First Record of the Land Snail *Pristiloma idahoense* (Gastropoda: Pristilomatidae) for Montana

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The land snail *Pristiloma idahoense* (Pilsbry, 1902) is reported from Montana for the first time. Five live individuals were found under downed wood beneath a mature coniferous forest canopy at 1670 m elevation in the Big Creek drainage of the Bitterroot Mountains, Ravalli County, Montana. This location extends the known range approximately 75 km east and over the crest of the Bitterroot Mountains from the nearest sites in Idaho County, Idaho and supports the hypothesis that the terrestrial mollusc fauna of Montana west of the continental divide has been strongly influenced by a molluscan radiation, which developed in a northern Idaho Pleistocene refuge. The probable route of dispersal for *P. idahoense* between the Bitterroot Mountains of Montana and the adjacent Lochsa River drainage of Idaho was over the lower mountains to the north in the Lolo Pass area.

Key Words: Distribution; Montana; *Pristiloma idahoense*; Pristilomatidae; range extension; terrestrial gastropod; land snail

*Pristiloma idahoense* (Pilsbry, 1902), the Thinlip Tightcoil, is a small land snail found primarily in northern Idaho, with additional records from northeastern Oregon and northeastern Washington (Pilsbry 1902; Baker 1932; Frest and Johannes 1995, 1997; Bosworth 2012; Burke 2013). NatureServe (2015) lists *P. idahoense* with a global rank of G2G3 (vulnerable to imperilled), and a state rank of S1 (critically imperilled) in Idaho, S2? (imperilled) in Washington, and SNR (not ranked) in Oregon. Recent surveys by the Idaho Department of Fish and Game (M. Lucid, personal communication) show that the species is widely distributed, although relatively rare, across the northern Idaho Panhandle and also extant in extreme northeastern Washington. Extensive surveys for land molluscs in Montana west of the continental divide began in 2005 and resulted in detections of a number of rare taxa of the Washingtonian Province with ranges primarily in Idaho (Frest and Johannes 2000; Hendricks et al. 2007; Hendricks 2012; Burke 2013). However, *P. idahoense* was not one of the species found during the Montana surveys, nor has it been recorded previously in the state. Here, I document the first occurrence of *P. idahoense* in Montana and discuss the biogeographic significance of this discovery.

On 2 June 2015 I found five live *P. idahoense* at one location in the Selway-Bitterroot Wilderness, Ravalli County, Montana, just north of the juncture of the trails leading to Big Creek Lakes and South Fork Lake in the Big Creek drainage of the Bitterroot Mountains. The site (46.48790°N, 114.34541°W) is on the eastern side of the Bitterroot Mountains (the crest of which forms the boundary between Idaho and Montana) about 1.0 km southeast of the outflow of Big Creek Lakes at 1670 m elevation. Two of the five snails were collected and preserved in 95% ethyl alcohol and later deposited in the mollusc collection at the Carnegie Museum of Natural History (CM 144502). The Montana voucher specimens are typical in size and external morphology for *P. idahoense* (Burke 2013; T. Burke, personal communication). The shells are low conic, 3.2 and 3.5 mm in diameter and 1.8 and 2.1 mm in height, tightly coiled with about 6.0 and 6.25 whorls, possess distinct shoulders, and are imperforate (Figure 1). *Pristiloma idahoense* is readily distinguished by its imperforate shell and distinct shoulder from the other *Pristiloma* species reported previously in Montana (Berry 1919; Russell and Brunson 1967; Hendricks 2012): *P. chersinella* and *P. wascoense*.

The Montana location extends the range of *P. idahoense* about 75 km east and over the crest of the Bitterroot Mountains from the closest known Idaho locality at Dipper Creek (46.35553°N, 115.29161°W) 5 km northeast of the historical Lochsa Ranger Station in Idaho County (Bosworth 2012; M. Lucid, personal communication), where John Slapcinsky collected a single shell (Florida Museum of Natural History: FMLHN 444802) on 9 July 2010. Forest canopy cover at the Montana site was about 70%, composed predominantly of mature Engelmann Spruce (*Picea engelmannii*), Subalpine Fir (*Abies lasiocarpa*), and Douglas-fir (*Pseudotsuga menziesii*), with a ground cover including patches of ferns and moss. The snails were under a piece of wood on the forest floor within 50 m of a small seepage.

