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The Grass Snake, *Natrix natrix natrix* (Squamata: Colubridae), as a predator of the Great Ramshorn Snail, *Planorbarius c. corneus* (Gastropoda: Planorbidae)

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Abstract. The grass snake is for the first time recorded as a predator of a snail (*Planorbarius c. corneus*). Documented by means of photographs taken in the municipality of Tübingen, Germany. It may be presumed that the natural dietary spectrum of *Natrix natrix natrix* also includes the great ramshorn snail.

Key words. Reptilia, Colubridae, *Natrix natrix*, predation, Gastropoda, Planorbidae, *Planorbarius corneus corneus*.

Snail-eating snakes are not exactly unheard of in nature. At least four different groups of colubrids occurring on four continents have in fact specialized in consuming snails (Dipsadinae, tropical America; Natricinae, North America; Pareatinae, Asia; Lamprophiinae, Africa) (ROSSMANN & MEYER 1990). All these, as well as other predators, detect snails olfactorily by following their slime trails (GÖTZ 2002). Recently the European grass snake (*Natrix natrix natrix*) has been observed consuming snails, a prey item previously not known for this species. The food spectrum of the grass snake is described as comprising amphibians of almost all species (its favourite prey), occasionally fish, reptiles (lizards, anguils, snakes), various small mammals (mice, shrews, voles), as well as birds and their eggs (see the summaries in KLINGELHÖFFER 1959, ECKSTEIN 1993, KABISCH 1999). According to data published by WIŚNIEWSKI (1958), grass snakes living in the surroundings of Berlin mainly prey upon brown frogs and fish, to a lesser extent also on green frogs. In spring, when prey is abundant, common toads are preferentially targeted near bodies of water. More recent studies have shown that newts and tadpoles account for a major portion of the dietary spectrum

of juvenile grass snakes (ECKSTEIN 1993). According to KLINGELHÖFFER (1959), the "favourite" food of grass snakes kept in terraria consists of tree and grass frogs. Newts are also taken occasionally, while pool frogs (pool frogs or edible frogs) and toads are less readily consumed. Fire salamanders and fire-bellied toads are usually avoided due to their corrosive and poisonous secretions, even though the latter may play a role as prey in certain areas, as has been demonstrated for Serbian individuals (KOCH 1920). On the other hand, invertebrates such as earthworms, snails/slugs, and insects are apparently consumed only very rarely (KLINGELHÖFFER 1959, HEMMER 1966), and nearly all of the relevant observations have been made under terrarium conditions.

An observation that confirms that grass snakes consume molluscs at least in the wild was made by us during a student excursion of the University of Tübingen on the 4th of May 2007 around 15.00 h on the banks of a pond called the "Tümpel am Schwefelbrunnen" (Bebenhausen, Municipality of Tübingen). This pond lies in the Goldersbach Valley, some 500 m northwest of the town limits of Bebenhausen at 360 m a.s.l.; established in 1970, it is fed by a spring that was rerouted



Fig. 1. The subadult grass snake (*Natrix n. natrix*) discussed in the text with its head stuck motionless in the shell of a fully-grown great ramshorn snail (*Planorbarius corneus corneus*). Photo: A. KWET.



Fig. 2. Foam bubbles line the sides of the snake's mouth, which have probably formed from the snail's secretions. Photo: A. KWET.

specifically for this purpose. The surface of this body of water covers about 100 m², and its maximum depth is 0.7 m. The pond is fully sun-exposed and heavily vegetated with *Elo-dea canadensis* (Canadian pondweed). Stocks of *Stratiotes aloides* (water soldier) and *Nymphaea alba* (white water lily) grow in the centre of the pond. The northern bank is thickly overgrown with brush that extends almost to the centre of the water surface, whereas the rest of the surrounding banks covered only a thin vegetation in which grasses (*Carex* sp.) dominate. Besides gold fish (*Carassius auratus auratus*) that have been released here, the pond is home to numerous palmate newts (*Lissotriton helveticus*) and to some alpine newts (*Mesotriton alpestris*) as well as numerous tadpoles of the common toad (*Bufo bufo*) and some larvae of the grass frog (*Rana tem-*

poraria). The weather was warm and sunny and the sky slightly overcast.

On the eastern bank of the pond, we observed one subadult and two juvenile grass snakes (*Natrix n. natrix*). Measuring about 50 cm in length, the subadult specimen was found lying motionless with its head stuck into the shell of a fully-grown great ramshorn snail (*Planorbarius c. corneus* LINNAEUS, 1758). Its entire upper jaw and large parts of the snake's head to about the centre of the parietals and including the eyes had disappeared into the shell of this orb snail (family Planorbidae) while the lower jaw grasped the shell from the outside (Fig. 1). When we approached it for the purpose of taking photographs, the snake did not show any response at first. That it was neither injured nor dead was demonstrated when, after a few minutes, we touched its body. The snake pulled its head back out of the shell and remained motionless immediately next to it for a few seconds. The snake had foam bubbles along the sides of its mouth (Fig. 2), and for a short moment a piece of tissue became visible that probably originated from the snail but could not be documented by means of photographs.

