Online ISSN: 2588-3526

Journal of Wildlife and Biodiversity

*Volume 9(1): 433-456 (2025) (*http://www.wildlife-biodiversity.com/*)*

Review Article

Systematics and distribution of the genus *Paralaudakia* Baig, Wagner, Ananjeva and Böhme, 2012 (Sauria, Agamidae): A review

Hamidreza Azhar[1], Ahmad Gharzi*[2], Khosrow Chehri[3], Rasoul Karamiani[4]

Department of Biology, Faculty of Science, Razi University, Kermanshah, Iran
*Email: adgharzi@razi.ac.ir

Received: 11 August 2024 / Revised: 24 October 2024 / Accepted: 26 October 2024/ Published online: 27 October 2024.
How to cite: Azhar, H., Gharzi, A., Chehri, KH., Karamiani, R. (2025Systematics and distribution of the genus Paralaudakia Baig, Wagner, Ananjeva and Böhme, 2012 (Sauria, Agamidae): A review, Journal of Wildlife and Biodiversity, 9(1), 433-456. **DOI**: https://doi.org/10.5281/zenodo.14635234

Abstract

The purpose of this study is to assess the genus *Paralaudakia*. Baig et al., 2012 based on 54 morphological characteristics divided genus *Laudakia* into three different genera: *Laudakia* Gray, 1845; *Stellagama* Baig, Wagner, Ananjeva and Böhme, 2012; and *Paralaudakia* Baig, Wagner, Ananjeva and Böhme, 2012. The genus *Paralaudakia* inhabits the mountainous rock settings. Its range includes eight recognized species and ranges from Greece and the delta of the Nile on the west, through Central Asia and the Middle East, to the northeastern Gobi Altai and the Brahmaputra River on the east. The Caucasian rock agama consists of eight species *P. caucasia* (Eichwald, 1831), *P. erythrogaster* (Nikolsky, 1896), *P. badakshana* (Anderson & Leviton, 1969), *P.bochariensis* (Nikolsky, 1897), *P. himalayana* (Steindachner, 1867), *P. lehmanni* (Nikolsky, 1896), *P. microlepis* (Blanford, 1874), and *P. stoliczkana* (Blanford 1875).

Keywords: *Paralaudakia*, Agamidae, Distribution

Introduction

Lizards of the Agamidae family range in size from little to large (25 to 900 mm). Five fingers are typically seen in acrodont teeth, moveable eyelids, and motor organs. The Agamidae, a monophyletic family of lizards, are distributed throughout the Old World (Sayyadi et al., 2019). They inhabit Asia, Africa, and Europe, but not in Madagascar or the Pacific Islands. Their geographic distribution matches the Iguanidae family's (Vitt and Caldwell, 2013). The physical structure, behavioural pattern, and ecological exploitation usage of lizards in these two groups show notable similarities (Avery, 1982). Numerous investigations into the phylogeny and

taxonomy of the Agamidae family have demonstrated *Laudakia's* paraphyletic status. They identified the *L. tuberculata* group as basal to this whole clade, whereas the *L. caucasia* group is a sister taxon to a clade that includes several *Phrynocephalus* species and *Laudakia stellio* (Bohme, 1982; Joger, 1991; Lazell, 1992; Macey et al., 1997; Moody, 1980; Schwenk, 1994). The Agamidae family has about 586 species in 67 genera and six subfamilies: Agaminae, Amphibolurinae, Draconinae, Hydrosaurinae, Leiolepidinae, Uromastycinae, The subfamily Agaminae consists of ten genera, among which are *Paralaudakia* and *Laudakia* (Uetz & Hošek, 2023). *Lacerta stellio* was the first species of the *Laudakia* group to be described and classified by Linnaeus in 1758. Originally, herpetologists classified agamids incorrectly because of their morphological and behavioural similarities to iguanids. For instance, Laurenti (1768) misidentified *Lacerta stellio* as *Iguana cordinilla*. An additional species, *Tropidurus torquatus*, was mistakenly identified as *Stellio torquatus* in 1820 (Burt & Burt, 1932). The lizard species of the genus *Laudakia* Gray, 1845 and genus *Paralaudakia* Baig et al., 2012 In the past, belonged to the Genus *Stellio* and African genus *Agama* Daudin, 1802 (Boulenger, 1885; Wermuth, 1967) and were distributed in mountainous rocky landscapes of the arid zone, from Greece and the delta of the Nile River in the west, through Asia Minor, Western Asia, and formerly Soviet Central Asia, to a large bend of the Brahmaputra River in the east, and the Gobi Altai Mountains in the northeast (Ananjeva et al., 2004).

In 1980, Moody brought 22 species, including some African taxa, back into the genus *Agama*, resurrecting six genera, including *Stellio*. For Asian rock agamids, Leviton et al. (1992) use the generic name *Laudakia* Gray, 1845, and for the Afro-Arabian group of taxa, *Acanthocercus* Fitzinger, 1843. In 1997, Baig replaced the *Stellio* group with two new groups based on variations in morphology, anatomy, karyotypic, and biochemistry: *Laudakia* for Palearctic species and *Acanthocercus* for Afro-Arabian species (Baig and Böhme, 1997). Melville shows that *Laudakia* is monophyletic (Melville et al., 2009), but Macey and Wagner's research has demonstrated that *Laudakia*, as recently acknowledged, is paraphyletic (Macey et al., 2000; Wagner et al., 2009) (Fig. 1). Furthermore, *Laudakia* is demonstrated by Edwards and Melville (2011), who based their research on mtDNA studies, to be monophyletic and a sister taxon to *Phrynocephalus* Kaup, 1825 (Edwards and Melville, 2011) (Fig. 2). The genus *Laudakia* was split into three genera: *Stellagama* Baig, Wagner, Ananjeva and Böhme, 2012; *Laudakia* Gray, 1845; and *Paralaudakia* Baig, Wagner, Ananjeva and Böhme, 2012.

