

**TAXONOMIC REVISION OF *PHRYNOCEPHALUS PERSICUS* DE FILIPPI, 1863  
COMPLEX WITH DESCRIPTION OF A NEW SPECIES FROM ZAGROS, SOUTHERN IRAN**

**Daniel Melnikov<sup>1</sup>, Ekaterina Melnikova<sup>1</sup>, Roman Nazarov<sup>2</sup>, and Mahdi Rajabizadeh<sup>3,4</sup>**

<sup>1</sup> *Zoological Institute, Russian Academy of Sciences  
1 Universitetskaya emb., St. Petersburg 199034, Russia  
E-mail: melnikovda@yandex.ru*

<sup>2</sup> *Zoological Museum, Moscow State University  
6 B. Nikitskaya Str., Moscow 125009, Russia  
E-mail: r\_nazarov@mail.ru*

<sup>3</sup> *Evolutionary Morphology of Vertebrates, Ghent University  
Ghent, Belgium*

<sup>4</sup> *Department of Biodiversity Institute of Science and High Technology and Environmental Sciences,  
Graduate University of Advanced Technology  
Kerman, Iran  
E-mail: khosro.rajabizadeh@gmail.com*

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A new species from *Phrynocephalus persicus* De Filippi, 1863 complex from southern Iran is described. It differs morphologically from *Ph. persicus* in fewer number of supralabial scales, presence of longitudinal row of enlarged scales on the dorsal side of the body, in supra- and infranasals same size as surrounding scales and molecular distinctions.

**Key words:** Squamata, Acrodonta, Agamidae, *Phrynocephalus* sp. nov., Iran, Zagros.

**INTRODUCTION**

The Persian toad-headed agama *Phrynocephalus persicus* De Filippi, 1863 was described from Iran by Italian explorer and traveler Filippo de Filippi. Twenty nine years later, Hungarian researcher Lajos M  hely described Horvath’s sun-watcher toad-headed agama *Phrynocephalus helioscopus* (Pall.) var. *Horv  thi* M  hely, 1894 from the Araks river valley.

After that some researchers consider these taxa as independent, others as synonyms, then all *Phrynocephalus* from Transcaucasia to Iranian plateau were named *Ph. persicus*.

Based on the original molecular and morphological data, specific status of *Ph. persicus* and *Ph. horv  thi* was shown by us (Melnikov et al., 2008). Also it was mentioned about a new species from the southern Iran, which needs to be described on the basis of molecular differences. Some scientists agreed with us and consider *Ph. horv  thi* and *Ph. persicus* as different taxa (  i  ek et al., 2011, 2012; Tosuno  lu et al., 2011), while other authors prefer to consider *Ph. horv  thi* as subspecies of *Ph. persicus* (Arakelyan et al., 2011; Solovyeva et al., 2011; Milto, Barabanov, 2012), like it was considered sixty years ago.

In the monograph on herpetofauna of Armenia (Arakelyan et al., 2011), probably «to avoid premature taxonomic changes» both names *Ph. persicus* and *Ph. persicus horv  thi* were presented equally. But in the species article, however, «*Ph. persicus horvathii*» is used, but with «Horvath’s Toad-headed agama» as the English name. Also there was a doubt about the type locality of *Ph. horv  thi*: «*P. p. horvathii*: “Aralich, am Flusse des Ararat” [=Aralich, on the Ararat River (*sic!*)].». We want to assure, that Ararat is a great well-known mountain, that in fact was part of Armenia at the time of the description, but later became Turkish; and that German word «Fu  e» is not the same as «Flusse», «(*sic!*)» normally used if familiar with original source.

Detailed review on history of the study Transcaucasian and Iranian *Phrynocephalus* was presented in the aforementioned paper (Melnikov et al., 2008), that was published in the Russian language as the proceedings of the Nikolsky Herpetological Society Conference. We decide to repeat some of it parts here, together with a description of a new species from southern Iran and with Lectotype and Neotype designation for *Ph. persicus* and *Ph. horv  thi* respectively with morphological description of all these type specimens.

### Important points in the history of study

**1. Taxonomic characters.** Filippo de Filippi (1863, 1865) proposed clear diagnostic characters for *Ph. persicus* from *Ph. helioscopus* (Pallas, 1771): enlarged thorny scales protrude in groups on dorsal side of the body and form one long row in the middle of the neck, scales on the thighs not keeled, nostrils separated from each other by five scales in one row, snout is more blunt. Researchers of XIX – beginning of XX, that knew well the description and having comparative specimens, distinguished *Ph. persicus* from *Ph. helioscopus* and even proposed their own diagnostic characters (Anderson, 1872; Blanford, 1876; Boettger, 1886; Bedriaga, 1907). Lajos M ehely (M ehely, 1894 *a, b*, 1899) also clearly separated his *Ph. h. horv athi* from *Ph. h. helioscopus*: smaller body size and extremities, scales on the extremities strongly keeled, clear white throat and breast, rusty red belly, nostrils separated from each other by three small scales. A. M. Nikolsky (1905, 1907 *a, b*, 1909), used characters proposed by J. Bedriaga (1907), distinguished *Ph. persicus* from *Ph. helioscopus*, and later proposed new characters for *Ph. h. horv athi* (Nikolsky, 1913, 1915). Later scientists used characters proposed by A. M. Nikolsky and made ambiguous conclusions about relationships between these forms (Laister, 1912; Carevskij, 1914). After his study of more than 300 specimens of toad-headed agamas, S. F. Carevskij (1926, 1929) clearly separated all three forms geographically and morphologically. In early papers S. A. Chernov consider *Ph. persicus*, *Ph. h. helioscopus* and *Ph. h. horv athi* as distinctive forms (Terentyev, Chernov, 1936, 1940; Chernov, 1937, 1939). But later he critically reviewed characters used for taxonomy of *Phrynocephalus* by Ya. V. Bedriaga, A. M. Nikolsky and S. F. Tsarevsky and synonymized *Ph. h. horv athi* (Terentyev, Chernov, 1949; Chernov, 1959). After that the opinion about synonymy of these forms became accepted in all subsequent papers, giving new ambiguous data in morphology (Aleksperov, Galaeva, 1975; Bannikov et al., 1977; Golubev, Baranov, 1991; Golubev, Mezhzherin, 1999), cytophysiology (Ushakov, 1962), caryology (Arronet, 1965; Sokolovsky, 1974, 1975; Manilo et al., 1991; Eremchenko, Panfilov, 1999) and molecular genetics (Mezhzherin, Golubev, 1989; Golubev, Mezhzherin, 1999) studies.

