1893

**Contribution to the Study of the Holothurians of the North
Atlantic: A translation of *Contribution à l'étude des Holothuries de
l'Atlantique nord. Monaco: Impr. de Monaco***

Emil von Marenzeller

John Lawrence

University of South Florida, lawr@usf.edu

Follow this and additional works at: https://digitalcommons.usf.edu/bin_books

Recommended Citation

von Marenzeller, E. (2021). Contribution to the Study of the Holothurians of the North Atlantic: A translation of *Contribution à l'étude des Holothuries de l'Atlantique nord. Monaco: Impr. de Monaco* (J. M. Lawrence, Trans.). Herizos Press, Tampa.

This Book is brought to you for free and open access by the Integrative Biology at Digital Commons @ University of South Florida. It has been accepted for inclusion in Integrative Biology Books by an authorized administrator of Digital Commons @ University of South Florida. For more information, please contact digitalcommons@usf.edu.

RÉSULTATS
DES
CAMPAGNES SCIENTIFIQUES

ACCOMPLIES SUR SON YACHT

PAR

ALBERT I^{ER}
PRINCE SOUVERAIN DE MONACO

PUBLIÉS SOUS SA DIRECTION

AVEC LE CONCOURS DU

BARON JULES DE GUERNE

Chargé des Travaux zoologiques à bord

FASCICULE VI

Contribution à l'étude des Holothuries de l'Atlantique Nord

Par E. VON MARENZELLER

AVEC DEUX PLANCHES

IMPRIMERIE DE MONACO

1893

RESULTS
OF THE
SCIENTIFIC CAMPAIGNS

ACCOMPLISHED ON HIS YACHT

BY

ALBERT IST

SOVEREIGN PRINCE OF MONACO

PUBLISHED UNDER HIS DIRECTION

WITH THE SUPPORT OF

BARON JULES DE GUERNE

IN CHARGE OF THE ZOOLOGICAL WORK ON BOARD

PART VI

Contribution to the study of the Holothurians of the North Atlantic

By E. von MARENZELLER

WITH TWO PLATES

MONACO PRESS

1893

von Marenzeller, E. 1893. Contribution to the study of the holothurians of the North Atlantic. A translation of *von Marenzeller, E. 1893. Contribution à l'étude des Holothuries de l'Atlantique nord*. Monaco: Impr. de Monaco. (J. M. Lawrence, Trans.)

© J. M. Lawrence. 2021. Herizos Press, Tampa.

Translator's note:

Emil von Marenzeller was born August 16, 1845 in Vienna and died there December 6, 1918. He studied medicine at the University of Vienna from 1863 to 1868 and obtained his doctorate in 1868. In 1873 he began work in the Hof-Naturalienkabinett, today's Natural History Museum in Vienna. Until his retirement, von Marenzeller was the manager of the collections of the lower animals.

I thank Michel Jangoux for help with some difficult words and phrases and Janessa Fletcher for preparing the photographs of the plates.

CONTRIBUTION
TO THE STUDY
OF THE HOLOTHURIANS
OF THE NORTH ATLANTIC
(BAY OF BISCAY, AZORE ISLANDS)
BY
E. von MARENZELLER

The collection of holothuroids made during the campaigns of the yacht *HIRONDELLE*, which S. A. Prince of Monaco has kindly confided to me for study, contains fourteen species:

Family ASPIDOCHIROTIDAE

Holothuria lentiginosa Marenzeller
— *Verrilli* Théel
— *tremula* Gunnerus
Stichopus regalis Cuvier
Pseudostichopus occultatus Marenzeller

Family Elasipodidae

Benthodytes janthina Marenzeller
Benthodytes (?) *typica* Théel
Peniagone azorica Marenzeller

Family DENDROCHIROTIDAE

Cucumaria abyssorum Théel
— *Hyndmani* Thompson
— *Montagui* Fleming
Thyone inermis Heller

Family SYNAPTIDAE

Synapta digitata Montagu
Chiridota abyssicola Marenzeller

Four of these species are new. Their names are in bold characters in the preceding list. A detailed description follows.

The findings of the *HIRONDELLE* also provide new information on the geographic and bathymetric of the known species. The remarkable fact of the existence in the same locality of *Holothuria tremula* Gunn., northern form, and of *Stichopus regalis* Cuv., Mediterranean form, has already been shown by the expedition of the *TRAVAILLEUR*, *Holothuria Verrilli* Théel was known only until now up to the Lesser Antilles and to the west of these islands at a depth of 399 to 982 m. *Pseudostichopus occultatus* Marzenzeller has been found in numerous examples, in diverse points in the eastern Mediterranean, during the campaigns of the Austrian vessel, the *POLA*, in 1890 and in 1891. Giglioli has already taken it in the Mediterranean in 1880, but the existence of this type outside of this sea has not been established with certainty.

The previously known habitats of *Cucumaria abyssorum* Théel were south of the Indian Ocean, near Crozet Island, the Antarctic Sea (92° 39' 45' East longitude) and the Pacific to the west of Valparaiso. It is interesting to find this species in the Atlantic, to the north of the Azores. *Cucumaria Montagui* Flem. (= *Colochirus Lacazei* Hérouard) from the west coast of France and Great Britain, still has not been encountered as far in the west and the southwest (Bay of Biscay and coasts of Galicia, Spain).

Thyone inernis Heller (= *Th. aurantiaca* Costa) was considered a species restricted to the Mediterranean. It could be, however, that *Thyone elegans* Norm. of the Shetlands is identical to it.

Synaptata digitata Mont. appeared to live only in very shallow water. Finally, the discovery of a *Chiridota* at a depth of 2870 m is particularly interesting. All the other species of this genus are, in fact, littoral.

The following table indicates exactly the locations and depths where the difference species were taken. We see there also their grouping at different Stations.

..