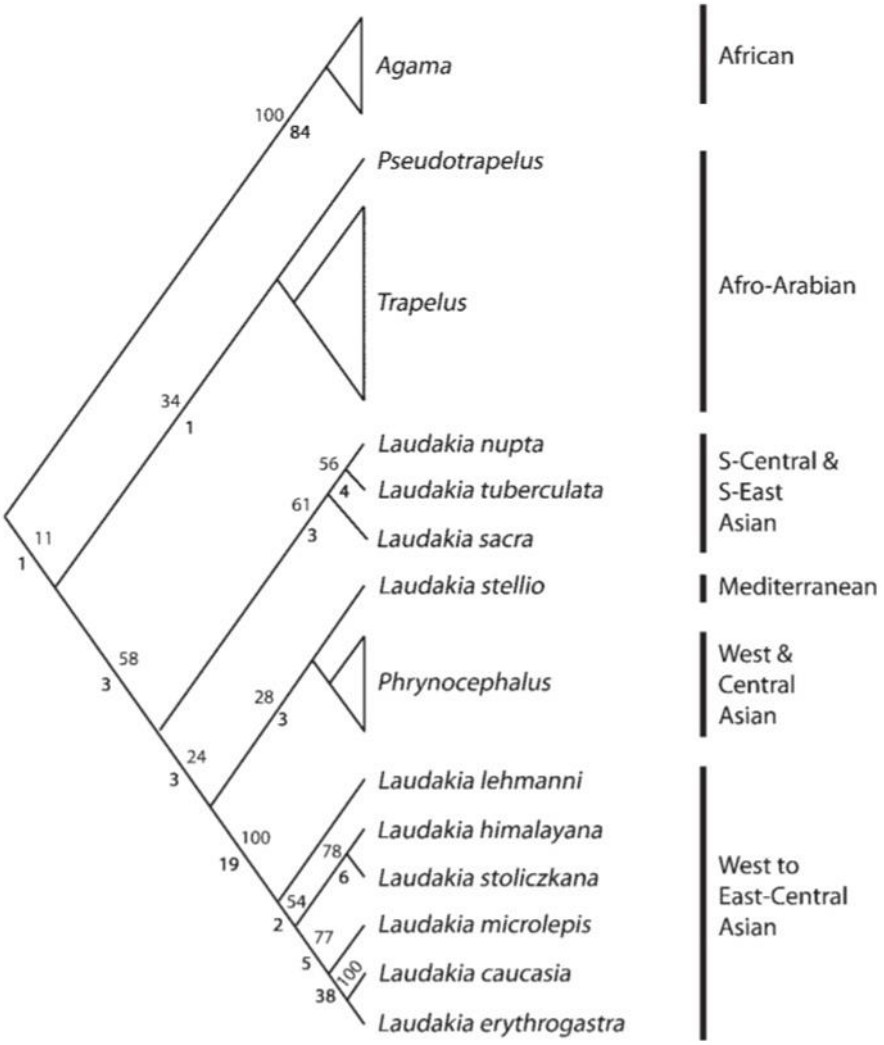

Figure 1. Phylogeny of *Laudakia* modified after Macey et al. (2000b). Bootstrap values are presented above branches, decay indices in bold below branches (Baig et al., 2012).

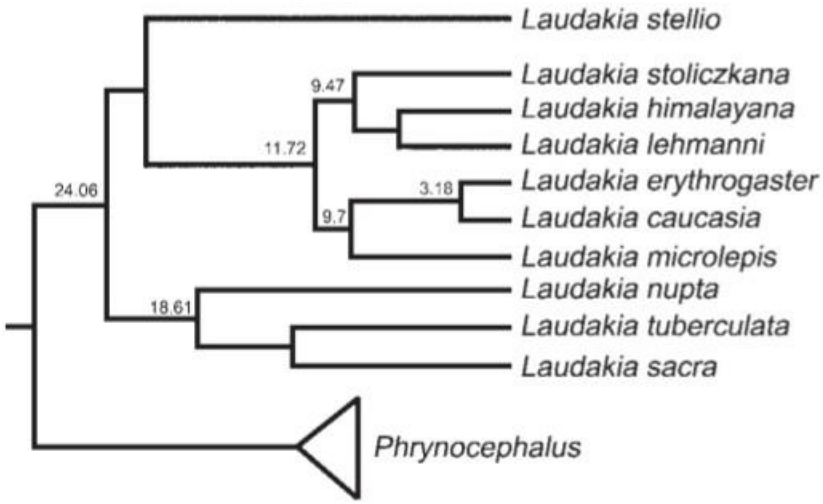

Figure 2. Ultrametric BEAST output for an mtDNA analysis, modified after Edwards & Melville (2011). Node ages are shown in mya (Baig et al., 2012).

Systematic Account

Genus *Paralaudakia* Baig, Wagner, Ananjeva and Böhme, 2012

Type species: *Stellio caucasius* Eichwald, 1831

Definition: Tail arranged in separate whorles of usually three, only sometimes two or four scale annulis. Gular scales flat. Vertebrate scales are larger than other back scales, and body scales are heterogeneous, atypical and keeled. Tail length about two times the snout-vent length or longer (Ananjeva et al., 2019).

Distribution: *Paralaudakia* is an agamid genus found in mountain rock landscapes. Its distribution ranges from Greece and the Nile River delta on the west, through the Middle East and Central Asia, to Gobi Altai on the northeast and Brahmaputra River on the east (Yousefkhani et al., 2013) (Fig. 3).

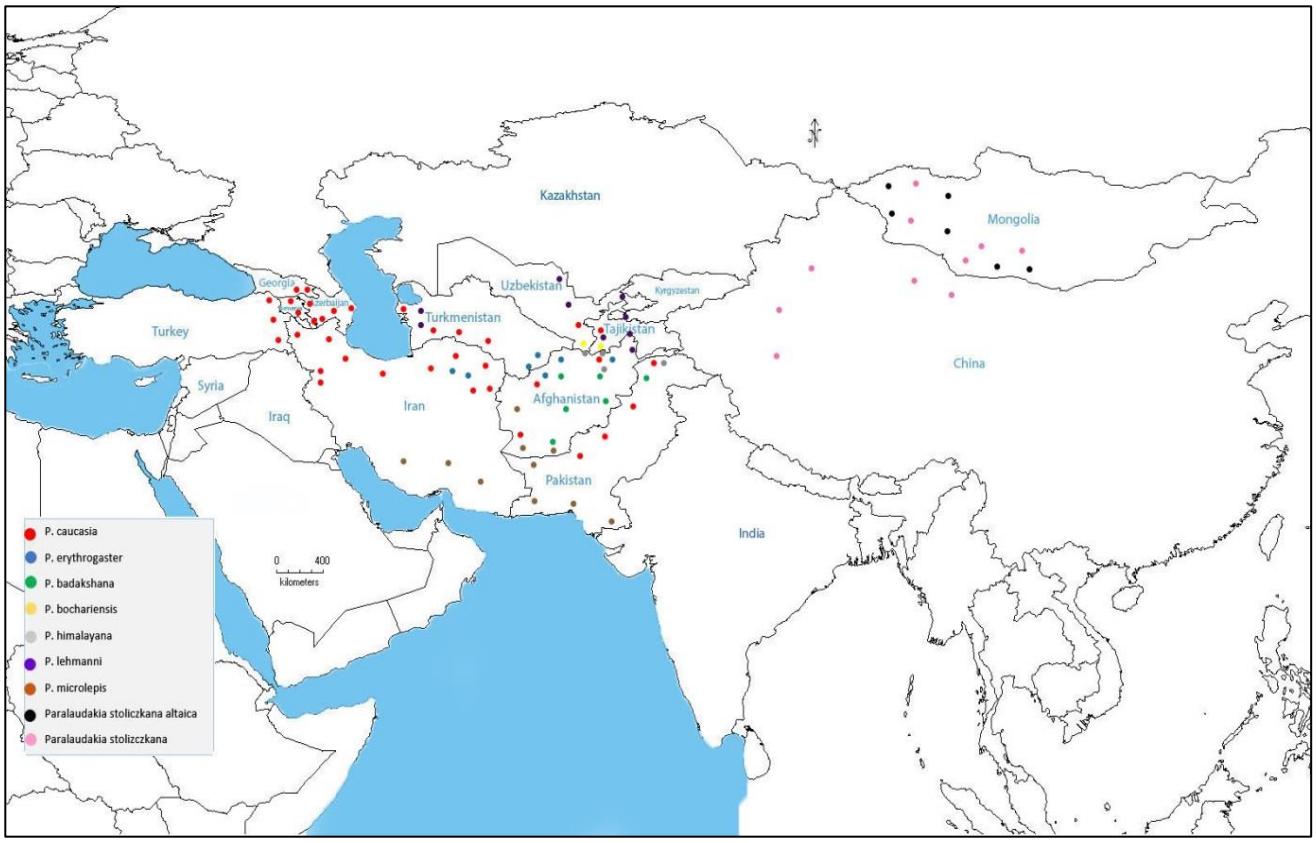

Figure 3. Distribution of the genus *Paralaudakia*.

