

THE FRESH-WATER SPONGES OF SIAM.¹

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(With Plates 24 and 25)

HISTORICAL NOTE.

Very little intensive work has been done upon the fauna of the fresh waters of Siam, and this statement is especially true of the fresh-water sponges. Through the kindness of Dr. H. M. Smith of the Siamese Department of Fisheries we have recently received specimens of two species of sponges from that country. Since so little has been done on this subject we think it altogether worth while to bring the records up to date.

The earliest record of the collection of a specimen of fresh-water sponge in Siam appears to be that made by Dr. R. Evans at Legeh in the interior of the Province of Pattani, southeast of Singora, Peninsular Siam, in 1899. Dr. Evans described this sponge as a new species, *Ephydatia blembingia*, in the Quarterly Journal of Microscopic Science in 1901.

Dr. N. Annandale, of the Zoological Survey of India, and Mr. H. C. Robinson made an expedition to Siam in 1901-1902 and found only a very few indeterminate specimens. They visited also the Federated Malay States at that time and failed to find any sponges at all. Again in 1915 and 1916, Dr. Annandale visited the regions around Penang and Singapore which are apparently very favorable localities for the growth of sponges, but he failed to find any sponges. From his observations, Dr. Annandale concluded, "There can be no doubt, therefore, that in most parts of Malaya, as in Ceylon, some unknown obstacle to the growth of sponges is wide-spread in fresh water." We have also been in correspondence since that time with the authorities in the Singapore Museum and they inform us that, so far as they know, no freshwater sponges have been found in the Federated Malay States. This information would seem to confirm Dr. Annandale's conclusion.

¹ Parts of this paper have already appeared in a preliminary account of the subject published in Vol. VIII, part 2, of the Natural History Supplement of the Journal of the Siam Society, 1930.

SPONGES OF TALE SAP, SIAM.

In 1915, Dr. Annandale made a hurried trip to Tale Sap, or the Inland Sea, near Singora in Peninsular Siam, for the purpose of making a study of the fauna of that lake with a view to comparing it with that of other similar lakes elsewhere. In his article in the *Journal of the Natural History Society of Siam* in 1916, he has the following to say concerning the freshwater sponges observed on that trip: "The only sponges (three species) found in Tale Sap belong to the cosmopolitan freshwater genus *Spongilla*, and one of them cannot be separated specifically from the common European *Spongilla lacustris*. Dry specimens of this species were found in a field near Pak Payun, where they had been left by a retreating flood. Specimens of two species were found at Lampam. One of these (*Spongilla nana*) I recently described from the Chilka Lake in Orissa, while the other is a particularly interesting new species of the sub-genus *Eunapius*. So far as I am aware, these are the only freshwater sponges (with the exception of *Ephydatia blembingia* Evans, from the Province of Pattani) as yet found either in the Malay Peninsula or in Siam; so far as it is yet known, the aquatic fauna of these countries offers a striking contrast to that of India and Burma in the poverty of its *Spongillidae*."

The sponges found by Dr. Annandale were all in the inner lake where the water contains only a very small amount of salt. The outer lake contains a much higher percentage of salt as the water enters that lake directly from the sea with the rise and fall of the tides: this salinity renders the water of this lake unsuitable for the growth of most freshwater sponges.

In the *Memoirs of the Asiatic Society of Bengal*, Vol. 6, Part 4, pp. 207-210, fig. 6, in 1918, Dr. Annandale described and illustrated the new sponge from Tale Sap, found some two years before, as *Spongilla potamolepis*.

A NEW RECORD FOR SIAM.

On March 11, 1929, Dr. H. M. Smith of the Department of Fisheries of Siam secured specimens of a fresh-water sponge from Nong Han, a large lake in Eastern Siam. These sponges are

described as having been very abundant on living bushes on an island in the lake. They were dry and from 6 to 10 feet above the water level at the time of collection and were incrusting the branches of the bushes between the leaves and had grown there during a flood period when the waters covered the bushes. This sponge is a typical *Spongilla carteri*. We find nothing in the structure, the gemmules, or the spicules to differentiate it from the type form.

A NEW VARIETY OF SPONGE?

