

A NEW NEMATODE, *OSTERTAGIA BULLOSA*, PARASITIC IN THE ALIMENTARY TRACT OF SHEEP.

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The nematode described in this paper was first collected by the junior author at an abattoir in Colorado Springs, Colorado, April 28, 1911. Comparison with the descriptions of species given in Ransom (1911) led to the conclusion that the species was probably new. Specimens were then sent to the senior author who also was of the opinion that it was a new species. The sheep from which this material was collected were originally from the ranch of Mr. W. H. Wells near Resolis, Colorado, and specimens of the nematode here described were collected by both of us during the summer of 1911 from sheep at Mr. Wells's ranch. The nematode was found in nearly every sheep examined at the ranch and was the only nematode found in the stomach with the exception of the stomach worm, *Hæmonchus contortus*. The new species was also found by us in sheep at the ranch of Mr. W. T. Kennedy near Amo, Colorado. A single specimen was found once in the intestine, but the occurrence of this nematode in the intestine was probably accidental, as the fourth stomach is evidently the normal location. In Colorado the greatest number of *Ostertagia* found in a single sheep was 73 and the greatest number of *Hæmonchus contortus*, 537. Usually there were less than a dozen of each. This comparative freedom from infection with nematodes in Colorado sheep is to be attributed in part to the dry climate and in part to the extensive area covered in range feeding, thereby preventing concentration of infection.

Mr. W. D. Foster of the Zoological Division, Bureau of Animal Industry, has called our attention to a single specimen of a nematode, a female, collected by him May 13, 1910, from a sheep received in

Washington from Montana. This specimen he had been unable to identify with any described species. Examination shows that it is of the same species as that collected by us in Colorado. *Ostertagia bullosa* is therefore known to occur in two of the Rocky Mountain States. Two other species of this genus have been found thus far only in the Rocky Mountain region, namely *Ostertagia marshalli* and *O. occidentalis*, these two being reported heretofore only from Montana. To these records may be added our finding, in 1911, at a Denver abattoir, of *O. marshalli* in sheep from Wyoming and Utah, and of *O. occidentalis* in sheep from Wyoming.

The new species is white when freshly collected and has the usual characteristics of the genus *Ostertagia*, but differs from other species of the genus in that the two ventral rays of each lateral lobe of the bursa are rather widely divergent, the spicules are simple and not split into several processes posteriorly, and the gubernaculum is of the same yellow-brown color as the spicules instead of being colorless.

In the key given in Ransom (1911) this species runs down to *Ostertagia trifurcata* of which only the male is known. In several respects, however, it differs from *trifurcata*. The gubernaculum in *O. trifurcata* is a narrow colorless structure, whereas in *O. bullosa* it is a yellowish-brown structure, irregularly trihedral in shape. The spicules in *O. trifurcata* are twisted but are not curved in their long axis, and are divided into 3 processes at the posterior end. The spicules in *O. bullosa* are narrow, curving, tubular structures, not divided at the posterior end which is acutely pointed. Each of the two terminal branches of the dorsal ray in *O. trifurcata* has a short process on the outer side and one on the inner. *O. bullosa* has a short process on the outer side, but the process on the inner side is only suggested by a slight and often indistinct bifurcation at the tip.

The principal characters of *O. bullosa* are as follows:

OSTERTAGIA BULLOSA Ransom and Hall, 1912.

Specific diagnosis.—*Ostertagia*: *Male* (fig. 1) about 7.3 mm. long. Maximum thickness 115 μ just in front of bursa. Diameter of head 17 μ ; diameter of body at level of nerve ring 44 to 48 μ , at base of esophagus 68 μ . Esophagus 510 to 545 μ in length, surrounded by a nerve ring at a distance of 220 to 250 μ from the anterior end. The excretory pore is situated about 270 μ from the anterior end of the body. Cervical papillæ not evident. The esophagus increases in diameter from 16 μ anteriorly to 45 or 50 μ at its posterior end. The bursal membrane has a very distinct longitudinal striation. The median lobe is only slightly shorter than the lateral lobes. The lateral lobes are usually partly folded over each other in their ventral portions. The ventro-ventral (fig. 2, *v. v.*) and latero-ventral (fig. 2, *l. v.*)

rays diverge considerably, which is unusual in the genus *Ostertagia*, and their tips are at least half as far apart as the tips of the latero-ventral and externo-lateral rays. The distance between the tips of the externo-lateral and medio-lateral rays is much less than that between the latter and the tip of the postero-lateral ray. Of the paired rays, the latero-ventral is the thickest. Following this in the order of size are