STATION NUMBER	DATE	LOCALITY		DEPTH (m)	NATURE OF BOTTOM	SPECIES COLLECTED
		LATITUDE	LONGITUDE			
46	26 July 1886	46°24'42" N	6°55'30" W	155	Gray sand, some yellow.	<i>Cucumaria Hyndmani</i> Thompson.
49	30 July 1886	43°48'44' N	8°11'15' W	150	Muddy sand with black spots.	<i>Synapta digitatus</i> Montagu.
58	7 August 1886	43°40' N	8°55' W	134	Sand, pebbles, broken shells.	<i>Stichopus regalis</i> Cuvier.
59	8 August 1886	43°53' N	9°1' W	248	Fine sand. — Off the coast of Galicia, Spain.	<i>Holothuria tremula</i> Gunnerus, <i>Stichopus regalis</i> Cuvier, <i>Cucumaria Hyndmani</i> Thompson, <i>Synapta digitatus</i> Montagu.
60	24 August 1886	43°12'5" N. begin 43°12'15" N. end	9°33'50" begin 9° 5' end	510 begin 363 end	Mud—To the west of Cape Finisterre, Spain.	<i>Holothuria tremula</i> Gunnerus, <i>Pseudostichopus oculata</i> Marenzeller.
85	28 May 1887	46°31' N	6°52' W	180	Muddy sand, white and yellow.	<i>Stichopus regalis</i> Cuvier, <i>Thyone inernnis</i> Heller.
86	29 May 1887	47°33' N.	6°8' W.	80	Soft mud.	<i>Synapta digitatus</i> Montagu.
226	4 August 1888	Strait	of Picot-Fayal	130	Muddy sand, broken shells.	<i>Holothuria lentiginosa</i> Marenzeller, <i>Cucumaria Montigui</i> Heller.
233	18 August 1888	Between Pico 38°33'21' N.	and São Jorge 30°28'54' W.	1300	Gravel, sand, broken shells.	<i>Holothuria Verrilli</i> Théel.
244	27 August 1888	38°33'57' N.	30°39'30' W.	1266	Muddy gray sand.	<i>Holothuria Verrilli</i> Théel.
248	2 September 1888	41°40'41' N.	29°4'23" W.	2870	White clay sand. Azores, about 1600 miles north of Terceira.	<i>Benthodytes janthina</i> Marenzeller, <i>Benthodytes (?) typica</i> Théel, <i>Peniagone azorica</i> Marenzeller, <i>Cucumaria abyssorum</i> Théel, <i>Chiridota abyssicola</i> Marenzeller.

Family ASPIDOCHIROTIDAE

Holothuria lentiginosa, nov. sp.

(Pl. I, fig. 1; Pl. II, fig. 1)

Campaign of 1888: Stn. 226, Strait of Pico-Fayal (Azores), depth 130 m. The sole specimen collected measures 160 mm in length and 48 mm in width. In its present state, it is strongly flattened, a little macerated toward its lower quarter. The ventral surface is colorless, with brownish circles around the ambulacral tubes. The back is a clear chocolate brown, with numerous irregular patches, most often transverse, with jagged edges and slightly clearer in the center. We note, in addition, on the upper third of the body, a very fine clear brown reticulation. The basic color of the fresh animal is reddish pink, the end of the large warty papillae of the sides is yellowish (Pl. I, fig. 1).

The integument is thick and rather smooth to the touch. The ambulacral tubes of the ventral surface are strong and have perfectly developed suckers. They are a little denser in the median ambulacrum than on the lateral ones. For 25 mm behind the mouth, they are, on the contrary, smaller and less dense. Approximately seventeen large papillae, in the form of warts, limit the lateral ambulacral radii toward the back. On the back, the ambulacral tubes are scarcely less numerous and are found distributed among the ambulacra and interambulacra absolutely as on the ventral surface, except that the suckers are smaller. Quite forward, the ambulacral tubes are rarer. The dorsal ambulacral radii have similarly warty papilliform tubes of a pale color. Only the first two of the series are very clear. The three others that follow each other at large intervals are very much smaller. No precise indication can be given regarding the posterior part, the single specimen being deteriorated as has been said.

Twenty tentacles of unequal size. Dead-end tentacles, long, tubular. The calcareous ring (Pl. II, fig. 1, b) is large. There is a Polian vesicle. At some distance behind the calcareous ring, to the left of the dorsal mesenterial lamella, is a bundle of seven small sand canals. We count thirteen to the right. They are free, pyriform, brownish in color at their end. The other viscera are missing. The spicules of the wall are towers, with spiny basal discs and smooth buckles. The towers have two stages, most 0.054 mm high, but they sometimes attain 0.07 mm. The mean diameter of the basal disc measures from 0.054 mm, 0.060 mm, 0.078 mm to 0.096 mm. The largest are found in the ambulacral tubes. The tower has four stems. The lower transverse rod is formed from the primary cross. The ring has twelve to sixteen spines. The buckles (Pl. II, fig. 1, b) measure ordinarily 0.048 to 0.054 mm in length and 0.024 to 0.03 mm in width. They have six to eight holes. The ambulacral tubes of the ventral surface have numerous supporting spicules. They are rods from 0.15 to 0.21 mm long and 0.012 to 0.24 in width, widened and pierced at their ends and in their middle where they have two bars forming handles (Pl. II, fig. 1, a). Some transitions of these latter to buckles of 0.09 to 0.15 mm in length and 0.036 to 0.042 in width. Finally, a ring of perforated plates and calcareous discs. The dorsal ambulacra lack perforated plates and the calcareous discs are smaller. These latter are still more reduced in the papilliform warts where, in addition, the rods are less numerous and more massive.

This holothurian belongs to the group of *H. signata*, *Polii*, *Sanctorii*, *pardalis*, etc., of Théel. *Holothuria Sanctorii* is reported by Th. Barrois, according to the determination of Ludwig, as

making part of the fauna of the Azores. The species is known only by the description of a single specimen published by Théel. The specimen in question was sent to me from Naples by Ludwig, under the name of *H. Sanctorii* ? Delle Chiaje. I gave it to the author of the CHALLENGER Report. Lambert gave a few lines to it. One can understand the desire that I have had to study the holothuroids collected in the Azores by Th. Barrois. It is very interesting for me to know the relations of these animals with the type previously described. Professor Th. Barrois of Lille has sent me his material with much kindness, and the comparison shows me in an obvious way that it is a matter of completely different species.