Paralaudakia caucasia (Eichwald, 1831)

Common Names: *Caucasian Agama, Kaukasus Agama*

Synonyms: *Lacerta muricata* (Pallas, 1801), *Stellio caucasicus* (Eichwald, 1831), *Agama caucasica* (Boulenger, 1885), *Agama reticulata* (Nikolsky, 1911), *Laudakia caucasia* (Sindaco, 2008).

Type Locality: limited to Baku, Azerbaijan by Anderson (1999), originally Tiflisium [= Tbilisi, Georgia] and Bacuam [= Baku] (Eichwald, 1831).

Diagnosis: Size is Medium to large; head and body sunk; olivaceous above with black fringe yellow ocelli; vertebrate enlarged scales keeled; sides with enlarged mucronate scales; tail has two segments; callous glands present (Baig et al., 2012).

Description: Head and body much sunk and nostril lateral, under the canthus rostralis, slightly tubular. Over head-scales smooth; occipital not magnified; tiny conical spinose scales on the side of the head near the ear and on the neck; ear greater than the eye-opening. Throat strongly wrinkled; no gular pouch. Body very depressed, with a very indistinct lateral plication; nuchal and laterodorsal scales very tiny, granular; a vertebral region with enlarged slick, weakly keeled, rather irregular scales; flanks with enlarged, strongly keeled or spiny scales; no mauve denticulation; abdominal scales smooth, distinctly smaller than the enlarged dorsals. 150 to 160 scales around the middle of the body. Limbs heavy, with compressed digits; the scales on the over surface of limbs much enlarged, strongly keeled, generally spinose; fourth finger slightly longer than third; fourth toe longer than third, fifth extending beyond first. Tail is rounded, sunk at the base, and covered with rather large spinose scales arranged in loops, two rings forming a distinct segment; the length of the tail does not similar, quite twice the distance from the gular fold to the vent. Male with a large vamp of callose preanal scales and an enormous vamp of similar scales on the belly. Olivaceous superior, with round yellowish black-edged blots, the black frequently forming a plexus; vertebral region yellowish, limbs with more or less distinct yellowish cross bars; lower surface yellowish in the female, blackish in the breeding male (Ananjeva et al, 2021; Yousefkhani et al., 2013; Ananjeva et al., 2019) (Fig. 4).

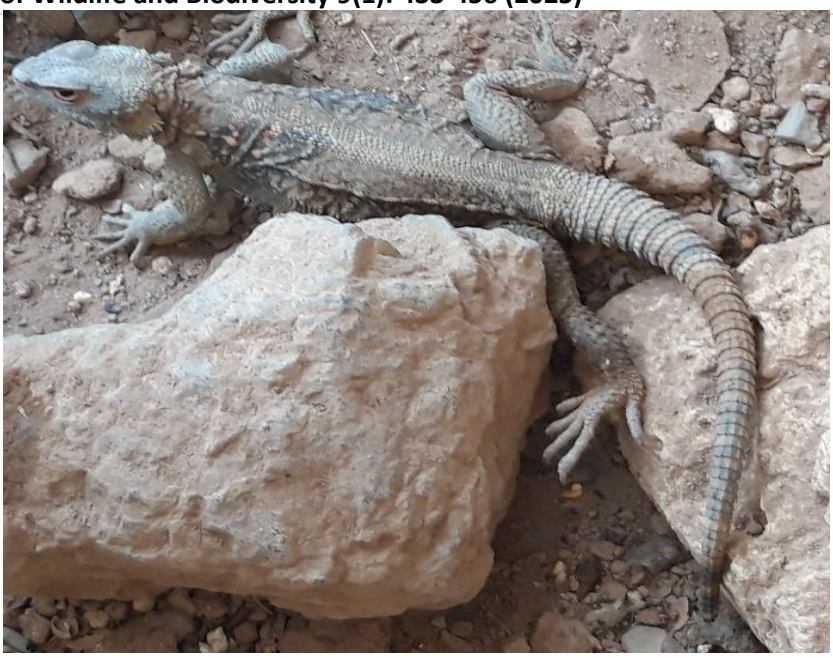

Figure 4. *Paralaudakia caucasia*

Distribution: Transcaucasus (Azerbaijan, Armenia, Georgia), Turkey, northeast Iran during the Elburz mountains, the Kopet-Dagh and Balkhan mountains of Turkmenistan, east of the Caspian Sea, north Afghanistan, north Pakistan, Uzbekistan, and Tajikistan. *P. caucasia* has a fritter distribution pattern in Iran, and there are several reports of the occurrence of this species in the Zagros Mountains (Anderson, 1999; Rastegar-Pouyani and Nilson, 2002; Yousefkhani et al., 2013).

Taxonomy: Annanjeva and Orlova (1979), based on morphological characteristics, segregated different populations of *P. caucasia* into eastern and western groups. Macey et al. (2000) identified three main groups: western populations in the Caucasus, central populations in Elburz and Eastern populations in Balkhan and Kopet-Dagh. No genetic evidence is currently available for the easternmost populations from Afghanistan and Pakistan. Macey et al. (2000) express that tectonic processes are the basis of differentiation among populations. Tectonic processes first fragmented populations in Lesser Caucasus and Elburz Mountains from those in the central and eastern part of the range (Elburz + Balkhan/Kopet-Dagh) about 2–3 MYA. In comparison, a more recent split (about 2.1 MYA) occurred among the Elburz populations and the eastern populations (Macey et al., 2000).

Remarks: In big groups of several hundred individuals, they hibernate. When they are in large numbers in the spring and early summer, they mostly eat insects, but, in the fall, they begin to eat more plants (Anderson, 1999). Individuals whose ages can be accurately determined to within one year for diameters up to 92 mm, two years for sizes up to 116 mm, and three years or more for bigger ones. The most plausible explanations for these individuals' stability and

low turnover are their extended lifespan, postponed reproduction, and inactive lifestyle (Panov and Zykova, 1995).

Habitat: Upland and mountainous regions up to 4,000 meters high, characterized by xerophytes and other herbaceous flora, and accompanied by stone walls and fences, big boulders in river beds, and rocky outcrops, scree, and clay slopes. also found near the Caspian Sea at low altitudes (Anderson, 1999) (Fig. 5).

Figure 5. Habitat of *Paralaudakia caucasia*

***Paralaudakia erythrogaster* (Nikolsky, 1896)**

Common Names: *khorasan agama*, *Rock Redbelly Agama*

Synonym: *Stellio erythrogaster* (Nikolsky, 1896), *Agama caucasica mucronata* (Guibe, 1957), *Agama erythrogaster* (Wermute, 1967), *Laudakia erythrogastra* (Macey, 2000), *Paralaudakia erythrogaster* (Baig, 2012), *Laudakia erythrogaster* (Ananjeva, 2020)

Lectotype: ZISP 8760, designated by Rastegar-Pouyani and Nilson (2002).

Type Locality: Iran, Khorasan Razavi Province, Kalender-Abad, and Fariman (Nikolsky, 1896). Restricted to Fariman by Rastegar-Pouyani and Nilson (2002) by lectotype designation (Rastegar-Pouyani and Nilson, 2002).

Diagnosis: The scales on the behind of the body are not similar, and the same shape; one or two linear rows of bladed ridges on each side of the body, and the number of scales around the middle part of the body is 80 to 114, In the first two-thirds of the tail, there are separate bands, each band consisting of two loops of scales, the throat scales are sharp and strongly bladed in adults (Kiladze and Chernova, 2018).

