

## ABOUT TYPE LOCALITY AND FINDS OF DAREVSKY'S VIPER [*Pelias darevskii* (VEDMEDERJA, ORLOV ET TUNIYEV, 1986), REPTILIA: VIPERINAE] IN GEORGIA

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The paper discusses the findings of *Pelias darevskii* (Vedmederja, Orlov et Tuniyev, 1986) on the territory of South Georgia (Javakheti Ridge and Erusheti Mountains and Akhaltsihe Highland). Comparative analysis of edafotops, an altitudinal spread, list of flora and vegetation in the Darevsky's viper biotopes in Georgia, Armenia and Turkey was done. It is suggested a broader area of the species in these countries, refined the type locality of Darevsky's viper and considered the cause of the misunderstanding.

**Keywords:** Georgia; Dzhavakhetskiy Ridge; Erusheti Highland; *Pelias darevskii*; type locality.

### INTRODUCTION

Since the description time of Darevsky's viper [*Pelias darevskii* (Vedmederja, Orlov et Tuniyev, 1986)] long time this species was considered as an endemic of north-western Armenia, although already a description possibility of its finding was assumed in the contiguous districts of Georgia (Orlov and Tuniyev, 1986). Appearing later, pointing on the finding of a Darevsky's viper in Turkey (Geniez and Teynié, 2005; Avcı et al., 2009; Tuniyev et al., 2009) on a considerable big distance from the known area, were of large interest. The new finds of species in Armenia (Agasian and Agasian, 2008) were located in direct closeness (12 km) from type locality and actually did not extend the known distributional area of species. Our research in Turkey show that a distinct species inhabits a neighborhood of Posof — *Pelias olguni* Tuniyev, Avcı, Tuniyev, Agasian et Agasian, 2012. In addition, there was an assumption on taxonomical independence of vipers from the vicinity of the village Zekeriya (Tuniyev et al., 2012).

In the southeast Georgia G. N. Iremashvili found vipers, identified by him as *Pelias darevskii*. That was

a base for a joint expedition which was carried out on the borderline districts of Georgia with Armenia and Turkey, where this species was found in three localities. A clarification of the type locality of species was given at the same time.

### MATERIAL AND METHODS

Material was collected in July 2014 in Ninotsminda, Akhalkalaki, Aspidindza, Akhaltsihe districts of Somkheto-Dzhavakheti Region of Georgia (Permission for collecting of Ministry of Environment and Natural Resources of Georgia No. 3828 from July 09, 2014). The route of the expedition covered Dzhavakheti Highland, including Dzhavakhetskiy Ridge (Mt. Madatapa — 2713 m), Akhalkalaki Highland, Erusheti Highland (Mt. Gumbati = Kyumbet = Gumati — 2963 m), the environment of Lake Khozapini (Kariakhisba = Kartsakhi = Actaş Gölü — 1798 m a.s.l.), riverhead Kura in the place of the crossing of the border between Turkey and Georgia, separating the Dzhavakheti Highland and Erusheti Mountains, Akhaltsihe Highland (Mt. Airilanbashi — 2582 m). Observations were carried out in a standard street method resulted in records of 18 specimens of vipers. Photographing and express descriptions of biotopes were conducted in the places of finds of snakes which were later compared to the known information of the habitat from the type locality of the species and the above-mentioned places of finds of "Darevsky's viper"

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**Fig. 1.** Habitat of Darevsky's viper on Mt. Madatapa — 2713 m a.s.l.

in Turkey. All sympatric reptile species are recorded in the viper's biotopes.

## RESULTS

Darevsky's viper was found in two localities: Mt. Madatapa at Dzhavakhetskiy Ridge (7 specimens) and Mt. Gumbati in the Erusheti Mountains (10 specimens) and Mt. Airilanbashi (1 killed specimen) in Akhaltsihe Highland near Village Tskaltiba.

