New Terebrid Species from the Indo-Pacific Ocean and from the Gulf of Mexico,

with New Locality Records and Provisional Lists of Species Collected in Western Australia and at Sabah, Malaysia

(Mollusca: Gastropoda)

BY

R. D. BURCH

Post Office Box 461, Winton, California 95388

(Plate 31)

THE CONTINUED INTEREST in the collection and study of mollusca, coupled with improvements in equipment for dredging and diving, keeps adding to the known fauna of relatively well-explored waters and makes possible the compilation of check lists for less-known areas and the description of species heretofore not recorded in the literature.

Through the interest and generosity of a number of individuals and institutions new locality records or range extensions can be noted here, and provisional lists of terebrid species are possible for several areas for which there is little reference material available. The new locality records are noted here immediately following the description of the last new species described from the particular area. It is my intention to avoid, if possible, adding to the confusion of the taxonomic problems of this family; therefore, I have conservatively assigned all species to the broad generic groups of Duplicaria, Hastula and Terebra, with the use of such other supraspecific taxa as have been employed by previous authors. Since it has not been possible to make anatomical examinations necessary for an exact generic assignment of the various species, all such designations are made tentatively on the basis of shell characters alone.

In some areas such as Hawaii and Japan, from which new species or new locality records are noted, the collecting has been relatively intensive for many years and several lists of species have been compiled and published. All new records and range extensions noted here for such areas have been set down only after an examination of the literature. Hastula (Hastula) tiedemani R. D. Burch, spec. nov. (Plate 31, Figure 6)

Description: Shell very small, moderately subulate in shape, with flat-convex whorls; sculpture of straight, sharp, strong axial ribs extending from suture to suture on each whorl, fading at the periphery of the body whorl; interstitial spaces between the ribs smooth with no spiral sculpture; protoconch of three and one-half conical whorls, amber colored, darker on the anterior part. Shell color a shining white, with a faint light-brown wide band on the anterior portion of the whorls, extending around the base of the body whorl anterior to the periphery. Aperture narrow; columella straight, simple; siphonal canal a little reflected. Length 6.0 mm; width 1.5 mm.

Holotype: Museum of Comparative Zoology, Harvard University, No. 251237.

Type Locality: The holotype was collected at 50 foot depth with the use of diving equipment by Mr. Alan Tiedeman in Maalaea Bay, off Kihei, Maui, Hawaii, in January, 1964. Lat. 20° 46′ N; Long. 156° 30′ W.

Discussion: This minute species must be considered very rare since only a single specimen has been obtained during the extensive collecting in the Hawaiian Islands. This may be partially attributable to the very small size; it is the smallest species of *Hastula* known to me. The holotype is an adult specimen of six complete whorls in addition to the protoconch, and the body whorl exhibits the characteristics found in adult specimens of the genus. *Hastula tiedemani* resembles *H. albula* (Menke, 1843) (= *H. casta* (Hinds, 1844)), except that *H. albula*

is very much larger with wider and more obese whorls. Hastula tiedemani differs from H. medipacifica Pilsbry, 1921, which has also suture-to-suture axial ribs, in that the former is very much shorter, with a narrower apical angle and a different color arrangement. The sculptural variations of both H. albula and H. medipacifica, the two species which most closely resemble H. tiedemani, are in all instances much larger and wider, with a greater apical angle, and the width of the aperture proportionately greater.

An effort has been made to secure additional specimens; however, the rarity and small size of this species have combined to prevent the collection of any other specimens. These factors have determined that this species be described from the unique specimen designated as the holotype.

This species is named in honor of Mr. Alan Tiedeman for his numerous additions to the knowledge of the terebrid species indigenous to Hawaii.

Hastula (Hastula) maryleeae R. D. Burch, spec. nov. (Plate 31. Figure 4)

Description: Shell small, moderately subulate, with flat-concave whorls; color dark brown, with an obscure white band at the periphery of the body whorl; sculpture of low, thin axial ribs on the posterior one-third of each whorl; anterior portion unsculptured; body whorl with a series of low, thin, weak semi-nodules at the periphery, not connecting with the crenules on the posterior portion and not extending to the base of the shell; protoconch of two glassy whorls; aperture effuse and moderately laminated on the columellar wall; columella short, straight, with a single strong plication. Length 23.7 mm; width 5.0 mm. Holotype: Museum of Comparative Zoology, Harvard University No. 251235

Type Locality: The holotype and 20 paratypes were collected in sand at low tide on March 16, 1961, by Mrs.

Mary Lee Burch at Surfside Beach, Freeport, Texas. Lat. 28° 57′ N; Long. 95° 38′ W.

Paratypes: Since this species has been taken in numbers by several collectors, paratypes are being deposited in a number of major institutions. Additional paratypes will remain in the collections cited in Table 1.

Discussion: This small species is regarded as uncommon along the Texas coast in a area bounded by Freeport, Texas, on the east and by Padre Island on the west. It is rather variable in both sculpture and color, with about 40% of specimens examined having the peripheral crenules on the body whorl entirely obsolete and replaced with a continuous swelling that forms a wide convex belt. The peripheral crenules or swellings on the body whorl, together with the crenules of the subsutural band, combine to give the outline of the whorls a concave appearance. As with many other species of the genus Hastula, this species often produces colorless or albino varieties; hypotype (21) is a solid opaque white. Other color variations between the dark brown of the holotype and the pure white of hypotype (21) most often show a light area immediately anterior to the suture, followed by a dark gray or purplish color which extends to the periphery of the body whorl where it is interrupted by a band of white before continuing to the base of the whorl. Hastula maryleeae differs from H. hastata (GMELIN, 1791) in that the former is more slender in form and does not have the continuous suture-to-suture axial ribs of the latter. It also differs from H. cinerea (Born, 1780) and H. salleana (DESHAYES, 1859) in that it possesses a row of small crenules, occasionally coalesced into a broad belt at the periphery of the body whorl.

This species is named in honor of Mrs. Mary Lee Burch for her understanding and assistance during the sometimes tedious days of this study and for having collected the first specimens which brought this species to my attention.

Hastula (Hastula) maryleeae

Table 1

Specimen	Collection	Locality	Collector
Holotype	M. C. Z. No. 251235	Surfside Beach, Freeport, Texas	M. L. Burch
Paratypes 1, 2	M. C. Z. No. 251236	Surfside Beach, Freeport, Texas	M. L. Burch
Paratype 3	Natal Mus., South Africa	Surfside Beach, Freeport, Texas	M. L. Burch
	No. 1067		
Paratypes 4, 5	Tiedeman Coll.	Surfside Beach, Freeport, Texas	M. L. Burch
Paratypes 6, 7	Campbell Coll.	Surfside Beach, Freeport, Texas	M. L. Burch
Paratypes 8 - 20	R. D. Burch Coll. No. 023	Surfside Beach, Freeport, Texas	M. L. Burch
Hypotype (21)	R. D. Burch Coll. No. 466	"Padre Island," Texas	C. Ivey
Hypotypes (22 - 26)	Webb Coll.	"Mustang Island," Texas	K. Webb

Hastula (Punctoterebra) betsyae R. D. Burch, spec. nov.

