VIII THE GENUS *AUSTRALELLA* AND SOME ALLIED SPECIES OF PHYLACTOLAEMATOUS POLYZOA

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(Plates II, III).

I described the genus *Australella* in 1910[1] in a footnote to a paper on Indian Phylactolaemata, but the type-species, which was the only one then distinguished, was an Australian form (*Lophopus lendenfeldi*, Ridley[2]) known from the original description only. The type-specimen is in the British Museum, whence I have been able to obtain a fragment through the kind offices of Mr. R. Kirkpatrick. This schizotype was before me when I described the genus, but the shrivelled condition of the colony rendered it necessary to rely on Ridley's diagnosis and figures rather than on direct observation. Relying, therefore, on this description, I placed *Australella* in the subfamily Lophopinae. An examination of admirably preserved material of a new species leaves no doubt now that it belongs to the Plumatellinae, as is indicated by Kraepelin's[3] recent note on *Lophopus jheringi*, Meissner, which he regards as a congener.

We owe the discovery of the new species to Mr. Baini Prasad, Patiala Research Scholar in the Government College, Lahore, whose keenness as a collector and observer is already beginning to cast light on obscure places in our knowledge of the aquatic fauna of the Punjab.

The genus *Australella* may now be defined as follows:—

Genus **Australella**, Annandale.

Plumatellinae in which the colonies are recumbent and dendritic but enclosed in a uniform apparently structureless jelly that fills up the interstices between individual zooecia and branches. There is no stolon; the zooecia arise directly one from another. Individually they are semirecumbent, the proximal part of each resting, when the branch to which it belongs is fully formed, on the object to which the colony is fixed, while the distal part is almost vertical. The polypide

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[1] *Rec. Ind. Mus.* V, p. 40 (1910).

[2] *Journ. Linn. Soc. London* (Zool.) XX, p. 62 (1890).

[3] Michaelsen's *Land und Susswasserfauna Deutsch-Sudwestafrikas* 1, Bryozoa, p. 61 (1914).

is normal; it has some 40 to 60 tentacles, which are moderately or very long. The lophophore generally resembles that of *Plumatella*. The statoblasts are large (0·4 mm. to 1 mm. long), but as a rule smaller than those of the Lophopinae. They resemble the free statoblasts of *Plumatella* in structure and have neither marginal processes nor terminal prolongations.

Apart from the synoecial jelly, the structure of the colony in this genus is very like that of *Plumatella*, but the order of branching is not quite the same. In the younger parts each zooecium normally produces a single bud, but the precise stage at which this bud is produced differs in different species and even in different parts of the same colony; in *A. lendenfeldi* it probably does not appear as a rule until the mother-zooecium is well developed, whereas in *A. indica* it develops while the latter is still small. As a rule, in both species, it arises on the left and the right side respectively of alternating zooecia, so that a zig-zag stem is produced, consisting of a linear series of zooecia pointing alternately in different directions. As the colony grows older a secondary bud is often produced on the opposite side of the mother-zooecium to that on which the primary bud was formed. These secondary buds are the mother-zooecia of lateral branches that pursue a similar course to that of the stem from which they orginated, but at an acute angle to it. The figure may be further complicated by the production of secondary buds, and ultimately of secondary branches, from zooecia of the primary branches, and as a matter of fact this often takes place at an early stage in the development of the colony.

The result is the formation of a solid encrusting body closely compacted and agglutinated together by the synoecial jelly, but increasing in bulk mainly in one plane and without vertical branches.

It sometimes happens that branches or parts of branches die off or are killed by injury. In such cases the synoecial jelly remains intact. New branches may arise in vacant masses of jelly by budding from isolated fragments of the polyparium and are thus found separated from the remainder of the colony expect in so far as they are united by the jelly. This fact sometimes gives the whole structure the false appearance of being a compound colony like that of *Pectinatella*.

The genus *Australella* has now been found in Australia, India and South America.

Key to the species of AUSTRALELLA.

