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Systematics and distribution of the true monitors *Varanus* Merrem, 1820 (Sauria, Varanidae) on the Iranian Plateau

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Abstract
Varanoidea is an ancient group of anguimorph lizards, the anguimorph genus *Varanus* includes today's monitor lizards, a clade of mid-sized to large, squamates widely distributed in tropical and subtropical regions. biogeographic analysis suggests an origin of varaniform lizards in East Asia. According to most studies, monitors grouped in three clades concordant with their geographic distribution: African, Indo-Asian, and Indo-Australian. There are currently 88 valid species assigned to *Varanus* that divided into 11 subgenera. In the Iranian Plateau, there are four species of monitors from two subgenera *Psammosaurus* including *Varanus griseus*, *Varanus caspius*, *Varanus nesterovi* and *Empagusia* include the species *Varanus bengalensis*. *V. caspius* is mostly present in the central parts of Iran, two species *V. griseus* and *V. nesterovi* being distributed from Kermanshah province to Shiraz and also in Iraq. The end of distribution of the species *V. bengalensis* is in the southeast of Iran including Sistan-Baluchestan and Hormozgan Provinces.

Key words: *Varanus*, monitor, Varanidae, Distribution, Iranian plateau, Asia.

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INTRODUCTION

Varanoidea is an ancient group of anguimorph lizards, comprising two extant New World helodermatids (*Heloderma horridum* and *Heloderma suspectum*), the Bornean earless monitor (*Lanthanotus borneensis*), and the Old-World monitors (*Varanus*) (Ast, 2001). The anguimorph genus *Varanus* encompasses today's monitor lizards (Varanidae Hardwicke & Gray, 1827), a clade of mid-sized to large, mostly carnivorous (though some are frugivorous) squamates widely distributed in tropical and subtropical regions (Fig. 1; Ivanov et al., 2017). In animals, body size dramatically affects life-history traits and ecology, and it is the most commonly used measurement in macroevolutionary studies (Wilson, 1975). Among terrestrial vertebrates, monitor lizards (*Varanus*) exhibit the greatest variation in body size within a single terrestrial vertebrate genus (Pianka, 1995). Extant monitors include island giants like the Komodo dragon (*V. komodoensis*) (up to 3 m long and 100 kg) and desert dwarves like the short-tailed goanna (*V. brevicauda*) (0.2 m and 0.016 kg), which vary by orders of magnitude (Brennan et al., 2021). Despite a conservative body plan, monitor lizards in Africa, Asia, and Australia are ecologically diverse. They also show specific ecological and morphological adaptations and can be found at home in trees, among rocks, in burrows, and swimming through watercourses and even the open ocean (Pianka, 1995; Bucklitsch et al., 2016). Monitor lizards inhabit a variety of environments, from deserts to rainforests (Bucklitsch et al., 2016). Most varanids are moderate to large in size with thick skin containing numerous rows of small, rounded scales circling the body. Monitors have well-developed limbs; their tail is long to very long and lacks caudal autotomy (Vitt & Caldwell, 2013). The greatest morphological diversity is