The description of *H. Sanctorii* ? of Ludwig, given by Théel, could not apply to the holothuroids of Barrois. In them, in fact, the basal discs of the towers are smooth, not spiny. The holothuroids of Barrois belong to group E 1 α of Théel (2), and the description of *H. farcimen* Selenka, also from the Azores, applies to it perfectly. The figure of Delle Chiaje, relative to *H. Sanctorii*, shows some rows or large papillae on the dorsal and lateral surfaces, all as in *H. lentiginosa* and others. We see nothing similar in the holothuroids of Barrois. *H. captiva* Ludwig is perhaps established on the young specimens of *H. farcimen* Selenka.

Holothuria Verrilli, Théel

(Pl. I, fig. 2, Pl. II, fig. 2)

1886. *Holothuria Verrilli*, THÉEL. (20), p. 6.

Campaign of 1888: Stn. 233 (between Pico and São Jorge, Azores), depth 1300 m. — Stn. 2244, depth 1266 m,

The numerous specimens collected present a different aspect according to the treatment to which they have been subjected. Those that have been simply placed in alcohol measure 110 mm in length and 30 mm in width. Their skin is creased with deep wrinkles. Others, tied with a ligature in the anal region, were injected with alcohol. They reach up to 200 mm in length and 70 mm in width. Their skin is smooth. The color is presently a dirty white. Watercolors of fresh animals made on the yacht show a basic grayish tone tinted with violet. This color is produced by a brown-violet pigment located in the deepest layers of the dermis and that appears by transparency (Pl. I, fig. 2).

The slender ambulacral tubes are irregularly distributed on the entire extent of the body. They are scarcely raised on the dorsal surface. The contrary occurs on the ventral surface, where they much more often protrude and are swollen in whole or in part. The ambulacral tubes are denser in the posterior fourth or fifth of the ventral surface, on the ambulacral as well as on the interambulacral. They outline a kind of a circumference. They are, in addition, sparse in the middle of the trivium than on the sides.

Twenty colorless tentacles. At their base, the edge of the tentacular area is strongly colored. There are no tubular dead-end tentacles. The calcareous ring (Pl. II, fig. 2, a) is large. A Polian vesicle attains up to 70 mm in length. A small sand canal with a yellowish madreporite plate, fixed to the wall of the body to the right of the dorsal mesenterial lamella. The two respiratory trees, which open by separate openings in the cloaca, have short lateral branches without secondary

branches. The caeca are large, smaller, however, than in *Holothuria intestinalis* Asc. and Rathke. The right branch is a little longer than the left. The Cuvierian tubules are lacking. The gonads differ according to sex. The gonadal dead-ends of males are long; those of females, very short and fat. Their end is sometimes pointed, sometimes rounded, so that all has the appearance of a well-developed loose cluster. The spicules of the wall are towers with two stages, with or without regular basal discs, but no spines (Pl. II, fig. 2, a). The are 0.54 to 0.69 mm high. The diameter of the disc is 0.07 to 0.09 mm. The tower with four or five stems. The lower transverse rod is formed of the primary cross. The ring has only four to five spines, respectively located in the extension of the stems. The ambulacral tube has no spicules of support, but a small number of towers, rudimentary or abortive, and always lacking the basal disc (Pl. II, fig. 2, b). The calcareous discs are smaller in the dorsal ambulacral tubes than in the ventral ones. They are 0.18 mm in diameter and have a trellis with numerous meshes.

The particular grouping of ambulacral tubes on the ventral surface, the quality, and in part, the form of the spicules, have convinced me to identify this holothurian with *H. Verrilli*, briefly described by Théel. This naturalist observed that the spicules are variable there. In the specimens from San Domingo, the stems end in smooth spines. In others, these have spines. Our specimens refer to the first type. In studying this species, I have been surprised to see how much it resembles *Holothuria intestinalis* Asc. and Rathke. I am led to believe that *H. Verrilli* is a form of the latter, special to deep waters. The reduced dimensions of the ambulacral tubes, their particular grouping, finally, the slightly different form of the spicules must, however, make it considered as distinct.

Holothuria tremula, Gunnerus

Campaign of 1886; Stn. 59, depth 248 m. — Stn. 66, depth 510 m at the beginning, 363 m at the end of the dredge. These two stations are found off the northern coast of Spain, province of Galicia.

Stichopus regalis, Cuvier

Campaign of 1886: Stn. 58, depth 134 m. — Stn. 59, depth 248 m.

Campaign of 1887: Stn. 85, depth 180 m.

This species is very widespread in the Mediterranean, with its vertical and horizontal distribution is very extended. Its presence in the Ocean, along with *Holothuria tremula* Gunnerus, has been confirmed by the TRAVAILLEUR (Bay of Biscay).

Jules de Guerne has published the following observations on them: "Several large holothuroids are found off the Spanish coast at depths of 250 m in completely favorable living conditions. The two species that we have collected show, at first glance, bilateral symmetry. One, (*H. tremula*), nearly cylindrical, can attain, when it is completely filled with water, a length of more than 30 cm with a maximum diameter of 5 to 6 sm. It is a beautiful pink and can be kept a few days in captivity because it does not have the annoying habit of eviscerating its organs. However, after some time, its skin undergoes a special kind of degeneration, although the animal continues to live a rather long time. Another form, *S. regalis*, very depressed, is remarkable for its dorsal appendages. Some

individuals have some *Stylifer* in the vicinity of the mouth¹. The mollusks designated by the name *Stylifer* have been studied by Dautzenberg. These are *Eulima intermedia* Cantraine².

Pseudostichiopus occultatus, Marenzeller

(Pl. II, fig. 3)

Campaign of 1886: Stn. 66, depth 510 m at the beginning, 363 m at the end of the dredging.

