SOME FRESH-WATER BRYOZOA OF WEST JAVA.

by

ADRIANA G. VORSTMAN

(Buitenzorg Museum).

In examining fresh-water Bryozoa it appeared that these animals are far from rare here. They could be found in almost every pool or lake examined. The water, however, should not be too much soiled. Indeed as VAN OYE [1]) quoted before in one of his publications: "Water, waar Bryozoën in voorkomen, is altijd zuiver of behelst hoogstens zwak mesosaprobe organismen ..... hun aanwezigheid is kenmerkend." In addition to some notes concerning the presence of Bryozoa scattered among his publications, VAN OYE wrote on Fresh-water Bryozoa in "De Tropische Natuur" in 1916. In 1906 KRAEPELIN published a description of a new species found in the Lake of Tj Ttajam namely *Plumatella javanica*. However, a systematic examination of fresh-water Bryozoa in Java or elsewhere in the Archipelago had as yet not taken place.

The starting point for an examination of such nature came to be the ponds in the Botanical Gardens in Buitenzorg which appeared to be rich in Bryozoa. They are found growing on leaves and stalks, on stems of waterplants, on dead branches and dead leaves sunk in the water, on stones and logs and on shells of snails *(Vivipara, Ampullaria* and *Testudinaria)*, so in the same places as they can be expected to occur in Europe. Here too they often occur in the neighbourhood of Sponges by which they are not seldom encroached.

My appointment as assistent at the Zoological Museum of the Botanical Gardens has enabled me to follow the colonies of Bryozoa in the ponds in their development and in their mode of multiplication during a year. After a systematic examination of the species occurring in the ponds some biological particulars concerning the forming of larvae and statoblasts have been collected. It seems to me that in this process any periodicity is out of the question. I found the colonies occurring in the ponds present during the whole year, and my impression is that free as wel as fixed statoblasts are being formed all the year round. With some species, *Plumatella punctata* phase *densa* KRAEPELIN, forming free statoblasts only, I found the forming of larvae more abundant than with *Plumatella emarginata* ALLMAN, having the capacity of forming free statoblasts by the side of fixed ones.

[1]) PAUL VAN OYE. Oekologie der Microorganismen met bijzonderheden betreffende Java. Koninklijke Vlaamsche Academie. Versl. en Mededeelingen. Maart 1922 pg. 373.

New species have not been found here. All species occurring here could be arranged among the species, described for Europe and America as well as for British India and Japan. I owe many thanks to Dr. MARCUS in Berlin, who has been kind enough to check my determinations on specimens sent to him, for which I am most obliged. He presented the collection sent to him to the Berlin Museum. I ultimately agree with him, that *Pl. emarginata* ALLMAN and *Pl. diffusa* LEIDY described by ANNANDALE from British India as being two different species, should be considered as belonging to the same species, as indeed I have succeeded in finding many transitions between these two. The Zoological Museum at Buitenzorg enabled me to follow the Bryozoa fauna in several lakes and ponds in Western Java. The types occurring there appeared for the greater part to be the same as those already familiar to me from the ponds of the Gardens with the exception of two:

The most common species in the Garoet Plain is a Bryozoon described by OKA from Japan. Dr. ASAJIRO OKA has been kind enough to send me some specimens from the Kasumiga-Ura of Japan for comparison. The species found in the Garoet Plain proved to be exactly alike.

The lake of Tji Gombong produced a second type, from the ponds of the Gardens unknown to me as yet, namely the phase *prostrata* of *Pl. punctata* described by KRAEPELIN, whereas only the phase *densa* was to be found in the Gardens. On this subject, however, more is said in the description of *Pl. punctata* HANKOCK.

Bryozoa occur even high up the mountains. Up till now I saw them wheresoever there are pools with clear stagnant water. *Pl. fructicosa* ALLMAN I even found in the "Kawah-Kamodjan" crater as high as 1600 M in a pool densely covered with *Salvinia* and *Limnanthemum*. Another remarkable place where Bryozoa occurred is the Goa Lalai, a bat-cave near the Tji Beureum waterfalls (Tji Bodas), likewise situated on a height of 1600 M. This is a cave containing water at the bottom. Here grew *Pl. emarginata* ALLMAN in a peculiar loose way on branches and leaves sunk to the bottom at the entrance of the cave.

Up till now I have come across Bryozoa in stagnant water only. Here follows a list of the lakes, pools and ponds in which Bryozoa were found with mention of the species occurring in each of them. Before passing to the description of the species I give a schematic drawing of the free statoblasts of the different types of the *Plumatella* genus. (Fig. 1). On the capsule is indicated how far the swim ring encroaches the capsule dorsally and ventrally. The dotted line shows how far the swim ring reaches ventrally. The outline of the statoblasts often varies much with the same species, according to the development of the swim ring. The border of encroachment of the swim ring however is more constant. In comparing this encroachment dorsally and ventrally the species can easely be recognised, see Fig. 1.

