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Preliminary Key to the Turtles, Lizards, and Amphisbaenians of Iran

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INTRODUCTION

Research toward a monographic treatment of the lizards, turtles, and amphisbaenians of Iran has been completed recently. Preparation of the final manuscript has been delayed, and a further delay in publication seems inevitable. For this reason, it seems desirable to publish the key to this fauna in a preliminary form as an aid to collectors and others concerned with the fauna of Iran and Southwest Asia generally. It is hoped that through use, its shortcomings will be revealed and communicated to the author, so that an improved, illustrated version can be included in the monograph.

To facilitate use of the key and to aid in recognition of significant range extensions, the distribution of turtles, lizards, and amphisbaenians is shown according to political divisions (ostans) in Table 1. The distribution according to natural geographic regions has been discussed in detail elsewhere (Anderson, 1968).

Non-herpetologists using this key are referred to Peters (1964) for definitions of unfamiliar terms. Species preceded by an asterisk (*) have not yet been recorded definitely from Iran. Certain difficulties attend the use of a key not accompanied by illustrations, diagnoses, and descriptions of each species, and individual specimens, especially juvenile and damaged specimens may not be identifiable on the basis of the key alone. This is particularly true in the case of geckos, in which loss of the

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FIG. 1. Map of Iran showing the primary political divisions (ostans). 1. Tehran, 2. Gilan, 3. East Azarbaijan, 4. West Azarbaijan, 5. Kordestan-Kermanshah, 6. Khuzestan-Lorestan, 7. Esfahan, 8. Fars, 9. Kerman, 10. Baluchestan-Sistan, 11. Khorasan, 12. Mazandaran. Boundaries and ostan numbers after Fisher, 1968, p. 4. Redrawn).

tail is frequent; in some cases it has been necessary to rely on caudal characters in the key. This is true in the case of certain species which I have not examined, and have had to base the dichotomies on descriptions in the literature, and in other instances where statistical criteria are the only definitive means of separating taxa other than the characters I have used in the key. If the locality is known for a specimen, the distribution table (table 1) should aid in a tentative identification.

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Mr. and Mrs. William S. Street deserve special mention in this list, as their two Iranian expeditions recently have helped to assemble the most comprehensive collections in U. S. museums. Their collections, deposited in Field Museum of Natural History, along with my own earlier collection from southwestern Iran (deposited in the California Academy of Sciences) have formed the basis of my studies of the amphibians and reptiles of Iran. Street Expedition material from Afghanistan has also provided comparative data.

Also deserving of special mention are the anthropological expeditions of Henry Field. Dr. Field has maintained an active concern with promoting knowledge of the fauna of Southwest Asia, and specimens collected by his expeditions and by other collectors at his request have formed the foundation of U. S. herpetological collections from that area over the past 45 years. Most of this material is in Field Museum of Natural History and at the Museum of Comparative Zoology, Harvard.

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KEY TO THE TURTLES OF IRAN¹

- 1a. Carapace without horny plates; feet with 3 claws *Trionyx euphraticus* (Daudin 1802)
- 1b. Carapace with horny plates; feet with 4 or 5 claws 2
- 2a. Head covered with undivided smooth skin; digits fully webbed 3
- 2b. Head covered by shields; digits not webbed 4
- 3a. Plastron united to carapace by bony suture; plastron not hinged, immovable; anal plates of plastron pointed, their median suture shorter than interabdominal suture
Mauremys caspica caspica (Gmelin 1774)
- 3b. Plastron united to carapace by ligamentous attachment; plastron more or less distinctly hinged, movable (in adults); anals rounded, their median suture longer than interabdominal suture *Emys orbicularis* (Linnaeus 1758)
- 4a. Forelimb with 4 claws *Testudo horsfieldii* Gray 1844
- 4b. Forelimb with 5 claws 5
- 5a. Shell oval in outline, with smooth, rounded posterior margin; ground color light olive, with large, distinct, individual dark markings ... *Testudo graeca ibera* Pallas 1814
- 5b. Shell elongate in outline, with upturned, emarginate posterior margin; ground color brownish olive, with very indistinct dark markings
Testudo graeca zarudnyi Nikolsky 1896

KEY TO THE LIZARDS AND AMPHISBAENIANS OF IRAN

- 1a. Limbs absent 2
- 1b. Limbs present 5
- 2a. Eyelids well developed and movable; osteoderms underlie scales of head and body.
ANGUIDAE 3
- 2b. No movable eyelids; no osteoderms underlie scales of head and body 4
- 3a. A deep lateral fold from head to level of vent; teeth blunt, with conical crowns
Ophisaurus apodus (Pallas 1775)
- 3b. No lateral fold; teeth long and sharp *Anguis fragilis colchicus* (Nordmann 1840)
- 4a. Body ringed with distinct annuli; eyes very small, beneath head shields; scales not imbricate *Diplometopon zarudnyi* Nikolsky 1907
- 4b. Body not ringed with distinct annuli; eyes usually large, well developed, with distinct iris and pupil, sometimes small (Typhlopidae and Leptotyphlopidae); scales imbricate snakes (not covered in this work)
- 5a. Skin soft, with granules, rarely imbricate scales; no paired, symmetrically arranged shields on top of head, which is covered by granules; neither suborbital nor frontosquamosal arch present on skull; clavicles broadened, forming loop at inner end; tongue smooth or covered by thread-like papillae; pupil of eye usually vertically elliptical (except in *Pristurus*). GEKKONIDAE 6

¹ Marine turtles of the Persian Gulf are not included.

