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# A NEW GENUS AND SPECIES OF SEA-SLUG, AND TWO NEW SPECIES OF SEA-HARES FROM AUSTRALIA.

By

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(Plates xxxiv-xxxv.)

During the last two years I have been able, through the kindness of the Director of the Taronga Zoological Park and the help of the staff of the Zoo Aquarium, to study and make observations upon Mollusca, particularly sea-slugs and sea-hares, living there in captivity. This has helped me considerably in identifying or describing material, as the animals of both these groups mentioned are liable to undergo a severe change in colour and form in preservative, and unless some record of these characters is made when the animals are alive, later research work on them may prove very difficult.

My thanks are, therefore, due to those who have helped me in this way, and I hope as a result of the opportunities afforded me, and with the aid of the material in the Australian Museum collection, to publish papers dealing with these two groups, so common in Australia yet so much neglected, the sea-slugs and the sea-hares.

## Family FIMBRIDÆ.

Genus *Propemelibe*, gen. nov.

Orthotype, *Propemelibe mirifica*, sp. nov.

Animal very large and showy, gelatinous, elliptical in shape, with a constricted neck and the head enlarged into an enormous rounded fringed veil with thickened edges. This veil is about half the size of the main part of the body. Rhinophores about half-way down the veil, set fairly well apart and retractile into truncate sheaths with minute stalks. Dorsal surface of the animal covered with irregular sized pustules and branched filaments, including the cerata. Cerata arranged in a single row along each side, very large when fully grown, about 5-7 along each side.

Foot very broad, mouth at the base of the veil, with thickened lips, no radula, but minute jaws. A dark belt of horny processes lines the lower portion of the posterior part of the stomach. Liver divided, extending to the cerata.

I have been compelled to create this new genus for the very interesting and hitherto unrecorded species described below, because of the difficulty experienced in placing it definitely in either of the two genera it resembles. Externally it resembles the genus *Fimbria* Bohadsch, 1761,<sup>1</sup> but, on the other hand, it has several internal characters of the genus *Melibe* Rang, 1829.<sup>2</sup>

<sup>1</sup> Bohadsch.—*Animalibus Marinis*, 1761, pp. 54-64, pl. v, figs. 1-3; O'Donoghue, *Trans. Zool. Soc.*, xxii, 6, 1929, p. 715.

<sup>2</sup> Rang.—*Manuel de l'Histoire Naturelle des Mollusques*, 1829, p. 129, pl. iii, fig. b.

In *Fimbria fimbria* (Linné), the type of *Fimbria*, from the Mediterranean, the veil is large, the tentacles are not on long stalks, the foot is broad and the body is plump and elliptical and not elongated into a tail. The tufts and cerata are very small, the latter not so well defined as those of *Melibe*. In *Melibe rosea* Rang, the type of *Melibe*, from the Cape of Good Hope, the body is thin and elongated into a long tail, the foot is extremely narrow with a deep furrow along it, the veil is much smaller than that of *Fimbria*, being only about one-seventh the length of the body, and the tentacles are on long slender stalks. The presence of jaws, though minute, and the belt of horny processes lining the posterior portion of the stomach of *Melibe* are, according to most authors, the main differences between *Melibe* and *Fimbria*.

My species has the elliptic body, broad foot, and extremely large veil of *Fimbria*, but the small jaws and the belt of processes in the stomach of *Melibe*. I, therefore, propose the new generic name *Propemelibe* for this species, the only other specimen of which, to my knowledge, is in the Queensland Museum collection. Through the kindness of the Director of the Institution, Mr. H. A. Longman, I was able to examine it, and found it identical with mine, though it would probably have been a little larger in life. It was labelled M.O. 1297, *Tethys leporina*, Moreton Bay, Queensland, a name, I believe, suggested for it by Mr. T. Iredale when shown it while on a visit to the Queensland Museum. It was quite unknown there.

*Propemelibe mirifica*, sp. nov.

(Plate xxxiv, figs. 1-8.)

