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Zoogeography of the amphibians and reptiles of Syria, with additional new records

Zoogeographie der Amphibien und Reptilien Syriens, mit neuen Nachweisen

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KURZFASSUNG

Zoogeographisch stellt sich die syrische Herpetofauna als heterogen dar. Sie umfaßt Elemente aus vier biogeographischen Regionen (Orientalische, Paläarktische, Saharo-Sindische und Äthiopische Region) und ist durch das Vorhandensein von fünf Ökozonen charakterisiert. 50% der terrestrischen Herpetofauna zeigen Affinität zur Paläarktischen, 32,3%, 14,6% und 3,1% zur Saharo-Sindischen, Arabischen bzw. Äthiopischen Region.

Fünf Reptilienarten sind neu für die syrische Fauna: *Emys orbicularis, Acanthodactylus opheodurus, Acanthodactylus schreiberi syriacus, Pseudotrapelus sinaitus, Uromastyx aegyptia microlepis* und *Leptotyphlops macrorhynchus*; *Coluber rogersi* wird zum zweitenmal festgestellt. Eine aktualisierte Zusammenstellung der Amphibien und Reptilien Syriens wird gegeben.

ABSTRACT

Zoogeographically, the Syrian herpetofauna is heterogeneous, originating from four biogeographical regions (Oriental, Palearctic, Saharo-Sindian and Afrotropical) and is characterized by the presence of five ecozones. 50% of the terrestrial herpetofaunal species are of palaearetic affinity while 32.3%, 14.6% and 3.1% are of Saharo-Sindian, Arabian and Afrotropical affinities, respectively.

Five records of reptiles are new to the Syrian fauna: *Emys orbicularis, Acanthodactylus opheodurus, Acanthodactylus schreiberi syriacus, Pseudotrapelus sinaitus, Uromastyx aegyptia microlepis,* and *Leptotyphlops macrorhynchus*; *Coluber rogersi* is reported for the second time. An updated list of the herpetofauna of Syria is given.

KEY WORDS

Syria, herpetofauna of Syria, zoogeography of Syria, new records for Syria: *Emys orbicularis, Acanthodactylus opheodurus, Acanthodactylus schreiberi syriacus, Pseudotrapelus sinaitus, Uromastyx aegyptia microlepis, Leptotyphlops macrorhynchus*

INTRODUCTION

Syria is located at an important transitory zoogeographical region between Asia and Europe. The presence of five ecozones resulted in a considerable heterogeneity of the herpetofauna of Syria where four kinds of faunal elements meet: Palearctic, Saharo-Arabian, Oriental and Afrotropical. Moreover, there are no natural boundaries between Syria and the neighbouring countries, allowing range extension for a couple of species. In the absence of natural barriers, endemism is minimized, perhaps limited to Mount Hermon (WERNER 1988). The herpetofauna of Syria is the least known compared to that of the surrounding countries. Most previous herpetofaunistic studies were based on short-termed investigations and restricted to limited parts of Syria (ANGEL 1936; BARBOUR 1914; BISCHOFF & SCHMIDTLER 1994; BOETTGER 1877, 1878/79; BOULENGER 1909, 1923; BERGER-DELL'MOUR 1986; EISELT 1940; ESTERBAUER 1992; KASPAREK 1995; MARTENS 1993; MARTENS & KOCK 1991, 1992; MORAVEC & MODRY 1994; PERACCA 1894; SCHMIDT 1939; SIVAN & WERNER 1992; SIEBENROCK 1913; WERNER, F. 1898, 1929; 1935, 1939; WERNER, Y. L. 1988; WETTSTEIN 1928; ZINNER 1972). Largely overlooked were old records by BERTHOLD (1842) and LORTET (1883) for *Emys orbicularis*, and the 'cryptic' record for *Bufo bufo* by BUCHHOLZ (in v. LEHMANN 1965) mentioned in a mam-

malogical paper. This last paper contains also a record of '*Lacerta muralis*' based on a misidentified *L. laevis* (ZFMK vouchers).

