



Foto 1: *Vipera ursinii eriwanensis*.

Foto: Jan Bergman.



Foto 2: *Vipera kaznakovi*. Vrouwtjes. Females.

Foto: Jan Bergman.

SOME NOTES ON THE GENUS *VIPERA* (SERPENTES: VIPERIDAE: VIPERINAE) IN ANATOLIA, TURKEY

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INTRODUCTION

Since the late 1980's, the Turkish herpetofauna in general, and the genus *Vipera* in particular have been studied relatively well (Nilson *et al.*, 1988, 1990; Billing *et al.*, 1990; Schätti *et al.*, 1991).

During 8 field trips, we have visited large parts of Anatolia and made numerous observations both on the Anatolian genus *Vipera* as well as on the sympatric snake-fauna. Here we present this, with additional data on altitude of occurrence, habitat preference and observations on captive reproduction. We also give some information on several new localities inhabited by various species of *Vipera*, based on reports from local inhabitants. These people were asked to identify various snake species from colour photographs. The photographs highlighted differences between species that are easily confused (e.g. *Coluber ravergieri* with members of the *Xanthina*-group, *Coluber nummifer* with the *Lebetina*-group, and *Coronella austriaca* with the *Pelias*-group). Whenever there was any uncertainty in the identification, it was rejected.

The occurrence of *Coluber ravergieri* and *Coluber nummifer* appears to be a good indication for the presence of, *Vipera xanthina* and *Vipera lebetina*, respectively. The same applies to *Coronella austriaca* and *Vipera ursinii* (Bergman, in prep.). The co-occurrence of a specific viper and its harmless image can be regarded as Batesian mimicry.

OBSERVATIONS

Pelias-group (Merem, 1820).

■ *Vipera ursinii eriwanensis* (Reuss, 1933).

We have observed specimens of this taxon during April and May, between Asbuga and Catac (province of Kars), at 2000-2200 m above sea level. Other snake species observed in this area are *Coronella austriaca austriaca* and *Natrix tessellata tessellata*.

In May 1985 a shed skin of this species was found northwest of Aladag (province Kars). Several other suitable habitats for this species can be found in adjacent provinces



Foto 3: *Vipera transcaucasiana*. Jong mannetje die een duizendpoot heeft uitgebraakt. A juvenile male has vomitted a big scolopender.
Foto: Jan Bergman.



Foto 4: *Coluber nummifer*. Vertoont batesiaanse mimicry met *Vipera lebetina*. Batesian mimicry to *Vipera lebetina*.
Foto: Jan Bergman.

(Agri, Erzerum, Tuncelli, and Sivas), but the occurrence of *Vipera ursinii erivanensis* in those regions has not been acknowledged. These habitats are similar to those observed near Aladag (volcanic rocks and subalpine meadows).

Some of these potential habitats, however, are damaged by extensive sheep grazing. Extensive grazing not only causes changes in micro-habitat, but the disappearance of insect foodplants as well. This leads to low insect densities, which, in turn, cause a reduction of insectivores (e.g. lizards) because of a shortage of food. The lack of lizards and insects, important prey items to *Vipera ursinii erivanensis*, will have a negative effect on the survival of this species, in the future.

Captive reproduction has been unsuccessful so far. This may be caused by the low body weight of the females, due to an increase in metabolic rate under too warm and stressful captive conditions.

■ *Vipera kaznakovi* (Nikolsky, 1909).

This medium-sized viper is locally known as 'kantra'. It can be found in Northeast Anatolia between Hopa and Georgia (province of Artvin) (Norström, 1988). In this region the habitats are dominated by a rich vegetation, because of the high precipitation level. However, small microhabitats consisting of stony areas and bare earth can be found in this area as well. These patches are favoured by *Vipera kaznakovi*, especially when there is some *Rubus* ssp. and *Pteridium aquilinum*-vegetation present.

Vipera kaznakovi has been observed, at an altitude of 800m above sea level, within a stone and bush mixed habitat situated south of Hopa (Bergman, 1991). In Turkey, no previous observations of *Vipera kaznakovi* have been made at this altitude (Billing et al., 1990; Bergman, 1991). However, this species has recently been observed at altitudes up to 1000m in former Soviet territory (Kurdajavtsev & Mamet, 1989).

Sympatrical (co-occurring) snake species observed in the Hopa-area are: *Natrix megalocephala*, *Natrix natrix scutata*, *Coronella austriaca austriaca* and *Elaphe longissima longissima*.