- 5b. Skin never soft, composed of scales, plates, or granules; either suborbital and/or frontosquamosal arch present on skull; clavicles not broadened on inner end, or if broadened, then tongue covered by imbricate, scale-like papillae or by oblique folds . 44
- 6a. Eyelids movable; digits not dilated; procoelous vertebrae 7
- 6b. Eyelids immovable (spectacle); digits dilated or not; amphicoelous vertebrae 8
- 7a. Subdigital lamellae smooth ... *Eublepharis angramainyu* Anderson and Leviton 1966
- 7b. Subdigital lamellae each with several small tubercles
Eublepharis macularius (Blyth 1854)
- 8a. Pupil of eye round *Pristurus rupestris* Blandford 1874
- 8b. Pupil of eye vertically elliptical 9
- 9a. Digits strongly dilated 10
- 9b. Digits not dilated 17
- 10a. Each digit dilated at base, with double row of lamellae beneath, forming pads; terminal phalanges compressed 11
- 10b. Each digit dilated at apex, terminating in subtriangular expansion, claw lying in longitudinal groove dividing apical expansion 15
- 11a. Tail with sharp, denticulated lateral edge; outer postmentals not in contact with labials *Hemidactylus garnotii* Duméril and Bibron 1836
- 11b. Tail without sharp, denticulated lateral edge (although in *H. flaviviridis* there is a ventrolateral row of small pointed tubercles); outer postmentals in contact with labials 12
- 12a. No enlarged dorsal tubercles, or if tubercles present, these are rounded, feebly keeled, not regularly arranged (none present in Iranian, Afghan, Pakistan, or northern Indian specimens examined); males with femoral pores only
Hemidactylus flaviviridis Rüppell 1835
- 12b. Enlarged dorsal tubercles numerous, strongly keeled, arranged in more or less regular longitudinal series; males with preanal pores only, or with both preanal and femoral pores 13
- 13a. Males with 15-27 femoral and preanal pores; 6-10 lamellae under 4th toe
**Hemidactylus brookii* Gray 1845
- 13b. Males with preanal pores only; 8-14 lamellae under 4th toe 14
- 14a. 8-11 lamellae and pairs of lamellae under basal expanded portion of 4th toe; 7-10 supralabials and 7-9 infralabials; males with 2-10 preanal pores.
Hemidactylus turcicus turcicus (Linnaeus 1758)
- 14b. 12-14 lamellae and pairs of lamellae under basal expanded portion of 4th toe; 10-12 supralabials and 8-10 infralabials; males with 9-13 preanal pores
Hemidactylus persicus Anderson 1872
- 15a. Apical expansion of digit with fine lamellae beneath; postanal sacs present.
Ptyodactylus hasselquistii (Donndorff 1789)
- 15b. Apical expansion of digit smooth beneath (low magnification); postanal sacs absent 16
- 16a. Largest dorsal tubercles more than one-half height of ear opening; tubercles extending onto occiput and temporal area, much larger than surrounding granules; whorls of caudal tubercles separated by 3-4 transverse rows of small scales
Asaccus elisae (Werner 1895)
- 16b. Largest dorsal tubercles less than one-half height of ear opening; tubercles becoming much smaller on nape, usually not extending onto head, or if so, few in number, scarcely larger than surrounding granules; whorls of caudal tubercles separated by 5-6 transverse rows of small scales
Asaccus griseonotus Dixon and Anderson 1973

17a. Digits with well-defined lateral fringe of elongated, flexible pointed scales	18
17b. Digits without lateral fringe of elongate, flexible pointed scales, although scales may be denticulate	23
18a. Dorsal scales intermixed with larger rounded tubercles <i>Crossobamon evermanni</i> (Wiegmann 1834)	
18b. Dorsal scales uniform, not intermixed with tubercles	19
19a. Dorsal scales small, not cycloid; scales of tail not large, not plate-like, and not strongly imbricate	20
19b. Dorsal scales large, cycloid; tail covered above (at least on posterior two-thirds) by single row of large, plate-like, strongly imbricate scales	21
20a. Back with 4 dark crescentic crossbars; 10-11 supralabials; forelimb does not reach beyond tip of snout <i>Stenodactylus affinis</i> (Murray 1884)	
20b. No dark crossbars on back; 12-15 supralabials; forelimb reaches beyond tip of snout <i>Stenodactylus doriae</i> (Blanford 1874)	
21a. Large cycloid scales of dorsum extend forward to occiput <i>Teratoscincus scincus</i> (Schlegel 1858)	
21b. Large cycloid scales not extending forward beyond shoulders	22
22a. Not more than 60 scales round middle of body <i>Teratoscincus bedriagai</i> Nikolsky 1899	
22b. About 100 scales round middle of body . . . <i>Teratoscincus microlepis</i> Nikolsky 1899	
23a. Dorsal scales uniform, small, homogeneous	24
23b. Dorsal scales heterogeneous	27
24a. No postmentals (chin shields) <i>Tropicolotes latifi</i> Leviton and Anderson 1972	
24b. Postmentals present	25
25a. A single pair of postmentals, not in contact; dark crossbars of body absent or indistinct, sometimes two dorsolateral series of spots <i>Tropicolotes helenae</i> (Nikolsky 1907) ¹	
25b. Two pairs of postmental shields; dark crossbars of body and tail distinct	26
26a. Dark dorsal crossbars of body and tail broader than interspaces <i>Tropicolotes persicus bakhtiari</i> Minton, Anderson, and Anderson 1970	
26b. Dark dorsal crossbars less than one-half width of interspaces <i>Tropicolotes persicus persicus</i> (Nikolsky 1903)	
27a. Dorsal scales of many sizes, all scales except labials and chin shields strongly keeled <i>Tropicolotes heteropholis</i> Minton, Anderson, and Anderson 1970	
27b. Dorsal scales small, intermixed with larger tubercles; at least some scales of head and body smooth (except <i>Bunopus aspratilis</i>)	28
28a. Subdigital lamellae with a single transverse series of tubercles, particularly on the free margin, seen under magnification (sometimes worn down in later part of epidermal cycle); distal phalanges not compressed	29
28b. Subdigital lamellae smooth; distal phalanges compressed or not	31
29a. Postmentals (chin shields) absent <i>Bunopus tuberculatus</i> Blanford 1874	
29b. Postmental shields present	30
30a. Ventrals strongly keeled; tail with large, strongly keeled, sharply pointed tubercles, no subcaudal plates <i>Bunopus aspratilis</i> Anderson 1973	
30b. Ventrals smooth; tail without enlarged tubercles, posterior three-fourths with enlarged subcaudal plates <i>Bunopus crassicauda</i> Nikolsky 1907	

