

STUDIES ON THE FAUNA OF CURAÇAO AND OTHER
CARIBBEAN ISLANDS: No. 63.

SHALLOW WATER HOLOTHURIANS KNOWN FROM
THE CARIBBEAN WATERS

by

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The most important contribution to our knowledge about the holothurian fauna of the islands along the coast of northern South America is ENGEL's brief report of 1939, based on Dr. WAGENAAR HUMMELINCK and earlier workers collections, up to the year 1936. His list comprises 13 species, of which all except *Pentacta pygmaea* (Théel) are included in HUMMELINCK's recent collections, which furthermore adds four more species. This expanded list is almost identical with that which recently has been compiled for the Puerto Rican waters, and with the inclusion of a few more species known from Surinam, Trinidad and Jamaica, etc., it looks as if now one has a fairly complete list of all the shallow water holothurians which occur in the Caribbean region.

After the identification of HUMMELINCK's new material had been completed, Mr. ELISHA S. TIKASINGH (1963) has produced a more extensive report on 'The shallow water Holothurians of Curaçao, Aruba and Bonaire', which will be of much help to the students of holothurians in the southern part of the Caribbean.

For the benefit of the workers in the biological stations along the shores of the Caribbean an annotated key is given of all these species, in addition to a brief list of the species collected, with their localities and general distribution.

TABLE 11.

GEOGRAPHICAL DISTRIBUTION OF CARIBBEAN SHALLOW WATER HOLOTHURIA.

	Greater Antilles				Lesser Antilles							Leeward Group				Windward Group				Lesser Antilles				Leeward Group				Windward Group			
	Cuba	Jamaica	Hispaniola	Puerto Rico	Virgin Islands	Anguilla	St. Martin	St. Eustatius	St. Kitts	Barbuda	Antigua	Isote Aves	Grenada	Barbados	Tobago	Trinidad	Margarita	Bonaire	Klein Bonaire	Curacao	Aruba	Colombia (mainland)	Venezuela (mainland)	Guyana	Brazil	Africa, W.					
* according to HUMMELINCK's recent collections																															
x additional data from ENCEY, 1939																															
+ additional data from TRASKIN, 1962																															
— additional data from other sources																															
1. <i>Isostichopus badionotus</i>																															
2. <i>Asiochopus multifidus</i>																															
3. <i>Actinopyga agassizii</i>																															
4. <i>Fossilohuria cubana</i>																															
5. <i>Selenkohuria glaberrima</i>																															
6. <i>Ludivigohuria mexicana</i>																															
7. — <i>floridana</i>																															
8. — <i>grisea</i>																															
9. <i>Microthale parvula</i>																															
10. <i>Brandohuria arenicola</i>																															
11. — <i>impatiens</i>																															
12. <i>Semperohuria surinamensis</i>																															
13. <i>Pentactia pygmaea</i>																															
14. <i>Parakhyone surinamensis</i>																															
15. — <i>suspecta</i>																															
16. <i>Thyoneria cognata</i>																															
17. <i>Thyonopsis brasiliensis</i>																															
18. <i>Lipotrepeza seguroniensis</i>																															
19. <i>Trachythyridium occidentale</i>																															
20. <i>Neophyllophorus trius</i>																															
21. <i>Chiridota rosifera</i>																															
22. — <i>peloria</i>																															
23. <i>Euaipia lappa</i>																															
24. <i>Synaptula hydriformis</i>																															

LIST OF HOLOTHURIANS RECENTLY COLLECTED BY
DR. P. WAGENAAR HUMMELINCK IN THE WEST INDIES

Localities indicated by station numbers; approx. depth in metres;
length in centimetres.

Aruba

- 1004 LAGOEN BOEKOETI (Lagoon of Bucuti), 29.XII.1948; sandy mud with Thalassia, about $\frac{1}{2}$ m.
Ludwigothuria floridana — 8 specimens, 10–15 cm.
- 1006a BOEKOETI (Bucuti reef), 17.I.1949; reef debris with muddy sand, some Thalassia, tidal zone with small pools.
Ludwigothuria floridana — 16 spec., 4–11 cm.
Brandtothuria impatiens — 1 spec., 7.5 cm.
- 1006b Boekoeti, 6.V.1955; Porites reef debris, tidal zone with small pools.
Ludwigothuria floridana — 21 spec., 5–12 cm.
Microthele parvula — 2 spec.
Brandtothuria impatiens — 1 spec.
Semperothuria surinamensis — 2 spec.
- 1301 MALMOK, Arashi, 14.VIII.1955; sandy shore with rock, Thalassia, $\frac{1}{2}$ –1 $\frac{1}{2}$ m.
Ludwigothuria floridana — 3 spec., 4–14 cm.
Microthele parvula — 1 spec.
Brandtothuria impatiens — 1 spec.
- 1303 PAARDENBAAI Rif, 28.IV.1955; sandy reef debris, near Rhizophora, $\frac{1}{2}$ m.
Ludwigothuria floridana — 2 spec.
- Collected by Dr. J. STOCK: Paardenbaai, lagoon near Caribe Club, 12.I.1959, 10 cm deep, *Ludwigothuria mexicana*, 1 spec.