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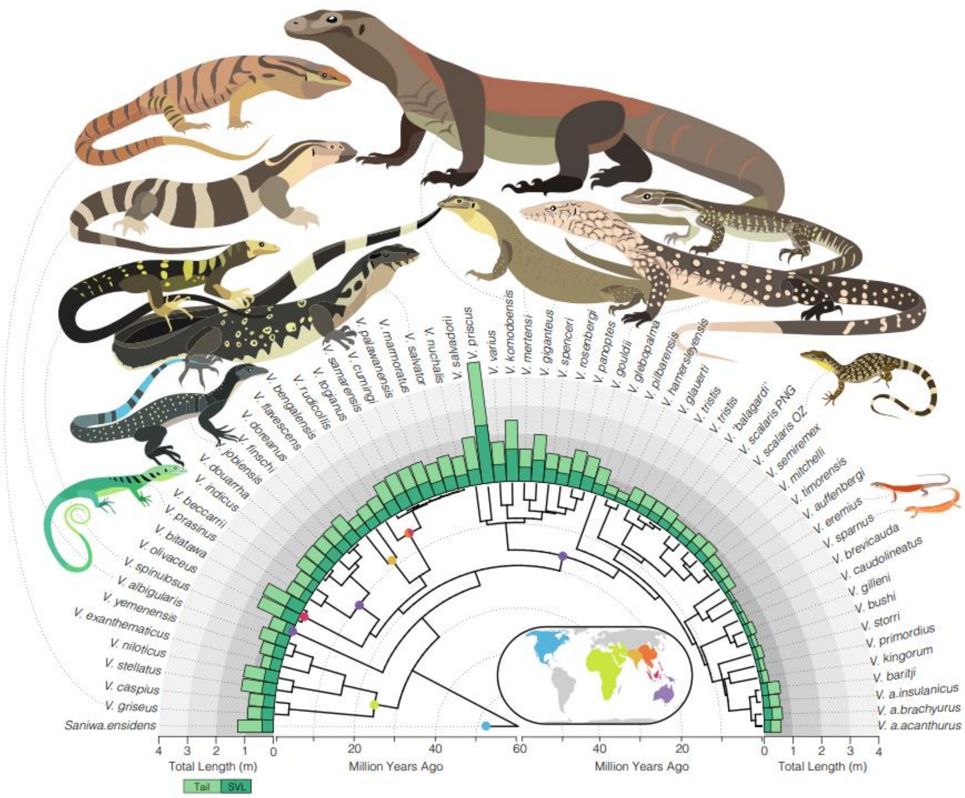

FIGURE 1. Body size among *Varanus* species varies across multiple orders of magnitude. Bar plots at tips of the tree show total length of sampled monitor lizards broken down into snout-vent length (SVL) and tail length. Inset map shows a rough global distribution of monitor lizards and the extinct relative Saniwa ensidens. Colored circles at nodes indicate primary distribution of the major clades of *Varanus* and correspond to distributions on the map (blue–North America; green–Africa and the Middle East; light orange–Indian Subcontinent; dark orange–Indochina and China; red–Sundaland and Wallacea; purple–AustraloPapua. (Brennan et al., 2021).

concentrated in the Australian species (Brennan et al., 2021). he social structure of monitors is very complex, diverse, and non-stereotyped. Additionally, the presence of a mammal-like social structure in their populations has been confirmed (Tsellarius & Tsellarius, 1997). The methods of hunting different types of prey, changes in diet composition, and hunting behavior of *V. griseus* vary in relation to environmental conditions. *V. griseus* prefers to hunt relatively large prey that is concentrated in specific places with a specific spatial and temporal order. The most important feature for prey is the ability to find it with the least cost and energy. The most suitable types of prey are rodents (*Rhombomys opimus*) in sandy deserts, *Vipera lebetina*, and the nests of some birds in river valleys (Tsellarius et al., 1997). Lizards and arthropods are readily eaten, but their predation was recorded only in conditions of low rodent and/or snake abundance. Severe deterioration of feeding conditions leads to increased mobility of *V. griseus*, spatial redistribution, and, as a possible consequence, community fragmentation (Tsellarius et al., 1997). Global biogeographic analysis of *Varanus* and allies suggests an East Asian origin for varaniform lizards, with dispersals west across Laurasia into Europe and east into North America. The origin of the genus *Varanus* is equivocal, but it likely followed a similar pattern, with independent clades dispersing west through the Middle East and into Africa and Europe, and south and east through Southeast Asia, Sundaland, and into IndoAustralia (Brennan et al., 2021). Monitor lizards have a fossil record dating back to the Late Cretaceous (Ivanov et al., 2017), and several varanoid lizards have been described from the Late Cretaceous and Tertiary periods (Holmes et al., 2010).