**2. Type localities.** In his work 1863 Filippo de Filippi designated type locality of *Ph. persicus* as road from Armenia to Teheran (Basoglu, Baran, 1977; Anderson, 1999; Ananjeva et al., 2004; Barabanov, Ananjeva, 2007). But later, in 1865, he re-

stricted the type locality of *Ph. persicus* to the flat deserts of Iran by the road from Sultaniyeh to Teheran (Anderson, 1872; Blanford, 1876; Boettger, 1886; Bedriaga, 1907; Laister, 1912) and noted that in Armenia he collected *Ph. helioscopus*. This very important specification of the type locality of *Ph. persicus* geographically separates it from the type locality of *Ph. h. horv athi* – Aralich village at the base of Ararat mountain, that at the time of description of this form also was part of Armenia (M ehely, 1894 *a, b*, 1899).

**3. Little known papers.** The description of De Filippi (1863) became well known, and all recent researchers, which consider *Ph. persicus* and *Ph. h. horv athi* as identical forms, cited it. Monography (1865) is less common – it is cited only by earlier researchers, that clearly separated these forms. The description of *Ph. h. horv athi* was separated in two parts in different volumes of «Zoologischer Anzeiger», so that subsequent scientists (Bedriaga, 1907; Laister, 1912; Nikolsky, 1913, 1915) knew only the first, less significant part (XVII. Jahrg. 5 Marz. 1894. № 441. S. 79 – 80). While the second more important part of the description (XVII. Jahrg. 19 Marz. 1894. № 442. S. 81 – 82) was published together with snakes and turtles descriptions. In 1899 M ehely repeated his description and even presented first image of *Ph. h. (Pall.) var. horv athi* in Tab. XIV (Fig. 1 *a*), but this paper also was not cited by subsequent researchers.

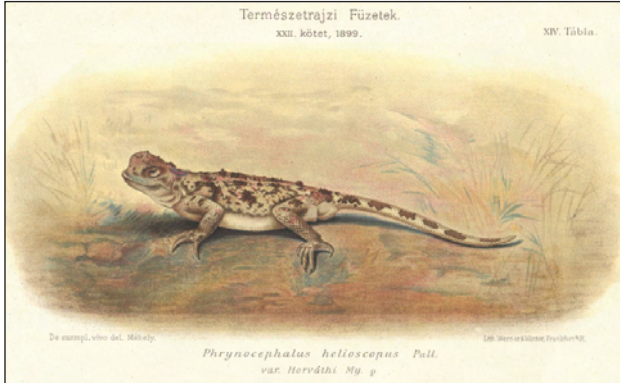
**4. Fragmented material.** After synonymy of *Ph. h. horvahi* with *Ph. persicus*, specimens from Transcaucasia, and especially from Armenia, were actively used for different studies of «*Ph. persicus*» (Darevsky, 1960; Arronet, 1965; Aleksperov, Galaeva, 1975; Mezhzherin, Golubev, 1989; Ananjeva et al., 2006) because it was incomparably easier than getting material from Iran. It is necessary to mention, that in the scientific literature there are no photographs of the real *Ph. persicus* from central Iran until now, only painting from old papers, for example in Anderson, 1872, P. 388, Fig. 5 (Fig. 1 *b*) and Bedriaga, 1909, Table IX, Fig. 9, 9 *a*, 9 *b*. All known photographs of «*Ph. persicus*» in fact are photographs of *Ph. h. horv athi* from different parts of its range (Ananjeva et al., 1998, 2004 – Armenia; Basoglu, Baran, 1977; Anderson, 1999; Baran et al., 2004; Baran, 2005 – Turkey; Schleich, 1976 – north-western Iran).

## MATERIAL AND METHODS

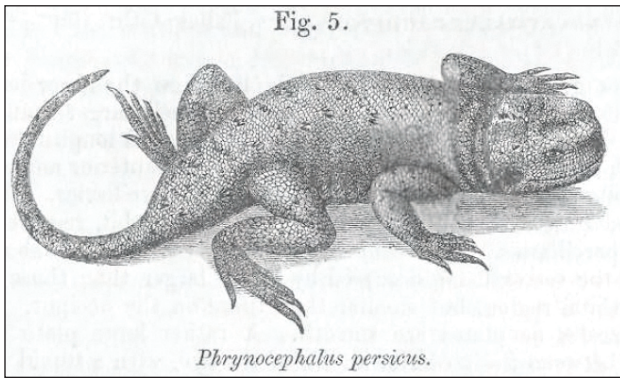
### Morphological analysis

*Locality data.* All known localities of Transcaucasian and Iranian sun-watcher toad-headed aga-

mas were analyzed. In some cases (for example, specimens of F. De Filippi and N. A. Zarudny) original routes and exact localities were reconstructed, using original papers (with Encarta Interactive World Atlas 2000 and old geographic maps).