(Plate 31, Figure 2)

Description: Shell small and moderately subulate, with flat-convex whorls, sculptured with low, slightly bent, angular ribs which are contiguous with the sutures on the early whorls and fading at the periphery of the body whorl; interstices between each axial rib contain a single depressed punctation at about one-third the whorl's width from the posterior suture; punctations not connected across the ribs forming an interrupted line of spiral sculpture; color pattern a series of irregular axial brown lines or flammules which occasionally coalesce to form interrupted spiral bands of color on the basically white shell; protoconch with three conical, glassy whorls; aperture oblong-ovate; columella straight and slightly angled; siphonal canal recurved. Length 34.0 mm; width 7.0 mm. Holotype: Museum of Comparative Zoology, Harvard University No. 251238

Type Locality: The holotype and 47 paratypes were collected in sand at 20 feet with the use of diving equipment by Mr. Alan Tiedeman off Honokohau, Maui, Hawaii, in December, 1963. Lat. 21° 04′ N; Long. 156° 38′ W. Paratypes: This relatively common species, which appears to be endemic to the Hawaiian Islands, has been taken in large numbers by several collectors. Paratypes are deposited in a number of major institutions. Additional paratypes will remain in the collections cited in Table 2.

Discussion: Hastula betsyae resembles H. penicillata (HINDS, 1844), except that a single punctation is present in each interstice of the former, while this interstitial space is not punctate in the latter. An examination of numerous specimens of H. penicillata from various locali-

ties in the Pacific and Indian oceans, together with a scrutiny of the various check lists and the literature published to date, has failed to disclose a single specimen of *H. penicillata* with an indication of the punctate sculpture displayed uniformly by each of over 400 examples of *H. betsyae* collected at Hawaiian localities, all of which have been examined under magnification. Except for various arrangements of the color pattern, *H. penicillata* is remarkably consistent in sculpture throughout its entire range eastward in the Pacific ocean to Easter Island; however, it appears that the species does not occur in the Hawaiian Islands. *Hastula betsyae* is the species referred to as *H. penicillata* (HINDS) by TINKER, 1958 (p. 198) and Weaver, 1960 (vol. 1, no. 5, bottom row).

This species is named in honor of Miss Betsy Clarke Harrison for having collected the specimens which first brought the species to my attention.

In addition to the new species Hastula tiedemani and H. betsyae described above from the recent collecting in the Hawaiian Islands, a number of additions to the published records of the fauna can now be noted. Through the efforts and interest of Mrs. Elizabeth Harrison, Mr. C. S. Weaver and Mr. Alan Tiedeman, the following should be included among the terebrids of Hawaii as listed by Pilsbry (1921), Mant (1923), Tinker (1952, 1958), Weaver (1960 - 1961), and various issues of The Hawaiian Shell News.

Hastula (Punctoterebra) anomala (GRAY, 1834);

Proc. Zool. Soc. London, p. 62; Fig.: HINDS in SOWER-BY, Thes. Conch., *Terebra*, 1844, pl. 44, fig. 97. This species superficially resembles *H. inconstans* (HINDS, 1844). It may be distinguished by a single row of punc-

Table 2
Hastula (Punctoterebra) betsyae

Specimen	Collection	Locality	Collector
Holotype	M. C. Z. No. 251238	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 1, 2	M. C. Z. No. 251239	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 3 - 7	San Diego Mus. Nat. Hist. No. 48930	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 8 - 10	Natal Mus., South Africa No. 1068	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 11 - 14	Tiedeman Coll.	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 15 - 18	Campbell Coll.	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 19 - 22	Weaver Coll.	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 23 - 26	Harrison Coll.	Honokohau, Maui, Hawaii	A. Tiedeman
Paratypes 27 - 47	R. D. Burch Coll. No. 172	Honokohau, Maui, Hawaii	A. Tiedeman
Hypotypes (48 - 52)	R. D. Burch Coll. No. 353	Haleiwa Bay, Oahu, Hawaii	B. Harrison
Hypotypes (53 - 56)	R. D. Burch Coll. No. 532	Waianae Bay, Oahu, Hawaii	C. Weaver

tations that occasionally coalesce to form a thin shallow subsutural groove. Collected at 20 feet off MacGregor's Landing, Maui, by Alan Tiedeman, Jan., 1964, and littorally at Nanakuli, Oahu, by Mrs. Jean Bromley in 1959. R. D. Burch Coll. Nos. 621, 622.

Terebra (Dimidacus) amanda HINDS, 1844;

Proc. Zool. Soc. for 1843, p. 154; Fig.: HINDS in Sowerby; Thes. Conch., 1844, *Terebra*, pl. 45, fig. 100. Collected at 35 feet in Pokai Bay, Oahu, by Mrs. Elizabeth Harrison on June 22, 1962, and at 80 feet, under sand in Waianae Bay, Oahu, by C. S. Weaver on August 29, 1963. R. D. Burch Coll. Nos. 405, 533.

Terebra (Strioterebrum) cancellata Quoy & Gaimard, 1832; Voy. Astrol., Moll., vol. 2, p. 471, plt. 36, figs. 27, 28 (non Röding, 1798, = T. anilis Röding, 1798); non Gray, 1834, = T. undatella Deshayes, 1859; non Cossmann, 1900, = T. intermedia Vredenburg, 1921). Two specimens collected under four inches of sand by C. S. Weaver at Nawiliwili, Kauai, in April, 1956. C. N. Cate Coll. No. 052.

Terebra (Decorihastula) marmorata Deshayes, 1859; Proc. Zool. Soc. London, p. 279, no. 21; Fig.: Reeve, Conch. Icon., 1860, Terebra, plt. 19, figs. 91 a, b. Specimens collected at 30 feet, in sand, off the Bureau of Standards Timing Station, Kihei Lagoon, Maui, by Mr. Joe Kern during 1964. Excellent specimens are in the Kern Coll. and Tiedeman Coll.; R. D. Burch Coll. No. 661.

Terebra (Decorihastula) nebulosa Sowerby, 1825;
Tank. Cat. App., p. 25 (non Kiener, 1838, = T. candida (Born, 1780); non Lorois, 1858, = T. guttata (Röding, 1798)). Collected at 35 feet in Pokai Bay, Oahu, by Mrs. Elizabeth Harrison on June 22, 1962. R. D. Burch Coll. No. 406.

Terebra (Perirhoe) tricolor Sowerby, 1825;
Tank. Cat. App., p. 24. Two specimens collected at 30 feet off MacGregor's Landing, Maui, by Alan Tiedeman during August, 1964. Tiedeman Coll. No. 1386.

Hastula (Punctoterebra) cernohorskyi R. D. Burch, spec. nov.

