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LIZARDS

LIZARDS, reptiles belonging to the order Squamata; a large and widespread group of animals exhibiting a generalized tetrapod body plan, although many aspects of this plan have been lost or modified in various groups.

"Lizard" is a colloquial term for these reptiles that are members of a larger evolutionary group that includes snakes. See Estes et al. (1988) for a detailed morphological characterization and analysis of the Squamata and its included taxa. Most lizards have four limbs, a long tail, and teeth in both jaws. Second to birds, they are the most often seen vertebrates in Iran, Afghanistan, and Central Asia, especially during daylight hours. Most are of small size (a few centimeters in length) and are insectivorous, although a few, such as the desert monitor, are larger and capable of preying on small vertebrates. All in Iran, with the exception of the vegetarian *Uromastyx* species and a few mixed-feeding species, are carnivorous. Many, but not all, can shed their tails in order to escape from predators.

Within our area, lizards inhabit a wide variety of biotopes, from Caspian forest habitats to active sand dunes. Although most species are diurnal, species of geckos comprise a nighttime fauna in many habitats. Lizards have many morphological adaptations that suit them to the substrates they inhabit, from specialized toe-pads in vertical rock-face dwellers to fringed-toes in loose-sand runners. Some burrowers have lost digits and entire limbs. Most, at least diurnal species, have good color vision and exhibit color patterns on their bodies, at least seasonally. Social behavior is often keyed to this color perception.

Predators on invertebrates and other small vertebrates, they are also prey for a wide variety of larger animals from snakes, birds the size of shrikes to the size of hawks and eagles, and predatory mammals of all sizes from mongooses and foxes to wolves and bears. In most cases their populations are too small to make them a primary food source for larger predators. Very small species, such as many geckos, fall prey to large hunting spiders, scorpions, and solpugids. The larger species of lizards often eat the smaller species.

Modern scientific study of lizards in Iran began with the field natural history studies of DeFilippi, Blanford, and Zarudny ([Zarudniĭ]; also, see entry FAUNA) in the mid- to late 19th and early 20th centuries. Until the present decade, studies on lizards have been sporadic, undertaken primarily by expatriate Europeans and Americans (see literature cited). With the present-day advent of modern universities throughout Iran, a new generation of zoologists has become active, and scientific knowledge about the fauna is growing apace (see for example the several papers by Rastegar-Pouyani cited in the bibliography). The most recent synoptic treatment of the lizards of Iran is that of Anderson (1999). A subsequent checklist and popular treatment of the lizards is included in *The Complete Fauna of Iran* (Firouz, 2005). Sindaco and Jermčenko (2008) published a list and distribution maps of the lizards of the western Palearctic. A list of reptiles and amphibians of Iran was also published in 2008 (Rastegar-Pouyani et al., 2008). A field guide to the lizards of Iran was published in Persian (Rastegar-Pouyani et al., 2007). Since those works were published, a number of new species has been recognized and nomenclatural changes have occurred

Knowledge of the Afghan lizard fauna began with scientific studies undertaken by the British Empire in India (synopses by Günther, 1864; Boulenger, 1890; Murray, 1892; Smith, 1935, 1940) but has been relatively stagnant since the publication of a checklist and key to the amphibians and reptiles of that country by Leviton and Anderson (1970), due in large part to the continuous strife and political upheaval of the last three decades.

Peter Simon Pallas was the first to make wide-ranging field studies of the herpetological fauna of the Russian Empire, traveling into Siberia and south to the Persian border, from 1768 to 1814. Subsequent Russian zoologists of the 19th century from Strauch (e.g., 1887) to Nikolsky (e.g., 1915) built upon these early expeditions of Pallas. Studies in herpetology of Russia and the former Soviet Union have continued actively ever since those times, and the literature is vast. In the years since the breakup of the Soviet Union, in the countries of

Central Asia bordering Iran and Afghanistan, research on some groups of lizards has continued, particularly ecological research, while work on other groups has been discontinuous. The most recent publication available in English that provides keys for identification, descriptions, and natural history notes for the entire amphibian and reptile fauna of Central Asia is that by Terentjev and Chernov (1949; English translation 1965). This publication has been superceded several times since, most recently by Ananjeva et al. (1998), but English translations are not available. However, a number of lizard groups have been revised subsequently (e.g., Szczerbak, 1974; Szczerbak and Golubev, 1986, 1996; etc.) and a popular synopsis of the fauna of northern Eurasia is available in Russian (Ananjeva et al., 2004) and English (2007). As in Iran, scientific work on the lizards of Central Asia continues in the individual countries and in Russia. Much of this work is published in western European languages, including in the English-language *Russian Journal of Herpetology*. Common English names for Iranian lizards have been provided by Anderson (1999), and Firouz (2005) has provided both English and Persian colloquial names.

