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# ANTIPATHARIA.

THE collection of Ceylonese Antipatharians here reported on was made in 1902 from the Pearl Oyster Banks in the Gulf of Manaar, by dredging within the 100-fathom line off Trincomalee and off Galle. The localities are more precisely referred to in Professor HERDMAN'S "Narrative" in Part I. of the General Report (1903).

The collection is a small one, including thirteen species, but nine at least of these seem to be new. The list is as follows:—

FAMILY: ANTIPATHIDÆ.

SUB-FAMILY: CIRRIPATHINÆ.

**Cirripathes* (?), n. sp.

SUB-FAMILY: ANTIPATHINÆ.

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| **Antipathes gallensis*, n. sp. | *Stichopathes gracilis*, GRAY, var. *spiralis*, nov. |
| **Antipathes gracilis*, n. sp.† | *Stichopathes echinulata*, BROOK. |
| *Antipathes abies*, GRAY. | **Antipathella rugosa*, n. sp. |
| **Stichopathes ceylonensis*, n. sp. | **Antipathella elegans*, n. sp. |
| **Stichopathes contorta*, n. sp. | **Antipathella irregularis*, n. sp. |
| **Stichopathes papillosa*, n. sp. | **Antipathella ceylonensis*, n. sp. |

* Those marked with an asterisk are reported as new.

† NON *Antipathes gracilis*, GRAY (1860) = *Antipathella gracilis*, GRAY;
NON *Antipathes gracilis*, KOCH (1889) = *Antipathes mediterranea*, BROOK (1889).

Before proceeding to the systematic report, we would make a few general observations :—

(*a*) In the detailed classification of Antipatharia much importance has been attached to the form and distribution of the spines on the axis. But it does not seem to have been sufficiently emphasised that there is considerable variation in both of these characters in the different parts of the colony. Thus in the branched forms the nature of the spines, the number seen from one aspect, and the arrangement of these in spirals or longitudinal rows in no way correspond on the larger branches and on the pinnules (Plate, fig. 2). In the simple colonies this is even more emphasised, *e.g.*, in *Cirripathes* (*?*) (Plate, fig. 8) those at the base are arranged irregularly (*a*), those about the middle of the colony have a distinct linear arrangement (*b*), while those near the tip are disposed in whorls around the stem (*c*). This distinction has been illustrated relative to the species described, in the figures on the Plate, where two views, and in one case three, have been given. This is of great importance where species are determined from fragmentary specimens.

(*b*) This difference between stem, branches, and pinnules is also borne out with regard to the size and shape of the polyps. In many of the specimens, on the stem and larger branches, the polyps are almost circular and disposed irregularly, their diameter being less than that of the axis, while on the pinnules they are elongated and rectangular, exceeding in breadth the diameter of the axis. Their distribution also varies in the different portions of the colony ; they are often separated by considerable intervals on the older parts, while on the pinnules they may be closely apposed. The length and degree of transparency of the tentacles does not seem to be a safe criterion, varying as it does with the degree of contraction and the mode of preservation.

(*c*) Of some general interest and deserving further investigation is the extraordinary modification shown in the spines of several species. The general Antipatharian spine is simple or papillose, but in some species they pass from an elongated sinuous form through a series of gradations to an antler-like growth and eventually simulate a tree-like structure (Plate, fig. 1, *a–f*). This has been previously noted, *e.g.*, by CARTER for *Antipathes spinosa* (CARTER), but no interpretation has been suggested. It may be due to a pathological condition, and in some cases where branched spines were observed it was noted that a sponge-like growth surrounded the axis, or it may be the result of irregular regeneration of broken spines. It is particularly well seen at the base of *Antipathes gracilis*, n. sp., and on *Antipathella rugosa*, n. sp. In *Antipathes abies*, GRAY, a forking of the spines was occasionally observed.

(*d*) The polyps of *Antipathes abies*, GRAY, which were unknown when Mr. GEORGE BROOK described the "Challenger" Antipatharia, are very well preserved in some of HERDMAN'S specimens, and we have therefore given a full description and figures of their external features (Plate, fig. 4).

(*e*) A fact which may yet prove to be of some importance is that in *Stichopathes papillosa*, n. sp., belonging to a genus typically simple, a knob-like projection, about 6 centims. from the base, indicates, without doubt, the remains of a branch.

(*f*) The various specimens show a considerable number of epizoic animals:—*e.g.*, Sponges, Polyzoa, Serpula-tubes, Spirorbis-tubes, Cirripede-galls, stalked Barnacles, Corals, and in one case a young pearl oyster.