(Plate 31, Figure 3)

Description: Shell of medium size, moderately subulate in form; color light brown or light olive-green throughout; a lighter shade immediately anterior to the sutures, and a darker band below the periphery of the body whorl extends to the siphonal canal with little contrast; early sculpture of low, rounded, close-set axial ribs contiguous with the sutures; ribs becoming shorter in succeeding whorls until they extend only over the posterior one-fourth of the whorl. At the sixth whorl, the axial ribs extend over the posterior one-half of the whorl and are microscopically punctate in the rib interstices. The single interstitial punctation, located on the posterior one-fourth of the whorl, intersects the edges of the ribs and forms an obsolete, narrow, shallow subsutural groove which continues to the aperture. Whorls flat-convex; aperture oblong-ovate and slightly effuse at the base; columella short, slightly angled and moderately twisted, with two plications; columellar wall lightly laminated; siphonal canal moderately recurved. Length 54.0 mm; width 7.0 millimeters.

Holotype: Museum of Comparative Zoology, Harvard University No. 251245

Type Locality: The holotype and 7 paratypes, all dead specimens devoid of animal, were collected littorally or by dredging over a sand bottom in shallow water off Natadola, Fiji Islands, by Mr. W. O. Cernohorsky during 1961 and 1962 and by Mr. A. Morse in 1959. Lat. 18° 06′ 40″S; Long. 177° 19′ 30″E.

Paratypes will remain in the collections cited in Table 3. Discussion: Hastula cernohorskyi has no closely-resembling species with which it might be confused, although some superficial similarity exists in H. anomala (Gray, 1834). With H. cernohorskyi, the crenules anterior to the suture are smaller, more rounded and close-set than in H.

Table 3
Hastula (Punctoterebra) cernohorskyi

Specimen	Collection	Locality	Collector
Holotype	M. C. Z. No. 251245	Natadola, Fiji Islands	W. Cernohorsky
Paratypes 1 - 5	Cernohorsky Coll.	Natadola, Fiji Islands	A. Morse
Paratype 6	Jennings Coll.	Natadola, Fiji Islands	A. Morse
Paratype 7	R. D. Burch Coll. No. 633	Natadola, Fiji Islands	A. Morse
Hypotype 1	Currin Coll.	Unknown, "bought from fisher- man in Philippines"	
Hypotype 2	Miller Coll.	Leleuvia Island, Fiji Islands	cited from ob- servation of W. Cernohorsky

anomala and extend only about one-fourth the distance across the whorl, while in *H. anomala* they extend to and beyond the periphery of the body whorl. The aperture of *H. cernohorskyi* is less effuse than that of *H. anomala*, and the columellar wall has less laminations. The distinctive uniform color of *H. cernohorskyi* will distinguish it from *H. anomala* and *H. lauta* (Pease, 1869), as will the greater apical angle and much larger size.

Hastula cernohorskyi is considered by the author to be endemic to the southern Fiji Islands and presently very rare. It is probably the second-largest species of the genus, only H. caerulescens (LAMARCK, 1822) exceeding it in size.

This species is named in honor of Mr. Walter Oliver Cernohorsky in recognition of his considerable contributions to the literature of the molluscan fauna of the Fiji Islands and for having collected the specimens which first brought the species to my attention.

Duplicaria (Duplicaria) crakei R. D. Burch, spec. nov. (Plate 31, Figure 1)

Description: Shell small, moderately subulate, with flat-convex whorls; color pale yellow, occasionally suffused or blotched with brown anterior to the subsutural groove and extending just below the periphery of the body whorl, followed by a wide blue-purple band anterior to the periphery covering the base of the shell; bottom of the subsutural groove colored same as base of shell with the color extending on to and occasionally suffusing the entire subsutural band; sculpture of straight, regularly-spaced, angular axial ribs, contiguous with the sutures and extending to the base of the body whorl. A deep spiral subsutural groove divides the whorls about one-third of their

width from the posterior suture, setting off a subsutural band of axially-lengthened straight crenules which are continuations of the ribs anterior to them. No other spiral sculpture than that formed by the subsutural groove. Protoconch paucispiral, of two and one-half conical, amber-colored whorls which are a darker shade on the posterior half of each whorl; columella very twisted, of same color as base of shell, with a single strong plication that is yellow or white; siphonal canal very recurved. Length 23.0 mm; width 5.5 mm.

Holotype: Museum of Comparative Zoology, Harvard University No. 251241

Type Locality: The holotype and 97 paratypes were collected in fine sand at low tide on Cable Beach, Broome, Western Australia, during August of 1962, by Mr. Ted Crake. Lat. 18° 00′ S.; Long. 122° 15′ E.

Paratypes: The collection of sufficient paratypes has allowed for deposit in a number of private and major public collections. Numbered paratypes will be retained in the collections cited in Table 4.

Discussion: The distinctive colors and their arrangement, together with the polished shining surface, combine to make *Duplicaria crakei* one of the most beautiful of the terebrid species. There are infrequent color variations in which the blue-purple color of the predominant form is replaced by various shades of brown, and in these a wide pale-brown color band, occasionally broken into blotches or spots, occupies the area immediately anterior to the subsutural groove and displaces about one-half of the yellow color of the predominant form. *Duplicaria crakei* is sculpturally similar to several other species but may be readily distinguished from them. It differs from *D. duplicata* (LINNAEUS, 1758) in that its crenules of the subsutural band are axially straight and sharp, while in *D.*

Table 4
Duplicaria (Duplicaria) crakei

Specimen	Collection	Locality	Collector
- Бреениен 	Concetion	Locality	Concetor
Holotype	M. C. Z. No. 251241	Broome, West Australia	T. Crake
Paratypes 1 - 5	M. C. Z. No. 251242	Broome, West Australia	T. Crake
Paratypes 6 - 8	San Diego Mus. Nat. Hist. No. 48935	Broome, West Australia	T. Crake
Paratypes 9, 10	Natal Mus., South Africa No. 1069	Broome, West Australia	T. Crake
Paratypes 11 - 13	Campbell Coll.	Broome, West Australia	T. Crake
Paratypes 14, 15	Tiedeman Coll.	Broome, West Australia	T. Crake
Paratypes 16 - 97	R. D. Burch Coll. No. 336 No. 337	Broome, West Australia	T. Crake

duplicata they are slanted or curved and have a flattened or rounded appearance. It differs from D. addita (Deshayes, 1859) in that it has a deeper, wider subsutural groove setting off a less-rounded, less-turreted subsutural band, and a smaller apical angle. The sculptural differences are more apparent from D. fictilis (Hinds, 1844), D. bicolor (Angas, 1867), and D. fuscobasis (E. A. Smith, 1877) in that D. crakei has a wide, flat subsutural band set off by the sharp, deeply-cut subsutural groove rather than the narrow, rounded subsutural band and shallow impressed subsutural groove of those species. Both D. macandrewi (E. A. Smith, 1877) and D. padangensis (Thiele, 1925) have distinct microscopic interstitial spiral striations, while the interstices between the axial ribs of D. crakei are smooth and polished.