Currently, no extant monitor lizard species are known from European territory, as geographically defined by an eastern border following the Ural Mountains and the Ural River, through the Caspian Sea to the eastern end of the main chain of the Great Caucasus, from which it runs westwards to the Black Sea. From there, it continues through the Bosporus, the Marmara Sea, and the Dardanelles towards the Aegean Sea, where the islands on the Anatolian shelf are excluded (Mertens and Wermuth, 1960). However, fossil representatives of this family were present in Europe until the Middle Pleistocene (Georgalis et al., 2017; Böhme et al., 2023).The fossil record of Varanidae, although still very incomplete, demonstrates great diversity across most of the Cenozoic and a wide geographic distribution. This encompasses broad areas that are currently well outside the range of extant forms, such as North America and Europe (Georgalis et al., 2021; Molnar, 2004). In fact, the varanid fossil record is far richer in Europe than on any other continent, spanning from the earliest Eocene up to the Middle Pleistocene (Augé, 2005; Augé et al., 2022; Fejérváry, 1935; Georgalis et al., 2017; Hofstetter, 1969; Villa et al, 2018; Georgalis et al., 2023). Most studies use these fossils and molecular data to determine interspecific relationships (Arida & Böhme, 2010). Several varanid paleospecies have been described from European and neighboring fossil sites. Those described before Estes (1983) were already synonymized by this author with *V. marathonensis* (Villa et al., 2018). The latter authors recognized only two European paleospecies, namely *V. marathonensis* and *V. mokrensis*. This seems problematic as long as only osteological characters are available (Böhme et al., 2023). The mitochondrial phylogeny by Ast (2001) is probably the most comprehensive and reliable study inferring relationships among extant varanid lizards because it is well sampled across taxonomic classification and geographic distribution (Arida & Böhme, 2010). In this phylogeny, extant species are grouped into three clades concordant with their geographic distribution: African, Indo-Asian, and Indo-Australian (Villa et al., 2018).

Given the phylogenetic hypothesis of Conrad (2012), no fewer than eight major *Varanus* lineages must have been present. These radiations include groups of Indo-Asian A monitors (the *Empagusia*, *Indovaranus*, and *Tectovaranus* clades), the *Dendrovaranus-Soterosaurus* clade, the Australasian clade, the Indo-Asian B clade, the lineage including *Varanus griseus*, and the *Polydaedalus* clade (Conrad et al., 2012). Relationships among anguimorph lizard groups have been contentious, particularly with regard to the placement of fossil taxa (Conrad, 2008; Conrad et al., 2011; Pyron, 2017). Analysis of morphological data in concert with novel phylogenomic data are largely consistent with previous assessments; however, Brennan et al. (2021) provide new insights into the phylogenetics of living members of *Varanus*. This phylogeny of *Varanus* highlights the adaptive capacity of these amazing lizards, emphasizing their ability to fill available niches. Overall, Brennan et al. (2021) suggest a more recent timeline for the diversification of modern varanid lizards when compared to other phylogenetic studies, with a crown age in the early-to-mid Oligocene. This timing suggests *Varanus* potentially dispersed into the Indo-Australian region shortly after the collision of the Australian and Asian plates. If this is true, the connection of Sahul to Sundaland likely facilitated the dispersal of monitor lizards across an Indonesian island bridge, and extensive overwater dispersal seems less probable. This pattern is consistent with the adaptive radiation of Australopapuan elapid snakes (Keogh, 1998) and python snakes (Reynolds et al., 2014; Esquerre et al., 2019), from Asian origins (Fig. 1; Brennan et al., 2021). The most recent study on the phylogenetic relationships of varanids was carried out by Georgalis et al. (2023) after the discovery of two fossil teeth from the Early Miocene of Hüenerbach, Switzerland. In this study, to obtain the optimal tree, they performed parsimony-based character optimization on denticles based on the phylogeny of Pyron et al. (2013) (Fig. 2; Georgalis et al., 2023). Levshakova (1986) and Stanner (2004) considered *Psammosaurus* to be composed of three species, namely the extant *V. griseus* and the two fossil taxa *V. darevskii* and *V. marathonensis*. Ivanov et al. (2018), as well as Villa et al. (2018), in contrast, assigned the last-named species to the Indian clade where *V. bengalensis* is also accommodated (the *Empagusia* group of *Varanus*). *Varanus darevskii* from the Pliocene of Tadzhikistan, however, is still regarded as a close relative or even predecessor of the extant desert monitors, and, particularly, on biogeographical grounds, of *V. caspius*. Thus, the SW Asian origin of the *Psammosaurus* clade is made plausible by

