

collected some aquatic plants belonging to two species of *Potamogeton*. Tiny juvenile specimens of *Dreissena* were adhering to their stems. However, here and there we also found some empty, but recent valves of adult mussels among the stones near the water's edge.

We were able to divide these shells into three morphological groups:

- slender, slightly curved specimens with a well developed carina,
- rather broad, triangular specimens with a well developed carina, and
- almost smooth, convex specimens with a weak indication of a crest-like carina running in the middle over its entire length.

With the help of the monograph of Schütt (1993) we were able to identify them as, respectively, *Dreissena polymorpha anatolica* (Locard, 1893), *Dreissena caputlacus* Schütt, 1993 and *Dreissena iconica* Schütt, 1991.

The first two had recently been recorded from the lake by May *et al.* (2006) and indeed were considered to represent two different taxa. However, the discovery of *Dreissena iconica* was a real surprise. Schütt (1991) based the description of this species on fossil material from the Burdur Valley and the former Konya-Ereğli Lake, 10 km south of Konya, and considered it extinct. More fieldwork in the near future aims to determine whether Seyhan Lake is indeed inhabited by three species of *Dreissena*. Another question to be resolved is whether these species occur in mixed colonies or form more or less separate colonies confined to particular depth ranges.

The genus *Dreissena* is well-known for its speciation in Turkey (Schütt, 1993; Schütt & Şeşen, 2007). However, most lakes or streams are inhabited by a single species. *Dreissena* is a fouling organism of economic importance in Turkey (Bobat *et al.*, 2004, 2005). Since the water of Lake Seyhan is used for producing hydroelectric power and for irrigation, these mussels could therefore easily become an economic problem in Lake Seyhan.

Yet the presence of at least two *Dreissena* species, and probably a third one that until recently had been known only as a fossil, calls for some kind of conservation measures to protect this unusual situation in Lake Seyhan.

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BIG RANGES FROM SMALL PACKAGES: NORTH AMERICAN VERTIGINIDS MORE WIDESPREAD THAN THOUGHT

By Jeffrey C. Nekola

More thorough field surveys, in conjunction with reanalysis of existing museum collections and analysis of mtDNA sequences are demonstrating that in North America, minute land snails such as vertiginids do not tend to develop local endemism.



Fig. 1. Species of *Vertigo* mentioned in the text.

Take for example what were believed to be the two most narrow range *Vertigo* species in eastern North America, *V. perryi* and *V. clappi* (Fig. 1). The former was thought to be limited to a 550 km stretch of the New England coast, while the latter was known only from a 650 km extent in the Southern Appalachians from western Tennessee to northern West Virginia. In the fall of 2004, Brian Coles of the Welsh National Museum and I discovered that *V. perryi* ranges at least as far west as central Wisconsin, a range extension of roughly 1500 km. This fall (2008), my reanalysis of half-century-old collections in the University of Michigan Museum of Zoology and the Royal Ontario Museum, as part of a Committee on the Status of Endangered Wildlife in Canada (COSEWIC) project to prioritize the conservation status of land snails of Ontario and Quebec, documented that the range of *V. clappi* is actually double what it had been thought to be, extending as far north as the northern shores of Lake Erie and Lake Ontario. These specimens had been misidentified as another common *Vertigo* species, thereby escaping detection.

Only in the midwest and desert southwest are some *Vertigo* species, such as *V. arizonensis*, *V. inserta* and *V. meramecensis*, limited to ranges of 500 km or less. Yet, even in these cases, none are narrow range endemics, with populations occurring across multiple river basins or mountain

ranges. It thus appears that like *Balea* from the eastern Atlantic, small snails such as *Vertigo* have an immense capacity for passive long-range dispersal, and tend to exhibit ranges of 1000 km or greater, with some (like *V. arthuri*) extending across the entire continent from Newfoundland to Alaska, south to northern New Mexico. Endemicity appears more apt to occur in large sized species (e.g. polygyrids, urocoptids, helminthoglyptids), presumably because of their more limited long-range dispersal ability.