Description: snout longer than the gap between eye-tympanum or eye width and more than twice that of tympanum diameter; tympanum exposed, more than half of eye width; groups of highly spinose scales present on the neck and sides of the head, especially around tympanum, preauricle constitute round series; vertebral scales strongly keeled, distinctly enlarged, almost similar in size, are not arranged in vertical series but constitute a band; ventral scales sometimes smooth but usually carinated, smaller than enlarged vertebral; gular scales smooth but mucronate; Colour pale brown above with untidy dark brown scales which are sometimes arranged in transverse series; head yellow and may be speckled with black; transverse stripes on the upper parts of legs and tail; underparts yellow, gular may show black marmoreal model but breeding males may be almost black ventrally; in life displays orange shade ventrally (Baig et al., 2012) (Fig. 6).

Figure 6. *Paralaudakia erythrogaster* (www.iranreptiles.blog.ir)

Distribution: Northeastern Iran, mainly around Mashhad, North Afghanistan, South East Turkmenistan, North Afghanistan, elevation 1000-2440 m (Baig et al., 2012).

Taxonomy: Although its validity is questionable, Tuniyev et al. (1991) classified *P. erythrogaster nurgeldievi* as a subspecies based on physical differences (Tuniyev, Atayev, and Shammakov, 1991). In 1998, Macey used mitochondrial DNA and found no discernible differences, classifying it as a synonym (Macey et al., 1998).

Remarks: It uses rodent nest as a hiding place and feeds on insects, especially beetles and caterpillars, and plants (Terent'ev & Chernov, 1949) and Ananjeva et al. (1998), although Naru's experiments did not show any plant material in the stomach of this lizard

Habitat: Semi-desert region in sandy soils, mixed with clay and limestones, full of deep holes and cracks, with little vegetation, including small bushes or short shrubs.

***Paralaudakia badakshana* (Anderson and Leviton, 1969)**

Common Names: *Badakhshana Rock Agama*

Synonym: *Agama badakhshana* (Anderson, 1969), *Stellio badakhshana* (Ananjeva, 1990), *Laudakia badakhshana* (Ananjeva, 1994), *Paralaudakia badakhshana* (Baig, 2012)

Type Locality: Mazar-i-Sharif; northern Afghanistan, 36°34'N, 67°05'E; elevation 457 m.

Diagnosis: Head and body sunk; tail longer than head and body; head scales flat; caudal scales forming separate annuli; 19-25 scales around tail at level of about fifth whorl; tympanum major, superficial; mid-dorsal enlarged scales smooth or faintly keeled, distinctly larger than ventrals; vamp of enlarged mucronate scales on flanks, distinctly larger than ventral and dorsolateral scales, toward equal to largest mid-dorsal scales; scales on dorsum of thigh very large and strongly keeled; mature males with large patch of callose abdominal scales (Anderson and Leviton, 1969).

Description: Head and body sunk; snout longer than the distance between eye-tympanum or eye width; tympanum exposed, slightly less than eye width; nostril below canthus rostralis, less than half of nasal, pointing backward, obsolete usually by one scale from rostral; no gular pouch, gular plicate; upper head scales heterogeneous, subequal, flat, obtusely carinated on tip and low spinose at posterior border; gular scales very tiny and smooth; skin of lateral sides loose forming a dorsolateral fold; total number of scales anent midbody 112 – 132; limbs strong, covered with enlarged mucronate scales, hindlimb some longer than the distance between gular fold and cloaca; Head olive or grey with black point over it; gular grey with or without yellow specks or reticulation; chest and belly pale yellow, in males with grey wash; vertebral stripe usually drab; olive-grey above with dark-rimmed yellow ocelli, males usually do not show bright and marked sample; tail with dark spots which sometimes gives the impression of cross bars (Baig et al., 2012).

Distribution: Afghanistan (Mazar-i-Sharif, Badakshan, Kabul and Ghazni), Pakistan (Sost and Gulmit, near Khunjrab Pass in northwestern Pakistan) (Jablonski, Khalili, and Masroor, 2023).

Taxonomy: This species was described by Anderson and Leviton (1969) using material gathered during the Street Expedition to Afghanistan. Although Baig (1992) recognized it as a unique taxon, he expressed skepticism regarding the accuracy of the type location (the reasons are provided under Himalayan) (Baig, 1992).

Remarks: Takhar Province is listed as this taxon's initial species data source. This taxon has never been the subject of genetic research; it is an endemic species in Afghanistan. Certain historical distribution sites (e.g., specimens ZFMK 8608–12 and 13315–16 from Ghazni) could represent distinct species, and the range might shift. Furthermore, some writers question the

validity of the type locality, which is "Mazar-i-Sharif, northern Afghanistan, 36°34'N, 67°05'E, 457 m height" (Baig et al., 2012). Therefore, additional research into Afghan populations (which are likely to belong to *P. badakhshana*) requires DNA genotyping and a thorough morphological assessment (Jablonski et al., 2023).

Habitat: There is little information known on *P. badakshana*'s habitats, which are described as montane, arid, or steppe regions near watercourses (Baig et al., 2012).

***Paralaudakia bochariensis* (Nikolsky, 1897)**

Synonym: *Stellio bochariensis* (Nikolsky, 1897), *Agama isozona* (Werner, 1899), *Agama chernovi* (Ananjeva, 1981), *Agama himalyana* (Wermute, 1967), *Stellio chernovi* (Ananjeva, 1990), *Laudakia bochariensis* (Barts, 2003), *Laudakia chernovi* (Szczerbak, 2003), *Paralaudakia bochariensis* (Baig, 2012).

Type Locality: Bocharia orientalis (Tajikistan).

Diagnosis: Head and body sunk; tail longer, two or more than two times that of SVL; vamp of strongly mucronate scales on flanks and groups of spinose scales on neck and sides of the head; three whorls of enlarged spinose scales in each part; callous glands only in males (Baig et al., 2012).

Description: Head and body sunk; snout longer than distance between eye-tympanum or eye width; tympanum exposed, more than half of eye width; nostril below canthus rostralis, half or less than half of nasal, pointing outward or outward and backward, obsolete usually by two scales from rostral; no gular pouch, gular frizzy; upper head scales heterogeneous, subequal, flat, obtusely carinated on tip and low spiny at posterior border; nate scales on flanks; other small dorsals distinctly smaller than enlarged vertebral or side scales; ventral scales smooth, smaller than enlarged vertebral and flank scales but larger than gular and other small dorsal scales; gular scales very small, slick; skin of lateral sides loose forming dorsolateral fold; Head olive brown or grey with dark spots over it; gular reticulated; chest and belly pale yellow, in males contains blue or grey wash; vertebral brindle pale yellow or silver grey, irregular dark spots form festooned band on each side of vertebral line; olive grey or light brown above with dark rimmed yellow ocelli; tail with dim spots which sometimes gives the impression of cross bars (Gemel, Gassner, and Schweiger, 2019) (Fig. 7).

Figure 7. *Paralaudakia bochariensis* (www.reptile-database.org)

Distribution: Tadjikistan and Uzbekistan (western side of Pamir) (Baig et al., 2012).

Taxonomy: *Agama chernovi*, from Tadjikistan, was identified as a new species by Ananjeva et al. (1981). When they compared the species to *P.himalayana* and *P.badakshana*, they discovered several differences between the two. Unfortunately, *Agama isozona*, previously described from the same location, was not used as a comparison for their specimens. When the original specimen of the later taxon is examined, it differs significantly from *P. himalayana*, to which Smith synonymized it (1935). The specimen is kept at the Natural History Museum in Vienna. At the same time, it has been observed that *A. chernovi* and *A. isozona* are distinct from *P. himalayana*, but their differences are not very noticeable. Ananjeva et al. (1981) determined that *A. chernovi* differed from *P. himalayana* and *P. badakshana* in that it had a somewhat longer tail, always keeled expanded vertebrals, less enlarged vertebral rows, and more rows of callous precloacal scales. However, it has been demonstrated that all of them are correct concerning *A. isozona*. Despite the lack of research on *P. bochariensis* type material, Nikolsky's (1915) description identifies certain characteristics that *P. bochariensis* has in common with *A. isozona* and *A. chernovi*. Moreover, reports of *A. chernovi*, *A. isozona*, and *P. bochariensis* have all come from areas close to one another. Consequently, *A. chernovi* and *A. isozona* must be considered junior synonyms of *P. bochariensis*, according to Ananjeva et al. (1981).