In captivity, *Vipera kaznakovi* has a gestation period varying between 90-96 days and litter size may be 3-12 neonates. Females normally have a reproductive cycle every other year. This is, however, highly depending on the availability of prey after gestation. Schweiger (1992) placed *Vipera kaznakovi* in the Rhinaspis-group, based on biochemical characteristics. However, we are of the opinion that some of the caucasian taxa belong to a group of their own, which forms a possible intermediate group between the Pelias- and Rhinaspis-groups. Species such as *Vipera kaznakovi*, *Vipera dinniki*, *Vipera pontica* and *Vipera barani* may belong to such an intermediate group.

Rhinaspis-group (Bonaparte, 1834)

■ *Vipera transcaucasiana* (Boulenger, 1913).

This species, previously considered a subspecies of *Vipera ammodytes*, is now regarded as a distinct species (Hermann et al., 1987). It displays the upturned snout, just like *Vipera ammodytes*, but it is patterned more like *Vipera aspis*. The recognition of *Vipera transcaucasiana* is entirely based on biochemical characteristics.

We have found this viper in three different places. It seems to occur along most of the northwest coast of Asia Minor. *Vipera transcaucasiana* is common around Amasra, east of Zonguldak (province of Adapazari). Here it was found in secondary habitat resulting from bush fires on limestone slopes in macchia-meadows. The elevation of the collecting

site is 300 m above sea level. In this area *Vipera transcaucasiana* was found co-occurring with *Coluber caspius* and *Elaphe longissima longissima*.

Within the Coruh valley (province of Artvin) about 300 m above sea level, this viper lives in terrain with sunspotted stone openings in heavy bush vegetation. Here *Vipera transcaucasiana* was found co-occurring with *Natrix natrix scutata*, *Coluber ravergieri* and *Coluber schmidtii*.

In the province of Sivas it can be found in open bush vegetation with extensive rock formations, up to 1650 m above sea level. Sympatric snakes observed here are *Natrix tessellata tessellata*, *Coluber caspius*, and *Typhlops vermicularis*.

In a summary of the distribution of the genus *Vipera* in Turkey (Nilson et al 1988), the occurrence of *Vipera transcaucasiana* in the province of Kars is not included. However, the presence of *Vipera transcaucasiana* in this area was already stated in 1986 (Nilson and Andren, 1986). According to our experience, it is quite unlikely that this species is an inhabitant of the Kars province because of the generally high altitude and the different (unsuitable) climate. The distribution of this species seems to follow the Çoruh river valley and its tributaries, starting from Georgia.

Vipera transcaucasiana seems to prefer secondary environments (clear felled areas, areas affected by forest fires, areas grazed by cows, etc), where the undergrowth is low and rich. If the undergrowth is dense it is confined to the open areas. We have found that this species is sensitive to intensive grazing by sheep and goats.

Specimens from the Taurus mountains (Eiselt and Baran 1970), South Konya (Toplakat, pers. comm.), and Konya (Nilson and Andren, 1986) may belong to a separate taxon, distinct from the northern and central populations. Based on similarities with Greek specimens, Nilson and Andren (1986) regard these animals as *Vipera ammodytes meridionalis*.

The southernmost observation of this taxon is made Northwest of Silifke, in South Turkey (Manteuffel, 1993). However, no conclusive evidence for the occurrence of this species this far south exists. Because of the similarity of this species with some colour morphs of *Coluber ravergieri*, this observation might well be a misidentification (see also: Franzen and Schmidtler, 1993).

The dorsal ground colour in males tends to change geographically from lime gray in west, lead gray in central and brown gray in east Turkey. A juvenile specimen from Köse Dag (province of Sivas) regurgitated a large millipede.

Many recently caught specimens were heavily infected with endoparasites (Nematodes and Cestodes). Only two captive reproductions were observed. In one couple, the male started courtship 31 days after its first spring moult, copulation followed 6 days later. Eighty-four days later the female gave birth to 11 viable young. In another couple, copulation took place at the end of may. 4 Juveniles were born at the end of August.

Lebetina-group (Linnaeus, 1758)

■ *Vipera lebetina obtusa* (Dwigubskij, 1832).

The members of this group are included in the re-introduced genus *Macrovipera*, by some authors. A single specimen was found dead on a road close to Nurdag in the province of Adana. The collecting site is located in a highly cultivated area. In this area *Coluber jugularis* was found as well.

Another case of mimicry is observed in this species and its colubrid image *Coluber nummifer*.



