HERPETOZOA 10 (3/4): 173 - 175
Wien, 30. Dezember 1997

Notes on the diet and reproduction of the Cyclades Blunt-nosed Viper, *Macrovipera schweizeri* (WERNER, 1935)

(Squamata: Serpentes: Viperidae)

Bemerkungen zur Nahrung und Fortpflanzung der Milosotter, *Macrovipera schweizeri* (WERNER, 1935)

(Squamata: Serpentes: Viperidae)

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KURZFASSUNG

Erste Angaben zur Nahrung und Fortpflanzung milensischer Milosottern, *Macrovipera schweizeri* (WERNER, 1935), werden gemacht. Die 24 untersuchten Exemplare stammten aus Museumssammlungen. Die zahlenmäßigen Anteile der Nahrungstiere betrugen insgesamt: Nagetiere (42,8%), Eidechsen (21,4%), Vögel (7%), Wirbellose (vornehmlich Käfer, 28,4%). Die festgestellten Gelegegrößen umfaßten vier bis elf Eier.

ABSTRACT

Preliminary data on the diet and reproduction of the Cyclades Blunt-nosed Viper, *Macrovipera schweizeri* (WERNER, 1935) from Milos are reported. All specimens examined (24) came from museum collections. Over-all numerical proportion of prey items: Rodents (42.8%), lizards (21.4%), birds (7%), invertebrates (mainly Coleoptera, 28.4%). Clutch size observed ranged from four to eleven ova.

KEY WORDS

Serpentes: Viperidae; *Macrovipera schweizeri*, diet, reproduction, ecology; Milos, Greece

The Cyclades Blunt-nosed Viper *Macrovipera schweizeri* (WERNER, 1935) is endemic to the the Western Cyclades islands of Milos, Kimolos, Polyaigos and Sifnos in the South Aegean (Greece).

Macrovipera schweizeri is remarkable for being the only European viper that is oviparous (ARNOLD & BURTON 1978). Adults measure up to 80 cm (TL) (SCHWEIZER 1957; ARNOLD & BURTON 1978). This viper is found in a wide variety of habitats including dry rocky outcrops and cultivated land (SCHWEIZER 1935, 1949; STUBBS 1985). As far as it is known, the most important populations occur on Milos Island. Today only certain habitats seem to hold significant numbers (in total: 7000-8000 individuals, STUBBS 1985). The Blunt-nosed Viper is particularly found in the western part of the island (where also the rare red variety occurs). There it lives in sheltered, densely vegetated places with rocky slopes or along water courses such as seasonal stream beds with *Nerium oleander*, *Pistacia lentiscus* and *Myrtus communis* (STUBBS 1985).

This unique, highly threatened species is facing extinction. It is considered endangered according to the 1996 IUCN Red List of Threatened Animals (WCMC 1996), in spite of the campaigns made by many scientists and naturalists. Continuous habitat destruction and the evident deficiency in applying the law are the main reasons for decline. Furthermore, very little is known on the ecology of this species and most data come from animals in captivity or anecdotal observations (e. g., SCHWEIZER 1949, 1957; PERRY & BLODY 1986).

The present work was stimulated by the fact that lack of basic ecological knowledge is hindering the setting up of effective conservation plans.

Considering that (i) the threatening situation of *M. schweizeri* populations forbids the capture of animals and (ii) that

museum specimens are useful for the retrieval of ecological data without removing animals from the wild, we examined all specimens from Milos island (24) that were deposited at the Herpetological collections of the Museum Koenig in Bonn (Germany) and at the Natural History Museum of Vienna (Austria). One specimen had a laboratory mouse in its stomach and, therefore, was excluded from this study. We measured the specimens for body length, removed the entire digestive tract and examined it for the presence of prey remnants. Prey items were identified to the lowest taxonomic category possible.

The stomach contents were summarized in two ways: i) proportion of the total number of prey items in the stomachs (%n) and ii) proportion of vipers eating a given prey taxon (F). In four female specimens we examined the number of eggs in the oviduct and measured their length and width to the nearest mm with vernier callipers.

For the identification of hairs and feathers from the stomachs of the animals, the method of DE MARINIS & AGNELLI (1993) was used. Identification keys and photographs were obtained from DAY (1966), KELLER (1980, 1981) and DE MARINIS & AGNELLI (1993). Comparative hair material was sampled from identified specimens deposited in the Zoological Museum of the University of Athens.

