

1905

\* *Calophora solitaria*.—Pupa cases common on stones, etc. among *Silene maritima* on the Bass Rock, June 1899 and 1901; moths emerged in July. \* *C. macricella* Sta. (*muchlightella* of Meyrick's Handbook?)—Rared from cases off wooden fence, Morningside, October 1900 and 1902. Determined by Mr. Barrett.

*Larerna misella*.—On grassy bank, Aberdeen, a good many, 16th August 1900. *L. lactella*.—North Queensferry, June 1900.

*Chrysochysta schrankella*.—Luffness Links, a few, on iris, July 1898. *Elachista kinunnella*.—Fala Moor, common, 17th July, 1897. *E. sonarella*.—Heriot, one, July 1897. *E. luttonella*.—Polton, June, 1901.

*Lithocolletis rhynfoliella*.—Aberfoyle, May 1897; Corstorphine Hill, May 1901. *L. almyfoliella*.—Dollart, 1st May 1897; Dalmahoy, common, May 1898. *L. messanella*.—Blackford Road, Edinburgh, 1900 (K. J. Morton); near Alloa, May 1901.

*Lyonetia clerckella*.—Bridge-of-Allan, May 1900; Culross, April 1901; Balerno, May 1905.

*Cenitostoma scitella*.—Morningside, several, June 1898. *Opostega crepusculella*.—Marpit, Davidson's Mains, a few, August 1898.

*Nephrala myrtillella*.—Bavelaw Wood, on bilberry, 29th May, 1900.

### THE TARDIGRADA OF THE FORTH VALLEY.

By JAMES MURRAY.

THIS short list of Tardigrada, found in the valley of the Forth, is entirely drawn up from material collected by Mr. Wm. Evans, and sent to me for examination. The localities where the collections were made are all in the lower part of the Forth valley, and at no great distance from Edinburgh. About a dozen forms were observed. The number of species cannot be definitely stated, as several of the forms seen were not in condition to be determined with certainty. It is also uncertain how many of the species of Tardigrada which have been described can really claim to be good species. Owing to the insufficiency of the earlier descriptions, and our ignorance of the life-histories of all but a few species, it is likely to prove that the same animal, at different

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THE TARDIGRADA OF THE FORTH VALLEY

stages of growth, has been observed several times over under different names. The study of the Tardigrada has been greatly neglected till quite recently. The only modern systematic works of any extent being Plate's monographic study (4), 1889, and Richter's numerous papers. There can be no doubt that with further work the list of Tardigrada of the Forth valley could be greatly extended. They are to be found, it may be mentioned, chiefly among damp moss, and on such water plants as *Elodea canadensis*. Figures in brackets in the text refer to the short bibliographical list at the end.

#### LIST OF SPECIES.

Genus ECHINISCUS.

Besides the five species included in the list, several others were seen, but as they were immature they could not be named.

*Echiniscus arctomyi*, Ehr. (3).—Nether Habbie's Howe, Pentland Hills, March 1905, one example.

*E. mutabilis*, Murray (7).—Cobbinshaw Moor, April 1905, type, two eggs.

*E. wendtii*, Richters (6).—Nether Habbie's Howe, Pentland Hills, March 1905, several.

*E. granulatus*, Doy. (2).—In moss (*Leucodon*) off tree, Rosebery, Midlothian, February 1905; the one example found differs from the type of the species in lacking the little spine at the junction of the tail-piece with the lumbar plate, but being otherwise typical I see no reason for separating it.

*E. spitzbergensis*, Scourfield (5).—In moss, Howgate, near Penicuik, 30th March 1905. This example agrees with Scourfield's description and figure in the number and arrangement of the plates and spines. The second pair of dorsal spines are, however, much longer. The texture of the plates offers a peculiarity, also found in all the Loch Morar examples; the pattern appears to consist of large rings with open (perforate) centres, instead of the coarse granules seen by Scourfield. I believe these apparent rings arise by some change of the granules. Living examples have not yet been seen in Scotland.

Genus MACROBIOTUS.

Only one species of the genus could be named. Cast skins of one or two other species, containing eggs, were found, but without seeing the teeth and pharynx they could not be identified.

*Macrobiotus hufelandi*, C. Sch. (1).—Frequent, Duddingston Loch (March 1905), Lochgelly, Midcalder, Roslin.

Genus MILNESIUM.

The only known species of the genus (since *M. albigenum*, Ehr., has been shown by Richters to be identical with *M. tardigradum*) occurred in one collection only.

*Milnesium tardigradum*, Doy. (2).—Boltonmoor, East Lothian, April 1905, abundant.

