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## TRANSPLACENTAL TRANSMISSION OF *Protostrongylus* sp. IN CALIFORNIA BIGHORN SHEEP (*Ovis canadensis californiana*) IN OREGON<sup>□</sup>

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**Abstract:** Transplacental transmission of *Protostrongylus* sp. was documented for the first time in California bighorn sheep (*Ovis canadensis californiana*) by recovery of third stage larvae from two fetuses.

### INTRODUCTION

Transplacental transmission of the lungworm *Protostrongylus* spp. has been confirmed in Rocky Mountain bighorn sheep (*O. canadensis canadensis*),<sup>1,2,3</sup> but has not been demonstrated in the California subspecies (*O. c. californiana*). In an earlier publication, *P. stilesi* was the only lungworm reported in a limited number of hunter-harvested California bighorn rams from Oregon,<sup>4</sup> where this host subspecies predominates as a result of successful reintroduction in 1954.

This paper reports the results of parasitologic examination of selected viscera from two pregnant ewes from Hart Mountain (42° 45' N, 119° 45' W), Lake County, Oregon.

### MATERIALS AND METHODS

Two ewes, 2.5 and 3.5 years old, died during trapping operations on 22 February 1978. The carcasses were eviscerated, the viscera were identified, frozen, and subsequently were delivered to our laboratory.

Upon thawing, the lungs were examined grossly for nodules and the air passages were opened and examined for nematodes. A few nodules were excised, teased apart in saline and the posterior

end of male worms and first stage larvae (L<sub>1</sub>) collected for identification. The lungs from the 2.5-year-old ewe were ground in a meat grinder with a 5 mm plate and digested in a pepsin-HCl solution for 2 h. Nematode larvae were recovered by washing the digested material through a series of screens, the smallest of which had openings of 43 µm. Material remaining on each screen was examined. Morphometric measurements were made on some of the recovered larvae. Each uterus was opened; cotyledons were removed and cotyledons and uterus (including the placenta) were ground separately, digested and examined as outlined above. The lungs and liver from each fetus also were examined similarly. Crown-rump measurements were taken for each fetus.

### RESULTS AND DISCUSSION

Fifteen to 20 lungworm nodules were found on the surface and in the parenchyma of the diaphragmatic lobes of the lungs in both ewes; nematodes were not found in the bronchial lumina. Excised nodules contained adult worms of both sexes and numerous first stage larvae. Male worms were identified as *P. stilesi*; all L<sub>1</sub> apparently were *Protostrongylus* spp. Twenty-two third

<sup>□</sup> Oregon State University Agricultural Experiment Station Technical Paper No. 5080.

stage larvae ( $L_3$ ) were recovered from the digested lungs of the 2.5 year old ewe.

Results from examinations of reproductive tracts and fetuses were comparable to those reported for pregnant Rocky Mountain bighorn ewes.<sup>1,2</sup> First stage and/or  $L_3$  were recovered from various portions of the reproductive tracts. Zero, 2, 0 and 33  $L_3$  and 3, 0, 2 and 3  $L_3$  were recovered from the cotyledons, uterus, fetal lungs and fetal liver, respectively, from the 2.5-year-old (4 mo. fetus) and 3.5-year-old (3 mo. fetus) ewe, respectively. A few  $L_1$  were recovered from various tissues, but these probably resulted from contamination. Although it is recognized that fetal measurements may not be accurate for aging bighorn sheep fetuses,<sup>4</sup> fetal ages were estimated to be three and four months old on this basis. Hibler *et al.*<sup>3</sup> postulated that transplacental transmission began in the 4th month of pregnancy and continued until birth. Therefore, our finding  $L_3$  in the 3-month-old fetus indicates that

transplacental transmission begins at an earlier fetal age than postulated.

Third-stage larvae were in the characteristic "C" shape previously described for *P. stilesi*.<sup>1,5</sup> Mean measurements of 8  $L_3$  were: length 539  $\mu\text{m}$  (475-615), width 47  $\mu\text{m}$  (30-69), esophageal length 149  $\mu\text{m}$  (133-177) and anus to posterior end 41  $\mu\text{m}$  (35-44). Except for slightly greater width, these measurements were similar to those of  $L_3$  recovered from Rocky Mountain bighorn fetuses.<sup>1,2</sup> It is probable that the  $L_3$  in these fetuses were *P. stilesi*, but more older animals will need to be examined to determine the presence or absence of *P. rushi* from California bighorns in Oregon. This study represents the first documentation of transplacental transmission of *Protostrongylus* in California bighorns. Additional studies will be necessary to determine the epizootiologic significance of this finding.

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