**Cirripathes** (?) n. sp.—Plate, fig. 8.

A very large simple colony, 135 centims. long, with a diameter varying from 3·75 millims. at the base to 0·75 millim. at the top. The basal portion, which is attached to a stone, is expanded into a circular disc 16 millims. in diameter. The stem is sinuous for the first 35 centims., but after that it is coiled into three distinct spirals, with diameters of 10 centims., 9 centims., and 8 centims. respectively—the corresponding heights being 10 centims., 8 centims., and 7 centims. The total height of the colony is 65 centims. The colour of the axis at the base is jet black, changing gradually to a golden brown. It is hollow, at least in the upper region, and is covered with distinctly papillose spines, which are 0·1 millim. in height near the top of the colony, but shorter and thicker further down. They are arranged irregularly near the base, where twenty can be counted from one aspect, but further up a linear arrangement seems to predominate. Near the top they are disposed in verticils round the stem, about one and a half to two lengths apart, and the number from one aspect diminishes to nine. They are of a paler colour than the stem.

As there are no polyps on the specimen, it is impossible to decide its position with security, beyond saying that it is either a *Stichopathes* or a *Cirripathes*, but the arrangement of the spines and the general nature of the colony would point towards its being a new species of *Cirripathes*, which we would refrain from naming. The specimen was trawled at Station XXIV., off Foul Point, outside Trincomalee, 46 fathoms.

**Antipathes gallensis**, n. sp.—Plate, fig. 15.

A fragmentary portion of a colony, 8 centims. high and 4·5 centims. broad. The branching is irregular, giving the whole a shrub-like appearance, suggestive of the broom. The main stem is short and sinuous, but a large branch arises about midway up and constitutes the greater part of the colony. The general colour is black towards the base, but rusty brown in the smaller branches, which are long and slightly flexed. The diameter of the axis is 1 millim. at the base and tapers very gradually.

The spines on the main branch are low and conical, standing perpendicularly and arranged irregularly, so that no definite number could be counted from any one aspect. Those on the smaller branches are compressed and thorn-like—the upper

margin being sub-horizontal, while the lower is convex. They are comparatively short, about one-third the diameter of the branch, and are disposed in fairly steep sinistrorse spirals and longitudinal rows, those in a row being about two lengths apart. The rows do not consistently alternate, but a quincuncial arrangement is infrequent. Five can be clearly seen from one aspect, while the tip of another is visible, seven making a complete revolution.

The polyps on the stem are large and circular, with a low truncated oral cone and prominent mouth opening, which is also circular. The tentacles are arranged radially and slightly distant on the branches, the polyps are arranged in a single longitudinal row and are elongated in the direction of the axis—this being specially marked on the smaller branchlets. They are very large and prominent, measuring 1·5 millims. in length. The projection bearing the circular oral opening is large and cylindrical. The tentacles when fully expanded are very long, but in most of the polyps they are contracted—being then thick set and conical. They are disposed in three pairs, the sagittal pair being inserted low down in the polyp. On the larger branches the distance between the polyps is equal to about one-half their length, but this diminishes considerably on the branchlets, where the polyps are more elongated though still of the same general character.

This species differs from any known form both in its mode of branching and in the arrangement of the spines.

Locality :—Station XLI., deep water off Galle.

**Antipathes gracilis,** n. sp.—Plate, figs. 7 and 14.

A small, complete, delicate whin-like colony, 6 centims. high and 1 centim. in diameter, attached by a small expansion. It consists of a main axis, 1 millim. in diameter at the base, tapering gradually to a fine point. The lower 13 millims. of the stem are devoid of branches. On the next 2 centims. small branches bearing pinnules arise sub-horizontally from three sides. These are almost straight and taper to a point, the longest being 8 millims. The remainder of the stem bears branches arising on all sides, but apparently in no definite order. The branches gradually diminish in length towards the apex of the colony. The colour of the axis is golden yellow when seen with transmitted light.

The spines on the bare part of the axis are slightly elongated, compressed, and triangular, the upper margin being sub-horizontal, the lower convex. They are arranged irregularly, about nine being visible from one aspect, at intervals of about one length. Many of the basal spines show an antler-like or dendriform mode of branching. On the upper part of the stem they are disposed in more regular longitudinal lines, five being now visible from one aspect. On the pinnules they are still of the same type, but more elongated, and with a greater slope towards the axis. They seem to be arranged irregularly, but a closer examination reveals a hint of a

steep dextrorse spiral. They are about one and a half lengths apart, and seven is a typical number from one aspect.