By happy chance, I found among the specimens collected by the *HIRONDELLE* a specimen, 6 mm long, of the type apparently common in the great depths of the *Mediterranean*. Giglioli had already taken it in 1881 during the campaign of the *WASHINGTON*, but the systematic study had not been done by him. For the complete description of the type, I return to my report on the echinoderms of the first three Austrian expeditions in the eastern Mediterranean³. The essential characters that distinguish *Pseudostichiopus occultatus* from the two species of the same genus described by Théel are taken from the calcareous spicules that could not be studied well in the preceding species. There are some reticulated plates around the anus (Pl. II, fig. 3, a), terminal small calcareous discs in the ambulacral tubes, some rods swollen in the middle (Pl. II, fig. 3, b) and some spicules also swollen in the middle in the respiratory trees and that, for the most part, end in a fork at one or both ends (Pl. II, fig. 3, c). The figures of the plates clearly show the identity of the specimen from the *HIRONDELLE* with those of the Mediterranean.

Family ELASIPODIDAE

Sub-Family PSYCHROPOTINAE

Benthodytes janthina, nov. sp.

(Pl. I, fig. 3; Pl. II, fig. 4)

Campaign of 1888: Stn. 248, depth 2870 m.

The body of the single specimen collected measures 140 mm in length and 45 mm in width. It shows no flattening. The back is strongly convex. The ventral surface is slightly swollen. The superficial layers of the integument, very altered, are well preserved only around the median ventral ambulacrum. The color of the pigment is deep violet. The dermis, gray violet and wrinkled into numerous grooves, is rather solid, not transparent. The mouth is completely ventral, the anus dorsal.

¹ JULES DE GUERNE, *Les dragages de l'HIRONDELLE dans le Golfe de Gascogne*, Assoc. française pour avancement des Sciences. Congrès de Nancy, 1886.

² P. DAUTZENBERG, *Campagne scientifique du yacht l'HIRONDELLE en 1886; Contribution à la faune malacologique du Golfe de Gascogne*, Mém. Soc. Zoologique de France, vol. 4. 1891.

³ *Berichte der Commission für Erforschung des östlichen Mittelmeeres*. Denkschriften d. K. Akad. der Wiss. in Wien. Vol. LX.

On the dorsal surface, corresponding to the ambulacra, are raised two rows of papillae, ten on the left side and eight on the right side. They are retracted and their origin is difficult to see. But the pigment that colors them makes them immediately distinguishable from the inside in opening the animal. These papillae are very clearly of different sizes. The anterior ones are 21 mm from the anterior edge of the body. The posterior ones are 35 mm from the posterior edge. The last is largest of all. Then come, in order of size, the first, then the second, located a short distance, then the seventh, located 26 mm behind. Between the seventh and the seventh papilla are some smaller and unequal papillae. There are four to the left, two only to the right. Between the seventh and tenth papillae are two other very small ones. The ninth and the tenth papillae are separated from each other by 28 mm. I counted one hundred and twenty ambulacral tubes in the marginal region. In the double row of the median ventral ambulacral ray, I found sixty-three. The anterior ones are located 25 mm behind the tentacles. Fourteen tentacles of approximately 4 mm in diameter. The ventral ones, a little smaller than the lateral and dorsal ones. Their structure is near that of the tentacles of *Benthodytes sordida* Théel. Each of them is divided into several lobes, which in turn has small lobes, notably on the edges. The internal wall of the body and most of the viscera are colored an intense violet. The calcareous ring is formed, as well as the state of preservation permits me to judge, of a kind of continuous trellis of thin calcareous stems, directed in various directions that become forked, extending in points and often anastomosing. We find in the sand canal of many holothuroids similar formations. A Polian vesicle, 41 mm long. The sand canal empties by three pores in front of the gonopore. It is filled with calcareous spicules in the form of crosses (Pl. II, fig. 4, a). The cloaca is very wide and very long. The specimen examined is female. The gonads greatly recall those of *Benthodytes abyssicola* Théel. Forty-four mm long, they have five short branches on one side and eleven on the others, that have two or three dichotomized caeca of 4 to 6 mm in diameter, less tapered than in the species above. The gonopore is located 30 mm behind the anterior end of the body. The calcareous spicules, very superficial, of the skin have entirely disappeared. I figure, however, some forms taken from a better preserved point near the anus (Pl. II, fig. 4. Here and there are also fragments of larger calcareous spicules, probably in the form of crosses, with spiny points.

Benthodytes janthina has great affinities with *Benthodytes abyssicola* Théel from the Southern Sea. The number of tentacles and its dorsal papillae as well as their size brings it very close. It is distinguished, however, by the absence of the transverse row of ambulacral tubes on the ventral surface immediately behind the tentacles and, finally, by the difference structure of the latter.

Benthodytes ? *typica*, Théel

1881. *Benthodytes typica*, Théel (18), p. 103.

The determination remains uncertain, the two specimens collected being deteriorated and incomplete.

This species was taken with the preceding.

Sub-Family ELPIDIINAE

Peniagone azorica, nov. sp.

(Pl. I, fig. 4; Pl. II, fig. 5)

Species found with *Benthodytes janthina* n. sp., and *Benthodytes* (?) *typica* Théel.

The body, 50 mm long, 13 mm wide, is colorless and recalls the aspect of *Elpidia incerta* Théel. The back is strongly convex and the ventral surface likewise a little swollen. The mouth is ventral and the anus dorsal. The dorsal appendage, in the form of a flap 11 mm long, 10 mm wide at its base. It is split, following the median line to the bottom. Each of the halves is formed by two large papillae joined together and that emit a long, slender extension, reaching the tentacular crown. There are no small papillae behind the appendage in the form of a flap. A total of twenty-one ambulacral tubes, of which nine are located on each side of the body and the united by a membrane border the anus behind. The first ambulacral tube is found at the end of the first third of the body. Five others follow at intervals of 6 mm. The seventh, eight and ninth ambulacral tubes are very close to each other and extend to the appendix described above. The length of the six anterior ambulacral tubes is 5 mm, the three following are a little longer. The skin, not very hard, is rather coarse to the touch. Ten tentacles. The disc, 3 mm wide, is covered with leafy lobules of different sizes that ramify into a large number of smaller lobules. The number of lateral arms, corresponding to the articles of the calcareous ring should be sixteen at the maximum. In one specimen there is fourteen, of which six are on one side and eight on the other. Two Polian vesicles, distant from each other. Their location corresponds to the lateral ambulacra. The sand canal, large and curved opens to the outside at 6 mm behind the tentacles by a pore located on the median line. It does not contain calcareous spicules. Two groups of gonads. Their gonoducts, very short, combine into one for a short length and then bifurcate again before leaving the body cavity. The two branches, scarcely 2 mm long, enfold the sand canal and open approximately 2 mm to the right and to the left of its opening. An identical disposition has been confirmed by Théel in *Elpidia purpurea*. The gonads vary according to sex. In females, the principal trunk has only a very limited number of branches and secondary ramifications. The terminal dead-ends are relatively very thick, oval. The total length of the organ, including the gonoduct, is 10 mm. In males, the ensemble of the genital system is nearly two times longer. The principal trunk has more primary branches that divide similarly into an infinite number of small terminal branches, narrow and cylindrical. In the two sexes, the right group is a little smaller than the left. The ventral longitudinal muscle is half as wide as the lateral muscles.

