

**New locality records of snakes resembling the
Big-headed Grass Snake, *Natrix megalcephala* Orlov & Tuniyev, 1987
(Ophidia: Colubridae) in Turkey**

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Received: 12. September 2011 / Accepted: 18. November 2011 / Available online: 20. November 2011

Abstract. In this study, 3 new locality records of *Natrix megalcephala* are reported from Ardahan, Giresun and Zonguldak provinces, respectively in eastern Anatolia (Asian portion of Turkey), as well as in the eastern and western Black Sea region of Anatolia. Previously the westernmost known locality for *N. megalcephala* in the Anatolian Black Sea region was Çamlıhemşin, Rize province. These three new records extend the known distribution from previous records in Anatolia of this taxon west along the Black Sea for approximately 700 km and east for about 160 km.

Key Words: Colchida, Colchis, Large-headed Grass Snake, *Natrix megalcephala*, Distribution range, Black Sea region, East Anatolia region.

The Big-headed grass snake, *Natrix "megalcephala"* (apostrophes due to uncertainty of taxonomic status), also known as Large-headed water snake or Colchida, water snake, was described from Pitsunda, Abkhazia, Georgia (type locality) by Orlov & Tuniyev in 1987 and has been recorded from the Caucasus Mountains of Azerbaijan, Georgia, and Russia (Orlov & Tuniyev 1987, 1992, 1999, Ananjeva et al. 2006, Tuniyev et al. 2009, Frotzler 2011). According Tuniyev et al. (2008), this species has undergone significant recent declines, largely due to predation from the introduced North American Raccoon *Procyon lotor*; competition with raccoons for prey (fishes); and habitat loss, most especially because of development along the Black Sea coastline (including tourism).

In Turkey, grass snakes resembling *Natrix "megalcephala"* have been detected only a few times and relatively recently (Başoğlu & Baran 1980, Baran et al. 1992, Mulder 1995, Baran & Atatür 1998, Sindaco et al. 2000, Budak & Göçmen 2005). Nilson et al. (1988) were the first to report observations of Turkish *N. "megalcephala"* in syntopy with the snakes *Vipera kaznakovi* and *Zamenis (former Elaphe) longissimus*, and in particular with the congeneric *Natrix natrix*, in the vicinity of Hopa in north-eastern Turkey. However, no further details or comments were given. Close to two decades later, Jandzik (2005) and Ilgaz et al. (2005) published

first exact localities of *N. "megalcephala"*-like grass snakes from Turkey, from 2 km northeast of Hopa, Artvin province, and from Çamlıhemşin, Rize province, respectively. Both records published in 2005 are from areas, where *N. "megalcephala"* has been confirmed to coexist with "normal" *N. natrix* (Mulder 1995, Ilgaz et al. 2005, Jandzik 2005).

However, the validity of the taxonomic status of *N. "megalcephala"* has been questioned and discussed in several publications. Initially, Orlov & Tuniyev (1987, 1992, 1999) have described *N. "megalcephala"* as a more massively built, broad headed water snake with enlarged frontal and temporal scales, and little pronounced sutures between cephalic scales compared with syntopic *N. natrix*. Furthermore, they found that *N. "megalcephala"* differs from other *Natrix* species in skull morphology, as well as size of eggs and hatchlings. However, this taxon has been viewed as a melanistic (black-coloured) form of *Natrix natrix* by other researchers. For example, Hille (1997) found no biochemical (allozymes) evidence that distinguishes *N. "megalcephala"* from other *N. n. natrix*, even though three "island *N. natrix*" taxa and the mainland *N. n. helvetica* and *N. n. natrix* all were genetically clearly distinct among each other. Velensky, in a breeding trial in 1997 with a female *N. "megalcephala"* from Sochi, Russia, found that the young from a Czech *N. n. natrix* had relatively larger heads than the young from the *N. "megal-*

cephala". Similar conclusions were drawn by Jandzik (2005), who investigated the morphological character expression in his *N. "megalocephala"* from near Hopa and compared it with other, preserved *N. "megalocephala"* and with sympatric *N. natrix* from northeastern Turkey. He found that the individuals of both taxa showed a mixture of morphological characters originally attributed to *N. "megalocephala"* and *N. natrix*. This adds to the methodological ambiguities in the original description of *N. "megalocephala"* by Orlov & Tuniyev (1987, 1992), such as measurements of suture pronouncement or reference points for head lengths, and the uncertainties accruing from potential effects of negative allometric growth in comparisons among individuals of different sizes classes (Jandzik 2005). No conclusive statistical analysis has been produced so far, that would show that putative *megalocephala*-characters, e.g. weak cephalic sutures and pronounced graduation between the frontal and nasal scales (Orlov & Tuniyev 1999), are not just simply a result of individual and local variation. In anticipation of a more thorough study on grass snakes in northern Turkey, we herewith present information on *Natrix "megalocephala"*-like specimens, indicating their much wider distribution as was previously known from Turkey.