The polyps are all arranged so as to face in one direction, and it is worthy of note that this is away from the bare portion of the axis mentioned before. On the stem they are disposed irregularly and are somewhat circular, the tentacles being inserted almost equidistant from the mouth opening. The oral projection is very prominent and cylindrical, and the mouth opening is circular. On the branches and pinnules they are very much elongated, and the tentacles are disposed in three pairs, the sagittal pair being inserted slightly below the level of the others; but apart from this the structure is much the same as in those on the stem. On the branches they are separated by intervals about equal to their breadth, but on the pinnules this distinct demarcation disappears.

This species approaches most closely to *Antipathes spinosa* (CARTER) (*Hydradendrium spinosum*, CARTER), but differs from it both in the mode of branching and in the character of the spines. In *A. spinosa* (CARTER) the polyps had not been observed when Mr. BROOK described the "Challenger" Antipatharia.

Locality :—Deep water off Galle.

**Antipathes abies,** GRAY—Plate, fig. 4.

Several very fine specimens of this species are included in the Ceylon collection. All are of the bottle-brush, or, more correctly, fir-tree type.

One magnificent colony (A) is 65 centims. in height, the breadth varying at the different parts. At 20 centims. from the base the diameter is 15 centims., but this gradually diminishes to 10 centims. at 40 centims. from the base, and tapers almost to a point at the top of the colony. It is attached to a stone, and for the first 11 centims. the axis is bare. Above this there are about a hundred principal branches of varying sizes. The colour of the axis is black, but owing to the thin cœnenchyma it presents a greyish surface. The branches have a superficial rusty or reddish-brown tint, getting paler towards the top of the colony. The diameter of the axis at the base is 5 millims.; it gradually tapers upwards.

A smaller colony (B) is also very perfect and compact. It is 30 centims. high and 15 centims. in diameter about half way up. From that point it ascends in a symmetrical cone. From the first 9 centims. of the stem the branches have been broken off, but the knob-like ends have been quite overgrown by the cœnenchyma.

The axis is 7 millims. in diameter at the base and tapers to a point. The colour is identical with that of (A).

The main stem is slightly curved and the branches are longest on the concave surface, so that in contour the colony is symmetrical.

The mode of branching is by no means regular. At some places there are signs of a spiral arrangement, but this is often interrupted by extra offshoots. The branches arise very close together, often only 2 millims. apart. They are mostly in planes at

right angles to the main stem, but some are turned upwards and others downwards, interlocking, so that no two overlap. At their point of origin they are about 2 millims. in diameter and present the crescentic shape characteristic of the species. A typical branch from the concave side of the stem has a chord of 10 centims., a perpendicular height of 2 centims., and a breadth of 5 centims. The branches bear branchlets, and even secondary and tertiary branchlets, extending in a plane at right angles to the long axis of the branch. The secondary branches arise in a distinctly alternate manner, the planes bearing them enclosing an angle of 60°. The branches do not all curve in one direction, but for the most part they diverge in pairs, so that the tips of two approximate, enclosing an ellipse. The secondary branches arise in a similar manner, so that the maximum of surface is exposed on the contour of the colony.

The spines vary greatly in the different parts of the colony. On the black main stem they are disposed very irregularly, and are very small and abundant. This is also the case on the paler branches, and owing to the conical form the whole gives the impression of a moss-rose stem. They are horny in colour and have a black broadened part where they arise from the stem. The smaller branchlets are transparent and hollow, being of a golden-brown colour with a faint reddish tinge. Here the spines are much longer, being bluntly conical and pointing slightly upwards. They are arranged in distinct longitudinal lines, which in reality are the result of steep sinistrorse spirals, five or six being seen from one aspect. They are almost equal to the radius of the pinnule and are about one length apart.

The polyps, which were unknown when Mr. Brook described the "Challenger" Antipatharia, are of two kinds, according to the position in the colony. On the main stem and larger branches they are scattered irregularly on the concave surface, being thus within the general network of the circumference. They are visible to the naked eye and appear as six-rayed stars. They are almost circular, the tentacles being disposed on six radii. The tentacles vary considerably in size, according to the state of retraction. On the pinnules the polyps are arranged on the convex surface and thus all face outwards. They are more rectangular in shape than on the stem, being elongated in the direction of the long axis of the pinnule. The tentacles are disposed in three pairs, those in the sagittal axis being inserted very far down and standing mostly perpendicular to the polyp. The distance between the polyps is approximately the same as the length of a polyp, viz., 0·9 millim. In all cases the mouth is situated on a prominent cylindrical projection, the oral cavity being elongated in the direction of the sagittal axis.

Cirripede galls are of frequent occurrence, and these are overgrown with the mud-coloured cœnenchyma, also bearing spines. Numerous barnacles are attached to the larger branches.

Another almost complete colony (C), without the basal attachment, is 22 centims. in height and 9 centims. in diameter at the widest portion. The main stem is bent

so as to form two arcs. The length of the branches on the concave surface of the stem greatly exceeds that on the convex, so that the contour is symmetrical.