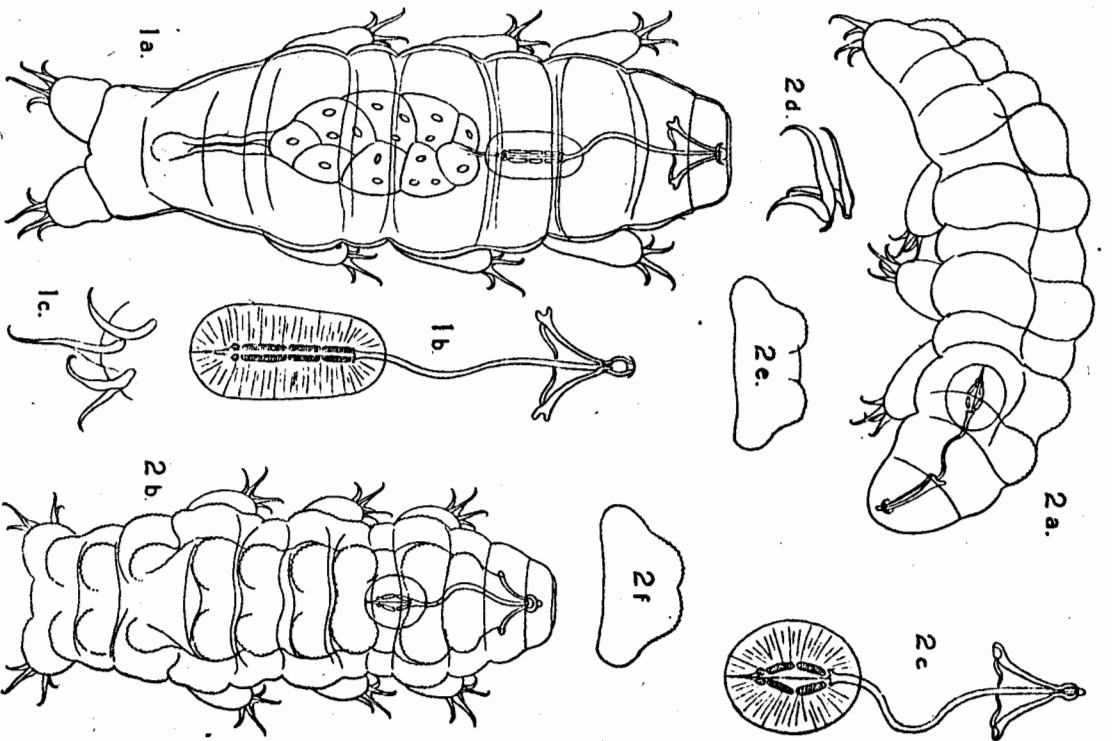
Genus DIPHASCON.

This genus is well represented in the Forth collections. I only know of three species of the genus previously described. Three species occurred in Mr. Evans' collections, and two of these were new, the third being the type species, *D. chilense*.

KEY TO THE SPECIES OF DIPHASCON.

- (A) Pharynx nearly round, gullet slender.
  - (a) Skin smooth, rods in pharynx 4 or 5 in each row.
  - (b) Skin papillose, embossed, rods in pharynx 3.
  - (B) Pharynx narrow, gullet wide or slender.
  - (c) Gullet slender, pharyngeal thickenings 4. *D. scottiam*, n.sp.
  - (d) Gullet wide, pharyngeal thickenings 3. *D. sibirbergense* (6).
  - (e) Gullet very wide and short, pharyngeal thickenings 2. *D. angustatum* (7).
- Diphasscon chilense*, Plate (4).—Near Aberdour, Fife, March 1905, one example.

*D. scottiam*, n.sp. Figures 1a to 1c. *Specific characters*.—Large, hyaline. Teeth curved, widely divergent, with bears. Gullet long, slender, flexible portion about as long as the pharynx. Pharynx narrow, twice as long as broad, slightly narrower in front; thickenings four in each row, the first two elongate rods of equal size, the third a similar but longer rod, the fourth a small nut. Claws, a long and a short in each pair; the long claw of one pair much longer than that of the other. Like *D. angustatum* in the narrow pharynx, it differs in having twice as many thickenings in each row and in the long slender gullet. The general form is also different, lacking the decided anterior narrowing of *D. angustatum*. Size, up to  $\frac{1}{16}$  inch = 378 $\mu$ . Oterston, near Aberdour, Fife, March 1905 (W. Evans); and in moss, Boltonmoor, East Lothian, April. Since found in several localities outside of the Forth Valley.



EXPLANATION OF FIGURES.

- 1a. *Diphasscon scottiam*, dorsal view.
- 1b. The same, teeth, gullet, and pharynx.
- 1c. The same, claws.
- 2a. *Diphasscon sibirbergense*, lateral view.
- 2b. The same, dorsal view.
- 2c. The same, teeth, gullet, and pharynx.
- 2d. The same, claws.
- 2e. The same, optical section about third legs.
- 2f. The same, optical section about first legs.