A total of 24 animals was examined, of which 12 had identifiable food residuals in their stomachs. Small mammals (*Rattus* sp., n=6) represented 42.8% of the diet (F=50), lacertid lizards [*Podarcis milensis* (BEDRIAGA, 1882), n=3] 21.4% (F=25), birds [Passeriformes undet., n=1] 7% (F=8.3). Invertebrates [mostly undetermined Coleoptera, n=4, F=25] were also present in the diet amounting to 28.4% of the total number of prey items.

The absence of published data regarding the complete fauna of small mammals of Milos Island does not permit us to hypothesize on the preference of rodents in the diet. However, recent unpublished results from mammal trapping carried out by our team, indicate a predominance of *R. rattus* and insectivores among small mammals. The majority of the European vipers feeds on small mammals where rodents and insectivores are the main prey groups (e. g., PRESTT 1971). Although insectivores are abundant in the habitats of the viper (ADAMOPOULOU, unpubl. data), they were not found in the stomachs examined. This may be related to the fact that in spring (when the snakes were collected), vipers in Milos are active during the morning (BRUNO 1985; STUBBS 1985). At this time of the year they probably prey mainly on rodents and not on insectivores which are more nocturnal (CAPULA & LUISELLI 1990).

Podarcis milensis represents the most abundant lizard species in the island reaching very high population densities (STUBBS 1985; ADAMOPOULOU, unpubl. data). This could be the reason why this lizard was the only reptile species present in the stomachs. *Vipera ammodytes meridionalis* BOULENGER, 1903 has also been observed to feed on lizards in the insular ecosystems of the Aegean (VALAKOS & VLACHOPANOS 1989; VALAKOS 1990).

The percentage of arthropods in the stomachs examined was relatively high. Nevertheless, these arthropods could represent secondarily ingested remains from the stomachs of preyed lizards (RUGIERO & al. 1995). However, among the vipers examined, arthropods were also found in stomachs that did not contain lizards. Anyway, arthropods were found in small specimens (TL < 52 cm) only. This might mean that the diet composition of small individuals differs from that in adults. Other small vipers such as *V. ursinii* (BONAPARTE, 1833) frequently prey on arthropods (AGRIMI & LUISELLI 1992).

The analysis of reproductive traits was carried out on four female museum specimens which were collected in spring (May). Number of ova in the first three animals was 11, 6 and 4, respectively. The oviducts of the fourth animal were damaged and the number of ova counted (2) was excluded from the analysis. Furthermore, one of the 11 ova was deformed and not measured. Egg length (n = 20): 12.9 - 31.5 mm ($\bar{x}$ = 22.74 mm, SD 5.68 mm); egg width (n = 20): 5.3 - 14.5 mm ($\bar{x}$ = 10.78 mm, SD 2.5 mm).

Until now, information on the reproduction of *M. schweizeri* comes exclusively from captive animals. SCHWEIZER (1949, 1957) observed egg deposition in three fe-

male animals. In the first case the clutch size was 7 (egg length 35 - 47 mm). The clutch size in the other two cases was eleven (length 33 - 37 mm) and seven eggs, respectively. In all cases, only about 50 % of the eggs hatched. PERRY & BLODY (1986) reported similar results from three years' observations on a female in captivity (clutch size: 7 - 11, egg length: 37 - 43 mm, about 30 % of the eggs were not fertilized).

Our observations, as far as clutch size is concerned, are in agreement with previous reports. Considering that *M. schweizeri* usually lays its eggs in late summer (SCHWEIZER 1957; BRUNO 1985), the comparatively small egg size found in our specimens is attributed to the early period of collection (May). Although *M. schweizeri* is one of the biggest vipers of Europe, its clutch size is similar to that of the other European vipers (BRUNO 1985).

ACKNOWLEDGMENTS

We would like to thank Dr. W. BÖHME (Bonn) and Drs. F. TIEDEMANN and H. GRILLITSCH (Vienna), who kindly allowed us to examine all *Macrovipera schweizeri* specimens from the Herpetological Collection of the Alexander Koenig Zoological Institute and Museum (Bonn, Germany) and the Naturhistorisches Museum of Wien (Vienna, Austria).

This study was supported by the General Secretariat for Research and Technology, project no. 1298/95ED.

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DATE OF SUBMISSION: September, 9th, 1997 Corresponding editor: Heinz Grillitsch

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