The present study tries to provide an updated list of reptiles recorded from Syria including notes on the zoogeographical affinities of the taxa.

MATERIALS AND METHODS

The present work is based on one hundred thirty-six specimens of amphibians and reptiles (belonging to 14 families, 23 genera and 33 species) that were collected in Syria between January 1980 and November 1987 by HYIAM KAHAL and deposited at the Jordan University Museum (JUM), Department of Biological Sciences, Amman. In addition, one hundred seventy-eight specimens of the Zoologisches Forschungsinstitut und Museum Alexander Koenig (ZFMK), Bonn, Germany and several specimens of the following museums were examined (numbers in parentheses):

BM British Museum (Natural History), London (16).

MTKD Staatliches Museum für Tierkunde, Dresden, Germany (14).

NHMB Natural History Museum, Basel, Switzerland (13).

NMW Naturhistorisches Museum Wien, Austria (19).

SMF Natur-Museum and Forschungsinstitut, Senckenberg, Frankfurt a. M., Germany (25).

ZSM Zoologische Staatssammlung, München, Germany (12).

Abbreviations used: SV: Snout-vent length (distance from the tip of snout to anterior border of cloaca), D: damaged.

Numbers in parentheses in 'New Records - Pholidosis and Measurements' indicate the number of specimens measured.

NEW RECORDS

Emys orbicularis (LINNAEUS, 1758)

Material (1 specimen): ZFMK 30536, Orontes river, at the road from Ain al-Karim to Ain Taqa, March 1980.

Measurements: see FRITZ (1993).

Remarks: Although listed already by FRITZ (1993) together with all ZFMK vouchers for his taxonomic review of this species, it has not been stressed to represent the first documented record for the Syrian fauna, despite two old mentionings by BERTHOLD (1842 - near Aleppo) and LORTET (1883 - Lake Genezareth).

Acanthodactylus opheodurus ARNOLD, 1980

Material (2 specimens): JUM 1820 (2), Tadmur, (Palmyra) road from ruins to Al-Basateen, July, 1987.

Pholidosis: Upper-labials (2): 7/7, 4 before subocular; lower labials (2): 6/6; number of transverse series of ventrals (1): 28; number of longitudinal series of ventrals (1): 10; number of gular scales (2): 11; number of scales from chin to gular (2): 29; number of femoral pores (1): 22/22; number of dorsal scales around midbody (1): 36; number of lamellae underneath 4th toe: 20/D-19/D; denticulation of the anterior edge of ear: 3/4 - 4/4.

Measurements: SV (1): 62 mm; tail (1): incomplete.

Remarks: First record from Syria. Scale counts and measurements fall within the ranges indicated by ARNOLD (1986) and SALVADOR (1982). This species occupies a large area which includes Syria, Iraq, Jordan, Israel, Sinai and the Arabian Peninsula (SALVADOR 1982).

Acanthodactylus schreiberi syriacus BOETTGER, 1879

Material (2 specimens): BM 1927. 8. 12. 30, Syria, Pres. Zool. Mus. Giza, coll. M. PORTAL. ZFMK 26461, Syrien, 1886.

Pholidosis: Upper labials: 7/7-8/8; lower labials (2): 7/7; number of gular scales (2): 9; number of dorsal scales around mid-body: 51 and 59; number of

scales between chin and gular (1): 36; number of femoral pores: 25/25 and 25/26; number of longitudinal series of ventrals (1): 8; number of transversal series of ventrals (1): 31; number of lamellae underneath 4th toe: (1): 19/19.

Measurements: SV (2): 74-85 mm; tail (2): 152 - 159 mm.

Remarks: First record from Syria. Scale counts and measurements fall within the ranges indicated by SALVADOR (1982) and are similar to those of specimens studied from Israel (NMW 15609-10, ZFMK 7095-7096) and Cyprus (NMW 4326). This species was reported from Cyprus, Lebanon and Israel (SALVADOR 1982).

