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STUDIES ON FRESHWATER BRYOZOA. IV. THE BRYOZOA OF RAJASTHAN, INDIA

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(With 2 Tables and 5 Text-figures)

INTRODUCTION

The purpose of the present study is to record the occurrence of the freshwater Bryozoa in Rajasthan, Western India. The collection work was undertaken by the survey party (February-April, 1962) of the Zoological Survey of India from two collection centres of Rajasthan one at Jodhpur and the other at Sambhar lake. Besides, the collections made by the author from Udaipur district (1970) were also included in the present report. Eleven species belonging to six genera were recorded from the localities the approximate situation of which is as pointed out in Text-fig. 1. All the species described hereunder are recorded from Rajasthan for the first time.

COLLECTION DATA

For a detailed account of topography, climate, vegetation, etc., of the collection localities see Part I of the Fauna of Rajasthan region (Roonwal, 1969). The list of the collection stations is as given under :

TABLE 1.—List of collecting stations for freshwater *Bryozoa* of Rajasthan (Coll. K. S. Rao)

	Collecting station	Approx. Lat. (N)	Approx. Long. (E)
	I. Jodhpur district		
1.	Tank inside Zoological Garden, Jodhpur	26°18′	73°04′
2.	Tank ½ km. west of Jodhpur Fort	26°18′	73°48′
3.	Mandore (12 km. N. of Jodhpur)	26°20′	73°00′
4.	Nagkund (1½ km. from Mandore)	26°19′	73°02′
5.	Balsamund (near Jodhpur)	26°18′	73°04′

Text-fig. 1. A geographical map of Rajasthan showing the approximate situation of the collection localities for Bryozoa.

6.	Takhat Sagar Lake (9 km. west of Jodhpur)	26°18′	73°00′
7.	Pratap Sagar (8 km. west of Jodhpur) (Part of Kaylana Lake)	26°18′	73°09′
8.	Agolai village (46 km. NW of Jodhpur)	26°19′	72°35′
9.	Loridi village (16 km. NW of Jodhpur)	26°22′	72°55′
10.	Umedsagar tank (10 km. west of Jodhpur)	26°15′	72°55′
	II. Pali district		
11.	Sardarsamund Lake (55 km. SE of Jodhpur)	25°54′	73°25′
	III. Nagaur district		
12.	Sambhar Salt Lake (Main lake)	26°55′	75°25′
	IV. Jaipur district		
13.	New *kyar* (near Sambhar Lake)	26°54′	75°13′
14.	Devdyani (near Sambhar Salt Lake)	26°55′	75°13′
15.	A tank of Sambhar in Khyra village (75 km. S)	26°52′	75°13′
16.	Erolai Dhani (village) (near Phulera)	26°52′	75°16′
17.	A shallow well 50 metres west of tank in Erolai Dhani (village)	26°52′	75°16′

V. Udaipur district

18.	Bhupalsagar (near Udaipur)	24°35′	73°40′
19.	Dewari (near Udaipur)	24°36′	73°38′
20.	Fatehsagar Lake (near Udaipur)	24°35′	73°35′
21.	Jaisamund (53 km. N of Udaipur)	24°57′	73°35′
22.	Madri (near Udaipur)	24°30′	73°40′
23.	Kotra (near Udaipur)	24°22′	73°13′
24.	Lake N of Udaipur near Game Sanctuary 53 km.	24°55′	73°35′
25.	Kalaria Tank (7 km. W of Udaipur)	24°33′	73°40′
26.	Pichola Lake (near Kalaria tank)	24°33′	73°42′
27.	Udaisagar Lake (12 km. from Udaipur)	24°38′	73°30′

SPECIES RECORDED

The following species were recorded from Rajasthan Collections.

1. *Hislopia lacustris* Carter, 2. *Hislopia moniliformis* Annandale, 3. *Fredericella sultana* (Blumenbach), 4. *Plumatella emarginata* Allman, 5. *Plumatella casmiana* Oka, 6. *Plumatella frusticosa* Allman, 7. *Plumatella javanica* Kraepelin, 8. *Plumatella repens* (Linnaeus), 9. *Hyalinella punctata* (Hancock), 10. *Stolella indica* Annandate, 11. *Lophopodella carteri* (Hyatt).

SYSTEMATIC ACCOUNT

Class I. GYMNOLAEMATA

Order 1. CTENOSTOMATA

Family 1. HISLOPIIDAE

Genus 1. **Hislopia** Carter

1. **Hislopia lacustris** Carter

(Text-fig. 2, D)

1858. *Hislopia lacustris* Carter, *Ann. Mag. nat. Hist.*, (3) **1** : 169.
1880. *Norodonia combodgiensis* Jullien, *Bull. Soc. Zool. France*, **5** : 77.
1885. *Norodonia combodgiensis* : Jullien, *Bull. Soc. Zool. France*, **10** : 181, 244, 245.
1885. *Norodonia sinensis* Jullien, *Bull. Soc. Zool. France.*, **10** : 91.
1907. *Hislopia lacustris* : Annandale, *Rect. Indian Mus.*, **1** : 145.
1967. *Hislopia lacustris* : Wiebach, *Amazoniana*, **1** (2) : 173.