Curaçao

- 1038a FUIK BAAI, Duitse Bad, 17.IV.1949; muddy lagoon with some Thalassia, near Rhizophora, about $\frac{1}{2}$ –1 m.
Fossothuria cubana — 1 spec.
Microthele parvula — 3 spec., about 3.5 cm.
Brandtothuria impatiens — 1 spec.
Semperothuria surinamensis — 5 spec.
- 1317 PLAYA FRANKI, Spaanse Put, 27.II.1955; sandy shore with some rock debris, about $\frac{1}{2}$ m.
Selenkothuria glaberrima — 1 spec., 5 cm.
Ludwigothuria grisea — 1 spec.
Microthele parvula — 9 spec., 1–3 cm.
Brandtothuria arenicola — 2 spec.
Brandtothuria impatiens — 1 spec.

- (1342) SPAANSE WATER, near Brakke Put Ariba peninsula, 19.XII.1954; enclosed bay with *Thalassia*, near *Rhizophora* (J. S. Zaneveld).
Isostichopus badionotus — 1 spec., 22 cm; leopard spotted, ventrum dark with two white bands; spicules poor.
Fossothuria cubana — 1 spec., 3 cm.
Ludwigothuria mexicana — 3 spec., 19, 20 and 26 cm; ventrum lighter here and there.
- 1324 Cape near SANTA MARTA BAAI, 24.II.1955; under limestone boulders.
Selenkothuria glaberrima — 1 spec., 15 cm.
- 1354 St. JORIS BAAI, near entrance, 20.II.1955; among scanty *Thalassia* near rocky shore, about 1 m.
Ludwigothuria grisea — 1 spec., 6 cm; contracted grey with pale warts.
- 1325 St. JAN, lagoon, 6.III.1955; narrow lagoon with muddy sand, with *Halimeda* and poor *Thalassia*, near *Rhizophora*.
Semperothuria surinamensis — 1 spec.
- Collected by Dr. J. STROCK: Piscadera Baai, 10.XI.1958, sand, about 2½ m, *Ludwigothuria mexicana*. Fuik Baai, 23.X.1958, sand, 2 m, *L. mexicana*; 3.XII.1958, in sand, 3 m, *Fossothuria cubana*; 10.XII.1958, sand, 3 m, *L. mexicana*.

Klein Bonaire

- 1049A-B EAST COAST at landing, 13.IX.1948; reef debris on sandy beach, 1 m.
Ludwigothuria grisea — 1 spec., 2 cm.
Chiridota rotifera — 1 spec.
- 1367 WEST COAST, 28.III.1955; among beach rock, ½ m.
Chiridota rotifera — 1 spec., 4 cm.
- 1371 NORTHEAST COAST, 13.IV.1955; shallow flat of limestone with fissures filled with sand; ¼–½ m.
Brandtothuria arenicola — 2 spec., 10 cm, mottled; 6 cm, black speckled, feet unusually well expanded, resembling the 'rathbuni' of H. L. CLARK.
Selenkothuria glaberrima — 4 spec.

Bonaire

- 1056 PLAYA LECHI (Paloe Lechi), 4.IX.1948; among beach rock, ¼ m.
Selenkothuria glaberrima — 3 cm.
- 1056Ba Playa Lechi, 27.II.1949; beach rock debris, ¾ m.
Ludwigothuria grisea — 4 cm, typically mottled.
- 1056Ca Playa Lechi, 30.VIII.1948; sandy reef, 1½ m.
Isostichopus badionotus — 12 cm, finely grey-mottled.

- 1059 North of PUNT VIERKANT, 9.IX.1948; rocky shore with sandy debris, high tide zone.
Selenkothuria glaberrima — 8 cm, tendency to spines on edge of rods.
- 1064c LAC, Poejito, 17.IV.1955; on Rhizophora in muddy lagoon with Thalassia, $\frac{1}{2}$ m.
Synaptula hydriformis — several spec.
- 1067 LAC, near Cay, 17.IX.1948; sand flat with Thalassia, $1\frac{1}{2}$ m.
Brandtothuria arenicola — 3 cm, grey, dull spots.
- 1373 LAC, Soerebon, 17.IV.1955; sandy lagoon, near Rhizophora, $\frac{1}{2}$ m.
Ludwigothuria mexicana — 6 cm contracted, dark, with pale ventrum; 33 cm, dark.
- 1373A LAC, Soerebon, 17.IV.1955; reef flat, $\frac{1}{2}$ m.
Chiridota rotifera — several spec.
- 1375 BOCA WASHIKEMBA, 7.IV.1955; beach rock pools in surf, $\frac{1}{2}$ m.
Selenkothuria glaberrima — 2 spec.
- 1376 LAGOEN, 2.IV.1955; surf swept coarse rock debris.
Selenkothuria glaberrima — 2 spec.
- 1071A BOCA ONIMA, 19.IX.1948; rocky beach in surf, $\frac{1}{2}$ m.
Selenkothuria glaberrima — 4 spec., 5–10 cm.

