus Bay, Anguilla. X 3. Page 131.

Fig. 4. Pecten sp. Fragment. Willoughby Bay, Antigua. X 0.9. Page 142.

Fig. 5. Pecten pilliceri Dall. Right valve. Yumuri River, Cuba. X 0.9. Page 135.

Figs. 6, 7. Amusium antiquum (Brown). (6) Interior. Hodge's Bluff, Antigua. X 0.9. (7) Left valve from same locality. X 0.9. Page 143.

Figs. 8 a, b. Pecten decorus, n. sp. (8a) Right valve. Gua. Page 137.

Fig. 9. Semelet sp. Left valve. Willoughby Bay, Antigua. X 0.9. Page 147.

Figs. 2 a, b. Metis trinitaria Dall. (2a) Left valve. Near Santiago Bay, Cuba. X 0.9. (2b) Right valve of same individual. X 0.9. Page 148.

Fig. 3. Solemya sulcifera, n. sp. Type. Bejucal, Cuba. X 0.9. Page 147.

Figs. 4, 5. Modiolus (Botula) cinnamomeus Lamarck. (4) Right valve. Near Santiago Bay, Cuba. X 0.9. (5) Right valve of another specimen from the same locality. X 0.9. Page 146.
DESCRIPTION OF PLATES.

Plate 14—continued.

Fig. 6. Lithophaga nigra (d'Orbigny). Dorsal view. Friar's Hill, Antigua. × 0.9. Page 146.

Figs. 7 a, b, 8, 9 a-c. Mytilus asphaliticus, n. sp. (7a) Left valve of young individual. Bejuca, Cuba. × 1.5. (7b) Exterior of same specimen. × 3.6. (8) Interior of right valve from same locality. × 1.5. (9a) Right valve of larger individual from same locality. × 0.9. (9b) Dorsal view of same specimen. × 0.9. (9c) Left valve of same specimen. × 0.9. Page 149.

Plate 15.

Figs. 1 a, b. Chione spenceri, n. sp. (1a) Right valve of type. Antigua. × 1.5. (1b) Left valve of same specimen. × 1.5. Page 150.

Fig. 2. Phacoides (Here) sp. Right valve. Crocus Bay, Anguilla. × 1.5. Page 149.

Figs. 3 a, b. Phacoides (Miltia) aff. P. hillaboroensis (Heilprin). (3a) Right valve. Santiago, Cuba. × 1. (3b) Left valve of same specimen. × 1. Page 149.

Figs. 4 a-c. Venericardia globosa, n. sp. (4a) Interior of left valve. Colombier Point, St. Bartholomew. × 1.5. (4b) Ventral view of same specimen. × 1.5. (4c) Exterior of same specimen. × 1.5. Page 151.

Plate 16.

Figs. 1 a-c. Liothyrida vaughani, n. sp. (1a) Ventral valve. St. Jean Bay, St. Bartholomew. × 1. (1b) Lateral view of same specimen. × 1. (1c) Dorsal view of same specimen. × 1. Page 152.

Figs. 2a-c. Venericardia vaughani, n. sp. (2a) Right valve of type. St. Bartholomew. × 1. (2b) Anterior view of same specimen. × 1. (2c) Left valve of same specimen. × 1. Page 151.

Fig. 3. Venericardia sp. Fragment of left valve. St. Bartholomew. × 1. Page 151.

Figs. 4 a, b. Antigona cesarina var. anguillana, n. var. (4a) Right valve of type. Crocus Bay, Anguilla. × 1. (4b) Left valve of same specimen. × 1. Page 150.

Figs. 5 a-c. Argyrotheca dalli, n. sp. (5a) Lateral view. Near Columbier Point, St. Bartholomew. × 3.33. (5b) Ventral view of same specimen. × 3.33. (5c) Dorsal view of same specimen. × 3.33. Page 152.