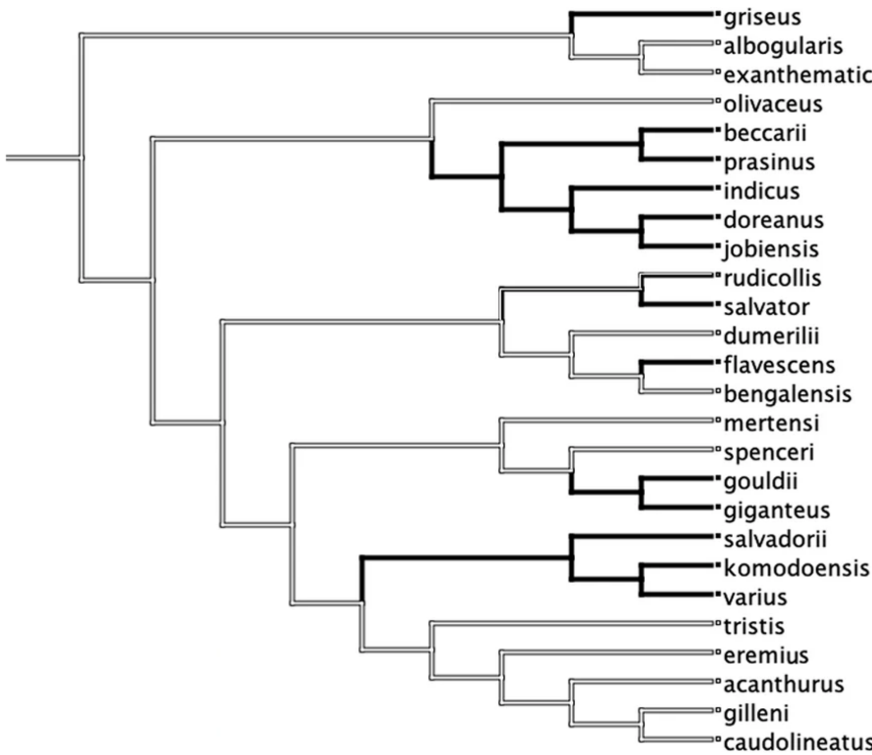

FIGURE 2. Parsimony-based character optimization on the tooth serrations based on the phylogeny of Pyron et al. (2013) (Georgalis et al, 2023*)*

V. darevskii, the extinct predecessor and Pliocene ancestor of *V. caspius* (Levchakova, 1986) from Tadzhikistan. Apart from the distinct morphological differences between the nominal taxa *V. griseus*, *V. nesterovi*, and *V.caspius* (shape of nostril, neck scalation, dorsal color pattern, tail shape, and tail coloration), the chorological pattern of the three parapatric forms also supports their full specific rather than subspecific status (Böhme et al., 2023).

SYSTEMATICS ACCOUNT
Order Squamata Oppel, 1811
Superfamily Varanoidea Camp, 1923
Family Varanidae Gray, 1827

Genus *Varanus* Merrem, 1820
There are currently 88 valid species assigned to *Varanus* (Uetz et al., 2024). This genus is divided into 11 subgenera, eight of which are represented in the Pacific East. Of these, one (*Philippinosaurus*) occurs only in the Philippines, one (*Soterosaurus*) is primarily found west of Weber's Line, and five (*Euprepiosaurus*, *Hapterosaurus*, *Odatria*, *Papusaurus*, *Varanus*) are restricted to Australia, New Guinea, and some of the Lesser Sunda Islands. The monotypic subgenus *Solomonsaurus* is restricted to parts of the western Solomon Islands (McCoy, 2015; Weijola, 2017; Uetz et al., 2024). Other subgenera include *Psammosaurus*, *Polydaedalus*, and *Empagusia* (Böhme, 2003).

Subgenus *Soterosaurus* Ziegler & Böhme, 1997
Distribution: From Sri Lanka through continental and insular Southeast Asia including the Philippines as well as the Greater and Lesser Sunda Islands, Sulawesi, and the northern Moluccas (Koch et al., 2013).

Subgenus *Varanus* Merrem, 1820
Distribution: Australia, southern part of New Guinea, and some Lesser Sunda Islands (Koch et al., 2013).

Subgenus *Papusaurus* Mertens, 1962
Distribution: Restricted to New Guinea.
The monotypic subgenus *Papusaurus* contains only one species, *V. salvadorii* (Koch et al., 2013).

Subgenus *Odatria* Gray, 1838
Distribution: Australia, New Guinea, Timor and off-shore islands.
The subgenus Odatria of monitor lizards underwent a major radiation on the Australian. three members of this subgenus, i.e., *V. auffenbergi*, *V. similis*, and *V. timorensis*, inhabit islands of the IndoAustralian Archipelago (Koch et al., 2013).