Collected by Dr. J. STOCK: Southwest coast, 28.XII.1958, in rock pools, *Ludwigothuria grisea*, 2 spec., dark brown, ventral side often somewhat red, covered with sand.

Grenada

- 1389 WHITE BAY, Point Saline, 26.I.1955; among coarse rock debris in open bay; $\frac{1}{2}$ –1 m.
Ludwigothuria grisea — 3 spec., 4–8 cm.
Brandtothuria arenicola — 2 spec., 3–4 cm.
Parathyone suspecta — 7 cm, few spicules.
Trachythyonidium occidentale — 1 spec.

Islote Aves

- 1114 NORTHERN LAGOON of Aves Island (W of Dominica), 12.V.1949; beach rock debris in open lagoon, $\frac{1}{2}$ m.
Synaptula hydriformis — many spec., $\frac{1}{2}$ – $1\frac{1}{2}$ cm.

Barbuda

- 1394 MARTELLO TOWER beach, 8.VII.1955; protected sandy shore with coarse rock debris, $\frac{1}{2}$ –1 m.
Synaptula hydriformis — 1 cm, 4/5 digits and terminal, large black spots on tentacles.

- 1396 GREAT LAGOON, S of Codrington Village, 4. VII.1955; sandy shore of lagoon with scanty Rhizophora and Thalassia, $\frac{1}{2}$ -1 m.
Synaptula hydriformis — several spec., $\frac{1}{2}$ -2 cm, dark.
- St. Kitts
- 1398 W. of Basseterre, 30.VI.1955; among coarse rock debris in open bay; $\frac{1}{2}$ -1 m.
Parathyone suspecta — 1 spec.
- St. Eustatius
- 1116B GALLOWES BAY, near Oranjestad, 15.VII.1949; open bay with coarse rock debris; $1\frac{1}{2}$ m.
Brandtothuria impatiens — 2 $\frac{1}{2}$ cm, smallest I have seen.
- St. Martin
- 1126 GREAT BAY, E. shore, 11.VI.1949; rocky beach with tide pools, scattered Thalassia, tidal zone.
Ludwigothuria grisea — 2 spec.
Microthele parvula — 18 spec., 1-4 cm.
Brandtothuria arenicola — 2 spec.
Parathyone suspecta — 1 spec.
Neophyllophorus tritus — few spec.
- 1127 GREAT BAY, NE. shore, 16.V.1949; rocky beach with muddy sand, Thalassia, $\frac{1}{2}$ m.
Microthele parvula — 10 spec., 1 $\frac{3}{4}$ -4 cm.
- 1128 GREAT BAY, NE. shore, 16.V.1949; sand beach, tidal zone.
Ludwigothuria mexicana — 2 spec., 16 $\frac{1}{2}$ and 29 $\frac{1}{2}$ cm.
- 1128B Great Bay, NE. shore, 26.VI.1949; sand beach with detached weeds, 1 m.
Ludwigothuria mexicana — 15 cm, coal black.
- 1130 SIMSON BAY LAGOON, outlet, 27.V.1949; tidal flow of enclosed mangrove lagoon, 1-1 $\frac{1}{2}$ m.
Ludwigothuria mexicana — 4 spec., 6-11 cm.
- 1131 SIMSON BAY LAGOON, Little Key, 2.VIII.1949; muddy sand with some Thalassia and Bathophora, near Rhizophora, $\frac{1}{2}$ -1 m.
Ludwigothuria mexicana — 2 spec., 12 and 17 cm.
Semperothuria surinamensis.
- 1132 SIMSON BAY LAGOON, Flamingo Pond, 8.VI.1949; with Rhizophora and Bathophora, in muddy lagoon, $\frac{1}{2}$ -1 m.
Synaptula hydriformis — several, 2-3 cm, greyish green and reddish; young specimens, 2-6 mm in length, probably belonging to same species.

Anguilla

- 1142 North of SANDY GROUND, 19.VI.1949; sandy reef debris, $\frac{1}{4}$ -1 m.
Microthele parvula — 14 spec., 3-6 cm.
Brandtothuria arenicola — 1 spec.

St. Croix

- 1405 KRAUSSE LAGOON, entrance, 15.VI.1955; on and near Rhizophora in
 1406 sandy lagoon, $\frac{1}{4}$ -1 m.
Synaptula hydriformis — numerous in both localities, resembling the
 typical form, some (formaline specimens) lacking spicules.

St. John

- 1407 TURNER BAY, 13.VI.1955; rocky beach with boulders in open bay, about
 $\frac{1}{2}$ m.
Neophyllophorus tritus — 2 cm, dark.

Bimini

- 1151 NORTH BIMINI (Bahamas), Laboratory Dock, 20.VII.1949; sandy mud
 with Thalassia, $\frac{1}{2}$ -1 m.
Euapta lappa — 2 large individuals, 33 and 35 cm long.

DISTRIBUTION OF SHALLOW WATER HOLOTHURIANS KNOWN FROM
 THE CARIBBEAN WATERS
 especially with reference to the Netherlands Antilles (cf. Table 11)

1 **Isostichopus badionotus** (Selenka)

H. L. CLARK, 1933, p. 109. — ENGEL 1939, p. 6, 11 (Curaçao, Bonaire). — FONTAINE 1953, p. 31. — TIKASINGH 1963, p. 84 (Curaçao).