a



b

**Fig. 1.** Paintings of *Ph. horváthi* from Méhely, 1899 (a) and *Ph. persicus* from Anderson, 1872 (b)

**Type material.** In the Catalogue of Herpetological collection of Turin Museum of Zoology (MZUT) (Elter, 1981) under the name *Ph. helioscopus* (Pall.), besides the specimen of *Ph. horváthi* R392 (840), that was collected by De Filippi in Armenia (De Filippi, 1865), there are several other specimens R396 (358), that were collected by him in Persia – that should be considered as original type series of *Ph. persicus* De Filippi, 1863 (in the catalogue no specimen is marked as type). From this series some specimens were donated to the other museums: Genoa Museum of Natural History – MSNG CE 9597 – 2 specimens (Capocaccia, 1961 – marked as syntypes of *Ph. persicus* De Filippi, 1863 from Persia, donated in 1876), Vienna Museum of Natural History – NMW 24821 – 3 specimens (Tiedemann et al., 1994 – marked as syntypes *Ph. helioscopus persicus* De Filippi, 1863 from Persia, 1 donated in 02.11.1863 from Turin, 2 – gift from F. Steindachner in 1874), Zoological Institute RAS –

ZISP 8844 – 1 specimen (Bedriaga, 1907 – marked as original specimen *Ph. persicus* De Filippi, 1863, received in 1896, communication from L. Camerano to Ya. Bedriaga). From these specimens we studied three: one from ZISP and two from Genoa Museum (photographs of Nikolai Orlov).

Type specimens of *Phrynocephalus helioscopus* (Pall.) var. *horváthi* Méhely, 1894 – male and female (Méhely, 1894 a, b, 1899) – were lost in 1956 together with the whole herpetological materials of the Hungarian Museum (communication from Judit Voros to Natalia Ananjeva, 29.06.2005). But in the catalogue of the available scientific names for *Phrynocephalus* (Barabanov, Ananjeva, 2007) for *Phrynocephalus helioscopus* (Pall.) var. *horváthi* Méhely, 1894 was proposed the Neotype – ZISP 5544.1, which was studied by us.

**Other material.** Specimens of *Ph. persicus* from the central Iran, including the type locality, studied: collections of Nikolai Zarudny (Zarudny, 1905; Nikolsky, 1905) – 11 specimens (ZISP 10256 – 10259, 10339; Museum of Nature of Kharkov National University of V. N. Karazin – MNKhNU 8723, 26530); specimen from National Museum of Natural History in Paris – MNHN Ag.414-2 1957. 0034 (photographs of Nikolai Orlov); eight voucher specimens for molecular analysis (photographs of Mahdi Rajabizadeh); five specimens from central Iran, Shirin-Su vicinity (ZISP 25013 – 25017). Also 50 specimens of *Ph. cf. persicus* from Azerbaijan, Nagorno-Karabakh and north-western Iran (ZISP 4911, 5035, 11109, 15490, 17398, 17998, 21933 – 21934, Zoological Museum of Moscow State University – ZMMGU Re 607, 3295, 8741, MNKhNU 14869). 181 specimens of *Ph. horváthi* from Armenia, Turkey, Nakhichevan (Azerbaijan) and north-western Iran, including the type locality (ZISP 4912, 4913, 4918, 5002, 5003, 5006, 5030, 5544, 5484, 5489 – 5490, 6722, 7865, 9862, 11110, 12171, 12172, 13391, 13393, 14332, 14499, 14869, 14928, 15251, 16283, 17101, 18443, 19167, 19303, 19488, 19489, 20390, 23403, 23406 – 23407, 23690 – 23691, 23692 – 23695, 23696 – 23697). Also 21 specimens of *Ph. helioscopus* from Kalmykia, Dagestan, north-eastern and eastern Iran (ZISP 7989, 9923, 11058; ZMMGU Re 609, 11311; MNHN Ag.414-2 1957. 0029 – 0031, 0032, 0033 (photographs of Nikolai Orlov). Studied material is represented by single specimens and series of different age and sex, including juveniles.

## RESULTS

### Data on distribution

All known localities of sun-watcher agamas from Transcaucasia and Iran grouped in five

parts: Transcaucasian 1 (Armenia, Turkey, north-western Iran), Transcaucasian 2 (Azerbaijan), central Iranian, south Iranian, and north-eastern and eastern Iranian (Fig. 2). These groups correspond to different species: *Ph. horváthi*, *Ph. cf. persicus*, *Ph. persicus*, *Ph. sp. nov.*, *Ph. helioscopus*, respectively.

**Molecular data**

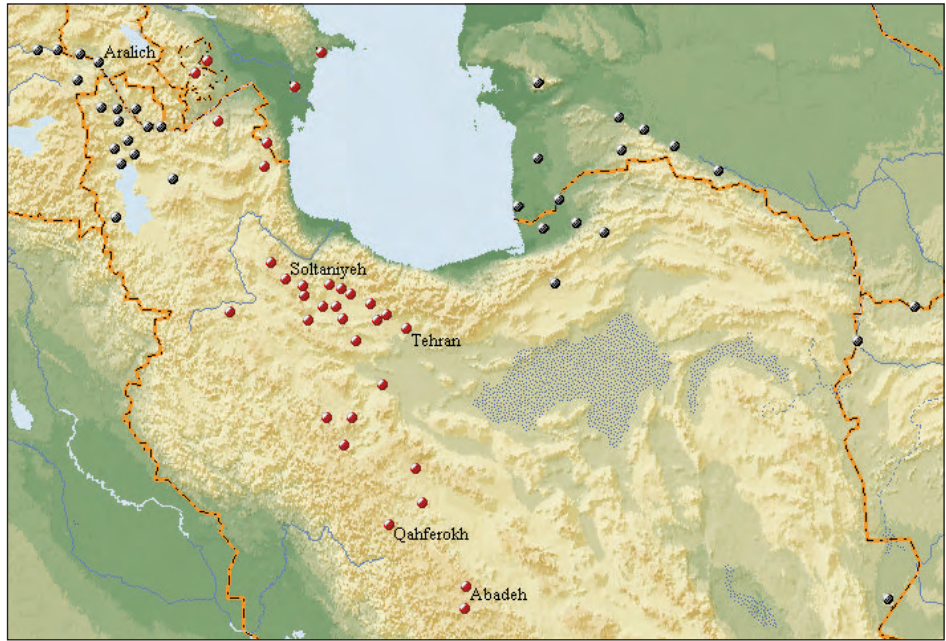
Melnikov et al. (2008) presented data on the mtDNA phylogeny of *Ph. persicus* and *Ph. horváthi* and showed that they should be considered as separate species (Fig. 3). Also it was shown that the new species from the southern Iran needs to be described.

