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THE PREDATOR *AEGOPINELLA NITIDULA* (DRAPARNAUD, 1805) AND ITS PREY *PERFORATELLA BIDENTATA* (GMELIN, 1791) (GASTROPODA: PULMONATA)

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ABSTRACT: The predatory snail *Aegopinella nitidula* (Drap.) (Zonitidae) can perforate a rather thick shell and extract from it even a strongly contracted snail body. Numerous empty shells of *Perforatella bidentata* (Gmel.) with a characteristic hole, found in the wild, indicate that this species often falls a prey to *Ae. nitidula*.

KEY WORDS: terrestrial snails, *Aegopinella nitidula*, *Perforatella bidentata*, predation

INTRODUCTION

Only few terrestrial snails are predators (WIKTOR 1958, 2004, URBAŃSKI 1984). One of them is *Aegopinella nitidula* (Draparnaud, 1805) (Zonitidae). In England its preferred prey is *Nesovitrea hammonis* (Ström, 1765) (MORDAN 1977). In western Poland this hygrophilous species often co-occurs with *Perforatella bidentata* (Gmelin, 1791) (Hygromiidae) (RIEDEL 1957). Because in adult *P. bidentata* the aperture is surrounded by a thickened lip with two massive teeth, the snail seems safe as long as it is contracted within the shell.

MATERIAL AND METHODS

The field observations were done and the snails collected in the neighbourhood of Sąpolno (NW. Poland) in 1991–2010. The laboratory observations included two periods: from early spring to autumn 1991, and from October 1993 to May 1994. One or more *Ae. nitidula* and a few individuals of other species (*Aegopinella pura* (Alder, 1830), *Cochlicopa lubrica* (O. F. Müller, 1774), *Euconulus alderi* (Grey, 1840), *Succinea putris* (Linnaeus, 1758), *Oxyloma sarsi* (Esmark, 1886), *P. bidentata, Vitrea crystallina* (O. F. Müller, 1774)) were kept in each container. Decaying leaves of trees, mostly black alder (*Alnus glutinosa* Gaertn.) or ash (*Fraxinus excelsior* L.) were used as food. From October till April the temperature in the laboratory was 8–18°C. In the remaining months it was usually 15–25°C.

RESULTS AND DISCUSSION

FIELD OBSERVATIONS

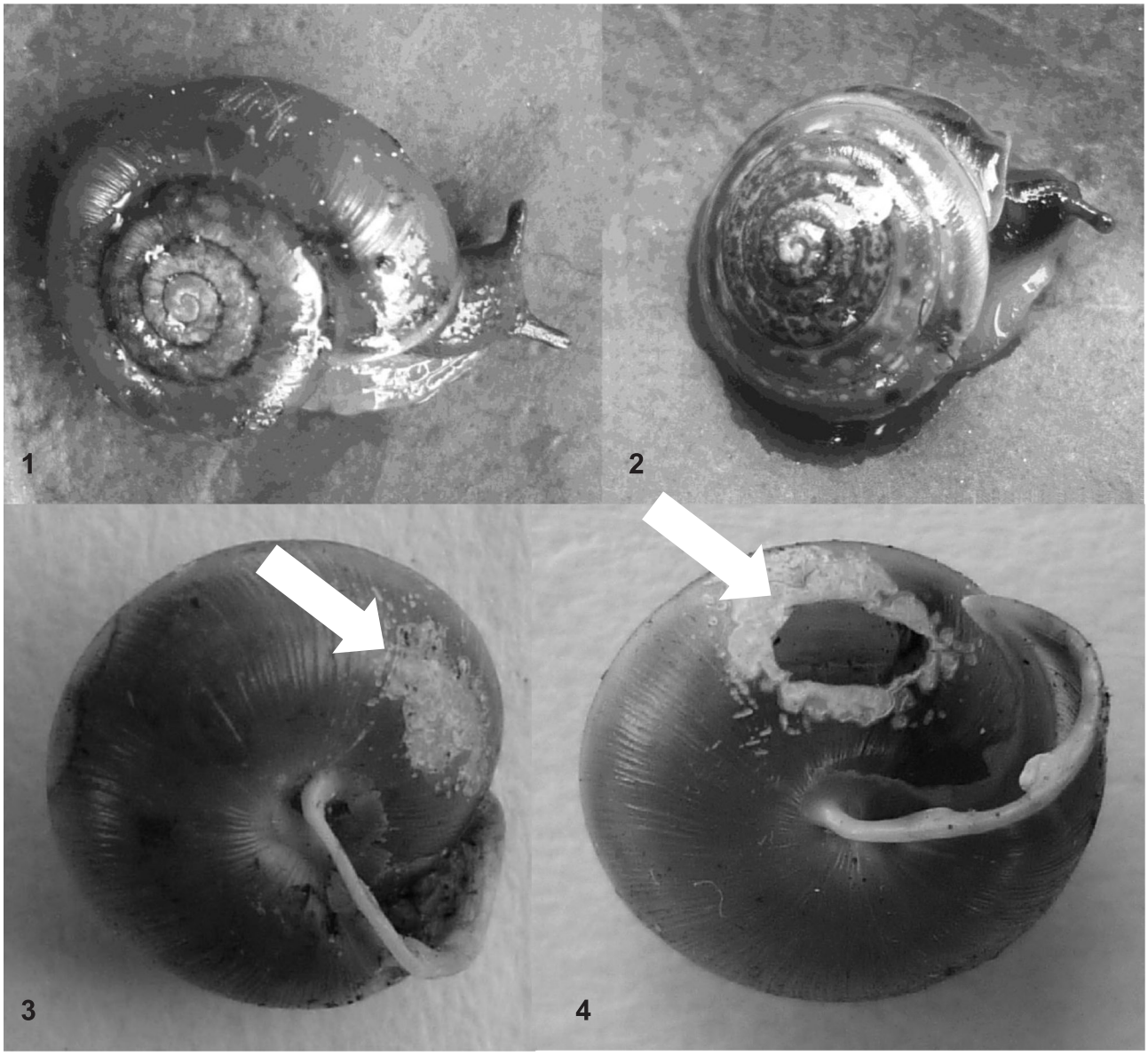
Protected by high slopes, the humid environment of the Brda oxbows provides an appropriate habitat for many snail species, among others *Ae. nitidula* and *P. bidentata* (Figs 1–2). The proportion of the respective species in the samples changed depending on the location and year of sampling. For example, of two