Known from most of the West Indian waters, including Bermuda, also tropical West Africa. It is one of the largest species in the region, and known under various names, based on the many color variations which exist, and which all have been withdrawn, as well as CLARK's *macroparenthesis*, a juvenile stage in which exceptionally large C-shaped spicules occur.

Curaçao (St. Kruis Baai, Caracas Baai, Spaanse Water, Fuik Baai) and Bonaire (Playa Lechi); cf. TIKASINGH's Table.

2 **Astichopus multifidus** (Sluiter)

H. L. CLARK 1933, p. 110. — FONTAINE 1953, p. 31.

Few specimens are known of this huge form, originally described (1910) from S.W. Channel of Tortugas, later sent in to the M.C.Z. from the shrimp grounds in the Gulf of Mexico by HILDEBRAND. Actually the species was collected in 1897 from shallow water in Jamaica, 2-5 feet depth on 'grassy' bottom, but it was not realized then that it was a new species. Normally the species lives in deeper water and H. L. CLARK's suggestion that it only accidentally wanders into more shoal water is probably correct. It has not been collected in Jamaica by any collector since 1909 when H. L. CLARK found one small individual near Port Antonio.

3 **Actionopyga agassizii** (Selenka)

H. L. CLARK 1933, p. 108. — FONTAINE 1953, p. 30, text fig.

This large species is common in the Bahamas and Jamaica and Haiti, with a single record from Bermuda. It has not been taken in the Virgin Islands, nor in Puerto Rico, and as far as I am aware there are no records from any locality along the north coast of South America.

4 **Fossothuria cubana** (Ludwig)

H. L. CLARK 1933, p. 100. — ENGEL 1939, p. 6 (Curaçao). — ? FONTAINE 1953, p. 30, listed as *pseudofossor*. — TIKASINGH 1963, p. 86 (Curaçao).

Lives hidden in mangrove mud. FONTAINE lists it (as *pseudofossor*?) from Montego Bay but 'nowhere else' in Jamaica; it is common in 'Phosphorescent Bay', near Parguera on the south coast of Puerto Rico.

Curaçao (Spaanse Water), Fuik Baai; cf. TIKASINGH's Table.

5 **Selenkothuria glaberrima** (Selenka)

H. L. CLARK 1933, p. 104. — ENGEL 1939, p. 6, 11 (Curaçao, Aruba). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 89 (Curaçao).

This form, often more than 15 cm long, is common under rocks in the surf zone in many localities in the West Indies, but not listed from Bermuda or the Gulf of Mexico. In Puerto Rico it is known from the north as well as the south coast. CLARK and FONTAINE both list it from Jamaica.

Curaçao (Playa Frankie, Santa Marta Baai, Piscadera Baai, Caracas Baai, Boca Labadera), Aruba (Punta Braboe, Boca Prins), Bonaire (Playa Lechi, Punt Vierkant, Boca Washikemba, Lagoen) and Klein Bonaire; cf. TIKASINGH's Table.

6 **Ludwigothuria mexicana** (Ludwig)

H. L. CLARK 1933, p. 107. — ENGEL 1939, p. 6, 11 (Curaçao, Bonaire). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 93 (Curaçao, Bonaire).

This large form, 45 cm long, is often wrongly identified as *Isostichopus badionotus*, but the retractile ventral feet which are arranged without order makes it easy to recognize it in the field. It is an excellent laboratory animal, very hardy and the early stages have been studied by EDWARDS in the Bahamas (under the name of *H. floridana*). Its exact distribution cannot be given at the present moment as it often has been lumped together with *floridana*, a smaller form with more primitive spicules. It is common in Jamaica as well as along the south coast of Puerto Rico, especially on 'grassy' spots.

Curaçao (Piscadera Baai, Spaanse Water, Fuik Baai, Awa di Oostpunt) and Bonaire (Lac); cf. TIKASINGH's Table. — St. Martin (Great Bay, Simson Bay).

7 *Ludwigothuria floridana* (Pourtalès)

H. L. CLARK 1933, p. 107. — ENGEL 1939, p. 6, 11 (Aruba). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 94 (Aruba).

This smaller species, which rarely reaches a length of more than 15 cm, is common in Florida, where *mexicana* is almost totally lacking and it has been found in one sheltered mangrove bay, in the Bahamas, where *mexicana* dominates in the open areas. The records from Swan Island and Colón, Panamá, may be correct but need confirmation as also its occurrence in Jamaica, as no material was available from these localities. FONTAINE speaks of this 'excessively large' species found on grassy bottom behind the reefs, which makes one suspect color varieties of *mexicana*.

Aruba (Punta Braboe, Bucuti Reef, lagoon near Oranjestad); cf. TIKASINGH's Table.

8 *Ludwigothuria grisea* (Selenka)

H. L. CLARK 1933, p. 105. — ENGEL 1939, p. 6 (Curaçao). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 91 (Curaçao).

