situations which support established morphological evidence that more than one species of *Alloglossidium* exist. For example, only freshwater shrimp are infected at St. James because only *A. renale* is present; crayfish are not infected because *A. corti* is not present. Similarly, at Brusly, crayfish are infected with *A. corti* and leeches with *A. macrobdellensis*, but *A. renale* is absent and, therefore, the abundant freshwater shrimp are uninfected.

Only two of several thousand freshwater shrimp were infected with metacercariae of *A. corti*. These specimens of *A. corti* were morphologically similar to *A. corti* from crayfish, possessed a metacercarial cyst wall, and were not gravid. Only one of hundreds of crayfish harbored *A. renale*. These six specimens from the crayfish were morphologically similar to *A. renale* from the usual shrimp host, had no cyst wall, and were gravid. No host-induced morphological variation had occurred in either of these infections.

Catfish which fed upon infected shrimp, both in nature and in the laboratory, did not harbor *A. renale* infections, thus supporting morphological evidence that *A. corti* and *A. renale* are valid species. Cercariae of *A. macrobdellensis* were used for the laboratory infection of the hosts of *Alloglossidium*. Cercariae released into aquaria containing crayfish, leeches, and shrimp invariably infected leeches, but no other host.

In conclusion, extensive field studies in Louisiana and limited laboratory experimentation support the established taxonomy of *Alloglossidium* which, at present, is based solely upon morphological information. *Alloglossidium corti*, *A. macrobdellensis*, and *A. renale*, in addition to being anatomically distinct, are ecologically independent and have differing host specificities. Further evidence is dependent upon the determination of additional life history information for all members of the genus.

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Snail and Mammalian Hosts for *Fasciola hepatica* in Eastern Washington

The channeled scablands (approximately 12,000 square miles) of eastern Washington, bounded by the Columbia, Spokane, Snake, and Palouse rivers (U.S. Gov Print Off 1974, No. 2401-02507), are marked by numerous springs, temporary and permanent ponds, and lakes. *Fasciola hepatica* is found in cattle and sheep of the area but the prevalence and distribution of the parasite in the region is spotty. Small herds of cattle that are grazed around springs and ponds often have a prevalence of infection of 50 to 100%. No information on natural infections with *F. hepatica* is available for this area.

A total of 12,163 snails of the genus *Lymnaea* from 87 sites in the channeled scablands were examined since 1968. The following snails serve as intermediate hosts in the region: *Lymnaea bulimoides* Lea, *L. palustris nutaliana* Lea, *L. proxima proxima* Lea, *L. stagnalis wasatchensis* Hemphill, and *L. modicella modicella* Lea. All of these snails have been found naturally infected in eastern Washington and were also infected experimentally. Recovered metacercariae were infective for mice. With the exception of *L. proxima proxima*, all of the above species have been incriminated as hosts for *F. hepatica*. Shaw and Simms (1930, Agric Exp Stn, Oreg State Agric Col, Stn Bull **266:** 1–25) found naturally infected *L. bulimoides techella* in Oregon and suggested it was the most important host in Oregon. Olsen (1944, J Agric Res **69:** 389–403) demonstrated that *L. bulimoides techella* was the host for *F. hepatica* in southern Texas. Earlier, Sinitsin (1929, J Parasitol **15:** 222) experimentally infected this snail with *F. hepatica*. *Lymnaea palustris* was incriminated as a host in the British Isles by Kendall (1949, Vet Rec **61:** 462; 1950, J Helminthol **24:** 63–74). This was based on experimental infections and Kendall concluded that *L. palustris* played a minor role in the transmission of liver fluke as naturally infected snails were not collected. Various subspecies of *L. stagnalis* have been experimentally infected with liver fluke (Kendall, 1949, Nature **163:** 880; Kendall, 1950, loc. cit.; Johnston and Beckwith, 1946, Trans R Soc S Aust **70:** 121–126). These authors suggested that *L. stagnalis* could serve as a natural snail host. Krull (1934, J Parasitol **20:** 49–52) reported *L. modicella* could be experimentally infected with *F. hepatica* and Griffiths (1939, Sci Agric **20:** 166–169) lists *L. modicella* as a potential carrier in the U.S. and parts of Canada. In the channeled scablands, *L. palustris* is the most important intermediate host and can survive in all major aquatic habitats. Laboratory studies indicate some *L. palustris* can withstand drying at 4 C for a least 190 days, can be frozen in water up to 75 days, and can be dried and frozen up to 110 days. Thus, this snail can survive the environmental stress of temporary aquatic habitats that dry up in late summer and freeze in the winter. Based on laboratory infections, *Lymnaea stagnalis* is the poorest host of the group.

Various mammalian hosts were found to be infected with *F. hepatica.* These include mule deer, *Odocoileus hemionus* (Rafinesque); whitetail deer, *O. virginianus* (Zimmerman); beaver, *Castor canadensis* Kuhl; and snowshoe hare, *Lepus americanus* Erxleben. A total of 53 hosts were checked from 1968 through 1975; 3 of 15 whitetail deer, 2 of 20 mule deer, 3 of 12 beaver, and 1 of 6 snowshoe hares harbored mature worms in the hepatic and common bile ducts. A total of 39 mature flukes were recovered from the 9 infected hosts: whitetail, 11 flukes; mule deer, 14 flukes; beaver, 10 flukes; snowshoe hare, 4 flukes. Worm measurements, in mm, mean followed by range: whitetail, 9.2 (7.0–10.5); mule deer, 9.6 (8.0–11.0); beaver, 14.6 (12.0–16.5); snowshoe hare, 17.0 (13.0–20.0). Worms from deer were considerably smaller than those from other hosts. Three specimens from each host have been deposited in the U.S. National Museum Helminthology Collection in Beltsville, Maryland (accession numbers 74449, whitetail deer; 74450, mule deer; 74451, beaver; 74452, snowshoe hare). Eggs from flukes recovered from whitetail deer and beaver produced miracidia which were infective for *L. bulimoides* and *L. palustris.* Recovered metacercariae were used to infect mice, and clinical manifestations were similar to those reported in mice for *F. hepatica* from cattle in Washington (Lang, 1972, Northwest Sci **46:** 190–193).

Infected whitetail deer came from the same general location. This was also true for mule deer. The two areas are approximately 5 miles apart and are grazed by infected cattle. Natural infections in whitetail deer have not been reported (Foreyt and Todd, 1976, Vet Med Small Anim Clin **71:** 816–822), even in areas where deer share the same range with infected cattle (Presidente, McGraw, and Lumsden, 1974, Can J Comp Med **39:** 155–165; Prestwood et al., 1975, Am Vet Med Assn **166:** 787–789). *Fasciola hepatica* has been reported from the Columbian black-tailed deer, *O. hemionus columbianus,* in California (Longhurst and Douglas, 1953, Trans North Am Wildl Conf **18:** 168–188; Browning and Lauppe, 1964, Calif Fish Game **50:** 132–147) and from deer (no species given) in California by Herman (1945, Calif Fish Game **31:** 201–208). Thus, *F. hepatica* has been reported from the Columbian black-tailed deer, a subspecies of mule deer, but no specific data on natural infections of *F. hepatica* in whitetail and mule deer have been published.

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