Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 11(2): 1571, February 2015 doi: http://dx.doi.org/10.15560/11.2.1571
ISSN 1809-127X

Range of *Pristiloma crateris* Pilsbry, 1946 (Gastropoda: Pulmonata: Pristilomatidae) in the United States Pacific Northwest

Barry Roth

745 Cole Street, San Francisco, CA 94117, USA
E-mail: barry_roth@yahoo.com

Abstract: Extensive holdings of *Pristiloma* snails in the Oregon State Arthropod Collection were evaluated and reidentified as necessary. The study confirmed the distinctness of *Pristiloma crateris* from other species and delineated a range in Pacific Northwest National Forests, primarily along the western and eastern slopes of the Cascade Range in Oregon.

Key words: land snails, Oregon, National Forests, taxonomy, species criteria

Originally described as a subspecies of the far northern species *Pristiloma arcticum* (Lehnert, 1884), *Pristiloma crateris* Pilsbry, 1946, has been independently recognized as a full species (Roth 2011; Burke 2013). The criteria for this taxonomic ranking are reviewed herein. The taxon is considered a Special-Status Species by the USDA PNW Forest Service and USDI Oregon/Washington Bureau of Land Management Interagency Special Status/Sensitive Species Program, and therefore of conservation interest. Examination of 191 samples previously identified as belonging to the genus *Pristiloma* Ancey, 1887, from the Oregon State Arthropod Collection, Oregon State University, Corvallis (hereinafter, OSAC), resulted in the identification of 104 samples of *P. crateris* and delineation of its range in Pacific Northwest National Forests.

Specimens were collected in the course of Forest Service and Bureau of Land Management regular surveys to determine plants and animals present in the lands under these agencies' stewardship. For surveys not specifically targeting *Pristiloma*, the collecting method was visual search in likely areas, such as zones of forest floor litter or around the bases of plants in wet meadows. Duncan et al. (2003: 20, 21) provided these special instructions for surveys focusing on *P. crateris*:

> During surveys of suitable wet habitat, search the undersides of woody debris, among wet mosses, rushes and other low vegetation at the edges of wetlands, springs, seeps and streams and in perennially damp forest floor litter, especially where it has accumulated at the bases of shrubs and against logs. Pick up a small handful of litter, vegetation or moss and examine both sides of each leaf or frond. Use a 10–15× hand lens to examine any object that might be a snail. Examination of material in bright light helps to make animals active and easier to detect. Care should be taken to avoid wind, even gentle air currents, that could cause shells to blow away while examining them.

The collected and sorted material was identified preliminarily by various workers and catalogued into the OSAC. Number of specimens per sample ranged from one to seven.

By far the majority of samples consisted of only the shells of the snails. A few had the contained animal soft parts. This was not a serious limitation, because shell characters are adequate to tell apart the species in question, except in poorly preserved or fragmentary material. This has also been the conclusion of previous authors, such as Pilsbry (1946: key, p. 396) and Thomas E. Burke (written communication, 2010). A single specimen (UMA04-008b) had the entire animal preserved with its genitalia in extruded position. This was informative as discussed below.

Because the thin, fragile shells of *Pristiloma* are not likely to survive extensive transport, I consider the presence of empty shells at a site to be presumptive evidence of an extant population at that locality.

I examined the specimens under a stereoscopic microscope at magnifications of 60×, 120×, and occasionally

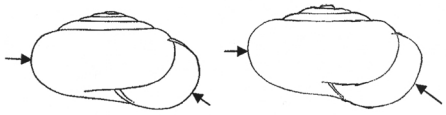

Figure 1. *Pristiloma crateris* (left) and *P. arcticum* (right); after Pilsbry (1946). Arrows indicate areas of difference in shell profile, described in text.

240×. The most informative orientation of the shell is with the aperture on the right and opening toward the viewer, as in the images of Figure 1 above. To achieve this stable viewing position I examined all specimens in a small dish of black paraffin (a jar lid would serve adequately) in which I had impressed a groove 5 mm long and about 0.5 wide. Shell specimens were placed in this groove and adjusted with an artist's camel-hair brush until positioned correctly.