The species ranges from the coast of Brazil, near Rio de Janeiro, to the West Indies. It is not known from Bermuda but it has been collected on the islands off Tropical West Africa. In Puerto Rico it is known from the south coast, and it is common in Jamaica where FONTAINE noticed that the mature specimens live in the open on the flats, while the young ones hide under rocks and among corals, as I have also observed in Puerto Rico. It seems to range along the entire North coast of South America to Colón, Panamá. ENGEL reports it from Colombia. HUMMELINCK lists the species from Curaçao, Klein Bonaire, Bonaire, Grenada and St. Martin.

Curaçao (Playa Frankie, Santa Marta Baai, Sint Jan Baai), Bonaire (Playa Lechi, near Zuidpunt) and Klein Bonaire; cf. TIKASINGH's Table. — St. Martin (Great Bay).

9

Microthele parvula (Selenka)

H. L. CLARK 1933, p. 103. — ENGEL 1939, p. 11 (St. Martin). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 87 (Curaçao).

This small, golden-brown species, which often divides by transversal fission, occurs under flat rocks all over the West Indies, including Bermuda. It is not uncommon on the south shore of Puerto Rico and FONTAINE lists it from Jamaica. The species was found by HUMMELINCK on Aruba, Curaçao, St. Martin and Anguilla.

Curaçao (Playa Frankie, Santa Marta Baai, Fuik Baai, Awa di Oostpunt); cf. TIKASINGH's Table. — St. Martin (Great Bay).

10

Brandtothuria arenicola (Semper)

H. L. CLARK 1933, p. 102. — ENGEL 1939, p. 6, 10 (Curaçao). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 88 (Curaçao).

An almost circumtropical species which in the western Atlantic ranges from Brazil to Bermuda, but frequently is overlooked because of its burrowing habits. In Bermuda it frequently reaches a length of 20–25 cm when alive, but so far I have only found small individuals, up to 10 cm long, in Puerto Rico. CLARK and FONTAINE report it as common in Jamaica. HUMMELINCK found the species in Curaçao, Aruba, Bonaire, Klein Bonaire, Grenada, St. Martin and Anguilla.

Curaçao (Playa Frankie, Porto Marie Baai, Caracas Baai, Spaanse Water), Aruba (Palm Beach, Reef Bucuti), Bonaire (Lac) and Klein Bonaire; cf. TIKASINGH's Table. — St. Martin (Great Bay).

11

Brandtothuria impatiens (Forskål)

H. L. CLARK 1933, p. 102. — ENGEL 1939, p. 6, 10 (Curaçao, Bonaire, St. Martin). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 89 (Curaçao).

Another almost circumtropical species which in the western Atlantic ranges from the West Indies to Bermuda. It is usually found hidden among rocks and corals a little below the depth which is comfortably reached with ordinary shore collecting. It is known from Puerto Rico and Jamaica, but not common. HUMMELINCK collected it on Curaçao, Aruba, Bonaire, St. Eustatius and St. Martin.

Curaçao (Playa Frankie, Santa Marta Baai, Fuik Baai, Awa di Oostpunt, Boca Grandi), Aruba (Malmok, Bucuti reef), Bonaire (Lac); cf. TIKASINGH's Table. — St. Eustatius (Gallows Bay), St. Martin (Great Bay).

12

Semperothuria surinamensis (Ludwig)

H. L. CLARK 1933, p. 105. — ENGEL 1939, p. 6, 11 (Curaçao, Aruba). — FONTAINE 1953, p. 30. — TIKASINGH 1963, p. 91 (Curaçao).

The species ranges from Brazil to Bermuda but so far it has not been listed from

the Bahamas, nor from the Gulf of Mexico. It is often found in tufts of algae or among *Porites*, with the larger individuals hiding in sand and mud. In Bermuda CROZIER has observed that the species divides by transversal fission. H. L. CLARK reports it from many localities in Puerto Rico, it is not uncommon near Parguera, and FONTAINE reports it from Jamaica.

Curaçao (Santa Marta Baai, St. Jan lagoon, Spaanse Water, Fuik Baai), Aruba (Punta Braboe, Bucuti reef); cf. TIKASINGH's Table. — St. Martin (Simson Bay lagoon).

13 **Pentacta pygmaea** (Théel)

H. L. CLARK 1933, p. 116. — ENGEL 1939, p. 6, 11.

The species was originally described from shallow water near Bahia, Brazil; later it was found to be common around Florida. It has also been collected north of Puerto Rico (A. H. CLARK 1939); I have found it on the north coast of Trinidad in 1937 (unpublished), and ENGEL lists a specimen which was collected by HUMMELINCK on Margarita Island, Venezuela.

14 **Parathyone surinamensis** (Semper)

H. L. CLARK 1933, p. 116. — ENGEL 1939, p. 6, 11. — FONTAINE 1953, p. 31.

Reported from Surinam, Colombia (Río Hacha, ENGEL), Barbados, St. Thomas, Puerto Rico, Jamaica (CLARK and FONTAINE), and Bermuda.