Material.—(i) 4 colonies, Mandore, Jodhpur Dist., on submerged rocks ; 2.iii.1962. (ii) 6 colonies ; Balsamund, Jodhpur Dist., on

Vallisneri leaves ; 3.iii. 1962. (iii) 12 colonies ; Partap Sagar, Jodhpur Dist., on weeds 3.iii.1962. (iv) 1 colony, submerged sticks from Umedsagar tank in Jodhpur Dist. ; 7.iii.1962. (v) 5 colonies Sardarsamund lake on submerged rocks in Pali Dist. ; 14.iii.1962. (vi) 2 colonies, Devdyani on *Vallisneria* leaves, in Jaipur Dist. ; 6.iv.1962. (vii) 3 colonies each, Jaisamund, Bhypalsagar, Dewali, and Fatehsagar, on submerged rocks, in Udaipur Dist. ; 2 to 6.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere* : India : Calcutta, Bulandshahr, Rewa, Indore, Bombay, Malwatal, Chilka lake, and Madras. Extra-Indian : America, West Germany, Japan, Africa, Russia, Europe and Burma.

Remarks.—The material conforms in general with the descriptions of this species given by Annandale (1911) and Wiebach (1967). Variations were, however, noticed. The Jaisamund material had larger zooecia with wider orifice, whereas the Balasamund material was marked by the invariable presence of spines around the orifice. The base of the spines is sometimes slightly raised. Overgrowth of colonies was rarely reported in *Hislopia*, but a number of such cases were found from the material collected on Vallisneria leaves from Devdyani. The observations of Stebbing (1972) on the phenomenon of recognition of the same species, during growth do not seem to hold good with freshwater ctenostomes.

2. **Hislopia moniliformis** Annandale

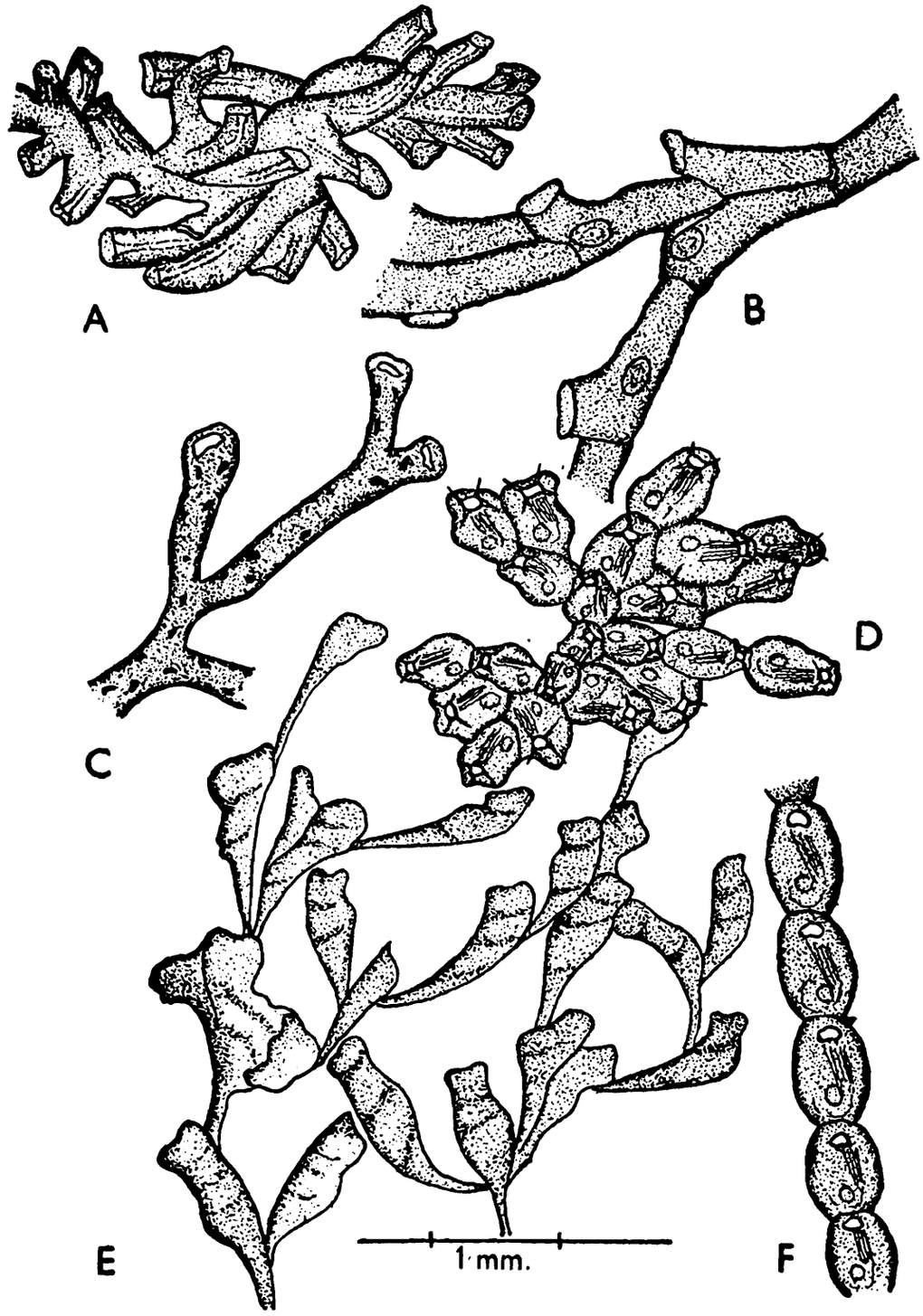
(Text-fig. 2, E)

1907. *Hislopia lacustris* subsp. *moniliformis* Annandale *J. Asiat., Soc. Beng.*, II (2) : 83-97.
1962. *Hislopia lacustris* subsp. *monoliformis* : Rao, *J. Univ. Saugor.*, II (2B.) : 47.
1967. *Hislopia moniliformis* Wiebach, *Amaxoniana.*, I (2) : 173.
1972. *Hislopia moniliformis* : Rao, *Pro. Second, Int. Conj. Bryozoa. Durham.* (in press).