Animal very large, over a foot in length, gelatinous and fairly transparent, conspicuous. Foot very broad and solid, wider at the anterior end, rounded at the posterior end. A short neck joins the body to the head, which is extended into an enormous circular membranous mantle or veil, about 7-8 inches in diameter, as long as the foot and about half the size of the animal. When expanded the veil looks like a large jelly-fish. Round its thickened edges are about four rows of numerous irregular-sized cilia, the largest  $\frac{1}{2}$  inch long. The rows are interrupted for about two inches at the central posterior, and central anterior portion of the margins. Within the veil at the posterior end is a large rounded mouth with thick fleshy lips. The rhinophores are slender and retractile into large receptacles broad at their tops and slender at the base, situated about half-way along the dorsal surface of the veil and fairly far apart. Along each side of the dorsal surface are arranged from five to seven variously sized and bluntly shaped cerata with broad bases and their upper margins divided into mostly three lobes. One particular one, at the posterior end of the animal, was particularly large and striking, and was about four inches high and stood well up beyond the back of the animal. It was constantly in movement and was one of the first to be cast off. When removed from the water after being cast off, it gave out a sickly sweet smell, showed signs of life for several days, and when touched would curl up its edges and exhibit general movement. The remaining cerata, ranging from half inch to two inches in size, grew rapidly. They were colourless, except for minute speckling, and by the time the animal died had all been cast off.

The whole dorsal surface of the animal is covered with large and small blister-like pustules, which are capable of contracting and expanding. Along

the central back is a dense mass of fluffy branched filaments reaching from almost the tail-tip to about half-way along the centre of the veil, and in company with the pustules and cerata, these are constantly in movement.

On dissecting the animal, no radula was found, but a pair of small pale coloured jaws, 6 mm. in length, were found imbedded below the lips. They are almost membranous, thickened at their point of junction, with edges not denticulated, but faintly striated and undulated. The entrance to the stomach was blocked by stringy weed. The stomach has a small upper part divided from a larger lower part by a slight constriction. In the posterior portion of this lower area is a large belt of very conspicuous, dark greeny-brown, white-tipped, lancet-shaped plates, small ones of varying size intermingling with the large ones. There are about 40 of these plates and the largest is 8 mm. in length. The liver is divided into 5-7 masses of irregular-sized balls, rising just in advance of the horny plates on either side and extending to the cerata. The intestine is fairly short and broad, with a rather rounded portion where it meets the stomach. It turns to the right and terminates in a rosette-shaped anus on the right side of the dorsal surface of the animal. The penis is very broad, curved, and beak-shaped at the anterior end. The genital opening is about two inches above the anal opening.

The animal is transparent and gelatinous, with a beautiful pinky-blue tinge over it. The cilia round the veil are deep rose-pink, except the uppermost row, which is white. A minute speckling of rose-pink is over the animal, especially round the veil edge. Inside the veil edge is a deep border, about an inch wide, of this speckling, which shows through to the outer surface. Round the mouth opening a large patch of speckling also occurs. The pustules over the surface are rich rose-pink or white. The branched filaments along the back are a smoky-grey with a pinkish tinge. These are tipped with silvery-white. The small cerata had suggestions of pustules on them, but were practically colourless. The large one was a most vivid ornamentation to the animal. When on the animal it had a large thick rachis with the upper end expanded into a thick club-shaped structure. Gelatinous like the body, it had large fluffy white and ruby-red protuberances on it. On the upper portion of the side away from the body was a large brilliant magenta patch of colour with big white pustules on it. The branched filaments scattered over the animal were a pale brown with faint speckling on them. The foot was colourless.

Owing to preservation, much of the colour has already disappeared and the animal has considerably diminished in size.

*Loc.*—Off Cairns wharf, Queensland. Type, Australian Museum collection. Reg. No. C. 57494.

This very interesting and beautiful creature was captured in a bucket by the crew of the Colonial Sugar Refining Company's boat "Fiona", and brought to the aquarium at Taronga Zoo, Sydney, about 19th August, 1931. It was swimming about and no fisherman at Cairns had seen it previously.

While it was in the aquarium, where it lived for about a fortnight, observations were made upon it. When first placed there it was very active, swimming and rising to the surface constantly by somersaulting. No particular crawling powers were noticed, although it moved slightly backwards or forwards on its broad foot. At a temperature of 69° Fahr. it was very lively, but at 76° it became sluggish. Between 69°-72° suited it well. Its favourite position was resting on

the bottom of the aquarium on its broad foot with the extraordinary large veil raised. This veil expanded like a large plate and was swept over the sandy bottom with the cilia furiously moving. Material was then scooped up by folding the edges of the veil in until they came together over the mouth. When the veil was in a raised position I noticed that the action of folding and unfolding the edges together served almost as a magnet for sweeping in towards the mouth pieces of food in the water, as though a suction was set up. The weeds put in for food did not appeal to the slug, but it relished small pieces of prawn. Some fishes, *Zanclus canescens*, popularly known as Moorish Idols, placed in the same tank temporarily, ate the cilia on the veil and had to be removed.

