On the distribution of four species of agama (Agamidae) in Turkey

by İbrahim Baran, Max Kasparek and Mehmet Öz

Abstract: The distribution of the Hardun, Agama stellio, the Caucasian Agama, Agama caucasia, the Syrian Agama, Agama ruderata, and Phrynocephalus helioscopus, in Turkey is presented with dot maps. A. stellio and A. caucasia are sharply separated both horizontally and vertically. The area of A. stellio is defined by the March isotherm of 8°C and the July and August isotherms of 24°C. A. ruderata occurs in the large steppe areas of Inner and South-east Anatolia, but not in those of Eastern Anatolia.


Key words: Agamidae - Agama - Phrynocephalus - distribution - Turkey - zoogeography

1. Introduction

Four species of agama occur in Turkey, three of the genus Agama and one of the genus Phrynocephalus (A. stellio, A. caucasia, A. ruderata, P. helioscopus). Although the distribution has been reviewed by BAŞOĞLU & BARAN (1977), no maps are available. DAAN (1967) and BARAN & ÖZ (1985) have given maps for the specimens of the Hardun, Agama stellio, which they examined. This of course does not give a complete picture of the distribution range. For this reason, distribution maps have been worked out for all species of Agamidae in Turkey, by using museum material, literature and field observations, and the distribution patterns are discussed. The maps should be regarded as a model for the conservation-orientated mapping of the amphibians and reptiles of Turkey.

2. Records

In the following list, abbreviations are given for the observers' names and references that are mentioned most frequently: IB = İ. BARAN, Ba-81 = BARAN (1981), MB = M. BAŞOĞLU, BÖ = BARAN & ÖZ (1985), CC = CLARK & CLARK (1973), GG = GIERTZ & GOLAY, MK = M. KASPAREK, KK = KILIÇ & KASPAREK. Museum material used was from the collection of Ege Üniversitesi (Aegean University) İzmir, which has been designated by the abbreviation "SZE". Records without literature reference or museum abbreviation are unpublished field observations. In the case of the Hardun with a large number of records, these are arranged in the order of the...
provinces (il or vilayet) of Turkey and within the provinces from west to east. Localities for the other species are listed from west to east without division into provinces.

**Hardun* Agama stellio** (Fig. 1)

Adana: Akyatan Gölü (36.40/35.15), 8.4.87: BRINCKMEIER. • Çatalalan (37.13/35.17): TEYNIÉ (1987). • Adana (37.00/35.19): VENZMER (1919), BODENHEIMER (1944), 1957 leg. MB (BÖ, SZE), 14.7.84: SCHAERLAECKENS. • Çukurova (36.50/34.45 - 36.48/35.50) observed almost everywhere, e.g. Davudi Dağları and Deveciuşağı in 1982 and 1985-87 (VAN DEN BERK et al.). • Karataş (36.34/35.24) and N of Karataş, 13.9.82: KINZELBACH, 21.12.86: MK, 27.3.88: VON BECKHOVEN & Dijkstra. • Ytlan-balesi (37.02/35.46): CC, 12.4.86: GG & HUSBAND, 16.5.89: MK. • Ceyhan (37.02/35.49), 13.4.84 leg. SCHOTH (SZE). • 15 km NE of Osmaniye (37.09/36.23), 11.4.87: KK. • Nurdagı Geçidi (37.13/36.41): CC.

Adıyaman: Nemrut Dağı (38.00/38.33), 28.9.82 and 19.7.86: KINZELBACH. Afyon: Actıgöl between Çardak and Dazkırı (37.51/29.46), 20.5.86: MK.


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Bitlis: Bitlis (38.24/42.07), 20.6.57: BAŞOĞLU & HELMICH (1959 and 1970, also BÖ and SZE).

Burdur: 20 km NE of Karamanlı (37.28/30.00): CC. • between Karamanlı and Burdur (37.35/30.05): CC. • Kuruçay Köyü (37.38/30.10), 10.3.84 leg. YILMAZ & ÖZ (SZE).


