

The Newsletter of the IUCN/SSC Mollusc Specialist Group  
Species Survival Commission • IUCN - The World Conservation Union

# TENTACLE



## Guest editorial

### Turning research into conservation action

By Rebecca J. Rundell

Like many of us, I was inspired and gratified by Lydeard *et al.*'s (2004) *BioScience* article on the global decline of nonmarine molluscs. This article clearly outlined the enormity of the extinction crises in nonmarine mollusc faunas. Freshwater and terrestrial molluscs are among the most threatened groups of animals; 42 % of recorded animal species extinctions are molluscs, and nonmarine species comprise 99 % of all molluscan extinctions (Lydeard *et al.*, 2004). Clearly, this article was pivotal in drawing attention to a neglected group of animals—animals that are the foci of our research programs.

I was similarly gratified by the conservation strategies summarized by Lydeard *et al.* (2004), summarized in the categories of research, management, and education and outreach. After all, biotic surveys, taxonomic, phylogenetic and phylogeographic study, and ecological investigations, as outlined by Lydeard *et al.* (2004) are the basis of my own research program. I have also worked with conservation managers and participated in outreach programs. I would venture that most, if not all, of the readers and contributors to *Tentacle* are not only dedicated to the conservation of their respective nonmarine mollusc groups and their habitats, but have also made substantial contributions to the body of knowledge required to conserve them.

However, as I work on setting the trajectory of my own career in evolutionary research on a group of Pacific island land snails, I wonder whether what I am doing will have any impact on the actual conservation of these and other nonmarine taxa and their habitats. I have found that the conservation managers with whom I have worked have become very interested in land snails and are dedicated to conserving them. But given the pull of more pressing priorities, limitations on time and staff (among other things), it is doubtful that the reports on my survey work and copies of research publications, while important contributions to science, will have a huge impact on the actual conservation of snails and forests.

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One could argue that to do much more than what we do best (i.e. research and publication on our organisms) is beyond the scope of our careers. But I struggle with the idea that in not making a real attempt to affect both policy and on-the-ground conservation efforts, we may be selling ourselves, and the natural world (and by extension, society), short. We, as

W.C., Matsumura-Tundisi, T. & Rocha, O.), p. 1-8. Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP, XVIII, São Paulo.

Thomé, J.W., Gomes, S.R. & Picanço, J.B. 2006. *Os caracóis e as lesmas dos nossos bosques e jardins*. Editora USEB, Pelotas, RS. 123 p.

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## PROPOSED HIGHWAY BRIDGE THREATENS HIGHEST DIVERSITY SNAIL SITE IN PENNSYLVANIA

By Timothy A. Pearce

Simpson Hill, near Brownsville in Fayette County, Pennsylvania, is located on a peninsula in a bend of Dunlap Creek. With 34 land snail species, this area has the greatest known number of land snail species in a 20 x 20 m area in Pennsylvania. Other high diversity sites in Pennsylvania, also limestone areas, are Ten Mile Creek with 32 species, Canoe Creek with 29 species, and Neff Barrens with 28 species. These high diversity sites were documented during a 2005-2006 snail survey of limestone areas funded by the Pennsylvania Wild Resources Conservation Fund.

Simpson Hill harbors several uncommon species, including two particularly rare ones: *Hendersonia occulta* and *Glyphyalinia raderi*. These latter two will certainly be on a list of rare species I will eventually propose to the State for special conservation status.

The threat is from a proposed bridge for the Mon-Fayette Expressway that would be located very close to Simpson Hill. Upon learning that Simpson Hill has a rare state-listed limestone-loving plant, *Delphinium exhaltatum*, the Turnpike Commission moved the proposed bridge 400 m away. However, biologists are concerned that the bridge would be too close to prevent two environment-altering factors: ice-melting salt would blow from the bridge in the wintertime, and the expressway would be a corridor for invasive species.

Presently the State lacks funds to build the bridge, a lack that is buying time for the Simpson Hill limestone community. We do not know how long the community will remain safe.

