

NOTES ON GEOGRAPHIC DISTRIBUTION

Mollusca, Gastropoda, Ellobiidae, *Carychium minimum*, and Ferussaciidae, *Cecilioides acicula*: Distribution extension and first provincial records of two introduced land snails in Ontario, Canada

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The distributions of introduced terrestrial gastropod mollusks in Ontario, Canada are only partially known, and the main references on introduced land snails and slugs in the province (Pilsbry 1939; 1940; 1946; 1948; Oughton 1948; Chichester and Getz 1973; Grimm and Wiggins 1974; and Dundee 1975) are incomplete. Of the several species of introduced snails known from Ontario by the late F. Wayne Grimm (personal communication to MJO, 8 December 1996), we recently have been able to verify two of them, *Carychium minimum* and *Cecilioides acicula*. Although these species have been known from Ontario for about a decade (personal communication to MJO, 8 December 1996), records of both have been unpublished until now. The material originally seen by Mr. Grimm has not been found in his collection that is now being curated for deposit in the Canadian Museum of Nature, Ottawa, and we have been unable to determine if it was deposited in another collection. The Ontario record of *C. acicula* also represents a new species record for Canada.

Two of us (FWS and MJO) collected samples of waterborne drift material from along streams and rivers. These consist of one- to several-liter samples of debris and concentrations of shells, frequently from the uppermost line of flooding.

The samples often contain large numbers of shells that were sorted out by hand. Of the eight samples that we have sorted, three contained shells of *Carychium minimum* and *Cecilioides acicula* and are reported here (Table 1, Figure 1). The Grand River and Bowmanville Creek drainages include extensive farmland and urban areas with small patches of woods. All specimens have been retained in the personal collection of RGF.



Figure 1. The province of Ontario, showing the two localities mentioned in the text, Grand River (1 and 2) and Bowmanville Creek (3).

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Table 1. Stream drift samples from Ontario containing *Carychium minimum* (1, 2) and *Cecilioides acicula* (2, 3).

Drift Sample #	Locality	Geoposition (WGS84)	Date	Collector
1	Ontario: Brant County: Grand River: 3 km SSW of Glen Morris	43°15'19.9" N 80°21'26.9" W	6 June 2006	MJO
2	Ontario: Brant County: City of Brantford: Grand River: Bell Homestead Trail, Tutela Heights Road	43°06'24.3" N 80°15'53.2" W	8 June 2006	MJO
3	Ontario: Regional Municipality of Durham: Clarington: Bowmanville Creek, 0.3 km NNW Hwy 401 bridge	46°54'02.1" N 78°40'49.9" W	24 April 2008	FWS

Carychium minimum

Empty adult shells of *C. minimum* were found in drift samples 1 (3 specimens) and 2 (57 specimens). In sample 2, this species was the most abundant *Carychium*, well outnumbering the native species, *C. exiguum* and *C. exile*. The natural range of *C. minimum* includes Europe and Siberia where it lives in wet habitats, including marshes, fens, wet meadows, dune slacks and moist woodlands, and is said to be virtually amphibious, capable of surviving prolonged floods (Kerney 1999). Our new Ontario records of *C. minimum* confirm the unpublished record of the species from Ontario, which also was found in stream drift of the Grand River; this earlier record was found close to the same spot as for our sample 1 (F. W. Grimm, personal communication to MJO, 8 December 1996).

There are two other confirmed published records of *C. minimum* in North America, one from San Francisco (Roth 1982) and a second from Cobble Hill, Vancouver Island, British Columbia (Forsyth 2004). An earlier record from Quincy, Massachusetts (Clapp 1912, and subsequently repeated in the literature), was discussed by Roth (1982), who determined that it is based on another European introduction, *C. tridentatum*. If correct, the earliest record of *C. minimum* in North America is an entry in an obscurely published annotated checklist by Hanham (1889), who recorded the species as common in the vicinity of Hamilton, Ontario. This record has

been entirely ignored in the recent literature and is problematic. The only *Carychium* listed in Hanham's 1889 checklist is *C. minimum*, but he did not include this species in a subsequent list for the same region (Hanham 1890) and only listed *C. exiguum*. This suggests to us that he had initially misidentified the common local *Carychium*, rather than reporting an introduced species. This record could be confirmed only if Hanham's specimens were to be found.

Among species of *Carychium* in Canada, *C. minimum* is recognized by the combination of its smoothish, relatively stouter shell that has fewer whorls and a more prominently thickened palatal lip that bears a more-or-less well-developed medial denticle-like swelling (Figure 2A). *C. minimum* is most similar to the native *C. exiguum*, which has an altogether more slender shell; in apertural view, the spire shows five whorls rather than the four of *C. minimum*.

Cecilioides acicula

A single empty adult shell of *Cecilioides acicula* was found in each of drift samples 2 and 3. This species, probably originally of Mediterranean origin, is introduced to central and northwest Europe, the Azores and Canary Islands, South Africa, New Zealand, Australia, Argentina, Bermuda, Barbados, Hawaii and the mainland United States (Miquel and Parent 1996, Kerney 1999, Barker 1999). In the continental U.S., *Cecilioides acicula* is known from Florida, Maryland, New Jersey, Pennsylvania, Virginia,

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Texas and California (Dundee 1975; Metcalf and Smartt 1997; Roth 1986; Roth and Sadeghian 2003; Örstan 2007). This is a subterranean species that is difficult to find alive (Kerney 1999) but is said to be more frequently encountered in stream debris (Kerney and Cameron 1979). Roth (1982) speculated that the subterranean habit of this snail could account for the paucity of records in western North America, while Örstan (2007) suggested that its distribution in North America is increasing but likely will be restricted to areas of limestone.

This species is unlike any other native or introduced snail in Canada (Figure 2B). The only other *Cecilioides* in North America is *C. aperta*, apparently native to the West Indies (Pilsbry 1946), but this species differs by having a less truncate columella, more convex whorls, and a thickened parietal callus. In Canada *Cecilioides acicula* is known currently only known from Ontario. These new Ontario records confirm the earlier unpublished record of the species Grand River in Ontario (F. W. Grimm, personal communication to MJO, 8 December 1996) and

demonstrate the species' occurrence outside of the Grand River basin.

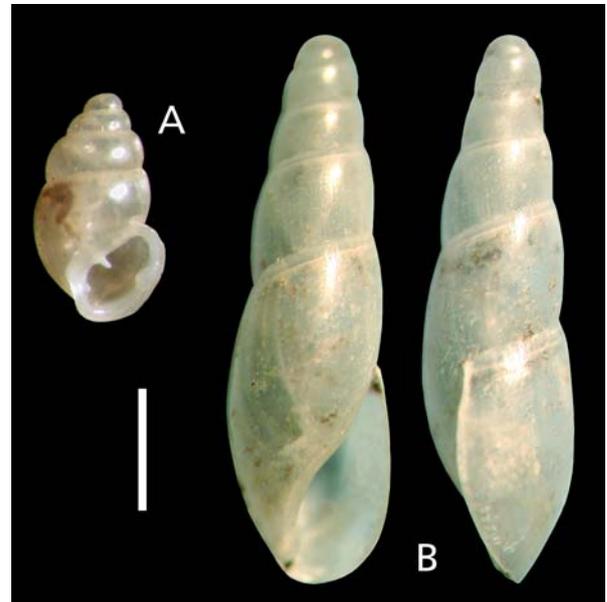


Figure 2. A, *Carychium minimum*, Grand River, drift sample 1. B, *Cecilioides acicula*, Grand River, drift sample 2. Scale bar = 1 mm.

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