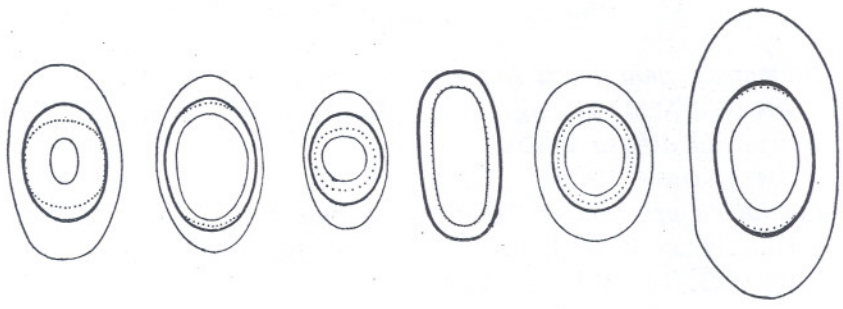

Fig. 1. Statoblasts of the genus *Plumattela*.

A = *emarginata* ALLMAN
B = *fructicosa* ALLMAN
C = *javanica* KRAEPELIN
D = *casmiana* OKA
E = *punctata* v. *densa* KRAEPELIN
F = *punctata* v. *prostrata* KRAEPELIN

List of the localities, where Bryozoa have been collected.	Plumatella						*Lophodella carteri* (HYATT)	*Pectinella burmanica* ANNANDALE
	emarginata ALLMAN	*fructicosa* ALLMAN	*javanica* KRAEPELIN	*casmiana* OKA	*punctata* var. *desna* KRAEPELIN	*punctata* var. *prostrata* KRAEPELIN		
The ponds of the Botanical Gardens + 200 M. VIII '26 till VIII '27.	+	+	+		+		+	+
„ pool of Tji Tajam, , 15-II-'27, + 200 M.		+	+					
„ „ „ G. Poetri, 6-V-'27, + 200 M.		+	+					
„ „ „ G. Babakan, 6-V-'27, + 200 M.		+	+					
„ „ „ Tji Binoeng, 12-V-'27, + 200 M.		+	+					
„ lake of Tji Gombong, 25-IV-'27, + 400 M.	+	+	+			+		
„ „ „ Waringloa, 13-III-'27,	+							
„ „ „ Lèlès, 26-II-'27, + 650 M.			+	+				
„ „ „ Bagendit, 27-II-'27, + 650 M.	+			+				
„ fish-ponds between Lèlès and Garoet, 26-II-'27, + 650 M.	+	+	+	+				
„ fish-ponds of Wanaradja and Sadang, 28-II-'27, + 700 M.			+	+				
„ lake of Pendjaloe, 6-VII-'27, + 700 M.		+		+				
„ „ „ Sindanglaia, 19 and 25-X-'27, + 1000 M.	+							
„ pond of Tji Bodas, 20-X-'26, + 1400 M.	+							
„ pool of G. Batoe, 21-X-'26, + 1400 M.	+							
„ fish-ponds of the Poentjakpass, 26-X-'26, + 1200 M.	+							
Telaga Warna 26-X-'26, + 1200 M.	+							
„ lake near Lembang, 22-II-'27, + 1200 M.	+	+			+			
A swamp in the Kawah Kamodjan, 8-VII-'27, 1600 M.		+						
The Goa Lalai (Tji Bodas) 24-X-'26, + 1600 M.	+							

Plumatella emarginata ALLMAN.

Plumatella emarginata ALLMAN.
ANNANDALE 1911 pg 220, Pl. III fig. 2, Pl. IV fig. 1.
Plumatella diffusa LEIDY.
ANNANDALE 1911 pg 223, Pl. IV fig. 2, Textfig. 43.
Plumatella princeps var. *emarginata*, *muscosa*, and *spongiosa*.
KRAEPELIN 1887 (I) pg 120, Taf. IV fig. 108, 111, and 113, Taf. V fig. 123, Taf. VII fig. 144.

Pl. I, Fig. 1, 2, 3 and 4.

At first I agreed with ANNANDALE that two different species *Pl. emarginata* ALLMAN and *Pl. diffusa* LEIDY should be distinguished. Finding, however, many transitions from one form to the other I share Dr. E MARCUS' opinion that here we have to do with one species only. A species which is very variable in colour and in way of growing, in size and outline of the statoblasts as well as in the number of the tentacles of the polypides.

Zoarium. When young the zoaria are entirely recumbent, the main branches radiating from a common centre. In fully developed colonies vertical rigid branches of as much as one cm. in length are sometimes produced which gives the colony a rugged appearance. Arising parallel to one another and pressed together, an almost solid mass can be formed. Branches of 3 to 4 cm. can sometimes be produced, giving the colonies a loose appearance. Such branches are not strong enough to stand erect when removed from the water. In rigid colonies the colour is dark brown almost black, in young colonies and those of a loose appearance the colour is reddish-brown or of a transparent horn-colour. Internal partitions are found.

Zooecia. The zooecia are almost of equal width throughout, with a keel at the dorsal side when attached to the substrate. In vertical branches this keel has mostly disappeared. The ectocyst is stiff and pigmented with the exception of the distal end which is colourless. Sometimes this white tip is extended down the dorsal surface in the form of a white triangle. Young zooecia are formed at the tip of the old ones in fan-like position.

Polypide. There are colonies with polypides of 29 as well as of 36 to 39 tentacles.