I. Synoecial jelly cartilaginous, scanty.
   Statoblasts oval, rounded at the ends . *A. indica.*
II. Synoecial jelly soft, very copious.
   A. Statoblasts oval, subtruncate . *A. lendenfeldi.*
   B. Statoblasts subcircular or polygonal *A. jheringi.*

Australella indica, sp. nov.

(Plate II.)

Zoarium.—The zoarium forms a massive, somewhat nodular structure growing round the stems of water-plants. It has an opaline gelatinous appearance and (preserved in formalin or spirit) a hard but elastic consistency. Even when the polypides are completely retracted the individual zooecia are distinctly visible, each having the appearance of being enclosed in a separate cell-like compartment. The surface, apart from the larger nodulosity, is otherwise smooth.

As is usually the case in the Plumatellinae, the precise organization of the colony is best seen in its terminal parts. There it is quite evident that the zoarium consists essentially of a main stem giving off lateral branches symmetrically in pairs, one branch at each side. The branches join the main stem at an acute angle and those that form each pair are given off almost simultaneously at the same level. The main stem is, as a whole, recumbent and adherent, but the lateral branches, although they are horizontal, at first run in the synoecial jelly, parallel to rather than in contact with the object to which the colony is attached. As they develop further, they become adherent and themselves give off lateral branches. Both the main stem and the main branches have actually a zig-zag course, because they are composed of zooecia which point alternately in two directions, this can only be seen clearly in the younger parts; for in the older parts interdigitation of the secondary branches takes place to such an extent that it is difficult to follow the course of any one branch, and the whole mass of zooecia seems to have a practically homogeneous honeycomb-like structure. Although the phase "main stem" is a convenient one, it must be understood that there are actually several or many stems of the kind in a single large colony such as the one figured on plate II, and that each is actually a unit or ray in a radiate dendritic whole.

The jelly which fills the interstices between the zooecia and between the stems and branches occupies a relatively small space. It is colourless and hyaline and, preserved in spirit or formalin, has the consistency of cartilage. I can detect no cells either in it or on its surface except, on the surface, those of unicellular algae. It is easily removed from the zooecia.

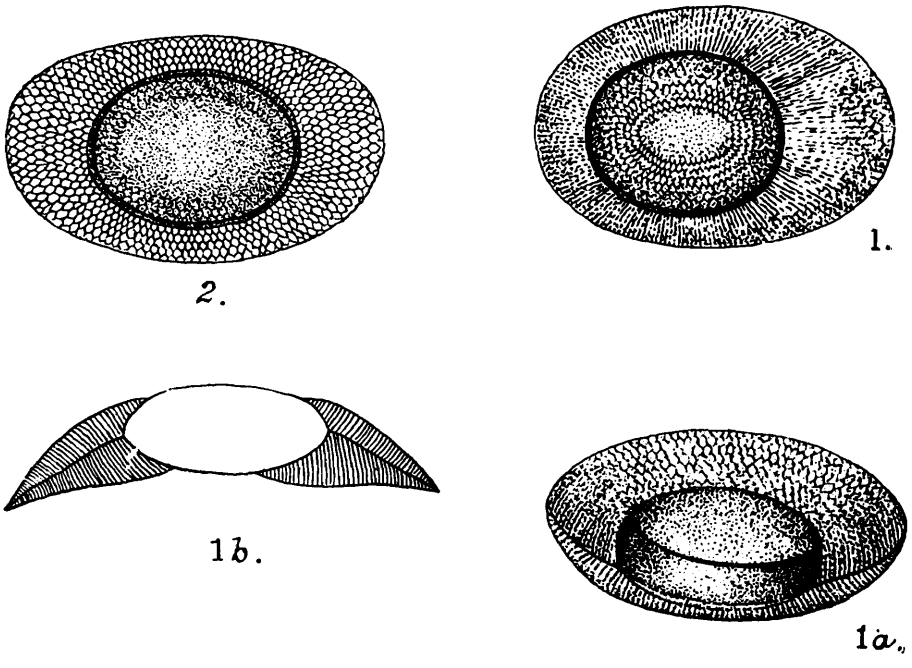
Zooecia.—The individual zooecia are distinctly ⌋-shaped. The horizontal arm is more slender than the vertical one, which is sometimes constricted at its base in such a way that it assumes an outline like that of an egg-cup. The soft tissues are very delicate and easily torn and there seems to be no horny or other non-cellular layer between them and the jelly, which, indeed, is itself the homologue of such a layer.

