7. *Notes on the Freshwater Fauna of India. No. I.—A variety of* Spongilla lacustris *from Brackish Water in Bengal.*—By N. Annandale, D.Sc., C.M.Z.S.

Thanks to Carter's[1] classical memoirs, the Freshwater Sponges of India are better known than most of the animals which inhabit our Indian tanks. In Bombay, Carter examined five species, basing on them the researches which laid the foundation of the scientific study of the Spongillidæ as living organisms. Two species have been recorded from Calcutta by Weltner,[2] and two by Bowerbank [3] from Central India. The following list, based mainly on the third part of Weltner's "*Spongillidenstudien*," [2] shows the distribution, in India and in the world, of all the forms as yet known to occur as members of our fauna:—

Indian Spongillidæ.

Genus *Spongilla*.		
1. *S. alba*, Cart.	...	Bombay.
2. *S. bombayensis*, Cart.	...	Bombay.
3. *S. carteri*, Brok.	...	Bombay, Chota Nagpur, Central India, Calcutta; Madura (Malay Archipelago), Mauritius, Eastern Europe.
4. *S. cerebellata*,[4] Bwrk.	...	Central India.
5. *S. cinerea*, Cart.	...	Bombay; Celebes, Flores, N. America.
6. *S. decipiens*, Weber	...	Calcutta; Celebes.
7. *S. lacustris*, auct.	...	Lower Bengal; Europe, N. America, Northern Asia, Australia.
Genus *Ephydatia*.		
8. *E. plumosa* (Cart.)	...	Bombay; N. America.

The following species have been recorded from countries near India and will probably be found to belong to the Indian fauna:—

Spongilla sumatrana, Weber	...	Sumatra.
Ephydatia fluviatilis, auct.	...	Eastern Asia, Europe, N. America; Australia.
„ *blembingia*,[5] Evans	...	Malay Peninsula.

During a recent visit (January 28th–30th) to Port Canning in Lower Bengal, I was much struck by the enormous number of sponge-gemmules which formed a scum on the surface of some of the shadeless brackish pools so numerous in the neighbourhood. These gemmules originated in a *Spongilla* which incrusted the stems of plants growing in the water and sticks which had fallen into it. Some of the pools were already drying up and the sponge was beginning to be exposed to the air. At one point I saw specimens which appeared to have been carried some distance from the tank by a gale of wind and were hard and dry.

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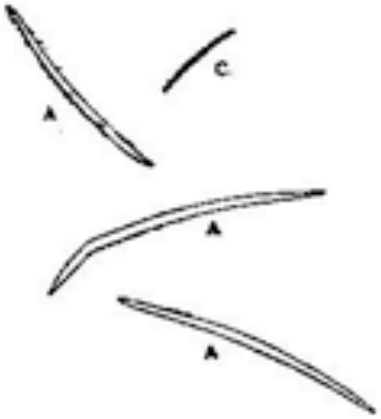
[1] *Ann. Mag. Nat. Hist.*, 1847, 1849, 1856, 1859, 1874, 1881.
[2] *Wiegm. Archiv. f. Naturgesch.* LXI, 1895.
[3] *Proc. Zool. Soc.*, 1863.
[4] Carter regarded this form as no more than a variety of his *S. alba*, (1881).
[5] *Quart. Journ. Micr. Science*, 1900.

I have made a careful examination of living and preserved material, and I cannot find any specific difference between this sponge and the widely-distributed *Spongilla lacustris*, which is not, however, usually regarded as a tropical form. It may be convenient, for the sake of reference, to give the form a varietal name.

Description of *S. lacustris* var. *bengalensis*—

Texture firm, resistant, fibrous. *Thickness* never more than half an inch. *Habit* incrusting; without branches, entirely surrounding support; pores and oscula inconspicuous; surface smooth, rounded. *Colour* flesh-colour or dull-green. *Gemmules* numerous, disposed throughout the sponge except on the surface, of two sizes, thickly coated, with a single funnel-shaped opening, spherical. *Spicules*:—skeleton spicules smooth, slender, cylindrical, feebly curved, very rarely bent at an angle, abruptly pointed, joined together in strands to form a reticulation in which the gemmules rest: flesh spicules very slender, cylindrical, feebly bent, pointed, minutely spineal throughout, numerous: gemmule spicules slender, cylindrical, sparsely covered with fine, pointed, recurved spines, which are more numerous towards the ends than at the centre; the spicules very numerous, arranged tangentially, not penetrating coat of gemmule.