Material.—(i) 2 colonies on *Valliseneria* leaves, Agolai village pond in Jodhpur Dist., 4.iii.1962. (ii) 4 colonies on dead leaves, Madri in Udaipur Dist., 8.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere* : India : Calcutta, Kashmir, Rewa, Extra-Indian : Germany, Burma.

Remarks.—Hislopia moniliformis occurs sparingly as compared with the cosmopolitan *H lacustris.* The zooecia in the present material are more elongated than those described by Annandale (1911). The peculiarities of this species, as reported by Rao and Ghosh (1962)



Text-fig. 2. (A-F) Portions of Colony—A. *Plumatella casmiana* ; B. *Plumatella fruticosa* ; C. *Fredericella sultana* ; D. *Hislopia lacustris* ; E. *Hislopia moniliformis* ; F. *Stolella indica.*

from Vindhyan material, are discernible in the Agolai material. The colonies are not profusely grown but very small.

Class II. PHYLACTOLAEMATA

Family 2. FREDERICELLIDAE

Genus 2. Fredericella Gervais

3. **Fredericella sultana** (Blumenbach)

(Text-figs. 2, C & 4, A-C)

1779. *Tubularia sultana* Blumenbach, *Ann. Nat. Hist.*, **13** : 330.
1844. *Fredericella dilatata* Allman, *Ann. Mag. nat. Hist. Ser.*, **1** (13) : 328.
1851. *Fredericella regine* Leidy. *Proc. Acad. Nat. Sci. Phil.* **5** : 320.
1866. *Fredericella pulcherrina* Hyatt, *Proc. Essx., Inst.*, **4** : 197.
1909. *Fredericella indica* Annandale, *Rec. Indian. Mus.*, **3** : 373.
1962. *Fredericella sultana* : Rao & Kulshrestha, *J. Univ. Saugor.*, **I I**, 2. B. : 50.

Material.—(i) 6 colonies from Pratapsagar on submerged rocks in Jodhpur Dist., 8.iii.1962. (ii) 2 colonies from Nagkund on submerged rocks in Jodhpur Dist., 7.iii.1962. (iii) a single colony from Dewali on submerged rocks in Udaipur Dist., 4.ii.1970. (iv) 4 colonies from Jaisamund lake on dead leaves in Udaipur Dist., 5.iii.1970. (v) 2 colonies from the lake near the game sanctuary on submerged weeds in Udaipur Dist., 8.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere ;* India : M.P., U.P., Kashmir, Punjab and Orissa. Extra-Indian : Europe, America, Asia, and Africa.

Remarks.—Fredericella material seems to be comparatively sparing in Rajasthan than in other parts of the country. The paiptoblasts are larger and often ornamented in the present material. The kidney-shaped paiptoblasts described by Annandale (1911) could not be observed. The abnormal paiptoblasts (Text-fig. 4, C) were observed from the material collected from Dewali, Udaipur Dist. Bushnell (1971) reports similar paiptoblasts from *Fredericella australensis*, collected in Mexico. As rule the Rajasthan *Fredericella* material had a uniform encrustation which was never dense.

