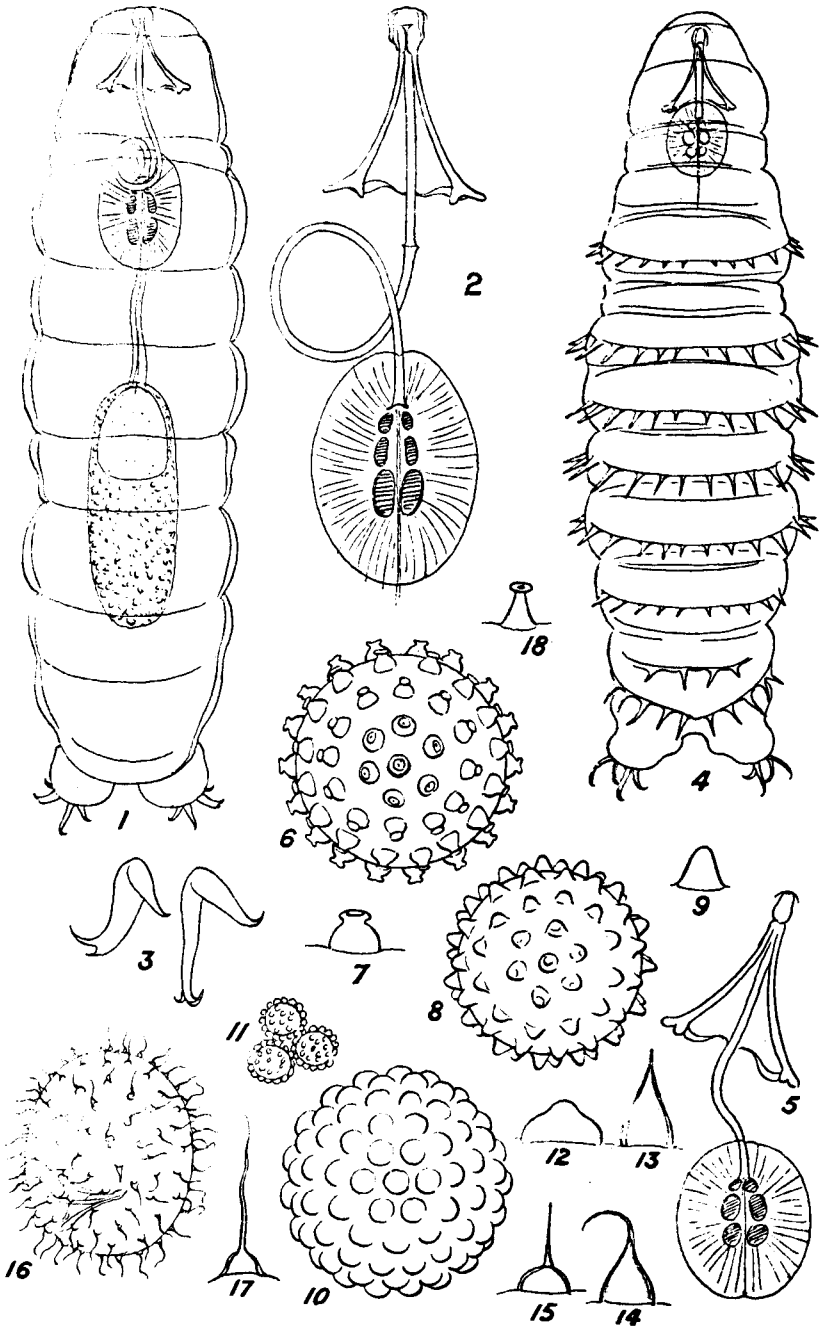

SCOTTISH ALPINE TARDIGRADA.

vious records are all from the south of England. Cambridgeshire being the northern limit.

6. *Platypiza picta*, Mg.—I took a male at Aberfoyle on 18th September. The only previous record of this species for Scotland is that of a female taken by Col. Yerbury at Golspie on 25th August 1900, as mentioned by Verrall ("Syrphidæ," p. 667).

7. *Loxocera aristata*, Pz. var. *Yerburyi*, Aud.—At Aberlady on 7th August I took a well-marked specimen of this melanic variety along with two specimens of the typical form of the species —all males. I have not seen any record of the occurrence of this form since it was brought forward by Mr. Austin ("Ent. Mo. Mag." 1899, p. 65) and described from specimens (4 males and 1 female) taken by Col. Yerbury at Kingussie and Nethy Bridge in July and August 1898. My specimen is very dark and exhibits no trace of the reddish colour on the hinder part of the thorax and the scutellum characteristic of the type.

MUSSELBURGH.

SCOTTISH ALPINE TARDIGRADA.