In 1929 Dr. Smith collected another very interesting sponge which had grown on the bark of submerged poles in a small pond in Bangkok in the grounds where offices of the Ministry of Lands and Agriculture were then located. Unfortunately this sponge does not contain any gemmules and its identification without them is unsatisfactory, so we must delay final decision upon it until more material bearing gemmules can be collected at other seasons of the year. Dr. Smith has kindly agreed to see to this collection for us. Our identification of this sponge is tentative.

NEED OF MORE MATERIAL FOR STUDY.

The freshwater sponges of both India and the coastal provinces of China have been studied, and it will be most interesting to make a comparison of the sponges from Siam with those already known from the other two countries. We would be very glad indeed to receive further materials representing this group from as many different localities in Siam as possible and to undertake a study of Siam's freshwater sponges. We hope that both Dr. Smith and other students of biology will assist in getting together a representative collection.

DETAILED DISCUSSION OF THE SPECIES.

Following is a detailed account of the six forms of freshwater sponges now known from Siam.

Spongilla lacustris auct. (Fig. 1)

Historical statement. Dr. Annandale stated in his article in the Journal of the Natural History Society of Siam, Vol. 2, p. 95,

1916, on the Fauna of the Inland Sea of Singora, that dry specimens of *Spongilla lacustris* were found in a field near Pak Payun, where they had been left by a retreating flood.

Habitat. This sponge may be found in flowing or still waters and adapts its habit of growth to its environment.

General characteristics. In still waters it frequently sends out long free cylindrical branches from a rounded or flattened base by which it is attached to its support. In rapidly moving waters it may form a small mass and not branch at all. All intermediate degrees of form may be found under varying conditions. It is a very variable sponge.

Color. When growing in strong light this species is very often a bright green in color due to the presence of a symbiotic fresh-water alga which grows freely in it. In the shade, it varies in color from a pale yellowish brown to a much darker color.

Structure. Radiating fibers are usually quite distinct and extend throughout the length of the branching forms; these are bound together at intervals by more or less regular transverse fibers. The fibers are generally slender and the sponge is often loose and fragile in structure.

Skeleton spicules. The skeleton spicules are slightly curved or straight, smooth, thin, gradually and sharply pointed. They vary from about 200 to 330 μ in length and are 6 to 15 μ in thickness.

Flesh spicules. The flesh spicules are very variable. They are small, 70 to 130 μ long, by 2 to 8 μ in thickness; curved, rarely straight, more or less thickly covered with small spines. They are usually sharp-pointed, though blunt-ended ones are sometimes present.

Gemmules. The gemmules usually lie freely in the meshes throughout the entire sponge. They are as a rule covered with a thick granular coat in which the spicules are embedded tangentially. They vary much in size; average ones measure from 500 to 600 μ in diameter.

Gemmule spicules. The gemmule spicules are also very variable. They resemble somewhat the flesh spicules but are often deeply bowed, forming almost semicircles. They are usually more

bluntly ended and bear heavier spines than the flesh spicules. Often the spines are curved and may be larger and more numerous near the ends of the spicules. They vary from 80 to 130 μ in length and from 3 to 10 μ in thickness.

Type. The type is not known.

Distribution. It is common in Europe and North America and is known in northern Asia.

Remarks. Annandale has the following comments on this species in the Memoirs of the Asiatic Society of Bengal, Vol. 6, p. 208, 1918: "These specimens consist of several dried fragments found lying in a field at the edge of the inner lake near Pak Payun. They had evidently been torn from their support and cast up on the field by a flood that had occurred some weeks previous to my visit. The basal membrane, which seems to have been attached to a branch or a rough stone, is intact, but the epidermal membrane has entirely disappeared. The sponge is hard and rather brittle, the skeleton comparatively stout; most of the skeleton spicules are normal, but many have one or more annular swellings. All are otherwise smooth. The flesh spicules, which are numerous, are slender, closely and regularly spined in the middle but smooth or nearly smooth at the ends..... There are no gemmules. There is no trace of buds on the surface of the sponge, which bears short irregular branches or prominences. The specimens were bright green when found, but the color had faded somewhat". He also states that "though they possess certain peculiar characters, they must be assigned provisionally to this species", i. e., *S. lacustris*.