Statoblasts. The free statoblasts are elongate and truncate at the extremities with convex, straight, or concave sides according to the greater or smaller development of the swim ring. The aircells cover a considerable part of the dorsal surface of the capsule, leaving visable just a small oval place in the centre. On the ventral side they encroach the capsule at the extremities only. The capsule itself, however, shows a reticulation of cellwalls. The length of the free statoblasts is $\pm$ 0·37 to $\pm$ 0·5 mm. The proportion of length and breadth is between 2 : 1 and 1·7 : 1.

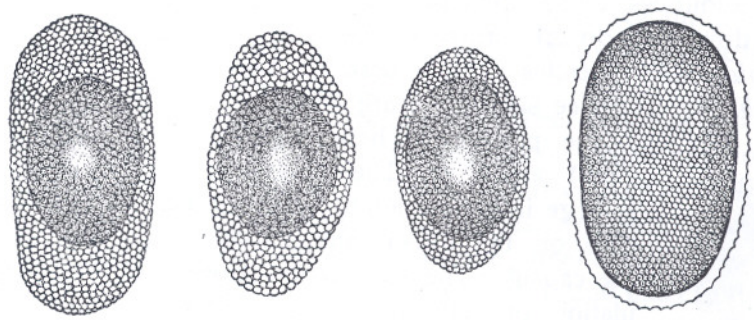

Fig. 2. Statoblasts of *Pl. emarginata* ALLMAN, × 80.

The fixed statoblasts have an oval form and are surrounded by a membranous margin, minutely serrated round the edge. The dorsal side of the capsule shows a reticulation of cellwalls. The length of the fixed statoblasts is ± 0'45 mm.

Biology. Free as well as fixed statoblasts are always produced in great numbers. They were not always found together in the same colonies. The forming of larvae is moderate. *Pl. emarginata* is the most common species in the lakes and pools of the mountains in the neighbourhood of Buitenzorg. They adhere to stones, dead branches and dead leaves, also to stems and leaves of waterplants. I found this species growing luxuriantly in the cave "Goa Lalai" as high as 1640 meter near the waterfalls of the Tji Beureum at Tji Bodas. Here they adhered to leaves and branches lying at the bottom of the water at the entrance of the cave. It was here that I found the modification with the long and loose branches of 3 and 4 cm. as described above.

Geogr. distribution. Europe, America, Southern Asia, Japan, probably Africa and Australia (ANNANDALE), Java.

Plumatella fructicosa ALLMAN.

Plumatella fructicosa ALLMAN.

ANNANDALE 1911 pg. 217; Pl. III. fig. 1, Pl. IV. fig. 4. Pl. V. fig. 1.

Pl. I, Fig. 5.

Zoarium. As a rule the zoarium is transparent and of a yellowish-brown colour, mostly adherent, but vertical branches of one cm. or more can be produced. Internal partitions are present.

Zooecia. The zooecia are cylindrical with a furrow produced on their dorsal surface when adherent. In vertical branches this furrow is not developed. The ectocyst is by no means rigid; it is swollen at the distal part

which is colourless. In adherent branches this colourless part is sometimes extended down the dorsal surface in the form of a white triangle.

Polypide. The tentacles number between 44 and 48.

Statoblasts. The free statoblasts are oval with a length of ± 0·43 mm. The proportion between length and breadth is of 1·6 : 1 and 2 : 1. The sides are convex, the capsule is large in proportion to the swim ring which encroaches little on the dorsal and hardly on the ventral side of the capsule. The wall of the capsule itself shows a reticulation of cellwalls. I have not been able to find the fixed statoblasts. ANNANDALE states that they are rare and not always adherent.

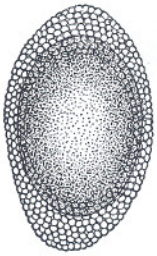

Fig. 3. Statoblast of *Pl. fructicosa* ALLMAN; × 80.

Biology. Pl. fructicosa adhere mostly on stems and leaves of waterplants, also on the shells of molluscs. Larvae are produced in great numbers. If the distal parts of the zooecia are much swollen the colonies mostly possess larvae.

The species is remarkable for occurring in great numbers in stagnant water in the crater "Kawah Kamodjan" in a swamp covered with *Salvinia* and *Limnanthemum* and surrounded by Pandan. Here I found the colonies on dead Pandan leaves sunk in the water and on the leaves of *Limnanthemum.*

Geogr. distribution. Europe, Calcutta, Java.

Plumatella javanica KRAEPELIN,

Plumatella javanica KRAEPELIN 1906 pg. 143; fig. 1, 2 and 3.
" " ANNANDALE 1911 pg. 221.

Pl. II, Fig. 6 and 7.

Zoarium. The zoarium is always entirely recumbent and branches are sparing, linear series are often found. The zoarium never produces vertical branches. In luxuriantly growing colonies the linear series can swarm together forming a solid mass. It is difficult to remove the colonies from the substrate without injuring the ectocyst of the zooecia.

Zooecia. The zooecia are transparent, and diverge towards the distal part. On the dorsal surface a strong furrow is produced often accompanied lengthwise by two reddish-brown lines on either side of it. The proximal part of the zooecia always adhere to the substrate and can become very long, the distal part being curved upwards. Young zooecia are produced in a straight line at the tips of the old ones.

