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Serologic Evidence of Respiratory Syncytial Virus Infection in Free-ranging Mountain Goats (*Oreamnos americanus*)

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Respiratory syncytial virus (RSV) is an important pathogen of the lower respiratory tract and is a potential predisposing agent of pasteurellosis and other respiratory diseases in domestic sheep, pygmy goats and cattle (Smith et al., 1979, Proc. Am. Assoc. Vet. Lab. Diag. 22: 259–268; Al-Darraji et al., 1982, Am. J. Vet. Res. 40: 224–229; Bryson et al., 1983, Am. J. Vet. Res. 44: 1648–1655; Harrison and Pursell, 1985, J. Am. Vet. Med. Assoc. 187: 716–720). Serum neutralizing antibodies to RSV are widespread in domestic sheep, goats, cattle and bighorn sheep (*Ovis canadensis*) in the United States (Rosenquist, 1974, J. Infect. Dis. 130: 177–182; Evermann and Trigo, 1985, Agric. Pract. 6: 15–22; LeaMaster et al., 1984, Proc. Am. Assoc. Vet. Lab. Diag. 26: 265–276; Dunbar et al., 1985, J. Am. Vet. Med. Assoc. 187: 1173–1174).

Studies on respiratory disease in mountain goats (*Oreamnos americanus*) are limited. However, pasteurellosis in mountain goats has been reported (Brandborg, 1955, Life history and management of the mountain goat in Idaho, Bull. No. 2, Idaho Fish and Game Dept., Boise, Idaho, pp. 110–114), and predisposing agents to bacterial pneumonia, such as parainfluenza-3 virus (PI-3), bovine viral diarrhea (BVD) virus, and lungworms of the genus *Protostrongylus* have been reported from mountain goats (Cowan, 1951, Proc. 5th Annu. Brit. Col. Game Conven. 5: 37–64; Johnson, 1983, Mountain goats and mountain sheep of Washington, Bio. Bull. No. 18, pp. 44–52; Foreyt and Leathers, 1985, J. Wildl. Dis. 21: 184–185). The present study was conducted to determine the seroprevalence of respiratory syncytial virus infection in free-ranging mountain goats as part of on-going studies to determine potential respiratory pathogens of wildlife species.

Blood samples were collected from 69 free-ranging mountain goats from the state of Washington between July 1977 and July 1981. Goats were trapped under a drop net and 10 cc of blood were collected from the jugular vein of each goat. The following age distribution was sampled, kids (n = 4), yearlings (n = 11), 2–4 yr (n = 42), 5–7 yr (n = 8), and 8–10 yr (n = 4). Forty-one goats were females, 27 were males, and the sex was not recorded for one. Blood samples were collected by either the authors or personnel from the Washington State Department of Game. Serum was separated from blood by the collector and was frozen at −20 C for later analysis.

A microtiter virus neutralization test was used for serological analysis (LeaMaster et al., 1984, op. cit.). A bovine strain of RSV (Mohanty A51908) was used as challenge virus. Initially each serum sample was diluted 1:5 in Eagles' minimum essential medium (MEM) without fetal bovine serum (FBS), and heat-inactivated at 56 C for 30 min. Serial twofold dilutions were performed using semiautomated diluters. The serologic tests were conducted in bovine turbinate cells from the National Veterinary Services Laboratory, Ames, Iowa, which were grown in MEM with

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Earle's salt base supplemented with 10% heat-inactivated FBS. Gentamicin was added to the medium at a final concentration at 50 μg/ml. The microtiter plates were incubated at 37 C for 5 days. Antibody titers were expressed as the highest dilution of serum that prevented 50% RSV cytopathogenic effect.

Neutralizing antibodies to RSV were detected in 29 (42%) of the 69 mountain goats, including kids (25%), yearlings (28%), 2–4-yr-olds (43%), 5–7-yr-olds (75%), and 8–10-yr-olds (25%). Fifty-six percent of the males and 35% of the females were seropositive for RSV. Antibody titers ranged from 1:5 to 1:20 (median = 1:5). This is the first report on the occurrence of RSV antibodies in mountain goats and indicates enzootic transmission in the population. The importance of RSV infection in the epizootiology of respiratory disease in mountain goats is unknown.

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Isolation and Serologic Evidence of a Respiratory Syncytial Virus in Bighorn Sheep from Colorado

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In December 1984, personnel of the Colorado Division of Wildlife began baiting Rocky Mountain bighorn sheep (*Ovis c. canadensis* Shaw) near Ouray, Colorado in order to treat them for *Protostrongylus stilesi* Dikmans. When the sheep began to visit the bait station, it was observed that approximately 50% of the herd were coughing and about 20% had a nasal discharge. Since a bighorn lamb had been found dead on the bait station the previous week, it was decided to collect and necropsy sick animals from this herd in order to investigate this possible respiratory problem.

On 4 January 1985, two clinically ill sheep exhibiting signs of coughing, slightly dull rough hair coat, and nasal discharge were collected and necropsied. One animal was an adult ewe and the other animal was an 8-mo-old ewe lamb. Gross necropsy findings were similar in both animals and included a moderate suppurative rhinitis/tracheitis and subacute suppurative bronchopneumonia. Approximately 5% of lung parenchyma was consolidated in both animals. The thymus was totally atrophied in the lamb. Gross lesions of the respiratory system were similar to those in bighorn sheep with early cases of bronchopneumonia observed during previous die-offs in Colorado (Spraker et al., 1984, J. Wildl. Dis. 20: 319–327). Tissue samples from posterior nasal septum lymphoid tissue, trachea, consolidated and normal lung parenchyma, and lungworm nodules were placed in viral transport media and transported on ice to the Diagnostic Laboratory, Colorado State University, Fort Collins, Colorado. These tissues were also cultured for bacteria.

A respiratory syncytial virus (RSV) was isolated from posterior nasal septum lymphoid tissue, trachea, and a lungworm nodule from the 8-mo-old lamb. The virus was identified by induction of characteristic syncytial cytopathic effect in fetal

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