FOLIA MALACOLOGICA
Folia Malacol. forthcoming paper
ISSN 1506-7629 (print) • ISSN 2300-7125 (on-line)
The Association of Polish Malacologists
Faculty of Biology, Adam Mickiewicz University
Bogucki Wydawnictwo Naukowe
Poznań, 2025
https://doi.org/10.12657/folmal.033.011

SHORT COMMUNICATION

FIRST OBSERVATION OF POTENTIAL PHORESY BETWEEN *PLANORBARIUS METIDJENSIS* AND *ANCYLUS FLUVIATILIS* (GASTROPODA: PLANORBIDAE) IN ALGERIA

Ramdane Ramdini[1]*, Andrew W. Bartlow[2], Ferroudja Medjdoub-Bensaad[1], Houria Bouaziz-Yahiatene[1]

[1] Biology, Mouloud Mammeri University, Tizi-Ouzou, 15064, Tizi Ouzou, Algeria (e-mail: ramdiniramdane@hotmail.com); RR https://orcid.org/0000-0002-1206-8681; FMB https://orcid.org/0000-0002-9396-3775; HBY https://orcid.org/0000-0003-3316-5234
[2] Genomics and Bioanalytics, Los Alamos National Laboratory, United States; https://orcid.org/0000-0002-1254-4481
* corresponding author

Abstract: Phoresy, an ecological phenomenon in which one organism attaches itself to another for dispersal, has been observed in various species. In this study, we describe the potential occurrence of phoresy between *Ancylus fluviatilis* and *Planorbarius metidjensis* in Algerian freshwater. Through field observations, we provide evidence to suggest that *P. metidjensis* may serve as a transport host for *A. fluviatilis*, facilitating its movement within aquatic ecosystems. Additionally, juvenile *P. metidjensis* were observed attached to adults of the same species, which may be a case of intraspecific phoresy. This interaction has implications for understanding the ecology and dispersal mechanisms of freshwater molluscs.

Key words: Algeria; *A. fluviatilis*; *P. metidjensis*; phoresy

The phenomenon of phoresy, or phoresis, was first described in the movement of bivalve molluscs from one area to another by attaching themselves to birds (Darwin 1882). Phoresy is defined as a phenomenon in which an animal (the phoront) gains an ecological or evolutionary advantage by migrating from its native habitat while being superficially attached to a selected interspecific host (the dispersal host) (Houck & OConnor 1991). Phoresy is common throughout the animal kingdom and serves as a dispersal mechanism for small species and those with low mobility. Common groups of organisms that use phoretic dispersal include mites, nematodes, lice, and pseudoscorpions (Bartlow & Agosta 2021). Phoresy is an important mechanism for avoiding intra-specific competition and inbreeding and may be a way to respond to environmental changes (Jackson & Sax 2010, Starrfelt & Kokko 2012). Several species use phoretic dispersal (13 phyla, 25 classes and 60 orders), with arthropods being a predominant group (Bartlow & Agosta 2021). Birds are efficient dispersal agents due to their speed and the great distances they can cover (Green & Figuerola 2005). Land and waterbirds, in particular, can transport algae and invertebrate organisms (Sorensen 1986, Bilton et al. 2001, Figuerola & Green 2002). Other common dispersal hosts include various groups of insects, mammals, frogs, and crustaceans (Bartlow & Agosta 2021).

Freshwater snails (Class: Gastropoda) play a pivotal role in ecological interactions; they can serve as bioindicators of water quality, can be invasive species, and can serve as hosts for various parasites that can infect humans (Burlakova et al. 2009, Mahmoud & Abu-Taleb 2013). In Algerian freshwater ecosystems, the pulmonate gastropod species *Planorbarius metidjensis* (Forbes, 1838) and *Ancylus fluviatilis* O. F. Müller, 1774 are frequently encountered (Aucapitaine 1862), but their interactions and potential for phoretic dispersal has not been documented. Here, we document potential phoretic dispersal involving two gastropod species.