Polypide. The tentacles number from 20 to 27. KRAEPELIN mentions in his paper (1906) 45 tentacles, but this must be a mistake. In the lake of Tji Tajam from which KRAEPELIN describes his type-specimen, I found *Pl.*

javanica entangled with *Pl. fructicosa*. The polypides of the latter have ± 45 tentacles. ANNANDALE makes no mention of the number of the tentacles of his *Pl. javanica*.

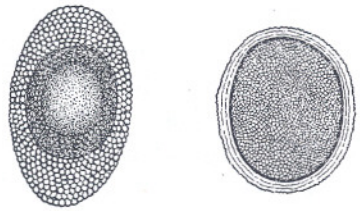

Fig. 4. Statoblasts of *Pl. javanica* KRAEPELIN; × 80.

Statoblasts. The statoblasts are oval, with a proportion of length and breadth of 1·6 : 1. The sides are convex and the extremities more or less truncate. Encroaching the capsule the aircells of the swim ring leave free a large round place in the centre of the dorsal as well as of the ventral side. On the dorsal side, however, this place is smaller. At the extremities the swim ring is much broader than at the sides. The length of the free statoblasts is ± 0·33 mm.

The fixed statoblasts are smaller than the free ones, the capsule of the fixed ones, however, is larger. They are almost round, covered with a reticulation of cellwalls on the dorsal side and fixed by a ring which is minutely undulated at the outside.

Biology. This form is very common in the lakes and ponds in the neighbourhood of Buitenzorg. On dead branches and dead leaves colonies of this species are often to be seen, also on shells of molluscs. Most luxuriantly I have found them on leave-sheets of waterplants and on stems of waterlilies. Here they were swarmed together forming a solid mass.

Free and fixed statoblasts as well as larvae can be found in the colonies at the same time. The forming of larvae is not abundant, free as well as fixed statoblasts are common.

Geogr. distribution. Java, India, Yunnan.

Plumatella casmiana OKA.

Plumatella casmiana OKA 1906 pg. 117; fig. 3.

Pl. I, Fig. 8.

Zoarium. The zoaria branch richely and are entirely recumbent. The branches are short and lie close to one another which gives the colony a more or less compact appearance. The zoarium is of a transparent yellowish-brown colour with the exception of the distal part of the zooecia which is colourless. Internal partitions are numerous.

Zooecia. The zooecia diverge minutely towards the distal end and possess a strong keel on their dorsal surface. In transverse section they are almost triangular.

Polypide. The number of the tentacles is ± 33.

Statoblasts. The free statoblasts are very long in proportion to their breadth, the proportion of length and breadth varies between 1·8 : 1 and 2·2 : 1. They are of a pale yellow hue, almost colourless. A narrow ring of aircells encroaches the capsule on the dorsal and on the ventral side. This ring is not continued in the horizontal plane of the capsule, all aircells touching the capsule immediately. The ring being formed by 3, 4 and 5 rows of aircells is of equal breadth on the dorsal and the ventral surface. The capsule itself is absolutely transparent and does not show any reticulation of cellwalls. The length of the free statoblasts is ± 0·3 mm. to ± 0·4 mm.

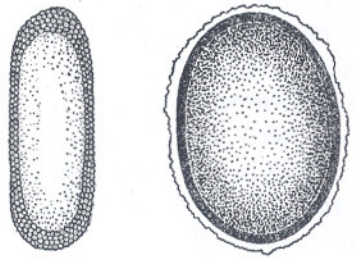

Fig. 5. Statoblasts of *Pl. casmiana* OKA; × 80.

The length of the fixed statoblasts amounts to 0·4 mm. The capsule not being supplied with cellwalls is fixed by a ring on which sometimes a reticulation can be seen. The ring encroaches a little on the capsule. The outer-edge of the ring is minutely serrated.

Biology. In the month of February 1927 this was the most common Bryozoan species in the lakes and fish-ponds of the Garoet Plain. Free and fixed statoblasts were found and many young colonies were formed by fixed larvae. The colonies adhere to waterplants as well as to dead branches and were found partly overgrown by *Spongilla carteri* CARTER [1]), the common Sponge of the neighbourhood of Garoet.

Geogr. distribution. Japan, Java.

Plumatella punctata HANCOCK.

Plumatella punctata ANNANDALE 1911 pg. 227; Pl. IV fig. 5.
" " KRAEPELIN 1887 (I) pg. 126; Pl. IV fig. 115, 116. Pl. V fig. 124, 125. Pl. VII fig. 153, 154.

Pl. III, Fig. 9 and 10.

KRAEPELIN distinguishes two phases of this species viz., *densa* and *prostrata* which he describes as an autumn phase and a summer phase. ANNANDALE describes a *Plumatella punctata* from British India which according to him agrees with the *densa* form of KRAEPELIN, and notices a form intermediate between the phases *densa* and *prostrata* of KRAEPELIN. Both forms described by KRAEPELIN occur in Java, but appear as two different species, and could be called two species of the *punctata* "Reihe" just as

[1]) The same Sponge has been collected from a fish-pond near Surabaya and was sent to Mr. GIST GEE of the Rockefeller Foundation, Peking, who checked the determination.

javanica is called by KRAEPELIN a specimen belonging to the *emarginata* "Reihe".