Denizli: Dumbızlar Köyü near Buldan (38.03/28.50), 7.10.64 leg. MB (BÖ, SZE). • 30 km W of Denizli = Sarayköy (37.57/28.55): CC. • Pamukkale (37.56/29.07), 13.3.86: GG.


Gaziantep: 10 km W of Kilis (36.45/37.03), 26.4.77 leg. IB (BÖ, SZE). • Üründülü Köyü near Kilis (36.51/37.05), 10.5.75 leg. IB (BÖ, SZE). • Kilis (36.43/37.06), 13.7.74 leg. IB (BÖ, SZE). The site “Syrian border, Gaziantep” by MERTENS (1952) apparently refers to the vicinity of Kilis. • Söğütü Köyü near Kilis (36.49/37.07), 11.7.74 leg. IB (BÖ, SZE). • Acar Köyü near Kilis (36.45/37.11), 26.4.77 leg. IB (BÖ, SZE). • 8 km W of Gaziantep (37.04/37.15): BIRD (1936). • Gaziantep (37.04/37.23): BIRD (1936), BODENHEIMER (1944), DAAN (1967), TEYNIÉ (1987), 1943 leg. MB (BÖ, SZE). • Rumkalesi (37.16/37.50): DAAN (1967), 15.4.86: GG.

Hakkari: without exact locality: leg. KOSSWIG (MERTENS 1953).


Isparta: Bozdurusmuş Beli (38.14/30.40), several observations 1985 and 1986: GRIMMER & SCHOLL, MK. • between Barla and Akkeçili (38.05/30.50), 27.5.86: MK.

İçel (= Mersin): Anamur (36.05/32.50) including Mamure Kalesi: CC, 1.8.83: KINZELBACH, 14.3.85: LENZ, 23.3.86: GG, 18-19.4.84: HANDKE & KALMUND, 3-4.4.86: KK, 8.4.87: BRINCKMEIER, 3.1.89: MK. • Gülner (36.21/33.24), 26.3.86: GG. • Babadil Adast (36.07/33.33), 14.4.87 leg. IB (SZE). • between Ovacık and Dedeler (36.14/33.38), 29.3.86: GG. • Dana Adast (36.12/33.47), 12.4.87 leg. IB (SZE). • Göksu valley at Barbarossa commemorative stone (36.24/33.52), 11.4.86:
Fig. 1. Distribution of the Hardun, *Agama stellio*, (dots) and the Caucasian Agama, *A. caucasia*, (triangles) in Turkey. The circles show field observations of most likely *Agama caucasia*, though not positively identified.

HUSBAND. • between Silifke and Taşucu (36.20/33.55), 9.4 and 21.4.87: KK. • Silifke Kalesi (36.24/33.55), 10.4.86: HUSBAND. • 10 km north of Silifke (36.27/33.58): 9.4.87: KK. • Uzuncaburç (36.34/33.58), 10.4.86: GG. • Korykos and Cennet Cehennem (36.27/34.06): TEYNIE (1987), 17.8.75: KINZELBACH, 11.3.85: LENZ, 9.4 and 22.4.87: KK. • Kızkalesi (36.27/34.07): 8.4.86: GG. • Kandırvane (36.29/34.10), 8.4.86: GG & HUSBAND. • Elvanlı (36.42/34.22): TEYNIE (1987). • Mezitli Köyü near Mersin (36.45/34.29), 18.6.68 leg. IB (BÖ, SZE). • Viranşehir near Mersin (36.45/34.32), 9.4.87: KK. • Sebil ("Zebil") (37.08/34.34): BOULENGER (1855), cf. also WERNER (1899) and DAAN (1967). • Mersin (36.48/34.38): WERNER (1902), cf. also DAAN (1967), 16.6.68 leg. MB (SZE). • Meşelik (37.04/34.47): TEYNIE (1987). • Güllek (37.13/34.49): VENZMER (1919). • Tarsus (36.55/34.54): VENZMER (1919), 12.4.87: HUSBAND, 19.4.87: MK.

