

Thala esperanza, a new Costellariidae (Mollusca: Gastropoda) from northern Puerto Rico

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ABSTRACT

Thala esperanza n. sp. is described from Playa Esperanza, municipality of Manati, on the northern coast of Puerto Rico. Small size, slender and delicate shell, smaller spire angle, larger number of spiral cords, and a distinctive constriction below the suture separates the new taxon from western Atlantic congeneric species.

Key words: *Thala*, Costellariidae, Puerto Rico, Atlantic Ocean, Caribbean Sea, new species, systematics.

INTRODUCTION

The costellariid genus *Thala* H. & A. Adams, 1853 comprises about 12 Recent species, of which two are known from the western Atlantic. *Thala foveata* (Sowerby, 1834) is known to occur at St. Vincent, Antilles and possibly at the island of São Thomé in the eastern Atlantic (Maes & Ræihle, 1975). *Thala floridana* (Dall, 1884) is found along the coasts of Florida, northern Cuba, the Gulf of Mexico, Haiti, and the Yucatan Peninsula. Cernohorsky (1970) and Abbott (1974) synonymized *T. floridana* with *T. foveata*, before Maes and Ræihle (1975) demonstrated that they are separate species. These latter authors, following preliminary observations of Ræihle (1968), have shown in a detailed anatomical study of *T. floridana* that *Thala* belongs in the Costellariidae (as Vexillidae), and provided support for the then still controversial proposal that this latter taxon deserved full familial status apart from Mitridae (e.g., Azuma, 1965; Ponder, 1972) due to differences in gross anatomy and early life history.

In this work we describe a third western Atlantic species of *Thala* collected in beach sediments from Manati,

Puerto Rico. Soft parts and radula are unknown; nonetheless, conchological characters are distinctive enough to justify the naming of a new species.

MATERIALS AND METHODS

Shells were measured using WILD M-5 and M-8 dissecting microscopes with ocular micrometers and photographed with a Nikon F2 camera with extension bellows and MicroNikkor 55 mm objective. Scanning electron micrographs were made using an ISI Double Stage DS-130 scanning electron microscope at the Electron Microscope Laboratory, Rosenstiel School of Marine and Atmospheric Science. Model I ANOVA with unequal sample sizes (Table 1) was performed according to Sokal and Rohlf (1981). Acronyms used throughout this paper are: ANSP, Academy of Natural Sciences of Philadelphia; FMNH, Field Museum of Natural History, Chicago; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge; MNHN, Muséum National d'Histoire Naturelle, Paris; UF, Florida Museum of Natural History, University of Florida, Gainesville; UMML, Invertebrate Museum, University of Miami Rosenstiel School of Marine and Atmospheric Science; USNM, National Museum of Natural History, Smithsonian Institution, Washington.

SYSTEMATICS

Family Costellariidae MacDonald, 1860

Genus *Thala* H. & A. Adams, 1853

Thala esperanza new species

(figures 1-6, Table 1)

Description: Shell fusiform (length/width \approx 2.7), imperforate, reaching 5.0 mm in length, 1.9 mm width. Spire angle about 27°. Shell surface smooth, translucent, golden brown to chestnut brown, usually with single spiral band of lighter color on middle of last whorl. Periostracum undetectable. Protoconch usually decollated in adult shells, when present transparent brown, smooth, with 2 whorls, about 0.4 mm diameter, embryonic whorl

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Table 1. Linear shell measurements (mm) and counts for *Thala esperanza* new species, holotype and paratypes 1, 2, 5–12, and *T. foveata*. Statistics for model I ANOVA with unequal sample sizes according to Sokal and Rohlf (1981); NS = not significantly different.

Character	<i>T. esperanza</i> (n = 11)			<i>T. foveata</i> (n = 6)			ANOVA
	Range	\bar{X}	SD	Range	\bar{X}	SD	
Total length	3.92–5.00	4.40	0.40	5.25–6.33	5.73	0.40	F = 24.14 p < 0.001
Shell width	1.36–1.88	1.62	0.16	2.04–2.24	2.15	0.07	F = 23.02 p < 0.001
Length last whorl	2.80–3.48	3.17	0.22	3.72–4.28	3.97	0.19	F = 56.34 p < 0.001
Aperture length	1.92–2.44	2.18	0.15	2.84–3.32	3.02	0.20	F = 81.54 p < 0.001
Aperture width	0.36–0.60	0.49	0.06	0.64–0.80	0.71	0.05	F = 65.12 p < 0.001
Teleoconch whorls	3.25–5.00	4.18	0.45	4.00–4.75	4.42	0.26	NS
Spire angle (degrees)	26–29	26.9	1.14	35–37	36.0	0.89	F = 213.9 p < 0.001
Spiral cords last whorl	23–31	27.4	2.20	16–18	16.8	0.75	F = 128.4 p < 0.001
Axial ribs last whorl	24–32	28.3	2.65	21–27	23.0	2.28	F = 23.41 p < 0.001
Length/width	2.17–3.05	2.73	0.24	2.47–2.83	2.65	0.13	NS
Aperture length/total length	0.44–0.61	0.50	0.05	0.51–0.55	0.52	0.02	NS
Length last whorl/total length	0.65–0.87	0.72	0.06	0.66–0.71	0.69	0.02	NS
Aperture length/aperture width	3.78–4.58	4.27	0.24	3.55–4.87	4.26	0.51	NS