The cerata grew rapidly, but were discarded easily. The big one, which constantly twisted and bent, came away just after the animal laid some eggs. The vivid colouring and the sickly sweet smell it gave off when removed from the water after being discarded are probably protective qualities.

The eggs were laid just at full moon, about six days after it was placed in the aquarium. The egg girdle was large and gelatinous with about sixty pale pink eggs in each capsule. These eggs gave a beautiful foamy pink appearance to the whole girdle.

A week after egg-laying the animal appeared sick, became sluggish, hid away in rock crevices, and when it did emerge suspended itself perpendicularly on its tail-tip with the veil up for long periods. Gradually the cerata were discarded, the filaments and pustules shrank, and the next day it died.

Family TETHYIDÆ.

Genus *Ramosaclesia* Iredale, 1929.

*Ramosaclesia* Iredale, Austr. Zool., v, 4, 23rd March, 1929, p. 352. Orthotype, *Aclesia glauca* Cheeseman, Proc. Zool. Soc., Lond., 1878, p. 277, pl. xv, fig. 4.

*Ramosaclesia rex*, sp. nov.

(Plate xxxv, figs. 1-6.)

Animal large, soft, plump and oval-shaped, with a fairly short head and stumpy tail. Two pairs of long linear tentacles are on the dorsal surface with branched filaments on them. Pleuropodial lobes small, united behind a large gill cavity. Mantle small, not covering the long curved gill. Foot very broad, terminating in the stumpy tail; squarely truncate at the anterior end, where it is laminated. Mouth large and round, sides of lips formed into two large flaps, giving the appearance of another pair of tentacles. Body covered with numerous simple or branched, almost transparent processes, the largest over an inch long. A row of the large filaments extends along each side of the central dorsal area from the tail to the head. Below this is another row of slightly smaller ones. All round and below them are numerous other branched and single processes. Round the entire edge of the foot is a thick line of the single filaments. Scattered over the surface of the animal are very small white and yellow hard pustules.

The body colour of the slug is light green with a bluish tinge towards the sides. Branched and single filaments are transparent light yellow-brown, with conspicuous black rings and dots on their bases, changing to fine black speckling on the upper part of the main stems and on the branches. Large and small

patches of black markings are over the dorsal surface. These extend into the tentacles and are dense round the head and sides.

When examined closely it is found that these black markings are formed by patches of black rings round the little hard pustules. Intermingling with them is fine black speckling, especially round the sides, round the mouth, under the labial flaps, and on the anterior and posterior portion of the foot. Standing out vividly against the green body colour of the animal is a double row on each side of the dorsal surface, about five in number, of rounded bright peacock-blue spots, with a narrow black band encircling them and a black centre spot. Gills pale colour, speckled with black. The inside of the pleuropodial lobes is pale green with scattered black spots and markings. Mantle similarly marked. Foot pale greenish colour.

Jaws easily recognized, large, broad and curved, olive-brown colour; radula dark brown, almost cordate shaped with about 30 rows of closely packed, long, slender, curved teeth with wider short bases. Some of these are plain, others have one or both edges serrated.

Eggs are laid in a dense, pale, greenish-yellow string-like mass, the string about 2 mm. wide.

Length of an average large specimen, 170 mm. extended and 61 mm. high; foot 61 mm. wide.

*Loc.*—Between twenty and thirty specimens were found by Master Rex Iredale in Manly Lagoon, Queenscliff, near Sydney, on the 3rd March, 1931. They were discovered just about the time of full moon, crawling on zosteria weed, and several had their eggs attached. Several specimens were brought to the Museum, six of which were taken to the Taronga Park Aquarium, where they lived for some time and were under observation. Type, Australian Museum collection. Reg. No. C. 57495.

They were very lively creatures, constantly crawling about and feeding voraciously on weeds placed in the tank. They elongated considerably when crawling, but assumed a hunched up, hare-like appearance when feeding or resting. Their favourite mode of crawling is in an almost continuous line with the head of one touching the tail of the other. The crawling movement was made by gliding the undersurface of the foot; the upper portion of the body did not undulate. Whether resting or crawling, the body appendages are constantly in motion. After crawling up the sides of the tank to the surface of the water, the animals would reach the bottom again by a somersaulting movement. The pleuropodial lobes are usually only opened for excretory purposes. After being a week in captivity several laid eggs. These remained intact for about six days, but gradually faded in colour, broke into small pieces and disappeared. More eggs were laid at the next full moon, after which the slugs gradually died, the last one on the 7th April, after being a month in captivity. On 12th April five more, including a little one, were placed in the aquarium. They were buried down at a depth of about eight feet in the same locality as the previous ones and were dragged up by an oar. These were smaller in size than the others, but were just as lively. One laid a mass of sage-green eggs, and all but one small one died during the last days of April.