Subgenus *Philippinosaurus* MERTENS, 1959
Distribution: Restricted to the Philippine islands of Luzon and Panay.
The subgenus *Philippinosaurus* comprises the only fructivorous monitor lizard species that feed mainly on leaves and fruits. All species are endemic to the Philippines (Koch et al., 2013).

Subgenus *Euprepiosaurus* Fitzinger, 1843
Distribution: Moluccas, New Guinea, Northern Australia, and various Pacific island groups such as the Bismarck Archipelago, the Solomons, and the Marshall Islands.
The subgenus *Euprepiosaurus* comprises two monophyletic clades, viz. the species groups of Pacific or Mangrove Monitors around V. indicus and the Tree Monitors around *V. prasinus* (Koch et al., 2013).

Subgenus *Hapterosaurus* Buckitsch, Bohme & Koch, 2016
Distribution. Members of the subgenus **Hapturosaurus** are restricted to the tropical rainforests of New Guinea and several offshore islands, such as Waigeo, Batanta, and the Aru Islands, as well as Northern Australia. During Pleistocene sea level depressions of up to 140 meters below present levels, all these island regions belonging to the Sahul Shelf were interconnected by subaerial land bridges (Voris, 2000; Bucklitsch et al., 2016).

Hapturosaurus is a monophyletic group (Ast, 2001; Ziegler et al., 2007) of medium-sized arboreal lizards (Collar et al., 2011) from New Guinea and northern Australia. This group was formerly placed as a species group within the subgenus *Euprepiosaurus*. The name *Hapturosaurus* refers to the autapomorphy of the prehensile tail found in the highly arboreal tree monitors of the V. prasinus species group (Bucklitsch et al., 2016).

Subgenus *Solomonsaurus* Buckitsch, Bohme & Koch, 2016
Distribution. The subgenus *Solomonsaurus* is endemic to the Solomon Islands southeast of New Guinea. it is known only from the islands of San Jorge (St. George), Santa Isabel, and Bougainville (Böhme & Ziegler 2007).
Originally, Mertens (1941) described *Varanus spinulosus* as a subspecies of the widespread *Varanus indicus*, based on his multiple species concept of Pacific monitors (Mertens, 1942). Later, the taxon was elevated to full species status by Sprackland (1994) and was initially placed in the subgenus *Euprepiosaurus* by Ziegler & Böhme (1997). However, *V. spinulosus* recently had to be removed from this subgenus because it lacks the unique synapomorphies of this monitor in genital morphology (Böhme & Ziegler, 2007). Therefore, the systematic position of this monitor lizard species was considered *incertae sedis* (Koch et al., 2010) and required review. In 2016, it was placed in the new subgenus ***Solomonsaurus***. The name *Solomonsaurus* refers to the Solomon Islands, which is the distribution range of the only recognized species within this currently monotypic subgenus (Bucklitsch et al., 2016).

Subgenus *Polydaedalus* Wagler, 1830
Distribution: the African steppe monitors (Bohme & Ziegler,1997).
The species of *Polydaedalus* mostly inhabit savannah habitats in Africa (Bucklitsch et al., 2016).

Subgenus *Empagusia* Gray, 1838
Distribution: From southeastern Iran and Afghanistan through Pakistan, India, Bangladesh and Nepal to Myanmar, Thailand, Malaysia, and the Greater Sunda Islands, Indonesia.
The subgenus *Empagusia* represents a paraphyletic clade (Koch et al., 2013).
Subgenus *Psammosaurus* Fitzinger, 1826
Distribution: northern Africa, Arabia, Middle East, Central Asia and southern Asia.
Species of the monotypic subgenus *Psammosaurus* are adapted to arid environments in Africa, Arabia, and southern Asia. This taxon is sister to the Polydaedalus clade in recent molecular phylogenies (Ast, 2001; Collar et al., 2011*).*