In the most recent monograph of the genus (Pilsbry 1946), *Pristiloma arcticum crateris* was described in the following text:

> The shell is imperforate, depressed, with quite low, conoid spire and rounded periphery, median in position; pinkish buff, glossy. Sculpture of weak but subregular ripples of growth below the suture, soon disappearing, leaving the peripheral region and base smooth except for very weak lines of growth; very fine, close spirals are seen on the upper surface. The whorls are regularly and rather closely coiled, the last not unduly wider. The aperture is narrowly crescentic, the outer and basal margins of the lip thin, columellar margin slightly spreading, thickened within, reflected at the insertion in a small callus over the axis. Height 1.5, diameter 2.75 mm; 5½ whorls. H./d. index about 54.5.
>
> * * *
>
> It is very similar to *P. arcticum*, but the base is more flattened, producing a less deeply concave basal lip and somewhat different shape of the aperture, and there is a fraction of a whorl more (Pilsbry 1946: 402–403).

The description was accompanied by a line illustration of the shell (*ibid*.: fig. 215; Figure 1). The description focuses entirely on shell characters. No anatomical detail was provided. The purported subspecies was contrasted with *P. a. arcticum*, which was described as follows and illustrated by line drawing (*ibid*.: fig. 214):

> "Shell imperforate, globose-depressed, most minutely striate, uniform tawny-brown, glossy. Whorls 5½ to 6, convex, very narrow, the last somewhat convex at base. Aperture depressed, lunar; peristome simple, acute, the basal margin arcuate. Width 2 mm., alt. 1.5 mm." (E. Lehnert.)
>
> * * *
>
> It is a glossy shell, with the general shape of P. lansingi; growth-striae faint, spire low-conic, whorls 4¾, slowly and regularly increasing, and last not disproportionately wide as in *P. johnsoni*, but about as in *P. lansingi*. Aperture narrowly crescentic. … The width of the spire a little exceeds two-thirds the greatest diameter of the shell (*ibid*.: 401–402).

Allowing for differences in authors' word-choice, the main differences between these descriptions, borne out by the illustrations, duplicated below, lie in the profile of the whorl and aperture. In *P. arcticum* the widest part of the shell occurs high on the whorl. Below this point (called the "periphery" by Pilsbry and other authors) the whorl slopes steeply to the convex base (Figure 1, right). In *P. crateris*, the widest part of the shell occurs near the middle of the whorl ("median," in Pilsbry's description) and the slope of the shell below the periphery is more rounded, leading to a less deeply "dished" base (Figure 1, left).

Pilsbry (1946: 396) himself recognized the importance of this distinction, summarizing the difference in a key as follows:

F. Basal lip deeply concave ..... *P. articum*
FF. Basal lip less curved ..... *P. a. crateris*

According to this distinction, all but one "*arcticum*-type" *Pristiloma* in the samples examined in this study are *P. crateris*. Small juveniles may have a whorl profile that is widest above the middle, but their relatively shallow base (and the fact that they co-occur with undoubted adult *P. crateris* in some samples) makes their identification as *P. crateris* certain. In the course of identifying the many lots of *P. crateris* in this study, I came to think of them as resembling a child-size coated aspirin tablet — an image that may help workers recognize the species and distinguish it from, for example, *P. lansingi*.

Pilsbry's (*ibid*.: fig. 214) illustration of a paratype of *P arcticum* from Point Barrow also shows a large, bulbous, first embryonic whorl, a feature not seen in any samples in this study. Forsyth's (2002; 2004: 92) figure of a specimen collected in montane forest in the Babine Range, Skeena Mountains, British Columbia shows the same feature. It is also present in specimens from Attu, Aleutian Islands, Alaska (Roth and Lindberg 1981; specimens in California Academy of Sciences). I have not examined specimens from mainland Alaska or British Columbia, but if consistent, the large first embryonic whorl should be a good identifying character.