Polypides.—The polypides closely resemble those of *Plumatella.* The lophophore is slender and bears between 40 and 50 slender and moderately elongate tentacles which have a narrow but

distinctly festooned web at their base. The epistome is large and rather broad. The whole polypide is slender, the stomach particularly so. The colour of the latter in formalin is pale yellowish green.

Statoblasts.—The statoblast is of moderate size, elongate and rounded at the extremities; the capsule is broadly oval and often sometimes eccentric (fig. 1). The swim-ring is broad. It is remarkable for its vertical curvature (figs. 1*a* and 1*b*), surrounding the capsule like the rim of a dish in such a way that one surface of the statoblast is distinctly concave and the other convex, although the capsule itself is perfectly symmetrical. The convex surface is the one by which it is fastened to the funiculus.

The average length of the statoblast is about 0·46 mm. and the average breadth about 0·29 mm., the corresponding dimensions of the capsule being about 0·25 and 0·187 mm.; but owing



FIGS. 1, 1*a*, 1*b*.—Statoblast of *Australella indica*, sp. nov.
FIG. 2.—Statoblast of *Plumatella punctata* var. *longigemmis*, nov.

to the curvature of the rim it is difficult to obtain exact measurements.

Type.—No. 6629/7 Z.E.V., *Ind. Mus.* A cotype has been sent to the British Museum.

Locality.—Lahore, Punjab (12-x-14).

The points in which this species differs from *A. lendenfeldi* are discussed under the heading of that species.

In one of the specimens part of the colony is undergoing regeneration. The polypides have apparently been killed or injured but the jelly remains intact New branches are arising from single polypides or pieces of polypides that have not perished. They consist of single or double rows of zooecia which have not yet produced lateral branches. The precise structure of such rows has already been discussed (p. 164).

One colony examined seems to have overwhelmed a colony of *Plumatella emarginata*. The latter, which has assumed the Alcyonelloid form, has managed to keep a small space clear for its more vigorous branches in the midst of the *Australella*.

Mr. Baini Prasad has given me the following notes on the occurrence of *A. indica* and on some species found in the same environment.

"On the occasion of a recent visit to Ferozpore I collected some material from the stagnant rainwater pools that abound on the banks of the river Sutlej mostly near the Kaiser-i-Hind railway bridge. The following representatives of the three classes, Sponges, Hydrozoa and Polyzoa were found.

SPONGES.

Spongilla carteri, Carter (Bowerbank *in litt.*).

Large masses of this sponge were found in two ponds, some measured more than a foot in length. Large dried-up masses consisting of spicules and gemmules only were found in another place where the water had quite dried up.

Spongilla lacustris subsp. *reticulata*, Annandale.

Large flat masses of this sponge of a bright green colour were found attached to the stems and leaves of *Potamogeton*. The pond was in an open place with no shade at all.

HYDROZOA.

Hydra oligactis, Pallas.

Only a single specimen of this form was found. It was attached to a *Potamogeton* leaf from the same pond in which *Spongilla lacustris* subsp. *reticulata* had been found. The specimen has only four tentacles and one bud, which shows the rudiments of the tentacles.

POLYZOA.

Australella indica, Annandale.

Large masses of this polyzoon were found in the same pond; these were covering the *Potamogeton* stems and leaves. Most of the individuals, however, were dead and large numbers of statoblasts had developed in them."

Australella lendenfeldi (Ridley).