Remarks: Synonymy: Das (1997) and Golubev (1998) mostly equated *Laudakia chernovi* with *Laudakia bochariensis* following Baig et al. (2012). Numerous reports of *L. himalayana* can be attributed to this species, according to Baig (1992). *Agama isozona* was regarded by Smith (1935) as a synonym for *L. himalayana* (Anderson and Leviton, 1969).

Habitat: Mountains, cliffs, or sunbathing on rocks are examples of habitats. Other examples are the Rocky Mountains covered in vegetation, rocky environments with almost vertical or vertical surfaces that offer cover, and barren rocky mountains (Ananjeva and Rzepakovsky, 1981).

***Paralaudakia himalayana* (Steindachner, 1867)**

Common Names: *Himalayan Agama*

Synonym: *Stellio himalayanus* (Steindachner, 1867), *Agama himalayana* (Boulenger, 1885), *Stellio bochariensis* (Nikolsky, 1897), *Laudakia himalayana* (Macey, 2000), *Paralaudakia (himalayana) himalayana* (Baig, 2012), *Paralaudakia himalayana bochariensis* (Davletbakov, 2016), *Paralaudakia himalayana himalayeyana* (Gemel, 2019).

Type Locality: Lei [= Leh] and Kargill, Ladakh-Province, Kashmir.

Diagnosis: Head and body moderately sunk; tail is longer, two or minor than two times that of SVL; there is no patch of strongly mucronate scales on flanks; groups of low spiny scales on neck and sides of the head; indis- tinct tail part of three whorls; callous glands only in males (Fläschendräger & Hoffmann, 2018).

Description: Tympanum present, more than half of eye width; nostril below canthus rostralis, less than half of nasal, pointing backwards, distinct usually by one scale from rostral; no gular sac, gular frizzy; upper head scales heterogeneous, subequal, smooth, rugose at hind border; vertebral scales smooth or keeled, central six rows of flat and roughly hexagonal, bordered by 3 – 4 rows of weakly keeled scales; no true vamp of enlarged mucronate scales on flanks; other small dorsals distinctly smaller than enlarged vertebral; ventral scales smooth, smaller than enlarged vertebral and side scales but larger than gular and other small dorsal scales; tail with dark spots which sometimes gives the impression of cross bars, the banded template is usually seen in females or youngs. Females are clearly distinguishable from males by the presence of a red or bright orange collar region; youngs have this female pattern (Baig et al., 2012) (Fig. 8).

Figure 8. *Paralaudakia hymalayana* (www.reptile-database.org)

Distribution: Southern Pamir, Wakhan Corridor in Afghanistan, mountain ranges of Karakoram, Ladakh and Himalayas up to Tibet. Khan (2002) documented the species from Gilgit and Chitral in the remote areas of northern Pakistan at elevations between 3000 and 3200 m (Baig et al., 2012).

Taxonomy: This species is identified as a supraspecies complex and forms a sub-group within *Paralaudakia* together with *P. bochariensis* and *P. badakshana*. The group belongs to the little *Paralaudakia* lizard species, and its SVL is rarely greater than 90 mm. Ananjeva et al. (1981) did, however, report that the range of *A. chernovi*, which is now known to be a synonym for *P. bochariensis*, is 80–120 mm. However, they did not provide any details on the specimens that were measured Ananjeva et al., 1981). Consequently, none of the *A. chernovi* specimens evaluated by Baig (1992) aside from the type specimen, which measured 96.00 mm—were longer than 90.00 mm. A few specimens of *P. badakshana* from Kabul, Afghanistan, are also known to have a range of 90 to 92 mm; however, every other specimen in this group that was studied had an SVL of 90 mm or less. Specifically, female *P. himalayana* is even shorter than male, reaching a maximum length of only 90 mm (Babar et al., 2012).

Remarks: The Pamir Knot, the meeting point of the Himalaya, Hindu Kush, Pamir, and Karakoram, is where this group speciated. After moving to the east, *Paralaudakia* Himalayana is now found in the southern Pamir, Wakhan, and the Himalayan, Karakoram, and Ladakh mountain ranges, all the way up to Tibet. Following a northwest path, *P. bochariensis* is currently distributed in many biotopes in Tajikistan and Uzbekistan on the western side of the Pamir. *P. badakshana*, which is currently found in the Afghan provinces of Badakshan, Kabul, and Ghazni, followed the southern side of the Hindu Kush range (Baig et al., 2012).

Habitat: mountainous regions, the sandy banks of rivers, the spaces between tiny stones away from the riverbed that are utilized for hiding, the cracks in the stone walls along rivers or roads, or behind bigger stones or stone slabs. They are not found near to this environment elsewhere. Hence their greater quantity along the watercourse may be connected to food availability (Baig, 1992).

***Paralaudakia lehmanni* (Nikolsky, 1896)**

Common Names: *Turkestan Rock Agama*

Synonym: *Stellio lehmanni* (Nikolsky, 1896), *Agama borstschewskyi* (Elpatjewsky, 1907), *Agama lehmanni* (Nikolsky, 1915), *Laudakia lehmanni* (Macey, 2000), *Paralaudakia lehmanni* (Baig, 2012).

Type Locality: Fergana and Bukhara, Uzbekistan ("provincia Ferganensi nec non in Bucharia, Turkestan" fide Wermuth, 1967).

Diagnosis: Head and body sunk; flower-shaped formation of enlarged scales on frontal side of head; olivaceous with atypical black spots; scales on the body and tail with intense ridges and spines, several vertical rows of highly enlarged spinose scales; no vamps on flanks; dorsolateral-fold marked with en- large spinose scales with distinct high ridges; tail section of three; callous glands present (Baig et al., 2012).

Description: Head and body sunk; snout longer than the distance among eye-tympanum or eye width and more than twice that of tympanum diameter; tympanum exposed, dished, more than half of eye width; nostril pierced under canthus rostralis and cannot be viewed dorsally, alike or more than half of nasal, separated by 1 – 2 scales from rostral, directing backward;
several enlarged mucronate scales randomly present; dorsolateral fold marked with enlarged, spinose scales along the entire length; other small dorsals distinctly smaller than enlarged ones; ventral scales smooth, smaller than enlarged dorsal; gular scales smooth; Colour olive-yellow or olive grey above with irregular black scales; head pale brown or grey; upper parts of legs and tail usually speckled with black but sometimes may show a banded pattern; underparts yellow usually spotted with black; throat in life shows black & orange spots which may appear or disappear (Baig et al., 2012) (Fig. 9).

Figure 9. *Paralaudakia lehmanni* (www.reptile-database.org)

Distribution: Eastern Uzbekistan, western Turkmenistan, western and central Tajikistan, western Kyrgyzstan and northern Afghanistan (Ananjeva and Golynsky, 2013).

Remarks: The end of June or the early part of July was the latest that eggs may be deposited. A single female lays two to three 18 to 20 mm long eggs. Young begin to appear toward the end of September at an elevation of 1500 meters above sea level. This species consumes a variety of arachnids and insects (Baig et al., 2012).