Of the more than 40 lizard families currently recognized, 8 are present in Iran, Afghanistan, and the countries of Central Asia bordering Iran and Afghanistan.

In addition, we include here a genus and species belonging to the family Trogonophidae of the suborder Amphisbaenia, a group of legless reptiles clearly derived from a lizard ancestor. Lizards are discussed in the present article initially according to family.

Family Agamidae. This is an Old World family of lizards closely related to the predominantly New World iguanids. As a family, they are highly diverse elsewhere in their range, but in Southwest Asia only three primary lineages occur, represented by the genera *Laudakia, Trapelus,* and *Phrynocephalus*. Species of the first two genera are widely distributed throughout the region and often or usually occur syntopically, that is, within the same biotope or habitat, the larger *Laudakia* (up to 33 cm, including tail) usually on and among rocks and rocky outcrops, *Trapelus* (up to about 29 cm, including tail) on primarily alluvial, flatland surfaces, often climbing into small shrubs or establishing posts on small rock piles, such as cairns. Both genera are diurnal, feeding on relatively large terrestrial invertebrates. The genus *Phrynocephalus* includes species of two size ranges, the larger approximately the same size as *Trapelus*, the smaller, more sedentary, usually less than 12.5 cm in length,

including the tail. *Phrynocephalus* is confined to flatland desert surfaces, primarily in the basins of the Iranian Plateau. Their species diversification is closely related to the geographical history of these relatively isolated basins. Only two species have spread south into the lower deserts of the Arabian Peninsula. A fourth genus, *Calotes*, a widespread arboreal genus of South and Southeast Asia, was reported from date groves in southeastern Iran in the late 19th century, and occurs along the Jalalabad River of Afghanistan. There have been no subsequent records for Iran. It does not extend into Central Asia. The smaller species take smaller invertebrate prey, as would be expected, and some species have become ant-specialists. As with other members of the family these genera do not easily drop their tails, nor regenerate them if severed, although the stumps may grow out a centimeter or more. All species have strong, fully developed limbs and there has not been any tendency to greatly reduce or lose limbs in the evolution of this family. Phylogenetic studies of the family as a whole are those by Moody (1980) and Frost and Etheridge (1989).

In the species lists that follow, I = Iran; A = Afghanistan; C = Central Asia.

Figure 1. *Laudakia caucasica* (S. C. Anderson photograph)

The agamid species thus far known from our area are:

Calotes versicolor (Daudin, 1802) (I, A)

Laudakia agrorensis (Stoliczka, 1872) (A)

Laudakia badakhshana (S. Anderson and Leviton, 1969) (A)

Laudakia caucasia caucasia (Eichwald, 1831) (I, A, C)

Laudakia caucasia triannulata (Ananjeva et Atajev, 1984) (C)

Laudakia chernovi (Ananjeva, Peters, and Rzepakovsky) (C)

Laudakia erythrogastra (Nikolsky, 1896) (I, A, C)

Laudakia himalayana himalayana (Steindachner, 1867) (A, C)

Laudakia lehmanni (Nikolsky, 1896) (A, C)

Laudakia melanura lirata (Blanford, 1874) (I)

Laudakia microlepis (Blanford, 1874) (I, A, C)

Laudakia nupta (DeFilippi, 1843) (I, A)

Laudakia fusca (Blanford, 1876) (I)

Laudakia nuristanica (S. Anderson and Leviton, 1969) (A)

Laudakia tuberculata (Gray, 1827) (A)

Phrynocephalus arabicus J. Anderson, 1894 (I)

Phrynocephalus clarkorum S. Anderson and Leviton, 1967 (A)

Phrynocephalus euptilopus Alcock and Finn, 1896 (A)

Phrynocephalus golubevi Shenbrot and Semenov, 1990 (C)

Phrynocephalus guttatus (Gmelin, 1789) (C)

Phrynocephalus helioscopus helioscopus (Pallas, 1871) (I, C)

Phrynocephalus helioscopus horvathi Mehely 1894 (I)

Phrynocephalus helioscopus saidalievi Sattorov, 1981 (C)

Phrynocephalus interscapularis Lichtenstein, 1856 (A, C)

Phrynocephalus luteoguttatus Boulenger, 1887 (A)

Phrynocephalus maculatus maculatus J. Anderson, 1872 (I, A, C)

Phrynocephalus mystaceus (Pallas, 1776) (I, A, C)

Phrynocephalus ornatus ornatus Boulenger, 1887 (I, A)

Phrynocephalus ornatus vindumi Golubev, 1998 (I)

Phrynocephalus persicus DeFilippi, 1863 (I)

Phrynocephalus raddei boettgeri Bedriaga, 1907 (A, C)

Phrynocephalus reticulatus reticulatus (Eichwald, 1831) (C)

Phrynocephalus reticulatus bannikovi Darevsky, Rustamov, and Shammakov, 1976 (C)

Phrynocephalus rossikowi Nikolsky, 1899 (C)

Phrynocephalus sogdianus Chernov, 1948 (C)

Phrynocephalus strauchi Nikolsky, 1899 (C)

Phrynocephalus scutellatus (Olivier, 1807) (I, A)

Trapelus agilis agilis (Olivier, 1804) (I, A?)