Between the 2nd and 3rd of May, again at the time of full moon, thirteen of these slugs were found by Master Iredale, crawling on the mud, not weed, in the

same place about three feet down. After heavy falls of rain in the lagoon, the slugs were noticed buried deep down in the water and appeared quite sick, as though the addition of fresh water affected them and caused them to submerge to escape it. The second lot placed in the aquarium lived for about a month, except one small one, which died on or about 3rd September, after having been in captivity practically five months.

Only once previous has there been any record of these sea-hares being found in eastern Australian waters. About 1895, the late Charles Hedley found several specimens of this species on the zosteria flat at Rose Bay, Sydney Harbour. They were curled up, and with one exception were either dead or dying from, Hedley suspected, the volumes of fresh water which recent rains had poured into that place.

The species was referred tentatively to *Aclesia glauca* Cheeseman.<sup>3</sup> Hedley endeavoured to procure specimens from New Zealand, but was unsuccessful, as the species was rare there. When the specimens were found in Manly Lagoon, I enquired for New Zealand ones and received the same reply.

The Australian species seem larger, slightly differently coloured, with brighter body processes than the New Zealand ones. The spots on them are peacock-blue instead of emerald green, and the dark patches appear more numerous. Some teeth on the radula are serrated, whereas Cheeseman describes those of his species as simple, but the serrations may have been invisible.

I agree with Hedley that it is doubtful whether this, a non-swimming creature, would be the same species as the New Zealand one, and therefore propose a new specific name *rex* for the Australian one.

Genus *Tethys* Linné, 1758.

*Tethys* Linné, Syst. Nat. (10), 1758, p. 653. Type, *Tethys leporina* L., 1758.

*Tethys extraordinaria*, sp. nov.

(Plate xxxv, figs. 7-8.)

Animal very large, fleshy and active. When extended reaching almost to a foot in length. The two pleuropodial lobes are extremely large and expansive, are constantly in movement and when open expose the interior. They reach to a height of about 5½ inches from the foot edge, and are united behind, well down the tail. These lobes are used for swimming, a performance noticed in the animal under discussion while it was in captivity. The two dorsal tentacles long and linear. Frontal lobes wide. Gill plume large. Foot broad anteriorly, narrowing posteriorly.

This extremely large species of *Tethys* is easily recognized by its conspicuous marking and unusual colour. The body colour is a rich umber-brown, with numerous large white spots and dashes over the whole dorsal surface, especially towards the lower surface near the foot edges. Broad, irregular, longitudinal, white bands, with small white spots between them, outline the edges of the pleuropodial lobes, extending downwards. Fine black veinings cover the whole surface of the animal with numbers of small black spots adjacent to or on them. Two larger black spots are situated together near the frontal lobes.

<sup>3</sup> Cheeseman.—Proc. Zool. Soc., 1878, p. 277, pl. xv, fig. 4.

On the inside of the pleuropodial lobes are white bands similar to those on the outside, with white mottling scattered round them. The mantle is mottled with similar white marking. The gill plume is pale, touched with dark brown.

The shell is large, thin, and depressed, 75 mm. long, 56 mm. broad.

*Loc.*—Sydney Harbour, New South Wales.

This remarkable species, the largest sea-hare recorded so far from New South Wales, was placed in the Aquarium at Taronga Zoological Park early in April, 1931, where it thrived well for some weeks, and during that time laid from four to five lots of large rich yellow string-like masses of eggs. Towards the end of April members of the Aquarium staff caught five more specimens in Athol Bay, Sydney Harbour, in a net 125 feet long, thrown over about 300 yards from the shore. They remarked that they were very numerous in that part of the harbour at that time.

Only one specimen, the first to be placed in the tank, was preserved, and this is now in the Australian Museum collection. Reg. No. C.57496. Recently two specimens of undoubtedly the same species as this were found swimming at Bottle and Glass Rocks, Sydney Harbour, by Mr. G. P. Whitley. They were smaller than the type specimen, and although there were no distinct white longitudinal marks on the outside of the pleuropodial lobes, there was a suggestion of them on the inside of the lobes. Otherwise the animals were similar.