Habitat: This lizard is found in mountains, reaching up to 2600 meters above sea level. It grows on steppe rocks and stones, canyon slopes, and more or less mild slopes covered in coarsely broken-up rock formations. Furthermore, it is occasionally close to alpine streams and rivers. They have also been discovered in several locations close to slopes with loess. Their hiding places include the spaces beneath or between stones, as well as the cracks in rocks or hillsides (Ananjeva et al.,1998).

***Paralaudakia microlepis* (Blanford, 1874)**

Common Names: Small-scaled Rock Agama

Synonym: *Stellio microlepis* (Blanford, 1874), *Agama microlepis* (Wermuth, 1967), *Stellio caucasica triannulatus* (Ananjeva, 1984), *Laudakia caucasia triannulata* (Macey, 1998), *Laudakia microlepis* (Macey, 2000), *Paralaudakia microlepis* (Baig, 2012), *Paralaudakia microlepis taftanica* (Sanchooli, 2015).

Type Locality: Iran, Khaneh-Sorkh Pass, between Sirjan and Kerman" (by designation of BMNH 1946.8.28.74 as lectotype fide Rastegar-Pouyani and Nilson 2002).

Diagnosis: Size relatively great; head and body sunk; olivaceous or bluish grey with yellow ocelli; vertebral enlarged scales flat or feebly keeled; flanks with or without any enlarged mucronate scales; body scales very tiny; tail segment of two whorls; callous glands present in both sexes**.**

Description: Head and body sunk; snout longer than the distance between eye-tympanum or eye width and more than two times that of tympanum diameter; tympanum exhibit, more than half of eye width; nostril pierced under canthus rostralis, alike or less than half of nasal, separated by 1 – 2 scales from rostral, directing outward; no gular vamp, gular plicate; upper head scales heterogeneous, subequal, mostly smooth, on hind margin mucronate; Colour is

highly uncertain in different populations. Generally olivaceous above with vertebral zone usually yellow, sometimes with distinct lateral spread and yellow ocelli or transversely expanded yellow spots with black border alike to *P. caucasia* but some of Afghan specimens are bluish grey with yellow spots arranged in lateral series, pattern of yellow ocelli or spots usually separate in upper half; gular region may be reticulated; belly pale yellow and may sometimes have black spots; under parts of forementioned grey Afghan specimens were also grey with some yellow blotches on the throat (Fig. 10).

Distribution: Southern Iran, southern and western Pakistan, Afghanistan and some parts of Turkmenia.

Taxonomy: Studies by Panov et al. (1987) and Panov and Zykova (1995) on rock agamas from Transcaucasia, Middle Asia, Iran, and neighbouring locations revealed significant differences in populations, especially in and around SW Turkmenia (Panov and Zykova, 1995; Panov, Zykova, Gauzer, and Vasilyev, 1987)They surmise that some of these hybrid features come from secondary interactions between *P. microlepis* and *P. caucasia*. *Paralaudakia microlepis* was discovered in southern Iran, north of Shiraz, and first described by Blanford in 1874.

The Maxent model results validate the species' known distribution pattern. According to the model, the southern Khorasan Province of Iran, the mountainous region that borders Afghanistan and Pakistan, and the central and eastern parts of the Zagros Mountains contained within the borders of the provinces of Fars and Kerman are the ideal places for suitability. Thus, the mountains of the Iranian Plateau effectively limit the distribution of *P. microlepis*. It does not seem that *P. microlepis* is a good fit for much of Iran's northern highlands or the area between Iran and Afghanistan. Nonetheless, the model did find much wider distribution ranges in Afghanistan, where there is just one reliable record that dates back to that time, as well as potentially suitable locations outside of the known range of *P. microlepis* in northwest Iran (Ananjeva et al., 2014).

Figure 10. *Paralaudakia microlepis* (www.reptile-database.org)

Remarks: Herpetologists used to mostly ignore or pay little attention to *Paralaudakia microlepis*. Blanford reported seeing it in 1874 in southern Iran, to the north of Shiraz. It was thus noted in later publications, however records, with the exception of Clark et al. (1969), were mostly based on the first description.

Habitat: The habitat of this species is comparable to that of *P. caucasia*, according to Anderson (1969, 1999), however niche distinctions between the two species are yet unknown (Ananjeva et al., 2014).

***Paralaudakia stoliczkana* (Blanford, 1875)**

this species includes two subspecies as follows:

***Paralaudakia stoliczkana altaica* (Munkhbayar and Shagdarsuren, 1970)**

Common Names: Mongolia Rock Agama

Synonym: *Agama himalayana altaicus* (Munkhbayar, 1970), *Agama stoliczkana altaica* (Munkhbayar, 1971), *Agama stoliczkana altaica* (Peters, 1970).

Type Locality: Source of the Uliastai River, Bulgan-Som, Khovd-Aimak, southern Altai Mts., Mongolia.

Diagnosis: Differs from the nominate form mainly by having a tail part of 3 whorls; slightly less number of scales around the tail and body; scales commonly more carinated; relatively shorter hind-limbs; callous glands present in males only at the precloacal position but seldom females also display this character.

Description: Head and body dorsolaterally sunk; head covered with soft scales; nostril on the edge of canthus rostralis; down spinose scales on the sides of the head; vertebral enlarged scales flat or weakly keeled; no patch of enlarged mucronate scales on flanks; tail segment consists of 4 perfect whorls but not marked; callous glands present in males only at the precloacal position. The colouration of this form is speckled with black on wan or lemon yellowish ground; the head lemon yellow with several black spots; yellowish latitudinal extensions from vertebral line are more distinct in the frontal half, which itself is darker than the posterior part; the gular dark grey with yellow spots or reticulated in juveniles; belly wan yellow with black spots; chest dark grey; tail light in proximal part and shows indistinct banded template and is dark distally (Baig et al., 2012) (Fig. 11).

Distribution: Mongolian and Gobi Altai area.

Taxonomy: Author Peters (1971) is cited for this subspecies (Peters, 1971). However, he noted that Peters (1971) created a primary homonym because Munkhbayar and Shagdarsuren (1970) had reported the same taxon under the same name a few months earlier. A holotype and thirty paratypes gathered between 1964 and 1970 in the Khovd district, near the Uliastajn [=Uliastai] River's source, served as the basis for the first description. The holotype was initially placed in the "State University for Education of Mongolia" herpetological laboratory. It was later sent to the University of Tashkent in 1970, where it is most likely gone now. Additionally, the collection stated earlier has two paratypes; the biological collection of "School number 33" contains three paratypes, and the collection of the "Zoological Museum of the Mongolian State University" contains one paratype. According to Munkhbayar (1971), altaica is a subspecies of *P. Stoliczkana*. This was consistent with Peters (1971), who published his description around a year after the initial description and recognized the taxa as different subspecies. When Peters (1971) studied *P. stoliczkana* populations from four distinct Central Asian locales, he discovered differences between the Gobi-Altai and Mongolian-Altai populations. He could

identify his *P.s.altaica* from the nominate variety by having a shorter tail and hind leg. Baig (1992) later confirmed these characteristics.

Figure 11. *Paralaudakia stoliczkana altaica* (www.inaturalist.org)

Remarks: PETERS' term is both a synonym and a homonym because it appears that both Munkhbayar and Shagdarsuren 1970 and Peters 1971 described the subspecies altaica (Buehler et al., 2021).

Habitat: hilly areas covered in foliage, old structures, stone walls, bridge parapets, roadside ditch openings, and the base of bushes (Munkhbayar et al., 2010).