Pilsbry (1946:401) gave the range of *P. a. arcticum* as Point Barrow, Alaska (the type locality) to Pierce County, Washington (Paradise Park and Longmire). Sample WEN01-001 of this study, from Kittitas County, Washington, is from slightly northeast of those localities. It is tempting to suggest that WEN01 001 and Pilsbry's Pierce County specimens are conspecific, although I have not seen shells of the latter. WEN01 001 does not have a bulbous first embryonic whorl and in that respect differs from the more northern shells of P. *arcticum*. The only illustration and description of the genitalia of *P. arcticum* is that by Baker (1931: pl. 15, figs. 1-3; reproduced by Pilsbry 1946 as figs. 211(1–3)), based on Paradise Park specimens. The anatomy of topotypic, Point Barrow, specimens of *P. arcticum* is unknown. Therefore, the only published figures purporting to be of *P. arcticum* may actually depict *P. crateris*. It is worth noting that specimen UMA04-008b of this study, from Umatilla County, Oregon, has a penial papilla similar to that described and illustrated by Baker (1930: pl. 15, fig. 3) for "*arcticum*."

All specimens herein identified as *P. crateris* are consistent in form and deployed within a relatively continuous, delimited range. This is consistent with their representing "a separately evolving metapopulation lineage, where a metapopulation is an inclusive

population made up of a set of connected subpopulations and a lineage is a population extended through time or an ancestral-descendant series of time-limited (instantaneous) populations" as in the definition of a species by de Queiroz (2005).

At the present time, we have insufficient information to demonstrate intergradation between *P. crateris* of this study and *P. arcticum* from elsewhere (which would be suggestive of a subspecific relationship), or identity of the reproductive systems of undoubted *P. arcticum* from the North Slope of Alaska with those of specimens from the Pacific Northwest. In the absence of such additional evidence demonstrating a subspecific relationship, the proper course is to recognize two different species: *Pristiloma arcticum* and *Pristiloma crateris*.

Of 191 samples examined, 104 were identified as *Pristiloma crateris*; they are listed in Table 1 by their OSAC tracking numbers, county of occurrence in Oregon, UTM coordinates (on the NAD27 datum), collectors' names, and dates of collection. Figure 2 is a map showing the localities plotted on a base map of Oregon state boundaries.

Prior to the present study, the range of *P. crateris* had been stated in the literature only in general terms (e.g., Burke 2013: 259: "*P. crateris* occurs in the Oregon Cascade

Table 1. OSAC samples identified as *Pristiloma crateris*, with county names, geographic coordinates (on datum NAD27), collectors, and collection dates.

