Report on a Collection of Freshwater Sponges from Japan.

BY

N. Annandale, D. Sc.,

Indian Museum, Calcutta.

(With Plate II).

Thanks to the kindness of Prof. I. Ijima and Prof. A. Oka I have recently had the opportunity of examining a collection of Japanese freshwater sponges which these gentlemen have generously presented to the Indian Museum. Little is known of the Spongillinae of Japan, and I have great pleasure in responding to Prof. Ijima's request for a report on the collection.

Three species[1] have hitherto been recorded from Japan, *viz.* *Ephydatia fluviatilis*, *E. japonica* (as *E. fluviatilis* var. *japonica*) and *E. mülleri*. In the collection under review two of these (*E. japonica* and *E. mülleri*) are represented, and also one other known species and one which I take to be new to science. The known species is the widely distributed *Spongilla fragilis*. Three of the five species now known to occur in Japan, have therefore an extensive geographical range, while two have not as yet been found elsewhere. Of the former, *S. fragilis* and *E. fluviatilis* have been recorded from tropical Asia, Australia and Siberia as well as from Europe and N. America, while *E. mülleri* is widely distributed in the Holartic Region and is represented in India by a closely allied form, namely *Ephydatia meyeni*.

Although other species of Spongillinae doubtless still remain to be discovered in Japan, the apparent prevalence of the genus *Ephydatia* is noteworthy, for this genus is represented by no less

---

1) Weltner, "Spongillienstudien III", in *Archiv f. Naturgesch.*, 1895, Bd. I.

than four of the five known species. In Europe about a dozen species of the subfamily are known, and of these only three represent *Ephydatia ;* while in India I have examined specimens of twenty-one species, of which three also belong to *Ephydatia*.

The following is a detailed account of the collection sent by Prof. Ijima :—

Genus **Spongilla,** auctorum.

Subgenus *Spongilla*, Wierzejski.

Spongilla fragilis, Leidy. (Pl. II, fig. 1).

S. fragilis, *Potts*, *Proc. Acad. Nat. Sci. Philadelphia*, 1887, p. 197, pl. V, fig. ii ; pl. VIII, figs. i, ii, iii, iv.

As the Japanese specimens perhaps differ in some slight particulars from those found in Europe and America, it will be well to describe them carefully.

SPONGE moderately hard and brittle, forming a thin layer on solid objects ; its external surface covered with minute ridges and projections ; the oscula small but conspicuous, being situated on low, broadly conical eminences from which branching canals radiate beneath the dermal membrane ; pores inconspicuous, minute, scattered. *Colour* (in alcohol) pale sepia-brown.

SKELETON consisting of broad but not very coherent primary fibres and distinct transverse ones.

SPICULES.— *Skeleton spicules* smooth, stout, sharply pointed, as a rule feebly curved. *Gemmule spicules* slender, blunt or bluntly pointed, feebly curved, often somewhat swollen in the middle and at the ends, covered with minute spines.

GEMMULES bound together in groups of various sizes ; each

gemmule small, spherical, provided with a thick coating of relatively large polygonal "air-cells" arranged in several or many tiers; with a single aperture, to which is attached a long, stout foraminal tubercle; the *foraminal tubule* projecting outwards from the side and then bending downwards, expanding slightly towards the distal end. *Gemmule spicules* somewhat scanty, arranged irregularly, sometimes forming two layers, one of which is in contact with the chitinous coat of the gemmule, while the other lies on the external surface of the outermost tier of "air-cells".

MEASUREMENTS:—

Average length of skeleton spicule	0.2924	mm.
Greatest diameter of skeleton spicule.	0.016	,,
Length of gemmule spicule	0.088–0.1	,,
Greatest diameter of gemmule spicule.	0.004	,,
Diameter of single gemmule (without "air-cells")	0.272–0.306	,,

HABITAT: Pond in the grounds of the University of Tokyo, Japan November, 1908.

The specimens, containing many immature gemmules and having clearly been in a vigorous condition when killed, would suggest that in Japan, as in other temperate climates, gemmules are produced at the approach of winter. In India, on the other hand, gemmules are produced, in most species, mainly at the approach of the hot weather although the winter months are here the driest as well as the coolest.

One of the specimens has its substance pervaded by the tubes of a Polyzoon of the genus *Plumatella*, as is often the case as regards freshwater sponges of many species in Europe, Africa and Asia.