The calcareous spicules are, as usual, cruciform, with four arms having, in addition, four extensions in the form of a spur. They are numerous and very dense in the skin of the dorsal and ventral surfaces, but their aspect is much different according to the regions of the body. The calcareous spicules of the back (Pl. II, fig. 5, a) are much larger, the arms of the cross and their extensions are stronger. They are separated less from each other. Their extensions in the form of a spur are very long and taper to a point instead of swelling at the end. The arms of the calcareous spicules of the ventral surface (Pl. II, fig. 5, b) measure from 0.06 mm to 0.1 mm in length, their extensions in the form of a spur, 0.03. The separation of the arms attains 0.12 to 0.24 mm. The arms of the dorsal calcareous spicules measure 0.15 to 0.20 mm in length. Their extensions in the

form of a spur, 0.15 to 0.18 mm. Their separation can be up to 0.19. In the ambulacral tubes only appear nearly typical ventral calcareous spicules. Other similar productions that approach, by the long points of the extensions in the form of a spur, the dorsal calcareous spicules. Still, they do not have the length; the arms notably, remain shorter. In the ambulacral tubes, we also find large calcareous spicules with four arms, with spiny extensions, and slightly bent rods, from 0.36 in length and 0.009 to 0.024 in width with attenuated and spiny ends. Similar rods and calcareous spicules with four arms, incompletely developed are also encountered in the vicinity of the mouth and tentacles.

The description of this species reflects, as that of many other *Elasipodidae*, the mediocre state of preservation of the specimens, altered during the collection, The dorsal lamelliform appendages and only a part of the ambulacral tubes are intact in only a single specimen. I am forced to take as much as possible the number and arrangement of the appendages of the body in opening the animals. In this regard, in considering the calcareous spicules, *Peniagone azorica* has some similarity with *Peniagone affinis*. The two forms are however very clearly distinguished by their aspect and their internal structure. I have placed this species, because of its lamelliform dorsal appendages, in the genus *Peniagone* of Théel. I make the observation, however, that there are, among the various species of *Elpidia* and *Peniagone*, such varied relations that a re-organization of these genera appears necessary.

Family DENDROCHIROTIDAE

*Cucumaria*⁴ abyssorum, Théel

i885. *Cucumaria abyssorum*, Théel (19), p. 66.

Campaign of 1888: Stn. 248, depth 2870 m.

The specimens examined are in part colorless, partly dotted with rows, with patches of the same color, larger and deeper in the vicinity of the ambulacral tubes. The largest measures 45 mm in length and 30 mm in width. The body is swollen, except at the posterior end, that is in the form of

⁴ H. Ludwig made the observation (12, p. 344) that the name *Pentacta* is prior in date to that of *Cucumaria*, but he hesitated to reject the latter, consecrated by usage. I cannot share these scruples. The law of priority being for me preemptory. Moreover, the question is different. The name of *Pentacta* should replace that of *Colochirus* and not that of *Cucumaria*. It is appropriate to note that it is not Goldfuss but Oken who established these genera. Goldfuss, in his book of 1820 (*Handbuch der Zoologie*), which served as the basis for the discussion, has always omitted the names of authors, both for *Pentacta* and for *Holothuria*. This is why Jäger and his successors are of the opinion that he himself is the author of the new name. But Goldfuss never had this pretension. He has, moreover, himself established the facts in his *Grundzüge der Zoologie*, published in 1826. We can read in this work: *Pentacta* Oken. The type of the genus *Pentacta* is *Holothuria doliolum* Pallas from the Cape of Good Hope. An erroneous citation (*Encyclopédie méthodique*, p. 86, fig. 6–8) was added to it. It has no importance. Examination of *Holothuria doliolum* Pallas, recently made by Ludwig (18, p. 1229), has proven that I am correct to suppose (14, p. 303), that it is not a matter of *Cucumaria* but a holothuroid in the genus *Colochirus* established by Troschel in 1846. This latter name must cede place to the older name of *Pentacta*. Even at the moment when I write these remarks, Jeffrey Bell was speaking in the same sense (5).

a lemon. The skin is rough to the touch. The ambulacral tubes are more numerous than in the typical form, *C. abyssorum*. Our specimens approach especially *C. abyssorum* var. *hyaline*. However, only the calcareous spicules of the smallest specimen, 23 mm in length and are still in part identical to those that Théel figured. The calcareous spicules of the largest specimen are denser, have shorter arms and recall those of the *grandis* variety. This tends to show that the varieties of this species are not limited.

Until now, *Cucumaria abyssorum* was known only in the Indian Ocean, near Crozet Island, in the Antarctic Ocean at 92°39'45" longitude East and in the Pacific, west of Valparaiso, at a depth of 1600 to 2225 fathoms (2592 to 3604 m), found by the CHALLENGER expedition.

Cucumaria Hyndmani, Thompson

Campaign of 1886, Stn. 46, depth 155 m; Stn. 59, depth 248 m.

This species was already known at the depth of 420 fathoms (686 m) (PORCUPINE).

Cucumaria Montagui, Fleming

1828. *Cucumaria Montagui* Fleming (8), p. 483.

Campaign of 1888, Stn. 226 Strait of Pico-Fayal, depth, 130 m.