This species is named to honor Mr. Ted Crake for having collected the shells from which the species is described and for his generous assistance in providing specimens and information relative to the terebrid fauna of the area.

The collecting for terebrid species in Western Australia has been limited to small areas, and the fauna of much of the lengthy coastline remains relatively unknown. No check lists appear to have been published for the general area, although a few limited listings have been made from certain areas along the coast. Through the generous assistance of Mr. Anthony Kalnins of Riverton, Mrs. M. Seymour of Port Hedland and Mr. Ted Crake of Broome, the following species can be recorded here from Western Australia localities:

Genus Hastula

- H. (Hastula) diversa (E. A. SMITH, 1901); Journ. Conch. vol. 10, p. 115, plt. 1, fig. 6
 Littoral, 200 miles south of Broome; R. D. Burch Coll. No. 340
- H. (Hastula) dispar (Deshayes, 1859); Proc. Zool. Soc. London, p. 284; fig.: Reeve, Conch. Icon., Terebra, plt. 25, fig. 137.
 - In fine sand at low tide, Broome. R. D. Burch Coll. No. 317.
- H (Punctoterebra) lauta (Pease, 1869); Amer. Journ.
 Conch., vol. 5, p. 66; fig.: Weaver, Hawaiian Marine Mollusks, 1960, vol. 1, no. 8.
 Littoral, Broome; R. D. Burch Coll. No. 534.
- H. (Punctoterebra) nitida (HINDS, 1844); Proc. Zool. Soc. London for 1843, p. 152; fig.: HINDS in SOWERBY, Thes. Conch., Terebra, 1844, plt. 45, fig. 103.

 In sand at low tide. Port Hedland; R. D. Burch Coll. No. 462
- H. (Punctoterebra) plumbea (Quoy & Gaimard, 1832); Voy. Astrol., Moll., p. 470, plt. 36, figs. 29,30.

Littoral; Murumba, King Sound; R. D. Burch Coll.

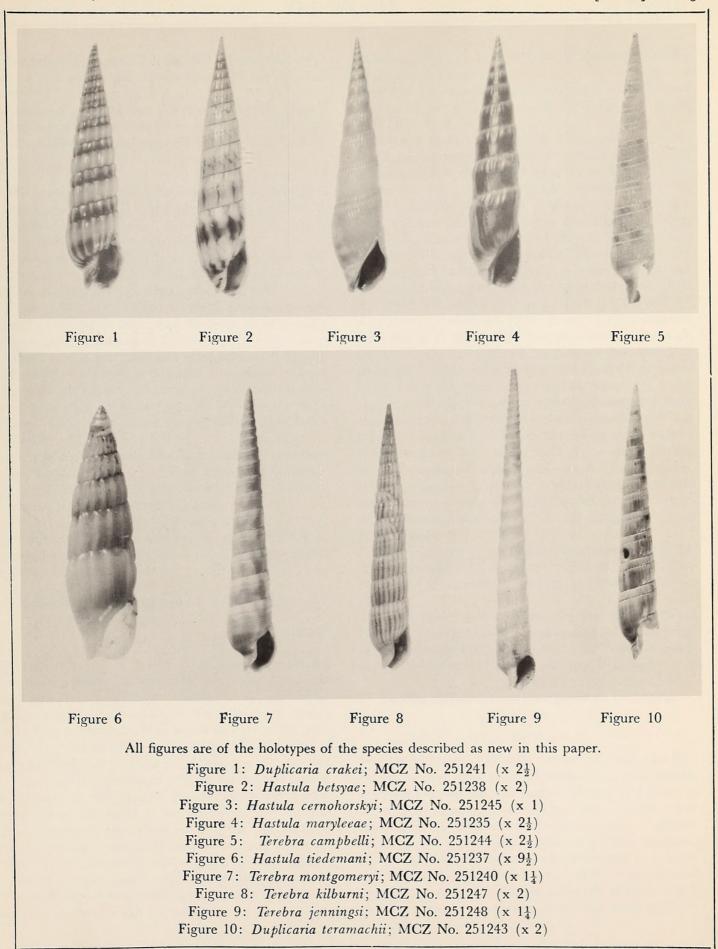
H. (Hastula) rufopunctata (E. A. SMITH, 1877); Ann. Mag. Nat. Hist., p. 229. No figure seems to have been published for this species until now. - In sand at low tide, Broome; R. D. Burch Coll. No. 314; Port Hedland; R. D. Burch Coll. No. 628.