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## CONTACT WITH AN ALIEN

By Aydin Örstan

Several species of European slugs, including *Arion subfuscus*, *A. intermedius* and *Limax maximus*, have long infiltrated the forests of North America (Chichester & Getz, 1969). I have occasionally found them alongside native philomycid slugs.

Studies have shown that high population densities may affect growth, mortality and reproduction of slugs adversely even when there is no food shortage (references cited by Jordaens *et al.*, 2003). Therefore, it is conceivable that the presence of large populations of alien slugs in forests in the USA could have negative effects on native slug populations. Interactions of slugs with each other may be mediated by their mucus. However, in the experiments conducted by Jordaens *et al.* (2003), *Deroceras leae* showed no preference for areas with mucus of conspecifics over areas with mucus of related heterospecifics. Nevertheless, as they also speculated, mucus of a species may have stronger effects on less closely related species.

A recent observation of mine sheds some light on the direct interactions of introduced and native slugs. In October 2006, I collected one adult *Philomycus carolinianus* and one adult *A. subfuscus* in Belt Woods, an old-growth forest fragment in Prince George's County, Maryland, USA. At home, I placed the two slugs together in a small plastic container (4 x 9 x 12 cm) with rotting tree leaves, pieces of mushrooms and damp toilet paper. A week later, while getting ready to anaesthetize the *A. subfuscus*, I noticed that the two slugs were near each other with the head of *P. carolinianus* in contact with the mid-section of the body of the *A. subfuscus*. Both slugs were motionless with their tentacles withdrawn. I quickly took several photographs before removing the *A. subfuscus*.

Huddling, defined as the formation of resting groups of slugs with large areas of their bodies in contact with each other, has been reported in the genera *Limax* (Cook, 1981), *Deroceras* (Waite, 1988) and possibly *Veronicella* (Dundee *et al.*, 1975). I have observed huddling in the field in philomycid slugs (unpublished). In the present case, the contact area between *P. carolinianus* and *A. subfuscus* was relatively small compared to their total body surface areas. Nevertheless, I am considering this to be a case of heterospecific huddling.



*Philomycus carolinianus* (left), native to the USA, huddling with an introduced *Arion subfuscus*.

The significance of this observation is that it shows that these two species of slugs do not necessarily avoid each other's company. However, it would be unwise to conclude from one observation recorded with a pair of captive slugs that the introduced and native slugs can coexist peacefully. More field observations and controlled experiments are necessary to understand if and how the native philomycid slugs are

interacting with the invaders in the wild. I must point out, however, that even if such studies demonstrated that the alien slugs were reducing the growth, reproduction and overall survival rates of the native slugs, the former are now naturalized in many parts of the USA (e.g. Jass, 2006) and would be practically impossible to exterminate without also harming the native wildlife.

Chichester, L.F. & Getz, L.L. 1969. The zoogeography and ecology of arionid and limacid slugs introduced into northeastern North America. *Malacologia* 7: 313-344.

Cook. 1981. Huddling and the control of water loss by the slug *Limax pseudoflavus* Evans. *Animal Behaviour* 29: 289-298.

Dundee, D.S., Tizzard, M. & Traub, M. 1975. Aggregative behavior in veronicellid slugs. *Nautilus* 89: 69-71.

Jass, J.P. 2006. Prevalence of invasive slugs in the leaf litter of Wisconsin State Natural Areas. *Tentacle* 14: 7-8.

Jordaens, K., Gielen, H., Van Houtte, N., Bernon, G. & Backeljau, T. 2003. The response of the terrestrial slug *Deroceras laeve* to the mucus and air-borne odours of con- and heterospecifics (Pulmonata: Agriolimacidae). *Journal of Molluscan Studies* 69: 285-288.

Waite, T.A. 1988. Huddling and postural adjustments in response to desiccating conditions in *Deroceras reticulatum* (Müller). *Journal of Molluscan Studies* 54: 249-250.