The holothuroid described with much care by Hérourard (9) under the name *Colochiris Lacazei* had been, according to the author's own remarks, known long before him. The species had been observed on several occasions. It lives not only on the western coasts of France, where Dicquemare had already found it in 1778, but also in the littoral of the British Isles. Ludwig (12, 348) removed it, correctly, from the genus *Colochirus* that, I have said above, should united with *Pentacta* and placed it near *Cucumaria*.

Cucumaria Montagui is not, moreover, a species completely typical of this genus. Ludwig (18, p. 348) refers *Cucumaria Lacazei* with doubt to a form described by Th. Barrois (8, p. 52) under the name *Cucumaria Lefevrei*. I do not share this opinion. The author of the species says, in fact, that the calcareous plates are nodulose as in *C. doliolum* (correctly *C. Planci* Brandt). Hérourard reunites *C. Lefevrei* with *Holothuria Drummondii* Thompson (presently *Phyllophorus Drummondii*), to which he refers equally *Colochirus gemmatus* Pourtales (presently *Thyone gemmate*).

This process is understandable only if we suppose that Hérourard does not accept the generally accepted definition of *Holothuria drummondii*, and that he is of the opinion that this species is identical to the *C. Lefevrei* observed by Barrois and himself. Hérourard does not explain this point of view. We regard today the old *Holothuria Drummondii* as a *Phyllophorus* having twenty tentacles and a small number of calcareous spicules. It is consequently a distinct type from the generic point of view. The question of its identity with *Thyone gemmata* Pourtales is debatable. I am not able to settle it.

Jeffrey Bell (4, p. 481, Pl. 481) published in 1883 figures of the calcareous spicules of a *Cucumaria* collected by Montagui, and which he designated by the name *Cucumaria Montagui*.

Although the spicules in question are altered after having been present for at least seventy years, enough remains however to establish that they are very different than those of *C. elongata* Dübén and Koren. Jeffrey Bell does not give a definitive description of the type according to fresh specimens. The choice of the name of *C. Montagu* indicates that Bell shares the opinion of Fleming, who considered *Holothuria pentacta*, var. *Montagu* (15, p. 112, pl. vii, fig. 4) as a distinct species. He is, in addition, convinced that Fleming and himself are concerned with the same type. I recognize identical calcareous spicules in two specimens of *Cucumaria* that were sent to me in 1886 by the Rev. A. M. Norman, under the name of *C. Montagu*, and in others dredged by myself in the vicinity of Saint-Malo and Cancale.

All my specimens concur absolutely from all points of view with *Colochirus Lacazei* Hérourard. The work of Hérourard, very precise from the anatomical and systematic point of view, give a clear idea of this particular species, but the simple complement of the figures of Bell and the priority of the old authors remains indisputable. Before Montagu, Pennant (17, vol. iv, p. 42, Pl. xxxvi, fig. 41) must have seen this species. The figures that he gives of it are otherwise characteristic of those of Montagu. But the name of *pentactes* that he attributes to it is not to be preserved. We do not know and we will never know the holothuroid sent to Linnaeus by König. The copy of the figure of this animal in *Zoologia Danica* (pl. 31, fig. 8) gives no information regarding this. Dübén and Koren have believed that it was a young *Cucumaria frondosa* Gunnerus (we know now that this species is found in Iceland). They advise completely abandoning the name of *pentactes*. As for myself, I consider this advice good and I cannot share the opinion of Ludwig that substitutes the name of *C. pentactes* L. for that of *C. elongata* Dübén and Koren⁵. Forbes has figured, it is true, under the name of *pentactes*, the species described later by Dübén and Koren. A few years ago, I myself was able to study some specimens of this species coming from Great Britain, but the establishment of this identity does not clarify in any way the *pentactes* of Linnaeus. The description that comes closest to that of Pennant was published by Dicomemarre (7, p. 283, pl. vi) under the picturesque title, *Le Fleurilardé*. It is better than the descriptions given by the English, before and after him, and the remarkable contrast so characteristic between the dorsal and ventral surfaces (form of *Colochirus*) is placed in evidence in a striking way. I admit I used to regard these indications as questionable and referred the species of Dicomemarre to *Holothuria* or *Cucumaria* ? *pentactes* Forbes (*C. elongata* Düb. and Kor.). but as soon as I was able to study myself the *Cucumaria* of the same fauna, having the same peculiarities, I have no longer doubt about the correctness of the observations of Dicomemarre. The *Fleurilardé* is certainly the species that Hérourard described again a hundred years after Dicomemarre.

Here is the passage concerning this type in the original work: "The kinds of tubercles that it has in a double row on two of the five angles of the body, i.e., at the sides of the back, are white, especially toward their end. The three double rows of feet that are on the sides and below in the middle of the width are white and have a form nearly like a larded or pickled hare because the sides have a brown color. As for below, it is whitish.

Gmelin had recognized in 1789 that *Fleurilardé* is a holothurian. He referred it to *Holothuria pentacta*. Cuvier already cited it in the first edition of the *Règne Animal* (1817). In the second, he criticizes *Holothuria pentacta* Gmelin and places the *Fleurilardé* of Dicomemarre in another section of the genus. Some lines further, he finishes in conclusion by uniting this species to

⁵ A. M. Norman cited, in 1869, this species as being a synonym of *Cucumaria fusiformis* Forbes and Goodsir without explaining this identification. But it appears then (16, p. 316) to have later abandoned this opinion.

Holothuria tremula Gunnerus. He never gave it a particular name and I cannot explain why Jäger (1833, **10**, p. 12) and de Blainville (1834, **6**, p. 193), independently of each other, designated this species under the name *Pentacta Dicquemari* and *Holothuria Dicquemari*, citing Cuvier. The name does not date, in fact, before 1833, and regret to have to abandon it. The description of Fleming, under the name of *Montagui* is prior.

Hérouard tells us that this species is figured in the *Règne animal*, illustrated under the name of *Holothuria doliolum*. *Cucumaria Montagui* was very well known to John Anderson, who described and figured it in 1862. He (**1**, p. 189–191, pl. xi), took it for an unknown form, but did not fill this gap and give it a name. K. Lampert (**11**, p. 128), placed this supposed new type, as later Hérouard, in the genus *Colochirus*, under the name *Colochirus Andersoni*.