Other mollusc species found in close proximity (< 30 m) were *Udosarx lyrata* (Lyre Mantleslug), *Radiodiscus abietum* (Fir Pinwheel), and *Discus whitneyi* (Forest Disc). Habitat at the Montana site differs

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somewhat from those described elsewhere for the species, which indicate that *P. idahoense* has been found most often at lower elevations in moist forest zones under mature, closed-canopy Ponderosa Pine (*Pinus ponderosa*), Douglas-fir or Grand Fir (*Abies grandis*), and Pacific Yew (*Taxus brevifolia*), sometimes in mossy talus and under coarse organic debris, and sometimes in association with limestone and basalt (Baker 1932; Frest and Johannes 1995, 1997, 2000; Bosworth 2012; Burke 2013).

The discovery of *P. idahoense* in Montana is not surprising, but the location of this first occurrence is unexpected. *Pristiloma idahoense* has been documented within 2 km of Montana on the Idaho side of Lookout Pass (1440 m elevation) near Mullen, Shoshone County (Bosworth 2012; M. Lucid, personal communication), about 150 km northwest of the Montana location.

The mountains of Montana along the boundary with Idaho north of Lookout Pass include the low-elevation valleys of the Clark Fork and Kootenai Rivers (at about 645 m and 555 m, respectively) and a number of low-elevation passes between 1440 m and 1525 m, thus affording suitable routes for dispersal into Montana. *Pristiloma idahoense* probably occurs in Montana north of Lookout Pass and efforts to confirm occurrence in that region should be made. From Lookout Pass south to Lolo Pass (1596 m), the boundary between Montana and Idaho is generally higher than 1920 m, with no river valleys and only a few passes dropping below 1825 m elevation. Nevertheless, it is possible that *P. idahoense* has reached Montana across this mountainous divide because it is forested in many places; additional surveys for the species are warranted in this area.

South of Lolo Pass to Lost Trail Pass (2138 m), the crest of the Bitterroot Mountains (which is part of the granitic Idaho Batholith) has numerous summits between 2500 and 2830 m near or above tree line and rarely drops below 2100 m, such that the Bitterroot Mountains form a significant alpine barrier to land mollusc dispersal between Idaho and Montana. Further,more, most drainages in the Bitterroot Mountains, including Big Creek where *P. idahoense* was discovered, were glaciated during the Pleistocene from the crest down to 1220 m, below which elevation the Bitterroot Valley was inundated by water from Glacial Lake Missoula (Alden 1953), unlike many of the documented *P. idahoense* sites in Idaho, which appear to have remained unflooded and ice-free. Thus, the probable route of dispersal for *P. idahoense* between the Bitterroot Mountains of Montana and the adjacent Lochsa River drainage of Idaho is over the lower mountains to the north in the Lolo Pass area.

The presence of *P. idahoense* in Montana is yet another indication that the terrestrial mollusc fauna in the state west of the continental divide has been strongly influenced by a molluscan radiation, which developed in a northern Idaho Pleistocene refuge (Leonard et al. 2003; Shafer et al. 2010). *Pristiloma idahoense* can be added to the Montana list of regional endemic mollusc taxa with close affinity to northern Idaho (Frest and Johannes 1995, 2000; Hendricks 2012; Burke 2013), which includes the slugs *Hemphillia camelus* (Pale Jumping-slug), *Hemphillia danielsi* (Marbled Jumping-slug), Kootenai burkei (Pygmy Slug), Magnipelta mycophaga (Magnum Mantleslug), Prophysaon humile (Smoky Taildropper), *Udosarx lyrata*, and *Zacoleus idahoensis* (Sheathed Slug), and the land snails *Allogona pychophora* (Idaho Forestsnail), *Cryptomastix multani* (Coeur d’Alene Oregonian), *Polygyrella polygyrella* (Humped Coin), and *Radiodiscus abietum*.

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