Pseudotrapelus sinaitus
(HEYDEN, 1827)

Material (2 specimens): JUM 1819, Horan (basalt boulder), June, 1987; JUM 1840, Horan (basalt boulder), July, 1987.

Pholidosis (2): Upper labials:15/14 - 15/16; lower labials: 15/14 - 15/15; Number of lamellae underneath 4th toe: 16/16 - 16/16; preanal pores: 6 - 6.

Measurements: SV (2): 97-99 mm; tail (1): 150 mm.

Remarks: First record from Syria. Both specimens (preserved in alcohol 70%) dark brown; tails with alternating transverse darker and lighter bands; throat light brownish-grey; tips of tubercles on digits brown. In both specimens, the tail is laterally compressed all along its length, and two enlarged dorsal rows of keeled scales form slight elevations at both sides of the tail. The third toe is not longer than the fourth. These characteristic features are found in populations of *P. sinaita* collected from the basalt outcrops between Safawi and Azraq but not in populations from Petra, Wadi Araba and the eastern coast of the Dead Sea. Similar findings were reported by WERNER (1971) for populations from southeastern Israel and northeastern Sinai. This species is widespread in Arabia, Israel, Jordan, Sinai, Egypt and Libyia (ARNOLD 1986).

Uromastyx aegyptia microlepis
BLANFORD, 1874

Material (1 specimen) JUM 1767, Tadmur, June, 1987.

Pholidosis: Number of femoral pores: 19/19; number of lamellae under neath 1st finger: 8/8; number of lamellae underneath 4th finger: 16/17; number of lamellae underneath 1st toe: 9/9; number of lamellae underneath 4th toe: 23/23.

Measurements: SV: 23.3 cm; tail: incomplete.

Remarks: First record from Syria. Colouration, scale counts and measurments fall within the range of the specimens studied from Jordan (DISI 1991). This species is widespread in Arabia, Kuwait, Iraq, Jordan and Israel. (ARNOLD 1986).

Leptotyphlops macrorhynchus
(JAN, 1861)

Material (1 specimen): ZSM, 5 km südl. Harran / Syr., S. Türkei (Syrische Steppe). 19. IV. 1976.

Pholidosis: Number of scales at midbody: 12; single anterior supralabial; posterior supralabial larger than anterior one but failing to reach the eye; rostral separated from supraoculars by prefrontal; snout prominent, hooked. Scale counts and colour similar to the description of HAHN (1978) and GASPERETTI (1988), and to the specimens collected from Jordan.

Remarks: First record from Syria.

BIOGEOGRAPHY OF SYRIA

According to ATALLAH (1977), Syria can be divided into five biogeographical zones which run parallel to the coastal line (the political borders of Syria were considered as those defined before June 1967) (table 1).

Syria is characterized by considerable variation in amount of mean annual rainfall, temperature, soil types, geomorphology, climatic conditions and plant communities at its various parts. This variety implies the presence of diversified eco-

Table 1: Biogeographical zones of Syria according to ATALLAH (1977).
Tab. 1: Die biogeographischen Zonen Syriens nach ATALLAH (1977).

1 Coastal plains
2 Western uplands
3 Nahr El-Assi (Ornotes) Valley (northern part of the Great Rift Valley)
4 Eastern uplands, divided into four subregions:
  A Ez-Zawiyah Mountains region
  B Hills of Homs and Hama regions
  C Mount Hermon-Anti-Lebanon Mountains
  D Golan Heights region
5 Syrian Desert, topographically divided into two subregions:
  A Northern desert including the area north of the Houran Plain and the periphery of Jabal Al-Arab, (Druz)
  B Northern part of the Eastern Desert 'Badyiah'

zones. Syria also occupies an important zoogeographical position at the point of contact of four zoogeographical regions: Palearctic, Saharo-Arabian, Oriental and Afrotropical. Moreover, the Eastern Desert forms the geographical centre of the Saharo-Sindian region that extends from North Africa as far as India. All these factors allowed some intermingling of reptilian species from the four zoogeographical realms which resulted in conspicuous heterogeneity of the herpetofauna of Syria.