#### EXPLANATION OF PLATES.

##### PLATE XXXIV.

##### *Propemelibe mirifica*, gen. and sp. nov.

1. Side view with veil expanded.
2. Internal structure: b = buccal mass, n = nerve centre, p = penis, u = stomach, f = female orifice, h = belt of horny processes in stomach, i = intestines, c = pericardium, a = anus, l = liver, g = gastrohepatic apparatus.
3. Single large cerata fully developed, showing dark patch of colour.
4. Side view of cerata.
5. Jaws.
6. Belt of horny processes lining portion of stomach.
7. Side view of single process from the belt.
8. Branched filaments from the dorsal surface and cerata.

##### PLATE XXXV.

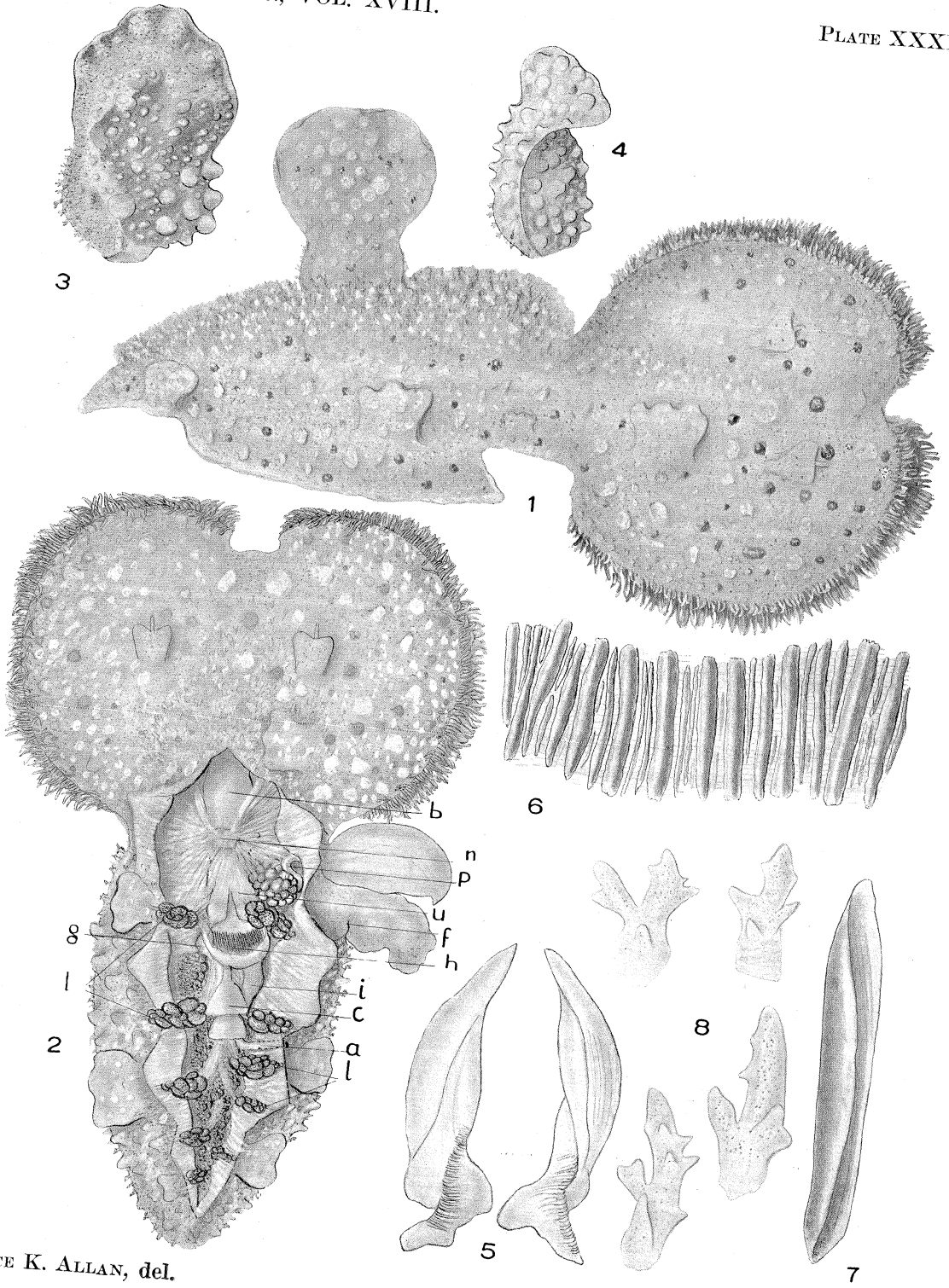
##### *Ramosaclesia rex*, sp. nov.