By JAMES MURRAY.

PLATE III.

THIS paper embodies the results of two visits to Ben Lawers in the summer of 1905. Mosses were gathered on the cairn and at a few places near the summit of the mountain, all above 3500 feet. The moss was washed next day and examined for Tardigrada. The result was so interesting that it is thought to justify the publication of this Note, without waiting to supplement it by work on other hills, as at first intended. The number of species found was not great. There was an undescribed species of *Diphascon*, a peculiar variety of *Macrobiotus ornatus*, and a remarkable variety of forms of eggs of *Macrobiotus*. The moss from the cairn was most productive.

A little peaty pool a few hundred feet below the summit was also very rich, and contained most of the common lowland species that were found. The highest *Sphagnum* obtained on the mountain had likewise many Tardigrada, which is contrary to my experience of *Sphagnum* elsewhere.

Here was obtained the curious *Echiniscus gladiator*, which is not at all rare in Scotland, though it has not, so far as I have heard, been got anywhere else. An egg found among this Sphagnum comes very close to *Macrobiotus coronifer*, Richters (5) and (6), though the spines are of different form to those figured by Richters. If the identification be correct, we have the curious association on the summit of Ben Lawers of arctic and antarctic Tardigrada, along with many common lowland species.

Many Tardigrada are unquestionably of world-wide distribution. *Diphascon chilense*, Plate, has been found in Spitzbergen (5) and the South Orkneys, and at many intermediate places, alpine and lowland, in both hemispheres. This is however, by no means the case with all species. The Tardigrada have not in the same degree the potentially cosmopolitan character which Jennings[1] assigns to the Rotifera. *Macrobiotus hufelandi* is reported from all over the world, but many of these records are unreliable, although the animal probably has a world-wide range. Scourfield's (7) *M. hufelandi*, for instance, reported from Spitzbergen, is evidently *M. echinogenitus*, Richters, though Richters afterwards did find *M. hufelandi* (Richters) in Spitzbergen. Prof. Richters further reports *M. hufelandi* (Richters, not Plate) from Possession Island in the Antarctic. On the other hand, in another part of the Antarctic region I found not a single egg of *M. hufelandi* (Richters or Plate), all the spiny Tardigrade eggs being quite peculiar. The association of Tardigrada which we find on the top of Ben Lawers, has, therefore, much greater significance than would, for instance, an association of Bdelloid Rotifera, in which we would find nothing to distinguish it from a lowland collection.

LIST OF SPECIES.

Genus Echiniscus.

E. arctomys, Ehr.—Several examples.

E. mutabilis, Murray (1).—Plentiful.

E. gladiator, Murray (1).—Several.

E. wendti, Richters (5).—One example. The 2-clawed larva was also found. An *Echiniscus*, which comes nearest to this

[1] "U.S. Fish Comm. Bull. 1899," p. 100.

species, was found, differing only in the shorter head seta, and the moderately large granules on the plates. A similar variation in the size of the granules has been seen in *E. mutabilis*.

E. sp.? larva. Broadest at head, plates 9 (2 median), head seta long, short curved seta at tail-piece, fringe of sharp spines on 4th leg, all claws with moderate sized curved barbs, granules of moderate size. Claws two.

Genus Macrobiotus.

M. hufelandi, C. Sch. (3) (6) (7).—In little peaty pool near the summit. The typical form of the egg was also in this pool (Fig. 18).

M. echinogenitus, Richters (5). According to Richters the animal is scarcely distinguishable from *M. hufelandi*. There are probably some little differences in pharynx or claws, but the opportunities for proving the connection between an animal of this section of the genus and the spiny eggs which they lay are very rare. Well-grown eggs may be seen in the body, but they are not spiny. The spines would appear to develop at a late stage, just before deposition. The commonest form of the egg, with acuminate spines curved at the top, was in the peaty pool. There was also a variety with the basal part of the spine nearly hemispherical, the points longer (Figs. 13, 14, 15).

M. ornatus, Richters (4).—Neither the type nor any of Richters' varieties was found, but a variety having many transverse rows of short, straight, equal spines (Fig. 4). It was longer than is usual, and may possibly be distinct. The pharynx and claws were typical. Length, 300 μ.

With this was a glabrous variety which I provisionally unite with this species (1, p. 691), having neither spines nor papillæ, but the typical pharynx with three roundish nuts in each row. One example had a short flexible portion of the gullet, as in *Diphascon* (Fig. 5).

Eggs of Macrobiotus.