Observations of phoresy were made in the Makouda region, Tizi-Ouzou, at several sampling points (36°48'10"N, 4°01'20"E; 36°48'06"N, 4°01'12"E; 36°47'53"N, 4°01'41"E and 36°47'56"N, 4°01'31"E) at an altitude of 356 m (Fig. 1). The river where we sampled is called Ighzar n tkharouva (long local name), which literally means river of Tikharouba. The habitat of these two species is a rain-fed river, not far from human settlements and is characterised by dense riparian vegetation consisting essentially of *Olea europea*, *Erica arborea*, *Pistacia lentiscus*, *Nerium oleander* and *Ampelodesmos mauritanicus* (Figs 2–5). Anthropogenic disturbances can be observed in this ecosystem through the discharge of various types of domestic waste.

Species were collected using a sieve (0.5 mm mesh) and by hand. The volume of each analysed sample was approximately 1 litre. Both methods are commonly used in mollusc studies (Cucherat & Demuyenck 2008). Some specimens were preserved in 75% ethanol for documentation purposes. Observations were made with the naked eye in their natural habitat, and a digital camera was used to photograph the specimens collected. The nomenclature of freshwater mollusc species was based on MolluscaBase (2024).

In the river where potential phoresy was observed, three species of molluscs were identified: *Planorbarius metidjensis*, *Ancylus fluviatilis* and *Galba truncatula*. At the four sampling points, several *P. metidjensis* (the dispersal host) specimens had *A. fluvitilis* (the phoront) attached to their shells. More than 1/3 (20/57) of the individuals of *A. fluviatilis* observed were clinging to the shells of *P. metidjensis* (Fig. 6). In addition, several small *P. metidjensis* individuals cling to the larger individuals, which may be a way of conserving energy (Fig. 7). It is unclear if these individuals are smaller adults or juveniles. If they are juveniles, it is not known whether they are the offspring of the adults to which they are attached. Notably, *Galba truncatula* was not found attached to *P. metidjensis*.

Interspecific interactions are frequent in all types of ecosystems and are one of the factors that structure communities (Boucher et al. 1982). Phoresy is a complex ecological interaction that enables species to disperse to more suitable conditions, avoid intraspecific competition, and locate more resources or mates. At high altitudes in Morocco, Yacoubi et al.