Family 3. PLUMATELLIDAE

Genus 3. Plumatella Lamarck

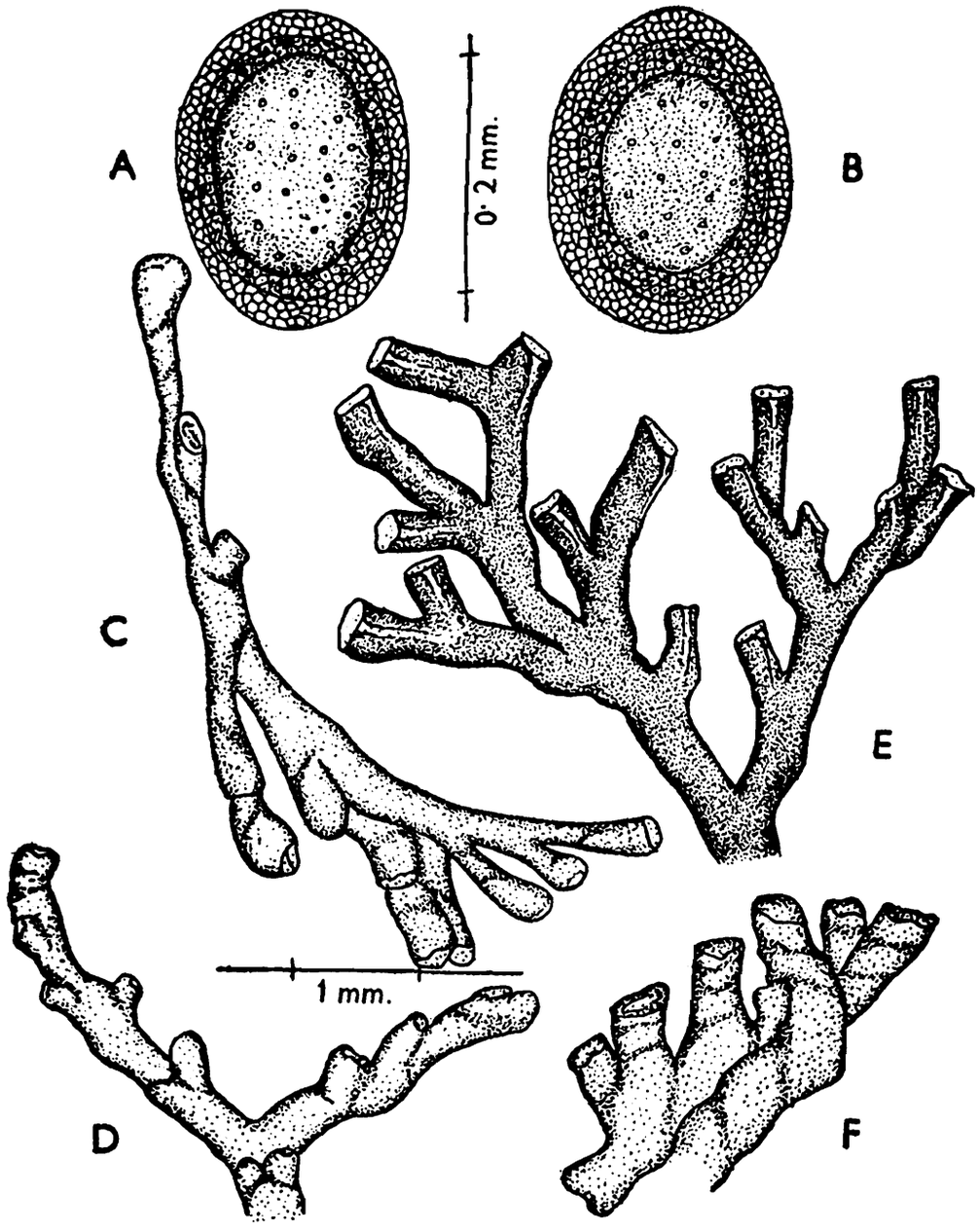
4. **Plumatella emarginata** Allman

(Text-figs. 3, E & 4D)

1844. *Plumatella emarginata* Allman, *Ann. Mag. nat. Hist. Ser.*, I. 13 : 320.
1847. *Plumatella emarginata* : Johnston, *Brit. Zooph.*, (ed. 2) : 404.
1850. *Plumatella allmani* Hancock, *Ann. Mag. nat. Hist. Ser.* II, 5 : 173.
1851. *Plumatella diffusa* Leidy, *Proc. Acad. nat. Sci. Phil.* ; **5** : 320.
1857. *Alcyonella benedeni* Allman, *Mon. Fresh-water Bryozoa*, : 89.

1885. *Plumatella lucifaga* Jullien, *Bull. Soc. Zool. France*, : 114.
1887. *Plumatella princeps* var. *emarginata* (Partim) *Deutschen Susswasserbryoz.* : 120.
1910. *Plumatella emarginata* : Annandale, *Rec. Indian Mus.* V : 47.
1927. *Alcyonella benedeni* : Abricossoff, *USSR. Compt. Rend. Acad. Sci. Urss. A.*, **19** : 307.
1962. *Plumatella emarginata* : Rao and Kulshrestha. *J. Univ. Saugor.* **II, 2 B** : 50.

Material.—(i) 2 colonies from tank inside zoological gardens on submerged rocks in Jodhpur, 1.iii.1962. (ii) 6 colonies from



Text-fig. 3. (A-B) Floatoblasts—A. *Hyalinella punctata* ; B. *Stolella indica* ; (C-F) Portions of colony—C-D. *Plumatella repens* from Sardar samund, Pali Dist. & Jaisamund, Udaipur Dist. ; E. *Plumatella emarginata* ; F. *Hyalinella punctata*.

Mandore on submerged rocks in Jodhpur Dist., 3.iii.1962. (iii) 5 colonies from Balasamund on submerged rocks in Jodhpur Dist., 5.iii.1962. (iv) 2 colonies from Pratap Sagar on dead leaves in Jodhpur Dist., 8.iii.1962. (v) 2 colonies from Loridi village on submerged leaves in Jodhpur Dist. 27.ii.1962. (vi) 10 colonies from Umedsagar on submerged rocks in Jodhpur Dist., 7.iii.1962. (vii) 3 colonies from Sardarsamund on submerged rocks in Pali Dist., 14.iii.1962. (viii) 2 colonies from the tank in Khyra village on submerged sticks in Jaipur Dist., 8.iv.1962. (ix) 3 colonies from a tank in Erolai village on submerged sticks in Jaipur Dist., 10.iv.1962. (x) A single colony from a shallow well in Erolaidani village on dead leaves in Jaipur Dist., 7.iv.1962. (xi) 3 colonies from Bhupalsagar on submerged rocks, in Udaipur Dist., 3.ii.1970. (xii) 2 colonies each from Dewali, Fatehsagar, Madri, Kotra, and Kalaria tanks on submerged rocks in Udaipur Dist., 7 to 10.ii.1970.

Distribution.—Rajasthan : Not reported. *Elsewhere* : India : Calcutta, Madras, Rewa, Indore, Mhow. Extra-Indian : Europe, N. America, Southern Asia, Africa, and Australia.

Remarks.—This seems to be the most abundant species in Rajasthan as it is in other regions. The high variability of the species is well known. The septa in between the zooecia is not a stable character in this species, but all the Rajasthan *Plumatella emarginata* material invariably showed a prominent septum. The floatoblasts and the sessoblasts conform with the earlier descriptions and lie within the variation range. The giant statoblasts of this species reported by Rao and Kulshrestha (1962) are not seen in the present material.