Trapelus agilis khuzistanensis N. Rastegar-Pouyani, 1999 (I)

Trapelus agilis sanguinolentus (Pallas, 1814) (I, A, C)

Trapelus lessonae (DeFilippi, 1865) (I, C)

Trapelus megalonyx Günther, 1864 (I, A)

Trapelus ruderatus fieldi(Haas and Werner, 1969) (I)

T. ruderatus ruderatus (Olivier, 1804) (I)

Family Uromastycidae. This small family of lizards is closely related to the above family and considered a subfamily of it by some. Its diversity is centered in northeastern Africa/Arabian Peninsula. Four species enter our region, and one is confined to the Central Plateau of Iran. The family does not extend into Central Asia. These are heavy-bodied, plant-eating lizards, larger than any species of the agamids in our area, up to 54 cm in the case of *U. aegyptius*. Their most obvious adaptation is the heavy, club-like tail armored with rows of large, sharp, thorn-shaped scales. These tails are used as defensive weapons against predators. The Iranian species are burrowers in alluvial soils. *Uromastyx asmussi* is the only species of the genus to occur on the Iranian Plateau. *Uromastyx hardwickii* is an Indian species that enters Afghanistan along the Kabul River Valley. The other two species are found in lowland Khuzestan and Fars and on some of the islands of the Persian Gulf.

Figure 2. *Uromastyx asmussi* (S. C. Anderson photograph)

The Iranian/Afghan species are:

Uromastyx aegyptius microlepis (Blanford, 1874) (I)

Uromastyx asmussi (Strauch, 1863) (I, A)

Uromastyx hardwickii Gray, 1827 (A)

Uromastyx loricatus (Blanford, 1875) (I)

Family Anguidae. In this family, distributed worldwide, there has been an evolutionary trend in limb reduction, and in the two species that occur in our area, there has been a complete loss of limbs, although the male of *Pseudopus apodus* retains remnants of the hind limbs as flaps. The tail is easily lost in our species, giving rise to the names "glass lizard," or "glass snake" for *Pseudopus*, the latter owing to their elongate, snake-like appearance. The smaller *Anguis* has been called "slow worm." Both species are wide-spread in western Eurasia, but in our area are largely confined to forested or once-forested areas. *Pseudopus* is an active predator on rodents, lizards, and eggs and fledglings of ground-nesting birds, whereas *Anguis*, with its sharp, recurved teeth, feeds primarily on gastropods and earthworms, but they also take soft-bodied insects. *Anguis* is ovoviviparous, the young delivered in egg sacs, which rupture immediately. A case has been made for including *Pseudopus* in the older genus *Anguis*, but the arguments are beyond the scope of this article and we continue the more familiar nomenclature here for the present.

Figure 3. *Anguis fragilis* (S. C. Anderson photo)

The anguid species in our region are:

Anguis fragilis colchicus (Nordmann, 1840) (I)

Pseudopus apodus (Pallas, 1775) (I, A, C)

Family Eublepharidae. This small family is related to the Gekkonidae (see below), but differs from them in significant ways, including the possession of moveable eyelids and procoelous vertebrae. The family is widely but disjunctly distributed in the Northern Hemisphere. The genus *Eublepharis* is found in our area and contains three species therein. One species, *Eublepharis angramainyu*, occurs in the foothills of the western Zagros Mountains and extends westward in the foothills bordering the Fertile Crescent. A second species, *E. turcmenicus*, appears to be narrowly constrained to the region of the eastern Kopet Dagh in Iran and Turkmenistan. The taxonomic status of

populations of the genus in Afghanistan is unsettled, but they are usually referred to *E. macularius*, which also occurs in Pakistan. These are large, ground-dwelling "geckos," nocturnal and rarely seen. Little is known of their natural history, other than that they feed on rather large invertebrates, such as locusts, scorpions, and solpugids and probably on smaller lizards as well. A comprehensive review of the family is that of Grismer (1989). *Eublepharis macularius*, the leopard gecko, is popular in the pet trade.

Figure 4. *Eublepharis turcmenicus* (J. R. Macey photo)

The species found in our area are:

Eublepharis angramainyu S. Anderson and Leviton, 1966 (I)

Eublepharis macularius (Blyth, 1854) (I?, A?)