The spines are typical both as to size and arrangement. A few are bifurcated, but as this is only of local occurrence it does not justify the dignity of a new species. The polyps are also typical, but in some, owing to contraction, the tentacles are very inconspicuous.

A beautiful complete colony (D), closely resembling a young larch tree, was attached to a stone by a disc-like expansion. It is 30 centims. in height, the greatest width being 10 centims. The first 10 centims. are bare, owing to the branches having been broken off, and the next 6 centims. bear branches only on one side. The diameter of the axis at the base is 2 millims. The spines and polyps are typical. A great number of barnacles are attached to the branches.

Another complete colony (E) was more of the bottle-brush type. It is 13·5 centims. high, with branches down to the very base—breadth 6·5 centims. The diameter of the axis at the base is 1·5 millims., tapering to 0·5 millim. The branching is not so regular as in the others, but in no case do the branches overlap. The spines and polyps agree closely with the typical forms, but the colour of the branches is slightly darker.

Localities :—Station LXIII., west of Periya Paar, in the Gulf of Manaar, 40 fathoms ; and Station XXIV., off Foul Point, outside Trincomalee, 46 fathoms.

**Stichopathes ceylonensis,** n. sp.—Plate, fig. 9.

A small, complete, simple colony attached to a piece of stone by an almost spherical expansion. It is 8·5 centims. long, but only reaches a height of 6 centims. owing to its spiral course.

The diameter at the base is 1 millim., and this diminishes to 0·75 millim. at the tip of the colony, so that the tapering is very slight. The stem is translucent, golden brown near the base, becoming paler upwards ; it is hollow throughout its entire length. The first 4 centims. are straight, followed by two open sinistrorse spirals 1·3 centims. in diameter.

The spines near the base are short, triangular, and compressed, standing at right angles to the stem, disposed irregularly, but mostly one to two lengths apart. Four may be seen from one aspect. On the upper half of the colony the spines are of the same type, but considerably longer in proportion to the thickness of the stem, being equal to about one-third of the diameter. They are arranged in steep sinistrorse spirals and longitudinal rows about two to three lengths apart. Four can be distinctly seen from one aspect, while the tips of two others are visible, so that there are eight altogether in a spiral.

The polyps are typical and prominent. The tentacles are very long and transparent, and the sagittal pair are inserted almost diametrically opposite. They are separated by a distance of about one-half the length of a polyp. Towards the top of the colony

they are alternately large and small—the smaller forms being probably younger. They are also separated by greater intervals.

This specimen comes nearest to *S. pourtalesi*, BROOK, but cannot be identified with it. It differs, for instance, in not having "crowded" polyps, and the arrangement of the spines is also different.

Locality :—Station LV., outside the pearl banks, Gulf of Manaar.

**Stichopathes contorta,** n. sp.—Plate, fig. 3.

A simple slender colony, 40 centims. long, attached to a piece of rock. It is very sinuous, growing first upwards, then coiling and turning downwards, again twisting and starting on an upward course. Thus the total height is only 7 centims., and the growing point is but 3 centims. above the base. The diameter of the axis is 1 millim. and is uniform throughout. The colour is blackish with a brown tinge, the axis is hollow down to the disc of attachment.

The spines are of a pale horny colour, and are slightly but distinctly papillose. They are arranged in longitudinal rows in the lower portion about two to two and a half lengths apart, seven being seen from one aspect. Further up, a distinct steep spiral arrangement may be seen—seven being required to form one revolution. Those in one longitudinal row are about two lengths apart.

The polyps are arranged on one side of the axis at intervals of about 1 millim., which is also the length of a polyp.

The oral cone is prominent and the mouth opening circular. The tentacles are about 0·5 millim. in length even in a contracted state. Young polyps are frequent between the larger older forms.

This species is nearest *S. lutkeni* (BROOK), but differs from it both in the number and arrangement of the spines.

Locality :—From off Galle and onwards up West Coast of Ceylon.

**Stichopathes papillosa,** n. sp.—Plate, figs. 6 and 13.

A complete, simple, robust colony attached to a piece of rock. It is 38 centims. long and attains a height of 18 centims.

The first 4 centims. are almost straight, the remainder coiled into ten distinct dextrorse spirals, 13 millims. in diameter and averaging 14 millims. high. The axis is 1·25 millims. in diameter at the base and tapers gradually to 0·5 millim. at the top. At a distance of 6 centims. from the base there is a projection which indicates the remains of a branch. The colour is black at the lower part, becoming lighter towards the apex.