tilted, about 0.3 mm diameter. Protoconch/teleoconch transition orthocline. Teleoconch reaching 5 convex whorls. Suture impressed. Constriction present abapically at suture, defining a spiral cord wider than remaining spiral cords. Combination of spiral and axial elements producing clathrate aspect to entire teleoconch. Axial sculpture of 24–32 flattened ribs on last whorl. Interspaces as wide as axial ribs on early whorls, $\frac{1}{4}$ rib width on last whorl. Spiral sculpture of 23–31 cordlets on last whorl. Cordlets much narrower than axial ribs on early whorls, equal in width to axial ribs on last whorl. Five or six additional abapical spiral ribs at base slightly wider than those on remainder of last whorl. Aperture elongate (length/width \approx 4.5). Outer lip with 9–13 small but well defined denticles that are absent in immature shells. Columella arched, with 4 columellar folds that follow orientation of spiral cords along base. Parietal region excavated, thus columellar plait not raised above shell surface at base. Anterior siphonal canal wide, weakly defined. Posterior siphonal canal delineated only along inner surface of aperture, without notch.

Holotype: USNM 860280, 5.00 mm length, 1.64 mm width.

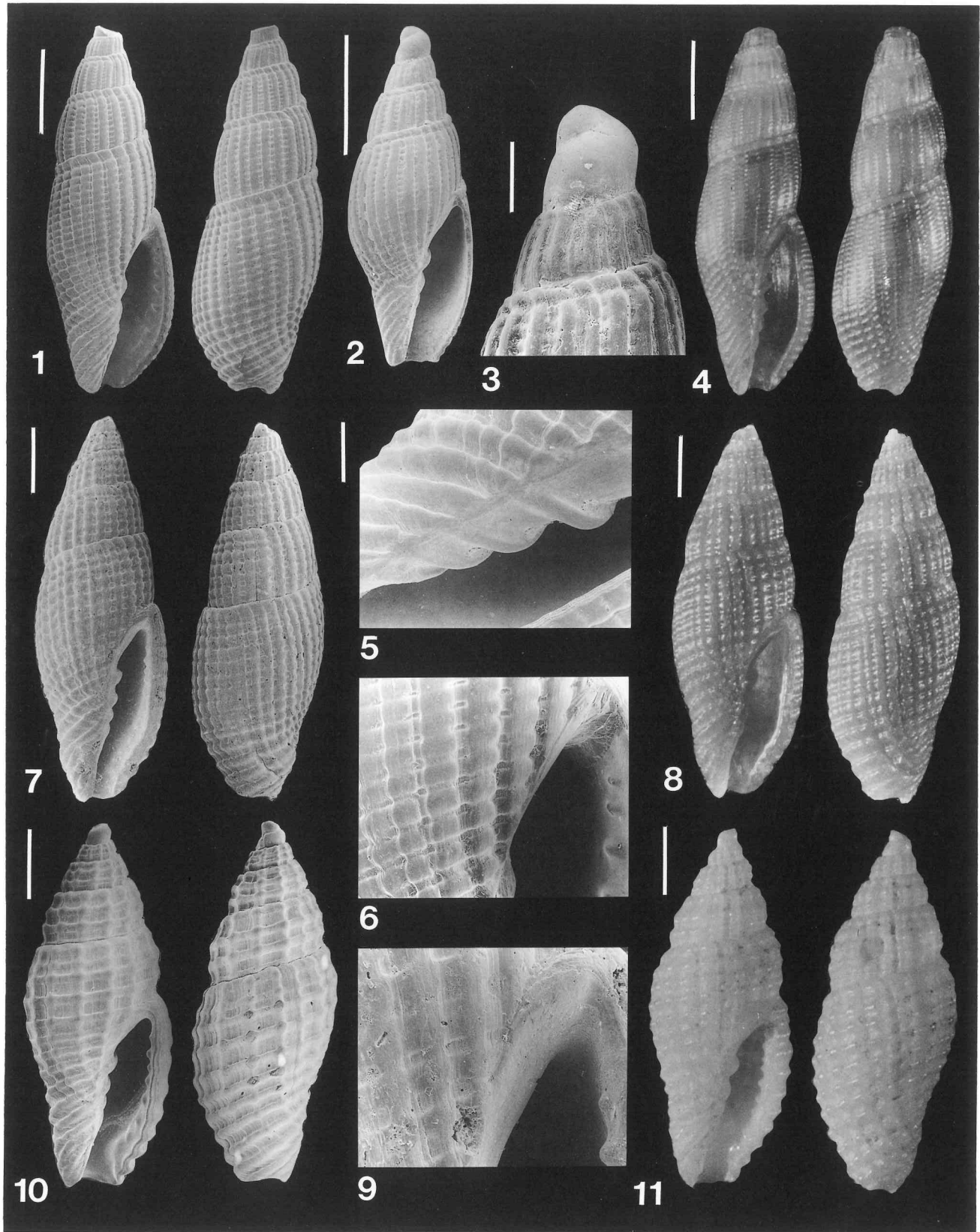
Type locality: Playa Esperanza, about 40 km west of San Juan, Municipality of Manati, northern Puerto Rico.