İzmir: Çeşme (38.20/26.19), 7.5.66 leg. IB (SZE). • Mustafa Çelebi Adast (38.23/26.28), 16.6.82 leg. IB (SZE). • İncirli Ada (38.24/26.46), 28.4.79 (Ba-81, SZE). • Karaada (38.54/26.50), 10.8.79 (Ba-81, SZE). • Tavşan Adast (38.51/26.53), 16.8.79 (Ba-81, SZE). • Stıçan Adast (38.01/26.53), 25.6.82 leg. IB (SZE). • Ptrasa Adast (38.52/26.54), 16.8.79 (Ba-81, SZE). • Güzelbahçe (38.21/26.54), 15.8.75 leg. ÖZBAŞ (BÖ, SZE). • Kavacık Köyü near Çatakaya (38.18/26.58), 14.4.82 leg. Öz (BÖ, SZE). • Karabağlar (38.16/27.02): BÖ. • Büyük Yamanlar (38.32/27.08), 13.10.66 leg. DÜZBASTILAR (BÖ, SZE). • İzmir (38.26/27.10) and vicinity including Bornova ("Burnabat"), Yeşildere ("Meles valley") and Petrota (?): BÖTTGER (1883), WERNER (1902), GADEAU DE KERVILLE (1939), DÁAN (1967), TRUTNAU (1967), ANDREN & NILSON (1976), 8.4.67, leg. IB (BÖ, SZE). • Bergama (39.07/27.11), 29.9.86: KK, 31.3.88: BRINCKMEIER. • Efes (37.51/27.15): ANDREN & NILSON (1976), 27.5.65 leg. IB (BÖ,


Konya: Beyşehir (37.41/31.44): BODENHEIMER (1944). • Karadağ near Karaman including Madenşehir and Binbirkilise (37.26/33.10), 30.4.85 and 29.5.88: MK. • Krater Gölü (37.43/33.40), 11.4.70 leg. IB (BÖ, SZE), May 1988: RIECK. • Akgöl near Ereğli (37.29/33.44): PANS (1976), 6.4.86: HERLYN. • Ereğli (37.31/34.03), May 1988: RIECK.


Mardin: Mardin (37.20/40.45): MERTENS (1924a), WOLTER (1919). • between Cizre and İdil (37.22/42.00), 15.8.81 leg. ATATÜRK (SZE).

20.2.80 leg. ÜÇÜNCÜ (BÖ, SZE). • İnlice near Gökçeovaкт (36.46/29.00), 18.4.76 leg. IB (SZE). • Karacaören Adast (36.33/29.03), 7.6.85: IB. • Gemiler Adast (36.33/29.04), 7.6.85 leg. IB (SZE). • Kaya Köyü near Fethiye (36.35/29.06), 18.3.69 leg. SPITZENBERGER (BÖ, SZE). • Delikliada (36.39/29.06), 2.8.84 leg. IB (SZE). • Fethiye (36.37/29.07): LAMBERT (1970).

Nevşehir: Göreme (38.38/34.49), 19.7.81: HELBIG, 6-9.5.86: GG, May 1988: RIECK. • Mustafapasa (38.35/34.53) and Ürgüp (38.38/34.54): May 1988: RIECK.

Niğde: Niğde (37.58/34.41): BODENHEIMER (1944). • Alihoca Köyü near Ulukışla (37.30/34.43), 22.4.72 leg. BUDAK (BÖ, SZE).

Siirt: Hüseyini (37.53/41.46), 1942 leg. MB (BÖ, SZE). • Alihoca Koyii near Uluküla (37.30/41.43), 22.4.72 leg. BUDAK (BÖ, SZE).