***Paralaudakia stoliczkana stoliczkana* (Blanford 1875)**

Common Names: Mongolia Rock Agama

Synonym: *Stellio stoliczkanus* (Blanford, 1875), *Agama tarimensis* (Zugmayer,1909).

Type Locality: Plains of Eastern Turkestan. [interpreted as “Eastern Turkestan around Yárkand and Káshghar” by Das (1999)]

Diagnosis: Head and body dorsolaterally sunk; head lidded with flat scales; nostril on the edge of canthus rostralis; low spinose scales on the sides of the head; vertebral enlarged scales flat or weakly keeled; no vamp of enlarged mucronate scales on flanks; tail part consists of 4 perfect whorls but not marked; callous glands present in males only at the precloacal situation.

Description: Head and body sunk, covered generally with tiny scales; snout longer than the distance among eye-tympanum and of eye width; tympanum exposed, more than half of eye

width; nostril pierced under or on the edge of canthus rostralis, more than half of nasal, separated by 2 scales from rostral, directing external and backward; no gular pouch, throat plicate; upper head scales heterogeneous, flat; upper labials 12 – 14 (13 ± 0.8), lower labials 11 – 13 (12 ± 1.0); tiny groups of spinose scales present on the neck and sides of head especially around tympanum; The colouration of this species is generally like to *P.caucasia*. Olive yellow superior; head and body speckled with black, may have pale yellow ocelli, pecially in frontal half; gular yellow or in males grey with yellow spots; belly pale yellow but males have a grey wash; tail light in proximal part and may show banded type whereas it is dark distally (Fig. 12).

Distribution: Mongolia, China (Kashgar, Tien-Shan and southern Gobi) (Ananjeva et al., 1998).

Taxonomy: *Agama tarimensis*, a new species from Mongolia, was briefly described by Zugmayer (1909), and both taxa were cited in later literature until 1971. At this point, Peters (1971) conducted a morphological investigation of the Central Asian material and compared *P.stoliczkana* with *A.tarimensis*. He separated the information into four categories: Kashgar, East Tien-Shan, Gobi-Altai, and Mongolian Altai—based on the disparate geographic locations. The lizards' light ground colour varies in tones and is more specific to an individual or area. Peters (1971) could not observe the yellowish-green markings of *A. tarimensis* that Zugmayer (1909) reported. He discovered variations in the number of scales in various body regions but no difference in colour pattern between *P.stoliczkana* and *A.tarimensis*. However, he concluded that these variations were clinal and proposed *A. tarimensis* as a junior synonym for *P. stoliczkana*.

Remarks: Individuals were only seen in late February and early March when the air temperature was around 30 °C. They were seen sunbathing on rocks and exposing as much of their surface as possible to direct sunlight. They were standing on their forelegs in the afternoon, facing the direction from which the sun was reflecting off their belly and head, exposing them to the highest amount of radiation. The next spring, basking started later in the day and lasted into the afternoon. The lizards hibernated throughout the warmest parts of the

summer, limiting their activities to the early hours of the day and the late afternoons of July and August (Ananjeva et al., 2011).

Figure 12. *Paralaudakia stoliczkana stoliczkana* (www. ceb.wikipedia.org)

Habitat: Its favored natural environments include desert, woodland, and shrubland. At least one protected area has it (Peters, 1971).

Key to the species of the genus *Paralaudakia* in Iran:

a. Number of scales around the body 110–160, enlarged vertebral scales keeled, gular scales smoo . . …….. . . *Paralaudakia caucasia*

b. Number of scales around middle of body less than 100, all scales of the body are very strongly mucronate or spinose, gular scales strongly keeled ….
……. . . *Paralaudakia erythrogastera*

c. Number of scales around the body often more than 160, vertebral scales flat or weakly carinate . …….. . . . *Paralaudakia microlepis*

Acknowledgments

We are thankful to Department of Biology, Faculty of Science, Razi University for their support.

References

Ananjeva, N. (2004). Phylogeny and Biogeography of Agamid Lizards (Agamidae, Lacertilia, Reptilia): Review of Concepts and Results of Molecular and Morphological Studies. *Usp. Sovrem. Biol, 124*(1), 44-57.

Ananjeva, N., Borkin, L., Darevsky, I., & Orlov, N. (1998). Amphibia and reptilia. Encyclopedia of the nature of Russia.(Field Guide of amphibians and reptiles of Russia and adjacent countries): ABF Publishing Company, Moscow, Russia.

Ananjeva, N., & Golynsky, E. (2013). Analysis of distribution of the Turkestan rock agama, *Paralaudakia lehmanni* (Nikolsky, 1896): Using of MAXENT modelling. *Tr. ZIN RAN, 317*(4), 426-437.

Ananjeva, N.B., Golynsky, E.A. and Hosseinian Yousefkhani, S.S., 2019. Analysis of the distribution of rock agamas of genus Paralaudakia Baig, Wagner, Ananjeva et Böhme, 2012 (Agamidae: Sauria, Reptilia): use of Maxent modeling. *Biology Bulletin, 46*, pp.179-185.

Ananjeva, N., Golynsky, E., & Mazanaeva, L. (2021). Distribution Modeling of the Caucasian Rock *Agama Paralaudakia caucasia* (Eichwald,),(١٨٣١Sauria: Agamidae) Based on an Updated Data Set. *Russian Journal of Herpetology*, *28*(3), 170-174.

Ananjeva, N. B., Golynsky, E. A., Hosseinian Yousefkhani, S. S., & Masroor, R. (2014). Distribution and environmental suitability of the small scaled rock agama, *Paralaudakia microlepis* (Sauria: Agamidae) in the Iranian Plateau. *Asian Herpetological Research, 5*(3), 161-167.

Ananjeva, N. B., Guo, X., & Wang, Y. (2011). Taxonomic diversity of agamid lizards (Reptilia, Sauria, Acrodonta, Agamidae) from China: a comparative analysis. *Asian Herpetological Research, 2*(3), 117-128.

Ananjeva, N. B., Peters, G., & Rzepakovsky, V. (1981). New species of the mountain agamas from Tadjikistan, *Agama chernovi* sp. nov. *Trudy Zool. Inst. Akad. Nauk SSSR (Leningrad),* ١٠١, ٢٧-٢٣.

Anderson, S. (1999). The lizards of Iran. Society for the Study of Amphibians and Reptiles, Ohio: Oxford.

Anderson, S. C., & Leviton, A. E. (1969). *Amphibians and reptiles collected by the Street Expedition to Afghanistan, 1965*: California Academy of Sciences.

Avery, R. A. (1982). Field studies of body temperatures and thermoregulation. *Physiology C, 12*, 93-166.

Babar Khan, B. K., Waseem Ahmed, W. A., Abdukadir Ablimit, A. A., Shamim Fakhri, S. F., & Hassan Ali, H. A. (2012). Range extension of four highland agamid lizards in Shimshal Pamir, Pakistan.

Baig, K., Wagner, P., Ananjeva, N., & Boehme, W. (2012). A morphology-based taxonomic revision of *Laudakia* Gray, 1845 (Squamata: Agamidae). *Vertebrate Zoology, 62*, 213-260.

Baig, K. J. (1992) .Systematic studies of the stellio-group of agaka (sauria: agamitdae). *Quaid-i-Azam University Islamabad, Pakistan.*

Baig, K. J., & Böhme, W. (1997). Partition of the 'Stellio'group of Agama into two distinct genera: *Acanthocercus* Fitzinger, 1843, and *Laudakia* Gray, 1845 (Sauria: Agamidae). Paper presented at the Proceedings of the 8th ordinary general meeting of the Societas Europaea Herpetologica.