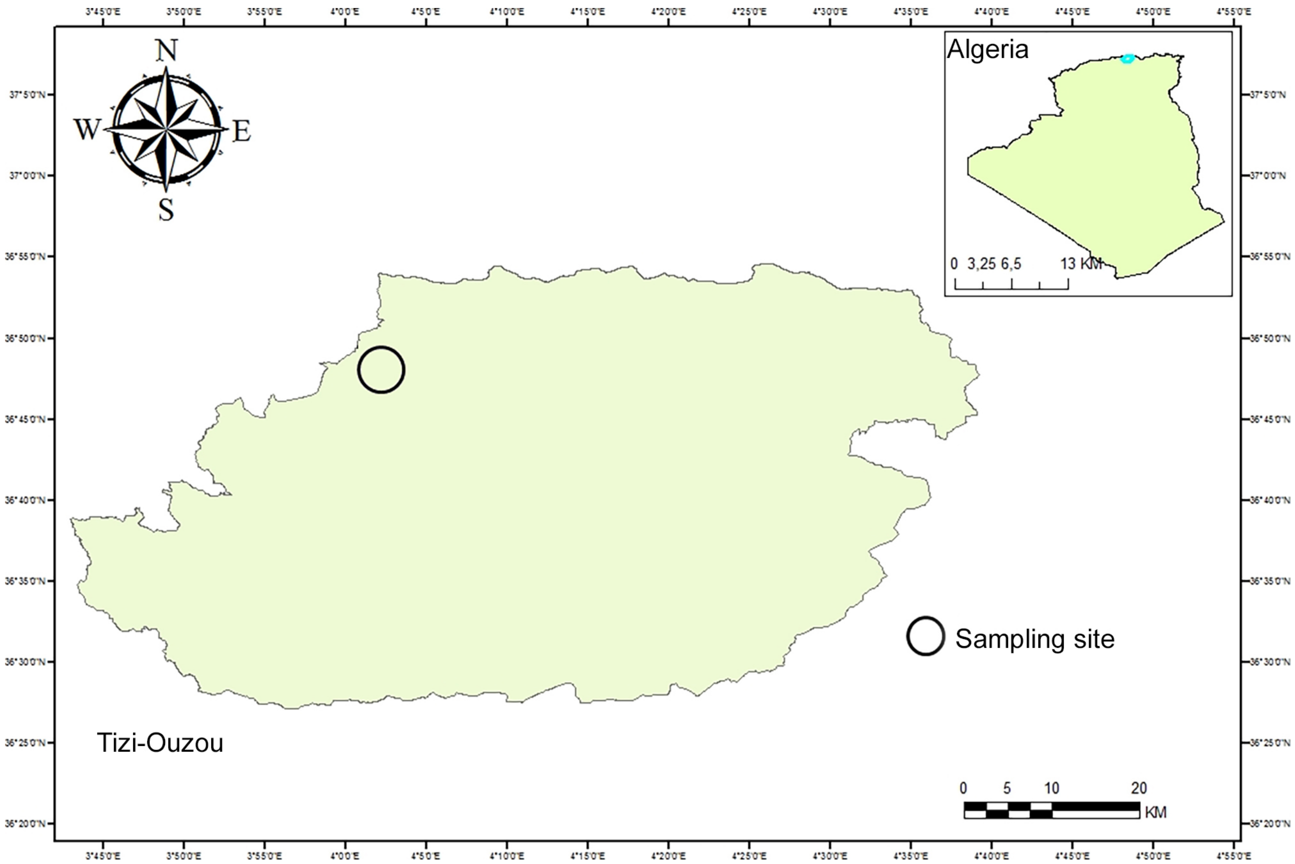

Fig. 1. The sampling site in Tizi-Ouzou, Algeria

(2007) have shown that *A. fluviatilis* is often accompanied by *P. metidjensis*. At the observation sites, the river has a weak current, which poses a challenge for the dispersal of the slow-moving *A. fluviatilis*. Perhaps, to overcome this problem, this species clings to the shell of *P. metjidensis,* another gastropod, which is larger and may have a higher dispersal speed. This can be an advantage for the phoronts, as they can disperse long distances more quickly when attached to the host species. It is unclear whether this significantly contributes to the dispersal of *A. fluviatilis*. We currently do not know whether *P. metjidensis* can move faster due to its larger size and whether this equates to longer dispersal distances. This would need to be experimentally tested as there are no such studies in the literature.

Dispersal of several gastropod species by phoresy have been recorded, including documentation of the pre-requisite characteristics of aquatic snails in the families Lymnaeidae and Planorbidae to attach to birds (Van Leeuwen & Van Der Velde 2012). Crawling onto larger organisms may be a common behaviour for dispersal for species within the family Planorbidae. Darwin (1859) mentions a case of *A. fluviatilis* being attached to a diving beetle in the genus *Dytiscus*. There are also reports of the species *Laevapex fuscus* being found on diving beetles of the genus *Cybister* (Rosewater 1970) and the species *Helisoma anceps* attached to a giant water bug (*Lethocerus americanus*; Hemiptera) (Owen 1962). These observations suggest that *A. fluviatilis* engages in phoretic dispersal. In our case, it is unclear if *P. metjidensis* functions as a true dispersal host or if this is an accidental association. Additionally, this is not the first observation of a mollusc being a dispersal host. Several species have been documented as dispersal hosts for midges, phorid flies, and sea anemones (Bartlow & Agosta 2021).

The observation of juveniles attaching to older individuals of the same species for dispersal is rare in the literature. One documented case involves aphid nymphs attaching to conspecific adults to locate food

Figs 2–5. Different habitats sampled

Fig. 6. Different observations of phoresy between *Ancylus fluviatilis* and *Planorbarius metidjensis*

plants (Gish & Inbar 2018). Here, we report another potential case of intraspecific phoresy, with juvenile *P. metjidensis* attached to adults of the same species. It would be worth investigating whether these are indeed juveniles, and if so, whether they are offspring of the adults to which they are attached.

In conclusion, our observations suggest the possibility of phoresy between *Planorbarius metidjensis* and *Ancylus fluviatilis* in Algerian freshwater habitats and a possible example of intraspecific phoresy in *P. metjidensis*. Future work should further test the hypothesis that *A. fluviatilis* uses *P. metidjensis* as a host for the purposes of dispersal. This interaction would suggest a complex ecological relationship between the freshwater molluscs and underscores the mechanisms and consequences of phoresy in aquatic ecosystems.

Fig. 7. Transport of *Planorbarius metidjensis* by a conspecific

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Received: November 21st, 2024
Revised: January 25th / February 19th / March 20th, 2025
Accepted: March 22nd, 2025
Published on-line: May 6th, 2025