Urfa: Savaşan (37.18/37.52), 13.-18.4.86, GG. • Hafteü (37.15/37.52), 14.4.86: GG. • between Hafteü and Savaşan (37.16/37.52), 16.4.86: GG, 28.4-1.5.87: KK. • Birecik (37.02/37.59): DAAN (1967), 5.8.83 and 22.7.86: KINZELBACH. • Küçük and Büyük Stütükakte Köyü near Urfa (37.22/38.32), 29.5.69 leg. IB (BÖ, SZE). • Urfa (37.09/38.48): CHANTRE (1882), DAAN (1967), 28.4.69 leg. IB (BÖ, SZE).

Uşak: Kürkçü (38.44/29.01): BODENHEIMER (1944).

Caucasian Agama *Agama caucasia* (Fig. 1)

Nazik Gölü (38.52/42.18), 15.6.57 leg. MB (SZE). • Möks = Mukus at Van Gölü, apparently Muks = Müküs (38.04/42.51), 1912 leg. KULZER (SZE), cf. BAŞOĞLU & HELLMICH (1970). • 50 km S of Kars (40.18 42.58): CC. • Südašt Göllü ("Aringöl") near Göldüzü ("Arın") (38.49/42.59): BAŞOĞLU & HELLMICH (1970). • Kötek (40.13/43.01): MERTENS (1952) [originally published as *A. stellio*, cf. also DAAN (1967)]. • Taşburun Köyü near Kağızman (40.06/43.04), 9.9.77 leg. IB (SZE). • Kağızman (40.10/43.08): TEYNIE (1987). • Erciş (39.02/43.21), 13.4.69 leg. IB (SZE). • Tuzluca (40.03/43.40): TEYNIE (1987). • hills south of Çaldıtrn (39.08/43.55), June 1989: HANOLDT. • northern slopes of Tendürek Dağıt between Doğubayazıt and Ziya­ret Geçidi (39.32/44.01), 26.7.87: MK. • 10 km S of Iğdır (39.49/44.03): CC. • 25 km S of Iğdır (39.45/44.03): CC. • Ararat (= Ağrı Dağı) and 20 km N of Doğubayazıt (39.43/44.04): TEYNIE (1987), CC. • Doğubayazıt including Isak Paşa Sarayt (39.40/44.07), 4.8.69 leg. IB (SZE), 26.7.87: MK, June 1989: HANOLDT. • observations of large agamas apparently belonging to *A. caucasia*, though not positively identified: mouth of Deli Çay into Van Gölü (39.00/43.28), 11.7.88: HAASS. • Erçek Gölü (38.40/43.35), 11.6.81: SIERING. • Bendimahi cascades (39.02/43.44), 9.7.88, HAASS. • Çaldıtrn (39.08/43.55), 11.7.88: HAASS. • between Araltık and Iğdır (39.57/44.23), 27.7.87: MK.

Syrian Agama *Agama ruderata* (Fig. 2)

Vicinity of Ankara (39.57/32.52): STEINDACHNER (1897), GADEAU DE KERVILLE (1939), WERNER (1902). • between Konya and Aksaray (38.05/33.10), 9.5.81 leg. ATATÜR (SZE). • Karadağ near Karaman (37.26/33.10), 30.4.85: MK. • Tuz Gölü
Fig. 2. Distribution of the Syrian Agama, *Agama ruderata*, in Turkey.

Fig. 3. Distribution of *Phrynocephalus helioscopus* in Turkey.

*Phrynocephalus helioscopus* (Fig. 3)
Taşburun Köyü near Kağızman (40.06/43.04), 9.9.77 leg. IB (SZE). • Başköy near Iğdır (40.08/43.31), August 1942 leg. MB & Kosswig (SZE, cf. MERTENS 1952) • 3 km W of Doğubayazıt (39.38/44.02): CC. • 10 km S of Iğdır (39.49/44.03): CC. • 2 km N of Doğubayazıt (39.39/44.05): CC. • Devlet Üretme Çiftliği Iğdır (39.48/44.36), 17.6.69 leg. IB (SZE) • Aralkt (39.52/44.31): MEHELY (1894).

