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TRANSACTIONS OF THE SOCIETY.

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XIII.—*Twenty-four more New Species of Rotifera.*

By P. H. GOSSE, F.R.S., Hon. F.R.M.S., &c.

(Read 12th October, 1887.)

PLATES XIV. AND XV.

RECENT investigations having still further augmented the list of our native Rotifera, I am enabled to present to the Society diagnostic descriptions and delineations of twenty-four new species.

1. *Philodina microps*. Body very slender, closely resembling *Rotifer vulgaris*, both in form and manners, but with eyes distinctly pectoral, small, round, of very pale red hue. Column thick, rounded, with minute hooked proboscis at front: spurs rather small, separated by a horizontal edge: corona in action not wider than head. Length 1/80 in. Marine.

This can scarcely be confounded with any recorded *Philodina*. For some time I felt sure it was *Rotifer vulgaris*, and marvelled that I could

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EXPLANATION OF PLATES XIV. AND XV.

Fig. 1.—*Philodina microps*. a, dorsal; b, lateral; c, corona expanded; d, retracted; e, antenna.

- Fig. 2.—*Notommata Theodora*. a, dorsal; b, lateral; c, foot retracted.  
" 3.— " *limax*. a, dorsal; b, lateral; c, brain and eye.  
" 4.—*Proales corymeger*. a, dorsal; b, lateral.  
" 5.—*Furcularia lactistes*. a, dorsal; b, lateral.  
" 6.— " *molaris*. a, dorsal; b, lateral.  
" 7.— " *sphærica*. a, dorsal; b, lateral.  
" 8.— " *stercæ*. a, dorsal; b, lateral.  
" 9.— " *Eva*. a, dorsal; b, lateral; c, mastax, from the right.  
" 10.—*Diglena aquila*. a, dorsal; b, lateral; c, beak, dorsal; d, lateral.  
" 11.— " *Rosa*. a, lateral; b, dorsal.  
" 12.—*Distemma platyceps*. a, dorsal; b, lateral.  
" 13.—*Mastigocerca Iernis*. a, lateral; b, foot-bulb enlarged.  
" 14.—*Diaschiza fetalis*. a, dorsal; b, trophi dorsal; c, *ib.* lateral.  
" 15.— " *acronota*. Lorica, lateral.  
" 16.—*Distyla lipara*, dorsal.  
" 17.—*Metopidius pygmæa*. a, dorsal; b, lateral; c, transverse section.  
" 18.—*Dispinthera capsæ*. a, dorsal; b, lateral.  
" 19.—*Monura Bartonia*. a, lateral; b, ventral.  
" 20.— " *loncheres*. a, lateral; b, posterior sinus.  
" 21.—*Mytilia pœcilops*. a, dorsal; b, lateral; c, transverse section.  
" 22.— " *producta*. a, dorsal; b, lateral.  
" 23.—*Anuræa schista*. a, dorsal; b, lateral.  
" 24.—*Notholca tabis*. a, dorsal; b, lateral.

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not see the eyes in the column. But when I looked to the *pectus*, they were plain enough, though very pale. I know no other species, whether of *Rotifer* or *Philodina*, with so very small a corona in rotation. The whole trunk is fluted. The viscera are tinged with pale smoke-brown, deepest in the abdominal canal. In some examples the hue is rather of a chestnut-brown.

I have examined perhaps half-a-dozen specimens, inhabiting the conferva of marine rock-pools in the Firth of Tay. The species is very shy of rotating, thus differing from other *Philodinae*, which are characteristically free. At the moment of extruding the column, its broad extremity opens a central orifice (*d*), which is strongly ciliated around its margin, while a row of cilia, apparently few and distant, is seen fringing the outer edge. The antenna (*e*) consists of (two?) telescopic joints, its extremity dilated, carrying four divergent setæ. (Fig. 1, plate XIV.)

2. *Notommata Theodora*. Near to *N. aurita*, *naias*, and *potamis*; from all which it differs in that the eye is small, and quite frontal, while the slender straight foot is protrusile to an immense length, or wholly retractile. Length, when fully extended, about 1/60 in. Lacustrine.