***Spongilla nana* Annandale. (Figs. 2 and 3)**

Historical statement. Annandale described this new species in 1915 in the Memoirs of the Indian Museum, Vol. 5, pp. 32-34, from specimens collected "in a small bay at the base of Patsahanipur promontory, Chilka Lake, Orissa, 26-1-'14." In 1918 he records in the Memoirs of the Asiatic Society of Bengal., Vol. 6, Pt. 4, p. 208, the finding of this sponge at the mouth of the Patalung river at Lampam, in the inner lake of the Tale Sap. We have not seen the gemmules of this species and have only a tiny bit of the sponge kindly given us

by the Indian Museum. Our description is therefore based upon Annandale's original description.

Habitat. The sponges from Chilka Lake were found forming small spheres or cushions attached to the stems of water plants among decaying vegetation in stagnant water in the lake. The salinity of the water was about 1.006.

The Tale Sap specimens were attached to twigs and formed minute cushion-shaped masses. The water in this case was practically fresh, though it was possible for the salt water to come through the outer lake and thus gradually reach the inner lake. The outer lake, which opened through a narrow channel to the sea, showed a salinity at 15° C. of from 1.0035 to 1.0085 in various parts. Only a narrow channel connects the inner lake with the outer one and the salinity at that point was 1.002; it is therefore likely that the water is quite fresh at Lampam.

General characteristics. "The sponge forms spherical or cushion-shaped masses that do not exceed and indeed rarely reach 5 mm. in diameter..... The whole structure is extremely fragile. There is, as a rule, a single osculum, and in some specimens a cylindrical central cavity can be detected extending downwards almost to the base of the sponge. The subdermal cavity is ample and the general arrangement of the canals and apertures resembles that found in *Spongilla alba*. There is little or no horny matter at the base of the sponge, which is attached lightly to its support."

The small bit of this sponge which we have forms a very thin smooth layer over the branches around the node of a small water plant for a few millimeters only. The surface is hispid, the ends of small spicule bundles projecting above the surface.

Color. Our small specimen in alcohol shows the same color which Annandale noticed both in living and in preserved material, "pale yellowish or buff."

Structure. "The skeleton has a distinctly radial arrangement, but contains very little horny matter. The radial spicule fibers are distinct but slender and feebly coherent. They can frequently be traced from a point near the center of the sponge to its surface, where they project as spines. The transverse fibers are,

however, imperfectly differentiated and in many places represented merely by an irregular network of single spicules. No distinct subsidiary skeleton can be detected."

Skeleton spicules. "The spicules in many respects resemble those of *S. alba*, but as a rule are more attenuated and irregular. The macroscleres in particular are remarkable in the latter respect. Some are sparsely and minutely spiny, but their irregularity of outline, the precise nature of which is best indicated by a figure (fig. 2), is often of a more general nature. The spicules of this type are sharply pointed at both ends and as a rule slightly and regularly curved," average length of skeleton spicule 192 u, thickness 10 u.

Flesh spicules. "The free microscleres are slender, spindle-shaped, sharply pointed slightly curved amphioxi, covered fairly uniformly with short straight blunt spines. They are numerous both in the parenchyma and in the dermal membrane." Length 10.2 u thickness 1u.

Gemmules. "The gemmules, though the sponge is never bulky enough to contain many of them, are fully formed and relatively large. They possess a thick pneumatic coat including many spicules. The single foramen is armed with a horny cup or short tubule. The spicules are for the most part tangential to the inner coat but a large number stand upright, or nearly upright..... There are also a few horizontal spicules on the surface." Diameter of gemmule 270 u.

Gemmule spicules. "The gemmule spicules are slender and, also exhibit a slight and regular curvature. As a rule they are distinctly mucronate at both extremities, but sometimes one end is blunt. They bear short, straight, sharp spines, which are fairly numerous at and near the extremities and sometimes a little retroverted in this region. The middle of the shaft is often bare or has only a few isolated spines." Length 98 u, thickness 5 u.

Type. The type is in the collection of the Indian Museum.

Distribution. It has been found only in Chilka Lake (type locality) and in the inner lake of Tale Sap.