Eublepharis turcmenicus Darevsky, 1977 (I, C)

Family Gekkonidae (sensu lato). In contrast to the above gamily, geckos lack moveable eyelids, the eyes covered with a clear, transparent scale called a spectacle. Most are nocturnal and are known for their vocal communication with other members of their species, by a series of sharp, chirp-like sounds. The common English name "gecko" is onomatopoetic for their sounds, as are their common names in many parts of the world. Recently, the call structures of geckos have been shown to be useful in analyzing the evolutionary relationships of species in our area (Nazarov, 2005). They constitute a greatly diversified family in the warm regions of the world. In Iran, Afghanistan, and Central Asia they constitute almost the whole of the nocturnal reptilian fauna. Many genera throughout their range have specialized toe pads that enable them to cling to vertical surfaces and to move across these with alacrity. Several of such species are familiar as house geckos and are considered good luck in many places, as indeed they are, in that they feed on insects such as mosquitoes, flies, cockroaches, and even scorpions. In our region only two genera, *Asaccus* and *Hemidactylus,* have such specialized pads, yet geckos of the genus *Cyrtopodion* with relatively unspecialized digits are almost as adept at negotiating vertical surfaces and frequently inhabit occupied human dwellings, ruins, and various man-made structures. They are particularly familiar around electric lights, where they lie in wait to prey on moths and other insects attracted to the light. In some villages, people fear them erroneously as venomous, perhaps because they are the size and color of small

scorpions. Most geckos are small lizards, ranging in size from *Tropocolotes* (3 to 6 cm total length) to *Teratoscincus keyserlingii,* the largest ground gecko (10.7 cm total length). *Teratoscincus* has peculiarly fragile skin, which comes away in large pieces if the lizard is grabbed by a predator or roughly handled by a person. The advantages of such an escape mechanism apparently outweigh the hazards of losing areas of protection against desiccation in the arid deserts where it lives. Most of the gecko genera in our area are ground-dwelling, some, e.g., *Crossobamon, Stenodactylus, Teratoscincus,* have digits adapted to moving on loose sand. Some species appear to be adapted to forested or wooded areas, e.g., *Mediodactylus sagittifer.* However, relatively little is known about the natural history of most geckos in our area. Most of what is known about the straight-toed geckos of Southwest and Central Asia has been summarized by Szczerbak and Golubev (1986; English translation, 1996). A number of previously unrecognized species of Iranian geckos are being described and named as of this writing. The proper generic assignment of several species of geckos, as well as the phylogenetic relationships of genera remain subjects of scientific contention. Recently, the the family Gekkonidae has been broken up into additional families or subfamilies, in Iran including Phyllodactylidae (which includes *Asaccus*) and the Spharodactylidae (including *Pristurus*and *Tropiocolotes*).

Figure 5. *Asaccus elisae* (S. C. Anderson photograph)

The recognized gecko species of our region are:

Agamura persica (Duméril, 1856) (I)

Alsophylax laevis Nikolsky, 1905 (C)

Alsophylax loricatus Strauch, 1887 (C)

Alsophylax tadjikiensis Golubev, 1979 (C)

Asaccus andersoni Torki, Fathinia,Reostami,Gharzi, and Nazari-Serenjeh, 2011 (I)

Asaccus elisae (F. Werner, 1895) (I)

Asaccus granularis Torki 2010 (I)

Asaccus griseonotus Dixon and Anderson, 1973 (I)

Asaccus iranicus Torki, Ahmadzadeh, Ilgaz, Avcı, and Kumlutaş, 2011 (I)

Asaccus kermanshahensis N. Rastegar-Pouyani, 1996 (I)

Asaccus kurdistanensis . Rastegar-Pouyani, Nilson and Faizi 2006 (I)

Asaccus nasrullahi Y. Werner, 2006 (I)

Asaccus tangestanensis Torki, Ahmadzadeh, Ilgaz, Avcı, and Kumlutaş, 2011 (I)

Asaccus zagrosicus Torki, Ahmadzadeh, Ilgaz, Avcı, and Kumlutaş, 2011 (I)

Asioiocolotes levitoni Golubev and Szczerbak, 1979 (A)

Bunopus crassicaudus Nikolsky, 1907 (I)

Bunopus tuberculatus Blanford, 1874 (I, A, C)

Carinatogecko aspratilis (S. Anderson, 1973) (I)

Carinatogecko heteropholis (Minton, S. Anderson and J. Anderson, 1970) (I)

Crossobamon eversmanni (Wiegmann, 1834) (I, A, C)

Crossobamon maynardi (Smith, 1933) (A)

Cyrtopodion agamuroides (Nikolsky, 1900) (I)

Cyrtopodion brevipes (Blanford, 1874) (I)

Cyrtopodion caspium (Eichwald, 1831) (I, A, C)

Cyrtopodion fedtschenkoi (Strauch, 1887) (A, C)

Cyrtopodion gastrophole (F. Werner, 1917) (I)

Cyrtopodion golubevi Nazarov, Ananjeva, and Rajabizadeh, 2009 (I)