Bohme, V. (1982). Uber Schmetterlingsagamen, Leiolepis b. belliana (Gray, 1827) der Malayischen Hallbinsel und ihre parthenogeneticschen Linien (Sauria: Uromastycidae). *Zoologische Jahrbuecher Systematik, 109*, 157-169.

Boulenger, G. A. (1885). *Catalogue of the Lizards in the British Museum (Natural History):* Iguanidœ, Xenosauridœ, Zonuridœ, Anguidœ, Annellidœ Helodermatidœ, Varanidœ, Xantusiidœ, Teiidœ, Amphisbœnidœ. 1885 (Vol. 2): order of the Trustees.

Boulenger, M. D., Zoljargal, P., Purvee, E., Munkhbayar, K., Munkhbaatar, M., Batsaikhan, N., . . . Roldán-Piña, D. (2021). The results of four recent joint expeditions to the Gobi Desert: Lacertids and Agamids. *Russian Journal of Herpetology, 28*(1).

Burt, C. E., & Burt, M. D. (1932). Herpetological results of the Whitney South Sea Expedition. 6, Pacific island amphibians and reptiles in the collection of the American Museum of Natural History. *Bulletin of the AMNH*; v. 63, article 5.

Edwards, D. L., & Melville, J. (2011). Extensive phylogeographic and morphological diversity in Diporiphora nobbi (Agamidae) leads to a taxonomic review and a new species description. *Journal of Herpetology, 45*(4), 530-546.

Fläschendräger, A., Hoffmann, M. H. (2018): Anmerkungen zur Höhenverbreitung von P*aralaudakia himalayana* (Steindachner, 1867). *Sauria, Berlin*, 40(3): 75–77.

Gemel, R., Gassner, G., & Schweiger, S. (2019). Katalog der Typen der Herpetologischen Sammlung des Naturhistorischen Museums Wien–2018. *Annalen des Naturhistorischen Museums in Wien. Serie B für Botanik und Zoologie, 121*, 33-248.

Jablonski, D., Khalili, F., & Masroor, R. (2023). The herpetofaunal diversity of Takhar Province, Afghanistan. *Herpetozoa, 36*, 73-90.

Joger, U. (1991). A molecular phylogeny of agamid lizards. *Copeia*, 616-622.

Kiladze, A., & Chernova, O. (2018). Adaptive peculiarities of pigmentation in the redbelly rock agama Paralaudakia erythrogastra (Nikolsky, 1896)(Agamidae). *Ukrainian Journal of Ecology, 8*(4), 248-251.

Lazell, J. (1992). The family Iguanidae: disagreement with Frost and Etheridge (1989). *Herpetol Rev, 23*, 109-112.

Macey, J. R., Larson, A., Ananjeva, N. B., & Papenfuss, T. J. (1997). Evolutionary shifts in three major structural features of the mitochondrial genome among iguanian lizards. *Journal of Molecular Evolution, ۴۴, ۶۶۰-۶۷۴.*

Macey, J. R., Schulte II, J. A., Ananjeva, N. B., Larson, A., Rastegar-Pouyani, N., Shammakov, S. M., & Papenfuss, T. J. (1998). Phylogenetic Relationships among Agamid Lizards of the *Laudakia caucasia* Species Group: Testing Hypotheses of Biogeographic Fragmentation and an Area Cladogram for the Iranian Plateau. *Molecular phylogenetics and evolution, 10*(1), 118-131.

Macey, J. R., Schulte, J. A., Larson, A., Ananjeva, N. B., Wang, Y., Pethiyagoda, R., . . . Papenfuss, T. J. (2000). Evaluating trans-Tethys migration: an example using acrodont lizard phylogenetics. *Systematic Biology, 49*(2), 233-256.

Melville, J., Hale, J., Mantziou, G., Ananjeva, N. B., Milto, K., & Clemann, N. (2009). Historical biogeography, phylogenetic relationships and intraspecific diversity of agamid lizards in the Central Asian deserts of Kazakhstan and Uzbekistan. *Molecular phylogenetics and evolution, 53*(1), 99-112.

Moody, S. M. (1980). Phylogenetic and historical biogeographical relationships of the genera in the family Agamidae (Reptilia: Lacertilia): *University of Michigan*.

Munkhbayar, K. Terbisch, K. Munkbaatar, M. (2010): Mongol orny chojor mutata. *Mulchugtscheid. – Ulaanbataar, publisher unknown*, 78 pp.

Panov, E., & Zykova, L. Y. (1995). Social organization and demography in the Rock Agama, Stellio caucasius. *Asiatic Herpetological Research*, 6, 97-110.

Panov, E., Zykova, L. Y., Gauzer, M., &Vasilyev, V. (1987). The intergradation zone for different forms of the *Stellio caucasius* complex in the south-western Turkmenia. *Zool. Zh*, *66*(3), 402-411.

Peters, G. (1971). Die Wirtelschwänze Zentralasiens (Agamidae: Agama). Ergebnisse der Mongolisch-Deutschen Biologischen Expeditionen seit 1962, Nr. 59. Mitteilungen aus dem Museum für Naturkunde in Berlin. *Zoologisches Museum und Institut für Spezielle Zoologie (Berlin)*, *47*(2), 357-381.

Rastegar-Pouyani, N., & Nilson, G. (2002). Taxonomy and biogeography of the Iranian species of *Laudakia* (Sauria: Agamidae). *Zoology in the Middle East, 26*(1), 93-122.

Sayyadi, F., Rastegar-Pouyani, N., Azadbakht, M. and Chehri, K., 2019. First comprehensive report of bacteria spp. associated with cloaca of Laudakia nupta (Sauria: Agamidae) in Iran using molecular studies. *Laboratory Animal Research, 35*, pp.1-4.

Schwenk, K. (1994). Systematics and subjectivity: the phylogeny and classification of iguanian lizards revisited. *Herpetol Rev, 25*, 53-57.

Terenteiv ,P., & Chernov, S. (1949). Key to Amphibians and Reptiles (Israel Program for Scientific Translation Jarusalem 1965).

Tuniyev, B., Atayev, C., & Shammakov, S. (1991). Stellio erythrogaster nurgeldievi ssp. nov.(Agamidae, Sauria)—A new subspecies from the eastern Kopet-Dagh. *Izv. Akad. Nauk. Turkm. SSR, 6*, 50-60.

Uetz, P., & Hošek, J. (2023). The reptile database. Available from: h ttp. *www. reptile-database. org* [Accessed: 17 December 2023].

Vitt, L. J., & Caldwell, J. P. (2013). Herpetology: an introductory biology of amphibians and reptiles: Academic press.

Wagner, P., Ineich, I., Leaché, A. D., Wilms, T. M., Trape, S., Böhme, W., & Schmitz, A. (2009). Studies on African Agama VI. Taxonomic status of the West African Agama (Sauria: Agamidae) with prominent tail crests: *Agama boulengeri* Lataste 1886, *Agama insularis* Chabanaud, 1918 and *Agama cristata* Mocquard, 1905. *Bonner zoologische Beiträge, 56*(4), 239-253.

Wermuth, H. (1967). Liste der rezenten Amphibien und Reptilien. Agamidae. Das Tierreich 86 :Walter de Gruyter, Berlin.

Yousefkhani, S. S. H., Ficetola, G. F., Rastegar-Pouyani, N., Ananjeva, N. B., Rastegar-Pouyani, E., & Masroor, R. (2013). Environmental suitability and distribution of the Caucasian Rock Agama, *Paralaudakia caucasia* (Sauria: Agamidae) in western and central Asia. *Asian Herpetol Res, 4*(3), 207-213.