**Morphological analysis**

Melnikov et al. (2008) showed that *Ph. persicus* and *Ph. horváthi* are good species and it is easy to distinguish them from each other and from *Ph. h. helioscopus*, using characters proposed by authors of descriptions. And it was noted that the character traditionally used as diagnostic for *Ph. persicus* – crest in the middle line of the neck, like other enlarged scales on the dorsal side of the body – can be developed in different degrees in different sun-watcher agama populations, not only in *Ph. persicus* (also in Blandford, 1876; Schwenk, Greene, 1987; Golubev, Mezhzherin, 1999).

The nominal subspecies *Ph. h. helioscopus* is clearly distinguished from all other sun-watcher toad-headed agamas by the jet-black tail tip. *Ph. persicus* and *Ph. horváthi* can be distinguished in comparative length of body and tail and distance between nostrils. In *Ph. horváthi* tail is thin and longer than the body (even longer and thinner than in *Ph. h. helioscopus*), in *Ph. persicus* the tail is usually shorter or equal to the body length. Distance between nostrils could be expressed as ratio to the body length – in *Ph. horváthi* larger than 200, in *Ph. persicus* – less than 200 (Melnikov et al., 2008).

Specimens of «*Ph. persicus*» from southern Iran differ morphologically and genetically from the real *Ph. persicus* from central Iran and we describe it



**Fig. 2.** All known findings of sun-watcher *Phrynocephalus* in Transcaucasia and Iran with important locality names. Black dots in west – *Ph. horváthi*; red dots – *Ph. persicus* and *Phrynocephalus* sp. nov.; black dots in east – *Ph. helioscopus*

herein as new species, together with Lectotype and Neotype designations for *Ph. persicus* and *Ph. horváthi* respectively with morphological descriptions of all type specimens.



**Fig. 3.** ML phylogenetic relationships between *Ph. persicus*, *Ph. horváthi* and *Ph. sp. nov.* based on the mtDNA gene ND2, 700 base pairs (Melnikov et al., 2008, with changes)

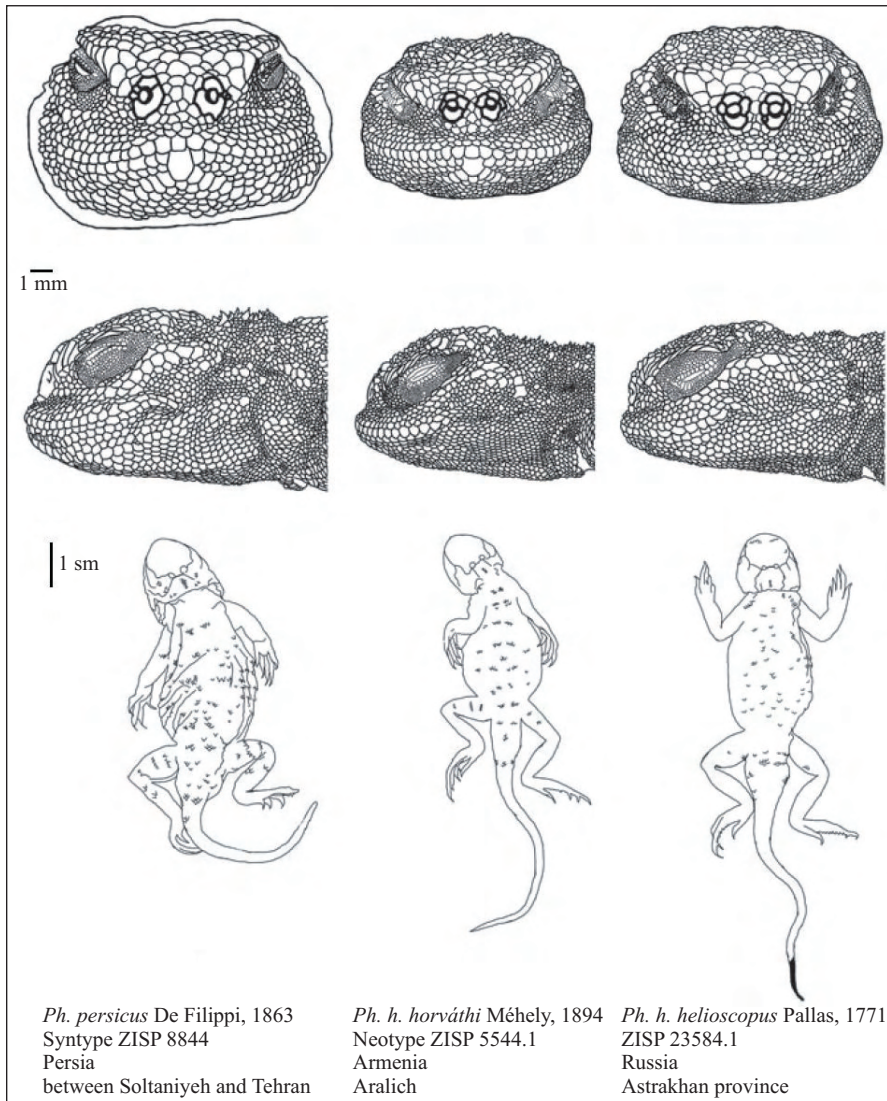


Fig. 4. Diagnostic characters of *Ph. persicus*, *Ph. h. horváthi* and *Ph. h. helioscopus* (Melnikov et al., 2008, with changes)

***Phrynocephalus persicus* De Filippi, 1863**

*Lectotype.* ZISP 8844 (Fig. 4; 7 a, b; 8 a, b - left; 9 a), adult female collected by Filippo de Filippi<sup>1</sup>.

*Paralectotypes.* MZUT R396(358); MSNG CE 9597; NMW 24821.

*Type locality.* Desert fields in Iran by the road from Sultaniyeh to Teheran (Fig. 2).