Cyrtopodion kirmanense (Nikolsky, 1900) (I)

Cyrtopodion longipes longipes (Nikolsky, 1896) (I, C)

Cyrtopodion longipes microlepis (Lantz, 1918) (I)

Cyrtopodion persepolense Nazarov, Ananjeva, and Rajabizadeh, 2009 (I)

Cyrtopodion scabrum (Heyden, 1827) (I, A)

Cyrtopodion sistanicus Nazarov and Rajabizadeh 2007 (I)

Cyrtopodion turcmenicum (Szczerbak, 1978) (I, C)

Cyrtopodion watsoni (Murray, 1892) (A)

Hemidactylus flaviviridis Rüppell, 1840 (I, A)

Hemidactylus persicus J. Anderson, 1872 (I)

Hemidactylus robustus Heyden, 1827 (I)

Hemidactylus turcicus (Linnaeus, 1878) (I?)

Mediodactylus heterocercus heterocercus (Blanford, 1874) (I)

Mediodactylus kotschyi ssp. (Steindachner, 1870) (I?)

Mediodactylus russowii russowii (Strauch, 1887) (C, A?)

Mediodactylus russowii zarudnyi (Nikolsky, 1900) (I, A? C)

Mediodactylus sagittifer (Nikolsky, 1900) (I)

Mediodactylus spinicauda (Strauch, 1887) (I, C)

Mediodactylus (=Carinatogecko) aspratilis (S. Anderson, 1973) (I)

Mediodactylus (=Carinatogecko) heteropholis (Minton, S. Anderson and J. Anderson, 1970) (I)

Mediodactylus (=Carinatogecko) ilamensis (Fathinia, Karamiani, Darvishnia, Heidari, and Rastegar-Pouyani, 2011) (I)

Mediodactylus (=Carinatogecko) stevenandersoni (Torki)

Pristurus rupestris Blanford, 1874 (I)

Rhinogecko femoralis (Smith, 1933) (I?,A?)

Rhinogecko misonnei de Witte, 1973 (I)

Stenodactylus affinis (Murray, 1884) (I)

Stenodactylus doriae (Blanford, 1874) (I)

Stenodactylus khobarensis (Haas, 1957) (I)

Teratoscincus bedriagai Nikolsky, 1899 (I, A)

Teratoscincus keyserlingii Strauch, 1863 (I, A)

Teratoscincus microlepis Nikolsky, 1899 (I, A)

Teratoscincus scincus (Schlegel, 1858) (A?,C)

Tropiocolotes bakhtiari Minton, S. Anderson and J. A. Anderson, 1970 (I)

Tropiocolotes helenae helenae (Nikolsky, 1907) (I)

Tropiocolotes helenae fasciatus . J. J. Schmidtler and J. F. Schmidtler, 1972 (I)

Tropiocolotes latifi Leviton and Anderson, 1972 (I)

Tropiocolotes persicus persicus (Nikolsky, 1903) (I)

Tropiocolotes cf. *steudneri* (Peters, 1869 (I)

Family Lacertidae. The members of this family are sometimes referred to as "true lizards" in Europe, where they make up the vast majority of the lizard fauna. They are "typical" in that they retain generalized morphological characters, retaining all four limbs, having fragile tails, and usually little-modified scales on head and body. Most have a series of pores on the ventral side of the thighs. These are best developed in males. They fill with secretions that are rubbed onto surfaces and presumably function in territoriality and other social interactions. These structures are not unique to this family, but are almost always present in lacertids. These lizards are terrestrial and insectivorous, although larger species will prey on smaller ones. A few species, especially of the genus *Darevskia,* are parthenogenetic, that is, all-female populations reproducing without fertilization by males. All species in our region are oviparous. Species of *Acanthodactylus* often have lateral scales on the digits elongated into fringes that enable rapid movement over sand and

other unconsolidated surfaces. This genus is most diverse in the low deserts stretching from North Africa to Pakistan. Species of this genus barely extend onto the Iranian Plateau and do not occur in Central Asia. *Eremias* is a complementary genus of Central Asia and the Iranian Plateau. This species-rich genus of flatland lizards owes its diversification to the geographic and climatic origins of the internal basins of these regions. Often, larger species occur syntopically with smaller species, presumably specializing in different prey items. *Mesalina* is primarily a genus of the low deserts of Southwest Asia, but *M. watsonana* is also found on the Iranian Plateau, although not as commonly and widely as its ecological near-equivalent, *Ophisops elegans.* Since Anderson's (1999) book on the lizards of Iran was published, the former genus *Lacerta* has been the subject of several revisions and has been broken up into smaller genera. Several new species have been described for Iran during this period. Small lizards, many of them rock-dwelling, living in northwestern Iran and further west are now in the genus *Darevskia; Iranolacerta,* also of northwestern Iran is a small genus of the northern Zagros region; *Timon* consists of large lizards that live in heavy brush in the Zagros Mountains and similar areas in Anatolia. Only two wide-ranging species still in the genus *Lacerta, L. strigata* and *L. media* extend into western Iran.