On the Mt. Madatapa (Fig. 1), the vipers occur on the south and east exposed slopes at an altitude range from 2200 to 2500 m a.s.l. Its extensive enough biotope is presented by steppe-like short-grass subalpine meadow with numerous collapsing tailings of lava streams, flowing down in the period of activity from the Volcano Madatapa. Stone mineral deposits are presented by large and by medium size dumping accumulations. In the conditions of proceeding process of soil forming and overgrowing of maternal rock, vipers were met at the burrows of rodents and present gaps between stones. Unusual

biotopes of flat stone talus deposits characteristic for the species' type locality here, are totally absent. Syntopic reptile species is only *Darevskia valentini* (Boettger, 1892), which forms dense populations.

Biotopes on Mt. Gumbati (Fig. 2) are also represented by the slopes of quiet volcano of east and south exposure. Here, steppe-like short-grass subalpine meadow is also developed with obvious tracks of overgrazing and presence of ruderal species of plants, such as *Urtica dioica*. Below, on a slope in a canyon, the narrow-leaved forests are developed with such species as *Betula litwinowii*, *Salix caprea*, *Sorbus aucuparia* and other. The area of viper habitats is extensive and proceeds on territory of Turkey. Vipers were found at altitudes from 2200 to 2600 m a.s.l. Together with vipers, the short-tailed sand lizard (*Lacerta agilis brevicaudata* Peters, 1958) and the smooth snake (*Coronella austriaca* Laurenti, 1768) live in the same biotope.

In the vegetation of both localities bushes of *Rosa spinosissima* is marked; such grassy species were identified as *Seseli libanotis*, *Stachys macrantha*, *Lotus caucasicus*, *Trifolium canescens*, *T. montanum*, *Pedicularis ar-*



**Fig. 2.** Habitat of Darevsky's viper on Mt. Gumbati — 2963 m a.s.l. at Erusheti Mountains.

mena, *Centaurea nigrofimbria*, *Campanula hohenackeri*, *Myosotis alpestris*, *Anthemis caucasica*, *Polygala alpico-la*, *Thymus nummularius*, *Anemone fasciculata*, *Dactylo-rhiza euxina* and other, i.e., in the predominant majority species characteristic of subalpine meadows. Habitats on Mt. Airilanbashi shou agricultural landscapes with stony ravines (Fig. 3).

## DISCUSSION

Potential habitat of Darevsky's viper in districts of Georgia adjacent with type locality was assumed in the description of the species (Orlov and Tuniev, 1986). This supposition was based on similarity of landscapes of Dzhavakheti Highland which southeast extremity are the Wet Mountains (Kechutskiy Ridge) in Armenia.

General likeness of landscapes is related to formation of basalt-andesite and dacite volcanos within the entire examined region, with outputs on the crests the basalts of Pliocene, Late Pleistocene and Holocene age. In other words, volcanic activity in this region began as early as in

the Tertiary period and proceeded up to the Holocene inclusive. It is necessary to underline that not only volcano's but also all of the upland surroundings are buried under lava streams, separating habitats of plants and animals on separate "islands." For example, the Akhalkalaki Lava Highland, forming the western part of Dzhavakheti Volcanic Highland, is built from surface powerful basaltic lava of Pliocene and Pleistocene ages, spreading from Trialetskiy Ridge. Westward it is limited by Erusheti Highland from which it is separated by Kura River valley.

A special expedition in September 1987 of the Sochi department of Russian Geographical Society to the basin of Lake Paravani, has one of special goals to search of Darevsky's viper in the territory of Georgia. B. S. Tuniev, member of this expedition, has inspected the extinct volcanos Godorebi (3191 m), Didi-Abuli (3301 m), Grigori (2773 m) and banks of Lake Paravani (= Parvana, 2073 m a.s.l.). However, a cold rainy weather (so characteristic for Dzhavakheti Highland) during three days of the field work does not allow successful finding of vipers. Also, attempts of other herpetologists at different



**Fig. 3.** Habitat of Darevsky's viper on Mt. Airilanbashi — 2582 m a.s.l. in Akhaltsihe Highland.



**Fig. 4.** *Pelias eriwanensis* from Lake Kartsakhi.

times visiting the territory of Georgia in search of Darevsky's viper failed.