Material: A female specimen from Karaali village (Giresun province) was collected on August 28, 2011 at 900 m a.s.l. (Fig. 1). It was fixed according to Göçmen et al. (2007), numbered and deposited in the Zoology Museum of Harran University (ZMHRU 205/2011, Leg. B. Göçmen, B. Akman, D. Yalçınkaya, M. Karış). We collected this specimen in daytime (Fig. 2), 12:45 h on wet, covered rich vegetation. It was rainy with an air temperature of 23° C. The pholidosis and morphological measurements were recorded according to those previously published on this species (Orlov & Tuniyev 1992, Ilgaz et. al 2005, Jandzik 2005). SVL and tail

length were measured to the nearest millimeter using a ruler. Other morphological measurements, were recorded using a digital caliper (Mitutoyo 500-181 U) with an accuracy of 0.02 mm. Data on color patterns (and photos) were taken from living animals.

Pholidosis: Head is covered by large regular scales. One preocular, 3 postoculars, 8 supralabials and 10 sublabials on both sides. The nasal touches 2 upper labials. The width of internasals is 3/2 larger than their length. There are 20 mid-dorsal scales and 164 ventrals. Two rows of subcaudals, but the scales were not counted as the tail was damaged. The anal plate is divided. The first row of lateral scales bordering the ventrals has a smooth surface. The scales of the second row are weakly keeled.

Length measurements: Head length, width and depth are 18.82 mm, 11.65 mm and 8.81 mm, respectively. Frontal length and width are 6.01 mm and 3.98 mm. Parietal length and width are 8.61 mm and 5.04 mm. Snout-vent length is 487 mm.

Color pattern: Lateral and dorsal coloration is dark grey (Fig. 2). Head is black with a white collar behind the head. White coloration extends onto the lower portion of upper labials. The first half of ventrum is spotted with alternating black and white spots. White coloration on tail vanishes to the end of the tail.

Additional accounts of *N. "megalocephala"*-like specimens from Turkey

We found Big-headed grass snakes around Çıldır Lake (e.g., Akçakale village in Çıldır county, see Fig. 1) at ca. 1950 m a.s.l. in the Kars and Ardahan provinces of northeastern Anatolia. They were observed between 9:30-14:45 h on August 20, 2011. The weather was clear and sunny with an air temperature of 21° C. There, *N. "megalocephala"* was found in sympatry with "normal" *N. natrix*.

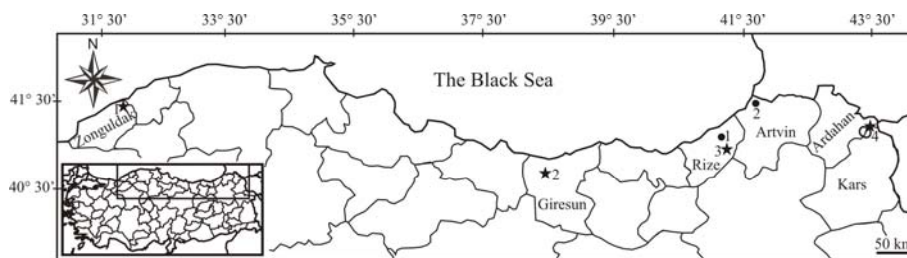


Figure 1. Localities of *N. "megalocephala"* from the Black Sea coastal strip and eastern Anatolia. Circles refers to known localities (see text): 1. Çamlıhemşin-Rize, 2. Hopa-Artvin. Stars refers to new localities: 1.Çaycuma-Zonguldak, 2. Karaali-Giresun, 3. Ayder plateau-Rize, 4. Çıldır Lake Ardahan and Kars.



Figure 2. Dorsal view (a) and head (b) of a female *N. "megaloccephala"* from Karaali village, Giresun province, northeastern Turkey.