Western Syria is part of the Levantine region. KOSSWIG (1955) showed that this East Mediterranean region forms a transitional zone between the Palearctic and the Saharo-Arabian desert belt. The Levant is characterized by a complex mosaic-like distribution pattern of different faunal elements as well as the presence of areas inhabited by endemic species. Two of these areas are shared by Syria.

(1) The Syrian Desert which extends through Syria, Iraq, Jordan and Saudi Arabia with the following endemic reptile species: *Acanthodactylus robustus, Trapelus persicus fieldi, Laudakia stellio picea* and *Stenodactylus grandiceps*.

(2) The centre of the Levantine region which is shared by four countries: Syria, Lebanon, Israel and Jordan. The endemic species here are: *Typhlops simoni, Chalcides guentheri, Lacerta media israelica* and *Micrelaps muelleri*. Also, *Cyrtopodion amictopholis* has been reported to occur on Mt. Hermon only (WERNER 1988; SIVAN & WERNER 1992).

Within the centre of the Levantine region which is occupied by Syria, several relict populations or at least disjunctive populations are found: *Eirenis modestus, Elaphe hohenackeri* and *E. quatuorlineata*. Moreover, detailed studies on the reptiles of Jabal Al-Arab (Druz) may reveal further relict populations, since two species of snakes - *Coluber ravergieri, C. schmidti* - were reported along its southern border which extends into northern Jordan (DISI 1993).

Table 2 shows that 50% of the reported terrestial herpetofaunal species are of palaearcarctic affinity while 32.3%, 14.6% and 3.1% are of Saharo-Sindian, Arabian, and Afrotropical affinities, respectively.

Syria shares a considerable number of reptilian species with the surrounding countries: Iraq, Jordan, Israel and Lebanon (fig. 1). Moreover, the present work shows the importance of Syria with respect to the zoogeography of the herpetofauna in the East Mediterranean region: Syria forms the heart of the Levantine region which acts as a connecting link between Afrotropical and Palearctic faunal elements (KOSSWIG 1955).

The terrestrial fauna of Syria has been subject to severe man-induced changes (KRUPP & SCHNEIDER 1991). KASPAREK (1995) indicated that the entire Syrian coast is heavily polluted with plastic and garbage, and he suggested to establish a protected area on the coast in order to provide nesting beaches for marine turtles.

Knowing that the herpetofauna of Syria plays a crucial role in the zoogeography of the Middle East, many of its aspects should increasingly be investigated such as status, biology, and ecology. The results of these studies would be the basis to formulate appropriate measures for conservation and management of the herpetofauna and its habitats through public information, education, legislation and law enforcement for habitat protection.

Table 2: List of amphibians and reptiles recorded from Syria. Indication of zoogeographical affinity is based on data from ARNOLD (1986), JOGER (1987), WERNER (1987, 1988), LAMARCHE & CLEMENT (1988), GASPERETTI (1988) and SCHÄTTI & GASPERETTI (1994). Faunal elements: A - Arabian, Af - Afrotropical, P - Palearctic, SS - Saharo-Sindian.

Tabelle 2: Liste der Amphibien und Reptilien Syriens. Die Angaben der zoogeographischen Affinität basieren auf den Arbeiten von ARNOLD (1986), JOGER (1987), WERNER (1987, 1988), LAMARCHE & CLEMENT (1988), GASPERETTI (1988) und SCHÄTTI & GASPERETTI (1994). Faunenelemente: A - Arabisch, Af -Äthiopisch, P - Paläarktisch, SS - Saharo-Sindisch.