¹ Schmidtler and Schmidtler (1972) have described a new subspecies, *Tropicolotes helenae fasciatus*, from Kordestan-Kermanshah and Khuzestan-Lorestan Provinces. The two subspecies are distinguished as follows: *T. h. helenae*—65-84 dorsal scales between axilla and groin, 0-6 indistinct dark dorsal crossbars with white posterior margins; *T. h. fasciatus*—80-92 dorsal scales, 5 distinct crossbars with white posterior margins.

- 31a. Postmentals (chin shields) present, and well differentiated in size and shape from granular small scales of chin and throat 32
- 31b. Postmental shields absent (sometimes a short row of enlarged, subcircular scales present behind mental) 43
- 32a. Subfemoral tubercles present among granules of lower surface of thigh, in short row of 2-6, often in contact with posterior row of large imbricate scales; males with continuous series of preanal and femoral pores 33
- 32b. No subfemoral tubercles; males with preanal pores only 34¹
- 33a. 24-29 strongly keeled, nonmucronate trihedral or subtrihedral tubercles in paravertebral row from occiput to level of vent; males with 28-41 (32-40 in Afghan specimens examined) preanal and femoral pores (total of both sides).
Cyrtodactylus fedtschenkoi (Strauch 1887)
- 33b. 19-23 strongly keeled, mucronate tubercles in paravertebral row from occiput to level of vent; males with 23-31 (24-29 in Afghan and Iranian specimens examined) preanal and femoral pores (total of both sides)
Cyrtodactylus caspius (Eichwald 1831)
- 34a. Subcaudal scales one head-width behind vent small, not enlarged and plate-like . 35
- 34b. Subcaudal scales one head-width behind vent enlarged, plate-like, 2 serially arranged plates, or pairs of plates covering each caudal segment 38
- 35a. Subcaudal plates smooth 36
- 35b. Subcaudal plates distinctly keeled 37
- 36a. Scattered small keeled tubercles among the large trihedral dorsal tubercles which form fairly regular longitudinal rows; tubercles on tail arranged around middle of each segment, not in terminal scale row *Cyrtodactylus russowii* (Strauch 1887)
- 36b. No scattered small tubercles among the rows of enlarged dorsal tubercles; caudal tubercles form terminal rings of each annulus
Cyrtodactylus kachhensis (Stoliczka 1872)
- 37a. 23-30 abdominal scales across middle of belly (about 11 scales in a distance across belly equal to length of snout)
Cyrtodactylus heterocercus heterocercus (Blanford 1874)
- 37b. 14-16 abdominal scales across middle of belly (less than 10 scales in a distance across belly equal to length of snout) *Cyrtodactylus saggitifer* (Nikolsky 1899)
- 38a. Subcaudal plates in 2 median series; dorsal tubercles distinctly smaller than interspaces; snout 2 to 2¼ times longer than diameter of eye
Cyrtodactylus kirmanensis (Nikolsky 1899)
- 38b. Subcaudal plates in a single median series; dorsal tubercles smaller or larger than interspaces; snout length less than twice diameter of eye 39
- 39a. Caudal tubercles arranged around middle of each caudal segment, not forming terminal ring of each segment **Cyrtodactylus kotschy* (Steindachner 1870)
- 39b. Caudal tubercles (or enlarged keeled scales) forming terminal ring of each segment 40
- 40a. Dorsal tubercles distinctly smaller than interspaces, rounded, smooth or weakly keeled to subconical, but not distinctly trihedral; peritoneum and investiture of some internal organs of abdominal cavity darkly pigmented; limbs and tail thin, attenuate. 41

¹ DeWitte (1973) has described a new genus and species, *Rhinogekko misonnei*, from the Dasht-e Lut (Kerman, Baluchistan-Sistan, and Khorasan Provinces). It would appear at this point in the key, and is distinguished from all other species in having the nostril situated at the apex of a prominent caruncle composed of four scales. It is closely related (if not identical) to "*Agamura*" *femoralis* Smith 1933, which is known from Baluchistan, Pakistan.