In Catalogue of Collections of the Museum of Nature of the Kharkov National University, named after V. N. Karazin (Vedmederja et al., 2007), it was indicated specimen of Darevsky's viper from territory of Georgia (No. 29044, Bogdanovskiy district, vicinity of Village Efremovka, Mt. Madatapa, July 03, 1975, 1 specimen., Coll. V. I. Vedmederja). Presumably, identification of viper, caught as early as 1975, was done shortly before the publication of the Catalogue, as in the moment of description of Darevsky's viper (Vedmederja et al., 1986) nor later, V. I. Vedmederja did not mention and did not publish information about this interesting record. The same specimen was identified as *P. eriwanensis* by O. Kukushkin with co-authors (Kukushkin et al., 2012), that caused our reasonable doubt in the rightness of the identification of this viper from the former Bogdanovskiy district (Tuniyev et al., 2013). Indeed, the Mt. Madatapa is located in direct closeness to the known natural habitat of *P. darevskii*. Not occasionally in the Catalogue (Vedmederja et al., 2007) this specimen found by V. I. Vedmederja was identified without any doubts as *P. darevskii*. Thus, we suppose (Tuniyev et al., 2013), that



**Fig. 5.** Area round Lake Kartsakhi — natural habitat of *Pelias eriwanensis*.

other specimens with Dzhavakheti parts of the Armenian Highland in south Georgia, indicated in the article of Kukushkin et al. (2012), indeed can belong to *P. eriwanensis*. It was confirmed during our research: *P. eriwanensis* (Fig. 4) was found near Lake Kartsakhi (Fig. 5).

Our find of Darevsky's viper on Mt. Madatapa in Ninotsminda (former Bogdanovskiy) district (Fig. 6) confirmed our doubts. Moreover, records of vipers on Mt. Gumbati in the Erusheti Mountains of the left-bank area of Kura River (Fig. 7) and Mt. Airilanbashi (Fig. 8) testify its extensive distribution range in south Georgia. Slope of Mt. Gumbati has a direct continuation on the territory of Turkey, which could indicate with certainty the presence of *Pelias darevskii* in the Turkish part of the Erusheti Mountains. Moreover, absolute external identity of middle- and high-mountain phytolandscape belts of all of tops of inactive volcanoes in north-western part of Armeno-Dzhavakheti Volcanic Highland (north-western external part of the Armenian Highland) as well as comparable hypsometric marks many of the examined volcanoes, can be reasons to suppose considerable more wide distribution of species in Armenia, Georgia and

Turkey. It is necessary to say that in Turkey we undertook two unsuccessful attempts of search of Darevsky's viper on Ak-Baba (= Yerakatar — 3011 m) (Tuniyev et al., 2012). However it was supposed the possibility of find the viper on this mountain, located directly on a border with Armenia. In the light of new finds of expedition of 2014 in south Georgia, this possibility only increases and can complement with other volcanic tops on the territory of Turkey on the border-line with Armenia and Georgia: Mt. Menaberd (= Tayakale — 2958 m), Mt. Yeghnasar (= Chokak — 2852 m), Mt. Mets Yeghnakhagh (= Ashotsk — 3042 m) and other (Fig. 9).

The finds of Darevsky's viper in South Georgia gave another optimistic chance in the additional searches of species and possibility of more wide range based on analysis of biotopes in the new places of finds. Indeed, for a long time, only the flat stone talus deposits described from type territory were surveyed (Tuniyev et al., 2009, 2012). It was considered that in Armenia, in a subalpine belt, Darevsky's viper could survive exceptionally in microbiotopes with flat small-stone talus deposits as under strong deforestation of primary biotopes vipers could



**Fig. 6.** *Pelias darevskii*, male from Mt. Madatapa.

find refuges, food and necessary temperature regime only on flat stone talus deposits (Tuniyev et al., 2012).