The spines are slightly but distinctly papillose, and vary in number in the different parts of the colony ; thus at the base fourteen can be counted from one aspect, whereas at the top only ten and points of two are visible. Those near the base are conical and covered throughout their whole length with small papillæ, but on the upper part of

the colony the papillæ are confined to the apex of the spines, which in this region are more flattened and triangular. They are arranged in distinct dextrorse spirals, and are about one length apart.

The cœnenchyma is very thick on the side devoid of polyps.

The polyps are about 1 millim. in diameter and almost form a square—the directive tentacles being inserted at the corners and the sagittal pair at a slightly lower level. The tentacles are very long when expanded, but on contraction form low, broad cones. The oral cavity is large and elliptical, being elongated transversely. The oral cone is large and prominent. The polyps in the upper part of the colony are close together, but lower down they are separated by a distinct groove. Smaller polyps, probably young forms, are of not infrequent occurrence.

The lower part of the stem is covered with Polyzoa.

The distinctive features of this new species are: the thickness of the cœnenchyma, the papillose character of the spines, together with the dextrorse spiral arrangement, and the distance between the spines as compared with their length.

Locality:—Deep water off Galle and onwards up West Coast of Ceylon.

**Stichopathes gracilis**, GRAY, var. **spiralis**, nov.

A very slender, simple colony, 58 centims. in length. Owing to its sinuous and spiral course, it only attains a height of 20 centims. It is attached by a broadened basal expansion. The first 5 centims. are straight; succeeding this there is a sinuous portion 17 centims. long, followed by two distinct spirals 6 centims. in diameter and about 6 centims. high. The diameter at the base of the stem is 1 millim. and this measurement scarcely diminishes even at the tip. The colour appears black, but when viewed with transmitted light has a decided reddish-brown tinge. The stem is hollow to the very base.

The spines near the base are very much damaged, but appear to be short, somewhat flattened cones, irregularly arranged, a comparatively small number (about 5) being visible from one aspect. About the middle portion of the colony they are short and triangular, standing perpendicularly to the axis, and disposed in irregular longitudinal rows and dextrorse spirals. The spines in a longitudinal row are separated by about two lengths. Six can be counted from one aspect.

Near the top of the colony the spines are much smaller and inclined to the axis, the upper margin being concave and the lower convex. They are arranged in very steep dextrorse spirals, nine in one spiral being seen from one aspect.

The distance between any two varies greatly—from two to four lengths. The polyps are arranged in a single longitudinal row, and are very large and prominent, measuring about 2 millims. in length. They are slightly elongated, the oral cone being low but distinct. The tentacles are disposed in three pairs, the sagittal pair being inserted at a considerably lower level than the others. They are very long when fully expanded, but when contracted are low, broad and conical; others are

like large spheres with a small filiform projection. They arise from somewhat spherical bases. The polyps are separated by a very small interval, but an annular constriction between each pair seems to pass round the stem.

This specimen agrees on the whole with *Stichopathes gracilis*, but as it differs in some details regarding the spines, and conspicuously in having a spiral course, it has seemed convenient to name a new variety.

Locality :—Deep water off Galle.

**Stichopathes echinulata,** BROOK.

This species is represented by a simple colony, incomplete at the base, 26 centims. long, very irregular and sinuous, so that the total height is only 8 centims. The growing point is turned downwards and is only 5 centims. above the lowest portion. The colony tapers very markedly from 1·5 millims. to 0·5 millim. The colour of the axis is almost black.

The spines are very short, compressed and directed upwards. They are arranged in very steep spirals, the distance between two rows being almost the same as that between any two on a spiral, so that they show a quincunx grouping. The distance between any two is equal to about four lengths of a spine.

The polyps are typical, but the sagittal tentacles are relatively distant from the oral cone. They are separated by a distance about two-thirds of the length of the polyp.

This species has been previously recorded from Mauritius.

Locality :—Station LX., outside the pearl banks, Gulf of Manaar.

**Antipathella rugosa,** n. sp.—Plate, figs. 5 and 11.

There are two specimens of this new species in the collection, both slightly damaged. The larger of these is 19 centims. high and 13 centims. broad. It is branched mostly in one plane, and consists of two main branches which arise dichotomously from a short main stem 1 centim. long. One branch arises at 60°, while the second after a short distance at right angles to the stem bends upwards and runs closely parallel to it. The first is broken off about 7·5 centims. from its origin, and the second at a slightly lower level. At the point of fracture large secondary branches are given off, and it is noteworthy that the angles of inclination are the same as for the first two, viz., 60° and 90°. The primary and secondary branches give off pinnæ in a strictly alternate manner, and these again bear pinnules. The pinnæ converge slightly. The whole plane of branching is slightly curved and the polyps arise on the convex surface.