Thyone inermis, Heller

Campaign of 1887; Stn. 85, depth 180 m.

Campaign of 1888; Stn. 226, strait of Pico-Fayal, depth 130 m.

Ludwig (**12**, p. 346) united, very succinctly, *Thyone aurantiaca* Costa with *Thyone inermis*, described by Heller in an inadequate way. *Thyone elegans* Norman (**16**, p. 317), dredged off the Shetland Islands at 100 fathoms (182 m) depth, is without doubt the same species. The specimens of the *HIRONDELLE* confirm the information given by Hérouard (**9**, p. 688, pl. 32, fig 1, 11-14) on the form and distribution of the calcareous spicules, information more complete already than that of Ludwig.

Family SYNAPTIDAE

Synapta digitata, Montagu

(Pl. II, fig. 6)

Campaign of 1886: Stn. 49, depth 150 m. — Stn. 59, depth 248 m.

Campaign of 1887: Stn. 86, depth 80 m.

It is a matter of fragments. One, taken a Station 86, measures 170 mm in length. It is colorless. A second, coming from Station 49, measures about 100 mm in length. Like other shorter pieces from Station 59, it is more or less colored a deep violet.

The calcareous spicules of *Synapta* are so variable in the same individual that they have been repeatedly the cause of errors in the establishment of new species. The European types, *S. synapta* Montagu and *S. inhaerens* O.-F. Müller, of course, have been the most often studied. Their calcareous spicules have been figured several times, It is easy to judge rapidly their variability. The calcareous plates *S. digitata* have two extreme forms: those that, without including the handle, are as wide or even a little wider than long, and those whose length exceeds one and half to two times the width. The specimen of Station 86 has calcareous plate shorter than those of individuals coming from greater depths. They recall the figures published by Th. Barrois (**2**, III, fig. 7–8). We

find, in addition, that the short and wide calcareous plates are more frequent in specimens of the North than in specimens of southern provenance. In these, on the contrary, they are longer and narrow.

The specimens of the *HIRONDELLE*, although they are taken at some depth, appear to confirm these general facts. I can, moreover, cite an example and show that the influence of a locality on the form of the calcareous plates cannot be absolutely defined, and that the extent of their variations of form should be considered as very broad. I have found in the bay of Muggia, near Trieste, at a shallow depth, a *S. digitata* that is already separating itself, by size and color, from the more common forms, so much that we could think it a distinct species. In the extended state, the body is 120 mm in length and 10 mm in width. The skin was not, as usual, pink, thin and transparent, but thicker and opaque. In alcohol, the animal is retracted to be no more than 80 mm in length and 9 mm in width. The skin took a pale reddish color. The back had patches, here and there, of a deep uniform red. On the ventral surface were likewise found numerous small patches pigmented red. The stems of the tentacles were reddish. The calcareous plates of the skin taken from the ventral side of the anterior part of the body are cordiform as those of *S. digitata* from the North Pl. II, fig. 6). But their structure is completely special. The very small plates were made thicker by a very complicated network of narrowing spicules, obstructing completely the small perforations of the plates. The anchors are likewise small and dense. Their end, slightly recurved, has on each side one to three strong teeth.

The exterior appearance of this synaptid and the calcareous spicules in question seem very particular. The study of the calcareous spicules of other segments of the body and those of the internal constitution show that this is nothing other than *S. digitata*. I shall find normal plates and anchors in synaptids of the same locality, forming a transition for those of the figured variety, but of a narrower form. I have seen a mutilated synaptid from Dalmatia and preserved in the Imperial Museum of Vienna some similar plates with the beginning of a calcareous reticulum. I believe that it is the beginning of a senile formation.

Until now, *Synaptula digitata* is especially known from shallow depths. Norman has dredged his specimens of wine-red color at 40 fathoms (64 m) of depths at the Shetland Islands.

Chiridota abyssicola, nov. sp.

(Pl. I, fig. 5; Pl. II, fig. 7)

Campaign of 1888: Stn. 248, depth 2870 m.

A watercolor was made of a fresh animal 110 mm in length. The diameter of the expanded tentacular circle was 15 mm. The body, in its anterior half, was 8 mm wide, in its posterior half, up to 18 mm, after which it decreased in the form of a cone. In alcohol, the body is retracted to the point of being no more than 70 mm.

Twelve tentacles with twelve to fifteen digitations. The calcareous ring is the same as in *Chiridota levis* Fabricius. More than twenty Polian vesicles. They attain in part 10 mm in length. A large sand canal is coiled on itself. I have not been successful in finding the ciliated organs in the form of a funnel. The group of gonads located to the right of the dorsal mesentery, is more strongly developed. Its gonoduct is the product of three ducts that branch dichotomously three or four times

at rather long intervals. It has, still a little before the point where it unites with the gonopore of the left, two small, little ramified groups with slightly smaller branches. The gonadal located to the left of the dorsal mesentery has the same structure but it is weaker.

The skin of the single specimen collected being greatly deteriorated, I can give no information concerning the number and location of papillae with wheels. I have found only four a little behind the middle of the body, in the right ventral interambulacrum. They consist of up to thirty small wheels 0.08, rarely 0.1 mm in diameter, ordinarily with six, exceptionally seven spokes (Pl. II, fig. 7). We count on the internal edge of the circle ninety or a hundred small teeth. There are no calcareous spicules.

The appropriate place to assign this species is not doubtful. It is a true *Chiridota*. The presence of this genus at a considerable depth is confirmed here for the first time. As for the species, its affinities with *Chiridota lives* F. are striking. However, the comparison is not possible for all the points. I think I should keep a certain reserve and give to this abyssal form a new name.