Genus **Ephydatia**, Lamouroux.

Ephydatia semispongilla, sp. nov. (Pl. II, fig. 2).

SPONGE forming filmy layers of small extent and generally of a

more or less circular outline on the leaves of water-plants; *consistence* soft, friable, very delicate; *dermal membrane* extremely delicate. Often, owing to the dropping out of the gemmules, the sponge has a honeycomb-like appearance. In alcohol there is practically no colour except that derived from the gemmules, which are yellow.

SKELETON quite incoherent.

SPICULES. *Skeleton spicules* long, very slender, sharply pointed, smooth but occasionally a little irregular in outline, as a rule feebly curved. *Gemmule spicules* long and slender; the rotulae feebly developed, consisting merely of a circle (or more usually of a couple of circles) of more or less recurved spines, which are considerably longer and stouter than the straight or nearly straight spines sparsely scattered on the shaft; the shaft more or less curved, of the same width throughout. *Free microscleres* absent.

GEMMULES relatively large and numerous, adherent to the support of the sponge but not strongly so; the *granular layer* well developed except on the extreme top of the gemmule, which presents an almost bare surface; the *spicules* arranged vertically and tangentially in the granular layer (from which they often project considerably), in a single row; the single *aperture* situated at the base of the gemmule, provided with a short, stout, straight *foraminal tubule*, which expands at the distal extremity.

MEASUREMENTS:—

Length of skeleton spicule	0.289-0.391 mm.
Greatest diameter of skeleton spicule	0.008-0.01 ,,
Length of gemmule spicule.....	0.076 ,,
Diameter of shaft of gemmule spicule	0.004 ,,
Diameter of rotule of gemmule spicule.....	0.002 ,,
Diameter of gemmule	0.425-0.561 ,,

HABITAT:—Kasumi-ga-Ura, Hitachi Province, Japan (Dr. A. Oka); November 1906. Some specimens from the locality taken a month earlier probably belong to the same species but are devoid of gemmules.

This sponge resembles some of the species of the subgenus *Euspongilla* (genus *Spongilla*) in more than one respect but is clearly an *Ephydatia*. The feeble development of the rotules of its gemmule spicules is a character which it shares with some forms of *Ephydatia crateriformis*, a North American species with which the Indian *E. indica* is probably identical. I have pointed out elsewhere, however, that there is considerable seasonal variation as regards the form of the birotulates in *E. indica* [1].

Ephydatia japonica (Hilgendorf). (Pl. II, fig. 3).

Spongilla fluviatilis *var.* japonica, *Hilgendorf, S.-B. Ges. Naturforsch. Freunde Berlin* 1882, p. 26.

Ephydatia fluviatilis *var.* japonica, *Weltner, Archiv f. Naturgesch.* 1895, Bd. I, pp. 123, 134.

This sponge was originally described from Tokyo by Hilgendorf, who regarded it as a variety of *Ephydatia fluviatilis*. Weltner apparently examined the type, which is in the Berlin collection, and also assigned it to *E. fluviatilis*. After examining a specimen collected by Dr. Oka in Lake Aoki, Shinano Province, however, I find myself forced to regard the form as distinct species, which may be recognized by its smooth skeleton spicules and short-shafted birotulates with no spines on the shaft but with deeply serrated rotules. The following are the measurements of the spicules and gemmule in the specimen I have examined, compared with those given by Hilgendorf:—

		(Hilgendorf)
Length of skeleton spicule..	0.238--0.272 mm.	—0.343-0.38 mm.
Greatest diameter of skeleton spicule	0.012-0.02 ,,	.—0.014-0.017 ,,
Length of birotulate	0.016' ,,	.—0.029 ,,

1) Rec. Ind. Mus vol. I, p. 273.

Diameter of rotule	0.018	mm.—0.023 mm.
Diameter of shaft of biro-		
tulate	0.0004	,, .—0.0006 ,,
Diameter of gemmule.....	0.68	,, .—0.441 ,,

The gemmule has a short, straight, broad but very delicate foraminal tubule.

Dr. Oka's specimen, which was taken in December 1899, was evidently dead or moribund when obtained. Few cells remain and I am unable to say whether vesicular cells, the presence of which in the parenchyma is characterestic of *E. mülleri*, were present or not.

Ephydatia mülleri Lieberkühn.