According to our knowledge this appears to be the first record of a grass snake preying on a snail in the wild. The curator of malacology at the Stuttgart Museum of Natural History, H.-J. NIEDERHÖFER (pers. comm.), confirmed that such an instance has as yet been unknown amongst mollusc specialists as well. Older literature reports at least occasional predation on slugs. As far as molluscs are concerned, HEMMER (1966) states the diet of the grass snake (referring to observations made by SCHREITMÜLLER) to include *Arion empiricorum* (large black slug) and *Limax* sp. (leopard or spotted slug) and furthermore refers to KLINGELHÖFFER'S (1959) listing of "Gastropoda indet." with the explicit reservation note "sicher?" ("sure?"). KLINGELHÖFFER (1928) describes young grass snakes possibly preying upon smooth slugs (*Deroceras* spp.) and for his part refers to FREIDENBERG-FÖRST (1921), a source we have been unable

to verify. In the terrarium, grass snakes appear to accept slugs as food at least every now and then, and ESSMANN (1968), for example, even states that “brown slugs” would be given preference over green frogs. STEMLER-MORATH (1952), who claims having kept and studied “several hundred” grass snakes, notes “only a very few extraordinary acts of ingestion”, but likewise quotes the observation made by SCHREITMÜLLER, that slugs of the genera *Arion* and *Limax* would be consumed. One of the few original sources is SCHREITMÜLLER (1910) himself, who communicates that he was in possession of a grass snake “that commonly fed on large black leopard slugs (*Limax*).”

The great ramshorn snail occurs at very high population densities at the Tübingen “Tümpel am Schwefelbrunnen” (numerous shells and remains of shells are to be found on the margins of the banks), which suggests that at least the grass snakes living there (also at high densities) regularly feed on these molluscs. We unfortunately neither examined more closely nor preserved the remains of the great ramshorn snail, thus could not clarify the question whether the snail was still alive when the snake attacked it or whether it had died before. Considering that snakes find their prey mainly by olfactory means (e.g., HEMMER 1966), the observed specimen has been attracted by the noticeable scent of the snail.

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References

- ECKSTEIN, H.-P. (1993): Untersuchung zur Ökologie der Ringelnatter. – Jb. Feldherpetol., Duisburg, Beih. 4: 1-145.
- ESSMANN, H. (1968): Futterprobleme bei Wassernattern. – DATZ, 21(6): 187-188.
- FREIDENBERG-FORREST (1921): Einige Beobachtungen an der Ringelnatter. – Lacerta, 8: 62-66.
- GÖTZ, M. (2002): The feeding behavior of the snail-eating snake *Pareas carinatus* WAGLER 1830 (Squamata: Colubridae). – Amphibia – Reptilia 23: 487-493.
- HEMMER, H. (1966): Der Funktionskreis von Nahrungserwerb und Nahrungsaufnahme bei der Ringelnatter (*Natrix natrix* L.). – Zool. Beitr. (N.F.), 12: 419-464.
- KABISCH, K. (1999): *Natrix natrix* (Linnaeus, 1758) – Ringelnatter. – S. 513-580 in BÖHME, W. (Hrsg.) (1999): Handbuch der Reptilien und Amphibien Europas, Bd. 3/IIA (Schlangen II), – Wiesbaden, Aula.
- KLINGELHÖFFER, W. (1928): Einrichtung von Zimmer- und Freiland- Aquarien und Terrarien. – Urban & Schwarzenberg, Berlin, 465 S.
- KLINGELHÖFFER, W. (1959): Terrarienkunde – 4. Teil: Schlangen, Schildkröten, Panzerechsen, Reptilienzucht. – Kernen, Stuttgart (2. vollst. neubearb. Aufl.), 379 S.
- KOCH, C. (1920): Herpetologische Beobachtungen in einem serbischen Gefangenenlager. – Bl. f. Aquarien- u. Terrarienkde., 32: 365.
- ROSSMANN, D.A.; MYER, P.A. (1990): Behavioral and morphological adaptations for snail extraction in the North American Brown snakes (Genus *Storeria*). – J. Herpetol. 24: 434-438.
- SCHREITMÜLLER, W. (1910): Eine weitere lohnende Zucht von Futtertieren für Lurche, Schwanzlurche, Schildkröten und Echsen etc. – Lacerta (Beilage der Wochenschrift für Aquarien- und Terrarienkunde), 6: 24.
- STEMMLER-MORATH, C. (1952): Zur Ernährung der Ringelnatter (*Natrix n. helvetica* [LACÉPÈDE]). – DATZ, 12: 331-332.
- WIŚNIEWSKI, N. (1958): Die Ringelnatter (*Natrix natrix natrix*) in der Umgebung Berlins. – Aquarien Terrarien, 5: 166-169.

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