- 40b. Dorsal tubercles distinctly larger than interspaces, strongly keeled and trihedral, peritoneum and investiture of organs of abdominal cavity without melanocytes; limbs and tail sturdy 42
- 41a. 24-28 abdominal scales across middle of belly (14-15 scales across belly in distance equal to length of snout); snout length less than $1\frac{1}{2}$ times diameter of eye
Cyrtodactylus agamuroides (Nikolsky 1899)
- 41b. 10-16 abdominal scales across middle of belly (6-8 scales across belly in distance equal to length of snout); snout length $1\frac{1}{2}$ times diameter of eye
Cyrtodactylus gastropholis (Werner 1917)
- 42a. 12-16 dorsal tubercles in longest transverse (chevron-shaped) series across back; width of dorsal tubercles distinctly smaller than greatest diameter of ear opening; 10-14 supralabials *Cyrtodactylus scaber* (Heyden 1827)
- 42b. 10 dorsal tubercles in longest transverse series across back; width of dorsal tubercles nearly equal to greatest diameter of ear opening; 9 supralabials
Cyrtodactylus brevipes (Blanford 1874)
- 43a. Tail cylindrical, very slender, and of almost uniform diameter from base to tip (tip blunt), no mucronate tubercles on annuli; distal phalanges of digits compressed, narrower than basal phalanges and strongly angularly bent
Agamura persica (Duméril 1856)
- 43b. Tail tapering gradually (tip of original tail sharp), 2 mucronate tubercles on either side of each annulus; digits cylindrical, not strongly angularly bent
Alsophylax spinicauda Strauch 1887
- 44a. No paired, symmetrically arranged shields on top of head, which is covered by granules, small scales, or tubercles 45
- 44b. Enlarged, paired symmetrical plates on top of head (some granules may be present, but large shields predominate) 70
- 45a. Venter covered by small juxtaposed granules or quadrangular scales; tongue deeply divided, long and slender, smooth, retractile into sheath at base; dorsum covered with numerous small juxtaposed granules or scales; dentition pleurodont.
VARANIDAE 46
- 45b. Venter covered by imbricate scales, not granules; tongue broad and short, smooth or covered with villose papillae, not deeply forked; dorsum covered by imbricate scales or a combination of imbricate scales and granules; dentition primarily acrodont.
AGAMIDAE 48
- 46a. Tail compressed throughout its length, with low, double-toothed crest above; abdominal scales in 88-110 transverse series from collar fold to groin
Varanus bengalensis bengalensis (Daudin 1802)
- 46b. Tail round in cross-section, or slightly compressed posteriorly, without double-toothed crest above; abdominal scales in 110-125 transverse series from collar fold to groin 47
- 47a. Tail round in cross-section throughout its length; back with 5-8 (usually 6) gray bars in addition to 1-2 nuchal crossbars, pattern becoming indistinct in older animals, pattern of dots predominating; tail patterned nearly to tip with 19-28 dark cross-bars *Varanus griseus griseus* (Daudin 1803)
- 47b. Posterior half of tail narrow in cross-section, compressed, distinct keel above; back with 5-8 (usually 6) sepia bars in addition to nuchal crossbar; tail with 13-19 dark crossbars, end of tail without pattern *Varanus griseus caspius* (Eichwald 1841)
- 48a. Tympanum concealed or absent 49
- 48b. Tympanum exposed 57
- 49a. Large fringed cutaneous fold at angle of mouth
Phrynocephalus mystaceus galli Krassowsky 1932

- 49b. No cutaneous fold at angle of mouth 50
- 50a. Dorsal scales heterogeneous, small scales intermixed with strongly enlarged scales 51
- 50b. Dorsal scales subequal, homogeneous 54
- 51a. Enlarged dorsal scales flat, not tubercular, posterior border not sharply upturned; sides of back of head and neck with long, flat, upturned fringe-like scales; both sides of 4th toe with long, well-developed fringes
**Phrynocephalus luteoguttatus* Boulenger 1887
- 51b. Some enlarged dorsal scales nail-like, often tubercular, large part of scale raised free of back; sides of back of head and neck without long flat, upturned fringe-like scales (but sometimes with short spiny scales); one or both sides of 4th toe with short fringe 52
- 52a. Nasal shields in contact, or rarely separated by a single series of scales; crossbars on tail most intense (black) ventrally, though usually quite dark dorsally as well; always present ventrally *Phrynocephalus scutellatus* (Olivier 1807)
- 52b. Nasal shields separated by 3-5 (exceptionally 1, usually 3) series of scales; crossbars on tail usually most intense dorsally, rarely absent, and much lighter or absent ventrally, sometimes interrupted dorsally, and seen as a series of spots along sides of tail 53
- 53a. No longitudinal crest of mucronate scales; a distinct transverse fold of skin across back of neck; entire nostril not seen when viewed from side of head; width of space between nostrils considerably smaller than distance between nostril and preocular ridge *Phrynocephalus helioscopus helioscopus* (Pallas 1771)
- 53b. A longitudinal nuchal crest of 3-8 mucronate, tubercular scales; no transverse fold of skin across back of neck; entire nostril seen when viewed from side of head; width of space between nostrils equal to space between nostril and preocular ridge
Phrynocephalus helioscopus persicus de Filippi 1863
- 54a. Sides of head and neck with long, projecting fringe-like scales; row of enlarged up-raised tubercular scales on posterior margin of thigh and sides of tail forming short fringe; often a row of slightly enlarged scales along flank
**Phrynocephalus interscapularis* Lichtenstein 1856
- 54b. Sides of head and neck without projecting fringe-like scales; no fringe of scales on posterior margin of thigh and sides of base of tail; no enlarged scales along flank. 55
- 55a. Nasal shields separated by 1-3 series of scales; ventral surface of tail with indistinct dark crossbars, or entire tip dark gray
Phrynocephalus maculatus maculatus Anderson 1872
- 55b. Nasal shields in contact, or partially separated; tail with 4 or 5 jet-black crossbars ventrally, tip of tail not black nor gray 56
- 56a. Distinct dark-margined light dorsolateral stripe from posterior angle of eye along body onto tail; single very elongate suborbital scale, 2 or 3 times as long as adjacent scales **Phrynocephalus clarkorum* Anderson and Leviton 1967
- 56b. No light stripe along side of body; 3 suborbital scales of about equal size
Phrynocephalus ornatus Boulenger 1887
- 57a. Femoral pores present; tail strongly depressed throughout most of its length, shorter than snout-vent length, covered above by whorls of very large, spinous tubercles which are rounded at their bases 58
- 57b. Femoral pores absent; tail not strongly depressed, except sometimes at base, longer than snout-vent length unless broken, without whorls of large spinous tubercles rounded at base (large keeled mucronate scales may be arranged in annuli, however) 60