In analogical biotopes with small flat-stone talus deposits on the slopes of mountains Achkasar and Kechut new micropopulations in Armenia (Agasian and Agasian, 2008) were found, while the habitats outwardly different from a type locality have been ignored, or looked for very superficially.

In the three new localities in Georgia the little areas of small flat-stone talus deposits are marked only on Mt. Gumbati (Fig. 10), while an overwhelming part of biotopes of Mt. Gumbati and all biotopes of Mt. Madatapa are characterized by large-blocks and medium size mineral deposits (Fig. 11), or even stony ravines on Mt. Airilanbashi (Fig. 3).

Biotopes very different from those in type locality of Darevsky's viper were marked by us also in Turkey (Tuniyev et al., 2012). The first two specimens were found on moist humid zone with short alpine meadows and numerous piles of stone, above the upper altitudinal limit of the forest at elevation of approximately 2050 m on Türközü Plateau (Avci et al., 2010). Biotopes of *Pelias olguni* on Mt. Ilgar-Dağ are presented by the upper edge of forest and subalpine elfin-woodland (*Betula litwinowii*), by subalpine glades with moraines among subalpine light forest (*Acer trautvetteri*, *Betula litwinowii*, *Salix*



**Fig. 7.** *Pelias darevskii*, female and male from Mt. Gumbati.

*caprea*, *Sorbus aucuparia*). On moraines and subalpine glades in biotopes of vipers there are undersized singly trees and bushes, including *Pinus kochiana*, *Cerasus avium*, *Malus orientalis*, *Corylus avellana*, *Rosa spinosissima*, *Viburnum lantana*, *Rubus buschii*, *Lonicera orientalis*, *Ribes caucasicum*, *R. alpinum*. Subalpine glades, transitory higher in subalpine meadows are presented by graminea-mixtoherbosum associations, in an altitudinal range from 2020 to 2100 m a.s.l. (Tuniyev et al., 2012). Biotopes of *Pelias "darevskii"* in vicinity of Vil. Zeke-riya are presented by subalpine hemixerophytous meadows close on edaphically signs to meadow-like steppes with juniper lying shrubs (*Juniperus oblonga*) on lime-stones in altitudinal range 1990 – 2100 m a.s.l. Along all habitat, the stony areas, small talus, acanguares and rocky outputs of limestone are located (Tuniyev et al., 2012).



Fig. 8. *Pelias darevskii*, killed male from Mt. Airilanbashi.

Species composition of flora composing the vegetation of meadows at biotopes in Armenia and Georgia is approximately identical. At the same time, on Mt. Gumbati forest vegetation is developed in more low belts, approaching general belts of vegetation to the vegetable belts of Mt. Ilgar-Dağ in Turkey. Flora and vegetation of Arsianskiy Ridge near Vil. Zekeriya strongly differs by the presence of such species as *Anacamptis pyramidalis*, *Hedysarum caucasicum*, *Linum* sp., *Verbascum* sp., *Lotus tenuis*, *Salvia verticillata*, *Papaver oreophilum*, *Echium vulgare*, *Origanum vulgare*, *Achillea* sp., *Lamium album* and others. As a result, we have noted that *Pelias olguni* and *Pelias "darevskii"* from Vil. Zekeriya live in subalpine biotopes, very similar to *P. dinniki*'s on the Great Caucasus (Tuniyev et al., 2012) and radically different from habitats of *P. darevskii* from type locality and Mt. Madatapa. Hence, habitat from Mt. Gumbati has intermediate position between type locality and Mt. Ilgar-Dağ.

Comparing the altitudinal range of finds of vipers of "*darevskii*" complex, it is possible to mark distinctions in Transcaucasian and Turkish parts of natural habitats. All of observation in Turkey are made on elevations 1990 – 2100 m a.s.l. In Georgia and Armenia, the more northern localities are located considerably higher: at 2200 – 2600 m a.s.l.