A noble form, of great elegance, and of glassy clearness; colourless, save for a tinge of pale-orange in the tissues of the head (frequent in the kindred species), and the occasional hue of the contents of the stomach. The body has the massive aspect of the species named, but the position of the eye is notable, close to the frontal edge of an ample brain. The form and extreme versatility of the foot, too, are quite peculiar. Sometimes the body is truncate behind, and only the tips of the tiny toes are seen protruding from the hyaline cavity (*c*); when, with lightning suddenness, the foot, like a slender rod of glass, is shot out to a length equalling the whole trunk; and so carried, while the animal darts along with headlong swiftness. The only parallel to this, that occurs to me, is the case of *Rotifer macrurus*. The toes are often turned suddenly, to the right or left, at a joint just above them, the long foot else preserving its perfect straightness. When smoothly swimming, the front often appears as if *auricles* were on the point of developing, but I have not seen them extruded. In retraction the front often becomes pursed-in at the middle. (Fig. 2.)

3. *Notommata limax*. Body vermiform, integument soft; alimentary canal ample, thrown into apparent annulation by alternate constrictions and swellings: brain having a globose terminal bulb partly filled with opaque chalk-masses, and partly with a large eye: foot-bulb contained within the body; toes long, slender, acute, decurved. Length 1/173 in. Lacustrine.

The slug-like softness of the skin gives this species some resemblance to *Diglena permollis*; but it is less versatile in outline. The brain recalls *N. aurita*, the ample sac having a slender tube running through it occupied with opaque specks, which terminates in an ovate expansion. This is, in part, opaque with chalk deposits, and its rounded extremity is filled by a large crimson eye (*c*). There is a likeness to *N. cyrtopus* in the toes; but the general facies is very diverse. Swimming it will suddenly augment its speed by pushing out for an

instant a pair of auricles. There is a distinct tuberculous tail. The whole animal is tinged with pale-yellow. I have seen two examples in *Utricularia* from a lough near Carrick-on-Shannon. (Fig. 3.)

4. *Proales coryneger*. Body nearly cylindrical, rounded in front and rear: foot stout, apparently one-jointed; toes two, furcate, rod-shaped, thick at base, tapering to an obtuse point, very slightly recurved, half as long as body-and-head. Length  $1/130$  in. Lacustrine.

This obscure form I cannot, on the evidence of a single specimen, identify with any species known to me; though I own it presents little distinctive character. Its long, thick, club-shaped toes form its most obvious distinction: these are usually carried *wide apart*. The figure suggests *Diaschiza*; but I could not detect any dorsal fissure, and the soft skin seems destitute of a lorica. There is a minute red eye in the occiput. In swimming it is rapid, smoothly gliding; darting to and fro, without any appreciable aim. It, like the following, occurred in the swift mill-stream of Kingskerswell. (Fig. 4.)

5. *Furcularia lactistes*. Back much arched, soft and plump, smooth, round: foot stout; toes long, slender, acute, decurved; foot and toes together equal in length to the trunk: a short pointed tail. Length  $1/175$  in. Lacustrine.

It possesses much elegance of form, and a most restless activity, every instant retrojecting the long foot and toes, with the action of a kicking horse, very forcibly and pertinaciously. It has one very curious habit: it constantly insinuates itself between two stalks of conferva, where it immediately begins to make itself a cell (only just large enough to hold it) by incessantly turning *head over heels*. As soon as it has got its place, it bends the front down to the belly, and begins to roll round and round, without a moment's cessation, for hours. If forced out, it at once begins the same process somewhere else. The habit, which is not that of an individual, but is characteristic of the species, may be compared with the tube-making propensity of *F. forficula* (See H. and G. Rotif. ii. 40, 41). In other respects it has the manners of its genus; as in its sudden and rapid motions, its volutions, and its swift shooting way of swimming. The incus-fulcrum appeared to be a massive pillar, with long, slender, divergent, arching rami: the mallei evanescent.