OSAC Tracking No.	County in Oregon	UTM E Zone 10	UTM N Zone 10	Collector	Collection Date (month/day/year)
MTH07-024	Clackamas	596134	4971309	C. Cha	07/12/2007
MTH07-026	Clackamas	596174	4961302	C. Cha	10/10/2007
MTH07-053	Clackamas	596169	4971288	C. Cha	10/10/2007
MTH01-001	Hood River	593229	5036524	J. Lowe	11/01/2001
MTH01-002	Hood River	593229	5036524	J. Lowe	11/01/2001
DES01-003	Jefferson	604347	4899337	Alford	05/15/2001
DES01-004	Jefferson	605469	4927281	Williams	10/24/2001
DES01-005	Jefferson	606059	4927393	Williams	10/31/2001
DES01-006	Jefferson	605475	4927290	Williams	05/30/2001
DES02-001	Jefferson	599283	4923262	K. Hennings	06/24/2002
DES02-002	Jefferson	600121	4923189	R. Rivard	06/24/2002
DES02-003	Jefferson	607846	4927963	Esterman	04/22/2002
DES02-004	Jefferson	607873	4928177	K. Hennings	04/22/2002
DES02-005	Jefferson	607804	4928216	K. Hennings	04/22/2002
DES02-006	Jefferson	608384	4925060	K. Hennings	04/30/2002
DES02-007	Jefferson	608127	4926556	Esterman	04/30/2002
DES02-008	Jefferson	608354	4926281	R. Rivard	04/30/2002
DES02-009	Jefferson	606278	4921609	K. Hennings	05/15/2002
DES02-010	Jefferson	606261	4921637	K. Hennings	05/15/2002
DES02-011	Jefferson	608225	4926335	K. Hennings	04/30/2002
DES02-014	Deschutes	602961	4898156	J. Dollhausen	10/02/2002
DES02-042	Deschutes	610689	4897736	M. Ditzel	10/24/2002
DES02-043	Deschutes	610799	4897850	J. Dollhausen	10/24/2002
DES02-044	Deschutes	610853	4897940	J. Dollhausen	10/24/2002
DES02-045	Deschutes	611217	4898654	R. Wolfe	10/24/2002
DES02-046	Deschutes	611450	4898982	M. Gallagher	10/24/2002
DES02-047	Deschutes	604367	4893586	R. Wolfe	10/15/2002
DES02-048	Deschutes	604576	4894825	R. Wolfe	10/15/2002
DES02-049	Deschutes	604694	4894912	R. Wolfe	10/16/2002
DES02-050	Deschutes	605158	4895074	R. Wolfe	10/16/2002
DES02-051	Deschutes	605505	4895202	A. Wagner	10/16/2002
DES02-052	Deschutes	605560	4895259	A. Wagner	10/16/2002
DES02-053	Deschutes	606114	4895740	R. Rivard	10/17/2002
DES02-056	Deschutes	608029	4896704	R. Wolfe	10/22/2002
DES02-057	Deschutes	608452	4896860	M. Ditzel	10/21/2002
DES02-058	Deschutes	610426	4897535	R. Wolfe	10/30/2002
DES02-059	Deschutes	610532	4897561	R. Wolfe	10/30/2002
DES02-060	Deschutes	610578	4897579	H. Hortsman	10/30/2002
DES02-069	Deschutes	602173	4897870	J. Dollhausen	10/07/2002
DES02-070	Deschutes	603529	4898806	M. Gallagher	10/08/2002
DES02-071	Deschutes	603664	4898986	R. Rivard	10/08/2002
DES02-072	Deschutes	603917	4899797	R. Wolfe	10/09/2002
DES02-073	Deschutes	604548	4899938	R. Wolfe	10/09/2002