Taxon	Zoogeographical affinity Zoogeographische Affinität
Amphibia Urodela	
Salamandridae	
Salamandra salamandra (LINNAEUS, 1758)	P
Triturus vittatus (JENYNS, 1835)	P
Amphibia Anura	
Pelobatidae	
Pelobates syriacus BOETTGER, 1889	P
Bufonidae	
Bufo bufo (LINNAEUS, 1758)	P
Bufo viridis LAURENTI, 1768	P
Hylidae	
Hyla savignyi (AUDOUIN, 1827)	P
Ranidae	
Rana levantina[1)] SCHNEIDER, SINSCH & NEVO, 1992	P
Reptilia Testudines	
Cheloniidae	
Caretta caretta (LINNAEUS, 1758)	marine
Chelonia mydas (LINNAEUS, 1758)	marine
Trionychidae	
Rafetus euphraticus (DAUDIN, 1802)	P(A)
Trionyx triunguis (FORSKAL, 1775)	Af
Emydidae	
Emys orbicularis (LINNAEUS, 1758)	P
Mauremys caspica rivuluta (VALENCIENNES, 1833)	P
Testudinidae	
Testudo graeca terrestris FORSKAL, 1775	P
Reptilia Squamata - Sauria	
Gekkonidae	
Asaccus elisae (WERNER, 1895)	A
Bunopus tuberculatus BLANFORD, 1874 [Syn: *B. blanfordii* (STRAUCH, 1887)]	A
Cyrtopodion amictopholis HOOFIEN, 1967	P
Cyrtopodion heterocercus mardinensis (MERTENS, 1924)	P
Cyrtopodion kotschyi orientalis STEPANEK, 1937	P
Cyrtopodion scaber (HEYDEN, 1827)	A
Eublepharis angramainyu ANDERSON & LEVITON, 1966	SS
Hemidactylus turcicus turcicus (LINNAEUS, 1758)	P
Ptyodactylus guttatus HEYDEN, 1827	A
Ptyodactylus hasselquistii (DONNDORFF, 1798)	SS
Ptyodactylus puiseuxi BOUTAN, 1893	A
Stenodactylus grandiceps HAAS, 1952	A
Chamaeleonidae	
Chamaeleo chamaeleon recticrista BOETTGER, 1880	Af
Agamidae	
Laudakia stellio picea (PARKER, 1935)	P
Laudakia stellio stellio (LINNAEUS, 1758)	P
Pseudotrapelus sinaitus (HEYDEN, 1827)	A
Trapelus pallidus haasi (WERNER, 1971)	A
Trapelus persicus fieldi (HAAS & WERNER, 1969)	A
Trapelus ruderatus (OLIVIER, 1804)	P
Uromastyx aegyptia microlepis BLANFORD, 1874	SS
Lacertidae	
Acanthodactylus boskianus (DAUDIN, 1802)	SS
Acanthodactylus grandis BOULENGER, 1909	A
Acanthodactylus opheodurus ARNOLD, 1980	A
Acanthodactylus orientalis ANGEL, 1936	A
Acanthodactylus pardalis (LICHTENSTEIN, 1823)	SS
Acanthodactylus robustus WERNER, 1929	A
Acanthodactylus schreiberi syriacus BOETTGER, 1878	P
Acanthodactylus scutellatus (AUDOUIN, 1829)	SS
Acanthodactylus tristrami (GÜNTHER, 1864)	A
Lacerta cappadocica wolteri (BIRD, 1936)	P
Lacerta cf. *kulzeri* MÜLLER & WETTSTEIN, 1932	P
Lacerta laevis laevis GRAY, 1838	P
Lacerta media israelica PETERS, 1964	P
Lacerta media wolterstorffi MERTENS, 1922	P
Mesalina brevirostris BLANFORD, 1874	A
Mesalina guttulata (LICHTESTEIN, 1823)	SS
Ophisops elegans ehrenbergi WIEGMANN, 1835	P
Ophisops elegans elegans MENETRIES, 1832	P
Scincidae	
Ablepharus kitaibelii kitaibelii (BIBRON & BORY, 1833)	P
Chalcides guentheri BOULENGER, 1823	A
Chalcides ocellatus (FORSKAL, 1775)	SS
Eumeces schneiderii pavimentatus (GEOFFROY-ST. HILAIRE, 1827)	SS
Eumeces schneiderii princeps EICHWALD, 1839	SS
Mabuya vittata (OLIVIER, 1804)	?SS(A)
Ophiomorus latastii BOULENGER, 1887	P
Scincus scincus conirostris BLANFORD, 1881	SS
Anguidae	
Ophisaurus apodus PALLAS, 1772	P
Varanidae	
Varanus griseus (DAUDIN, 1802)	SS
Reptilia Squamata - Ophidia	
Leptotyphlopidae	
Leptotyphlops macrorhynchus (JAN, 1860)	SS
Typhlopidae	
Typhlops simoni (BOETTGER, 1879)	P
Typhlops vermicularis MERREM, 1820	P