Manitors in the Iranian plateau
Varanus psammosaurus griseus (Daudin, 1803)
Tupinambis griseus Daudin 1803 (Type locality: Dardsha, coast of the Caspian Sea)
Varanus scincus Merrem 1820
Tupinambis arenarius Geoffroy 1827
Varanus arenarius Duméril & Bibron 1836
Monitor terrestris Calori 1857
Psammosaurus terrestris Rabl Rückhard 1881
Psammosaurus scincus Blanford 1881
Varanus griseus Boulenger 1885
Psammosaurus griseus Sixta 1900
Varanus (*Psammosaurus*) *griseus* Mertens 1942
Varanus griseus griseus Gardner 2013
Varanus griseus Šmíd et al. 2014
Varanus (*Psammosaurus*) *griseus* Bucklitsch et al. 2016
Varanus griseus Bar et al. 2021
Varanus griseus Böhme et al. 2023

The **desert monitor lizard** has a concave head and a nostril in the form of a diagonal slit that narrows anteriorly and is closer to the eye. It possesses relatively weakly enlarged glands on the neck, a dorsal side usually with dark and/or distinct cross-stripes, and lighter spots on the ground that are darker. Its tail is round in cross-section with distinct cross-stripes along its length (Fig. 3; Böhme, 2015). *Varanus griseus* (Daudin, 1803) is a terrestrial species with a desert-sandy distribution pattern whose population includes two subspecies: *V. g. griseus* in North Africa, Arabia, and the Near East, and *V. g. koniecznyi* Mertens, 1954 in southern Pakistan and northwestern India (Mertens, 1942, 1954; Böhme, 1997, 2003, 2015). The gray desert monitor is found in the Provinces of Khuzestan, Ilam, Kermanshah, Bushehr, and Fars (Fig. 7; Safaei Mahro et al., 2015).
The zoogeographical origin of Desert Monitor is Saharo-Turano-Sindian region (Anderson, 1999; Baig et al., 2008; Bauer et al., 2017; Bayless, 2002; Damadi et al., 2017;Escoriza et al., 2011; Jablonski et al., 2021; Khan, 2004; Mertens, 1954; Malakhov & Chirikova, 2018; Sindaco et al.,2000; Akman1 et l., 2023).

Varanus psammosaurus caspius (Eichwald, 1831)
Psammosaurus caspius Eichwald 1831 (Type locality: Dardsha Peninsula, southeastern coast of Caspian Sea, Turkmenistan).

FIGURE 3. *Varanus griseus*. The sample was found in the south of Dehloran city, Ilam province (Fathnia et al., 2009).

Varanus caspius Gray 1845
Varanus griseus caspius Anderson 1963
Varanus griseus caspius Nilson & Andren 1981
Varanus griseus caspius Khan 2003
Varanus griseus caspius Heidari et al. 2010
Varanus caspius Böhme et al. 2023
In 2023, Boehm et al. declared the *V. caspius* a separate species from the *V. griseus*, based on morphological differences, habitat, and distribution of Iranian plateau monitors and the results of the Brennan et al (2021) study (Fig. 4).

The following are some of the characteristics of the scaly fish: the anterior half of the tail is more or less circular in transverse section, narrow in the posterior half, compressed on both sides in transverse section, and has a distinct blade on the upper surface; the ventral scales are in 110-125 transverse rows from the collar to the groin; the transverse stripes on the dorsal area are red-brown; and the tail has 13-19 dark transverse stripes; the end of the tail (usually the distal third) is uniformly yellowish and patternless (Rastegar-Pouyani et al., 2007).

V. g. caspius (Eichwald, 1831) has a vast distribution from central Iran (Qom) and the eastern coast of the Caspian Sea in the west to Tadzhikistan in the east (Fig. 7; Ehrlich, 2013; Chirikova et al., 2019; Böhme, 2023).

Varanus empagusia bengalensis (Daudin, 1802)
Tupinambis bengalensis Daudin 1802
Tupinambis cepedianus Daudin 1802
Lacerta argus Daudin 1802
Varanus punctatus Merrem 1820
Varanus taraguira Merrem 1820
Varanus bengalensis Duméril & Bibron 1836
Monitor inornatus Schlegel 1839
Monitor cepedianus Schlegel 1839
Uaranus lunatus Gray 1845
Varanus dracaena Theobald 1868

FIGURE 4. *Varanus caspius*. The Zoological Museum specimen of Razi University has been used for photographing.