*Description of the lectotype.* ZISP 8844, adult female.

<sup>1</sup> Lectotype designated to clarify taxonomical status of species described and due to revision of the group; we herein do not follow recommendation 74D of *International Code of Zoological Nomenclature* (ICZN, 1999) and designate Lectotype from ZISP collection as we have largest *Phrynocephalus* types collection and this group traditionally actively studied in ZISP till now.

*Measurements.* SVL: 57 mm, TL: 50 mm, HH: 9.5 mm, HW: 12.6 mm, HL: 14.2 mm, length of left forelimb: 22 mm, length of left hind limb: 37 mm (including toe length, not including claw).

*Description.* Robust body. Head and body depressed. Nostril directed upper and laterally, pierced in the central part of small nasal scale. No depression between nasals. Nasal scale is visible from above, lower nasal is very large, about seven times larger than scales between nasals, upper nasal about two times larger than scales between nasals. Nasals separated from the first canthal scale by one small scale. There are eight enlarged polygonal scales in the central frontal area, about twice larger than interorbital scales. Interorbital scales about same size as parietal, temporal and occipital scales. Two enlarged scales of oval shape, at the each side of occipital area of the head, slightly tubercled. There is a row of eight thorn-like scales in the middle line of neck, starting from scales between enlarged occipitals and forming a crest, second, fourth and fifth are largest with dark almost black tip. Occipital about same

size as surrounding scales. There is a line of six-seven enlarged tubercled scales, at the each side of the temporal area of the head, from lower posterior part of the orbit in the hind direction, last one is the largest. Supraorbitals about twice smaller than interorbitals. There are 14 upper and 17 (left) – 15 (right) lower labial scales. There is no external ear. Gular fold slightly developed, distinguished as line separating scales of different size. Dorsal scales are smooth, heterogeneous, little larger than lateral scales, but there is no distinguished longitudinal row of enlarged scales. There are enlarged thorn like protruding scales, single or in groups of three-five scales, along the middorsal line, about two times larger than normal scales. Lateral body scales are very small and smooth, with a group of five-six scales, forming tubercle with central enlarged thorn like scale, that is significantly less developed than those on the dorsal part. These tubercles

distinguishably mark the border between lateral and ventral scales. There are 144 scales rows around midbody, 84 dorsal scales along the vertebrate and 76 ventral scales along the belly between the anterior border of the shoulders and cloaca. No precloacal or femoral pores. Dorsal body scales are smooth, not mucronate, only thorny scales protrude. Gular scales are smooth, ventral scales smooth. Scales of the upper side of extremities are smooth, about twice larger than dorsal scales, with enlarged protruding thorn like scales like those on the dorsum, but smaller. Hind limb short, toes reaching gular fold when adpressed. The fourth toe is longest, reaching 7 mm. Lamellae 13 under the left fourth finger, 16 lamellae under the left fourth toe. Forelimb is short, digits not reaching even femoral articulation when adpressed. In the manus fourth finger is the longest, reaching 5 mm. Tail little depressed at its base. Dorsal tail scales are smooth, about same size as scales on the extremities. Ventral tail scales are smooth. Tail scales not arranged in whorls.

*Coloration (after ethanol preservation).* Upper parts of the body are gray, with dirty yellowish tint of shedding skin. There are dark brownish crest scales on the neck, three pairs of dorsal dark brownish patches – in the underarm area, before the limbs and at the tail base. There are also dark almost black dots singly or in groups, irregularly covering dorsal side of body and extremities. Tail is gray from above, with dirty yellowish tint of shedding skin, without dark dots, with 8 – 9 gray patches on the sides. Ventral body side coloration is off-white with dirty yellowish tint of shedding skin, especially on the belly. Throat off-white, with gray vermicular pattern.

#### ***Phrynocephalus horváthi* Méhely, 1894**

*Neotype.* ZISP 5544.1 (Fig. 4; 7 e, f; 8 a, b – right), adult male collected by Ivan S. Polyakov in 1879 in Aralich<sup>2</sup>.

*Type locality.* Aralich village, base of Ararat mountain (Fig. 2).

*Description of the neotype.* ZISP 5544.1, adult male.

<sup>2</sup> Was designated by Barabanov et Ananjeva (2007), herein we just approve their act following rules of *International Code of Zoological Nomenclature* (ICZN, 1999); Neotype designated to clarify taxonomical status of species described and due to revision of the group; type specimens of *Phrynocephalus helioscopus* (Pall.) var. *Horváthi* Méhely, 1894 – male and female (Méhely, 1894 a, b, 1899) – was lost in 1956 together with whole herpetological materials of Hungarian Museum (communication from Judit Voros to Natalia Ananjeva, 29.06.2005); proposed Neotype fit well to the original description.

*Measurements.* SVL: 48 mm, TL: 60 mm, HH: 8 mm, HW: 11.5 mm, HL: 11.8 mm, length of left forelimb: 22 mm, length of left hind limb: 36 mm (including toe length, not including claw).