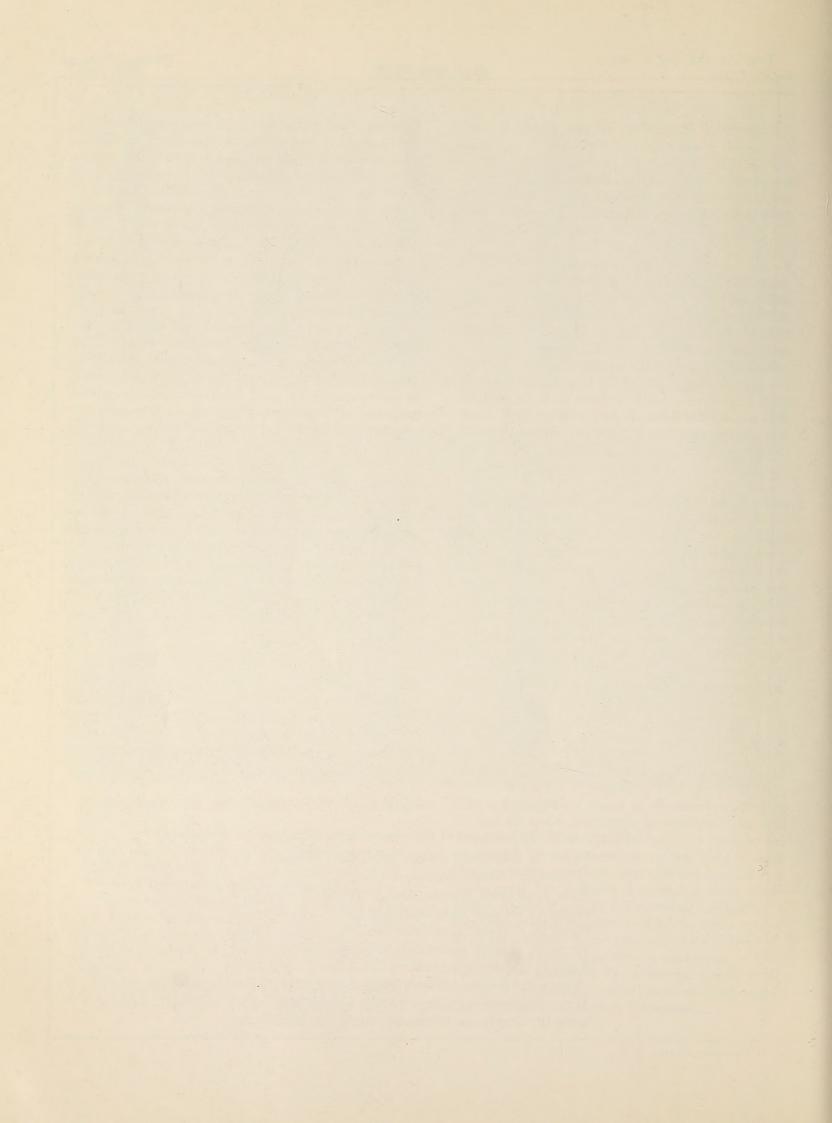
Genus Duplicaria

- D. (Duplicaria) addita (Deshayes, 1859); Proc. Zool.
 Soc. London, p. 293; fig.: Reeve, Conch. Icon., 1860,
 Terebra, plt. 19, fig. 94. Broome; R. D. Burch Coll.
 No. 338; and Port Hedland, R. D. Burch Coll. No. 476.
- D. (Duplicaria) australis (E. A. SMITH, 1873); Ann. Mag. Nat. Hist., p. 264; fig.: Hedley, Proc. Linn. Soc. New So. Wales, 1908, vol. 38, prt. 3, plt. 7, fig. 2. King Sound, R. D. Burch Coll. No. 375; Broome. R. D. Burch Coll. No. 150; Port Hedland, R. D. Burch Coll. No. 464; and Cape Leveque, R. D. Burch Coll. No. 065.
- D. (Duplicaria) duplicata (Linnaeus, 1758); Syst. Nat., Ed. 10, p. 742, no. 419; fig.: Gaultieri, Test., plt. 57, fig. N.

This species has been given a number of names which are primarily based on the many color variations and patterns, all of which are to be found among specimens collected in Western Australia. After longitudinally sectioning shells of various color and sculptural forms obtained from many areas, including eastern Africa and the Red Sea, I am unable to follow the arrangement for this species erected by Bartsch, in which the dark brown color form is given a new name, Terebra duplicatoides, and a new subgenus, Myurellisca, erected for it. (see Bartsch, Paul, 1923 - Nautilus 37 (2): 63-64). Broome, R. D. Burch Coll. No. 111; Port Hedland, R. D. Burch Coll. No. 463; and Albany, King George Sound, R. D. Burch Coll. No. 081.

D. (Duplicaria) evoluta (DESHAYES, 1859); Proc. Zool. Soc. London, p. 292; fig.: Reeve, Conch. Icon., 1860, Terebra, plt. 13, fig. 55 (non Hirase, 1917, plt. 2, fig. 11 and plt. 4, figs. 42 - 44; non Kira, 1959, plt. 70, fig. 17). This species is often found in the same localities as D. australis and is occasionally intermingled with it in the same population. There is some question as to the relationship between these two species, since in some instances both forms have been collected together in a single track. For purposes of separating these closely related species it may be noted that D. evoluta has a base color of dark gray, brown or black, with a narrow white band anterior to the periphery of the body whorl. In D. australis the basic color is solid white or light orange. The bottom of the subsutural groove of D. evoluta is finely punctate when examined under magnification, while in *D. australis* it is smooth.





Broome, R. D. Burch Coll. No. 465; a melanistic color form also occurs here infrequently, R. D. Burch Coll. No. 367.

D. (Pervicacia) ustulata (Deshayes, 1857); Journ.
 Conchyl., p. 97, plt. 3, fig. 12.
 Albany, King George Sound; R. D. Burch Coll. No. 618.

Genus Terebra

T. (Decorihastula) amoena Deshayes, 1859; Proc.Zool. Soc. London, p. 297; fig.: Reeve. Conch. Icon., 1860, Terebra, plt. 18, fig. 80.

Port Hedland, R. D. Burch Coll. No. 460.

T. (Decorihastula) picta HINDS, 1844; Proc. Zool. Soc. London for 1843, p. 156; fig.: HINDS in SOWERBY, Thes. Conch., 1844, Terebra, plt. 45, fig. 105.

The specimens from Western Australia exhibit considerable variation in color, with the large majority being melanistic. Specimens collected at Murumba, King Sound, are of the color and color pattern of Hinds' description, while those collected from more southern localities are about 95% of the melanistic color variety. King Sound, R. D. Burch Coll. No. 377; Broome, R. D. Burch Coll. No. 339; and Port Hedland, R. D. Burch Coll. No. 477.

T. (Clathroterebra) violascens Hinds, 1844; Proc. Zool. Soc. London for 1843, p. 154; fig.: Hinds in Sowerby, Thes. Conch., 1844, Terebra, plt. 45, fig. 98. Broome, R. D. Burch Coll. No. 536.

The terebrid fauna of Australia, particularly that of the area included above, seems to be unique in the high proportion of species of the genera *Duplicaria* and *Hastula* to those of the genus *Terebra*.

Duplicaria (Duplicaria) teramachii R. D. Burch, spec. nov.

(Plate 31, Figure 10)

Description: Shell of medium size with tight-wound, flat-convex whorls; basic color ivory-white, overlaid anterior to the subsutural groove with a broad, interrupted band of reddish-brown which, on the body whorl, extends to the base of the shell; body whorl anterior to the periphery encircled by a faint, narrow band of color, same as basic shell coloration; sculpture of thin, narrow, close-set, straight axial ribs contiguous with the sutures and extending weakly to the base. A narrow subsutural groove, more deeply impressed in the interstices, cuts the ribs about one-fourth the whorl width from the posterior suture, forming a subsutural band of crenules which are extensions of the axial ribs anterior to the groove; columella straight, with a single strong plication; columellar wall strongly laminated; aperture long and narrow. Length 37.0 mm; width 5.5 mm.

Holotype: Museum of Comparative **Zoology**, **Harvard** University No. 251243

Type Locality: The holotype was dredged at 70 fathoms off Tosa, in Tosa Bay, Japan, in 1962. Lat. 33° 25′ N; Long. 133° 32′ E.

Discussion: There are no species which closely resemble Duplicaria teramachii in form and sculpture although several species of the genus have a similar color or color pattern. The subsutural groove of D. teramachii is narrow, relatively shallow and more deeply cut at its juncture with the rib interstices; while in D. duplicata (LINNAEUS, 1758), D. dussumieri (KIENER, 1839), D. evoluta (DES-HAYES, 1859) and D. spectabilis (HINDS, 1844) the groove is broad and much more deeply cut; a very broad impressed groove such as that displayed by D. kirai Oyaма, 1962, D. latisulcata (Yokoyama, 1922) and D. recticostata (Yokoyama, 1920) is even farther removed from that of D. teramachii. The subsutural groove of D. albozonata (E. A. Smith, 1875) does not have the deep interstitial cut observed in D. teramachii and the subsutural band of that species is composed of slanted, wave-like crenules; with the columellar wall not laminated, a more obese form and different color pattern also distinguishing it from D. teramachii. The apical angle of D. teramachii is also narower than that of each of the above species. The color and color pattern of D. tiurensis (SCHEPMAN, 1913) are similar, but the more widely spaced axial ribs not extending beyond the periphery of the body whorl and the not-laminated columellar wall distinguish it from D. teramachii.

