guage differing equally from the Aymara and Quichua, called Puquina, and the early chroniclers speak of them as extremely savage, so much so that when asked who they were, they answered, they were not men but *Uros*, as if they did not belong to the human family. Whole towns of them, it is said, lived on floats of *totora* or reeds, which they moved from place to place according to their convenience or necessities.

REMARKS ON SOME CURIOUS SPONGES.

BY PROFESSOR JOSEPH LEIDY.

Among the many remarkable marine productions which puzzle the naturalist as to their relationship in the animal kingdom, is the *Hyalonema mirabilis* of the Japan seas. First described and named by Dr. John E. Gray, of the British Museum, this distinguished zoologist viewed it as a coral related with Gorgonia, or the Sea Fan.

The specimens of Hyalonema, as ordinarily preserved, appear as a loosely twisted bundle of threads converging to a point at one extremity of the fascicle and more or less divergent at the other. The threads bear so much resemblance to spun glass that the production has received the name of the Glass Plant. They are mainly composed of silex and are translucent, shining, and highly flexible. The fascicle is upwards of a foot and a half in length and near half an inch thick. The threads range from the thickness of an ordinary bristle to that of a stout darning needle.

Specimens of the Hyalonema fascicle, as they have been brought to us, almost invariably present some portion invested with a brown warty crust; the wart-like elevations terminating in a cylindrical ring with radiating ridges. These elevations are the individual polyps, continuous through the

intervening crust, of which Dr. Gray views the fascicle as the central axis.

In some specimens of the Hyalonema fascicle the narrow end is enveloped in a spongy mass, or as Dr. Gray observes, "a species of sponge." He supposes the sponge to be independent of the fascicle or "coral," though necessary to it as a means of attachment in its habitation. According to this view the fascicle with its warty crust, is a parasite of the sponge into which the fascicle is inserted. Dr. Gray remarks that "in general the specimens are withdrawn from the spongy base and the lower part of the axis is cleaned; but it is evident that they all are attached to such a sponge in their natural state."

When the writer first had an opportunity of seeing a specimen of Hyalonema, consisting of a fascicle partially invested with a warty crust, presented to the Academy of Natural Sciences of Philadelphia in 1860, and before he had seen an account of the remarkable production, his impression was that it was a silicious fascicle of a sponge, upon which a parasitic polyp had found a convenient and secure resting-place. M. Valenciennes had previously expressed a similar opinion, as observed in the introduction to Professor Milne Edwards' work on British Fossil Corals.

Notwithstanding the frequency of silicious threads entering into the composition of many sponges, Dr. Gray remarks, in referring the Hyalonema fascicle to a coral, that this is peculiar "as being the only body the animal nature of which is undoubted that is yet known to secrete silica; the spicules and axis of all the corals which had fallen under his observation being purely calcareous."

Professor Brandt of St. Petersburg views the fascicle and its warty crust as parts of a polyp, and the sponge mass as a parasite which attaches itself to the polyp, gradually penetrating its silicious axis, and finally killing it.

Dr. Bowerbank who has so extensively investigated the sponges in general, regards all three of the elements of the

Hyalonema—the fascicle, the warty investment and the sponge mass—as parts of one sponge. The wart-like elevations of the crust he views as oscules of the sponge.

Professor Max Schultze of Bonn, has published an elaborate memoir on the Hyalonema, accompanied by beautiful plates of perfect specimens preserved in the Museum at Leyden. He represents the fascicle and the sponge mass attached to one end as belonging together, while the warty crust is referred to a polyp, to which the author has given the name of *Polythoa fatua*.

To conclude these discordant views, we may add that of the distinguished micrologist Ehrenberg, who considers the fascicle as an "artificial product of Japanese industry."

The Hyalonema in Professor Schultze's work, is represented as a sponge mass of conical or cylindrical form with rounded summit, from which the rope of silicious threads projects. The sponge mass measures five inches long and three in diameter; the fascicle projects a foot and two inches. The sponge mass is described as composed of loosely interwoven cords of fine silicious needles. The entire surface, except the end opposite to the fascicle, is provided with numerous orifices about one line in diameter. The flattened end of this sponge mass is furnished with six orifices half an inch in diameter, communicating by canals in the interior with a system of interspaces finally ending in the smaller orifices of the surface generally.

The long silicious threads of the fascicle are composed of delicate concentric layers enclosing a fine central canal. The external layer appears to be composed of imbricating rings, most conspicuous toward the free end of the thread and almost or quite disappearing toward the other end. The arrangement reminds one of the appearance of the cuticle on the hairs of mammals. The projecting edges of the ring toward the free ends of the thread are most prominent and also form reversed hooklets.

Professor Schultze regards the sponge mass as situated at

the bottom of the fascicle, and its flattened extremity with the large oscules at the base. This appears to be the general view, but it has occurred to me that the sponge mass in its natural position was uppermost, and was moored by its glassy cable, or rope of sand, to the sea bottom, perhaps to marine algæ. This opinion is founded on the circumstance that in sponges generally the large oscules from which flow the currents of effete water are uppermost. The ends of the threads of the fascicle, with their reversed hooklets, are also well adapted to adhere to objects.