I met with several examples of this interesting species, inhabiting floating tufts of a floccose conferva, that waved in a rapid rivulet in the village of Kingskerswell. And, a few weeks later, two more occurred in water from Carrick-on-Shannon, Ireland. These had the same form, and identically the same habits, as the Devonshire specimens. And, more recently, I have detected the species in other waters. (Fig. 5.)

6. *Furcularia molaris*. Body ovate, with a thick truncate head, and suddenly diminishing to a long foot, terminated by two blade-shaped, straight, acute toes: back elevated; belly straight. Length  $1/240$  in. Lacustrine.

A single round eye, well-defined, of ruby brilliance, near the frontal part of a clear saccate brain, marks this rather insignificant species. The trophi are nearly as in *F. lactistes* just described; but the mallei are more developed. An ample alimentary canal, undivided, nearly fills the trunk; and a clear ovary crosses it obliquely, having in

general embryonic vesicles more or less conspicuous. The long foot and toes are carried straight behind, and both extended are about as long as the trunk. It is, as usual, restless, moderately swift, with a smooth gliding course. It is an elegant and attractive little species, which, for lack of any very marked characteristics, I name from the locality in which I found it,—the Kingskerswell mill-stream. Here, on different occasions, I have met with several examples. (Fig. 6.)

7. *Furcularia sphaerica*. Body globose dorsally, nearly flat ventrally: foot short, thick; toes small, straight, acute; the dorsum projecting over them with a slight rim or margin, which, laterally seen, looks like a tail. Length  $1/240$  in. Marine and lacustrine.

In lateral aspect this pleasing little form may easily be mistaken for a deep *Colurus*, till the trophi reveal its true Furcularian character, confirmed by a minute ruby eye at the extreme front; as also by its motions. The head seems not retractile. I first formed acquaintance with it, in half a dozen examples on different occasions, from tide-pools in the Firth of Tay. Then a specimen, recently dead, occurred in fresh water among *Myriophyllum*, thickly studded with *Melicerta ringens* and *Floscularia cornuta*. And presently, to confirm the amphibious habitat, I found one alive in *Utricularia* from a lough in the centre of Ireland. These fresh-water specimens I could in no wise distinguish from the marine. (Fig. 7.)

8. *Furcularia sterea*. Body ovato-cylindric, with a thick truncate head, and subprone face; behind ending in a short, decurved, acute tail: foot short and thick, apparently one-jointed; toes moderate, acute, scarcely decurved. Length  $1/173$  in. Lacustrine.

Having much in common with *F. molaris*, this is yet quite diverse in facies and habit. The head is of nearly the same thickness as the trunk; the little overarching tail (seemingly a stiff point), and the short but massive foot, are differences that strike one at first sight. The eye is distinct, quite prominently frontal; immediately beneath it the face recedes, and becomes a subprone ciliate surface, applied to the feeding-ground. It is much larger than *F. molaris*. The single specimen seen had a great contractile vesicle, and a small undeveloped ovary. The stomach seemed undivided. The fore-parts were tinged of a delicate yellow hue. It was not much addicted to swimming, but crept vivaciously about the vegetation, grubbing and browsing. I obtained it in water from a little rockery-pond in the grounds of Watcombe Park, the beautiful estate of Colonel Wright, near Torquay. (Fig. 8.)

9. *Furcularia Eva*. Body stout, fusiform, strongly elevated on the shoulder: foot short, indistinct; toes more than half as long as body-and-head, thick for half this length, then abruptly attenuated for the remainder. Length  $1/144$  in. Lacustrine.

The great length and peculiar form of the toes, which are often thrown back and carried over the back, give a facies to this rather fine species, which at once strikes an observer. Sometimes these organs are extended in opposite directions in a horizontal line, imparting to the animal the figure of the letter T reversed. The mastax is ample; the incus a thick rod, bent in the middle backwards, and ending occipitally in a pair of long and broad scythe-shaped processes: the mallei indistinct.

A slender brain descends behind; but no eye is visible, unless two very pale globules, close side by side, in the very front, are such.

A single specimen only has occurred, whose activity mainly consisted in the vigorous throwing into different positions of the characteristic toes. (Fig. 9.)