E. mülleri, *Weltner*, *op. cit.* p. 125.

This species is recorded by Weltner from Yedo. There is a small but typical specimen in the collection sent me by Prof. Ijima It was collected by Dr. Oka at Kameido near Tokyo in October, 1901 and was evidently in a vigorous condition when killed, although. it contains numerous gemmules.

The following "key" to the Japanese species of *Ephydatia* may be useful to naturalists in Japan, but it must be used with caution in view of the fact that other species may yet be found.

Key to the species of Ephydatia recorded from Japan.

A. *Shafts of the birotulates curved; rotulae feebly developed.*

a. Skeleton spicules smooth, very slender. Gemmules adherent, with the aperture at the base .....*E. semispongilla.*

B. *Shafts of birotulates straight.*

a. Skeleton spicules smooth. Shafts of birotulates much longer than the diameter of the rotulae, which are not deeply indented ..... *E. fluviatilis.*

b. Skeleton spicules smooth. Shafts of birotulates smooth, not much longer than the diameter of the rotulae, which are deeply serrated ..... *E. japonica.*

c. Some or all the skeleton spicules rough in the middle. Shafts of some of the birotulates bearing spines, of all not much longer than the diameter of rotulae, which are deeply and irregularly serrated ..... *E. mülleri.*

Explanation of Plate II.

Figs. 1, 1a, 1b. *Spongilla fragilis* from Tokyo.

Fig. 1. Skeleton spicules.

Fig. 1 a. Young gemmule spicules.

Fig. 1 b. Fully formed gemmule spicules. All × 240.

Figs. 2, 2 a, 2 b, 2 c. *Ephydatia semispongilla*, sp. nov.

Fig. 2. Fragment of skeleton, × 70.

Fig. 2 a. Gemmule from above, × 70.

Fig. 2 b. Skeleton spicules, × 240.

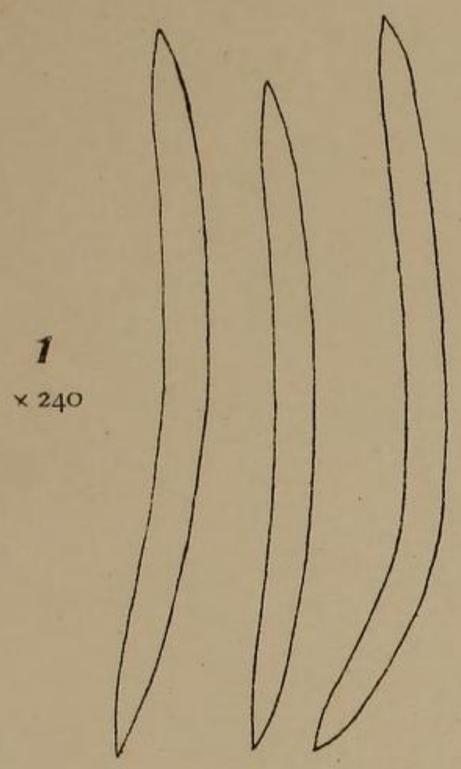
Fig. 2 c. Birotulates, × 240.

Fig. 3, 3 a. 3 b. *Ephydatia japonica*.