*D. bullatum*, n.sp. Figures 2a to 2f. *Specific characters*.—Short, broad. Body in section somewhat trilobate, two narrow lateral flanges separated from the median dorsal mass, the dorsal portion bearing at each apparent segment of the body a pair of rounded low prominences; on the anterior part of the body the processes of each pair touch, behind they are widely separated. Skin all minutely papillose, papillae larger on the dorsal bosses. Teeth curved, divergent, with bearers; gullet long, slender, the flexible portion longer than the pharynx. Pharynx shortly elliptical, nearly as broad as long; three thickenings in each row, two equal narrow rods and one small nut (at posterior end). Claws, one of each pair longer than the other, and that of one pair much longer. Resembling *D. chilense* in the nearly round pharynx and slender gullet, it differs in having fewer thickenings in each row, in the papillose skin, and the two rows of bosses on the back. The legs are short, and the last pair unusually divergent. In moss, south shore of Loch Leven, 8th April 1905 (W. Evans), two examples. Size  $\frac{1}{8}$  inch.

## WORKS REFERRED TO.

- (1) SCHULTZE, C. A. S., 'Macrobolus hufelandi,' "Isis" of Oken, 1834, p. 708.
- (2) DOVÈRE, 'Sur les Tardigrades,' "Ann. Sc. Nat." ser. 2, t. 17, 1840, p. 282.
- (3) EHRENBERG, 'Mikrogeologie, 1854," Atlas, Pl. 35 B.
- (4) PLATE, L. H., 'Naturgeschichte der Tardigraden,' "Zool. Jahrb." Bd. III. Morph. Abt., 1889, p. 537.
- (5) SCOURFIELD, D. A., 'Non-marine Fauna of Spitzbergen,' "Proc. Zool. Soc. London," 1897, p. 791.
- (6) RICHTERS, F., 'Fauna Arctica," Bd. III., 1904, pp. 499 and 506.
- (7) MURRAY, J., 'Tardigrada of the Scottish Lochs,' "Trans. Roy. Soc. Edin.," vol. xii., 1905, p. 677.

## CONTRIBUTION TO A FLORA OF THE OUTER HEBRIDES. No. 3.<sup>1</sup>

By ARTHUR BENNETT, F.L.S.

THE following records, notes, etc., are such as have accumulated since 1895. Dr. Shoobred's excellent papers on the Flora appeared in the "Journal of Botany," 1895, pp. 237-249, and 1899, pp. 478-481.

<sup>1</sup> No. 1 "Ann. Scot. Nat. Hist.," 1892, pp. 56-64; No. 2 *l.c.*, 1895, pp. 240-247.

His collections show that much yet remains to be done in the islands; and it would seem by Mr. W. S. Duncan's researches that the alpine element (noted as so poor by Babington in 1844) is richer than has been supposed.

*THALICTRUM ALPINUM*, L.—"Can be gathered in South Harris with one foot on heaps of seaweed on the shore." W. S. Duncan.

*RANUNCULUS HEDERACEUS*, L.—Stornoway and near Loch Boisdale in South Uist. Duncan.

*R. FLAMMULA*, L., *forma MINIMA*, A. Benn.—Dry moorland by the coast, on the west side of North Uist. Dr. Shoobred, *sp.*

*SUBULARIA AQUATICA*, L.—South Harris, Mc Gillivray. Two stations in North Harris (Duncan, *sp.*). On record for Shetland (Beeby, *sp.*) and Caithness (Henderson), but not for the Orkneys.

*VIOLA ERICETORUM*, Schrader, *forma*.—Scarp, 1896, W. S. Duncan, *sp.* "I don't think this is *ericetorum*; I think rather *ericetorum* × *Rivinitana*; but for absolute certainty it would be necessary to know whether sterile or not." Mr. Beeby *in litt.*

*V. LUTEA*, Huds.—Sandhills, Kirkibost Island, 1898, Shoobred, *sp.*; looks like *Symeii*, Baker. Found in Sutherland (Grant, *sp.*) and Caithness (Grant, *sp.*), but not in Orkney or Shetland.

*V. CURTISII*, Forster.—Scarp, Hushinish; North Harris, Duncan, *sp.* The Lancashire *V. Curtisii* was named *V. sabulosa*, Bor.,<sup>1</sup> by M. Lloyd, of Nantes, France. Lange in "Danske Fl." p. 654, 1887, refers Boreau's plant to *V. tricolor*, var. *arenaria*, Sonder, "Fl. Hamb." p. 137, 1851; and Nyman puts *Curtisii* as a variety of *V. lutea*, Huds. Of course Forster's name precedes all these.

Among these Hebridean *Violas* there are three distinct forms, one from Scarp with large flowers like *lutea*, the intermediate (Benbecula), and the North Uist, the last with the growth of Anglesea specimens, but larger flowers, and also larger than the Devon *Curtisii*. In its mode of growth the Scarp plant is as diffuse as the Devon plant, but the flowers are three times the size. The North Uist and Barra specimens grow in compact masses, and the flowers are larger than in the Devon plant. In boreal plants the flowers are often large, at the expense of the foliage. So far as leaves go, they are of all sizes, breadth, etc., between the narrowest (Lythan Sandhills), through the next (Braunton Burrows), to the wide leaves of Irish specimens. All these forms are wholly yellow-flowered.

<sup>1</sup> Notes et obs. quel. pl. de France, 3; "Bull. soc. indust. d'Angers," 1846-53.