10. *Diglena aquila*. Body fusiform: head furnished with a beak: foot short, thick; toes nearly as long as trunk, thick to half-length, then diminished to stiff, straight rods with obtuse points. Length 1/65 in. Lacustrine.

The long straight blunt toes are very characteristic. The proboscis is a broad shield, somewhat as in *Stephanops*, permanent, surrounded by a ring of very long vibratile cilia. It forms, indeed, a hooked beak, shaped like that of an eagle, the edges of which, converging to a point (*c*), are distinctly visible from above, through its hyaline substance.

In manners it is headstrong, abrupt, vigorous; most restless, never pursuing one course more than an instant, but suddenly stopping, and turning round on itself, augmenting its speed greatly for a moment, rushing, or rather *shooting*, forward for three or four times its length, then again and again, but never springing sidewise. I first received it from the middle of Ireland, by the kindness of Mr. Hood, jun.; then in a pond near my own residence; and on several occasions since.

It bears a very close resemblance to a species discovered by Mr. E. C. Bousfield, of which he courteously sent me a drawing, under the name of *Notommata rapax*. This has two conspicuous styles (antennæ?) projecting straight from the head, which I do not see in *D. aquila*. If, however, the two are identical, his specific name has the priority.

None of my earlier examples showed any trace of an eye-spot; but since this article was written I have met with a specimen, in another missive from Mr. Hood, jun., in which was conspicuous a very large black occipital eye, if, indeed, it was not an opaque chalk-mass of the brain. (Fig. 10.)

11. *Diglena Rosa*. Body lengthened, fusiform, annulose, larva-like: proboscis frontal, beak-shaped, within which are two colourless eyes: foot minute; toes small, straight, acute. Length 1/150 to 1/115 in., average width 1/475 in. Lacustrine.

The strong division of the body into annular false-joints recalls *Taphrocampa*. The head, too, resembles that of an insect-larva. The frontal beak is broadly triangular, like that of *D. aquila* just described, and its sharp point, hooked downward, can be seen from above, through its transparent substance. Two well-defined, perfectly colourless bodies, side by side, are also seen through the base of the beak, apparently eyes without pigment. A ring of close-set cilia surrounds the front, behind the base of the beak. The face is truncate, studded with warty eminences. The body terminates in a distinct bulbous tail.

Several examples occurred in conferva-tufts waving in the swift mill-stream at Kingskerswell. All were of a clear horn-yellow hue, with the long alimentary canal full of opaque food-matter. They were restless and swift;—the jaws often protruded from the face, *more generis*. The beak was much more acute and better-shaped in some than in others.

Numbers 2, 9, and 11 of the present series I owe to the kind efforts

of three young ladies, the lovely and accomplished daughters of R. W. Beachey, Esq., of Kingskerswell. I have honoured these three species with their names, as an expression of gratitude for the zeal with which they have kept me supplied—themselves skilful microscopists—from the waters within their reach. Each of these three species was discovered in the prolific mill-stream so often mentioned in this article. (Fig. 11.)

12. *Distemma platyceps*. Body subfusiform; belly flat; head broadly truncate: eyes two colourless globules, remote, occipital: foot rounded; toes taper, acute, slightly decurved. Length  $1/144$  in. Marine.

Though not unlike certain conditions of *Diglena suilla* and *permollis*, this is distinguished by its two large colourless eyes; and by the fact that while the trophi are of the usual *calliper*-form, the mallei are (or seem) attached to the bases, rather than to the ends of the circular rami; while the fulcrum is nearly as long as the mallei. An inconspicuous hooked proboscis is present, which appears retractile. The broad face is of hyaline delicacy, free from corrugations and marks, as if clear gelatinous flesh, and this well defined from surrounding tissues, in all aspects.

Young specimens are very restless and mobile, but an adult was of slow movement. Five or six examples occurred to me in water from a tide-pool near Carnoustie, in Forfarshire. In one the jaws were about half extruded from the face, and (as if by paralysis) could not be retracted, or even moved:—an accident, the occurrence of which I have observed on repeated occasions, in predatory Rotifera. The species is numerous also in a ditch near Goodrington, South Devon. (Fig. 12.)