Near the base the axis is opaque and black in colour, but this passes gradually into a transparent horny yellow in the upper parts of the colony. The smaller branches and pinnules are hollow.

The spines on the large branches are short and slender, tapering in a marked

degree.. They are slightly inclined to the axis, and are arranged irregularly, about fifteen being visible from one aspect. Those on the pinnules are very thin and delicate, fairly long, conical in shape, and inclined to the axis at an acute angle. They are arranged in distinct longitudinal lines which are the expression of steep dextrorse spirals. Five can be seen from one aspect. The distance between two in a longitudinal line is equal to about two lengths.

On the main branches the polyps are arranged irregularly, and are almost circular, the tentacles, which are moderately long, being equidistant from the oral cavity. On the pinnules the polyps are arranged on the convex surface and are elongated in the direction of the axis. The distance between the polyps varies. In some places they are crowded together, while in others they are separated by a distance equal to their breadth. In all cases the body of the polyp is large. The oral cavity is circular and borne on a very prominent cylindrical projection. The tentacles are large and inclined outwards, being very rugose in appearance, due probably to the state of retraction. They are arranged in three rows of two each—the sagittal tentacles being inserted far down.

The colony bears numerous epizoic animals :—Cirriped galls and stalked barnacles, tubes of *Spirorbis*, several Polyzoa, a Sponge, and a young pearl oyster shell. It is worthy of note that the majority of these are overgrown by the cœnenchyma and bear both polyps and spines.

A second specimen of this species—also slightly damaged—is 14·5 centims. in height and 8 centims. in breadth. It consists of a main stem with a basal attachment from which three branches arise on one side at about 60°. These are slightly arched, and the longest, which is 12 centims. in length, has a diameter of 1 millim., tapering to a point. The whole colony is flabellate. In its spines, polyps, and colour it agrees with the other specimen.

This species should be included in BROOK's Group A ("Challenger" Report), but it does not approach closely to any of species already included in that group.

Localities :—Deep water off Galle, and Station VIII., deep water, in Gulf of Manaar.

**Antipathella elegans,** n. sp.—Plate, fig. 10.

A complete, very graceful colony, 13 centims. in height, with a maximum breadth of 5·5 centims. at a distance of 9·5 centims. from the base, which is expanded into a disc-like attachment. At a distance of 3 centims. from the base the main stem bifurcates and the two subsidiaries develop almost equally. The mode of branching is not uniform. The general appearance is dichotomous, but this breaks down in several places where three or four branches arise on one side. The stem and branches are black at the base, gradually passing into golden brown near the apex. All the branches and pinnules are hollow. The diameter of the branches varies very little in the different parts, and the gentle tapering gives the whole colony a very graceful appearance. The axis is 1 millim. in diameter at the base. The spines are short and

very much compressed, being somewhat triangular with a very broad base. The upper margin is sub-horizontal, while the lower is convex. They are arranged in very steep sinistrorse spirals and longitudinal rows, the distance between two in a row being four lengths, while that between two in a spiral is one length. From one aspect five can be seen quite distinctly along with the tips of other two, making in all eight spines in a circumference. The spines near the base are shorter, smaller and more conical. They are disposed in sinistrorse spirals and distinct rows, the distance between two in a row being about four lengths.

The polyps are typical. They are situated in a single row on the branches and branchlets, and are very much elongated in the direction of the axis. The distance between the polyps varies in the different parts; they are in some places close together, in others separated by intervals equal to half their length. Very often a line passing through the oral cones is a line of spines, and the polyps occupy a length corresponding to four spines in a longitudinal row. The oral cone is very prominent and the mouth opening is circular. The tentacles vary in different parts according to their state of contraction. The sagittal pair are inserted rather far down, corresponding to spines 1 and 5 on a circumference. In some cases the tentacles have spherical terminations.

This species is chiefly distinguished by the nature and arrangement of the spines, which are markedly different from those of other species, but also by the polyps, which, though typical of the genus, nevertheless bear specific characters.

Locality :—Station LX., outside pearl banks, Gulf of Manaar.

**Antipathella irregularis,** n. sp.—Plate, fig. 12.

This species is represented by a small complete colony and a fragment. The former is 4 centims. in height and 6 centims. in breadth, the general shape being sub-flabelliform. The branches arise mostly in two planes, but occasionally in a third, leaving one quadrant bare. Frequent fusions occur.

The other specimen consists of a short main stem with a disc of attachment at the base. The stem is only 2 centims. high, and the axis tapers from 1 millim. at the base to a very fine point at the apex. The branches are longer than the main stem and constitute the greater part of the colony. They arise on three sides at a very large angle, so that the expansion is mostly lateral.