1890. *Lophopus lendenfeldi*, Ridley, *Journ. Linn. Soc. London* (Zool.) XX, p. 62.

So far as I can judge from the specimen before me, this species differs from *A. indica* mainly in the following characters:—

1. The synoecial jelly is much softer and more copious.
2. The colony is broken up into a number of short branches lying separated in the jelly.
3. The tentacles of the polypide are longer and more numerous.
4. The statoblast is larger and has the sides more nearly parallel and the extremities subtruncate; the swim-ring is not curved in cross-section.

Ridley's statement that the different parts of the polyparium are joined together by a stolon is due to a misunderstanding: a stolon is indeed present at the base of the jelly, but it is that of a hydroid (*Cordylophora whiteleggi*, v. Lendenfeld), of which I have found a single hydranth projecting from the surface of the colony in the schizotype of the polyzoon.

Australella jheringhi (Meissner).

1893. *Lophopus jheringhi*, Meissner, *Zool., Anz.*, p. 290.
1914. *Australella jheringhi*, Kraepelin, Michaelsen's *Land und Süsswasserfauna Deutsch-Südwestafrikas* 1, Bryozoa, p. 61, pl. i, fig. 9.

I have not seen this species, which is only known from Brazil. It may be readily distinguished from the other two by its nearly circular statoblasts.

Genus **Plumatella**, Lamarck.

Plumatella punctata, Hancock.

1887. *Plumatella punctata*, Kraepelin, *Deutsch. Susswasserbryozoen* 1, p. 126 (numerous figures).
1911. *Plumatella punctata*, Annandale, *Faun. Brit. Ind., Fresw. Sponges*, etc., p. 227, p. 213, figs. 42 G and G′ and pl. iv, fig. 5.
1914. *Plumatella punctata*, Kraepelin, *op. cit. supra*, p. 60, pl. i, fig. 10.

Since 1911 I have found this species fairly abundant, with *Fredericella sultana indica* and *Plumatella tanganyikae bombayensis*, in the canal at Cuttack in Orissa. Kraepelin has recently recorded its occurrence in South-West Africa.

var. **longigemmis**, nov.

(Plate III, fig. 2).

A closely allied form grows luxuriantly in a small pool of practically fresh water on Barkuda Island in the Chilka Lake (Ganjam district, Madras Presidency). It agrees with *P punctata* in every respect except that the gemmules are uniformly more elongate and have relatively smaller capsules than is usually the case (fig. 2, p. 166). They have the swim-ring slightly curved in

cross-section, in this respect somewhat resembling those of *Australella indica*, though the feature is less marked. The average length of the gemmule is 0·42 mm., the average breadth 0·25 mm., but the difficulty in exact measurement noted in the case of *A. indica* (p. 166) also occurs with reference to them, though not to the same extent. The average measurements of the capsule are about 0·24 × 0·17 mm.

The colonies of this new variety were found on stones and rushes in July, 1914. They exhibited among themselves, so far as the zoarium was concerned, a complete transition between the two seasonal phases of the species found in Europe. In several instances the freshwater sponge *Spongilla alba*, Carter had already begun to grow over them; by November of the same year it seemed to have exterminated them altogether.

Genus **Stolella**, Annandale.

Stolella himalayana, Annandale.

(Plate III, fig. 1).

1911. *Stolella himalayana*, Annandale, *Faun. Brit. Ind., Freshw. Sponges*, etc., p. 246, fig. 49.

For some reason all reference to this species is omitted from the *Zoological Record*. I take the opportunity to reproduce an enlarged photograph of one of the types, a young colony from Malwa Tal in the Western Himalayas.

Stolella indica, Annandale.

1911. *Stolella indica*, Annandale, *op. cit.*, p. 299, fig. 45, pl. v, figs. 3, 4.

Professor K. Ramunni Menon has sent me specimens of this species from the town of Madras. It thus occurs in the Main Area of the Indian Peninsula as well as in the Indo-Gangetic Plain.