Number of vipers in Georgia is not high, and expansion of their distribution range cannot substantially influence on its conservation status. The Darevsky's viper still

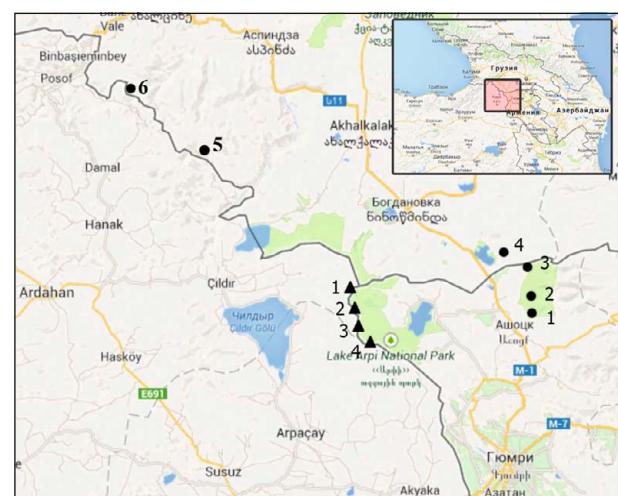


Fig. 9. Known (circle) and expected (triangle) places of Darevsky's viper finds. Known places: 1, Mt. Sevsar; 2, Mt. Achkasar; 3, Mt. Kechut; 4, Mt. Madatapa; 5, Mt. Gumbati; 6, Mt. Airilanbashi. Expected places: 1, Mt. Menaberd; 2, Mt. Yeghnasar; 3, Mt. Mets Yeghnakhagh; 4, Mt. Yerakatar.



**Fig. 10.** Little areas of small flat-stone talus deposits described from type territory are marked only on Mt. Gumbati.



**Fig. 11.** An overwhelming part of biotopes of Mt. Gumbati and all biotopes of Mt. Madatapa are characterized by large-blocks and medium size mineral deposits.



**Fig. 12.** Mt. Sevsar, Dzhavakhetskiy (Kechutskiy) Ridge, Ashotsk (former Gukasyan) district, northwestern Armenia — terra typica of *Pelias darevskii*.

remains narrow distributed, sporadically spread species, not forming high-dense populations.

In conclusion, we would like to elucidate name of the type locality of *Pelias darevskii*. In the original description (Vedmederja et al., 1986), the type locality was indicated as Mt. Legli, Wet Mountains, Gukasyan District, Armenia, in accordance to the label of holotype. However, the detailed study of cartographic material, including old editions, showed that a mountain with the similar name “Legli” in the examined district is absent. However, there is a Mt. Leyli (Azeri name), also called Kechut (Armenian name), located directly on a border with Georgia, altitude 3156 m a.s.l. Southward the highest peak of Dzhavakhetskiy Ridge — the Mt. Achkasar (= Achkala — 3196 m) is located, which was also temporary identified as mountain “Legli.” However I. S. Darevskiy (1956) who was first collector of these vipers, later formed the type series of *Vipera* (= *Pelias*) *darevskii*, clearly specified a place of collecting as a top, located directly above Settlement Gukasyan (now Ashotsk). On the maps, this extinct volcano is named

Sevsar (= Karadag), 2950 m altitude. This fact, without the extended discussion, was used by us as a foundation for pointing for type locality of *Pelias darevskii* — Mt. Sevsar at description of *Pelias olguni* (Tuniyev et al., 2012). Arising misunderstanding under labeling by I. S. Darevsky appears to the all subsequent publications. It is explained by the fact that one of Mt. Sevsar’s branches had the local name Leyli among Azeri people living at that time there. I. S. Darevskiy unintentionally transformed this name Mt. “Leyli” to Mt. “Legli.”

Thus, **terra typica** of *Pelias darevskii* (on an actual place of type series collecting, including Holotype) it is necessary to recognize as the Mt. Sevsar, Dzhavakhetskiy (Kechutskiy) Ridge, Ashotsk (former Gukasyan) district, northwestern Armenia (Fig. 12).

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