Varanus lunatus Anderson 1871
Varanus dracaena Anderson 1871
Varanus bengalensis Mertens 1942
Varanus (*Empagusia*) *bengalensis* Koch et al. 2013
Varanus (*Empagusia*) *bengalensis* Bucklitsch et al. 2016

The Bengal Monitor (*Varanus bengalensis*) can reach a snout-vent length (SVL) of around 180 cm, with a 100 cm tail. It's terrestrial in habit, though young individuals can be arboreal (Fig. 5; Kabir et al., 2009). This species is primarily omnivorous; however, scavenging is frequently observed. It's found in all habitats throughout Bangladesh. As a large and ecologically flexible species, *Varanus bengalensis* is commonly encountered in many ecological settings, including human-modified habitats. Its global distribution ranges from southeastern Iran to southern Asia (Jaman et al., 2024). In Iran, the Bengal Monitor, also sometimes called the Bengal Tiger, is present in the Provinces of Sistan and Baluchestan, Kerman, and Hormozgan (Fig. 7; Safaei-Mahroo et al., 2015).

Varanus psammosaurus nesterovi Böhme, Ehrlich, Milto, Orlov & Scholz, 2015
Varanus nesterovi Böhme, Ehrlich, Milto, Orlov & Scholz 2015 (Type locality: “Biare,” currently Byara Village, Muhafazat as Sulaymaniyah, Iraq (35°13’50’’ N 46°07’15’’ E), 1086 m elevation)
Varanus griseus Tuck 1971
Varanus griseus caspius Mertens 1973
Varanus griseus caspius Fathinia et al. 2009
Varanus (*Psammosaurus*) *nesterovi* Bucklitsch et al. 2016
Varanus (*Psammosaurus*) *nesterovi* Böhme et al. 2023

Nesterov’s desert monitor A large growing representative of the section *Psammosaurus Varanus* (total length up to 120 cm) easily distinguished from *V. griseus*, 1.its broad, short head with a convex profile. 2. nostrils round to vertically oval, not quite in front of the eyes. 3.scaly neck of strongly enlarged scales and spines, strongest on the sides of the neck, which may even form curved spines. 4.dorsal side uniformly sandy, without well-visible dark cross-stripes, at best with only rudimentary and indistinct streaks of a dark pattern and 5. tail laterally compressed with a distinct dorsal keel for almost the entire length of the tail, and the indistinct cross-stripes compressed only in the proximal half, the remainder of the tail uniformly yellowish (Fig. 6; Böhme, 2015). Examination of the skulls of the two species *Varanus griseus* and *Varanus nesterovi* by CT-scan and extraction of skull bones (the characteristics of the skull bones in

Figure 5. Photograph of a juvenile Bengal monitor lizard (*Varanus bengalensis*) captured in Bahu Kalat (Gandu) Protected Area (Oraie et al., 2024).

FIGURE 6. *Varanus nesterovi* in its natural environment at Mortka, Darbandikhan, Iraq (Böhme et al., 2023).

some lizards are a distinguishing feature between species) is true to some extent for the mentioned species; The similarity in the structure of the skull indicates a close relationship between the two species and their similar feeding method (Ghanbarinia.et al, 2019). The documented localities of *Varanus nesterovi* form a distribution range that appears to be wedged between the respective ranges of *V. g. griseus* and *V. g. caspius*. As far as known, it is confined to the western and southwestern margin of the Zagros Mountain range on both sides of the Iraqi-Iranian border, extending down to the area of Shiraz, Fars Province, Iran. It seems that *V. nesterovi* prefers more elevated habitats, having been recorded from 600 to 1100 m (Fig. 5; Böhme, 2015). *V. nesterovi* is an endemic inhabitant of the southwestern Zagros Mountain range (Fig. 7). Its distribution area in submontane to montane steppe habitats is wedged between those of its two much more widespread relatives: *V. griseus* in the west and *V. caspius* in the east (Böhme et al., 2023).