The evident rarity of *Duplicaria teramachii* and the depth from which it was trawled in Tosa Bay indicate that the species may justifiably be described from the unique specimen.

This species is named in honor of Mr. Akibumi Teramachi for his considerable contributions to the knowledge of the molluscan fauna of Japan and for having obtained the specimen from which the species is described.

Terebra (Strioterebrum) campbelli R. D. Burch, spec. nov.

(Plate 31, Figure 5)

Description: Shell of medium size, very slender, with flatconvex whorls; basic color yellowish-white, with moderately-sized square or rectangular blotches of brown on the subsutural band occasionally extending onto the whorl anterior to the subsutural groove and a narrow, obscure white band at the periphery of the body whorl; sculpture of low, curved, rounded axial ribs; interstices of juvenile and sub-adult whorls bisected by numerous microscopic impressed striae; striations join across ribs of adult whorls to form about seven narrow, impressed spiral grooves; axial ribs obsolete anterior to the periphery of the body whorl; a well-defined subsutural groove cuts the axial ribs about one-fourth the whorl's width from the posterior suture, creating a flat or slightly rounded subsutural band composed of straight or dextrally-slanted crenules which are occasionally microscopically striated in the interstices; whorls tightly wound, so that the subsutural band is even with, or slightly below, the sides of the adjacent whorl peripheries; columella straight, with no plications; columellar wall not laminated; siphonal canal moderately recurved. Length 25.5 mm; width 4.5 mm.

Holotype: Museum of Comparative Zoology, Harvard University No. 251244

Type Locality: The holotype and one paratype (R. D. Burch Coll. No. 510; length 30.7 mm, width 5.0 mm) were dredged in 70 fathoms off Tosa, Japan, in Tosa Bay. during 1963. ex A. Teramachi Coll. Lat. 33° 25′ N; Long. 133° 32′ E.

Discussion: Terebra campbelli resembles T. picta HINDS, 1844, except that in the latter the subsutural band is raised, giving the shell a turreted appearance, and the columella is slightly twisted, with a single moderately strong plication, while the subsutural band is level or slightly depressed in T. campbelli, with the columella straight and not plicated. The interstitial striations between the axial ribs of T. campbelli are much finer and more numerous while crossing the ribs of adult whorls, but this interstitial striation does not coalesce in T. picta. Other species which superficially resemble T. campbelli are T. columellaris HINDS, 1844, T. amoena DESHAYES, 1859, T. gotoensis E. A. SMITH, 1879, T. pertusa (BORN, 1780), T. marmorata Deshayes, 1859, and T. andamanica Melvill & Sykes, 1899, but all of these have a greater apical angle and a punctate interstitial striation that does not cut across the ribs as in T. campbelli.

This species is named in honor of G. Bruce Campbell in recognition of his generous assistance and for his contributions to the literature on the terebrid fauna of the western Americas.

In addition to the above new species, Duplicaria teramachii and Terebra campbelli, the efforts of Mr. Akibumi Teramachi have made possible the addition of the following terebrids to the lists of Japanese species compiled by Hirase, 1917, Kuroda & Habe, 1952, and Oyama, 1961. Terebra (Noditerebra) constricta Thiele, 1925: Deutsche Tiefsee Exped., Gastr., prt. 2, p. 347, plt. 30, fig. 5. [This specific name may be a homonym; see: Hinds, 1844; Proc. Zool. Soc. London for 1843, p.166, no. 116.] Dredged at 50 fathoms off Tosa, in Tosa Bay, Japan; ex A, Teramachi Coll. R. D. Burch Coll. No. 647.

Terebra (Noditerebra) pectinata (VREDENBURG, 1921); Rec. Geol. Surv. India, p. 355, plt. 10, fig. 20.

The present specimens are subfossil, with the protoconch and early whorls missing, and a heavy black deposit on the shells. The basic color appears to be solid orange, with perhaps a white peripheral band on the body whorl. - Dredged in 50 fathoms in Tosa Bay, Japan; 1962. ex A. Teramachi Coll. R. D. Burch Coll. No. 507.

Terebra (Triplostephanus) jenningsi R. D. Burch, spec. nov.

(Plate 31, Figure 9)

Description: Shell of medium size, very slender and elongated, with flat-concave whorls; basic color a bright orange throughout, with a white band encircling the whorls anterior to the sutures and including both of the two crenate subsutural bands; protoconch of two and one-half opaque white dome-like whorls; following three whorls of the teleoconch have two rows of microscopic crenules anterior to the posterior suture and one row of similarly small beads at the anterior suture, with the intervening peripheral section of the whorl being flatconcave; succeeding whorls moderately concave between the crenules for about 22 turns, becoming more flat or flat-convex on later whorls. The double row of crenules, the posterior row being larger, becomes progressively obsolete until it has the appearance of a slightly raised broad belt, which is obsoletely nodular and broken only by the wrinkled axial growth lines. Anterior row of small, less well defined beads continues strongly throughout and around the periphery of the body whorl; at about the fourteenth whorl, the concave peripheral area of the whorls becomes spirally sculptured with four or five shallow, narrow impressed grooves, which are occasionally finely-punctate within, and with curved, arcuate axial growth lines; aperture ovate and flaring, constricted at the base; columella twisted, with the siphonal canal sharply recurved. Length 76.2 mm (with about 3.0 mm broken from apex); width 8.5 mm.

Holotype: Museum of Comparative Zoology, Harvard University No. 251248

Description of animal: I am indebted to Mr. W. O. Cernohorsky for his observations which make possible this description of the animal of *Terebra jenningsi*.

Siphon simple, of a pale yellow color which becomes bright yellow towards the extremity; eye-stalks short and pointed, cream-white with the black eyes situated slightly back from the tips; sole and dorsum of foot cream-white; foot truncated anteriorly and pointedly-rounded posteriorly; operculum narrow-elongate, translucent orange-yellow in color.

Type Locality: The holotype was dredged in three to four fathoms on clean sand substrate at the inner edge of the main barrier reef, one mile to the northwest of Namotu Island, Fiji Islands, by Mr. A. Jennings. Lat. 17° 50′S; Long. 177° 25′E.

This rare species seems to be restricted to the area bounded by Longitudes 115° East and 177° East and Latitudes 18° South and 15° North. Paratypes and hypotypes will be retained in the collections cited in Table 5.