A. = skeleton spicules. C. = flesh spicule.

Length of skeleton spicule	...	0·3 mm.—0·4 mm.
Length of flesh spicule	...	0·14 mm.
Length of gemmule spicule	...	0·16 mm.
Diameter of larger gemmule	...	0·9 mm.
Diameter of smaller gemmule	...	0·6 mm.

The most notable peculiarity of this variety is the total absence of branches,[1] but in certain forms of the species the branches are better developed than in others. *S. lacustris* is so variable

[1] Ledenfeld describes his *S. lacustris* var. *sphaerica*, from New South Wales, as "ohne *Fortsätze, kuglig oder eiformig*," (*Zool. Jahrb.* part 2, 1887). The exact position of this form is doubtful; Weltner is not sure that it belongs to the genus *Spongilla*, no gemmules being available for examination.

that Potts,[1] in his monograph of the Freshwater Sponges of the world, recognized six varieties in addition to the typical form. The Bengal form most nearly resembles his *montana* (from the Catskill Mountains, New York) as regards its spicules; but in the gemmule spicules the spines are more distinctly aggregated at the ends in the Bengal form. I regard the angularly bent skeleton spicule, of which I have only seen two examples, as an abnormality. The gemmules are very distinctly of two sizes, the smaller ones being less numerous than the larger ones. They are scattered indiscriminately through the sponge, and in both the opening is directed outwards. They are not found in groups, and have no large air-cells. Dried pieces of the sponge bear a close external resemblance to Weltner's[2] figure of part of a branch of *Euspongilla lacustris* from Germany; but there is in the centre of each of such pieces of the Bengal form a twig or grass-stalk which would be absent from European specimens. The green colour of the Port Canning examples was due to a multicellular alga[3] whose filaments ramified among the spicules. This alga was evidently growing with great activity, but it had only commenced to invade certain pieces of the sponge.

S. lacustris has been recorded from brackish water in Europe and possibly in Australia. The species is evidently adaptable, and its great fertility as regards gemmules, gives it every chance of a wide dispersal.

The common sponges in the Calcutta tanks are *S. carteri* and *S. decipiens*. The former propagates itself during the winter months, by means of buds, and forms gemmules rather later in the year than does *S. decipiens*. By the end of January, specimens of the latter are usually reduced to mere skeletons containing these bodies, while even large examples of *S. carteri* are, at the same date, either devoid of gemmules or contain only a few.

The life-history of these two forms differs also in other respects. The buds of *S. carteri* attach themselves chiefly to water-plants such as *Pistia stratiotes* and *Limnanthemum* and grow rapidly into globular masses, which may be six or eight inches in diameter. These gradually weigh down the leaves or roots to which they adhere, and finally sink them in the mud. The lower part of the sponge then dies, the cells probably migrating towards the upper part. *S. decipiens*, on the other hand, incrusts the lower part of the stems of reeds, bricks which have fallen into the water, and other sunk objects. Neither species is exposed to the air for any great part of the year in Calcutta, as both are said by Carter to be exposed in Bombay.

Both species shelter a number of Insect larvæ, some of which are generically identical with those found in the same position in Germany. A minute Naidomorph worm is abundant in the

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[1] *Proc. Acad. Nat. Science, Philadelphia*, 1887.
[2] *Ent. Nachr.* (Berlin) xx., No. 10, p. 160, fig. 7, 1893.
[3] Cf. M. and A. Weber, *Zool. Ergeb. Niederland Ost-Ind.* Vol. I, page 59, pl. V, fig. 1.

decaying tissues of older specimens, and appears to play an important part in the liberation of the gemmules. At Port Canning I found a crab of the genus *Varuna* concealed in considerable numbers among grass stems coated with *S. lacustris*. The relations between the Freshwater Sponges and the various animals associated with them is a subject to which I hope to return later.