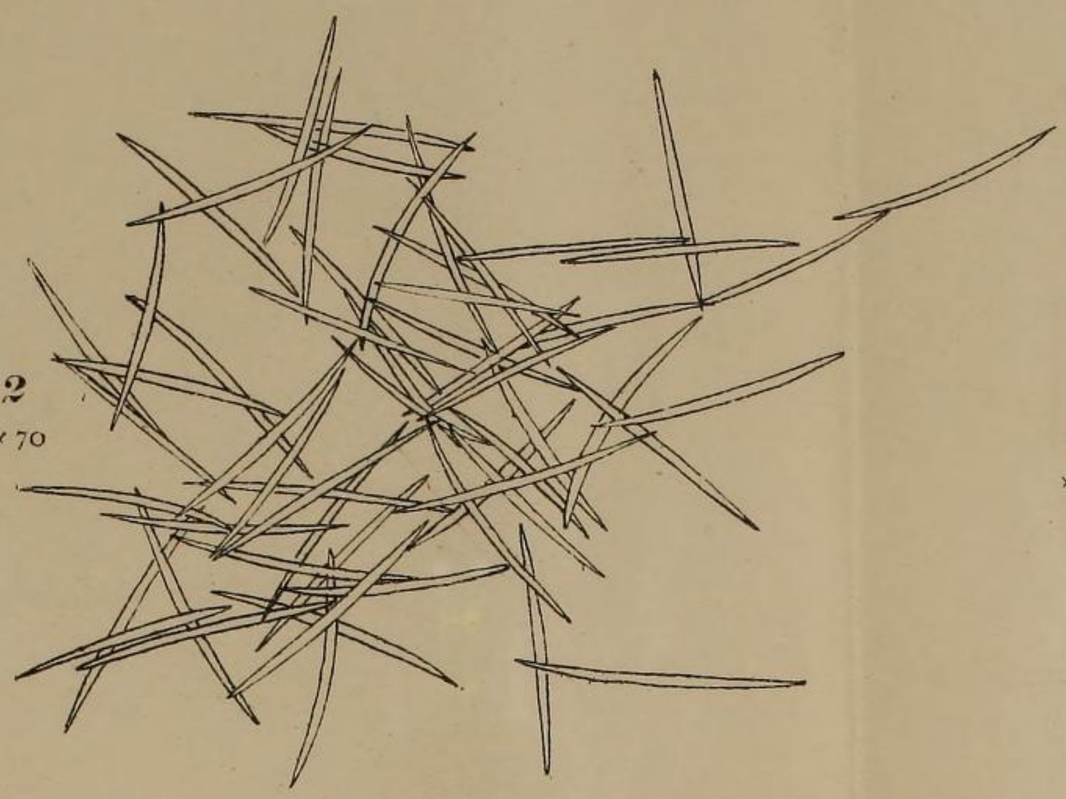
Fig. 3. Gemmule, × 70.

Fig. 3 a. Skeleton spicules, × 240.

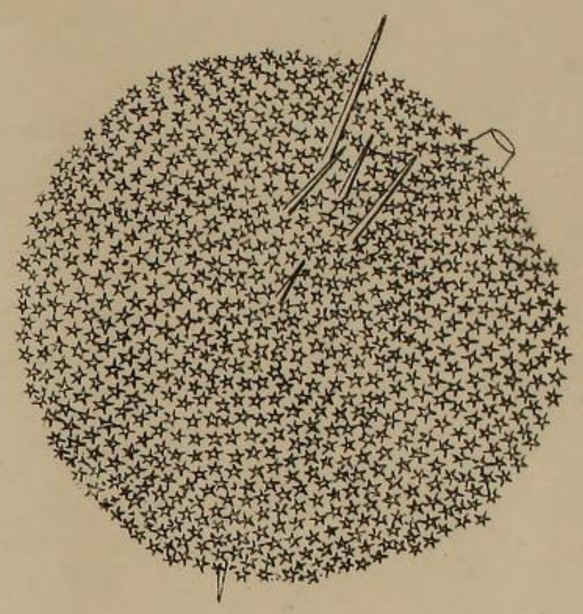
Fig. 3 b. Birotulates, × 240.