Remarks. Annandale at first considered this sponge as an

abortive or abnormal individual of *Spongilla alba*, but later came to the conclusion that it was a distinct species. The spicules of both *S. alba* and *S. nana* seen to be very close to some of the forms of *S. lacustris*. We question the validity of the separation of species on the basis of external and temporary characteristics when the less variable elements, the spicules and the gemmules, are so very similar.

***Spongilla carteri* Gee. (Fig. 4)**

Historical statement. These specimens were sent to me by Dr. H. M. Smith. They were collected in Nong Han, Eastern Siam, on March 11, 1929. This is the first record of this species from Siam.

Habitat. The specimens were taken from living bushes in a large swamp where they were left above the water level by the receding floods. Dr. Smith writes: "They had been growing on bushes temporarily submerged but at the time of my visit the bushes were six to ten feet above the water and the sponges were incrusting the branches between the leaves."

General characteristics. Two specimens were sent me. One was about 2 to 3 centimeters in diameters and 8.5 centimeters long. This specimen had grown on a very small supporting twig and has a smooth surface. Another, a larger lump of about 3 by 5 centimeters, had evidently been broken from a supporting twig.

Color. Both of these sponges are a dirty dark brown in color but the gemmules are a cleaner yellowish brown.

Structure. The skeleton of these specimens is typical. The distinct heavy-branching fibers radiating from the central support are bound together by the transverse ones forming a somewhat irregular network. The fibers are composed of a number of spicules and often the transverse ones are flared out a bit where they join the radiating ones.

Skeleton spicules. The skeleton spicules are of the ordinary type; they are slightly curved, rarely straight, smooth and gradually and sharply pointed at both ends. They measure from 306 to 351 μ long and are from 14 to 20 μ thick.

Flesh spicules. This species contains no flesh spicules.

Gemmules. In both of these specimens the gemmules are

abundant and fill most of the inner portion of the sponge. They are typical in their general characters.

Gemmule spicules. These spicules are curved, smooth, gradually and sharply pointed, and resemble in general appearance those of the skeleton, though they are smaller and more sharply pointed. There is nothing to distinguish them from similar spicules of the species. They are from about 170 to 186 μ in length and from 7 to 8 μ in diameter.

Type. Although there is still some confusion concerning the type of this species, the specimen sent by Carter to Bowerbank should probably be considered the type. This specimen is in the British Museum. The specimens from Siam are in my collection.

Distribution. This is a very hardy sponge and occurs over a very wide range. It or its varieties have now been found in Europe, Africa, Mauritius and Madura Islands, India, Ceylon, Burma, Java and China, and now we have it recorded from Siam.

Remarks. The Siam sponges possess no characteristics by which I can distinguish them from the typical form of the species. The finding of this species in Siam was not unexpected and it is likely to be found in the other intervening area between India and China since it is a common sponge in parts of both countries. We have not yet found this species in China north of Amoy which is about 25° north latitude, though it is very common there and in Canton.

***Spongilla potamolepis* Annandale. (Fig. 5)**

Historical statement. During his zoological expedition in 1915-16, Dr. Annandale secured specimens of this sponge at Lampam, Tale Sap. Up to the time of the finding of this sponge only three sponges had been recorded from the fresh waters of Siam. He described this species in the Memoirs of the Asiatic Society of Bengal, Vol. 6, pp. 207-210, 1918. The following description is based upon the original one.

Habitat. The largest specimen entirely covered a small branch of a tree. It was found in a dry condition on the banks of the lake (Tale Sap) near Lampam where it had evidently been cast up there by a flood. Smaller specimens were collected from the

bamboo piles in the same locality.

General characteristics. "The sponge forms a crust from 2 to 3 mm. thick on sticks and bamboos. It is very hard and not at all brittle. The external surface is smooth and there are no branches. The oscula are small and scattered; each is approached by a ramifying horizontal subdermal channel into the floor of which the main exhalant channels open." The largest specimen included a small twig which it completely enclosed. The sponge including the twig was 3 cm. thick and 30 cm. in length. "The color is brownish or clay colored."