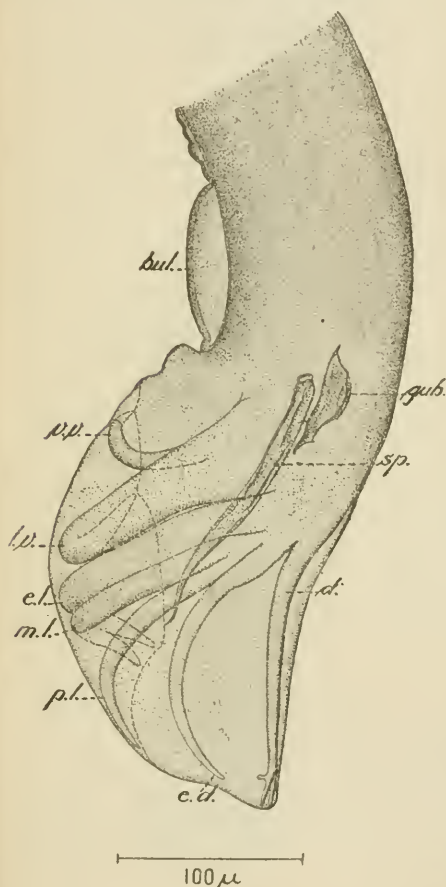


FIG. 2.—*OSTERTAGIA BULLOSA*. POSTERIOR END OF BODY OF MALE, VIEWED FROM LEFT SIDE. *bul.*, PREBURSAL BULLA; *d.*, DORSAL RAY; *e. d.*, EXTERNO-DORSAL RAY; *e. l.*, EXTERNO-LATERAL RAY; *gub.*, GUBERNACULUM; *l. v.*, LATERO-VENTRAL RAY; *m. l.*, MEDIO-LATERAL RAY; *p. l.*, POSTERO-LATERAL RAY; *sp.*, LEFT SPICULE; *v. v.*, VENTRO-VENTRAL RAY. ENLARGED.

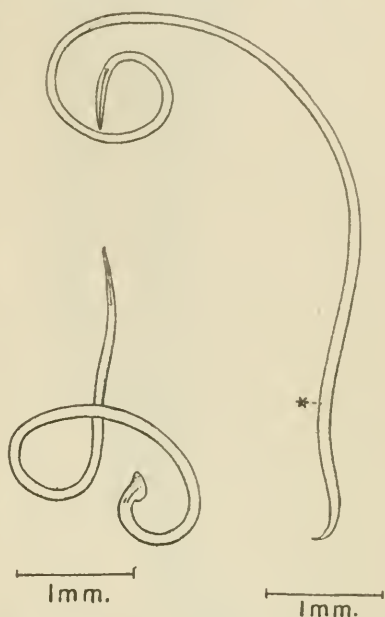


FIG. 1.—*OSTERTAGIA BULLOSA*. MALE AND FEMALE. *VULVA. ENLARGED.

the externo-lateral (fig. 2, *e. l.*), then the medio-lateral (fig. 2, *m. l.*), the postero-lateral (fig. 2, *p. l.*), and the externo-dorsal (fig. 2, *e. d.*), which are of about the same size, and lastly the ventro-ventral. The dorsal ray (fig. 2, *d.*) is about 140 μ long and is bifurcated 25 to 40 μ from its posterior end. The terminal branches have each a small branch, sometimes reduced to a mere knob, on the outer side. At times each of the terminal branches ends in a very

small fork and at times appears to end without forking. The spicules (fig. 2, *sp.*) are 140 to 180 μ long and 15 to 20 μ wide at the anterior end. They gradually narrow toward the posterior end, which is pointed, and do not fork. Usually the tips are curved but in some

specimens they appear to be straight. The gubernaculum (fig. 2, *gub.*) is irregularly trihedral in shape, somewhat resembling a plow-

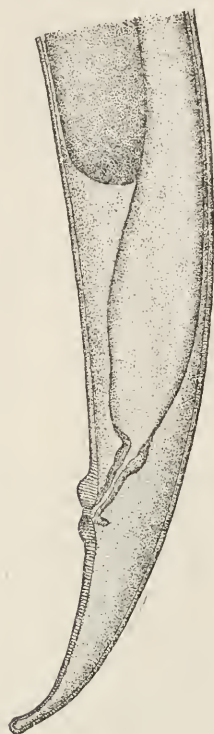


FIG. 3.—OSTERTAGIA BULLOSA. TAIL OF FEMALE, VIEWED FROM LEFT SIDE. ENLARGED.

share in outline when viewed from the side, and prolonged into a short slender process anteriorly. Measured from the side it is about 25μ wide and 65μ long. It is of the same yellow-brown color as the spicules.