13. *Mastigocerca Iernis*. Body long-oval; a low dorsal ridge throughout, rising abruptly with an oblique edge in front: toe not so long as lorica; sub-styles two, unequal, the chief one about one-third as long as the toe, remote from it at the base. Length  $1/80$  in.; of head and body,  $1/173$ ; of toe,  $1/185$ . Lacustrine.

This species has much resemblance to *M. scipio*; but the regular form of the lorica, and that of its ridge; and the origination of the toe and of the main sub-style, on opposite sides of the foot-bulb, so as to be remote from each other,—seem sufficient peculiarities to warrant its distinctness.

Several examples have occurred in *Utricularia vulgaris*, sent me by Mr. W. R. Hood from a lough in the heart of Ireland. Most of these were dead, mere empty loricae, affording excellent opportunities for precise observation and delineation; others were alive and active. I subsequently found it in water from Cannock Chase, sent by Mr. Bolton. The distinctive characters noted above were conspicuous in all; as also in some vigorous examples from Perthshire. In these the extremities of the jaws were occasionally protruded. I detected, moreover, on the front, three tubercles (one central and two lateral), which seemed fleshy, extensile, and retractile. (Fig. 13, plate XV.)

14. *Diaschiza fretalis*. Lorica pyriform in outline, viewed dorsally; gibbous laterally; each plate cut off obliquely behind, and somewhat excavate: belly nearly flat: toes long, blade-shaped, regularly decurved, acute: head furnished with a beak-like projection. Length  $1/185$  in. Marine.

This form comes very near to *D. rhamphigera*, but the oblique excavation of each of the dorsal lorica-plates is much more distinct, the frontal beak is more slender, nearly evanescent, and does not appear to be a prolongation of the trophi, which, moreover, are somewhat diversely shaped. There is a red eye on the inner surface of the brain, which I did not perceive in *D. rhamphigera*; and, above all, it is marine.

Only a single specimen has been observed, and that *dead*; but so recently as to leave the internal organs and viscera well-defined, and *in situ*. It was from a tide-pool at Invergowrie. Both species, if they are distinct, require further study. (Fig. 14.)

15. *Diaschiza acronota*. Lorica much elevated, heart-shaped in lateral outline; the dorsal cleft very manifest: head globose, prominent: foot thick; toes stout, long, nearly straight, tapering: eye occipital, pale, very large. Length  $1/140$  in.; depth  $1/400$ . Lacustrine.

This very remarkable form is another novelty yielded by the mill-stream at Kingskerswell. It seems a very distinct and interesting species; though known, as yet, only by a single dead specimen, in which the eye and the trophi remained in position. The eye is a remarkable feature, from its great size, irregular shape, and pale hue. It occupies nearly half the vertical depth of the body, of a very pale salmon-red. In all these points it resembles the organ in *D. paeta*. The mastax is small: the toes have a backward curve, so slight as to be scarcely perceptible. (Fig. 15.)

16. *Distyla lipara*. Lorica skin-like, flexible, plicate: body flask-shaped, soft and very plump, not pointed behind: toes large, blade-shaped, not shouldered: brain simple; eye minute, occipital. Length, total extended,  $1/162$  in.; of lorica alone,  $1/260$  in.; but being very flexible, it contracts to  $1/350$  in. Lacustrine.

This differs, at sight, from its known congeners by its round, manifestly soft, body, properly egg-shaped, specially in its hind parts, scarcely at all flattened, and destitute of the usual inangulation; the edges of the dorsal and ventral plates approaching close in the middle, and diverging at both extremities, so that the rounded surface is scarcely broken. The soft integument is constantly thrown into deep irregular plicæ, which do not appear to be permanent. A great foot bears, on a condyliform joint, two toes which are widely blade-shaped, longer than the mastax, acute, but not in the least shouldered at the tips. They are habitually thrown up under the belly. The eye is minute, pale-red, occipital. The trophi are normal, long, and capable of being brought to the very front, where they work vigorously. The whole head is protrusile, and very mobile.

