XXIV.—Description of two new species of Floscularia, with remarks. By W. Murray Dobie, M.D., F.B.S.E., Member of the Royal Medical and Clinical Societies of Edinburgh.

While examining various Rotifera in April this year (1849), I met with two Floscularias which differ essentially from any hitherto described. I propose in the present paper to characterize and describe briefly these two species, to which the plate has reference, and accompany the description with a few general remarks.

Floscularia campanulata (mihi). Pl. VI. fig. 3.

Sp. Char. Case diaphanous. Rotatory organ furnished with five flattened lobes fringed with very long cilia. Body ovate, without proboscis. Tail long and terminating abruptly in a transparent filament spread out into a kind of sucker at the point of attachment. Pl. VI. fig. 1.

Length \( \frac{1}{3} \) in. when extended. Egg with two red eye-spots, contained in a large ovary.

Hab. Boggy Park pond, 8½ miles from Chester. Found on Ceratophyllum and Confervae.

Floscularia cornuta (mihi). Plate VI. fig. 4.

Sp. Char. Case short, diaphanous, and not very distinct. Rotatory organ furnished with five rounded lobes surrounded with extremely long and delicate cilia. A short, narrow, non-ciliated, flexible process (cornu) is attached to the outside of one of the lobes. Egg with two red eye-spots. Young animal with vibratile cilia on head and rapidly locomotive.

Length \( \frac{1}{40} \) in. when extended.

Hab. Boggy Park pond. Found on Ceratophyllum.
The following table will serve to show the relation these new species bear to the Floscularias which have been already discovered.

<table>
<thead>
<tr>
<th>Species</th>
<th>Lobes</th>
<th>Processes</th>
<th>Cilia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floscularia proboscidea</td>
<td>6.</td>
<td>One large and ciliated.</td>
<td>Short.</td>
</tr>
<tr>
<td>ornata</td>
<td>5-6 rounded.</td>
<td>None.</td>
<td>Long.</td>
</tr>
<tr>
<td>campanulata</td>
<td>5 flattened.</td>
<td>None.</td>
<td>Long.</td>
</tr>
<tr>
<td>cornuta</td>
<td>5.</td>
<td>One narrow and non-ciliated.</td>
<td>Very long.</td>
</tr>
</tbody>
</table>

The usual length of the adult *Floscularia campanulata* is about \( \frac{1}{50} \) th of an inch when extended, but I have met with specimens larger than this. The case in this species is long, and not very defined, its surface is granular, and it contains minute rounded bodies in its substance.

The body of this *Floscularia* when fully contracted is completely inclosed within its case, which however is absent in the young animal. The body in both species is hyaline or colourless, except when coloured food has been received into the alimentary canal.

The entrance to the alimentary canal in the *Floscularia campanulata* resembles a large open cup, and may be termed the infundibulum; the edge of which, when the animal is expanded, is divided into five lobes by a corresponding number of depressions. Each of these lobes is flattened or laminar, slightly thickened at the margin, which is thickly fringed by long and very delicate cilia or setae, except for a small space in the middle of the depression. One of the lobes is rather larger than the other four. Five bands, apparently muscular, are seen passing to the centre of these depressions. Lines of a fainter description run up the centre of each lobe to near its apex; these lines are frequently observed to contain highly refracting bodies resembling little globules of oil. See fig. 3.

The rotatory organ of the *Floscularia cornuta* differs from the preceding; it is divided by very deep depressions into five lobes, each terminated by a kind of ciliated knob; and to the back of one of these lobes the flexible *cornu* is attached externally. The infundibulum in both species is separated from the next cavity,—which, following Dujardin, I call the vestibule,—by a rim enlarged at certain points into little knobs, each of which is clothed with cilia, not vibratile.

The next portion of the alimentary canal is the crop separated from the vestibule by a diaphragm, in which is a slit-like opening fringed with vibratile cilia, the motion of which gives rise in
my opinion to the peculiar serpentine movement always observed at this point. See fig. 3 d.

The cilia on the upper surface of this diaphragm and on the edges of its aperture assist in carrying the food into the crop. In both species the crop is ciliated throughout its interior. The next cavity, or second oesophageal bulb, contains the jaws and teeth—communicating above with the crop, and below with the conical termination of the alimentary tube. The teeth and jaws seem exactly alike in both the species I have examined with care: each jaw contains a bifurcated tooth, greatly resembling that of the Stephanoceros, only much more minute. See figs. 3, 4 & 5.