15 **Parathyone suspecta** (Ludwig)

H. L. CLARK 1933, p. 115. — FONTAINE 1953, p. 31.

The type locality was Barbados, and CLARK lists the species as ranging from Brazil to Colombia. It is therefore surprising that Dr. HUMMELINCK reports it only from Grenada, St. Kitts and St. Martin, but not from any locality along the shore of the northern coast of South America, nor does ENGEL report it. It is listed by CLARK and FONTAINE from Port Antonio, Jamaica, but so far no specimens of this dark, soft-skinned form have been reported from the Puerto Rican waters.

St. Martin (Great Bay).

16 **Thyoneria cognata** (Lampert)

H. L. CLARK 1933, p. 115. — DEICHMANN 1954, p. 398 (Genus *Thyoneria* established with *cognata* as the type). — TIKASINGH 1963, p. 97 (Aruba).

A fairly delicate spindle-shaped form with 10 equal tentacles and delicate feet scattered all over the body and also in double rows along the radii. Calcareous ring

tubular with distinct tails. Spicules unlike any other type known from the West Indies, as elongate plates with two rows of holes and smaller button-like plates with up to 4 holes. The species was originally described from Cuba and from Brazil, and has later been taken around Florida and Yucatán. Recently TIKASINGH has reported it from Aruba, and it may possibly belong to the entire Caribbean region. It lives hidden in sandy mud among eelgrass roots.

Aruba (Malmok).

17 **Thyonepsolus braziliensis** (Théel)

H. L. CLARK 1933, p. 117.

The 3.2 cm long type was collected at Porto Seguro, Brazil, and later a large number of small individuals, few mm long, were taken by H. L. CLARK, at Buccoo Reef, Tobago — an indication that the eggs possibly are carried on the mothers back, as is the case in the type species of *T. nutriens* H. L. Clark from California. The discovery of a third species, *T. beebei* Deichmann, from the Panamic waters, has made the distribution of the genus less lop-sided, and one would be inclined to think that this Atlantic species must extend its range into the Caribbean waters,

18 **Lipotrapeza seguroensis** (Deichmann)

H. L. CLARK 1933, p. 111. — FONTAINE 1953, p. 31. — DEICHMANN 1954, p. 404.

The types came from Porto Seguro, Brazil, and the species ranges from this locality northwards to Tortugas, Florida. It is listed by CLARK and FONTAINE from Jamaica, where it usually occurs hidden in sand and mud on eelgrass patches. It has not been taken from Puerto Rico, and no specimens were reported from the north coast of South America.

19 **Trachythyonidium occidentale** (Ludwig)

H. L. CLARK 1933, p. 112.

According to CLARK the species ranges from Porto Seguro, Brazil, to Tortugas, Florida. So far it has not been collected in Jamaica, but in 1958 a few specimens were found at Cape Rojo, the southwestern corner of Puerto Rico, surprisingly enough taken under rocks in the surf zone. Possibly older specimens hide in mud and sand. A single specimen was collected by HUMMELINCK in the surf zone, among rocks, about $\frac{1}{2}$ m deep, at Grenada.

20 **Neophyllophorus tritus** (Sluiter)

H. L. CLARK 1933, p. 112.

The type was described from Tortugas and only 10 tentacles were observed; later a specimen from Antigua was discovered to have at least 18 tentacles of varying

size. In Puerto Rico several specimens were found at Cape Rojo, likewise under rocks in the surf zone as the foregoing species, this being the same habitat as that of HUMMELINCK's specimens from St. Martin and St. John.

St. Martin (Great Bay).

21 *Chiridota rotifera* (Pourtalès)

H. L. CLARK 1933, p. 122. — ENGEL 1939, p. 7, 11 (Curaçao, Bonaire). — FONTAINE 1953, p. 32. — TIKASINGH 1963, p. 95 (Aruba).

This small species occurs widespread in the western Atlantic, from Brazil to Bermuda. CLARK and FONTAINE report it as common in Jamaica and it occurs also near Parguera, Puerto Rico, where both CLARK and I have found it. It is often taken among algae or in dead coral. According to HUMMELINCK's collecting results the species may be also quite common in Bonaire.

Curaçao (St. Kruis Baai), Aruba (Malmok), Bonaire (Playa Lechi, near Zuidpunt, Lac) and Klein Bonaire; cf. TIKASINGH's Table.

22 *Chiridota peloria* Deichmann

H. L. CLARK 1933, p. 123. — FONTAINE 1953, p. 32.

Of this gigantic form only the types exist: two broken specimens, almost 25 cm long, taken in 'lined' tubes in Montego Bay, Jamaica. The size and the large number of curved rods in the skin should make it easy to recognize this unusual form.

23 *Euapta lappa* (J. Müller)

H. L. CLARK 1933, p. 118. — ENGEL 1939, p. 6 (Curaçao). — FONTAINE 1953, p. 32, text fig. — TIKASINGH 1963, p. 95 (Curaçao).