- 58a. Whorls of spinous scales on upper surface of tail not separated by small scales; back without transverse rows of enlarged spinous tubercles
Uromastix microlepis Blanford 1874
- 58b. Whorls of spinous scales on upper surface of tail separated by small scales; back with more or less regular transverse rows of enlarged spinous tubercles 59
- 59a. 9-15 femoral and preanal pores on each side; 7-10 tubercles across base of tail; 20-25 transverse rows of scales on middle of belly, on space corresponding to length of head (tip of snout to angle of jaw) *Uromastix asmussi* (Strauch 1863)
- 59b. 15 or more femoral and preanal pores on each side; 12 tubercles across base of tail; 30-40 transverse rows of scales on middle of belly, on space corresponding to length of head *Uromastix loricatus* (Blanford 1874)
- 60a. Well-marked dorsel crest, at least on neck *Calotes versicolor* (Daudin 1802)
- 60b. No dorsal crest 61
- 61a. Caudal scales obliquely arranged, not forming annuli; tympanum small, more or less deeply sunk 62
- 61b. Caudal scales forming more or less distinct annuli; tympanum usually larger than eye, superficial 65
- 62a. Dorsal scales homogeneous, large scales of back grading into progressively smaller scales of flanks, no distinctly larger scales among them . . . *Agama agilis* Olivier 1807
- 62b. Dorsal scales heterogeneous, back and usually flanks with scales of varying sizes intermixed 63
- 63a. Abdominal scales distinctly keeled; largest dorsal scales about twice width of adjacent small scales; at least anterior oval vertebral spots linked together to form undulating gray or lavender vertebral stripe on neck and back, bordered by brown (darker) stripes extending onto dorsal surface of head; males with distinct gular sac
Agama blanfordi Anderson 1966
- 63b. Abdominal scales smooth (rarely faintly keeled); largest dorsal scales about 3 times width of adjacent small scales; oval vertebral spots often indistinct, contained within dark crossbars, and not linked into longitudinal stripe; males without gular sac. 64
- 64a. Upper surface of thigh with patch of enlarged scales usually distinct, intermixed with smaller scales; flanks with numerous enlarged scales among smaller scales; "glandular" callose preanal scales in 2 rows; small patch of scales on neck just posterior to occiput in which direction of imbrication is reversed, i.e., these scales have anterior margins imbricate *Agama rudrata rudrata* Olivier 1807
- 64b. Upper surface of thigh usually lacking distinctly enlarged scales, or with an area of large scales not intermixed with small scales; enlarged scales of back do not extend onto flanks; "glandular" preanal scales in single row; none of the neck scales showing reversed imbrication *Agama rudrata megalonyx* (Günther 1864)
- 65a. Flanks without enlarged scales or tubercles; distal two-thirds or more of tail with segments composed of more than 2 annuli when viewed laterally (anterior portion of tail up to 2 or 3 head-widths posterior to vent may have only 2 annuli per segment), or segmentation indistinct 66
- 65b. Flanks with enlarged scales, arranged in patches or in regular series; segments of tail composed of 2 annuli throughout length of tail 68
- 66a. Median dorsal scales in straight longitudinal series, 6-10 across middle of back, grading into dorsolateral scales; hemipenes of male nonpigmented
**Agama melanura lirata* (Blanford 1874)
- 66b. Median dorsal scales in oblique longitudinal series, 16-20 across middle of back, clearly set off from dorsolateral scales; hemipenes of male black 67
- 67a. A prominent transverse fold of skin across nape *Agama nupta nupta* de Filippi 1843
- 67b. No fold of skin across nape *Agama nupta fusca* (Blanford 1876)

- ¹
- Counts must be made exactly midway between snout and vent.

- 82b. Parietal scales not in contact; nuchals smooth, post-nuchals smooth or very weakly keeled; no light vertebral stripe *Mabuya aurata* (Linnaeus 1758)
- 83a. 2 median rows of dorsal scales united into single row of broad scales; postnasal shield present *Eumeces taeniolatus* (Blyth 1854)
- 83b. 2 median rows of dorsal scales broader than those on flanks; no postnasal shield 84
- 84a. Dorsum with dark vermiculate or mottled pattern, mid-dorsal spots tending to form longitudinal lines *Eumeces schneiderii variegatus* Schmidt 1939
- 84b. Dorsum without dark vermiculate or mottled pattern 85
- 85a. Base of tail reddish in life¹ *Eumeces schneiderii zarudnyi* Nikolsky 1899
- 85b. Base of tail not reddish in life, dorsum with or without orange or reddish flecks. *Eumeces schneiderii princeps* (Eichwald 1839)
- 86a. Eyelids immovable (spectacle) *Ophisops elegans* Ménétrières 1832
- 86b. Eyelids movable 87
- 87a. Nostril separated from 1st supralabial by nasal shield 88
- 87b. Nostril in contact with 1st supralabial, or separated from supralabial by very narrow brim 100
- 88a. Ventral plates in straight longitudinal series; lower nasal resting on 1st supralabial. 89
- 88b. Ventral plates in tessellated or oblique longitudinal series, converging posteriorly; lower nasal resting on 2 or 3 supralabials 90
- 89a. Occipital in contact with interparietal, or separated from it by small shield; large transparent scales of lower eyelid edged with black; ventral plates in 10 longitudinal series *Eremias guttulata* (Lichtenstein 1823)
- 89b. Occipital absent or minute, not in contact with interparietal; transparent shields of lower eyelid not edged with black; ventral plates usually in 12 (rarely 10 or 14) longitudinal series *Eremias brevirostris* (Blanford 1874)
- 90a. Subocular bordering mouth 91
- 90b. Subocular not bordering mouth 97
- 91a. Lateral scales of 4th toe forming a distinct fringe in its entire length 92
- 91b. Lateral scales of 4th toe not forming a distinct fringe 93
- 92a. A broad dark dorsolateral stripe from nostril through eye, along body and side of tail, one or 2 additional narrower dark stripes mediad to these on each side, the remainder of the dark dorsal stripes interrupted and anastomosing to form a reticulate pattern, evident even in very young specimens; 4th toe with 2 complete rows of subdigital scales, i.e., a total of 4 scales counted around toe (except that an extra scale may be present at a joint) **Eremias scripta* (Strauch 1867)
- 92b. Dorsal pattern consists of 7 dark stripes, the outer dorsolateral stripe broadest, these stripes persisting unbroken in both adults and juveniles; 4th toe with single row of subdigital scales, i.e., total of 3 scales counted around toe (except an extra scale may be present at a joint) *Eremias lineolata* (Nikolsky 1896)
- 93a. The 2 series of femoral pores broadly separated, space between the 2 series at least one-third the length of each *Eremias pleskei* Bedriaga 1907
- 93b. The 2 series of femoral pores meeting, or separated by space not greater than one-fourth length of each 94
- 94a. Back with 5-11 dark stripes, broader than interspaces, none of the stripes containing light ocelli or spots; stripes persistent in adults, but sometimes indistinct so that