A well-marked character of this species is a prominent cuticular swelling anterior of the bursa on the ventral surface (fig. 2, *bul.*). For some distance anterior of the swelling the cuticle on the ventral surface is somewhat thickened and at a distance of 100 to 125μ in front of the bursa the cuticle splits to form this swelling. When

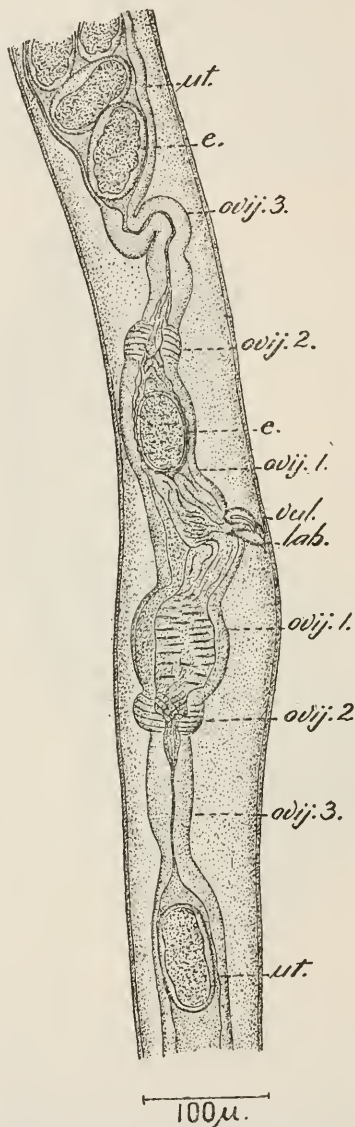


FIG. 4.—OSTERTAGIA BULLOSA. REGION OF VULVA OF FEMALE, VIEWED FROM LEFT SIDE. *e.*, EGG; *lab.*, RUDIMENTARY CUTICULAR FLAP ANTERIOR OF VULVA; *ovij. 1*, TERMINAL PORTION OF OVJECTOR; *ovij. 2*, SPHINCTER OF OVJECTOR; *ovij. 3*, NONMUSCULAR PORTION OF OVJECTOR; *ut.*, UTERUS; *vul.*, VULVA. ENLARGED.

viewed from the side, the optical section of the cuticle forming the ventral boundary of the swelling is usually oval but sometimes has a more rectangular outline, resembling somewhat the trigger guard on a rifle. The swelling is apparently filled with a clear transparent fluid. The prebursal papillæ are located near the lateral limits of this swelling and about $15\ \mu$ in front of the anterior edge of the bursa.

Female (fig. 1), 8.8 to 9.8 mm. long by about $13\ \mu$ wide in the region of the vulva. The head measures 20 to $25\ \mu$ in diameter. At the nerve ring the body is 50 to $60\ \mu$ in thickness, at the base of the esophagus 70 to $80\ \mu$, and at the anus 50 to $55\ \mu$. The esophagus is 580 to $620\ \mu$ long and is surrounded by a nerve ring 220 to $255\ \mu$ from the anterior end. The excretory pore is 265 to $320\ \mu$ from the anterior end. Cervical papillæ not evident. The vulva (fig. 4, *vul.*) is transversely elongated, commonly presenting a crescentic outline with the convexity of the crescent directed posteriorly. At times a very small, rudimentary cuticular flap (fig. 4, *lab.*) is evident. The vulva is situated 1 to 1.3 mm. from the posterior end of the body. The tail (fig. 3) tapers posteriorly, always curving ventrally and usually curving more sharply near the end to form a rather open hook, which terminates in a slightly enlarged, rounded tip. The cuticle of the tail beginning in the anal region and extending to the tip is marked by very fine transverse striations close together. The anus is situated 120 to $150\ \mu$ from the tip of the tail. The cuticle surrounding the anus is usually swollen so that a prominence appears at this point 25 to $35\ \mu$ in diameter and 5 to $8\ \mu$ high. The combined length of the muscular portions of the ovijectors (fig. 4, *ovij.*), including the sphincters, is 220 to $360\ \mu$. The maximum size of the eggs (from measurements of eggs observed in the ovijectors) is $85\ \mu$ long by $65\ \mu$ wide (fig. 4, *e.*).

Host.—*Ovis aries*.

Location.—Fourth stomach.

Localities collected.—Colorado; Montana.

Type-specimens.—Cat. No. 16083, U.S.N.M. (Bureau of Animal Industry Helminthological collection); collected July 30, 1911, at Wells's ranch, Resolis, Colo., by B. H. Ransom from the fourth stomach of a sheep.

REFERENCE.

- RANSOM, B. H. 1911. The nematodes parasitic in the alimentary tract of cattle, sheep, and other ruminants. Bull. 127, Bureau Animal Ind., U. S. Dep. Agr., Washington, 132 pp., figs. 1-152.