The entire animal is transparent and nearly colourless; but the numerous folds and corrugations impart an appearance of a blue-black tinge to the body. The form and outline are subject to slight but continual changes, contracting and expanding. The animal is lithe and active, but not locomotive. A single specimen has occurred in water from Sutton Park ditch, Birmingham, in the orange-coloured sediment which abounds with fine Desmidiæ. (Fig. 16.)

17. *Metopidia pygmæa*. Lorica ovate, much elevated, the back rounded, the edges overhanging; hind margin rounded; ventral surface

flat: foot stout, long; toe apparently single, small, acute. Length, extended,  $1/350$  in.\* Lacustrine.

This seems the smallest of the genus; smaller than *emarginata*, or than *triptera*, which latter was in sight at the same time, for comparison. It is very transparent and colourless, the viscera only just discernible; the trophi, though working, were but shadowy lines. The extremity of the lorica is neither pointed, nor sinuate, but evenly round: its overhanging margins are remarkable, recalling *Notholca scapha*. There are two clear colourless globules at the very front, remote from each other, probably eyes. The frontal hook is carried rather close to the front, and seems incapable of independent motion; it is visible in a dorsal view, as a line parallel to the front. Two minute air-bubbles were in the alimentary canal of the individual examined; but no particles, nor stain, of food, though the tiny creature was industriously picking all the time it was under observation,—an hour or more. It was active and restless, creeping about the floccose, but rarely swimming, and then laboriously. A single specimen occurred in a phial of *Utricularia* sent by Mr. W. R. Hood, from the middle of Ireland. (Fig. 17.)

18. *Dispinthera*, gen. nov., Fam. *Coluridæ*. Gen. Char.—Body sub-cylindric, inclosed, in part, within a lorica open in front and in rear, apparently cleft down the venter: head and foot habitually protruded: head distinct, protected by horny plates, but without a frontal hook: two cervical eyes.

*D. capsæ*. Lorica in most parts soft and flexible: foot stout; toes two, furcate, thick, straight, tapering, acute. Length  $1/250$  in. Lacustrine.

This apparently new form I found in the sediment of water dipped by Mr. Bolton from "ditch No. 2," in Sutton Park, Birmingham, crowded with fine Desmidiææ. The facies strikes one as very peculiar, and difficult to explain. The front is capable of much protrusion, in a conical form, where a globose tubercle is visible, but only occasionally; and a similar one, but more constant, on the occiput (or rather crown of the head), just below the point of the occipital sheath. The lorica is discernible chiefly about the head; it there projects into several points, which seem very flexible, but constant. When the head is far retracted (which is seldom), an array of spears is left bristling up. Now and then, at the pectus, the integument is seen to fall into a flap, or hanging lip, to be presently withdrawn. The principal shield protects the back of the head, but does not form an arching hood, or frontal hook. The trophi, in several good views, seemed of the pattern (fig. 39 of my paper "On Manducatory Organs," Phil. Trans. 1856); assigned to *Notomm. gibba*. The whole facies recalls one of the smaller *Notommatæ*; yet the two well-defined eyes remove it from them; besides the manifest lorica. It seems to approach the marine genus *Mytilia*, but not very close.

Only a single specimen occurred, in June. It was active and busy, constantly turning and wheeling about, but little given to locomotion.

\* The figures in the plates are not drawn to one scale; if they were, this would be not one-fourth as long as No. 13 on the left of it. Each figure is drawn as the containing area will permit, the object being to show as much structural detail as possible.

It suggests the odd notion of a creature carrying its great clumsy head in a bandbox. (Fig. 18.)

19. *Monura Bartonia*. Lorica ovate, moderately compressed, dorsal outline (viewed laterally) one-third of a circle, ending in triangular points, which have the dorsal side slightly excavate: one eye frontal: toe straight, slender, acute, more than half as long as the lorica, shouldered dorsally. Length, from frontal hook to tip of toe,  $1/173$  in. Lacustrine.