*Description.* Slender body. Head and body depressed. Nostril directed forward, pierced in the central front part of small nasal scale. There is no depression between nasals. Nasal scale is not visible from above, upper nasals are twice larger and lower nasals three times larger than surrounding scales, separated from the first canthal scale by three small scales. Frontal, intraorbital, parietal, temporal and occipital scales are uniform and about same size, slightly larger than supraorbitals. One enlarged tubercled scale, at the each side of occipital area of the head. There is a row of nine thorn-like scales in the middle line of neck, starting after scales between two enlarged occipitals and forming a crest, in three groups – first four and last three are the largest, jet black colored. Occipital is same size as surrounding scales. There is a line of five-six enlarged flat scales, at the each side of the temporal area of the head, from lower posterior part of the orbit in the hind direction, last one is the largest. Supraorbitals are small, two-three times smaller than interorbitals, with some slightly enlarged thorny shaped scales between them. There are 13 upper and 14 (left) – 15 (right) lower labial scales. There is no external ear. Gular fold slightly developed, distinguished as line separating scales of different size. Dorsal scales are smooth, heterogeneous, little larger than lateral scales, but there is no distinguished longitudinal row of enlarged scales. There are enlarged thorn-like protruding scales in a groups of two-ten scales on the dorsum, about 1.5 (rarely 3) times larger than normal scales. Lateral body scales are very small and smooth, with some slightly enlarged scales on the slightly distinguished tubercles formed by groups of scales. There are 135 scales rows around midbody, 76 dorsal scales along the vertebrate and 80 ventral scales along the belly between the anterior border of the shoulders and cloaca. No precloacal or femoral pores. Dorsal body scales are smooth, not mucronate, only thorny scales protrude. Gular scales are smooth, ventral scales smooth. Scales of the upper side of extremities keeled and mucronate, about same size or 1.5 times larger than dorsal scales, there is no enlarged protruding thorn like scales on the extremities. Hind limb is long, toes reaching eye when adpressed. The fourth toe is longest, reaching 7 mm. Lamellae 14 under the left fourth finger, 20 lamellae under the left fourth toe. Forelimb is long, digits reaching femoral articulation when adpressed. In the manus fourth finger is the longest, reaching 5 mm. Tail is little depressed at its base, with small pit after the cloaca. Large hemipeneal pockets present. Dorsal tail scales

are smooth, same size as scales on the extremities. Ventral tail scales smooth. Tail scales are not arranged in whorls.

*Coloration (after ethanol preservation).* Coloration contrasting black and gray to light-gray. Upper parts of the body are dark gray, with blackish crest scales on the neck, three pairs of blackish dorsal patches – in the underarm area, before the limbs and at the tail base. There are also three pair of smaller patches between the first and second pair and eight patches of joining together pairs on the tail, after third pair, forming dark tail cross bands. There are dark, black and white dots single or in groups, irregularly covering dorsal side of body and extremities. Extremities are gray with about nine (fore limb) to eleven (hind limb) transversal bands, especially contrasting on toes, where they appear as black and white cross bands. Head is gray with lighter band from one eye to another, bounded by darker, almost black cross bands. Five small dark patches at the each side of the head are above supralabials and five are below infralabials. Tail is gray from above, became lighter in it distal part, with eight dark bands on the sides that was described above. Ven-

tral body side coloration is uniformly off-white, only light brownish tail cross bands slightly appear in the middle part of tail, and there are some brownish film on the breast, and infralabial patches described above.

***Phrynocephalus ananjevae* sp. nov.**

*Holotype.* ZISP 10256.1 (Fig. 5), adult male collected by Nikolai Zarudny on 14.04.1904.

*Paratypes.* Two adult females, without heads, ZISP 10256.2 – 3, two subadult males 10256.4 and ZISP 10257 (Fig. 6 a), with the same data as Holotype. And three specimens from the reptile collection of International Center for Science, High Technology and Environmental Sciences Zoological Museum (ICSTZM) in Kerman, Iran – ICSTZM6H1207-08 and ICSTZM6H1211 from Abadeh, Bahman region (in the road to Tange Firuz), Fars province.

*Type locality.* Qahferokh (approximately 32°16' N, 50°58' E, now vicinity of Farokhshahr), Zagros mountains, southern Iran (Fig. 2).

*Diagnosis.* Medium sized *Phrynocephalus* with enlarged thorny scales on the dorsal side of the body, forming distinguishable crest on the neck; with short tail, shorter or equal to the body, in males slightly longer and short extremities; with scales on the extremities not keeled; without jet-black tail tip; with longitudinal row of enlarged scales along the vertebra; with large distance between nostrils (up to 5 scales in one row); nostrils directed forward, supra- and infanasals same size as surrounding scales; with 13 supralabials.

*Description of the holotype.* ZISP 10256.1, adult male.

*Measurements.* SVL: 50 mm, TL: 54 mm, HH: 8.6 mm, HW: 13.3 mm, HL: 12.8 mm, length of left forelimb: 21 mm, length of left hind limb: 36 mm (including toe length, not including claw).

*Description.* Head and body depressed. Nostril directed forward and laterally, pierced in the central front part of small nasal scale. There is a slightly developed depression between nasals. Nasal scale is not visible from above, surrounded by same sized scales, separated from the first canthal scale by two-three small scales. One enlarged polygonal scale in the frontal area, on the each



**Fig. 5.** Holotype of *Phrynocephalus ananjevae* sp. nov.: a – general view from above; b – general view from below; c – head from above; d – head from below; e – head from side; f – head from front

side of the head, is above the first two enlarged canthal scales, first – about half size and second about same size as polygonal scale. Between these two polygonal scales there is also group of eight enlarged scales in three transversal rows, little smaller in size than polygonal scale. Interorbital scales are about same size as parietal, temporal and occipital scales. Two enlarged scales of irregular shape, at the each side of occipital area of the head, front one is flat more or less rectangular and hind one is almost triangle shape, thorn-like. There is a row of seven thorn-like scales in the middle line of neck, starting after enlarged scales in the occipital area and forming a crest, with first, fourth and seventh are the largest. Occipital is same size as surrounding scales. There is a line of five-six enlarged tubercled scales, at the each side of the temporal area of the head, from lower posterior part of the orbit in the hinder direction, last one is the largest and thorn like. Supraorbitals are small, about three times smaller than interorbitals, with some slightly enlarged thorny shape scales between them. There are 13 upper and 16 (left) – 15 (right) lower labial scales.