5. **Plumatella casmiana** Oka

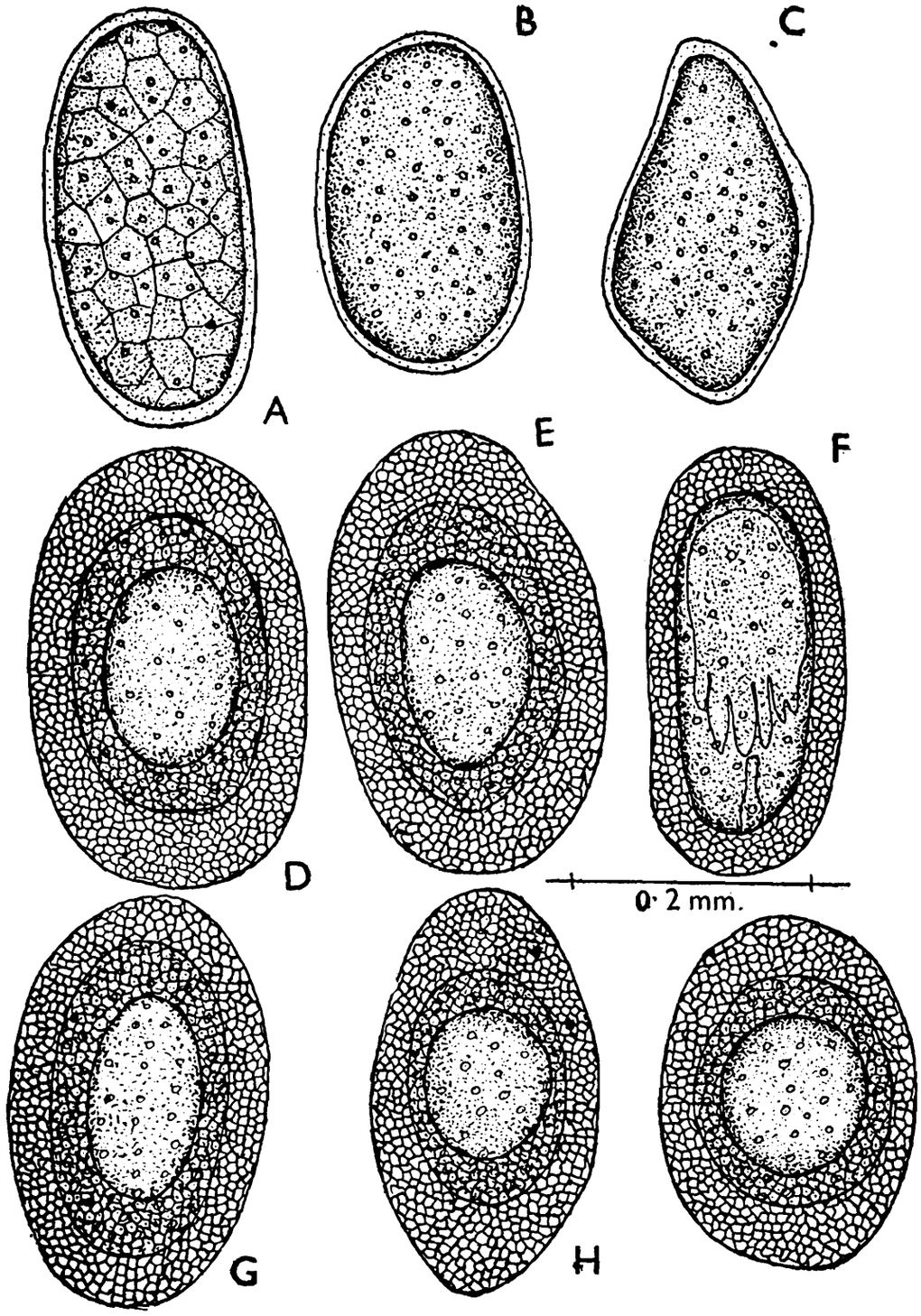
(Text-figs. 2, A & 4, E, F)

1907. *Plumatella casmiana* Oka, *Annot. Zool. Jap.*, **6** : 117.
1955. *Plumatella casmiana* : Toriumi, *Sci. Rep. Tohoku. Imp. Univ. Ser.*, **4** (21) : 67.

Material.—(i) 7 colonies from Jaisamund lake on submerged sticks in Udaipur Dist.

Distribution.—Rajasthan : As above. *Elsewhere* : India : Govindhgadh, Patalpani fall area in Madhya Pradesh. Extra-Indian: N. America, Japan and Germany.

Remarks.—This species was recently reported from Madhya Pradesh (Rao, 1972, in press). It could be recorded from a single station in Rajasthan which represents the third locality of the species



Text-fig. 4. A-B Paiptoblasts of *Fredericella sultana* ; C. Abnormal paiptoblasts of *F. sultana* ; D. Floatoblasts of *Plumatella emarginata* ; E-F. Normal & thin floatoblasts of *Plumatella casmiana* ; (G-I) Floatoblasts G. *Plumatella fruticosa* ; H. *Plumatella javanica* ; I. *Plumatella repens.*

from India. The recent material resembles the one from Patalpani fall area. In external form it resembles *Plumatella emarginata.* The

two types of floatoblasts characteristic of *Plumatella casmiana*, were noticed. The measurement of the floatoblasts and sessoblasts recorded are as given under.

TABLE 2—Measurements of floatoblasts and sessoblasts of *Plumatella casmiana* : from Rajasthan.

Structure measured	Normal Type	Thin type
Length of entire statoblast	0.38 mm	0.36 mm
Width of entire floatoblast	0.29 mm	0.28 mm
Length of capsule	0.22 mm	0.26 mm
Width of capsule	0.07 mm	0.10 mm
Length of sessoblast	0.40 mm	0.35 mm

Plumatella casmiana from Rajasthan shows a comparative variation in the length of their floatoblasts and other measurements than that of the material reported from other Indian localities. The honeycomb colonies of the species reported by Bushnell (1971) could not be observed in Rajasthan.