The genera *Colurus* and *Monura* (if, indeed, they are not one) appear to contain a large number of species, peculiarly difficult to define satisfactorily. Yet this and the following are, I think, to be distinguished. The toe and foot together are nearly equal in length to the lorica. I could find no trace of a median line in the toe. Its extreme length and tenuity are notable. Each posterior point of the lorica forms an equilateral triangle, clearly defined from the general area of the lorica, by a line—the base of the triangle. These two triangular termini are of excessive delicacy, and may easily escape a cursory notice. On the extreme front, under the frontal hook, is a small dark crimson eye, like a wart on the face.

Its manners are those of so many of its fellows, remaining long totally withdrawn between the closed lorica-plates in front, pivoting and swaying on the toe-tip incessantly for hours. I first obtained it, in the spring of this year, from a pond known as the Reservoir, at Barton, near Torquay. Since then I have met with single specimens from many localities, and in abundance in the Kingskerswell mill-stream. (Fig. 19.)

20. *Monura loncheres*. Dorsal outline narrowly ovate, lateral nearly semicircular; lorica rounded behind, with a median angular notch: toe shouldered dorsally, excessively long and slender. Total length  $1/200$  in.; vertical depth  $1/550$  in. Marine.

The most striking points in this beautiful species are its great depth (from back to belly), making about a half-circle, and the tenuity of the toe, which seems indivisible. This runs to so exceedingly fine a point as to escape notice, except with the most delicate focusing; even with a quarter objective, and the best possible light. The foot, of two condyli-form joints, and the toe, together, are fully equal to the lorica in length; viz.  $1/400$  in. The ventral cleft is narrow, straight-sided, slightly approximate in front, and reaching round to the occiput, posteriorly to a short acute sinus (*b*), whose sides form a right angle. There is a brilliant ruby eye about the middle of a saccate brain, and therefore cervical.

I have examined a number of examples, at different times, in sea-water obtained by Mr. Hood from the Invergowrie tidepools. In one of these I timed the period of emptying the contractile vesicle to be just three minutes. It had this peculiarity, that the emptying was but partial on each occasion: that the bladder suddenly diminished its volume, but not to a point, *nor nearly*. The animal's posturing manners are exactly the same as described in the preceding species. (Fig. 20.)

21. *Mytilia pœcilops*. Lorica pergamentaceous, very flexible, constantly thrown into irregular folds, whence the outline is very variable: the face, in particular, is capable of great protrusion in wide plicate membranes: prevalent figure, foot, and toes, much as in *M. Teresa*. Length of lorica  $1/240$  in.; depth  $1/480$  in. Marine.

Though this has many features in common with *Tavina* and *Teresa*, particularly the foot and toes, it has important peculiarities. The *dorsal* outline is like that of the latter, the lateral that of the former; but *both* more rough and uncouth. The skin thrown irregularly into coarse rude folds, occurring at intervals at every part, precludes any fixed form, so that the figure accurately copied has become in a few minutes, though gradually, flagrantly incorrect. The front is large and broadly truncate, capable of pushing out, from its lower part, great membranous sacs and folds, which slowly change every moment, and the use of which is inexplicable. These expansions do not appear to be ciliated. The mastax and trophi are as in its congeners; there is an ample brain, which carries a cervical red eye. The whole back is ridged, —tectiform, not keeled (*c*).

I have observed numerous examples in sea-water from the Invergowrie tide-pools. They have all been remarkably heavy and sluggish in manners, little given to locomotion, wholly lacking the sprightly vivacity of the kindred species.

With one of these specimens a curious phenomenon occurred, which I cannot at all explain (see *b*). The animal was jerking and shaking itself, as if either wishing to be free from an annoyance, or else tearing some prey. Having got it somewhat turned, I saw that it carried, between its bent-up foot and its much developed face, what appeared an *egg*, of dark granular substance, as if just laid, of a pointed-oval form, reminding me, in shape and spotting, of a tern's egg. Whether it was a real egg, or no; if so, whether its own;—I could not tell. It appeared uninjured; and was firmly held for several hours,—as long as the *Mytilia* lived. By-and-by the interior of the "egg" displayed many clear circles (of which I could count about twenty), closely like the nucleated embryonic vesicles often seen in the ovary;—a fact which adds to the inexplicability of the phenomenon:—for they certainly were not visible at first. Another thing was remarkable. The carried "egg" had sensibly become less in bulk, while it retained its perfect form and outline; yet it had not been sucked, for the *Mytilia's* mouth was not, nor had been, in contact with its surface. After three hours, the egg was not more than one-third of its original bulk. Unfortunately no further change occurred during the lapse of a night; the next morning both the animal and the egg were unaltered in appearance, and the former evidently dead. The species seems unusually intolerant of captivity. The abdominal viscera are generally of a rich orange-brown hue, and the whole tissues are more or less suffused with the same colour. (Fig. 21.)