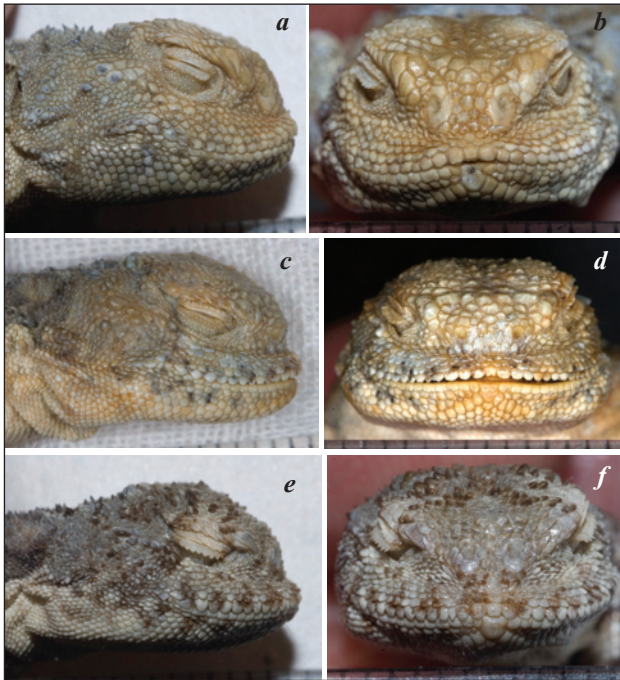
There is no external ear. Gular fold slightly developed, distinguished as line separating scales of different size. Dorsal scales are smooth, heterogeneous, longitudinal row of enlarged scales present. There are enlarged thorn-like protruding scales, single or in groups of two-three scales, between longitudinal row scales, about three times larger than normal scales. Lateral body scales are very small and smooth, with a groups of about seven scales, forming tubercle with central

enlarged thorn-like scale, that is significantly less developed than those on the longitudinal row. These tubercles form a distinguishable mark at the border between lateral and ventral scales. There are 123 scales rows around midbody, 81 dorsal scales along the vertebrate and 78 ventral scales along the belly between the anterior border of the shoulders and cloaca. No preloacal or femoral pores. Dorsal body scales are smooth, not mucronate, only thorny scales protru-



**Fig. 6.** Series: *a* – type series of *Phrynocephalus ananjevae* sp. nov.; comparative specimens from central Iran: *b* – collected by Nikolay Zarundy (Khoshkeri, Khara Magommed Abad and Naim Abad); *c* – from Shirin Su





**Fig. 7.** Head scalation in type specimens of: *Ph. persicus*. Lectotype: *a* – head from side; *b* – head from front; *Ph. ananjevae* sp. nov. Holotype: *c* – head from side; *d* – head from front; *Ph. horváthi*. Neotype: *e* – head from side; *f* – head from front

de. Gular scales are smooth, ventral scales are smooth. Scales of the upper side of extremities are smooth, about same size as scales of the longitudinal row, with enlarged protruding thorn like scales like those on the longitudinal row, but smaller. Hind limb is not long, toes reaching temporal area of the head when adpressed. The fourth toe is longest, reaching 7 mm. Lamellae 11 under the left fourth finger, 16 lamellae under the left fourth toe. Forelimb is not long, digits not reaching even femoral articulation when adpressed. In the manus fourth finger is the longest, reaching 4 mm. Tail is little depressed at its base, with small pit after the cloaca. Large hemipeneal pockets present. Dorsal tail scales are smooth, same size as scales in the longitudinal row of enlarged dorsal scales. Ventral tail scales smooth. Tail scales are not arranged in whorls.

*Description of Paratypes.* Presented in Table 1.

*Coloration (after ethanol preservation).* Upper parts of the body are gray, except dark brownish crest scales on the neck, three pairs of dorsal dark brownish patches – in the underarm area, before the limbs and at the tail base. There are also dark dots singly or in groups, irregularly covering dorsal side of body and extremities. Tail is gray from above, without dark dots, with a lighter almost white distal half and sides, with 8–9 gray patches on the sides bounded by almost black dots, forming 3–5 ocelli in the first third of tail. Ventral body side coloration is uniformly off-white yellowish.

*Etymology.* Species is named in honor of Natalia Ananjeva, Zoological Institute, St. Petersburg (Russia) in recognition of her contribution to herpetological research of Agamidae and *Phrynocephalus* in particular. She helps a lot to all of the coauthors in their zoological careers. Especially she helped the first author, to whom she proposed in 2005 to resolve the problem with *persicus-horváthi* complex, and that was a start point for his agamid studies.

*Distribution.* Species is known from southern Iran, Zagros mountains in the vicinity of Qahferokh and Abadeh.

**Morphological comparisons**

*Ph. ananjevae* sp. nov. differs from sun-watcher agamas of the *Ph. helioscopus* complex in absence of distinguishable jet-black tail tip, that is present in *Ph. helioscopus* (Fig. 4); in the presence of enlarged thorny scales on the dorsal side of the body, forming distinguishable crest on the neck vs. no thorny scales and neck crest in *Ph. helioscopus* (Fig. 4); in short tail (shorter or slightly longer than body vs. longer than body in *Ph. helioscopus* (Fig. 8).

*Ph. ananjevae* sp. nov. differs from *Ph. horváthi* mostly in characters common for *Ph. persicus*: presence of enlarged thorny scales on the dorsal side of the body, forming distinguishable crest on the neck vs. less developed thorny scales in *Ph. horváthi* (Fig. 4); short tail (shorter or slightly longer than body vs. considerable longer than body in *Ph. horváthi*) (Fig. 8); scales on the extremities are not keeled vs. strongly

**Table 1**

Morphological characters of *Phrynocephalus ananjevae* sp. nov. type series

	Sex	L	Lcd	HH	HW	HL	Lf	Lh	Sl	IL	SaM	Ds	Vs	4t	4f	Sdt	Sdf
Holotype																	
ZISP 10256.1	m	50	54	8.6	13.3	12.8	21	36	13	16	123	81	78	7	4	16	11
Paratypes																	
ZISP 10256.2	f	39+	47	–	–	–	22	35	–	–	130	77	67	7	4	15	12
ZISP 10256.3	f	41+	48	–	–	–	22	38	–	–	126	75	74	7	4	17	12
ZISP 10256.4	m	37	37	6.7	10.1	10.5	19	28	13	16	125	79	72	6	3.5	15	11
ZISP 10257	m	39	–	7.4	10.4	11	17	28	13	15	127	76	74	5	3.5	14	10