1. Side view.
2. Single jaw.
3. Teeth from radula.
4. Branched and unbranched filaments from the dorsal surface.
5. Dark spot from base of filaments, much enlarged.
6. Coloured spot on the dorsal surface, enlarged.

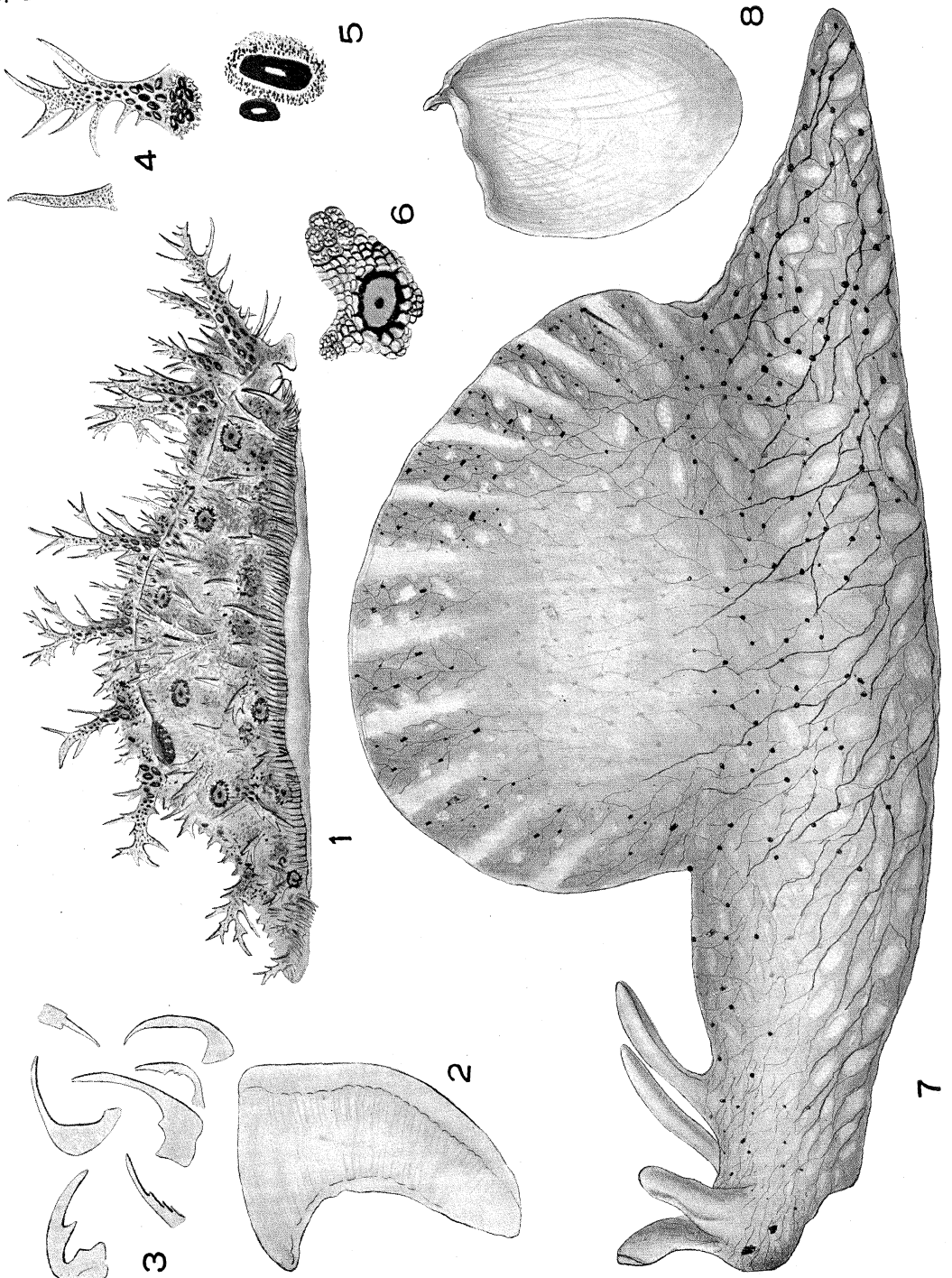
##### *Tethys extraordinaria* sp. nov.

7. Side view.
8. Shell.





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