Continued

Table 1. *Continued.*

OSAC Tracking No.	County in Oregon	UTM E Zone 10	UTM N Zone 10	Collector	Collection Date (month/day/year)
DES02-074	Deschutes	604501	4899548	R. Wolfe	10/09/2002
DES02-075	Deschutes	604308	4899285	R. Wolfe	10/10/2002
DES02-076	Deschutes	604346	4899318	J. Dollhausen	10/10/2002
DES02-077	Deschutes	604350	4899302	R. Wolfe	10/10/2002
DES02-078	Deschutes	604215	4898939	J. Dollhausen	10/10/2002
DES02-079	Deschutes	604044	4898791	M. Gallagher	10/10/2002
DES02-080	Deschutes	604740	4900787	H. Hortsman	10/05/2002
DES02-081	Deschutes	604543	4900766	L. Turner	10/05/2002
DES03-023	Jefferson	606427	4928775	J. Dollhausen	04/23/2003
DES03-024	Jefferson	606589	4928663	J. Dollhausen	04/23/2003
DES03-025	Jefferson	606668	4928566	J. Dollhausen	04/23/2003
DES03-026	Jefferson	607004	4928589	J. Dollhausen	04/22/2003
DES03-027	Jefferson	607170	4928544	J. Dollhausen	04/22/2003
DES03-028	Jefferson	606005	4928584	J. Dollhausen	04/23/2003
DES03-029	Jefferson	607883	4928106	J. Dollhausen	04/23/2003
DES03-030	Jefferson	606210	4928531	J. Dollhausen	04/23/2003
DES03-031	Jefferson	606670	4928568	R. Rivard	04/24/2003
DES03-032	Jefferson	606210	4928533	J. Dollhausen	04/23/2003
DES03-033	Jefferson	619512	4942870	J. Dollhausen	05/06/2003
DES03-034	Jefferson	619512	4942870	J. Dollhausen	05/06/2003
DES03-038	Jefferson	607887	4928105	J. Dollhausen	04/22/2003
DES03-043	Deschutes	615271	4886062	L. Clark	05/17/2003
DES06-011	Jefferson	609436	4933609	H. Suna	10/27/2006
DES06-012	Jefferson	609468	4933067	H. Suna	10/27/2006
MTH07-007	Wasco	624348	5013388	D. Lysgaard-Rutz	03/25/2007
MTH07-023a	Clackamas	596206	4971105	M. O'Neill	06/19/2007
UMP01-044	Douglas	569607	4794597	S. Burns	07/11/2001
UMP01-045	Douglas	569748	4795714	Machado	11/19/1998
UMP02-005	Douglas	553572	4777459	J. Blois	05/29/2002
UMP02-006	Douglas	553572	4777459	J. Blois	05/29/2002
UMP02-007	Douglas	553572	4777459	unknown	unknown
UMP02-009	Douglas	553572	4777459	Moriarty	05/30/2002
UMP02-011	Douglas	553572	4777459	J. Blois	06/04/2002
UMP02-012	Douglas	553572	4777459	Moriarty	06/04/2002
UMP02-013	Douglas	553572	4777459	J. Blois	06/04/2002
UMP02-014	Douglas	553572	4777459	J. Blois	06/05/2002
UMP02-015	Douglas	553572	4777459	Moriarty	06/05/2002
UMP02-016	Douglas	553572	4777459	Moriarty	06/05/2002
UMP02-017	Douglas	553572	4777459	Moriarty	06/05/2002
UMP02-018	Douglas	553572	4777459	Moriarty	06/04/2002
UMP02-019	Douglas	553572	4777459	Moriarty	06/04/2002
UMP03-002	Douglas	566732	4793697	K. Thompson	06/15/2003
UMP03-003	Douglas	568001	4793331	R. Siebdrath	06/15/2003
UMP03-004	Douglas	567107	4789183	K. Thompson	06/24/2003
UMP03-005	Douglas	558661	4784326	R. Siebdrath	07/29/2003
UMP03-006	Douglas	568516	4793074	R. Siebdrath	07/16/2003
UMP03-007	Douglas	568516	4793074	K. Thompson	07/16/2003
WIN03-001	Klamath	575729	4727333	J. Chambers	05/12/2003
WIN03-002	Klamath	568983	4715755	J. Chambers	05/29/2003
WIN03-003	Klamath	574542	4736920	J. Chambers	05/28/2003
WIN03-004	Klamath	575725	4728102	J. Chambers	05/12/2003
WIN03-005	Klamath	569211	4715873	J. Chambers	05/29/2003
WIN03-006	Klamath	571667	4729838	J. Chambers	07/07/2003
WIN03-007	Klamath	563256	4690906	J. Chambers	05/11/2003
WIN03-008	Klamath	563095	4689962	J. Chambers	05/11/2003
WIN03-009	Klamath	575776	4727286	J. Chambers	05/13/2003
WIN03-010	Klamath	573187	4738728	J. Chambers	09/10/2003
MTH07-028	Clackamas	596208	4971198	C. Cha	10/11/2007
EUG05-001	Linn	505411	4897882	P. Larson	11/09/2004
WIL02-013	Lane	560398	4872371	S. Burns	10/24/2002
UMA04-008b	Umatilla	778892	4998132	J. Uriarte, M. George	08/17/2004