I have been able to observe *Pl. punctata* phase *densa* during a whole year from August 1926 till August 1927 in the ponds of the Botanical Gardens at Buitenzorg, where they are very common and I could not notice any change in the habit of the colonies. *Plumatella punctata* phase *prostrata* was lacking entirely in the ponds, but I found this form to be the most common species in the lake of Tji Gombong, examined in the month of April 1927. Though I am of opinion that we have to regard them as different species, I retain the denomination as phases given by KRAEPELIN, as too little is known about the composition of the water of the ponds of the Gardens and the lake of Tji Gombong.

Plumatella punctata phase **densa** KRAEPELIN.

Zoarium. The zoarium is entirely recumbent, transparent and colourless, often forming an almost uniform flat layer radiating from a common centre instead of being a dendritic body. Sometimes, however, distinct branches are formed. The zoarium lacks internal partitions, the zooecia form one common synoecium out of which the distal parts of the zooecia project.

Zooecia. The ectocyst of the zooecia is greatly swollen and more or less contractile, being free in the distal part only, the proximal parts forming one common synoecium.

Polypide. The tentacles number ± 28.

Statoblasts. Only free statoblasts are formed. They are oval, almost round, with a proportion between length and breadth of 1·3:1 and a length of ± 0·35 mm. On fully developed statoblasts a serrated edge is formed round the free statoblasts which is only visible when strongly magnified. ANNANDALE nor KRAEPELIN mention this serrated edge. The swim ring encroaches the capsule on the dorsal as well as on the ventral side, this part being twice as broad dorsally as ventrally. A large oval part in the centre remains uncovered. The capsule itself shows a reticulation of cellwalls.

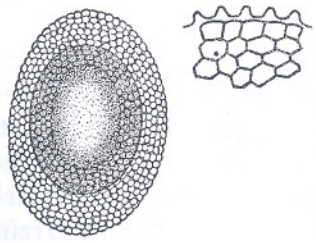

Fig. 5. Statoblast of *Pl. punctata* var. *densa* KRAEPELIN (× 80) with a part of the edge of the swim ring strongly enlarged.

Biology. It seems that the colonies of *Plumatella punctata* phase *densa* are apt to adhere to a living substrate, though they were also found on sticks and dead leaves and the shells of molluscs. Stems and leaves of waterlilies are often covered with a solid mass of luxuriantly growing colonies. The colonies can be more or less swollen. As a rule the more swollen forms possessed the larvae.

On the following dates colonies were examined with a positive result on account of their possessing larvae: August 25, September 20, November 11, November 24, February 17, March 22, May 2, May 28, June 2. The larvae produce mostly two polypides, but I have often seen swimming larvae with 3, and 4 polypides formed inside. Statoblasts and larvae occur in the same colonies.

Geogr. distribution. N. America, Europe, Calcutta, Java.

Plumatella punctata phase **prostrata** KRAEPELIN.

Zoarium. The zoarium is entirely transparent, colourless and swollen, the zooecia being twice as large as that of the phase described above. Long linear series are mostly formed without lateral branches.

Zooecia. The zooecia are not seperated from one another by internal partitions. They form one common synoecium which is distinctly contractile. The ectocyst is covered with minute tubercles.

Polypide. The tentacles number $\pm$ 50. They are short in proportion to the length of the polypides.

Statoblasts. Only free statoblasts occur. They are oval, with the sides almost parallel and the extremities rounded. The dorsal side of the statoblasts is flat, the ventral side distinctly convex.

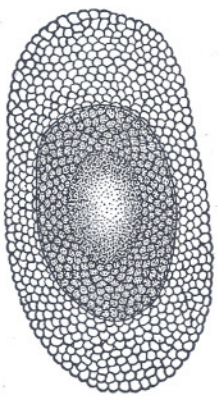

Fig. 7. Statoblast of *Pl. punctata* var. *prostrata* KRAEPELIN; × 80.

The swim ring does not encroach the capsule on the ventral side, but does so on the dorsal side, leaving free an oval space in the centre. The wall of the capsule itself contains reticulation of cellwalls. The swim ring is much broader at the extremities than at the sides. A serrated edge is lacking here round the swim ring of fully developed statoblasts. The length of the statoblasts is 0·6 mm, with a proportion between length and breadth of 2 : 1.

Biology. Colonies were found as the most common Bryozoa in the lake of Tji Gombong examined in the month of April. They occurred on waterplants as well as on sticks. Free statoblasts were produced in great numbers, appearing to be bluish-black through the ectocyst. Parts of a colony were able to refix themselves, when removed from the substrate which I could often perceive on the walls of a glass basin. When loosened from the substrate the branches are able to move to and fro.

Geogr. distribution. N. America, Europe, Java.

Lophodella carteri (HYATT).

Lophodella carteri (HYATT) ANNANDALE 1911 pg. 232; fig. 48, Pl. III fig. 4a and 4.
" " ULMER 1907 pg. 289; fig. 4.
Pectinella davenporti OKA 1907 pg. 1 and 2 (c).