[1)] Described from Haifa/Israel. Whether distinct from or conspecific with *Rana bedriagae* WERNER, 1912 has still to be demonstrated by bioacoustic evaluation of topotypic material of the latter (see BÖHME & WIEDL 1994).

Table 2: Continued.
Tab. 2: Fortsetzung.

Taxon	Zoogeographical affinity Zoogeographische Affinität
Boidae	
Eryx jaculus jaculus (LINNAEUS, 1758)	SS
Eryx jaculus turcicus (OLIVIER, 1801)	SS
Colubridae	
Coluber jugularis jugularis LINNAEUS, 1758	P
Coluber najadum (EICHWALD, 1831)	P
Coluber nummifer REUSS, 1834	P
Coluber ravergieri MENETRIES, 1832	P
Coluber rogersi (ANDERSON, 1893)	P
Coluber rubriceps (VENZMER, 1919)	P
Coluber schmidti NIKOLSKY, 1909	P
Coluber ventromaculatus GRAY, 1834	SS
Eirenis coronella (SCHLEGEL, 1837)	A
Eirenis decemlineatus (DUMERIL & BIBRON, 1854)	P
Eirenis lineomaculatus SCHMIDT, 1939	P
Eirenis modestus (MARTIN, 1838)	P
Eirenis rothi JAN, 1863	P
Elaphe hohenackeri taurica (WERNER, 1898)	P
Elaphe quatuorlineata sauromates (PALLAS, 1814)	P
Lytorhynchus diadema (DUMERIL & BIBRON, 1854)	SS
Lytorhynchus kennedyi SCHMIDT, 1939	SS
Malpolon moilensis (REUSS, 1834)	SS
Malpolon monspessulanus insignitus (GEOFFROY, 1827)	P
Micrelaps muelleri BOETTGER, 1880	P
Natrix tessellata (LAURENTI, 1768)	P
Psammophis schokari (FORSKAL, 1775)	SS
Rhynchocalamus melanocephalus (JAN, 1862)	P
Spalerosophis diadema cliffordi (SCHLEGEL, 1837)	SS
Telescopus fallax syriacus (BOETTGER, 1880)	P
Telescopus nigriceps (AHL, 1924)	A
Elapidae	
Walterinnesia aegyptia LATASTE, 1887	SS
Viperidae	
Cerastes cerastes (LINNAEUS, 1758)	SS
Macrovipera lebetina obtusa DWIGUBSKY, 1832	P
Pseudocerastes persicus fieldi SCHMIDT, 1930	A
Vipera ammodytes (LINNAEUS, 1758)	P
Vipera bornmuelleri WERNER, 1898	P
Vipera palaestinae WERNER, 1938	P