The ovigerous sac or ovary is large in both, containing several large ova which seem to be discharged from the cloaca, which is common to both the ovary and the alimentary canal. The red points can be seen in the egg before it is discharged; the movements of the young animal within its case are quite perceptible at this period. See figs. 6 & 3 h.

The eggs for some time before they are completely hatched remain about the bottom of the case. I have been unable to detect any male organs in either of the species.

The tail is long, and composed of non-striated muscular fibre inclosed in a continuation of the general integument. In the Floscularia campanulata it terminates in a homogeneous non-contractile filament produced into a sucker-like expansion, by which the animal attaches itself to Confervæ or Ceratophyllum.

The muscular system consists of non-striated fibres. Those composing the tail extend upwards and are lost upon the surface of the body. In the F. campanulata five very distinct bands run up the sides of the vestibule and infundibulum, and terminate by bifurcating in the depression between the lobes. The body and tail are highly contractile; the vestibule particularly so, large animalcules being frequently forced through the aperture leading into the crop by the powerful and continued contractions of its walls.

No trace of a vascular system can be observed. The tremulous gill-like organs found in some Rotifers are here absent.

With the exception of the eye-spots in the young animal, there are no organs of special sense. The whole surface is acutely sensible of tactile impressions, but the lobes of the rotatory organ and the cornu are perhaps more sensitive than the general surface.

The cilia on these animals are of two kinds: the usual short vibratile kind line the interior of the crop and alimentary canal, and cover the lower part of the vestibule. The other variety of cilia are extremely long and filiform, of uniform thickness, and not vibratile under ordinary circumstances. They are slowly
moved and spread out by the contractile substance of the lobes of the rotatory organ.

When a solution of caustic potash is brought in contact with the filiform cilia, a most violent vibratile action immediately commences, and continues till the whole bundle is completely disorganized. Violent mechanical stimulation seems to have a similar effect, though in a less degree.

I may here notice more particularly the peculiar cornu or process of the F. cornuta. The lobes of the rotatory organ of this animal resemble very much those of the F. ornata, with this difference, that in the F. cornuta only five exist, while in the F. ornata there are six according to Ehrenberg. The cornu is attached to the exterior of one of these lobes; it is narrow and flexible; the animal seems never to move it. It is best seen when the animal expands itself fully, for in the contracted state it is completely retracted within the integument.

Immediately below the integument of the Floscularia cornuta are groups and lines of very small granules continually in a state of rapid molecular motion. In appearance they exactly resemble the molecules in the cusps of the Closterium. Besides the molecular they are subject to another motion; for occasionally they may be seen to move from one part of the surface to another in currents not very distinct or persistent, and in no definite direction. I have seen them running in lines down the tail and collecting into groups. This flowing movement occurs chiefly during the contractions and relaxations of the entire animal. See fig. 4.

In the Flos. campanulata there are larger fixed granules distributed here and there throughout the body and tail; these bodies more nearly resemble globules of oil.

I am in much doubt as to the nature of these minute bodies in the F. cornuta. I think it probable they are connected with the nutrition of the animal, and analogous to the free floating corpuscles in the abdominal cavity of the Hydatina senta, or the so-called blood-corpuscles of the Tardigrada, so well described by M. Doyère.

The Floscularia campanulata is gregarious; sometimes as many as eight or ten specimens may be seen attached to a small portion of Conferva.

The Flos. cornuta is found single; there are seldom more than two or three near one another.

The Flos. campanulata is a very active animal, expanding and contracting itself with great rapidity. The Flos. cornuta is by no means so strong and active: both species when satiated with food remain contracted for a considerable time.

Ehrenberg regards the Floscularia described and figured by
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M. Peltier* as identical with his *Floscularia ornata*. Both Dujardin and Peltier found the rotatory organ five-lobed in the species observed in France. Admitting these descriptions to be correct, we must either hold with Pritchard that the *Floscularia ornata* has sometimes five, at other times six lobes, or consider the five-lobed species of Peltier and Dujardin† to be a variety of Ehrenberg’s true *Flos. ornata*.