6. **Plumatella fruticosa** Allman

(Text-figs. 2, B & 4, G)

1844. *Plumatella fruticosa* Allman, *Ann. Mag. nat. Hist. Ser.* **I**, **13** : 328.
1847. *Plumatella repens* van Beneden, *Mem. Acad. Roy. Belg* : 21.
1850. *Plumatella corolloides* Allman, *Rep. Brit. Assoc.* : 335.
1856. *Plumatella stricta* Allman, *Mon. Freshwater Bryozoa. Ray. Soc. Lond.*
1855. *Plumatella lucifaga* Jullian, *Bull. Soc. Zool. France.*, **10** : 9.
1887. *Plumatella princeps* var. *fruticosa* Kraepelin, *Deutsch. Susswasser bryozen.* **i**, : 120.
1890. *Plumatella fruticosa* : Bran. *Bibl. zool.*, **II** : 9.
1907. *Plumatella repens* Annandale, *J. Asiat. Soc. Bengal. NS.* **iii**, : 88.
1954. *Plumatella repens* Toriumi, *Sci. Rep. Tohoku. Univ.*, **20** : 293.

Material.—(i) 2 colonies from the tank ½ km. west of Jodhpur fort on submerged weeds, 4.iii.1962. (ii) 4 colonies from Nagkund on submerged rocks in Jodhpur Dist, 7.iii.1962. (iii) 6 colonies from Takhatsagar lake on submerged *Vallisneria* leaves in Jodhpur Dist., 10.iii.1962. (iv) 3 colonies from Erolaidani village tank on submerged rocks in Jaipur Dist., 7.iv.1962. (v) 6 colonies from Fatehsagar lake on submerged rocks in Udaipur Dist., 8.ii.1970. (vi) 2 colonies from Kotra tank on submerged rocks in Udaipur Dist., 10.ii.1970. (vii) 2 colonies from Pichola tank on submerged rocks in Udaipur Dist., 12.ii.1970.

Distribution.—Rajasthan not reported. *Elsewhere* : India : Calcutta, Chilka lake, Travancore, Bombay, Ganges delta, and the Himalayan region. Extra-Indian : Europe, N. America, Rajshahi, Africa, Lahore.

Remarks.—*Plumatella fruticosa* seems to be well distributed in Rajasthan. The colonies were observed profusely grown and shrubby. The floatoblasts are long and elliptical with a smooth capsule. The sessoblasts are large and elongated with markings on the surface.

7. **Plumatella javanica** Kraepelin

(Text-fig. 4, H)

1906. *Plumatella javanica* Kraepelin, *Mitt. Nat. Mus. Hamburg.* **23** : 123.
1908. *Plumatella emarginata* var. *javanica* Loppens., *Ann. Biol. Lacustre.*, **3** : 162.
1910. *Plumatella javanica* : Annandale, *Rec. Indian Mus.*, **5** : 37.
1967. *Plumatella javanica* : Wiebach, *Amazoiana*, **I** (2) : 173.

Material.—(i) 2 colonies from Umedsagar on dead leaves in Jodhpur Dist., 7.iii.1962. (ii) 3 colonies from Sardarsumund lake on submerged sticks in Pali Dist., 14.iii.67 (iii) 2 colonies from Devdyani on submerged rocks, in Jaipur Dist., 1.iv.1962. (iv) 4 colonies from Udaisagar lake and Kalaria tank on weeds from Udaipur Dist., 13.ii.1970.

Distribution.—*Rajasthan* : As above. *Elsewhere* : India : Calcutta, Berhampore, Murshidabad, Darjeeling, Tamil Nadu, Travancore, Indore and Mhow. Extra-Indian : Europe, N. America, Java, China and Japan.

Remarks.—This species is of a limited occurrence in Rajasthan. The zoarium is irregularly and sparingly branched and resembles the material of *Plumatella fruticosa* reported from Narmada (Rao, 1972, in press).

8. **Plumatella repens** (Linne)

(Text-figs. 3, C, D & 4, I)

1758. *Tubipora repens* Linne, *Ann. Nat. Ser.*, **15** : 15.
1856. *Plumatella corolloids* Allman, *Mon. Fresh water Polyzoa. Ray Soc. Lond.*
1866. *Plumatella limnas* Perfitt, *Ann. Mag. nat. Hist. Ser.*, **3** : 171.
1890. *Plumatella fungosa* Braem, *Bibl. Zool.*, **II** : 1.
1970. *Plumatella repens* : Toriumi, *Bull. Mar. Biol. Asamushi. Tohoku. Univ.*, **xiv** : 11.

Material.—(i) 2 colonies from Sardarsamund on submerged from Pali Dist., 14.iii.1962. (ii) 3 colonies from Jaisamund lake on bark in Udaipur Dist., 2.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere* : **India : Recorded** from few localities but under different names. **Extra-Indian** : Japan, N. America, Europe.

Remarks.—This cosmopolitan species seems to be of limited occurrence in Rajasthan. The *Plumatella repens* material described by Annandale earlier has been synonymised by the same author with *Plumatella fruticosa* (Annandale, 1911). The present record of the species can, hence be treated as the first from Indian waters. This highly variable polmorphic and polytypic species is most confusing and is closely related to *Plumatella fungosa.* The experimental rearing studies of Toriumi (1971) may in future prove the identity of both the species. The Rajasthan *Plumatella repens* conforms in general with its earlier descriptions and resembles *Plumatella fungosa* closely. The Sardarsamund and the Jaisamund material may vary to a large extent phenotypically (Text-fig. 3, C & D). The branching pattern of zooarium differs in both. The floatoblasts have a high variation range in their size and shape. The capsule length seems to be a constant character in all the lots. The species will however be dealt in detail elsewhere.