Foto 5: *Vipera wagneri*. Mannetje. Male.
Foto: Jan Bergman.



Foto 6: *Vipera albizona*. Vrouwtje met tekening gelijk aan
vrouwtjes van *V. wagneri* en *V. xanthina*. Female shows similar
pattern to both *V. wagneri* and *V. xanthina* females.
Foto: Jan Bergman.

Xanthina-group (Gray, 1849)

■ *Vipera xanthina*, the Ottoman viper (Gray, 1849).

This species has been observed in the hills north of the ruin-town Efesus (province of Izmir). *Vipera xanthina*, like many other vipers, frequently inhabits the stone walls that enclose cultivated areas.

Other snakes observed in Efesus were *Typhlops vermicularis*, *Eirenis modestus*, *Coluber jugularis*, *Coluber najadum najadum*, and *Coluber rubriceps rubriceps*

Vipera xanthina, the Ottoman viper, has been bred successfully in captivity. The success, however, is highly depending on age and size of the females. The number of offspring varies between 2-9 juveniles.

■ *Vipera wagneri* (Nilson and Andren, 1984).

This beautiful species has been observed by us in May 1989, within the valley of the Aras-river (Bergman 1992), at an altitude of 1600-1850 meters above sea level.

After the site of its discovery had been revealed by Joger et al. (1988), the population of *Vipera wagneri* was drastically reduced by the activities of (local) snake catchers, who sold the snakes to collectors. An intense captive breeding programme is necessary to reduce the strain on the wild population, because of the constant demand for new specimens by private collectors and institutions (Bergman, in press).

Elaphe hohenackeri, *Elaphe quatuorlineata sauromates*, *Coluber ravergieri*, and *Natrix tessellata tessellata* were observed sympatrically within the region of Aras.

Vipera wagneri inhabits a habitat of volcanic boulders, just like *Vipera raddei* which only lives a few kilometers away in the Aras valley. *Vipera raddei*, however, seems to prefer a drier environment. The gestation period of 13 females bred by us varied between 103-107 days with an offspring of 4-8 juveniles (Bergman in press). Under ideal conditions, females can reach maturity at an age of 2 years.

■ *Vipera albizona* (Nilson, Andren and Flärdh, 1990).

This viper was found by us in May 1990, at the type-locality (= the locality where the specimens of the species' first description originate from) in the province of Sivas. The habitat consisted of volcanic rocks, at an altitude of 1850-1900 meters. The populations of this species are fragmented and isolated; the population-density seems to be very low.

Co-occurring with *Vipera albizona* at the type-locality were *Coluber ravergieri* and *Eirenis modestus*. According to local shepherds *Vipera ursinii* can be found here as well.

One female, which reproduced in 1990, did not eat enough during 1991 to attain a body weight suitable for another successful reproduction. This may imply a 2 year, or perhaps even longer, reproductive cycle. One captive female is known to have given birth to six young in October.

Schätti et al. (1991) consider *Vipera albizona* to be conspecific with *Vipera xanthina*. We are, however, of the opinion that it is more closely related to *Vipera wagneri*. Specimens of *Vipera albizona*, observed by us, show very clear morphological differences with *Vipera xanthina*, *Vipera bommulleri* and *Vipera wagneri*.

■ *Vipera raddei* (Boettger, 1890).

This species, described earlier as *Vipera xanthina raddei* by Mertens (1952), seems to have been confused with *Vipera wagneri* from Tuzluca (Province Kars, Bergman, in press b).



Foto 7: *Coluber ravergeri*. Vertoont batesiaanse mimicry met *Vipera xanthina*. Batesian mimicry to *Vipera xanthina*.
Foto: Jan Bergman.



Foto 8: *Vipera raddei* 'kurdistanica'. Jong exemplaar geboren in gevangenschap. Juvenile born in captivity.
Foto: Jan Bergman.

We have found *Vipera raddei* at Mount Ararat at an altitude range of 1550-1700 meters above sea level. Within the volcanic boulder habitat at Mnt. Ararat the following sympatric snake species were observed: *Eryx jaculus familiaris*, *Coluber ravergeri*, *Coluber schmidtii*, *Natrix sp.*, *Elaphe hohengeri*, *Elaphe quatuorlineata sauromatus*. In some locations aggregations of over 100 specimens have been observed just below the snowline (Mulder, pers. comm.).