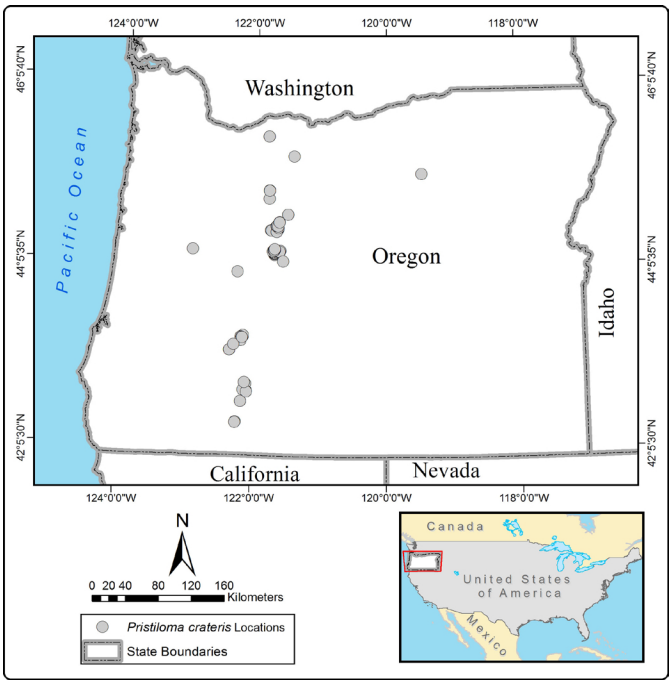

Figure 2. Location of samples of *Pristiloma crateris* identified in this study.

Mountains in mid- to higher elevation wet meadows and riparian areas.").

All sampling locations yielding *P. crateris* were contained within a bounding box extending from 45.4822° N, 122.9308° W (UTM Zone 10: 505411E 5036524N) to 42.3120° N, 119.6161° W (UTM Zone 10: 778892E 4689962N). The type locality of the species, "one mile south of Crater Lake, Klamath County, Oregon" (Pilsbry 1946: 403) is imprecise by today's standards but can be estimated as approximately 42.89° N, 122.13° W, within the perimeters of the range shown by this study, and near the northern end of the southernmost group of localities shown on Figure 2.

ACKNOWLEDGEMENTS

I am grateful for assistance given throughout this study by Kelli Van Norman and Darci Rivers-Pankratz. Ms. Van Norman and Edmund K. Hall prepared Figure 2. Field personnel who collected specimens in the course of agency surveys are named in Table 1 and deserve credit for their meticulous effort in sampling small, cryptic invertebrates such as these mollusks. Preparation of this paper was supported by Contract AG-046W-P-14-0037 of the USDA Forest Service.

LITERATURE CITED

Baker, H. B. 1931. Nearctic vitreine land snails. Proceedings of the Academy of Natural Sciences of Philadelphia 83: 87–117, pl. 15.

Burke, T. E. 2013. Land snails and slugs of the Pacific Northwest. Corvallis: Oregon State University Press. 344 pp.

De Queiroz, K. 2005. Different species problems and their resolution. BioEssays 27(12): 1263–1269. doi: 10.1002/bies.20325

Duncan, N., T. Burke, S. Dowlan and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan. USDI Bureau of Land Management. 70 pp. http://www.blm.gov/or/plans/surveyandmanage/files/11-mollusks_v3_enclosed2.pdf

Forsyth, R. G. "2001" [2002]. New records for land snails from the mountains of northwestern British Columbia. The Canadian Field-Naturalist 115(2): 223–228. http://biodiversitylibrary.org/page/34995297

Forsyth, R. G. 2004. Land snails of British Columbia. Royal BC Museum Handbook. Victoria: Royal BC Museum. 192 pp.

Pilsbry, H. A. 1946. Land Mollusca of North America (north of Mexico). Academy of Natural Sciences of Philadelphia, Monograph 3, 2(1): i–viii, 1–520, frontis.

Roth, B. 2011. Identification of submitted mollusk samples, *Pristiloma*, from Pacific Northwest National Forests. Unpublished report submitted to USDA Forest Service, Region 6. 11 pp.

Roth, B. and D. R. Lindberg 1981. Terrestrial mollusks of Attu, Aleutian Islands, Alaska. Arctic 34(1): 43–47. doi: 10.14430/arctic2502

Received: December 2014
Accepted: January 2015
Editorial responsibility: Robert Forsyth