This large form which may reach a length of 2-3 feet is usually found on coral flats under rocks, often 2-3 together. It is reported from many localities in the West Indies but so far has not reached Bermuda; it is said to occur in the eastern tropical Atlantic. It is known from Jamaica where it appears to be not uncommon, and it has been taken occasionally along the south coast of Puerto Rico. HUMMELINCK has a single specimen from Bimini in the Bahamas where it recently has been discovered to be not uncommon.

Curaçao (St. Kruis Baai, Caracas Baai).

24 *Synaptula hydriformis* (Lesueur)

H. L. CLARK 1933, p. 119. — FONTAINE 1953, p. 32, text fig.

Up to 1933 this species was known as rather common from the coast of Brazil to Bermuda and both CLARK and later FONTAINE report it as common in Jamaica.

In 1958 it was collected in tufts of algae outside 'Phosphorescent Bay' near Parguera, on the south coast of Puerto Rico. HUMMELINCK reports it from mangrove lagoons on St. Croix, St. Martin and Bonaire, and from more sandy habitats on Barbuda and the Aves Island, west of Dominica.

Bonaire (Lac). — St. Martin (Simson Bay lagoon).

KEY TO THE SHALLOW WATER HOLOTHURIANS KNOWN FROM THE
CARIBBEAN WATERS

- 1a Tentacles disk-shaped, in the number of 20 or more . . . 2
- 1b Tentacles digitate, plumose or branching like trees . . . 13

- 2a Large forms; gonads in two tufts 3
- 2b Large to smallish forms; gonads in single (left) tuft . . . 4

- 3a Tube feet on flattened ventral side in broad longitudinal bands.
Upper side with large warts. Spicules a close layer of tables
with low, squat spire, and usually a number of C-shaped rods.
Color black, orange, or spotted, or striped
1. *Isostichopus badionotus* (Selenka)
- 3b Ventral side with feet arranged without order, often retracted.
Spicules numerous minute grains; no tables. — Taken in
shallow water in Jamaica, but normally occurring in deeper
water 2. *Astichopus multifidus* (Sluiter)

- 4a Anal opening surrounded by five distinct calcified "teeth".
Spicules rosettes, bone-shaped rods and large grains. Color
dark gray, mottled with white. — Common in grassy flats in
Jamaica 3. *Actinopyga agassizii* (Selenka)
- 4b Anal opening without calcified "teeth" 5

- 5a Skin thin, filled with spicules, rough like fine sandpaper.
Tentacles small, ventrally placed; feet small, often retracted.
Spicules tables with enormous hemispherical spire and strongly
knobbed buttons. Color dirty white, often with two rows of
dusky spots on upper side. — Hidden in mangrove mud . . .
4. *Fossothuria cubana* (Ludwig)

- 5b Skin not particularly thin, moderately to sparingly supplied with spicules 6
- 6a Skin excessively smooth, almost free from spicules; ventral side with numerous, soft feet. Tentacles black, body gray or brown. — Common under rocks, in the surf zone
 5. *Selenkothuria glaberrima* (Selenka)
- 6b Skin not excessively smooth, well supplied with spicules 7
- 7a A moderate number of tables in the skin, with small disk and about 12 sharp spines on the top of the spire; in addition rosettes and/or small plates 8
- 7b Layer of tables crowded, or only few, weakly developed tables present; in addition numerous oval plates (buttons) with holes in two rows; in one species the holes become obliterated in some buttons 10
- 8a Ventral side with numerous soft feet; dorsal side with warts. Spicules chiefly small, oval plates, with four central holes, circles of marginal holes and short marginal projections. Color mixed gray and black, occasionally with specks of red and yellow in the living specimen. — On reefs and in grassy patches; as young often hiding under rocks and among coral
 6. *Ludwigothuria grisea* (Selenka)
- 8b Ventral side with scattered feet; spicules predominatingly small rosettes and small plates 9
- 9a Large (up to 45 cm) thickskinned form, smooth-skinned. Spicules small complex rosettes changing into biscuit-shaped plates with minute holes. Color usually rose-colored ventrum and velvet black upper side, but spotted and almost black individuals may occur. — Found more or less isolated on grassy patches in the open; small individuals almost unknown
 7. *Ludwigothuria mexicana* (Ludwig)
- 9b Moderately large forms (15–20 cm), thin-skinned. Spicules predominatingly simple, cloverleaf rosettes and small, large-holed plates. Color mottled gray, with black blotches, sometimes

almost black. — Occurs usually in large numbers of varying size on the same spot, in mangrove swamps.

8. *Ludwigothuria floridana* (Pourtalès)

10a Small, flattened, thick-skinned forms, with numerous feet on the ventral side, low warts on the dorsal side. Spicules a crowded layer of tables and large, thin, oval plates with 2 rows of small holes. Color golden brown. — Under flat rocks in shallow pools. 9. *Microthele parvula* (Selenka)

10b Body not flattened but flask or cigar-shaped or almost cylindrical, with small terminal tentacles 11

11a Body cigar-shaped, light gray (occasionally quite dark), with 2 rows of black spots on the dorsum or speckled with small dark dots. Skin fairly smooth as tables become scarce with age, while buttons increase in number; they are small with 6 small holes which may disappear completely. — Buried in sand or mud as adult, among coral, such as *Porites*, when young 10. *Brandtothuria arenicola* (Semper)