Figure 6. *Acanthodactylus grandis* (S. C. Anderson photograph)

The species for our region are:

Acanthodactylus blanfordi Boulenger, 1918 (I)

Acanthodactylus cantoris Günther, 1864 (A?)

Acanthodactylus boskianus (Daudin, 1802) (I)

Acanthodactylus grandis Boulenger, 1909 (I)

Acanthodactylus micropholis Blanford, 1874 (I)

Acanthodactylus nilsoni N. Rastegar-Pouyani, 1998 (I)

Acanthodactylus schmidti Haas, 1957 (I)

Apathya cappadocica urmiana Lantz and Suchow, 1934 (I)

Apathya yassujica (Nilson, Rastegar-Pouyani, Rastegar-Pouyani, and Andrén 2003) (I)

Darevskia chlorogaster (Boulenger 1908) (I)

Darevskia defilippii (Camerano 1877) (I, C)

Darevskia mostoufi (Baloutch, 1976) (doubtfully valid species) (I)

Darevskia praticola praticola (Eversmann 1834) (I)

Darevskia raddei raddei (Boettger 1892) (I)

Darevskia raddei vanensis (Eiselt, J. F. Schmidtler, and Darevsky, 1993) (I)

Darevskia steineri (Eiselt 1995) (I)

Darevskia valentini valentini (Boettger 1892) (I)

Eremias acutirostris (Boulenger, 1887) (I, A)

Eremias afghanistanica Böhme and Szczerbak, 1991 (A)

Eremias andersoni Darevsky and Szczerbak, 1978 (I)

Eremias aporosceles (Alcock and Finn, 1896) (A)

Eremias arguta (Pallas, 1773) (I, C)

Eremias aria Anderson and Leviton, 1967 (A)

Eremias fasciata Blanford, 1874 (I, A)

Eremias grammica (Lichtenstein, 1823) (I, A, C)

Eremias intermedia (Strauch, 1876) (I, A, C)

Eremias kavirensis Mozaffari and Parham, 2007

Eremias lalezharica Moravec, 1994 (I)

Eremias lineolata (Nikolsky, 1896) (I, A, C)

Eremias montana N. Rastegar-Pouyani and E. Rastegar-Pouyani 2006 (I)

Eremias nigrocellata Nikolsky, 1896 (I, A, C)

Eremias nigrolateralis N. Rastegar-Pouyani and Nilson, 1998 (I)

Eremias nikolskii Bedriaga, 1905 (C)

Eremias persica Blanford, 1875 (I, A, C)

Eremias pleskei Bedriaga, 1907 (I)

Eremias regeli Bedriaga, 1907 (A, C)

Eremias scripta (Strauch, 1867) (A, C)

Eremias strauchi strauchi Kessler, 1878 (I)

Eremias strauchi kopetdaghica Szczerbak, 1972 (I, C)

Eremias velox velox (Pallas, 1771) (I, A, C)

Iranolacerta brandtii brandtii (De Filippi 1863) (I)

Iranolacerta brandtii isfahanica (Nilson, Rastegar-Pouyani, Rastegar-Pouyani, and Andrén 2003) (I)

Iranolacerta zagrosica (Rastegar-Pouyani and Nilson, 1998) (I)

Lacerta strigata Eichwald 1834 (I, C)

Lacerta media media Lantz and Cyrén 1920 (I)

Mesalina brevirostris brevirostris Blanford, 1874 (I)

Mesalina brevirostris fieldi (Haas and Y. Werner, 1969) (I)

Mesalina guttulata (Lichtenstein, 1823) (I?)

Mesalina watsonana (Stoliczka, 1872) (I, A, C)

Ophisops elegans Ménétries, 1832 (I)

Ophisops jerdoni Blyth, 1853 (A)

Timon princeps princeps Blanford, 1874 (I)

Timon princeps kurdistanica (Suchow, 1936) (I)

Family Scincidae. The skinks form the largest lizard family and are distributed worldwide. The arid areas of Iran, Afghanistan, and Central Asia have relatively few skink species, many of which have special adaptations that suit them to desert conditions. Ours vary in size from the tiny *Ablepharus* to the medium sized *Eumeces.* There has been an evolutionary trend within the family to limb reduction and loss. The genus *Ophiomorus* demonstrates various degrees of limb loss as adaptations to burrowing, and those that live in sand and other loose soils have developed sharply wedge-shape heads that aid in moving below ground. The genus *Scincus* is also adapted to sand-swimming; their sharp rostral and jaw areas, reduced ear openings, small eyes, and modified nostrils enable them to dive into the sand and move rapidly beneath the surface. Lizards of both these genera are believed by people living in the regions where they occur to have medicinal properties, and dried specimens can still be found in some apothecary shops. *Ophiomorus* is a group of skinks centering on the Iranian Plateau and mountainous areas to the west, while *Scincus* is a genus of North Africa and Arabia, entering Iran in the low desert of Khuzestan and Fars. The two genera overlap only within the Jaz Murian Basin, where an as-yet-undescribed species of *Scincus* has recently been discovered. The other genera in our region are less specialized in appearance. Southwest Asian species previously in the genus *Mabuya* (see Anderson, 1999) are now placed in *Trachylepis* and the genus *Eumeces* has been revised, *Eumeces taeniolatus* removed to the genus *Eurylepis.*