Genus 4. **Hyalinella** Jullien

9. **Hyalinella punctata** (Hancock)

(Text-fig. 3A & F)

1850. *Plumatella punctata* Hancock, *Ann. Mag. nat. Hist. Ser. II.*, **5** : 173.
1868. *Plumatella vitrea* Hyatt, *Proc. Essex. Inst.* **5** : 193.
1885. *Hyalinella vitrea* : Jullien, *Bull. Soc. Zool. France.* **x.** : 91.
1887. *Plumatella punctata* var. *donsa* Kraopelin, *Die Deutchen Susswasser Bryozoen* : 11.
1908. *Hyalinella punctata* : Loppens, *Ann. Biol. Laoustre*, **3** : 141.
1910. *Plumatella punctata* : Annandale, *Rec. Indian Mus.*, **5** : 37.
1955. *Hyalinella punctata* : Toriumi, *Sci. Rep. Tohoku. Imp. Univ.*, **4** (16) : 193.

Material.—(i) 2 colonies from the tank inside Zoological gardens, Jodhpur, on submerged weeds. 1.iii.1962. (ii) one colony from Mandore, on submerged stones in Jodhpur Dist., 3.iii.1962. (iii) Four colonies from Umedsagar on submerged stones in Jodhpur Dist., 7.iii.1962. (iv) 3 colonies from a tank in Khyra village on dead leaves in Jaipur Dist., 8.iv.1962. (v) 3 colonies from Bhupalsagar on dead leaves in Udaipur Dist., 3.ii.1970. (vi) 6 colonies from Jaisamund on submerged *Vallisneria* leaves in Udaipur, 2.ii.1970. (vii) 2 colonies from Kotra on submerged rocks from Udaipur Dist., 9.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere* : India : Calcutta, Rewa, Indore. Extra-Indian : Europe, N. America.

Remarks.—The species is sufficiently represented in Rajasthan. It was previously recorded only from Calcutta. The present author recorded the species from Madhya Pradesh (Rewa and Indore). The record of this species from Rajasthan extends its distribution to the W. India. It is flat semitransparent with recumbent zooecia. The orifice of the zooecium is prominent with an agglutinised ectocyst. The latter is wrinkled in order zooecia with a faint emargination and furrow. A definite septum is absent. Floatoblasts are rounded or oval with a large capsule and agree in general with the earlier descriptions.

Genus 5. **Stolella** (Annandale)

10. **Stolella indica** Annandale

(Text-figs. 2, F & 3, B)

1909. *Stolella indica* Annandale, *Rec. Ind. Mus.*, **3** : 279.
1910. *Stolella indica* : Annandale, *Rec. Indian Mus.*, **5** : 45.
1943. *Stolella indica* : Rogick, *Ann. Newyork., Acad. Sci.*, **5.** : 45.
1962. *Stolella indica* : Rao and Kulshrestha, *J. Univ. Saugor.*, **112. B.** : 50.

Material.—(i) 3 colonies from Takhatsagar submerged rocks in Jodhpur Dist., 10.iii.1962. (ii) 5 colonies from Pratapsagar on submerged rocks from Jodhpur Dist., 8.iii.1962. (iii) A Single colony from Agolai village on submerged rocks in Jodhpur Dist., (iv) 6 colonies from Devdyani on dead leaves in Jaipur Dist., 1.iv.1962. (v) 2 colonies from a tank in Khyra village on submerged rocks in Jaipur Dist., 8.iv.1962. (vi) 6 colonies from a tank is Erloi village on Bark, in Jaipur Dist., 10.iv.1962. (vii) 2 colonies from a shallow well near Eolaidani village on submerged sticks in Jaipur Dist., 7.iv.1962. (viii) 12 colonies from Bhupalsagar on submerged rocks in Udaipur Dist., 3.ii.1970. (ix) 6 colonies from Madri on aquatic plants from Udaipur Dist., 9.ii.1970. (x) 6 colonies from Fatehsagar on submerged rocks in Udaipur Dist. (xi) 4 colonies from Pichola lake submerged rocks in Udaipur Dist., 12.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere* : India : Calcutta and the Indogangetic plains, Rewa. Extra-Indian : N. America.

Remarks.—The *Stolella* material though observed earlier as a rare species strictly restricted to the Indogangetic plains by Annandale (1911), it could be recorded profusely by the author from different parts of India. The author agrees with Bogick (1943) that *Stolella himalayana* Annandale is no more than a synonym of *Stolella indica.* The Rajasthan *Stolella* material proves the fact further that the younger colonies from Erloidani village resemble *Stolella*

indica whereas the profusely grown older colonies from Jodhpur Dist. (Text-fig. 2, f), resemble *Stolella himalayana.* The floatoblasts and sessoblasts fully conform with the descriptions of Annandale (1911).

Family 4. LOPHOPODIDAE

Genus 6. **Lophopodella** Rousselet

11. **Lophopodella carteri** (Hyatt)

(Text-fig. 5, A-G)

1866. *Pectinatella carteri* Hyatt, *Proc. Essex. Inst.*, **4** : 197.
1904. *Lophopodella carteri* : Rousselet, *Jour. Quckett. Micr. club.*, **2. 9** : 47.
1908. *Lophopus carteri* : Annandale, *Rec. Indian Mus.*, **2** : 169.
1910. *Lophopodella carteri* : Annandale, *Rec. Indian Mus.*, **5** : 37.
1956. *Lophopodella carteri* : Toriumi, *Sci. Rep. Tohoku. Imp. Univ.*, **4. 22** : 57.