Discussion: Terebra jenningsi resembles T. triseriata GRAY, 1834, and T. cumingi Deshayes, 1857, but is readily distinguished from them. The double row of crenules forming the subsutural band of those species is highly developed into strong beads which continue throughout the growth of the shell, while in T. jenningsi the subsutural collar is nodular and less well defined and is progressively obsolete becoming a flatly-rounded, obscurely nodular belt. Both T. triseriata and T. cumingi have strong, raised axial ribs crossed by numerous small impressed spiral striae which serrate, occasionally bead or cancellate the peripheral area, while in T. jenningsi the ribs are only slightly raised or completely obsolete, the growth lines weak and dextrally arcuate, spirally encircled with about four uninterrupted rounded impressed grooves. The apical angle of T. cumingi is greater than that of T. jenningsi, while the very twisted columella and laminated columellar wall of that species are in contrast to the slightly bent columella and unlaminated columellar wall of T. jenningsi. The aperture of T. jenningsi is more flaring and lengthened, with the columella longer and less sharply bent than in T. triseriata. The whorls of T. triseriata are more numerous (in the ratio of about 3:2) than in T. jenningsi, and the highly developed subsutural and peripheral sculpture creates a more turreted and concave whorl than is formed by T. jenningsi.

The color pattern of the shell is often a helpful species-differentiating characteristic of the genus *Terebra*, though less useful in this respect with species of *Duplicaria* and *Hastula*. The basic orange color of *T. jenningsi*, with the encircling white band at the sutures continuing around the body whorl as a row of small, poorly defined white crenules at the periphery, assist in separating this species from *T. cumingi* and *T. triseriata*, both of which are basically a solid deep-amber color, with an occasional rare white or albino specimen.

This species is named in honor of Mr. A. Jennings for his generous assistance in collecting quantities of Fiji Islands specimens for study, and for having collected the specimens which first brought this species to my attention.

Terebra (Decorihastula) kilburni R. D. Burch, spec. nov.

(Plate 31, Figure 8)

Description: Shell small, with turreted, tightly-wound, flat-convex whorls, very slender in proportion to the width; basic color ivory-white, broken by a reddish-brown stain in the rib interstices which forms irregular, disconnected unevenly-sized blotches of color; ribs white or lighter color, with occasional interstices not colored; protoconch paucispiral, consisting of two and one-half conical, glassy, amber colored whorls; teleoconch sculpture of axial ribs contiguous with the sutures, with the anterior threefourths of the whorl having about four minute, pricked punctations in the interstices; posterior punctations increase in size with shell growth to form a deeply-punctate, occasionally obsolete, subsutural groove; axial ribs straight, close-set, rounded, continue to base of shell with the interstitial striae, about ten on the penultimate whorl, also extending to base; the indistinct subsutural band formed by deep punctations of the subsutural groove is occasionally microscopically striate; an obscure white band circles

Table 5
Terebra (Triplostephanus) jenningsi

Specimen	Collection	Locality	Collector
Holotype	M. C. Z. No. 251248	Natadola, Fiji Islands	A. Jennings
Paratypes 1 - 3	Jennings Coll.	Natadola, Fiji Islands	A. Jennings
Paratypes 4 - 6	Cernohorsky Coll.	Natadola, Fiji Islands	A. Jennings
Paratypes 7, 8	R. D. Burch Coll. No.034	Natadola, Fiji Islands	A. Jennings
Paratype 9	R. D. Burch Coll. No. 521	Nadi Island, Fiji Islands	A. Jennings
Paratype 10	Cernohorsky Coll.	Vatukoula, Fiji Islands	W. Cernohorsky
Hypotype 1	R. D. Burch Coll. No. 607	Malawali Island, Sabah, Malaysia	M. Saul
Hypotype 2	M. Saul Coll., No. 387 B	Malawali Island, Sabah, Malaysia	M. Saul
Hypotype 3	R. D. Burch Coll. No. 033	Batangas Bay, Philippines	ex D. Dan

the body whorl at the periphery; aperture very narrow and elongate; columella twisted, with a single plication; columellar wall moderately, translucently laminated; siphonal canal recurved. Length 32.0 mm; width 5.0 mm. Holotype: Museum of Comparative Zoology, Harvard University No. 251247

Type Locality: The holotype and 15 paratypes were collected by dredging in two to three feet off Wading Island, Fiji Islands, in July, 1962, by Mr. A. Jennings. Lat. 17°45′S; Long. 177°25′E.

Paratypes and hypotypes will be retained in the collections cited in Table 6.

Discussion: Terebra kilburni resembles several species of similar sculpture which include T. columellaris HINDS, 1844, T. undulata Gray, 1834, T. turrita (E. A. SMITH, 1873), T. fijiensis (E. A. SMITH, 1873), and T. paucistriata (E. A. Smith, 1873). Terebra kilburni is a smaller and more slender species, with more tightly wound whorls and smaller, more closely-set axial ribs than T. columellaris or T. undulata. The axial ribs of T. paucistriata and T. fijiensis are also larger and more widely spaced, and on all of the above similar species a distinct, well-formed subsutural groove separates a crenate, turreted subsutural band which does not resemble the smaller, flatter, not crenate band of T. kilburni. The axial ribs of T. turrita are sharp and widely spaced, with the interstices bluntly grooved and the whorls very turreted, while in T. kilburni the close-set, rounded ribs possess interstitial shallow, narrow grooves.

The color pattern of each of the above species is different from that of *Terebra kilburni*. The basic dark yellow color of *T. paucistriata* is broken by a relatively broad band of white which covers the subsutural crenules

and a portion of the whorl anterior to them; the periphery of the body whorl has an obscure white band. The color and color pattern of *T. fijiensis* are similar to that of *T. paucistriata*, but sculptural differences exist between the two species. The basic white color of *T. columellaris* is obscured by brown or orange predominant on the adult whorls so that only an occasional white rib is visible, with more of the white color visible in the crenules of the subsutural band and a distinct peripheral band of white at the body whorl. The interstices of *T. turrita* rib sculpture are colored with brown in the same manner as *T. kilburni*, but the great sculptural differences distinguish these two species very readily.

This species is named in honor of Mr. R. N. Kilburn for his patient assistance and advice on the identification and synonymy of this and numerous other terebrid species.

Terebra (Dimidacus) montgomeryi R. D. Burch, spec. nov.