Paratypes: Paratypes 1–4, USNM 860281; Paratypes 5–

6, UF 193382–193383; Paratype 7, ASNP 391938; Paratype 8, AMNH 232313; Paratype 9, MCZ 302588; Paratype 10, MNHN, unnumbered; Paratype 11, FMNH 223388; Paratype 12, UMML 8375; Paratypes 13–16, USNM 860282; All from type locality, D. Piferer col. 05/1973, beach drift.

Remarks: Protoconchs are almost always decollated in beach-collected shells of this new species. Only two of 17 shells examined in this study had intact protoconchs, and those clearly were immature specimens. We do not know whether protoconch decollation occurs while snails are still alive. Decollation occurs frequently in unrelated gastropods (e.g., *Caducifer atlanticus* Coelho, Matthews & Cardoso, 1970, a buccinid from off Brazil, see Leal, 1991:151). The protoconch is very thin and translucent in *T. esperanza*. Decollation probably also occurs in *T. foveata*. In examining one of the specimens illustrated by Maes and Ræihle (1975) (UF 158165, St. Vincent, Lesser Antilles), we found that the protoconch of that specimen, present in Maes & Ræihle's illustration, is now missing (figures 7, 8).

Of the western Atlantic species of *Thala*, *T. esperanza* can be more easily separated from *T. floridana*. We do not provide statistical comparisons between these two species, but such comparisons may be made using data in Table 1 and in Maes and Ræihle (1975). *Thala floridana* has a much thicker and larger shell, with nearly



Figures 1–6. *Thala esperanza* new species. **1.** Holotype, Playa Esperanza, Manati, Puerto Rico (SEM). **2.** Juvenile shell of paratype 4 (SEM). **3.** Protoconch of paratype 4 (SEM). **4.** Paratype 1. **5.** Parietal region showing columellar plaits on holotype (SEM). **6.** Shell sculpture near adapical part of aperture on holotype (SEM). All from type locality. **Figures 7–9.** *Thala foveata*, UF 158165,

twice the average width of *T. esperanza*. Shells of *T. floridana* are usually dark brown, but some can be white (Maes & Raeihle, 1975) (figure 11). Shells are never white in *T. esperanza*. The 40° spire angle of *T. floridana* is broader than that of *T. esperanza* (27°). *Thala floridana* has a much coarser sculptural pattern (figures 10, 11), with about 13 spiral cords and 20 axial ribs on the last whorl. These numbers average 27.4 and 28.3, respectively, in *T. esperanza* (figures 1, 4, Table 1) (See Appendix 1 for a list of specimens of *Thala floridana* examined).

The degree of overall shell similarity between *T. esperanza* and *T. foveata* is greater. Table 1 shows measurements, proportions, and meristic counts for adult shells of the two species. All known specimens of *T. foveata* are thicker and significantly larger (Table 1) than any shell in the type series of *T. esperanza*. The base in *T. foveata* is always more tapered. *Thala esperanza* differs in having flattened axial ribs with narrower interspaces, significantly larger spire angle, and greater numbers of spiral cords and axial ribs on last whorl. There is also a marked, distinctive constriction defining a wider spiral cord just below the suture in the new species (figures 1, 4, 7, 8) (See Appendix 1 for specimens of *T. foveata* examined).