The polymorphism in populations of this species, existing in certain areas in North-West Iran is probably caused by historical climatological and geological reasons. The members of these populations are described by Nilson and Andren (1986) as a distinct subspecies, *Vipera raddei kurdistanica*. Two other, closely related, taxa, *Vipera latifii* (polymorphic) and *Vipera albicornuta* (monomorphic) are considered to be separate species by the same authors.

None of the specimens observed in areas in southern Turkey and former Russia differ from the Turkish subspecies *kurdistanica* in colour, but the pattern may be polymorphic. This species is therefore considered monotypic by Schätti et al. (1991).

According to Vinegar (1974) and our own observations, pregnant females of other snake species that are kept under suboptimal temperature conditions during embryogenesis can produce offspring with pattern aberrations that closely resemble the polymorphic pattern of *Vipera raddei*. It is well known that specimens of a population that lives near the periphery of the species distribution, often have a reduced gene flow compared with the central population, which have a constant influx of 'new' blood. Within other small viper populations e.g. *Vipera seoanei* and *Vipera dinniki* polymorphism also occurs frequently. The gestation period for one female from Yuksekova was in progress for 99 days when three young were born.

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LITERATURE

- Bergman, J., 1991. Juvenilt parningsbetende hos *Vipera kaznakovi*. Snoken 4(21): 16-17 (In swedish with english summary).
- , 1992. Ein erster Fund einer abnormalen, runden pupille bei *Vipera wagneri* (Nilson und Andren, 1984). Sauria 14(1): 33.
- , In press a. Hasselsnoken, *Coronella austriaca*, en indikator och imitator, levande i amexistens med Peliasgruppen? Med synpunkter på släktet *Viperas* övrigartkomplex, och dess samexistens med andra Colubridformer. Snoken (In swedish with english summary).

- , In press b. Erfarenhet av *Vipera wagneri* i natur och terrarium. Snoken (In swedish with english summary).
- Billing, H., G. Nilson & U. Sattler, 1990. *Vipera pontica* sp. n. a new viper species in the kaznakovi group (Reptilia, Viperidae) from northeastern Turkey and adjacent transcaucasia. Zool. script. 19(2): 227-231.
- Franzen, M. & J.F. Schmidler, 1993. Erwiderung zu: 'Bericht über Reptilienfunde in der Türkei' von Dietmar Manteuffel. Salamandra 29(1): 92-95.
- Hermann, H.W., U. Joger, G. Nilson & C.G. Sibley, 1987. First step towards a iochemically based reconstruction of the phylogeny of the genus *Vipera*. Proc. 4th ord. Gen. meet. S.E.H., Nijmegen, 195-200.
- Joger, U., A. Teynie & D. Fuchs, 1988. Morphological characterization of *Vipera wagneri* Nilson and Andren 1984 (Reptilia: Viperidae) with first description of the males. Bonn. Zool. Beitr. 39(2/3): 221-228.
- Kudajavtsev, S.V. & S.V. Mamet, 1989. Terrestrial snakes of the Sovietunion. The snake 21: 29-35.
- Manteuffel, D., 1993. Bericht über Reptilienfunde in der Türkei. Salamandra 28(3/4): 223-230.
- Mertens, R., 1952. Amphibien und Reptilien aus der Türkei. Rev. Fac. Sci. Univ. Istanbul (Ser. B) 17: 41-75.
- Nilson, G. & C. Andren, 1986. The mountain Vipers of the middle East: The *Vipera xanthina* complex (Reptilia, Viperidae). Bonn. Zool. Monogr. 20: 1-90.
- , C. Andren & B. Flärdh, 1988. Die Vipern der Türkei. Salamandra 24: 215-247.
- , C. Andren & B. Flärdh, 1990. *Vipera albizona*, a new mountain Viper from Central Turkey, with comments on isolation effects of the Anatolian 'Diagonal'. Amphibia-Reptilia 11: 285-294.
- Norström, M., 1988. Erfarenhet av den Kaukasiska viperan *Vipera kaznakovi* i Turkiet. Fauna och Flora 83: 26-33 (In swedish).
- Schweiger, M., 1992. Die Europäische Hornotter *Vipera ammodytes* (LINNAEUS 1758). Teil 1: Systematik, ökologie und Lebensweise. Herpetofauna 14(77): 11-22.
- Schätti, B., I. Baran & H. Sigg, 1991. Rediscovery of the Bolkar Dagh viper: morphological variation and systematic implications on the '*Vipera xanthina* complex'. Amphibia-Reptilia 12: 305-327.
- Vinegar, A., 1974. Evolutionary implications of temperature induced anomalies of development in snake embryos. Herpetologica 30: 72-74.