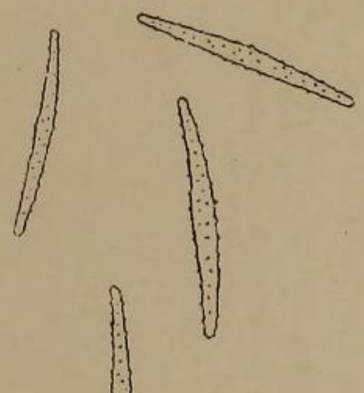
1
× 240



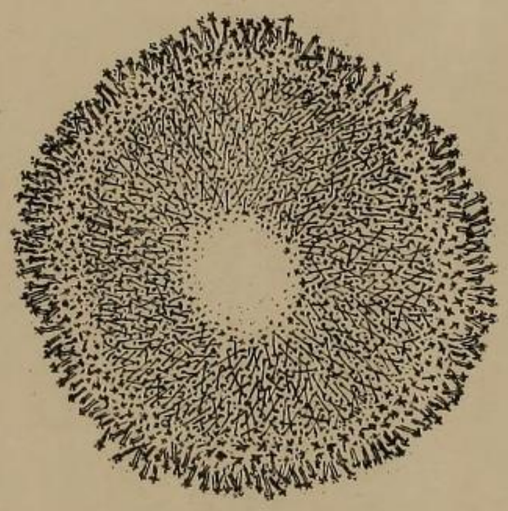
2
× 70



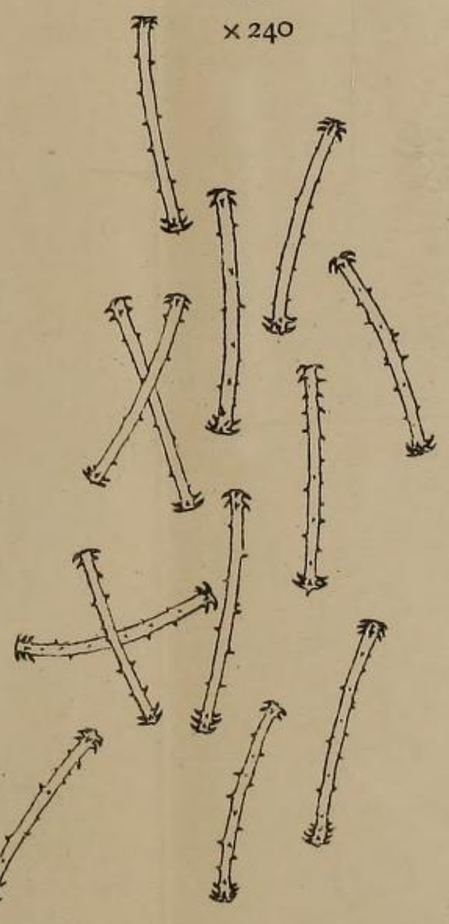
3
× 40



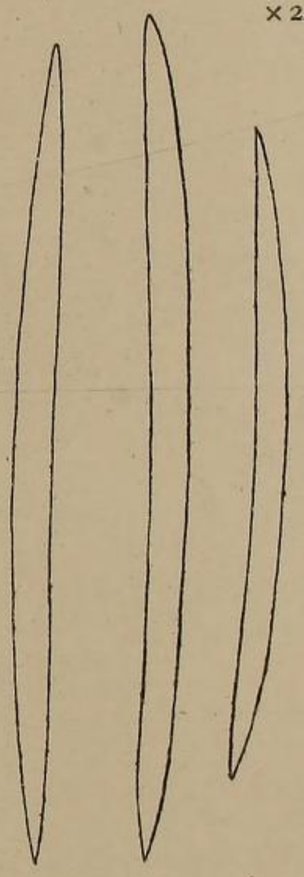
1a
× 240



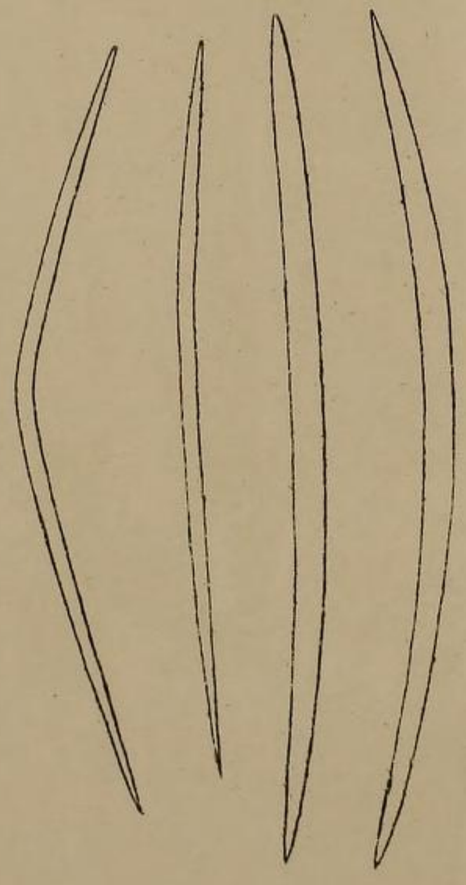
2a
× 70



2c
× 240

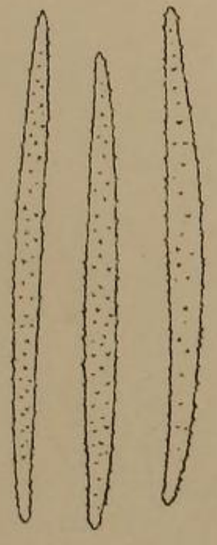


3a
× 240



2b
× 240

3b
× 240



1b
× 240

Annandale: Japanese Freshwater Sponges.