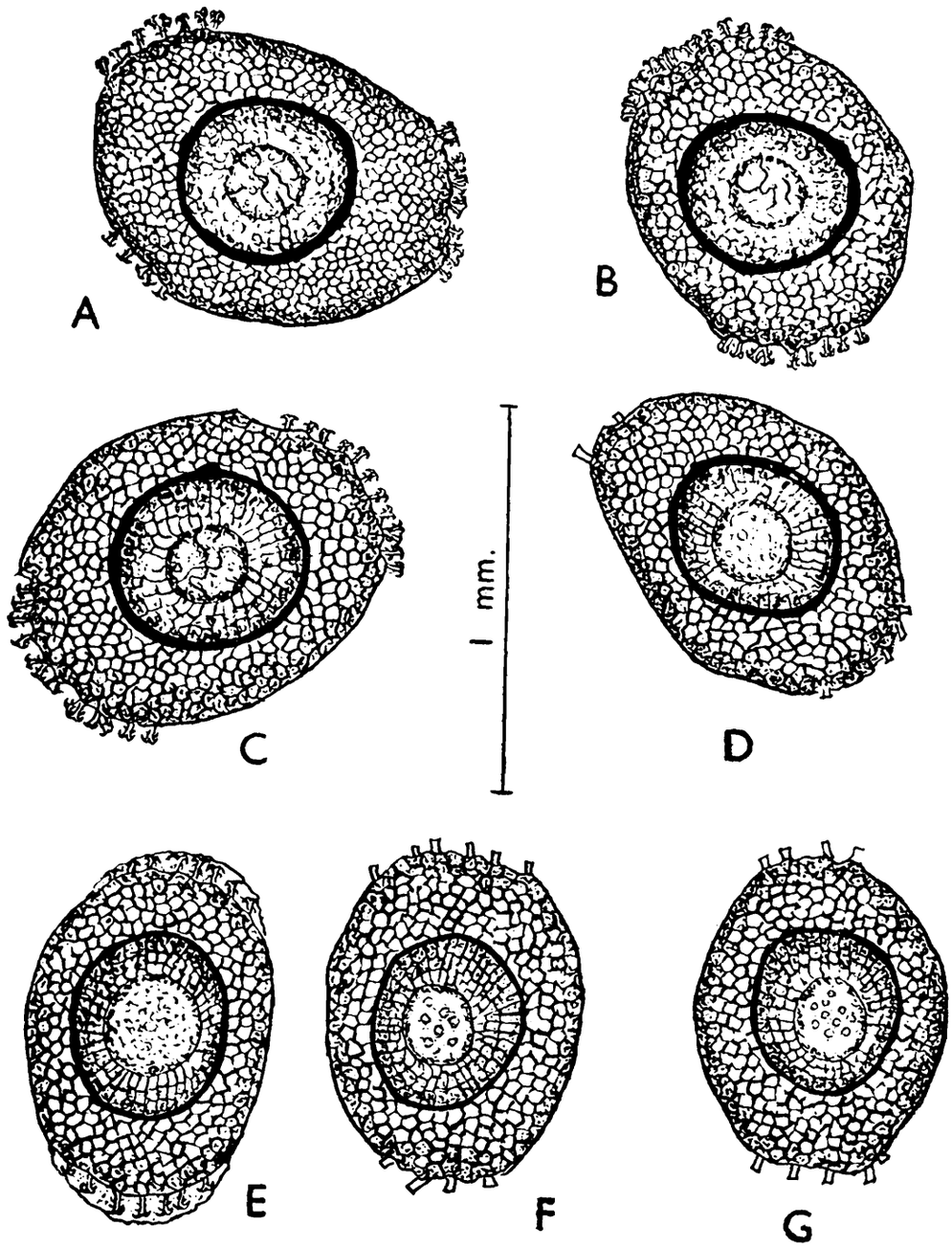
Material.—(i) 50 colonies from Balasamund lake on the stems of aquatic plants in Jodhpur Dist., 5.iii.1962. (ii) 12 colonies from Bhupalsagar on submerged stones in Udaipur Dist., 3.ii.1970. (iii) 12 colonies from Jaisamund and Kalaria lakes on aquatic plants from Udaipur Dist., 2.ii.1970.

Distribution.—Rajasthan : As above. *Elsewhere* : India : Bombay, Western Himalayas, Orissa and Madhya Pradesh. Extra-Indian : America, Japan and Europe.

Remarks.—This species was collected in abundance from Balasamund lake. After the recent records of this species from Madhya-Pradesh and Rajasthan, from many localities the species seems to be well represented in India. It was hitherto considered a rare species. The spinoblasts in the Rajasthan material present extreme variations, firmly suggesting that *Lophopodella carteri* var *himalayana* Annandale is no else than its synonym. Rogick (1935) and Toriumi (1956) commented on the variations in the spinoblasts of the species. Further variations could be observed in the Rajasthan material, (Text-fig. 5, A-G) in the structure and number of spines.

DISTRIBUTIONAL PATTERN

The distributional pattern of various freshwater Bryozoan species in Rajasthan is interesting. The record of *Plumatella emarginata, P. javanica, P. repens, Hislopia lacustris* and *Fredericella sultana,* which are cosmopolitan in their distribution, can be easily explained. The occurrence of *Plumatella casmiana* in Rajasthan is noteworthy and shows the range of adaptability of the species which was hitherto known from areas of optimum environment. *Plumatella fruticosa,*



Text-fig. 5. A-G Spinoblasts of *Lophopodella carteri* showing extreme variations in the structure of spines.

which prefers colder temperatures, has now been recorded from this region. *Lophopodella carteri* is a temperate species and was supposed earlier to have a limited distribution. Its recent abundant records from Madhya Pradesh and Rajasthan make the view untenable. Annandale's contention that *Stolella indica* is restricted to the Indo-gangetic plains no more holds good by its recent records from Rajasthan. The wide occurrence of *Hyalinella punctata* in an arid environment is yet to be explained.