Structure. "The skeleton is extremely compact and hard, resembling that of *Potamolepis*, Marshall: it consists of a close network of single spicules and bundles of spicules with interstices that are polygonal both in vertical and in transverse sections. There are no well-defined spicule-fibers, but there seems to be a fairly plentiful, but diffuse secretion of horny matter at the nodes of the skeleton. There is very little if any inhalant subdermal cavity."

Skeleton spicules. "The skeleton spicules are all smooth and at least moderately stout but vary greatly in shape. In the older parts of the largest specimen I have examined, the majority are amphistrongylous and often a little inflated at the extremities. In less well-developed sponges, though similar spicules can be discovered; the majority of the macroscleres are both longer and more slender, they are still distinctly amphistrongylous but are not inflated at the tips. Spicules of this type are gradually replaced towards the periphery of young sponges by amphioxi sometimes considerably longer than themselves. We may thus find a single sponge with spicules that are from 9 to 20 times as long as thick. The longest amphioxi are about 320 μ long and the shortest amphistrongyli 240 μ long." No flesh spicules are present.

Gemmules. "The gemmules form a pavement layer at the base of the sponge or are arranged in small groups which adhere tightly to the object to which the sponge is attached. Each gemmule is small (680 μ in diameter) and subspherical and has a single foraminatal tubercle, which is situated in the middle of the upper surface. The pneumatic layer is fairly thick but rather irregular; its cells are

small but well defined. The gemmules are of a dark brown color."

Gemmule spicules. "The gemmule spicules which form an irregular mass outside of the pneumatic layer of the gemmules, are short, fairly stout and cylindrical, densely covered with minute spicules and as a result abruptly pointed at the extremities. Occasionally they are sigmatoid but in most cases the main axis is feebly curved."

Type. The type is preserved in the collections of the Zoological Survey of India in the Indian Museum, Calcutta.

Distribution. It is known to date from only the type locality, Lampam, Tale Sap, Peninsula Siam.

***Spongilla sumatrana* var. *siamensis* n. var. (Fig. 6)**

Historical statement. Dr. H. M. Smith kindly sent me several small specimens of an encrusting sponge which he had collected on April 20, 1929, from small poles or stakes in a small pond in the compound of the Department of Fisheries in Bangkok, Siam.

Habitat. This sponge forms a thin, 2 to 4 mm., film over the surface of the bark of the stakes in the pond. One specimen is as long as 12 cm. and as wide as 7 cm. in its widest parts; it is never very thick. Another specimen entirely covers a small stick about 13 cm. long and 1.5 cm. in diameter with a very thin film. There are also several other smaller specimens which exhibit similar characteristics to those just described. The sponge is quite clean, so the water must have been free from sediments of any kind.

Color. Dr. Smith writes that when fresh the color of the sponge was yellow. When dry it is a light yellowish-brown in color.

General characteristics. The surface of the sponge is smooth except where it is marked by the numerous small channels which appear as shallow open canals upon the surface of the dry sponge after the covering epidermal membrane has disappeared. These canals radiate from the oscula forming irregular star-like markings. They cover most of the surface of the sponge.

Structure. The structure of the sponge is firm though brittle. The skeleton, in the area next to the support, is made up of an irregularly arranged meshwork of spicules. In some of the

specimens I can detect distinct short-fiber rays in the upper portion of the sponge. These are rather weak and are perpendicular to the support upon which the sponge is growing.

Skeleton spicules. There are two different types of spicules, with connecting intermediate forms, found in our several specimens of similar sponges, from Dr. Smith, all of which I take to be the same species.

(1) In one (No. 54520), the majority of the spicules are almost uniform in diameter throughout their entire length except right at the ends where they become abruptly sharp-pointed. The sloping areas near the tips are covered with comparatively large spines almost to the point. The spines on the body of the spicule are perpendicular to its length but as the end is approached they often gradually change their direction until in some cases they point in the direction of the axis of the spicule.

(2) In the other type (No. 54523), the spicules are also about uniform in diameter and are similarly spined but their ends are rounded and in most cases the rounded ends are entirely covered with spines. The spines on the ends are as a rule more numerous and larger than those on the body of the spicule. Sometimes the spines are so numerous as to give the ends the appearance of being enlarged.