¹ Preserved individuals in which the color has faded cannot be identified to the subspecies level, as far as I have been able to determine.

back appears almost uniform sandy; 4th toe with 2 complete rows of subdigital scales and a complete row of sharply pointed lateral scales, i.e., a total of 4 scales counted around penultimate phalanx; collar scales small, usually only a single median collar scale distinctly larger than adjacent gulars.

Eremias fasciata Blanford 1874

- 94b. Light ocelli or spots on upper flanks (rare exceptions), dark stripes of juveniles breaking up in adults to form spots or broken lines; 4th toe with single complete row of subdigital scales, a complete row of somewhat smaller ventrolateral scales, and a few scattered, much smaller, ventrolateral scales not forming complete row; total of 3 scales counted around penultimate phalanx; usually several collar scales distinctly larger than adjacent gulars 95
- 95a. Adults with dark interrupted dorsolateral black stripe forming ocelli with white spots, this dorsolateral pattern not contrasting strongly with interrupted dark stripes and spots of dorsum; juveniles with 3 dark stripes on dorsum between white-spotted dorsolateral stripes, vertebral stripe being black, bifurcated on nape (dark stripes breaking up into several irregular rows of dark spots with age); ventral surface of tail carmine red in juveniles (in life) *Eremias velox velox* (Pallas 1771)
- 95b. Adults usually with black dorsolateral stripe, more or less continuous for at least major portion of its length, containing white spots, black stripe contrasting strongly with dorsal color pattern; juvenile with 4 dark stripes on dorsum between dorsolateral white-spotted stripes, vertebral stripe being white (dark stripes breaking up into 4 more or less regular rows of dark spots with age); ventral surface of tail not red in juveniles 96
- 96a. Adults with 4 more or less distinct rows of dark spots on dorsum between dorsolateral dark stripes; dark dorsolateral stripes usually containing white spots in single row; distal portion of tail bluish in juveniles (in life)
- Eremias persica* Blanford 1874
- 96b. Adults usually without dark stripes or spots on mid-dorsum; dorsolateral region with alternate rows of light and dark spots, often fusing longitudinally, forming 2-4 longitudinal stripes, often broken, the impression being 3-4 rows of white spots on flanks; ventral surface of tail yellow in juveniles (in life) ... *Eremias strauchi* Kessler 1878
- 97a. 4th toe with distinct fringe on both lateral and medial sides, formed by complete row of sharply pointed lateral scales and complete row of similar medial scales; ungual lamellae of fingers and toes with prominent, flat, lateral expansions
- Eremias grammica* (Lichtenstein 1823)
- 97b. 4th toe without distinct fringe; ungual lamellae without prominent lateral expansion. 98
- 98a. 5th toe with 2 complete rows of subdigital scales and incomplete row of small lateral scales; 2nd supraocular (1st of 2 large, undivided supraoculars) as long as or shorter than its distance from 2nd loreal *Eremias arguta* (Pallas 1771)
- 98b. 5th toe with single complete row of subdigital scales and a few scattered lateral scales not forming complete row; 2nd supraocular (1st of 2 large, undivided supraoculars) longer than its distance from 2nd loreal 99
- 99a. 4th toe with single row of subdigital scales; usually distinct tympanic shield; 4th supraocular usually distinct *Eremias intermedia* (Strauch 1876)
- 99b. 4th toe with 2 rows of subdigital scales, internal much larger; tympanic scale usually small or indistinct; 4th supraocular usually indistinct
- Eremias nigrocellata* (Nikolsky 1896)
- 100a. Digits with lateral fringes 101
- 100b. Digits without lateral fringes 104