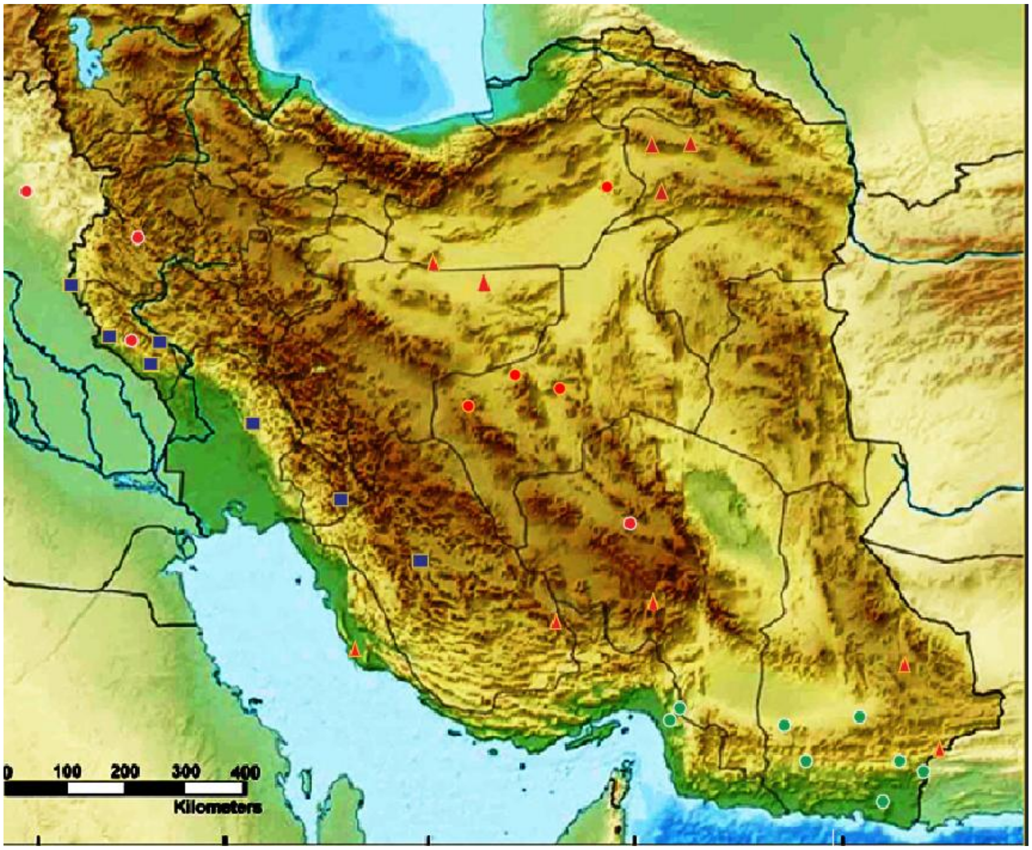

FIGURE 7. *Varanus* distribution map in Iranian plateau. *V. nesterovi* (blue square), *V. griseus* (red circle), *V. bengalensis* (green circle) and *V. caspius* (red triangle). The presence points shown in this map are approximate. (The map was taken from the articles, Böhme et al., 2023; Oraie et al., 2024; Böhme, 2015; Fathnia et al., 2009; Shafiei Bafti et al., 2021; Yousefi et al., 2023; Nasrabadi et al., 2016; Ebrahimi Pour et al., 2016).

CONCLUSION

The desert monitor lizard is the largest lizard in Iran, occurring across a wide area of the country. Consequently, maintaining suitable habitat for this species seems essential. Large areas in the northeast, south, and southwest of Iran are climatically favorable for the desert monitor lizard (Kafash, 2016). On the Iranian Plateau, four monitor species from two subgenera are present: *Psammosaurus* (including *Varanus griseus*, *Varanus caspius*, and *Varanus nesterovi*) and *Empagusia* (which includes *Varanus bengalensis*). *Varanus caspius* is an endangered species, and its distribution range has drastically changed, a trend expected to continue. Alarmingly, some protected areas have already become unsuitable habitats for this species (Shadloo et al., 2021). Furthermore, *V. bengalensis* has also been categorized as an endangered species (Oraie et al., 2024).

Given the similarity of the external and cranial features of *Varanus griseus* and *Varanus nesterovi*, as well as the proximity and, in some places, overlapping of their distribution areas, molecular studies are necessary to confirm their species separation. In recent years, we have witnessed the destruction of many animal habitats, including those of lizards, primarily due to human activities and climate fluctuations. Therefore, it seems necessary to examine the population dynamics, habitat status, and effects of climate fluctuations on other species. Further studies are also needed regarding their physiology, interspecific phylogeny, and other relevant aspects.

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