As will be seen from the above descriptions, the spicules are very variable. At times smooth spicules are found and at other times they are thickly covered with small spines. All intermediate stages of spininess may be found in both of the types of spicules. Now and then we find a spicule with its ends rounded and one of the terminal spines is a bit larger than the others, forming a sharp-pointed end to the spicule.

The sharp-pointed spicules vary in length between 170 and 192 μ and from 12 to 16 μ in thickness. Immature spicules with smaller dimensions also occur in the preparations. The spicules with rounded ends average a little shorter and a little thinner.

Flesh spicules. I can find no flesh spicules in any of my material. There are numerous small, gently curved, usually sharp-pointed spicules all through some of the preparations (No. 54520), but I consider these to be the young developing skeleton spicules.

Gemmule spicules. I also find (in Nos. 54521, 54522, and 54523) numerous sausage-shaped spicules with rounded ends usually bearing an abundance of spines of variable size over their entire surface. These spicules are often abnormal in shape or are strongly and, frequently, irregularly curved. Generally the inner side of the strongly curved spicule is free from spines or bears a much smaller number than the outer surface. At times spicules which have their rounded ends somewhat enlarged are observed. I have also seen three or four small spheres, of about the diameter of the larger spicules, which are covered with spines.

These spicules are very variable in length, some few measuring as much as 110 μ , while others are very short: they would probably average from 70 to 90 μ long. In thickness they range from 10 or 12 to 16 μ ; some of the shorter ones being the thickest.

Gemmules. I have not been able to find any gemmules in the several specimens which were kindly collected for me by Dr. Smith, though collections were made on the following dates: April 20, June 14, June 29 and November 2, 1929.

The slides which show the sausage-shaped spicules are all from specimens collected on June 14. The specimens collected on April 20 and on November 2 neither seem to have them. Possibly specimens collected between these dates may bear gemmules.

Type. The specimens from which these descriptions are derived are being retained in my collection.

Distribution. This sponge seems to be common in the pond in Bangkok in the pond in the Department of Fisheries but has not been reported as yet from other sources.

Remarks. As I have not been able to find the gemmules, I make this as only a tentative identification subject to final confirmation or to revision when the gemmules are secured. It is in all probability a *Stratospongilla* and its general habit of growth suggests its relationship to *S. sumatrana*. It seems likely that the various forms of skeleton spicules are simply stages in the development of the mature spicule with rounded ends covered with spines. It is possible in the material in hand to trace practically all the intermediate stages of the development.

Ephydatia bogorensis var. **blembingia** Evans. (Fig. 7)

Historical statement. In July, 1900, this sponge was collected by Richard Evans, one of the members of the expedition sent out by Cambridge University, from a jungle pool near Blembing in lower Siam. He described and illustrated it very fully in 1901 in the *Quarterly Journal of Microscopic Science*, Vol. 44, pp. 71-109. Annandale refers to it again in the *Records of the Indian Museum* in 1907, Vol. 1, pp. 269-270.

Habitat. "The pool of water in which the sponge.....was found was situated in a comparatively dense jungle at a distance of a few yards from the bank of the river. The trees growing around it were so big, and their foliage so thick, as to admit only a small amount of light ever passing through them. Consequently the pool.....was always in a deep shade."

General characteristics. "In reality it is an encrusting sponge, though some specimens have a massive appearance. But this is due to the habit of growing on such supports as blades of grass and branching weeds of various kinds which inhabit the same pool of water as the sponge. It never seems to produce independent branches which, when present, give a sponge a kind of bush-like appearance..... If, at first, a specimen appears to branch, on closer examination the apparent branching reveals itself as the result of creeping over a branched support. Consequently in spite of its massive appearance.....it is an encrusting sponge. The biggest specimens measure no more than about an inch across." It is "pale flesh-colored."

Structure. "The surface texture of the preserved sponge is somewhat wooly, an appearance caused by the spicule fibers which support the otherwise smooth dermal membrane. The fibers often penetrate the membrane, owing undoubtedly to its being rubbed off their extreme points."