Another *N. "megaloccephala"*-like specimen was observed on the Ayder plateau, Rize province, at ca. 1000 m a.s.l. on August 25, 2011 (Fig. 1), not far from the specimen found by Ilgaz et al. (2005). The weather was variably cloudy with an air temperature of 19° C. Finally, the last specimen (Fig. 3) was observed in Çaycuma village, Zonguldak province, at 30 m a.s.l. on October 10, 2011 (Fig. 1). It was cloudy with an air temperature of 20° C. The snake was released after photos were taken.

It may come at no surprise that *N. "megaloccephala"*-like specimens have been discovered at far distant sites, such as between Çaycuma and Karaali with approximately 530 km distance. As mentioned by Velensky (1997, and refs. therein), large headedness and melansim, two relevant *megaloccephala*-characters, occur in different populations of *N. natrix* not associated with *N. "megaloccephala"*. One such example is an evidently large-headed *N. natrix sicula* from Sicily, Italy (p. 228, Kwet 2010). Another individual, resembling a typical Big-headed grass snake, can be seen in Fig. 4, depicting a large-headed melanistic female *N.*

natrix helvetica from Aurigeno, Maggia Valley, Switzerland, almost 2000 km east of the nearest *N. "megaloccephala"* from Çaycuma, Turkey. Furthermore, visibly large head and tendency to melanism can be seen in the Turkish specimens in Figs 2 and 3, but no particularly enlarged frontal and temporal scales, or unusual cephalic sutures.



Figure 3. A "*N. megaloccephala*" from Çaycuma village, Zonguldak province, northwestern Turkey.



Figure 4. *N. natrix helvetica* resembling *N. "megaloccephala"* and *N. tessellata* from Aurigeno, Maggia Valley, Switzerland. (a) frontal view, (b) from left to right, a large-headed female, a male, and a female *N. tessellata*.

Even though grass snakes resembling *N. "megalcephala"* can occur at very different sites throughout a large portion of the vast range of *N. natrix*, it remains remarkable that the Big-headed grass snake from Turkey mostly were found in rather humid, forested areas. Similar observations were made in nearby Georgia, where grass snakes found in rich and dense forests predominantly resembled *N. "megalcephala"*, whereas *N. natrix* were more common outside of such areas (Frotzler et al. 2011). But ecological separation is not complete, as in both countries, the Big-headed grass snakes occurred also in syntopy with *N. natrix* (see above). There are no accounts showing that both taxa mate independently from each other, yet, *N. "megalcephala"* may represent an incipient species, whose further independent evolution may have been interrupted by occasional introgression from the regional common grass snake, *N. natrix*. Alternatively, *N. "megalcephala"* may represent a distinct morph, an ecophenotype, of the grass snake, endemic to ancient coastal regions of Pleistocene refuges, when the Caucasus was a peninsula (Frotzler et al. 2011). In such a case, the two water snakes principally act as a single species with the *megalcephala*-genes being inherent in the *N. natrix* genome. *Megalcephala*-genes can be locally selected as a coadapted gene complex, once environmental conditions are suitable for that type, much like polymorphism can be shaped and altered by local selection pressures. Research on various snake species show such varying polymorphism, including the selective advantage of local melanism in the adder, *Vipera berus*, (Andren & Nilson 1981), the variation of dorsal color pattern as the result between natural, local selection and migration between populations that can change over time, as in the asp viper (Mebert et al. 2011) in American natricine *Nerodia sipedon insularum* (Ehrlich & Camin 1960, King 1987, 1993), and variation of ecophenotypes of the garter snake *Thamnophis elegans* among populations at only a few kilometer distance (Manier & Arnold 2005). If such is the case for the two grass snake taxa involved in our study, then the local frequency of *N. "megalcephala"* would be regulated, i.e. selected for or against, by fluctuating environmental conditions over multiple generations (10-100s of years), enabled by the ongoing uni- or bilateral introgression between both, weakly diverged taxa. That such a mixing is possible between even two "good" species was demonstrated for two other natricine snakes (Mebert 2008, 2010).

In summary, this paper represents the first records of *N. "megalcephala"* from inland northeastern Anatolia and the western Black Sea region of Anatolia, substantially extending its range to the west and east in Turkey. The Black Sea Mountains probably act as a dispersal barrier for this taxon, in particular as the climate becomes more arid along its southern versant and southwards. In light of the various information compiled here, it is understood that the validity of the taxonomic status of *N. "megalcephala"* remains not resolved and requires more detailed molecular studies based on nuclear and mitochondrial DNA from a substantially larger sample. We would appreciate such a study on a population level that would show what the relationship between *N. "megalcephala"* and *N. natrix* is, regarding a range of possibilities from being conspecifics to evolutionary independent entities (taxa).

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