Figure 7. *Ophiomorus brevipes* (S. C. Anderson photo)

The skinks of our area are:

Ablepharus bivittatus (Ménétries, 1832) (I)

Ablepharus darvazi Eriomchenko and Panfilov, 1990 (C)

Ablepharus deserti Strauch, 1876 (C)

Ablepharus lindbergi F. Werner, 1960 (A)

Ablepharus pannonicus Fitzinger, 1823 (I, A, C)

Asymblepharus alaicus (Elpatjevsky, 1901) (C)

Asymblepharus himalayana (Günther, 1864) (A?)

Chalcides ocellatus ocellatus (Forsskål, 1775) (I, C)

Eumeces blythianus (J. Anderson, 1871) (A?)

Eumeces schneiderii princeps (Eichwald, 1839) (I, A?, C)

Eumeces schneiderii zarudnyi Nikolsky, 1900 (I, A?)

Eurylepis taeniolatus parthianicus (Szczerbak, 1990) (I, A?, C)

Eurylepis taeniolatus taeniolatus Blyth, 1854 (A)

Ophiomorus blanfordi Boulenger, 1887 (I)

Ophiomorus brevipes (Blanford, 1874) (I)

Ophiomorus chernovi S. Anderson and Leviton, 1966 (I?, C)

Ophiomorus maranjabensis Kazemi, Qomi, Kami, and Anderson, 2011 (I)

Ophiomorus nuchalis Nilson and Andrén, 1978 (I)

Ophiomorus persicus (Steindachner, 1867) (I)

Ophiomorus streeti S. Anderson and Leviton, 1966 (I)

Ophiomorus tridactylus (Blyth, 1853) (I, A)

Scincus scincus conirostris Blanford, 1881 (I)

Scincus mitranus J. Anderson, 1871 (I)

Trachylepis aurata transcaucasica (I)

Trachylepis aurata subsp. (A?)

Trachylepis septemtaeniata (Reuss, 1834) (I, C) (Chernov, 1926) (I)

Trachylepis dissimilis (Hallowell, 1860. (A?)

Trachylepis vittata (Olivier, 1804) (I)

Family Varanidae. Lizards in this family are called monitor lizards (goannas in Australia). The family is distributed throughout the tropics and deserts of the

Old World. These are the largest lizards, and fossil species would dwarf the living ones. Two species, *Varanus griseus* and *V. bengalensis* live in our area. The latter species, widespread in the Indian subcontinent and eastward, penetrates west into eastern Baluchistan in Iran and into easternmost Afghanistan. These are strong-limbed predators. They have long, forked tongues with which they constantly pick up olfactory cues. The desert monitor, *V. griseus*, forages methodically over large areas, entering rodent burrows in its search for prey. They feed on reptiles, birds, and any mammals small enough for them to overcome and swallow. *Varanus bengalensis*, which occurs along the Kabul River in Afghanistan, readily enters water and forages through marshes as well as drier habitats, where standing water is rare. Most of what is known of the biology and natural history of the Bengal monitor has been recorded in the monograph of the species by Auffenberg (1994). Monitors are hunted for their skins, which are used for leather, and they may be threatened with extinction in some areas. Two subspecies of the desert monitor occur in Iran, *V. griseus caspius* on the Iranian Plateau and into Central Asia, *V. g. griseus*, distributed through North Africa and the Arabian Desert extending into lowland Khuzestan. Most of the ecological and behavioral studies of this subspecies have been carried out in Turkmenistan and Uzbekistan. A third subspecies, *V. g. koniecznyi*, occurs in Pakistan east of the Iranian Plateau. In Iran, monitors are called *bozmajeh* "goatsucker," as there is a folk belief that a monitor will grab a ewe and suck its milk (Firouz, 2005).