Skeleton spicules. The skeleton spicules are curved, or sometimes straight, spindle-shaped, covered with fine spines and sharp-pointed. Instead of gradually tapering to a point, these spicules are only slightly tapering and become abruptly pointed. The spines frequently cover the spicule nearly to the very tip.

Evans noticed groups of much smaller spicules in various parts of the sponge similar to the regular spicules and thought that they were the spicules of a parasitic sponge. Annandale later examined these preparations and decided that these were the spicules of embryonic sponges. The mature spicules are from about 280 to 340 μ in length and from 8-16 μ in thickness.

Flesh spicules. No flesh spicules were observed.

Gemmules. The gemmules are never found in groups but occur singly scattered throughout the entire sponge. They are nearly oval in shape, but are sometimes flattened on the side upon which the pore-tribe opens. "The pore is placed at the bottom of a small depression surrounded by a rosette-like structure which is raised up, and into the composition of which all the layers of the gemmule coat enter."

Gemmule spicules. The gemmule spicule consists of a shaft which has a curved umbrella-like disk at each end, the smooth convex surface being outside while the shaft joins the middle of the concave side. The edges of the disk bear large numbers of small teeth-like projections which are frequently curved inward toward the shaft. The entire shaft is covered with heavy spines which are somewhat crowded together near the disks. The spines vary a great deal in size and length, some projecting as far as the edges of the disks. These spicules are from 64 to 70 μ long, 6 or 7 μ thick, and the rotules measure about 22-25 μ in diameter.

Type. The British Museum of Natural History contains part of the type. I have minute bits of this sponge from both the British Museum and the Indian Museum.

Distribution. This sponge has up to date been reported from only the original locality, a jungle pool near Blembing, a small village on the river of the same name, in Peninsular Siam.

Remarks. I have just completed a study of this sponge and, after careful comparison with *E. bogorensis* Weber, have reached the conclusion that it is only a variety of Weber's sponge described some eleven years earlier from Java. Evans evidently did not know of Weber's paper or of the sponge described in it for he makes no reference whatever to it, though he does compare his sponge with

Dosilia plumosa which has similar gemmule spicules but bears little other resemblance to Evans's sponge.

On the other hand the relationship of *E. bogorensis* and *E. blembingia* is very close. I have stated the following observations upon the spicules as the basis of my placing *E. blembingia* as a variety of *E. bogorensis*:

- a. The skeleton spicules of the Blembing sponge are in most cases more heavily spined and more abruptly sharpened at their ends.
- b. The disks of the birotulates of the Blembing sponge are more convex and more regularly incised and the shaft is slightly shorter and comparatively thicker than the Java sponge.

For further information the reader is referred to Evans' very thorough discussion of this sponge in his original description.

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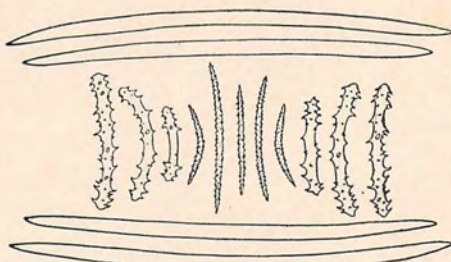


Fig. 1. *Spongilla lacustris*.
Showing skeleton, flesh, and gemmule spicules.

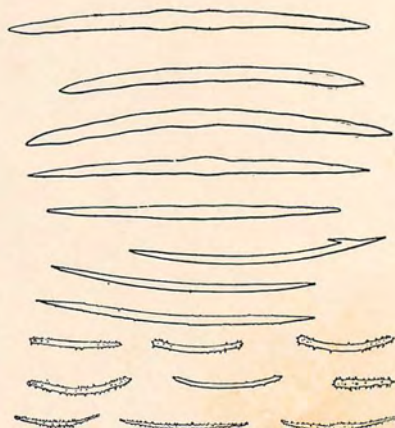


Fig. 2. *Spongilla nana*.
These figures were drawn from specimen collected in Chilka Lake. (After Annandale.)