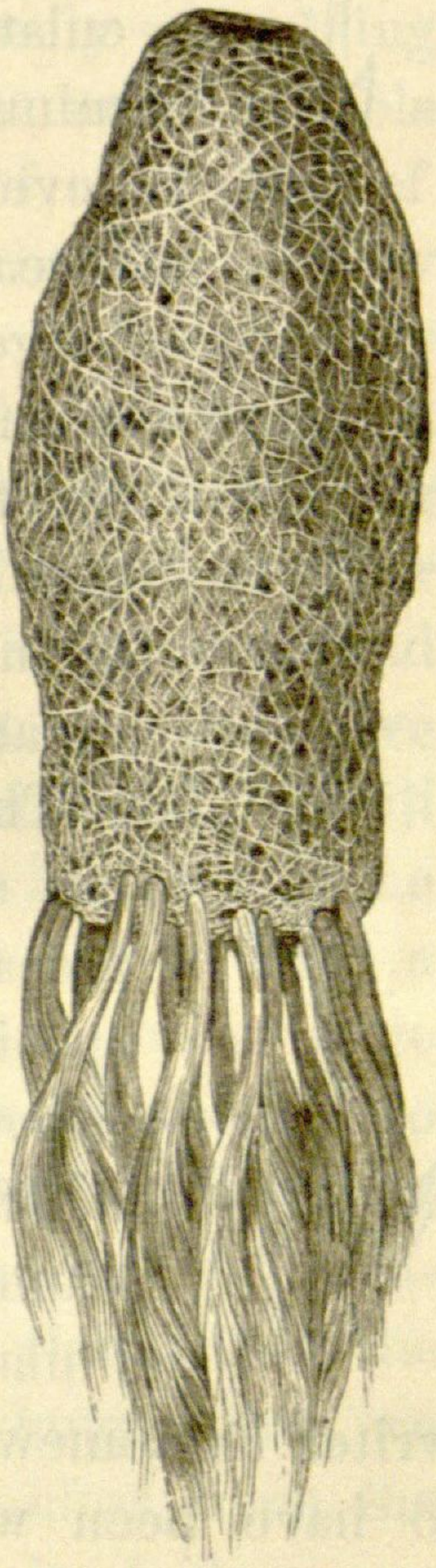
The equally wonderful and still more beautiful *Euplectella* of the Philippines was also at first represented upside down, as seen in the figure of Professor Owen in the "Zoological Transactions of London," the reverse of the position now assigned to it as represented in figure 76 of the third volume of the NATURALIST. In the same manner Euplectella and Hyalonema appear to me to be alike constructed so as to be anchored in position by the silicious threads, with their reversed hooklets. It may be that Hyalonema, in its home, is suspended by means of its glossy cable, but I think it highly improbable that it should either sit or be attached by the base of the sponge mass in which the large oscules are placed.

In the Proceedings of the Zoological Society of London for 1867, Dr. Gray observes that, according to Dr. William Lockart, "the Japanese Hyalonema is found growing on the rocks of the island of Enosima not far from Yokohama. The fishermen offer the sponges with their silicious fibres for sale to visitors at the temples of Enosima."

An entirely different sponge, apparently intermediate in character with Hyalonema and Euplectella, recently described in the Proceedings of the Academy of Natural Sciences of Philadelphia, under the name of *Pheronema*, would appear to throw some light upon the question of what belongs to Hyalonema. The specimen, obtained from the island of Santa Cruz, W. I., is preserved in the Museum of

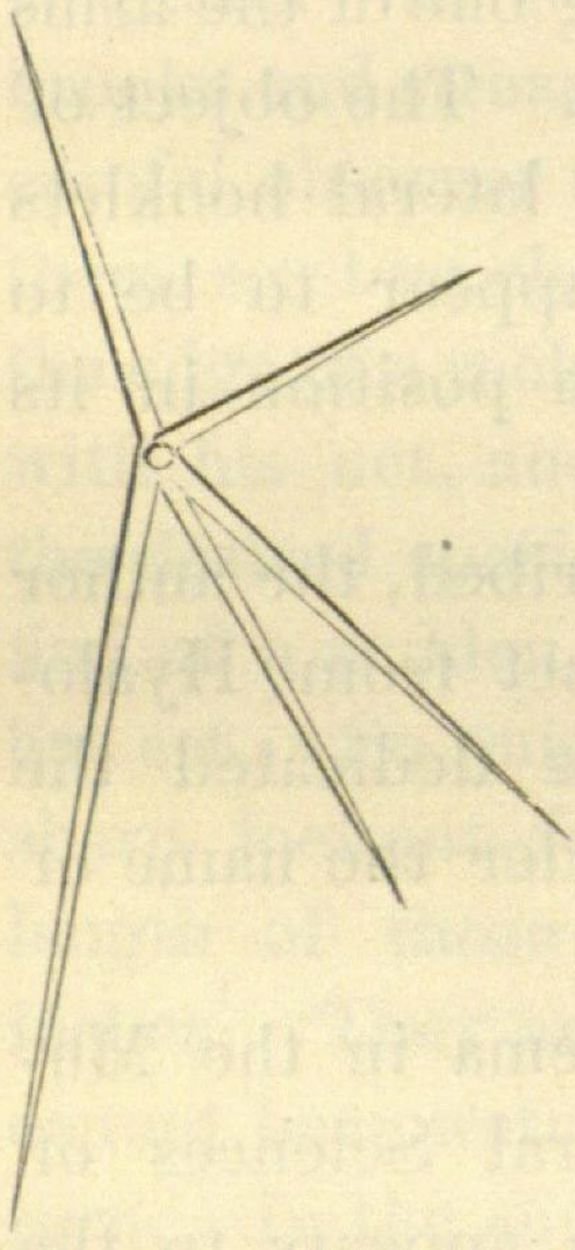
the Academy. It is represented in the accompanying figure (Fig. 10), one-half the natural size. The body of the sponge is oblong ovoidal, with one side more protuberant than the other. The narrower extremity, which I suppose to be the upper, is conical, and its truncated apex presents a single, circular orifice, the third of an inch in diameter. The opposite extremity is rather cylindrical with a broad, slightly rounded extremity, from which project numerous fascicles of silicious threads.