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CONSERVATION STATUS OF FRESHWATER SNAILS IN WISCONSIN

By Joan P. Jass

Conservationists seeking to present a case in support of the need for research on the smaller and less charismatic members of their local fauna may be stymied by an absence of even the most basic data to use in providing evidence for the relative stability or lack of it in these populations. The State of Wisconsin for example was able to identify a list of 527 invertebrate species of greatest conservation need in formulating its most recent Wildlife Action Plan (<http://dnr.wi.gov/org/land/er/wwap>). However, only four of these are freshwater snails, with the vast majority of the aquatic gastropods recorded from the state (64/68, 94 %) by Jass (2004) being relegated to the category of those for which so little information was available that their conservation status could not be assessed.



Fig. 1. *Promenetus exacuous*, a planorbis widely distributed in the eastern United States but recorded from only eight Wisconsin counties and under review (SU) for determination of its conservation status in the state (Milwaukee Public Museum Mollusk lot 19659, collected marshy pond, 3 miles [5 km] SW of Eagle, Waukesha County, Wisconsin, 8 June 1972, shell diameters < 5 mm).

This need for additional basic biological and zoogeographic data can scarcely be exaggerated, as the following figures may illustrate. One quarter of Wisconsin's counties are without even a single record for any aquatic gastropod species. More than half of those 68 snails (54 %) were reported from a total of seven or fewer of the counties in the state (7/72, < 10 %). Moreover, many of those reported records are from the fairly distant past, leaving the current relevance of such distribution data open to considerable question. Dates associated with the

records reported by Jass (2004) were broken down into three categories: reports before 1928, 1929-1968, 1969-2004. Slightly more than 35 % (24/68) of the county records were from the earliest category, and only 38 % of them were reported in the most recent time span. Even though county records are lacking in zoogeographic significance, the absence of them, especially for species thought to be of generally wide distribution (Fig. 1), may be useful to indicate the location of gaps in collecting.

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FRESHWATER BIVALVES IN NORTH AMERICA

Mortality of native freshwater mussels associated with increased populations of *Dreissena polymorpha*, 15-18 years after its introduction to the upper Rideau River, Ontario, Canada

By Frederick W. Schueler & André L. Martel

Three years ago in *Tentacle* we reported (Martel *et al.*, 2006) on conditions in the Rideau River, in eastern Ontario, Canada, where increasing numbers of *Dreissena polymorpha* (the zebra mussel) were, in 2005, beginning to cause mortality in upstream "hot spots" of unionid diversity and abundance, 15 years after the species' initial discovery in the river (1990) and 5 years after it had affected almost the entire downstream half of the river. At the foot of the Andrewsville Flats (44.95017° N 75.81949° W, WGS 84), in lock-bypass riffles over limestone rubble and bedrock, in this clear-water canal-river, no *D. polymorpha* were found until 1998, though they had been present in upstream lakes at least since 1993. From 1999 to 2002 they were found here at a rate of about 1.25 individuals per hour of searching and then with increasing abundance each year through 2003-2005 (Martel *et al.*, 2006).

We now report on the three subsequent field seasons, despite the non-quantitative character of our observations, because they complete the series from the onset of mortality, to the elimination of all living unionids, except a few of the hardy *Elliptio complanata* (eastern elliptio), which was previously a minority species at this site.

On 25 July 2005, there were about 150 zebra mussels per square metre on the bedrock bottom of the Andrewsville Flats. On 25 September 2005, for the first time, there seemed to be an increase in the mortality of the big old unionids that lived on the largely bare bedrock bottom here. Most of the shells were *Lampsilis cardium* (plain pocketbook; 71 shells, mostly adults, including one individual with a shell measuring 172 x 96 x 70 mm—it had possibly been the largest invertebrate in eastern Ontario) and *Lasmigona costata* (fluted shell; 11