3. Discussion

*Agama stelio* and *Agama caucasia* are closely related species which are sometimes grouped together in the genus *Stelio* (but see the discussion in BÖHME 1981). *A. stelio* is a mainly east Mediterranean species, whose distribution area extends over Greece, Turkey, Iraq and the Levant. Isolated occurrences are known from Lower Egypt and Arabia. *A. caucasia*, on the other hand, is a mainly Asiatic species with a distribution area extending from eastern Turkey and Transcaucasia through Iran to Afghanistan and Pakistan (cf. e.g. BÖHME 1981). Both species meet in eastern Turkey. Fig. 1 shows that the distributions do not overlap, but are sharply separated from each other. The boundary between both species is the eastern shore of lake Van. Further studies should be made as to the exact boundary and whether there is any local co-existence, i.e. whether they occur sympatrically.

In general, *A. stelio* occurs along the coast and on headlands. In southern central Anatolia it is found at altitudes up to about 1000 m. The altitudes in southeastern Anatolia are generally 300-500 m. Unlike the Hardun, *A. caucasia* occurs at altitudes mostly between 1500 and 2000 m: Tuzluca 1450 m, Kağızman 1500 m, lower slopes of Mt. Ararat 1650 m, Sodalt Göl 1725 m, Erçek Gölü 1890 m and areas south of Kars 2000 m. Both species are thus well separated both horizontally and vertically.

The distribution area of *A. stelio* correlates well with mean summer
temperatures. It occurs in areas with a mean March temperature above 8°C and mean July and August temperatures above 24°C. There seems to be no relationship with the mean winter temperatures (the climatic parameters from HARITA GENEL MÜDÜRLÜĞÜ 1977). The distribution area of A. caucasia shows no correlation with climatic parameters. In Turkey, it occurs in the coldest parts of the country. Its distribution pattern resembles that of P. helioscopus.

A. stellio has relatively small fat bodies which amount to only 1.5 to 1.8% of the total body weight (LOUMBOURDIS & KATTOULAS 1984). This might indicate a less-developed disposition for hibernation. Some observations show that Harduns are sometimes active in Turkey in mid-winter e.g. at Karataş (Adana prov.) on December 21th or at Anamur on January 3th. Unfortunately, no data on fat deposits in A. caucasia are available, but one might expect a quite different pattern as an adaptation to the long and cold winters in Eastern Anatolia.

The Hardun is widely distributed along the Aegean and Mediterranean coasts, the Inner Aegean region and south-east Anatolia. In all these areas, it is a more or less common species. It also occurs in the Marmara region, in Inner Anatolia and in the Black Sea coastland. However, in the latter areas, it is rather rare. The low number of records is not the result of insufficient data, but actually reflects the real scarcity of the species there. For example, the Hardun has been found at Krater Gölü and on the slopes to the south of the Ereğli Marshes in the Konya province. However, M.K. did not find the species during several visits in 1985-88. Another example are the Sultan Marshes and their surroundings in Kayseri province. Only one site for this species was found in a study area of some 100,000 ha (KASPAREK 1985). There seem to be local populations, which are more or less isolated from each other. This makes the species vulnerable and special protection should be given. The occurrence in the Black Sea Region does not seem to be natural, but a consequence of introduction by man. Naturalized populations also exist in other parts of the species’ distribution area. The Black Sea population has existed at least since the last century.

The Syrian Agama is confined to Inner Anatolia and South-east Anatolia. This is the area where steppes occur naturally. A. ruderata does not occur in Eastern Anatolia which is the third large steppe region of Turkey (see LOUIS 1939). A few sites around Van Gölü can be interpreted as a spur from the area in south-east Anatolia. The absence of the species in the western half of Inner Anatolia might be not real but due to insufficient surveying. Further study is necessary to determine the western border of its distribution area.

Unlike A. stellio, A. caucasia is extremely tame. MK could approach within 40 cm of some individuals. Similar observations were reported by CLARK & CLARK (1973).

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References
As the list of faunistic references is quite long, only a selected bibliography is given here. The other references can be found in the herpetological bibliography of Turkey (BARAN 1986).


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