In no kind of *Floscularia ornata* has any cornu or process been seen attached to any of the lobes. My friend Mr. Hallett, late of the Museum of the Royal College of Surgeons, writes me that he finds the *Flos. ornata* with a six-lobed rotatory organ and no process.

M. Dujardin †, in describing his family Floscularia, observes as follows on the masticatory apparatus of the genus *Floscularia*:

“The *Floscularia* has simple mandibles; in the *Stephanoceros* the mandibles are compound.” With this assertion of Dujardin I do not agree; the whole apparatus closely resembles that of the *Stephanoceros*, only on a smaller scale. One thing I feel certain of is, that the tooth is bifurcated and therefore cannot be simple.

In figure 5 I have endeavoured to represent the dental apparatus of the *Floscularia* as I myself have frequently observed it. I cannot vouch for its entire accuracy, as it is very difficult to obtain a good view of them.

M. Dujardin § thus observes regarding the eggs: “Les œufs montrent un seul point rouge et non deux comme ceux qu’a représentés M. Ehrenberg.” I must here also differ from M. Dujardin. In nearly all my examinations of the eggs and young of the *Floscularia*, I have been able to make out *two* very distinct red eye-spots; they appear in the egg when it has reached its full size, but are best seen in the young animal.

Dujardin’s observations || differ from those of Ehrenberg in another particular; I again quote from Dujardin’s work: “Ce même auteur (M. Eh.) leur assigne un étui membraneux, mais ceux qui ont été observés en France manquent toujours de cet étui.” My own observations coincide with Ehrenberg’s descriptions; the sheath is never absent except in the very young animal, but is often so delicate as to escape superficial observation.

The two Floscularias described in this communication were obtained from a pond situated in Trevalyn in the parish of Gresford, Denbighshire, within a few yards of the boundary line limiting the detached portion of Flintshire in Gresford. The

† Hist. Nat. des Infus. p. 610.
‡ Hist. Nat. des Infus. p. 609, also at p. 611. “Les mâchoires m’ont paru unidentées.”
|| Ib. p. 609.
place is named the "Boggy Park," from an elevated quagmire in the meadow abounding in *Pinguicula vulgaris, Anagallis tenella, Parnassia palustris,* &c. It lies nearly two miles south of the Rossett station of the Shrewsbury and Chester Railway, at the base of the slope which descends from the table-land of Gresford. This eastern declivity of North Wales commands, at an elevation little exceeding a hundred feet above the level of the sea, a view not to be surpassed for extent and beauty;—on the north stretching over the peninsula of Wirral; and in some states of the atmosphere even to the southern mountains of Cumberland; on the south to the Wrekin far into Shropshire; eastward to the Peckforton, Delamere and Lancashire Hills;—the towers of Chester and to Beeston Castle over the Vale Royal; in clear weather to the mountainous district where Yorkshire, Derbyshire and Lancashire unite—a distance not less than forty miles.

**EXPLANATION OF PLATE VI.**

**Fig. 1.** Sucker-like termination of the tail of *Floscularia campanulata.*

**Fig. 2.** Process on one of the lobes of *Flos. cornuta.* The cilia surrounding the rounded knob-like extremity of the lobe are supposed to be cut short.

**Fig. 3.** *Floscularia campanulata,* magnified 270 diameters. The cilia are represented on one lobe only.

a. Granules resembling oil globules.

b. One of the five muscles of the infundibulum.

c. Rim separating the infundibulum and the vestibule.

d. Diaphragm separating the vestibule from the crop with waved aperture.

e. Dental apparatus and sac.

f. Termination of the intestine.

g. Case (étui, Dujardin).

i. Sucker-like termination to tail.

**Fig. 4.** *Floscularia cornuta,* magnified 200 diameters.

a. Cornu or flexible process.

b. Division between infundibulum and vestibule, with ciliated knobs as in fig. 3.

c. Minute granules in a state of molecular motion.

d. Diaphragm.

e. Dental apparatus.

f. Two ova in ovisac.

g. Termination of intestine.

h. Case in outline.

**Fig. 5.** Dental apparatus isolated.

**Fig. 6.** a. Young *Floscularia cornuta* with vibratile cilia.

b. Same, contracted.

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