Eggs of animals of this genus were found in considerable variety Many of them could not be assigned to any known species. The number of forms of spiny Tardigrade eggs which have already been found in Scotland compels us to suppose that there are many species still undescribed, or that the eggs are variable in form. While considerable allowance must be made for variability of the spines, my experience leads me to expect that many of the varieties will be

found to be constant. The same form turns up time and again, identical in size and shape of spines. Till something more is known about the development of these animals, from the egg to the adult, I think it would be rather unsafe to follow the precedent set by Richters when he described *M. echinogenitus* from peculiarities of the egg only.

M. hufelandi, Richters (not Plate, C. Sch.?) (Fig. 18).—If it be the case, as stated by Richters, that *M. hufelandi* and *M. echinogenitus* are indistinguishable except by their eggs, then the egg which he figures is not *M. hufelandi*, since Plate earlier figured another form, with blunt conical processes, as that of the species (3).

Macrobiotus sp. (Figs. 6 and 7).—Differs from *M. hufelandi*, Richters, in the shorter thicker processes, with bulging outline.

M. hufelandi, Plate (Figs. 8 and 9).—Although this is not identical with the egg figured by Plate, the form of the spines is the same.

Macrobiotus sp. (Figs. 10 and 11).—Processes hemispherical, set very close together. Similar to an egg figured by Richters (6, Plate V., Fig. 4) as a variety of *M. echinogenitus*, but the processes are lower.

Macrobiotus sp. (Fig. 12).—Similar to an egg figured by me (1, Plate IV., Fig. 20), but the processes relatively shorter and broader.

M. echinogenitus, Richters (Figs. 13, 14, and 15).—Fig. 13 is nearly typical; Fig. 14 is the form which appears to be commonest in Scotland, the points longer and curved; Fig. 15 appears to be a modification of the egg of this species, a hemispherical basal portion bears a sharp, straight spike.

M. coronifer, Richters (Figs. 16 and 17).—The most interesting of the eggs found on Ben Lawers. It differs from all other spiny *Macrobiotus* eggs in that it is oval, while they are spherical. Richters (5 and 6) says that the eggs are covered with small weak spines. The Ben Lawers egg agrees in this respect, but the form of the spines differs from those figured by Richters (6). They are shown as small, straight spikes, evenly tapering and without expanded basal portion. Ours have a minute hemispherical base, on which rises a very slender undulate seta. The egg contained a living young, with well-developed teeth, but the pharynx was not clearly seen. With the exception of this egg, none of Richter's species which possess the circlet of spines at the base of each claw, have yet been seen in this country.

Diphascon alpinum, n. sp. (Figs. 1 to 3).

Specific characters.—Whitish, narrow, of nearly equal width throughout. Teeth curved, divergent; gullet slender, very long. Pharynx broad, oval, or thromboid, short diameter to long as 8 to 11; 3 rods in each row increasing both in length and thickness from first to third. The claws, a larger and a smaller pair, one claw of each pair longer and with a supplementary point. The claws are thicker than in the other species, the larger claw of the smaller pair especially. Length over all 250 μ.

The general form is most like *D. spitzbergense*, Richters (5), and the pharynx is of about the same relative length and breadth. The resemblance goes no farther. *D. spitzbergense* has a thicker, shorter gullet, longer and thinner claws, and the arrangement of rods in the pharynx quite different. *D. angustatum*, Murray (1), has quite a different form, broadest at third legs and tapering to a kind of snout, nearly straight slightly divergent teeth, thick gullet, narrow pharynx with a different arrangement of rods.

The other three species agree with *D. alpinum* in having a slender gullet, but all have longer claws and differ in many points. *D. chilense* (3) has nearly circular pharynx and more numerous rods, not increasing in size. *D. bullatum* (2) has papillose and embossed skin, rounder pharynx and quite different rods. *D. scoticum* (2) is at once distinguished by the narrow pharynx and slender straight parallel rods.

The species is thus seen to differ conspicuously from all the previously described species in the genus, the arrangement of rods in the pharnyx and the characters of the claws being enough to mark it as a good species.

In moss from the cairn on Ben Lawers, very abundant, July 1905. On a second visit in September of the same year, not an example could be found.

It is of great interest that the same animal, identical in all respects, has been found in abundance in moss brought by the Scottish Antarctic Expedition from the South Orkneys, and kindly given to me by Mr. R. N. Rudmose Brown.

Diphascon scoticum, Murray (2).—This species, apparently the commonest of the genus in Scotland, was plentiful in the September collection. The peculiar lenticular bodies (nuclei?) in the stomach wall are characteristic for the species. From the Ben Lawers examples I ascertained a feature overlooked in the original description, viz., that the longer claws of each pair have very fine supplementary points. This character, general or universal in *Macrobiotus*, appears to be general also in this genus, and is even found in the long single claws of *Milnesium*.