The colour of the axis near the base is black, but it passes through a dark amber to a horny yellow in the branchlets. The secondary branches are somewhat elongate and slender and appear slightly flabellate.

The spines near the base of the stem are short, conical, and irregularly disposed; but on the branches a definite arrangement can be traced. There they are compressed and triangular in form, arranged sometimes in a dextrorse and sometimes in a sinistrorse spiral. They are about two lengths apart and five can be seen from one aspect.

The polyps are rather small and are disposed on one side of the stem and branches, so that none appear on the quadrant devoid of branches. They are oval in shape, being elongated in the direction of the axis. The oral cone is low but definite; the mouth is scarcely discernible. The tentacles are comparatively long and delicate, having a broad base and tapering markedly. The distance between the polyps varies, but in most cases there is a valley-like depression between them, giving the surface an undulating appearance.

The distinctive features of the species are the irregular mode of branching, the character and arrangement of the spines, and the nature of the polyps.

Locality :—Station XXIV., off Foul Point, outside Trincomalee, 46 fathoms.

**Antipathella ceylonensis**, n. sp.—Plate, fig. 2.

Of this species there are two specimens—one complete colony and a broken part of another.

The former is a small, graceful, delicate colony, complete but for the tips of some of the branches. It is 7 centims. in height and 5 centims. in breadth. The main stem is 5 centims. long, and the axis is about 1 millim. in diameter above the disc of attachment, which is 1 centim. broad. The branching is approximately in one plane, and there are signs of fusion in three places. About 1 centim. from the base two branches arise, almost of the same diameter as the main stem. One of these is 4 centims. long, the other is 6 centims. and bears a comparatively large secondary branch. The branching is irregular, but nearly alternate. The branchlets are very slender and arise at different angles, very seldom at an angle less than 60°, and most frequently at right angles.

The spines near the base are short, conical, and distant; those on the pinnules are larger and thorn-like, the lower margin of the compressed triangle being convex. They are equal to about half the diameter of the pinnule and are about three lengths apart. The arrangement is in steep sinistrorse spirals, four being seen from one aspect.

The polyps are disposed on one side of the branches and are elongated in the direction of the long axis. The tentacles are short and are arranged in three pairs, the sagittal pair being inserted at a level slightly lower than the others. The oral opening is circular, and is elevated on a prominent cylindrical projection.

This species comes nearest to *A. tristis* (Duch.), but is distinguishable from it both in spines and polyps.

Locality :—Station XXIV., off Foul Point, outside Trincomalee, 46 fathoms.

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## EXPLANATION OF THE PLATE.

Fig. 1. *Antipathella rugosa*, n. sp., dendriform spines, *a–f*, different stages of growth.
„ 2. *Antipathella ceylonensis*, n. sp., arrangement of spines.
(*a*) Main axis; (*b*) Axis of pinnule.
„ 3. *Stichopathes contorta*, n. sp., arrangement of spines.
(*a*) Near base of the colony; (*b*) Towards the tip of the colony.
„ 4. *Antipathes abies*, Gray, polyps.
(*a*) On main branches; (*b*) On axis.
„ 5. *Antipathella rugosa*, n. sp., polyps on pinnules.
„ 6. *Stichopathes papillosa*, n. sp., polyps near the tip of the colony.
„ 7. *Antipathes gracilis*, n. sp., complete colony. Nat. size.
„ 8. *Cirripathes* (*?*), n. sp., arrangement of spines.
(*a*) Near base of colony; (*b*) Middle of colony: (*c*) Near tip of colony.
„ 9. *Stichopathes ceylonensis*, n. sp., arrangement of spines.
(*a*) Near base of colony; (*b*) Towards top of colony.
„ 10. *Antipathella elegans*, n. sp., arrangement of spines.
(*a*) Lower part of axis; (*b*) Near top of axis.
„ 11. *Antipathella rugosa*, n. sp., arrangement of spines.
(*a*) Near base of main stem; (*b*) Part of a pinnule.
„ 12. *Antipathella irregularis*, n. sp., arrangement of spines.
(*a*) Main stem and branch; (*b*) Pinnule.
„ 13. *Stichopathes papillosa*, n. sp., arrangement of spines.
(*a*) Near the base of the axis; (*b*) At the tip of the axis.
„ 14. *Antipathes gracilis*, n. sp., arrangement of spines.
(*a*) On main stem; (*b*) Part of a pinnule.
„ 15. *Antipathes gallensis*, n. sp., arrangement of spines.
(*a*) Main stem and branch; (*b*) Pinnule.