22. *Mytilia producta*. Skin flexible, plicate: body slender, very extensile: eye single, frontal: foot and toes nearly as in *M. Teresa*. Length 1/100 in. Marine.

The lorica, flexible in *M. pœcilops*, is perhaps even more so in this species, and recognizable only at the posterior extremity, where each lateral plate can be traced, as, with a rounded end, it curves under the trunk, to approach its fellow-plate, leaving a narrow ventral cleft. The face is quite truncate, slightly oblique, not abnormally developed. When gliding rapidly along a seaweed, the animal is very worm-like, the body and the foot, about equal in length, forming two successive cylinders,

the latter half as thick as the former. But both, especially the foot, are capable of sudden elongation at will. Thus the creature has a facies which distinguishes it from either of its congeners. Perhaps it comes nearest to *Teresa*. The toes are even broader proportionally; together much exceeding the width of the foot whence they issue. The eye is conspicuous, nearly frontal, but changes its position with the brain. The whole animal is colourless, but very full of folds and corrugations. Very long mucus-glands proceed from the toes through the whole of the foot.

The species first occurred to my observation on the 7th of May, 1887, on very fine seaweeds (*Ceramium*), which I gathered in the deep cup-like pool in limestone rock at Oddicombe Point. I met with about half-a-dozen examples. (Fig. 22.)

23. *Anurea schista*. Lorica oblong, tapering to a short spine behind; dorsal plate tessellated in polygonal areas on each side of a mesial ridge, and punctured; ventral plate much shorter, produced into a projecting sharp point, divided from the dorsal by a deep cleft. Length  $1/162$  in., width  $1/470$  in. Lacustrine.

It has relations with *stipitata* and *cochlearis*; in tessellation agreeing with the latter, and with *tecta*. The anterior spines are straight. It is evidently an approach to *Notholca*, but I do not see the ridges and furrows descending from the spines. The tessellæ are somewhat coarse and ill-defined. The straight short antlers, and the great descending point of the ventral plate, distinguish it at once from every known species. This point is a stiff taper spine: sometimes it projects obliquely (*b*); then, in a moment it is jerked in, so as to be quite hidden, only to be as rapidly thrown out again. Even in a dorsal view it can be clearly seen, through the transparent tissues. I believe I have seen, on two occasions, a discharged egg, carried under the belly, in the manner of *tecta*, &c. The eye is a ball of deep red, of enormous size. A very large contractile vesicle, when full, forces up the other viscera to the middle of the body; when, often, the well-defined contrast between the dark turbid contents of the intestine, and the crystal clearness of the bladder, is curious and striking. The bladder has no effect on the ventral spine, whose movements are manifestly voluntary. (Fig. 23.)

I have seen nearly a score of specimens in water sent by Mr. Bolton from the Botanic Garden, Birmingham. It is a sprightly active swimmer.

24. *Notholca labis*. Almost the very counterpart of *N. scapha*, save that the outline is a longer oval, and the lorica is prolonged into a short, broad, truncate tail behind. Length  $1/216$  in.; width  $1/370$  in. Lacustrine.

One of the discoveries of Mr. Hood of Dundee, who finds it numerous in a pool in Emmock Wood, near that city. He has repeatedly sent me specimens, but hitherto all have been dead on arrival. As, however, the internal organization is probably normal, the correctness of the diagnosis and delineation is not lessened by the fact that perfect loricae are at absolute command. The little tail to the lorica reminds one of the handle of a dust-pan, if so homely an illustration can be tolerated. The ridges and furrows from the frontal spines are almost obliterate. (Fig. 24.)

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