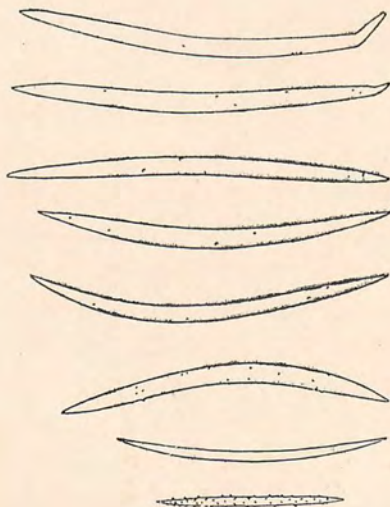


Fig. 3. *Spongilla nana*.
These figures showing the more regular spicules were drawn from Patalung specimens. (After Annandale.)

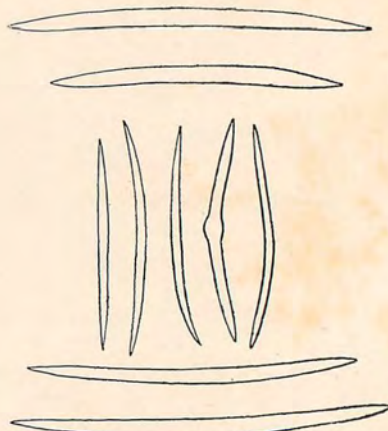


Fig. 4. *Spongilla carteri*.
Typical skeleton and gemmule spicules.

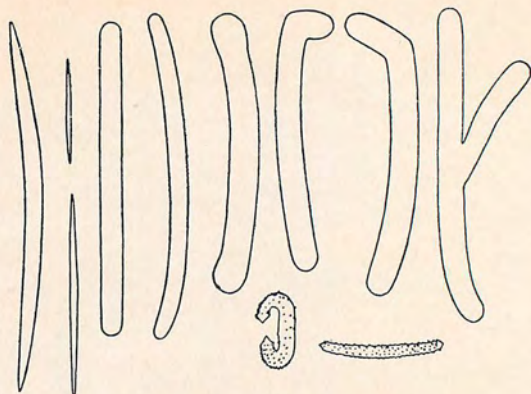


Fig. 5. *Spongilla potamolepis*.
Skeleton and gemmule spicules. (After Annandale.)

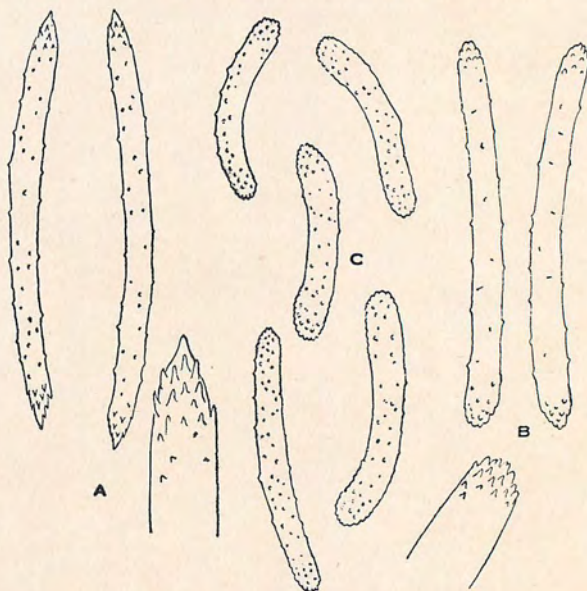


Fig. 6. ? *Spongilla sumatrana* var. *siamensis*.
A. Skeleton spicules with sharp ends; one end much enlarged.
B. Skeleton spicules with rounded ends; one enlarged.
C. Gemmule spicules.

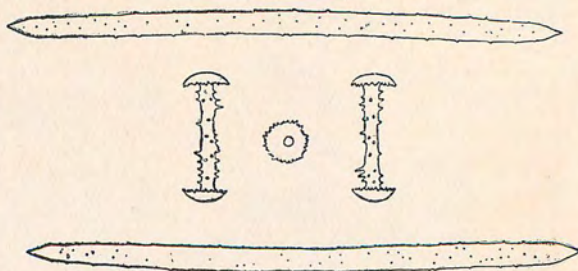


Fig. 7. *Ephedatia bogorensis* var. *blembingia*.
Skeleton and gemmule spicules.