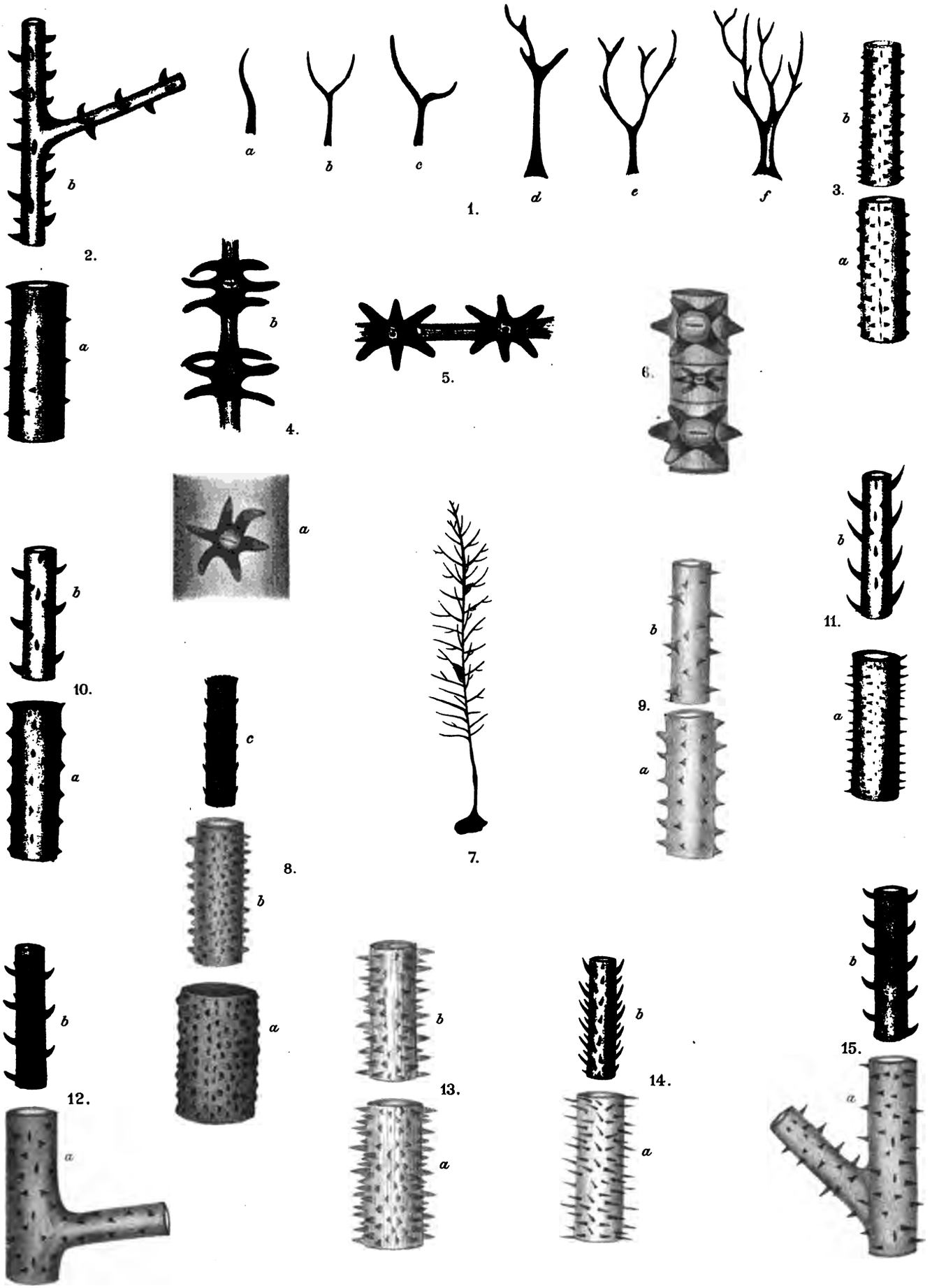


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FIG. 1, ANTIPATHELLA RUGOSA, n. sp.; FIG. 2, ANTIPATHELLA CEYLONENSIS, n. sp.; FIG. 3, STICHOPATHES CONTORTA, n. sp.; FIG. 4, ANTIPATHES ABIES, Gray; FIGS. 5 and 11, ANTIPATHELLA RUGOSA, n. sp.; FIGS. 6 and 13, STICHOPATHES PAPILLOSA, n. sp.; FIGS. 7 and 14, ANTIPATHES GRACILIS, n. sp.; FIG. 8, CIBRIPATHES, n. sp.; FIG. 9, STICHOPATHES CEYLONENSIS, n. sp.; FIG. 10, ANTIPATHELLA ELEGANS, n. sp.; FIG. 12, ANTIPATHELLA IRREGULARIS, n. sp.; FIG. 15, ANTIPATHES GALLENSIS, n. sp.