Fig. 10.



The sponge body is of a light brown hue, and rigid to the feel. Its surface exhibits an intricate interlacement of the sponge tissue, which appears mainly composed of stellate, silicious spicules of various sizes. The coarser spicules of the surface, of which one is represented in Fig. 11, three times the diameter of nature, have five rays. Four of these together are irregularly cruciform, while the fifth projects in a direction opposed to all the others. They appear to be so arranged that the crucial rays interlace with those of the contiguous spicules, forming a lattice work on the surface of the sponge, while the odd ray opposed to the others penetrates the interior of the sponge. The finer tissue, seen through the intervals of the latticed arrangement on the surface of the sponge, appears to be made up in the same manner of finer stellate spicules. Some of the largest stellate spicules of the surface have a spread of half an inch.

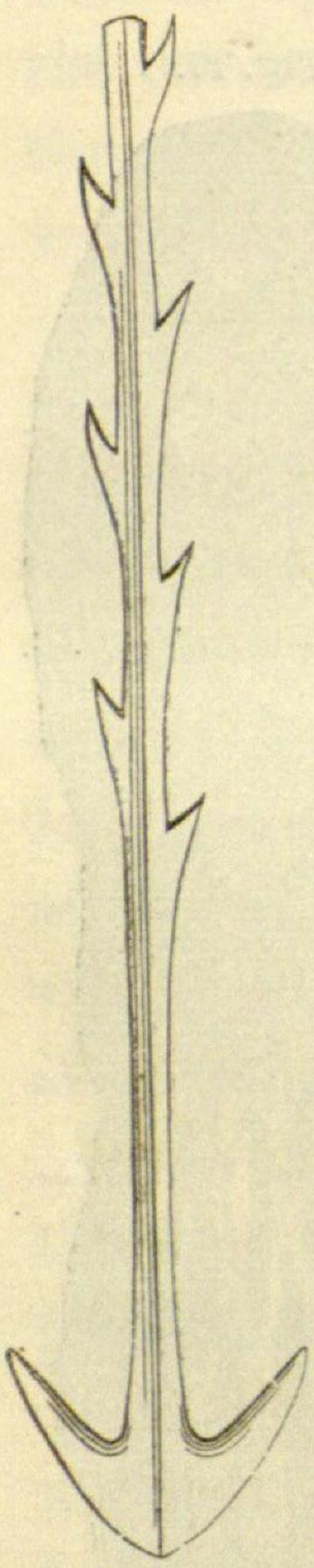
Fig. 11.



The fascicles of silicious threads projecting from the body

of the sponge are upwards of twenty in number and over two inches in length. They resemble in appearance tufts of blonde human hair. The individual threads are nearly like those proceeding from the lower end of Euplectella. Where thickest they are less than the $\frac{1}{200}$ of an inch in diameter, and become attenuated towards the extremities. At first, as they proceed from the body of the sponge, they are smooth and then finely tuberculate. The tubercles are gradually replaced by minute recurved hooks, which become better developed approaching the free end of the threads which finally terminate in a pair of longer opposed hooks, reminding one of the arms of an anchor, as seen in Fig. 12. The object of the tufts of threads, with their lateral hooklets and terminal anchors, would appear to be to maintain or moor the sponge in position in its ocean home.

Fig. 12.



The singular sponge thus described, the author has attributed to a genus distinct from Hyalonema and Euplectella, and has dedicated the species in honor of his wife, under the name of *Pheronema Annæ*.

Of the specimens of Hyalonema in the Museum of the Academy of Natural Sciences of Philadelphia, there is one which appears to the writer as somewhat significant. The fascicle would appear to have been withdrawn from its sponge body and lain sometime in the sea before it was found. This is inferred from the fact that the Polythoa crust reaches to within an inch and a half of the end, which in the natural condition is inserted in the sponge mass. Two sharks eggs are also attached to the fascicle by their tendrilled extremities, and one of the tendrils clasping the fascicle is included in the polyp crust.