Thala esperanza can be distinguished from its eastern and western Pacific congeners by its much smaller size and differences in shell shape and sculpture. *Thala gratiosa* (Reeve, 1845) from tropical west America has a somewhat similar shell contour, but is twice as large and has a much coarser sculpture with relatively fewer elements (Keen, 1971; Sphon, 1969). The western Pacific *T. milium* (Reeve, 1845) and *T. todilla* (Mighels, 1845) also differ by their larger size, coarser sculpture, purple color in the former and four-whorled protoconch in the latter (Cernohorsky, 1970; Kay, 1979).

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APPENDIX 1

Material of *Thala foveata* examined, all from Calliaqua, St. Vincent, British Virgin Islands: UF 158165, 1 shell, beach drift, H.H. Monroe, 01/1961, ex-McGinty Collection; UF 145855, 2 shells, H.H. Monroe, 01/1961, ex-McGinty Collection; "rocky cove on windward side of SE Point, Calliaqua Bay", 13°07'20"N, 61°11'55"W, ANSP 324791, 1 shell, V.O. Maes 02/1972; 13°07'04"N, 61°12'20"W, ANSP 354555, 2 shells, H.H. Monroe 1956, Ex-Finlay Collection.

Material of *Thala floridana* examined: East Coast of Florida: St. Augustine, UF 158167, 3 shells, Ted Yocius 10/1972, 225 ft, Ex-J.M. Bijur Collection; AMNH 246013, 2 shells, Ted Yocius, Jerome M. Bijur Collection; Fort Pierce, AMNH 127640, 16 shells, Thomas Hughes leg.; MCZ 298862, 3 shells, Bernadine Baker coll., Ex-Doris Folsom 5/1976; Palm Beach, Boynton Beach, UF 145856, 1 shell, McGinty 8/1944; UF 169469, 41 shells, McGinty Collection, 02/1944; Boynton Beach, Ocean Ridge, UF

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St. Vincent, West Indies. 7. Shell (SEM). 8. Shell. 9. Shell sculpture near adapical part of aperture (SEM). **Figures 10-11.** *Thala floridana*. 10. USNM 860284, Bear Cut, Miami, Florida (SEM). 11. USNM 860283, off Miami Beach, Florida. Scale bars = 1 mm, except for Figures 3, 5, 6, 9 = 0.2 mm.

158164, 1 shell, T. McGinty 8/1944; Card Sound, UF 63207, 2 shells, M. Smith 1/1935, University of Alabama leg.; UF 13150, 1 shell, C.B. Lungren 1909; 1.6 km off Miami Beach, USNM 860283, 1 shell, M. Almasi and D. Marszalek 10/1978, 24 m depth; Bear Cut, Miami, USNM 860284, A. Emery 02/1956, beach drift; Bird Key, Biscayne Bay, UNSM 414387, 3 shells, *Eolis* Sta. 13, 2–10 ft., Henderson Coll. 1910; Florida Keys: Key Largo, AMNH 242626, 4 shells, ex-Alice Denison Barlow Collection; Little Molasses Reef, off Key Largo, UF145851, McGinty 4/3/1950; Bonefish Key, UF 192101, 4 shells, Beal-Maltbie coll., Ex-McGinty Collection; UF 146530, 1 shell, McGinty Collection; UF 63202, 8 shells, M. Smith coll., University of Alabama leg.; UF 162451, 3 shells, Blenn R. Bales, G.L. Warmke leg. 1989; UF 135603, 3 shells, V. Orr, H.G. Lee leg.; MCZ 118844, 10+ shells, B.R. Bales 5/7/1940; MCZ 100714, 8 shells, B.R. Bales leg.; AMNH 116412, 2 shells, 1940, Dr. and Mrs. Julius Wisoff Collection; AMNH 114121, 1 shell, T. McGinty coll.; AMNH 138995A, 1 shell, A.S. Koto leg.; AMNH 189020, 4 shells, A.S. Koto leg. 1949, J.M. Cate Collection; AMNH 138995, 4 shells, A.S. Koto leg., M.K. Jacobson Collection; AMNH 199169, 9 shells, A.S. Koto leg.; Lower Matecumbe Key, USNM 53477, 3 shells, H. Hemphill, in grass; Key Vaca, UF 156266, 9 shells, McGinty 2/1939; MCZ 153269, 25+ shells, B.R. Bales; Key Vaca, Boot Key Harbor, UF 145853, 7 shells, McGinty coll. 3/1945; MCZ 226804, 2 shells, grassy bottom, 1 fm. McGinty coll.; No Name Key, UF 63203, 2 shells, University of Alabama leg.; Little Torch Key, UF 123072, 33 shells, M.C. Teskey 1968-1977, on sand patches; Grassy Key (Florida Bay), MCZ 110198, 4 shells, under rocks, P. McGinty leg.; Pumpkin Key, UF 63205, 2 shells, M. Smith 1/1935, University of Alabama leg.; Islamorada, AMNH 121444, 3 shells, ex-E.C. Styles; Big Pine Key, UF 63204, 4 shells, M. Smith coll., University of Alabama leg.; Key West, AMNH 8982, 3 shells, Constable, Jay Collection; USNM 53541, 1 shell, H. Hemphill, on rocks; Barraconta Key, 9 miles W of Key West, UF 13149, 2 shells, G.W. Van Hyning, 6/11/1958; Middle Sambo Shoals, UF 145852, 6 shells, McGinty 6/1946; Dry Tortugas: MCZ 258469, 1 shell, J.S. Schwengel, dredged; Loggerhead Key, UF 158168, 1 shell, T. McGinty 8/1941, 0.5 fm; Garden Key, South Coaling Dock, UF 13151, 2 shells, G.W. Van Hyning 7/16/1938, on piling; Gulf