samples collected in the same place, the one from 27.09.1991 (n=77) contained 18 *Ae. nitidula* and 12 *P. bidentata*, and the one from 20.04.2010 (n=82) – 70 *Ae. nitidula* and 4 *P. bidentata*. The maximum shell size of *Ae. nitidula* was: I – width 10.8 mm/4.7 whorls, II – width 10.6 mm/4.8 whorls. The shell of *P. bidentata* reached the maximum width of 6.8–9.5 mm and 5.6–6.6 whorls. Some of the live snails found in the field had characteristically damaged shell near the aperture (Fig. 3).

Among the empty shells of adult *P. bidentata* collected in the field (n=194) 14.9% had damaged surface (Fig. 3), and 33.0% had perforated body whorl (Fig. 4). Depending on the year, the percentage of perforated shells varied from 27.5 to 41.3%, and of shells with damaged surface from 9.8 to 19.6%. Likewise, empty juvenile shells had traces of aggression of *Ae. nitidula* (25.9% with holes, 3.7% with damaged surface). Perforated shells of other species were rather rarely found (*Ae. pura, Cochlicopa lubrica, Euconulus alderi, Vitrea crystallina* and even young *Ae. nitidula*).

LABORATORY OBSERVATIONS

In laboratory *Ae. nitidula* ate dead snails and attacked live ones. It was the most active in spring and summer. The body of dead snails and live Succineidae were usually extracted through the aperture. However, in some cases the predator could perforate the shell wall when the prey's body was strongly contracted. Because the speed of crawling of *Ae. nitidula* is rather small (ca. 0.5 mm per second), mainly snails lying on the ground with the shell aperture facing upward were threatened. During attack



Figs 1–4. *Aegopinella nitidula* (1), *Perforetella bidentata* (2), *P. bidentata*, shell surface damaged by *Ae. nitidula* (3), *P. bidentata*, shell perforated by *Ae. nitidula* (4)

the aggressor was usually placed on the bottom of the prey's shell and this made it difficult for the prey to escape. Sometimes the predator went away having damaged the shell surface (Fig. 3). When the attack lasted longer, it perforated the shell and then it extracted the prey (very rarely it made the second hole). In shells of *P. bidentata*, *Ae. nitidula*, *Ae. pura*, *E. alderi* and *V. crystallina* the hole was usually made 0.7–0.9 whorl away from the aperture margin, and its size was ca. 2–3 × 1.0–1.5 mm (Fig. 4). In contrast, shells of *C. lubrica* were mostly perforated across a few whorls. Traces remaining around the hole indicated a chemical dissolution of the shell wall (round openings in the periostracum and white cavities in the calcareous layer).

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