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Data on the reproduction of a Caucasian Viper, Vipera kaznakovi Nikolsky, 1909 (Serpentes: Viperidae) from Hopa (Northeastern Anatolia, Turkey)

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Abstract. In the current study we report an observation of a Caucasian Viper, *Vipera kaznakovi* from Hopa (Artvin, Turkey) giving birth. During our field studies, we captured a female *Vipera kaznakovi* on July 21, 2012 from Esenkıyı village, Hopa (Artvin, Turkey), it was brought to the laboratory and kept in a terrarium for a period until May 28, 2013. The female (SVL= 483 mm, total length, TL = 541 mm) gave birth to eight young (mean SVL= 146 mm, mean TL= 161.4 mm, range= 155 – 172 mm; mean weight, W= 3.11 g, range= 2.6 – 3.4 g) on August 11, 2012. In six and a half months, the juvenile snakes had reached 163 mm SVL, 187 mm TL and 5.1g W and increased their size by approximately 15%.

Keywords: Caucasian Viper, *Vipera kaznakovi*, reproduction biology, Turkey

True vipers (subfamily: Viperinae) are distributed in Europe, Asia, and Africa and include generally ovoviviparous species (MALLOW *et al.*, 2006). *Vipera kaznakovi* is endemic to the Caucasus and listed as Endangered in the IUCN Red List due to its Area of Occupancy being less than 500 km^2 (TUNIYEV *et al.*, 2009a). The species range stretches along the Black Sea coast, covering the forested foothills of the Caucasus up to 1000m a.s.l, from Hopa (Artvin) in Turkey and the Suramsky pass in the east across Colchis up to the Mikhailovsky pass in the west (BAŞOĞLU & BARAN, 1980; BARAN & ATATÜR, 1998; ORLOV & TUNIYEV, 1990; SINDACO *et al.*, 2000; ANANJEVA *et al.*, 2006; TUNIYEV *et al.*, 2009a). The main threats to *V. kaznakovi* have been illegal overcollection for the international pet trade, habitat loss and destruction due to urban development, tourism, dam construction and agriculture (BARAN & ATATÜR, 1998; TUNIYEV *et al.*, 2009a).

The Caucasian Viper inhabits the forested slopes of mountains, in the bottoms of humid canyons, in post-forested clearings and meadows (BAŞOĞLU & BARAN, 1980; ORLOV & TUNIYEV, 1990; MALLOW *et al.*, 2006; TUNIYEV *et al.*, 2009a). Phenology of the species depends on altitude. The individuals on the Black-Sea coast are active from March to November, whilst in the highlands they are active in the second half of April - beginning of May to the end of

September - beginning of October (ORLOV & TUNIYEV, 1990; TUNIYEV *et al.,* 2009a). Soon after emerging from hibernation, the period of mating occurs from the end of March up to mid-May and parturition time is at the end of August - early September depending on altitude (TUNIYEV *et al.,* 2009a).

On our field trip at the vicinity of Esenkıyı village, Hopa (Artvin, Turkey), we captured a female on July 21, 2012, the individual was brought to the laboratory and kept in a terrarium (120x40x50 cm, LxWxH) for a period until May 28, 2013. The female (snout-vent length, SVL= 483 mm, total length, TL= 541 mm) gave birth to eight newborn snakes on August 11, 2012, (Fig. 1) two died due to non-feeding in the terrarium. The average size of the newborn juveniles was 3.11 g (range=2.6–3.4 g) in weight, 140.6 mm (133-150 mm) SVL, and 161.4 mm (155–172 mm) TL (Table 1).

Coloration of the newborn juveniles was slightly different from that of the female. Dorsum ground colour is black, with two longitudinal red brown stripes forming an intervening zig-zag shaped or straight black dorsal band present as indicated by ORLOV & TUNIYEV (1990), HÖGGREN *et al.* (1993) and MALLOW *et al.* (2006). However, the dorsum ground color of the juveniles is more brightly coloured (ORLOV & TUNIYEV, 1990) than that of the female. ORLOV & TUNIYEV (1990) also reported that the head pattern of the juveniles is separated from the dorsal stripe by a light area as is shown in Fig. 1. The ventrum is black.

In captivity, females frequently give birth at night (ORLOV & TUNIYEV, 1990; MAMET & KUDRYAVTSEV, 1997). The cluch size of *V.kaznakovi* generally is between 3 and 5 (ORLOV & TUNİEV, 1990; MALLOW *et al.,* 2006). The newborns are 145 mm in SVL and weigh 4.1 g (ORLOV & TUNIYEV, 1990). MAMET & KUDRYAVTSEV (1997) reported that a female Caucasian viper [SVL= 484 mm, TL= 546 mm] gave birth to four newborn juveniles on July 9, 1993 at Moscow Zoo. The young individuals were measured as 152 mm for SVL and 4.11 g in weight by the authors. The cluch size of the closely related species *Vipera dinniki* and *V.darevskii* ranges from 3 to 7 and young snakes appear between August and September (ORLOV & TUNİYEV, 1990; MALLOW *et al.,* 2006; TUNİYEV *et al.,* 2009b). The mean size of newborn vipers is 131 mm for SVL, 3.1 g in weight (MALLOW *et al.,* 2006).

Newborn snakes first shed their skin on the second day from birth and twice before hibernating at the end of the October, 2012. ORLOV & TUNIYEV (1990) reported juvenile vipers generally shed twice before hibernation: first is second day after birth, second just before hibernating.

Six and a half months later, the average size of the juvenile Caucasian vipers had increased by approximately 16% (range= 11% - 20%) of the original length and the mean SVL had increased to 163 mm (148 – 173). The mean weight had increased to 5.10 g (4.4 – 5.8) and the rate of increase was about 61% (59% - 64%). ORLOV & TUNIYEV (1990) reported one year old individuals reach 200 mm in SVL and they had increased their size about 38% from birth.

In summary, our results confirmed previous data about reproduction of *V. kaznakovi* and range of clutch size was increased to 3 to 8. However, most of the available data was obtained from captive individuals. We urgently need to obtain data on the ecology of *V. kaznakovi* in the wild to help protect the species from future threats.

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Table 1. Summary statistics of juvenile Caucasian Vipers from Hopa.

	August 11, 2012			May 28, 2013		
	W	SVL	TL	W	SVL	TL
N	8	8	8	8	8	8
Mean	3.11	14.06	16.14	5.10	16.29	18.70
Range	2.6 – 3.4	13.3 – 15.0	15.5 – 17.2	4.4 – 5.8	14.8 – 17.3	16.8 – 20.2
SE	0.09	0.20	0.20	0.17	0.31	0.38
SD	0.26	0.57	0.58	0.49	0.88	1.08

Fig. 1. General view of female Caucasian Viper and newborns from Hopa.

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