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## A SECOND RECORD OF *MILAX NIGRICANS* (PHILIPPI, 1836) FROM THE NETHERLANDS

By Henk K. Mienis

During a mollusc excursion to Juliana Park, in Hoorn, the Netherlands, on 10 October 1999, several specimens of a large keeled slug were collected. These slugs belonged without doubt to the family Milacidae, but differed considerably from the four species belonging to that family that had been recorded so far from the Netherlands (Gittenberger *et al.*, 1984; Bruyne *et al.*, 1994).

Several specimens were sent for identification to Prof. Andrzej Wiktor (Wrocław, Poland), a well known specialist in the family Milacidae, who has authored the most up to date revision so far of that family (Wiktor, 1987). He immediately identified these slugs, based on anatomical characters, as belonging to *Milax nigricans* (Philippi, 1836), a Mediterranean species originally described from Sicily, Italy.

During additional visits to the Netherlands I was able to confirm the presence of this alien species in the same park in the spring of 2000 and in the autumns of 2001 and 2002 (Mienis, 2006).

Last autumn I again spent a month in my country of origin, during which, as usual, I carried out some fieldwork in North-Holland. On 10 October 2006 I visited one of the 42 fortifications surrounding Amsterdam: Fort aan de Middenweg, in south-east Beemster. I was allowed to sample the earthen wall surrounding the fort and the first slug I came across turned out to be a perfect, adult specimen of *Milax*

*nigricans*. The slug was found under leaf-litter about 3 m from the gate giving access to the main part of the fort. No additional specimens were seen.

In order to verify my identification I went to the Juliana Park in Hoorn the next morning, where I found several specimens of almost similar size. They confirmed my initial identification made in the field: *Milax nigricans*.

The park in Hoorn was laid out on a former refuse dump, so we may not rule out the possibility that this alien slug species was already present in that area before they turned it into a park. The Fort aan de Middenweg was built between 1889 and 1913, but was never used for military purposes. Today it is a nature reserve with restricted access. There is no connection whatsoever between the fort and the park in Hoorn, some 20 km to the north-east. The question is therefore: how did this alien slug arrive in the fort compound? At present the underground buildings are used in part as a wine cellar and warehouse for antiquities. However, near the entrance of the fort, some touring caravans are often stored for several months. Is it possible that *Milax nigricans* reached the fort by hitch-hiking on one of these caravans?

This slug seems to be well established at least in Hoorn, where it has already survived seven Dutch winters. *Milax nigricans* may therefore be placed on the list of slugs occurring in the Netherlands. Whether we should be glad about this addition is another question. At least nine alien slug species are now known from the Netherlands: *Arion vulgaris* Moquin-Tandon, 1855 (= *A. lusitanicus* auct., not Mabille, 1868), *Milax nigricans* (Philippi, 1836), *Tandonia budapestensis* (Hazay, 1881), *Tandonia sowerbyi* (Férussac, 1823), *Lehmannia valentiana* (Férussac, 1823), *Limacus flavus* (Linnaeus, 1758), *Deroceras panormitanum* (Lesson & Pollonera, 1882), *Deroceras sturanyi* (Simroth, 1894) and *Boettgerilla pallens* Simroth, 1912. A similar trend may be observed in most of the other Western and Central European countries. Whether this is correlated to global warming or to a general globalization of the world's fauna and flora is difficult to prove.

So far it is only in the case of *Arion vulgaris* that there are increasing indications from several European countries that these slug species are replacing native species, in this case the native *Arion rufus*. However, some of the invasive slugs, including *Arion vulgaris*, *Tandonia budapestensis* and *Boettgerilla pallens*, have become so common that they are now considered pests, causing economic damage to strawberries, carrots, potatoes and other agricultural and horticultural products in the fields (Godan, 1983; Fischer & Reischütz, 1998; Moolenbeek, 2002).

In cases of economic damage these pest slugs are usually controlled with pellets containing metaldehyde, carbamate or methylcarbamate. Such control measures may cause havoc among non-target species, not only the native slugs and snails but also other invertebrates and vertebrates.

Although hardly anything is known so far about the behaviour of introduced populations of *Milax nigricans* in the Netherlands or elsewhere in Europe, from a conservation point of view these invasions of so many alien slugs should be monitored carefully and where possible should be halted by