Pl. III, Fig. 11.

Zoarium. The zoarium is a transparent jelly mass of an oval form much swollen and colourless. Fully developed colonies do not surmount 1 to 1·5 cm.

Zooecia. Only the distal parts of the zooecia are distinguished from one another, projecting from a common synoecium.

Polypide. The polypides are large in proportion to the zoarium. The number of the tentacles is ± 90. The whole external surface of the polypides is covered with minute tubercles. The intestinal canal has a yellow colour, by which the polypides are distinguished from the polypides of *Pectinella burmanica.*

Statoblasts. Only free statoblasts are produced. They are oval and measure on an average 1 mm. in length without the processes that are

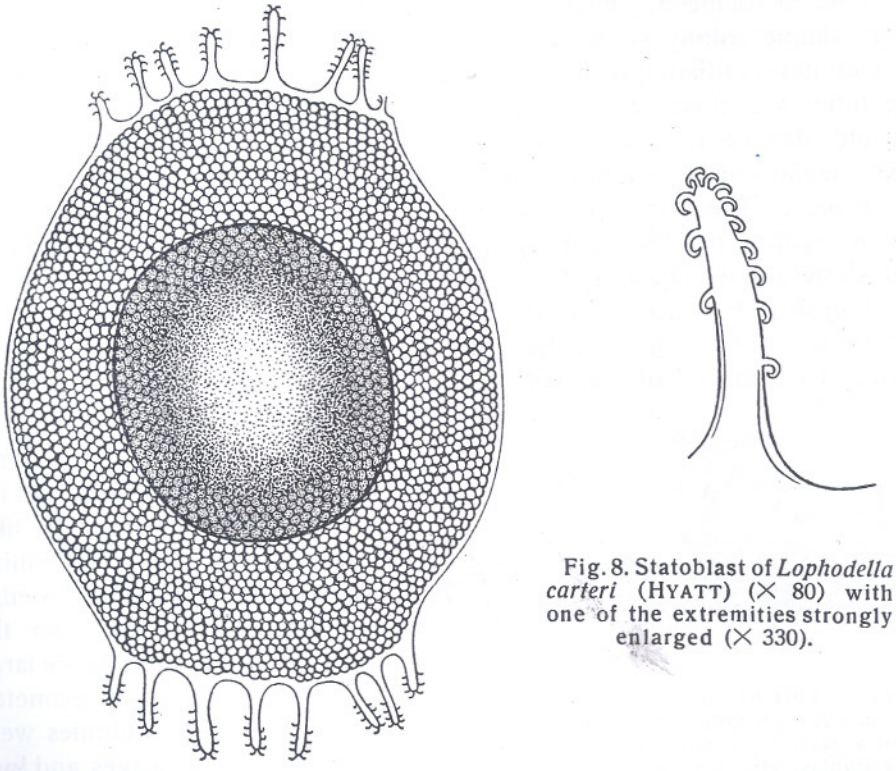

Fig. 8. Statoblast of *Lophodella carteri* (HYATT) (× 80) with one of the extremities strongly enlarged (× 330).

produced at either end, being eight in number. Spinules are arranged in two parallel rows, one row on either side of the process. The whole of the statoblasts is curved like a saddle. The swim ring is large in proportion to the capsule, which is almost round. The aircells encroach little on the dorsal and on the ventral side of the capsule.

Biology. On stems and leaves of waterlilies as well as on sticks and logs of wood I found the small colonies in the ponds of the Gardens during the whole year. Colonies full of statoblasts as well as zoaria without

any statoblasts were found at the same time. Young statoblasts appear in the common synoecium as white dots. The zoaria are able to change their position by sliding over the substrate, but the whole action is extremely slow. In a glass basin I saw fully developed colonies dividing themselves into two parts, both parts behaving as free colonies.

Geogr. distribution. India, Africa, Japan, Java.

Pectinella burmanica ANNANDALE.

Pectinella burmanica ANNANDALE 1911 pg. 235; Pl. III and Textfig. 47.
Pectinella gelatinosa OKA 1907 pg. 117; fig. 1b and 2.

Pl. III, Fig. 12.

Zoarium. The zoarium of simple colonies is a round yelly mass of ± 2 cm. in diameter. I have seen compound colonies of almost 50 cm. being Every simple colony shows a clear division in segments, every segment filled up with tubes radiating from a common centre and branching dichotomously. The tubes are mostly full of statoblasts. In the middle of the simple colonies the old degenerated polypides can be seen like round bubbles on thin stalks, while young polypides are formed round the edge of these colonies.

Zooecia. The basal parts of the zooecia form a common synoecium out of which the distal parts project. These free distal parts are swollen and show a reticulation at the tips.

Polypide. The whole surface of the polypides is covered with tubercles like those of *Lophodella carteri*, but the intestinal canal lacks the yellow colour. The number of the tentacles is ± 90.