Coast of Florida: St. Martins Reef, near Aripeka Bird Racks, 6 mi. W of Aripeka, Pasco-Hernando County line, MCZ 233672, 14 shells, W.A. Smith 5/25/1963; Ozone, Crystal Beach, AMNH 246038, 3 shells, Dan Steger coll., Jerome Bijur Collection; AMNH 125612, 10 shells, S. Levine leg. 1960; AMNH 189024, 5 shells, S. Levine leg. 1960, J.M. Cate Collection; AMNH 125928, 76 shells, S. Levine leg. 1960; AMNH 194560, 66 shells, Gordon Newell-Usticke Collection; Ozone, Crystal Beach, St. Joseph Sound, UF 193036, 27 shells, Dan Steger; UF 137573, 5 shells, D. Steger 1970, H.G. Lee leg.; AMNH 189023, 3 shells, mud and grass bottom, E. Marcott leg. 1963, J. Cate Collection; Marco, UF 137649, 1 shell, H. Hemphill, 2 fms, H.G. Lee leg.; USNM 53542, 1 shell, H. Hemphill; 15–35 mi. off Ft. Walton (FL), MCZ 145877, 5 shells, 13–19 fms., L.A. Burry; Featherbend Bank, UF 63206, 2 shells, M. Smith 1/1935, University of Alabama leg.; Okaloosa County, off Destin, UF 158166, 1 shell, UF 145857, 2 shells, McGinty 10/1941, 14 fms; Bahamas: Andros, first island off Mintie Bar, SE end of South Bight, USNM 271832, 7 shells, P. Bartsch; Abaco, Little Harbor, USNM 180492, 5 shells, O. Bryant; Grand Bahama Island: Dead Man's Reef, 26°34'45"N, 78°51'45"W, ANSP 371266, 1 shell, J. Worsfold, Ex-J. Worsfold; McLean's Town, 26°38'45"N, 77°57'30"W, ANSP 369060, 8 shells, J. Worsfold, Ex-J. Worsfold; Eight Mile Rock, Hepburn Town, "Garbage Hole", 26°31'30"N, 78°47'15"W, ANSP 370392, 4 shells, J. Worsfold, Ex-J. Worsfold; Wood Cay, 26°44'15"N, 79°58'15"W, ANSP 369615, 3 shells, J. Worsfold, Ex-J. Worsfold; West End, Settlement Point, 26°42'15"N, 78°59'50"W, ANSP 368626, 6 shells, J. Worsfold, Ex-J. Worsfold; West End, Hotel Jetty, 26°42'15"N, 078°59'50"W, ANSP 368711, 21 shells, J. Worsfold, Ex-J. Worsfold; Nassau, New Providence Island, UF 145849, 1 shell, McGinty 6/6/1947, 4–6 fms, Sta. 17; Cuba: Las Villas, Caibarien, Cayo Salinas, AMNH 138924, 1 shell, M.K. Jacobson leg., 07/1947; Esperanza (NW Cuba), USNM 414396, 5+ shells, Barrera Expedition, Sta. 210, 2–3 fms; Santa Rosa (NW Cuba), USNM 414498, 1 shell, Barrera Expedition, Sta. 209, 3–6 fms; Bermuda, AMNH 45068, 2 shells, Constable, Jay Collection; MCZ 24174, 2 shells, O. Bryant 1903; USNM 223283, 6 shells, Haycock coll.; Haiti, Dept. de l'Ouest, Saltrois, USNM 439975, 1 shell, Orcutt, Chamberlain Coll.