(Plate 31, Figure 7)

Description: Shell of medium size, moderately subulate, with turreted, flat whorls; basic color white, with flammules of a deep orange color on the early whorls coalescing to form large blotches of color on the adult whorls; the orange flammules are very concave on the posterior portion of the whorls, with the points thus formed extending to the suture and forming an irregular series of relatively large white spots on the subsutural band; axial sculpture composed only of flexuous, microscopic growth lines; subsutural groove shallow and finely punctate at the bottom, setting off a subsutural band that is slightly

Table 6
Terebra (Decorihastula) kilburni

Specimen	Collection	Locality	Collector
Holotype	M. C. Z. No. 251247	Wading Island, Fiji Islands	A. Jennings
Paratypes 1 - 5	Jennings Coll.	Wading Island, Fiji Islands	A. Jennings
Paratypes 6, 7	Natal Mus., South Africa		
	No. 1070	Wading Island, Fiji Islands	A. Jennings
Paratypes 8 - 10	R. D. Burch Coll. No. 366	Wading Island, Fiji Islands	A. Jennings
Paratypes 11 - 14	Cernohorsky Coll.	Wading Island, Fiji Islands	A. Jennings
Paratype 15	R. D. Burch Coll. No. 649	Lomalagi, Fiji Islands	W. Cernohorsky
Paratypes 16 - 18	Cernohorsky Coll.	Lomalagi, Fiji Islands	W. Cernohorsky
Hypotypes 1, 2	M. C. Z. No. 251246	Madang, New Guinea	I. Pert
Hypotypes 3 - 10	R. D. Burch Coll. No. 302	Madang, New Guinea	I. Pert
Hypotype 11	R. D. Burch Coll. No. 479	Thursday Island, Queensland Australia	ex W. Eyerdam

crenate in the teleoconch whorls; progressively obsolete with growth until the band is flattened and broken only by the minute growth lines; anterior to the subsutural groove are four or five rows of unconnected microscopic punctations which give the appearance of spiral striae, with additional obsolete rows anterior to the periphery of the body whorl; aperture narrow-ovate, light-orange within; columella white, moderately twisted, with a single plication; siphonal canal recurved and bounded by a strong cord. Length 57.0 mm; width 10.0 mm.

Holotype: Museum of Comparative Zoology, Harvard University No. 251240

Type Locality: The holotype was collected in fine sand at four feet, inside the reef of Piti Bay, off Piti, Guam, Mariana Islands. Lat. 13° 27′N; Long. 144° 43′E.

Only the holotype and a single hypotype of *Terebra montgomeryi* are known to me. Hypotype no. 1 was collected off Natadola Island, Fiji Islands, in 1963, by Mr. A. Jennings and is in the Jennings Collection. Length 50.3 mm; width 8.7 mm.

Discussion: Terebra montgomeryi resembles T. cingulifera LAMARCK, 1822, except that the latter species has a basic color of plain yellowish-white or pinkish-white, with a spiral sculpture of four or five continuous indistinct grooves which are occasionally punctate within, while the whorls of T. montgomeryi are not grooved and the punctations are on the shell surface and not connected. The basic color of T. pallida Deshayes, 1857, is a plain dark orange-red, with a series of about six narrow spiral grooves, not punctate within, on the penultimate whorl and a laminated columellar wall, while the columellar wall of T. montgomeryi is not laminated.

This species is named to honor Mr. Tom Montgomery for collecting and donating the holotype, and for his assistance with specimens of terebrids of Guam.

The limited reference literature for Fijian terebrids seems presently confined to CATE & BURCH, 1964. Collecting done subsequently to the publication of that paper, at Fiji by Mr. A. Jennings and Mr. W. O. Cernohorsky, and at Madang, New Guinea by Mrs. Isobel Pert, has resulted in a number of additions to that list, which are included here.

Duplicaria concolor (E. A. SMITH, 1873): Ann. Mag. Nat. Hist., vol. 11, p. 265; unfigured. - This is the D. australis (E. A. SMITH, 1873) of CATE & BURCH, 1964. The variability often exhibited by Fijian species

and the similarity of *D. australis* and *D. concolor* led to the error in identification of the Fiji specimen cited. Jennings Collection.

Duplicaria raphanula (Lamarck, 1822): Anim. s. Vert. vol. 7, p. 288, no. 16; fig.: Kiener, Icon. Coq. Viv., 1839, plt. 10, fig. 20. - Fiji Islands. Cernohorsky Collection.

Hastula castaneofusca (THIELE, 1925): Deutsche Tiefsee Exped., Gastr., prt. 2, p. 345, plt. 29, fig. 21. Madang, New Guinea. R. D. Burch Collection.

Hastula cernohorskyi R. D. Burch, 1965.

Hastula exacuminata SACCO, 1891: I moll. terr. terz. Piem. Lig., Terebra, p. 18, fig.: Reeve, 1860, Conch. Icon., Terebra, plt. 26, fig. 143. - Madang, New Guinea. R. D. Burch Collection.

Hastula plumbea (Quoy & Gaimard, 1832): Voy. Astrol.,
 Moll., p. 470, plt. 36, fig. 29. - Fiji Islands. Cernohorsky Collection; Jennings Collection.

Hastula stylata (Hinds, 1844): Proc. Zool. Soc. London for 1843, p. 152; fig.: Hinds in Sowerby, Thes. Conch., Terebra, plt. 44, fig. 79; 1844.
Fiji Islands. Cernohorsky Collection.

Terebra chlorata Lamarck, 1822: Anim. s. Vert., vol. 7, p. 288. no. 14; fig.: Kiener, 1839, Icon. Coq. Viv., plt. 4, figs. 8, 8 a. - Madang, New Guinea. R. D. Burch Collection.

Terebra fijiensis (E. A. SMITH, 1873): Ann. Mag. Nat. Hist., p. 266; unfigured. - Fiji Islands. Cernohorsky Collection; Jennings Collection. Madang, New Guinea. R. D. Burch Collection.

Terebra flavofasciata Pilsbry, 1921: Proc. Acad. Nat. Sci. Philadelphia, vol. 69, p. 306, plt. 12, fig. 3. Madang, New Guinea. R. D. Burch Collection.

Terebra jenningsi R. D. Burch, 1965.

Terebra kilburni R. D. Burch, 1965.

Terebra marmorata Deshayes, 1859: Proc. Zool. Soc. London, p. 279; fig.: Reeve, 1860; Conch. Icon., Terebra, plt. 19, figs. 91 a, b. - Fiji Islands. Cernohorsky Collection.

Terebra montgomeryi R. D. Burch, 1965.

Terebra pallida Deshayes, 1857: Journ. Conchyl., p. 87, plt. 4, fig. 3. - Fiji Islands. Cernohorsky Collection; Jennings Collection; R. D. Burch Collection.

Terebra triseriata Gray, 1834: Proc. Zool. Soc. London, p. 62; fig.: Reeve, 1860, Conch. Icon. Terebra, plt. 13, figs. 52 a, b. - Fiji Islands. Cernohorsky Collection. Madang, New Guinea. R. D. Burch Collection.



Burch, R. D. 1965. "New terebrid species from the Indo-Pacific Ocean and from the Gulf of Mexico, with new locality records and provisional lists of species collected in western Australia and at Sabah, Malaysia (Mollusca: Gastropoda)." *The veliger* 7, 241–253.

View This Item Online: https://www.biodiversitylibrary.org/item/134249

Permalink: https://www.biodiversitylibrary.org/partpdf/93957

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder.

Rights Holder: California Malacozoological Society

License: http://creativecommons.org/licenses/by-nc-sa/3.0/ Rights: https://www.biodiversitylibrary.org/permissions/

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at https://www.biodiversitylibrary.org.