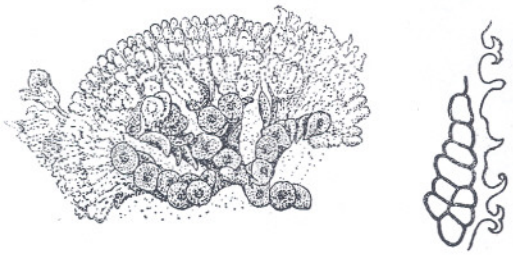

Fig. 9. Part of a colony of *Pectinella burmanica* ANNANDALE seen from below (× 3) and a part of the edge of the swim ring of a statoblast strongly enlarged (× 210).

Statoblasts. Only free statoblasts are produced. These are almost circular. The whole of the statoblast is curved saddle-like. The swim ring is broad containing numerous spinules round the edge and encroaching little on the capsule. The statoblasts are large measuring 1·5 mm. in diameter.

Biology. The colonies were found on sticks, leaves and logs of wood during the whole year in the ponds of the Gardens with young as well as with fully developed statoblasts. Young statoblasts can be seen as small white dots in the colonies. Many minute algae grow in the jelly wall of the ectocyst and give a green colour to the colony.

I have not been able to see larvae of *Pl. burmanica* nor of *L. carteri* though I often examined them on producing larvae.

Geogr. distribution. India, Japan, Java.

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PLATE I.

Fig. 1. *Pl. emarginata* ALLMAN, a rigid colony; $1^1/_3 \times$ nat. size.
Fig. 2. *Pl. emarginata* ALLMAN from the Goa Lalai (Tji Bodas); nat. size.
Fig. 3. *Pl. emarginata* ALLMAN entangled with a sponge; $2 \times$ nat. size.
Fig. 4. *Pl. emarginata* ALLMAN, a young colony formed by a larva; $2 \times$ nat. size.
Fig. 5. *Pl. fructicosa* ALLMAN; $1^1/_3 \times$ nat. size.
Fig. 8. *Pl. casmiana* OKA; $2 \times$ nat. size.

PLATE II.

Fig. 6. *Pl. javanica* KRAEPELIN, thin colonies; $2 \times$ nat. size.
Fig. 7. *Pl. javanica* KRAEPELIN, a luxuriantly growing colony; $1^1/_3 \times$ nat. size.

PLATE III.

Fig. 9. *Pl. punctata* phase *densa* KRAEPELIN; $2 \times$ nat. size
Fig. 10. *Pl. punctata* phase *prostrata* KRAEPELIN. $2 \times$ nat. size.
Fig. 11. *Lophodella carteri* (HYATT); $3 \times$ nat. size.
Fig. 12. *Pectinella burmanica* ANNANDALE, a simple and a compound colony; nat. size.