11b Body flask-shaped to almost cylindrical 12

12a Body flask-shaped, mottled gray or brown or purplish, often contracted with low, rounded warts. Skin rough on account of the tables with squarish disk and stout spire with numerous teeth. Inner layer of oval buttons with 6 large holes. — Usually hidden among rocks or coral, often at some depth (a few fathoms). 11. *Brandtothuria impatiens* (Forskål)

12b Body cylindrical, thin-skinned, rarely contracting with distinct warts. Color dark purplish brown with pale tentacles. Spicules an external layer of crowded tables, usually without disk and 1–2 pairs of spines forming a Maltese cross, single or double; in young individuals the tables may have a complete disk; an inner layer of flat bars, with scalloped edge

12. *Semperothuria surinamensis* (Ludwig)

13a Tentacles dendritic 14

13b Tentacles digitate or feathershaped 21

- 14a Tentacles 10 in number, in some forms the ventral pair is smaller 15
- 14b Tentacles normally 20 in number, those in the inner circle are smaller and may be easily overlooked 19
- 15a Small form, few cm long, with soft-skinned sole with feet in 3 rows, and sharply set off from the rest of the scale-covered body. Dorsal side with scales and scattered feet. Rose colored, at least when young. — Known from Brazil (Porto Seguro), and Tobago, W.I. . . . 17. *Thyonepsolus braziliensis* (Théel)
- 15b Larger forms without a soft-skinned sole and without scales on the upper side 16
- 16a Up to 10 cm long, with thick skin, packed with spicules. Ventral side with tube feet in 3 double rows; dorsal side with 2 double rows of blunt tubercles; rarely a few scattered in the interradii. Chocolate brown. — On rocky bottom
13. *Pentacta pygmaea* (Théel)
- 16b Small to medium-sized forms, rarely 15 cm long. Body fusiform, with feet scattered over the entire surface, sometimes more or less distinctly in rows along the radii, particularly in younger individuals 17
- 17a Skin soft, with few spicules, consisting of a few, large-holed buttons and a few baskets, often incomplete
14. *Parathyone suspecta* (Ludwig)
- 17b Skin stiff, packed with spicules 18
- 18a Skin packed with four-holed, knobbed buttons, and with an outer layer of complete baskets
15. *Parathyone surinamensis* (Semper)
- 18b Skin packed with elongate plates, mostly with two rows of holes; in addition a varying number of smaller, button-like plates, with up to four holes 16. *Thyoneria cognata* (Lampert)
- 19a Color dark, greyish brown. Spicules tables with circular disk, with 4 central holes and an outer circle of about 12 marginal holes. — Found hidden in mud.
18. *Lipotrapeza seguroensis* (Deichmann)

- 19b Color light brown to yellow, or red to purplish. Spicules oval tables with more or less reduced 2-pillared spire. 20
- 20a Color brown to yellowish. Spicules tables with dentate edge on disk; spire often reduced to 2-4 spines. — Often found under rocks, in the surf zone
19. *Trachythyonidium occidentale* (Ludwig)
- 20b Color red to purplish, tentacles dark purplish. Spicules oblong tables, mostly with 4 holes in the disk which has an undulating to slightly dentate margin; sometimes 4 additional holes are present; spire low, 2-pillared. — Under rocks in surf zone or in sand 20. *Neophyllophorus tritus* (Sluiter)
- 21a Tentacles palmate; stem short, broad, with short finger-like digits along the edge. Spicules as heaps of 6-spoked wheels and, scattered in the skin, few to numerous, curved rods 22
- 21b Tentacles not palmate, with few, long digits along the slender stem, or with a large number of broad leaves, forming a plume. 23
- 22a Small form, few cm long, with few curved rods scattered in the skin. 21. *Chiridota rotifera* (Pourtalès)
- 22b Large form (type 25 cm long), with a crowded layer of curved rods in the skin. — Collected once, "in lined tubes", in Jamaica 22. *Chiridota peloria* Deichmann
- 23a Large form, 2-3 feet long, with plumose tentacles. Body more or less distinctly striped with dark bands, mixed with silvergray and white. — Under coral blocks. 23. *Euapta lappa* (J. Müller)
- 23b Small form, less than 10 cm long, with few, slender digits on the tentacles. Anchors without any teeth on the flukes, anchorplates with six large holes, all dentate; complete transverse bridge on anchorplates handle.
24. *Synaptula hydriformis* (Lesueur)

Not included in the key are three apodous forms which it is claimed have been taken once in Jamaica: *Leptosynapta circopatina* H. L.

Clark, a single immature specimen from the Pond behind Fort Royal, Kingston Harbor; *Eupatina multipora* H. L. Clark, 1924, from Drunkenman's Key, off entrance to Kingston Harbor, and *Epitomapta roseola* (Verrill), listed on the basis of a not too well-preserved specimen from Titchfield Pt. Reef, at Port Antonio. None of these three species have been found on later trips by Dr. CLARK, nor has FONTAINE been able to add any new records. For descriptions the student is referred to CLARK's 1924 and 1933 papers.

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