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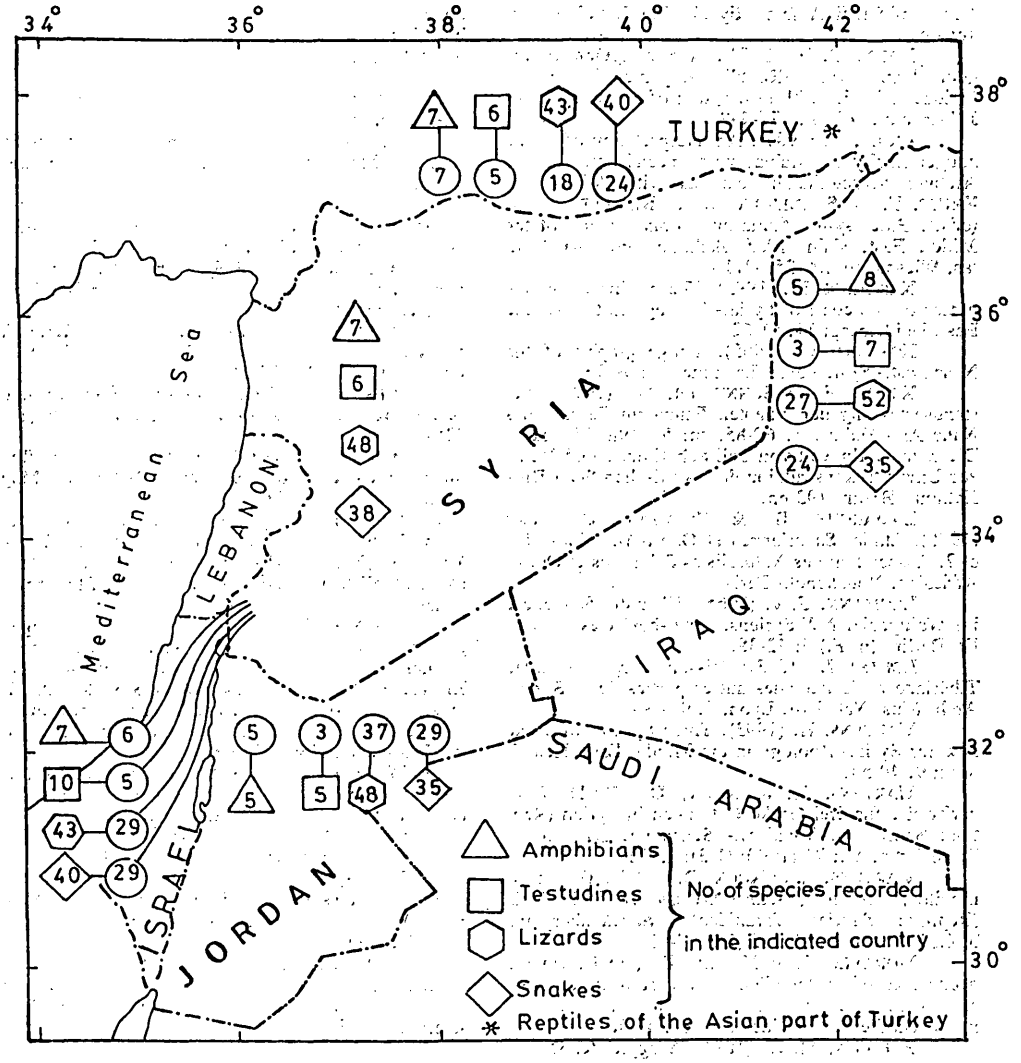

Fig. 1: The amphibian and reptile fauna of Syria compared to that of the Asian part of Turkey, Iraq, Jordan and Israel. Numbers of species recorded in the respective countries are entered in angular symbols; numbers of species which these countries share with Syria are entered in circles.
Triangle - Amphibia, square - Testudines, hexagon - Sauria, rhombus - Serpentes.

Abb. 1: Die Amphibien- und Reptilienfauna Syriens im Vergleich zu den Faunen der Asiatischen Türkei, des Irak, Jordaniens und Israels. Artenzahlen in den entsprechenden Ländern sind in eckigen Symbolen angegeben; Die Anzahlen der Arten, die diese Länder mit Syrien gemeinsam haben, sind in Kreise eingetragen.
Dreieck - Amphibia, Quadrat - Testudines, Sechseck - Sauria, Raute - Serpentes.

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