Figure 8. *Varanus griseus caspius* (Photograph by Masoud Yousefi)

The taxa in our area are:

Varanus bengalensis bengalensis (Daudin, 1802) (I, A)

Varanus griseus griseus (Daudin, 1803) (I)

Varanus griseus caspius (Eichwald, 1841) (I, A, C)

Amphisbaenia, Family Trogonophidae. Amphisbaenians are small, burrowing reptiles, a distinct evolutionary group, probably once derived from a lizard ancestor. They are included here for convenience, but they are as distinct from lizards as are snakes (also derived from lizards). The family Trogonophidae centers in eastern North Africa/Arabia and has a single representative extending into the active sand dunes of Khuzestan and Fars in Iran. It has

rarely been collected and little is known of its natural history, other than that its morphology, especially its wedge-like head is adapted for a life moving beneath the surface of loose sand. The family has been reviewed by Gans (1960). See also Anderson (1979).

Figure 9. *Diplometopon zarudnyi*

A single species occurs in Iran, none in Afghanistan or Central Asia:

Diplometopon zarudnyi Nikolsky, 1907 (I)

Diversity and Biogeography. See Anderson (1999) for a detailed discussion of the ecological and behavioral influences on lizard distribution. Lizards are strongly influenced by substrate type, vegetation type, temperature regimes, moisture availability, and feeding strategies and feeding niches. Owing to its topographical diversity, Iran has the greatest habitat variation of the area under consideration here, although considered as a whole, the Central Asian republics bordering Iran and Afghanistan have habitats varying from the low deserts and steppes of Turkmenistan to the high mountains and valleys of Uzbekistan and Tajikistan. The various habitats of our region and their lizard communities are determined both by current climatic conditions and by the paleogeographical determinants of the current topography. The makeup of the lizard fauna has ultimately been determined by the evolution and distribution of species as tectonic and climatic events have repeatedly separated and brought together populations of different origins.

Of the present physiographic barriers to and/or corridors of distribution for the lizard fauna, the interior basins are the most ancient portions of Iran, Afghanistan, and Central Asia (see Anderson, 1999 for a summary of significant paleogeographical events). These basins have been terrestrial environments from at least the late Cretaceous to the present and in contact with one another since the Miocene, although many have contained freshwater to brackish bodies of water at intervals. The many ranges of the interior plateau have resulted from the continuing uplift of the Iranian Plateau in the broad sense from the collision of the Gondwanan plates with the northern continental mass, and their extents and elevations have fluctuated considerably during the Tertiary and Quaternary. The diversity of such genera as *Phrynocephalus, Eremias,* and *Ophiomorus* in flatland habitats undoubtedly resulted from the varying extent of desert and steppe environments during the

existence of interior basins, particularly during periods when lacustrine deposits accumulated. The Alborz mountain chain, having a long and complex orogeny has also probably had a terrestrial existence since the Miocene, although its status as a series of mountain ranges high enough to affect climate and to serve as a barrier between faunal areas is more recent, probably only since the Pliocene. On the other hand, these ranges have served as a corridor for the extent of more mesic genera, such as *Anguis*, *Pseudopus*, and *Lacerta* into the region. The Zagros range and its foothill belts received marine, and later, terrestrial sediments, until the Pliocene/Quaternary. Their present elvations and influence on climate date only from the Pleistocene. Nonetheless, they share isolated species of such genera as *Asaccus, Tropiocolotes,* and *Eublepharis,* disjunctly distributed to the south and east of the Iranian Plateau. Together with the Anatolian and Caucasian mountains, the Zagros complex harbors a distinctive lizard fauna composed of genera unique to this region, such as *Darevskia* and *Iranolacerta.* The Persian Gulf, long a barrier between the Arabian Shield and the eastern interior plateau, was evacuated by the sea one or more times during the Pleistocene, allowing faunal contact between the eastern Iranian Plateau and eastern Arabia. Such plateau genera as *Phrynocephalus* and *Teratoscincus* apparently extended southward during this period, *Stenodactylus* and *Scincus* moving north to low desert coastal areas of Iran. The lizard fauna of the Iranian islands of the Gulf reflects this prior contact.

While there are many species that are unique to Iran, Afghanistan, or one or more Central Asia republics, there are few genera in Afghanistan and Central Asia that do not occur in Iran as well. *Alsophylax* and *Asymblepharus* are rare examples, the former a highland Asian taxon, the latter a southern Himalayan example. Iran, which embraces territories contiguous with highland areas to the northwest and low deserts of Arabia and Euphrates to the southwest has a number of genera not shared with Afghanistan or Central Asia, such as *Anguis, Asaccus, Carinatogecko, Hemidactylus, Apathya, Darevskia, Iranolacerta, Lacerta, Timon, Scincus,* and *Diplometopon.* A number of genera that occur in our area are widely distributed throughout Southwest Asia and/or the larger western Palearctic; these include *Laudakia, Cyrtopodion, Acanthodactylus, Chalcides, Eumeces,* and *Trachylepis.*

Our understanding of the evolutionary relationships of lizards is still in flux; the advent of molecular techniques in systematics is enriching our knowledge of these relationships and holds promise for understanding phylogeography as

well (see for example, Macey et al., 2000).

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