BIBLIOGRAPHY

1. ANDERSON (JOHN), *On a apparently new form of Holothuria*, Ann. and Mag. of Nat. Hist. [III], vol. 9. London 1862.
2. BARROIS (TH.), *Catalogue des Crustacés podophthalmiques et des Echinodermes, recueillis à Concarneau, durant les mois d'août et septembre 1880*. Lille 1882.
3. BARROIS (TH.), *Liste des Echinodermes recueillis aux Açores, durant les mois d'août et septembre 1887*, Revue biol. du nord de la France, vol. 1. Lille 1888.
4. BELL (F. JEFFREY), *On the spicules of Cucumaria Hyndmanni, Cucumaria calcigera, and two allied forms*, Journ. Roy. micros. Soc. [II], vol. 3. London 1883.
5. BELL (F. JEFFREY), *Ad historiam Cucumariæ*, Ann. and Mag. of Nat. Hist. [VI], vol. 8 London 1891.
6. BLAINVILLE (D. DE), *Manuel d'Actinologie et de Zoophytologie*. Paris 1834.
7. DICQUEMARE (J. F.), *Le Fleurilardé* in Rozier, Observations sur la physique, sur l'histoire naturelle et sur les arts, etc., vol. 12. Paris 1778.
8. FLEMING (J.), *A history of British Animals*. Edinburgh 1828.
9. HÉROUARD (EDG.), *Recherches sur les Holothuries des côtes de France*, Arch. de Zool. expériment. et générale [II], vol. 7. Paris 1890.
10. JÄGER (G. F.), *De Holothuriis*, Dissertatio inauguralis. Turici 1833.
11. Lampert (K.), *Die Seewalzen. Holothurioidea. Eine systematische Monographie*, in: Semper *Reise im Archipel der Philippinen*, vol. 4, part. 3. Wiesbaden 1885.
12. LUDWIG (H.), *Die Seewalzen*. Bronn's Klassen und Ordnungen des Thierreiches, vol. 2, 3^e part. 1889–92.
13. LUDWIG (H.), *Drei Mittheilungen über alte und neue Holothurienarten*, Sitzungsber. d. K. p. Akad. d. Wiss. zu Berlin, vol. 54. 1887.
14. MARENZELLER (E. VON), *Kritik adriatischer Holothurien*, Verhandl. K. K. zoolog. botan. Ges. Wien 1874.
15. MONTAGU (G.), *Descriptions of several marine Animals found on the south coast of Devonshire*, Trans. Linn. Soc. vol. 9. London 1808.
16. NORMAN (A. M.), *On the Crustacea, Tunicata, Polyzoa, Echinodermata, Actinozoa, Hydrozoa and Porifera*, Shetland final dredging report, part, II, Report of the 38th meeting of the British assoc. for advanc. of science for 1868. London 1869.
17. PENNANT (T.), *British zoology*. London 1777.
18. Théel (Hjalmar), *Report on the scientific results of the voyage of H. M. S. Challenger during the years 1873–1876. Zoology*, vol. 4, part. XIII. *Report on the Holothurioidea*. Edinburgh 1881.
19. THÉEL (HJALMAR), *Report on the scientific results of the voyage of H. M. S. Challenger during the years 1873–1876. Zoology*, vol. 14, part, XXXIX. *Report on the Holothurioidea*. Edinburgh 1885.
20. THÉEL (HJALMAR), *Reprts on the results of dredging, under the supervision of Alexander Agassiz in the Gulf of Mexico (1877–1878), in the Caribbean sea (1879–80), and along the*

eastern coast of the United States during the summer of 1880, by the U. S. coast survey steamer BLAKE, Lient. Commander C. D. Sigsbee, U. S. N. and Commander J. R. Bartlett, U. S. N. Commanding, xxx. Report on the Holothurioidea, Bull. Mus, Comp. Zool. Harvard Collège, vol. 13, n° 1. Cambridge 1886.

21. TROSCHER (F. H.), Neue Holothurien-Gattungen, Archiv. für Naturgesch. 12^e ann. vol. I. Berlin 1846.
-

LEGEND OF PLATE I

	Page
Fig. 1. HOLOTHURIA LENTIGINOSA Marenzeller, natural size	4
Fig. 2. HOLOTHURIA VERRILLI Théel, natural size	5
Fig. 3. BENTHODYTES JANTHINA Maenzeller, natural size	7
Fig. 4. PENIAGONE AZORICA Marenzeller, natural size	9
Fig. 5. CHIRIDOTA ABYSSICOLA, natural size	14

These figures were done by W. Liépoldt, of Vienna, under the direction of the author, from watercolors done from nature aboard the yacht *HIRONDELLE* by Marius Borrel.

M. Berrel et W. Liepoldt pinx.

Lith. Werner & Winter, Frankfurt.

HOLOTHURIA, BENTHODYTES, PENIAGONE, CHIRIDOTA.

LEGEND OF PLATE II

	Page
Fig. 1. HOLOTHURIA LENTIGINOSA Marzenzeller.....	4
a, tower spicules; b, tubercles of the skin X 440.	
Fig. I A. HOLOTHURIA LENTIGINOSA Marzenzeller	4
Calcareous spicules supporting the ambulacral tubes X 170.	
Fig. I B. HOLOTHURIA LENTIGINOSA Marzenzeller	4
Calcareous ring X 103.	
Fig. 2. HOLOTHURIA VERRILLI Théel	5
a. Tower spicules of the skin X 300; b, rudimentary tower spicules of the ambulacral tubes X 300.	
Fig. 2 A. HOLOTHURIA VERRILLI Théel.	5
Calcareous ring X 105.	
Fig. 3. PSEUDOSTICHOPUS OCCULTATUS Marenzeller	7
a, Network of plates around the anus; b, calcareous spicules of the tentacles X 160; c. calcareous spicules of the respiratory trees X 300.	
Fig. 4. BENTHODYTES JANTHINA Marenzeller.	7
Calcareous spicules of the skin. X 95.	
Fig. 4 A. BENTHODYTES JANTHINA Marenzeller	7
Calcareous spicules of the sand canal. X 135.	
Fig. 5. PENIAGONE AZORICA Marenzeller.	9
a, calcareous spicules of the dorsal region; b, of the ventral surface. X 160.	
Fig. 6. SYNAPTA DIGITATA Marenzeller.....	13
Calcareous plate and anchor of an abnormal specimen from Trieste. X 330.	
Fig. 7. CHIRIDOTA ABYSSICOLA Marenzeller.....	14
Rotiform spicule: left, half of the external surface, right, half of the internal surface. X 440.

E. von Marenzeller delin.

Lith. Wernier & Winter, Frankfurt