**Fig. 8.** General view of type specimens: *Ph. persicus* Lectotype, *Ph. ananjevae* sp. nov. Holotype and *Ph. horváthi* Neotype: a – from above; b – from below

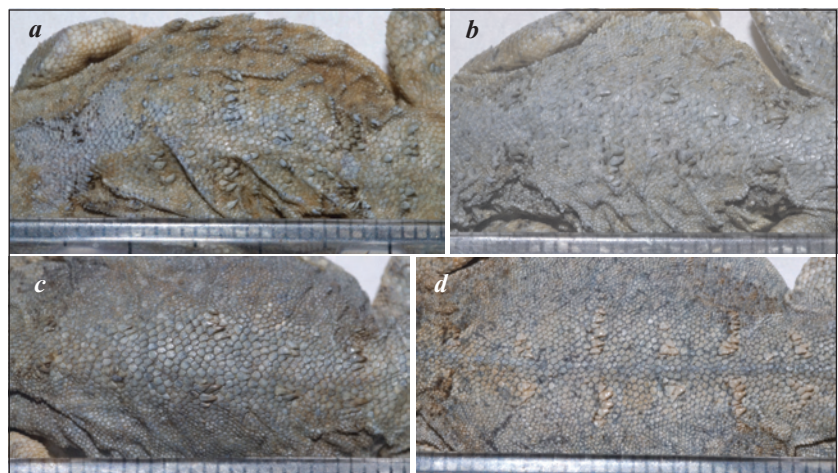
keeled in *Ph. horváthi*; presence of enlarged protruding thorn like scales on the extremities vs. absence in *Ph. horváthi*; fore- and hind limbs are short (toes not reaching eye when adpressed vs. reaching in *Ph. horváthi*; digits not reaching femoral articulation when adpressed vs. reaching in *Ph. horváthi*); fingers and toes are short (11 and 16 lamellae under the left fourth finger and toe respectively vs. 14 and 20 in *Ph. horváthi*).

*Ph. ananjevae* sp. nov. differs from *Ph. persicus* in presence of longitudinal row of enlarged scales along the vertebra (Fig. 9), with 75 – 81 dorsal scales in *Ph. ananjevae* sp. nov. vs. 82 – 98 in *Ph. persicus*; small supra- and infranasal scales, that equal in size to the surrounding scales vs. *Ph. persicus* with considerable enlarged infranals (Fig. 7); less number of supralabials, 13 in *Ph. ananjevae* sp. nov. vs. 13 – 17 in *Ph. persicus* (Fig. 7 a, c).

Series of species compared (Fig. 6) and their morphological measurements comparison (Table 2) represented.

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**Fig. 9.** Dorsal scalation: a – *Ph. persicus* Lectotype female, b – *Ph. ananjevae* sp. nov. Holotype male; c – *Ph. ananjevae* sp. nov. Paratype female; d – *Ph. persicus* female ZISP 25013

**Table 2**

Comparison of some morphological characters of *Phrynocephalus ananjevae* sp. nov. type series with types and comparative specimens of *Phrynocephalus persicus* and *Phrynocephalus horváthi*

	Sex	L	Lcd	Sl	Ds
<b><i>Phrynocephalus ananjevae</i> sp. nov.</b>					
<b>Holotype</b> (ZISP 10256.1)	m	50	54	13	81
<b>Paratypes</b> (ZISP 10256.2)	f	39+	47	–	77
ZISP 10256.3	f	41+	48	–	75
ZISP 10256.4	m	37	37	13	79
ZISP 10257	m	39		13	76
<b><i>Phrynocephalus persicus</i></b>					
<b>Lectotype</b> (ZISP 8844)	f	57	50	14	84
ZISP 10258.1	f	52	49	13	86
ZISP 10258.2 (10339)	f	49	46	15	92
ZISP 10258.3	f	50	49	14	89
ZISP 10259	f	52	48	14	82
ZISP 25013	f	55	50	17	91
ZISP 25014	m	48	49	16	88
ZISP 25015	f	46	42	15	98
ZISP 25016	f	38	36	15	96
ZISP 25017	f	35	35	14	89
<b><i>Phrynocephalus horváthi</i></b>					
<b>Neotype</b> (ZISP 5544.1)	m	48	60	13	76

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**ТАКСОНОМИЧЕСКАЯ РЕВИЗИЯ КРУГЛОГОЛОВОК  
ГРУППЫ *PHRYNOCEPHALUS PERSICUS* DE FILIPPI, 1863  
С ОПИСАНИЕМ НОВОГО ВИДА ИЗ ЮЖНОГО ИРАНА, ЗАГРОС**

**Д. А. Мельников<sup>1</sup>, Е. Н. Мельникова<sup>1</sup>, Р. А. Назаров<sup>2</sup>, Мехди Раджабизаде<sup>3,4</sup>**

<sup>1</sup> Зоологический институт РАН  
Россия, 199034, Санкт-Петербург, Университетская наб., 1  
E-mail: melnikovda@yandex.ru

<sup>2</sup> Зоологический музей Московского государственного университета  
Россия, 125009, Москва, Б. Никитская, 6  
E-mail: r\_nazarov@mail.ru

<sup>3</sup> Кафедра эволюционной морфологии позвоночных, Университет Гент  
Гент, Бельгия

<sup>4</sup> Отдел биоразнообразия Института науки, высоких технологий и естественных наук,  
Университет новых технологий

Керман, Иран  
E-mail: khosro.rajabizadeh@gmail.com

Описывается новый вид круглоголовки из комплекса *Phrynocephalus persicus* De Filippi, 1863 из южного Ирана, Загрос. Он отличается от *Ph. persicus* меньшим количеством верхнегубных щитков, наличием на спине продольного ряда увеличенных чешуй, маленькими верхне- и нижненосовыми щитками, и молекулярно-генетическими признаками.

**Ключевые слова:** Squamata, Acrodonta, Agamidae, *Phrynocephalus* sp. nov., Иран, Загрос.