- 101a. 3 scales around fingers; ventrals usually 10 in longest transverse row across belly; dorsal scales feebly keeled, 48 or more across middle of body
Acanthodactylus micropholis Blanford 1874
- 101b. 4 scales around fingers; ventrals 13-18 in longest transverse row across belly; dorsal scales strongly keeled, 54 or less across middle of body 102
- 102a. Ventral scales in oblique or irregular longitudinal series, not forming straight longitudinal rows; 18-22 dorsal scales in transverse series between hind limbs
Acanthodactylus fraseri Boulenger 1918
- 102b. Ventral scales in straight longitudinal rows, at least down middle of venter; outer series may be somewhat oblique; 10-16 dorsal scales in transverse series between hind limbs 103
- 103a. Dorsal color pattern reticulate, not lineate even in young specimens, indistinct in large adults; 13-18 ventral plates in longest transverse series; 38-54 dorsal scales across middle of back *Acanthodactylus cantoris schmidtii* Haas 1957
- 103b. Dorsal color pattern lineate, young specimens with 6 dorsal and one lateral light longitudinal streaks, with or without round white spots between them; some adults nearly uniform, no distinct pattern; 12-16 ventral plates in longest transverse series; 34-46 dorsal scales across back *Acanthodactylus cantoris blanfordi* Boulenger 1918
- 104a. Lower eyelid with 5-7 transparent shields edged with black; subdigital lamellae keeled *Apathya cappadocica urmiana* Lantz and Suchow 1934
- 104b. Lower eyelid without transparent shields; subdigital lamellae smooth or tuberculate 105
- 105a. Ventral plates more or less rectangular with rectilinear or nearly rectilinear posterior margins 106
- 105b. Ventral plates trapezoidal, with notches between longitudinal rows 108
- 106a. Dorsal scales strongly keeled, more or less distinctly hexagonal; collar serrated
Lacerta chlorogaster Boulenger 1908
- 106b. Dorsal scales smooth, granular, round or oval, collar not serrated 107
- 107a. 5-6 (rarely 4) supralabials anterior to subocular; normally 2 superposed postnasals (but sometimes fused on one or both sides of head); pterygoid teeth strongly developed; outer ventrals with small black spots *Lacerta brandtii* de Filippi 1863
- 107b. 3-4 (rarely 5) supralabials anterior to subocular; normally a single postnasal; pterygoid teeth absent; outer ventrals without black spots (turquoise blue spots present in males) *Lacerta saxicola* Eversmann 1834
- 108a. Ventral plates in 10 longitudinal series; 34-37 dorsal scales across middle of body 109
- 108b. Ventral plates in 6 or 8 longitudinal series; 38 or more dorsal scales across middle of body 110
- 109a. Outer row of ventrals (marginals) smooth; 20-22 gulars; 13-17 femoral pores on each side; lower edge of subocular one-half or less than one-half maximal length of shield
Lacerta princeps princeps Blanford 1874
- 109b. Outer row of ventrals (marginals) keeled; 17-19 gulars; 16-21 femoral pores on each side; lower edge of subocular one-half or more than one-half maximal length of shield *Lacerta princeps kurdistanica* Suchow 1936
- 110a. 17-21 femoral pores, row of pores reaches knee; usually less than 20 temporal scales; 5th submaxillary shield always well developed; young specimens usually with uninterrupted lateral light line in addition to vertebral and dorsolateral lines
Lacerta strigata Eichwald 1831
- 110b. 12-16 femoral pores, row of pores does not attain knee; usually more than 20 temporal scales; 5th submaxillary small or absent; young specimens with lateral light line interrupted in its anterior half *Lacerta trilineata media* Lantz and Cyrén 1920

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TABLE 1. Summary of distribution of turtles, lizards, and amphisbaenians among the political divisions of Iran (see fig. 1).

KEY: + definite record; ? doubtful record; P probable occurrence, but no record. Species preceded by an asterisk (*) have not been recorded definitely from Iran.

Species	1	2	3	4	5	6	7	8	9	10	11	12
1. <i>Emys orbicularis</i>		+										+
2. <i>Mauremys caspica caspica</i>	P	+	P	+	+	+	P	+				+
3. <i>Testudo graeca iberica</i>	+	+		+	+	+	+	+				
4. <i>Testudo graeca zarudnyi</i>							+		+	+	+	
5. <i>Testudo horsfieldii</i>										+	+	
6. <i>Trionyx euphraticus</i>						+						
7. <i>Agama agilis</i>	+	+			+	+	+	+	+	+	+	+
8. <i>Agama blanfordi</i>						+		+				
9. <i>Agama caucasica caucasica</i>	+	+	+	+			+				+	+
10. <i>Agama caucasica microlepis</i>							+	+	+	+	+	
11. <i>Agama erythrogastra</i>												+
* <i>Agama melanura lirata</i>										P		
12. <i>Agama nupta nupta</i>	+				+	+	+	+	+	+	+	
13. <i>Agama nupta fusca</i>										+		
14. <i>Agama rudrata rudrata</i>	+	+	+	+	+	+	+	+	?	?		
15. <i>Agama rudrata megalonyx</i>									P	P		
16. <i>Calotes versicolor</i>										+		
* <i>Phrynocephalus clarkorum</i>										P		
17. <i>Phrynocephalus helioscopus helioscopus</i>												+
18. <i>Phrynocephalus helioscopus persicus</i>	+		+	+		+	+	+		?		+
* <i>Phrynocephalus interscapularis</i>											P	P
* <i>Phrynocephalus luteoguttatus</i>	?									P		
19. <i>Phrynocephalus maculatus maculatus</i>	+						+	+	+	+	+	+
20. <i>Phrynocephalus mystaceus galli</i>											+	
21. <i>Phrynocephalus ornatus</i>											+	
22. <i>Phrynocephalus scutellatus</i>	+						+	+	+	+	+	+
23. <i>Uromastix asmussi</i>							+		+	+	+	
24. <i>Uromastix loricatus</i>					+	+		+				
25. <i>Uromastix microlepis</i>						P		+				
26. <i>Anguis fragilis colchicus</i>	?	+									+	+
27. <i>Ophisaurus apodus</i>	P	+	P	+	P	+					+	+
28. <i>Agamura persica</i>	+							+	+	+	+	+
29. <i>Alsophylax spinicauda</i>												+
30. <i>Bunopus aspratilis</i>						+		+				
31. <i>Bunopus crassicauda</i>	+						+					
32. <i>Bunopus tuberculatus</i>	+					+		+	+	+	+	+
33. <i>Crossobamon eversmanni</i>										+	+	
34. <i>Cyrtodactylus agamuiroides</i>									+	+		
35. <i>Cyrtodactylus brevipes</i>								?		+		
36. <i>Cyrtodactylus caspius</i>										+	+	+
37. <i>Cyrtodactylus fedtschenkoi</i>										+	+	
38. <i>Cyrtodactylus gastropholis</i>								+				
39. <i>Cyrtodactylus heterocercus heterocercus</i>					+							
40. <i>Cyrtodactylus kachhensis</i>								+				

(continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12
41. <i>Cyrtodactylus kirmanensis</i>								?	+	+		
* <i>Cyrtodactylus kotschyi</i>				P	P							
42. <i>Cyrtodactylus russowii</i>										+		
43. <i>Cyrtodactylus sagittifer</i>									+	+		
44. <i>Cyrtodactylus scaber</i>						+		+	+	+		
45. <i>Eublepharis angramainyu</i>						+		+				
46. <i>Eublepharis macularius</i>											+	
47. <i>Hemidactylus flaviviridis</i>						+		+	+	+		
48. <i>Hemidactylus garnotii</i>						+		+	+	+		
49. <i>Hemidactylus persicus</i>						+		+	+	+		
50. <i>Hemidactylus turcicus turcicus</i>	+					+			+	+		
51. <i>Asaccus elisae</i>						+		+				
52. <i>Asaccus griseonotus</i>					+							
53. <i>Pristurus rupestris</i>								+	+	+		
54. <i>Ptyodactylus hasselquistii</i>						+						
55. <i>Stenodactylus affinis</i>								+				
56. <i>Stenodactylus doriae</i>								+	+			
57. <i>Teratoscincus bedriagai</i>										+	+	+
58. <i>Teratoscincus microlepis</i>										+		
59. <i>Teratoscincus scincus</i>	+						P		+	+	+	+
60. <i>Tropicolotes helenae</i>						+						
61. <i>Tropicolotes heteropholis</i>					+							
62. <i>Tropicolotes latifi</i>									+			
63. <i>Tropicolotes persicus persicus</i>										+		
64. <i>Tropicolotes persicus bakhtiari</i>						+						
65. <i>Acanthodactylus cantoris blanfordi</i>						+			+	+		
66. <i>Acanthodactylus cantoris schmidtii</i>						+		+				
67. <i>Acanthodactylus fraseri</i>						+		+				
68. <i>Acanthodactylus micropholis</i>										+		
69. <i>Apathya cappadocica urmiana</i>		+		+								
70. <i>Eremias arguta</i>											+	+
71. <i>Eremias brevirostris</i>						+		+				
72. <i>Eremias fasciata</i>									+	+	+	
73. <i>Eremias grammica</i>											+	
74. <i>Eremias guttulata</i>	+					+	+	+	+	+	+	+
75. <i>Eremias intermedia</i>											+	
76. <i>Eremias lineolata</i>											+	
77. <i>Eremias nigrocellata</i>											+	+
78. <i>Eremias persica</i>	+	+					+	+	+	+	+	+
79. <i>Eremias pleskei</i>			+	+								
* <i>Eremias scripta</i>										P	P	
80. <i>Eremias strauchi</i>			+	+							+	+
81. <i>Eremias velox velox</i>		+									+	+
82. <i>Lacerta brandtii</i>			+				+					
83. <i>Lacerta chlorogaster</i>		+									+	+
84. <i>Lacerta princeps princeps</i>							+	+				
85. <i>Lacerta princeps kurdistanica</i>					+							
86. <i>Lacerta saxicola defilippii</i>	+	+										+

(continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12
87. <i>Lacerta saxicola raddei</i>			+									
88. <i>Lacerta strigata</i>		+	+					+				+
89. <i>Lacerta trilineata media</i>	+		+	+	+		+					
90. <i>Ophisops elegans</i>	+	+	+	+	+	+	+	+	+	+		
91. <i>Ablepharus bivittatus bivittatus</i>	+		+		P	P	P	+				
92. <i>Ablepharus grayanus</i>										+	+	
93. <i>Ablepharus pannonicus</i>	+					+	+	P			+	+
94. <i>Chalcides ocellatus ocellatus</i>								+	+	+		
95. <i>Eumeces schneiderii princeps</i>	+	+	+	+	P	+	P	+				
96. <i>Eumeces schneiderii variegatus</i>								+				
97. <i>Eumeces schneiderii zarudnyi</i>								+	+	+		
98. <i>Eumeces taeniolatus</i>											+	
99. <i>Mabuya aurata</i>	+	+	+	+	+	+	+	+			+	+
100. <i>Mabuya vittata</i>		+			+							
101. <i>Ophiomorus blanfordi</i>										+		
102. <i>Ophiomorus brevipes</i>									+	+		
103. <i>Ophiomorus persicus</i>								+				
104. <i>Ophiomorus streeti</i>										+		
105. <i>Ophiomorus tridactylus</i>										+	P	
106. <i>Scincus conirostris</i>						+		+		+		
107. <i>Varanus bengalensis bengalensis</i>									+	+		
108. <i>Varanus griseus griseus</i>						+		+				
109. <i>Varanus griseus caspius</i>	+						P		+	+	+	P
110. <i>Diplometopon zarudnyi</i>					+							
TOTAL (species and subspecies)	23	18	13	13	14	32	21	41	30	43	39	26



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