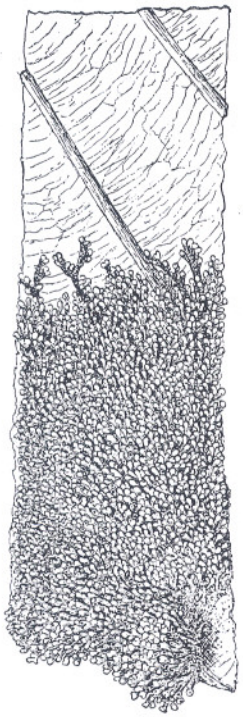

Fig 1. ×1⅓

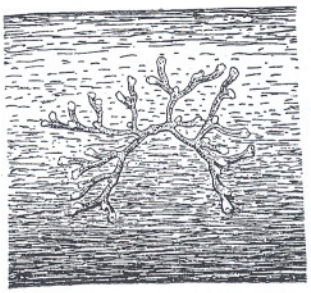

Fig. 4. ×2

Fig. 5. ×1⅓

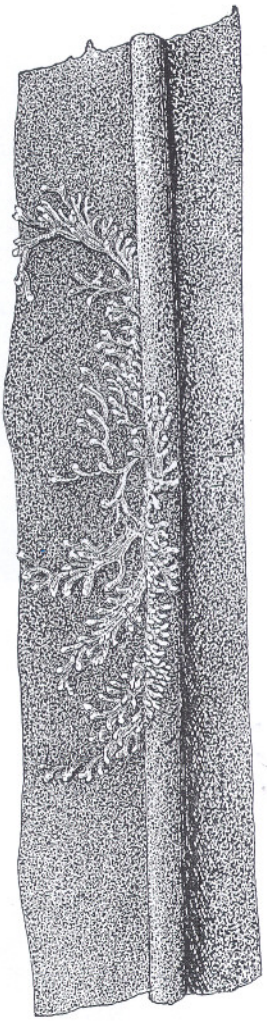

Fig. 8. ×2

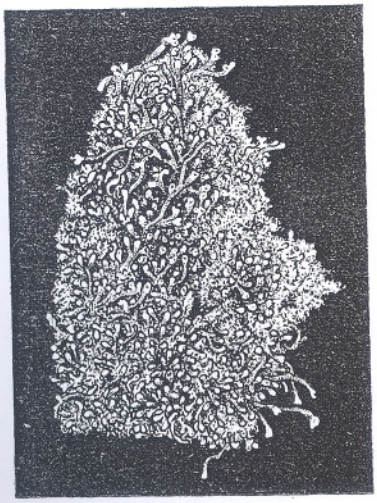

Fig. 3. ×2

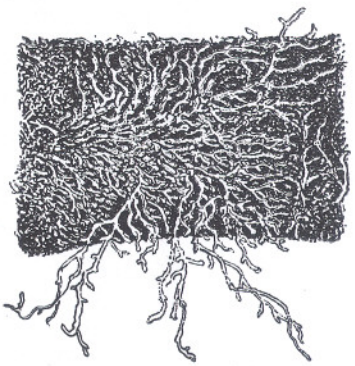

Fig. 2. ×1

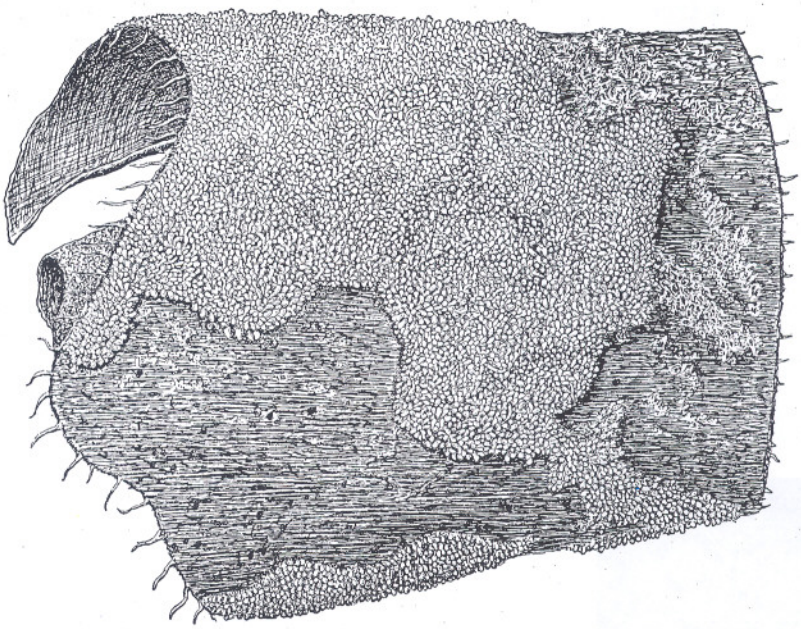

Fig. 7. $\times 1^1/_3$

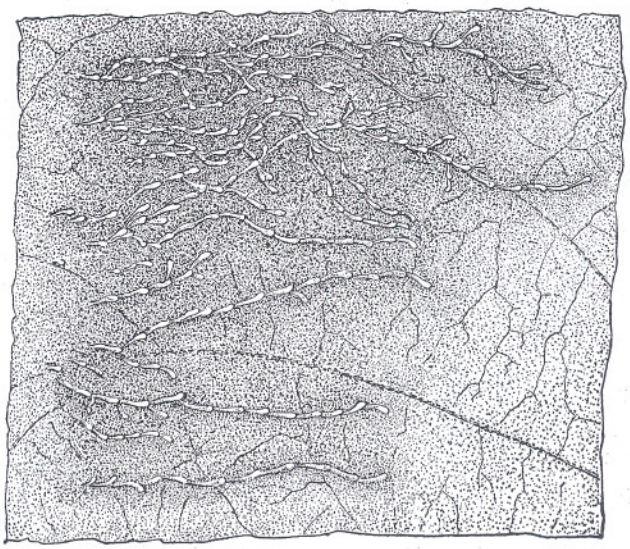

Fig. 6. $\times 2$

Fig. 9. ×2

Fig. 10.
×2

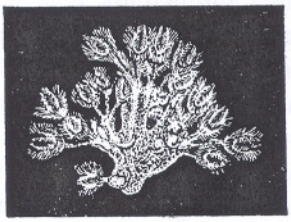

Fig. 11. ×3

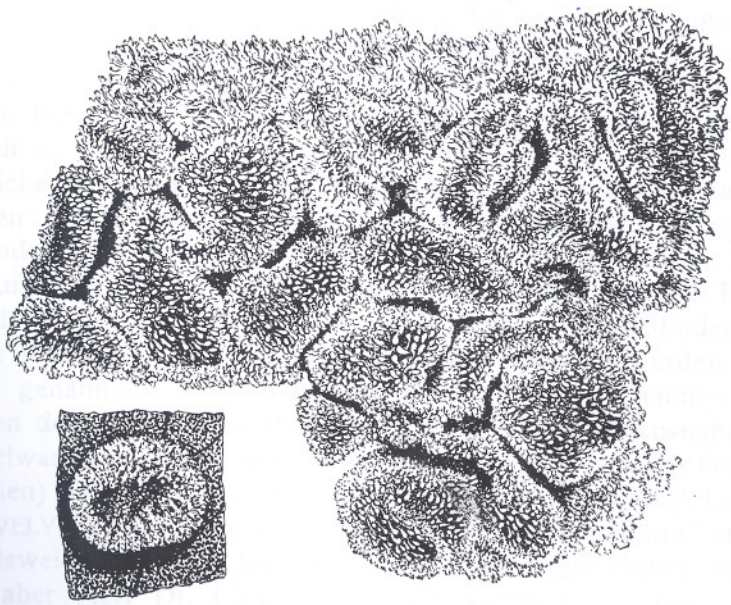

Fig. 12. ×1