

MONOGRAPHIAE  
BIOLOGICAE

VOLUME 72

*Series Editors*

H.J. Dumont and M.J.A. Werger

Biogeography and Ecology of  
Turkmenistan

*Edited by*

VICTOR FET

*Dept. of Biological Sciences, Loyola University, New Orleans, Louisiana, USA*

and

KHABIBULLA I. ATAMURADOV

*Natural Conservation Society, Ashgabat, Turkmenistan*



Kluwer Academic Publishers

Dordrecht / Boston / London

*paulus*, which are found in plains from the Caspian Sea to Mongolia; another group includes species that inhabit only Middle Asian deserts: *Acanthaclisis curvispura*, *Nohoveus crucifer*, *Aspoeckiana caudata*, *A. longiventris*, *Lopezus autumnalis*, *L. karakumicus*, *Maracanda talitzkii*, and *Quinemurus metamerus*. Two species, *Aspoeckiana carlic* and *Lopezus nanus*, are endemic for the East Karakum Desert.

A representative East Karakum ant-lion complex from the Repetek Reserve includes fifteen species. Of those, *Acanthaclisis pallida*, *Lopezus fedtschenkoi*, *Aspoeckiana longiventris*, *Maracanda amoena*, and *Neuroleon leptaleus* are common species attracted to the light at night from May to August. From August to October, *Aspoeckiana caudata*, *Lopezus autumnalis*, *Geyria lepidula*, and *Quinemurus metamerus* can be found. *Myrmecaelurus varians* and *Nohoveus crucifer* have evening activity and fly above the sand at low altitude. In the sand, one can find numerous pits of ant-lion larvae of *Morter hyalinus*. Other pits made by *Morter semigriseus* larvae are located inside rodent holes but also can be found in human settlements, in cellars and under sheds. Larvae of *Acanthaclisis pallida*, *A. curvispura*, *Creoleon elegans*, and *Neuroleon leptaleus* are found in rodent burrows.

#### Mountains and Foothills

The distinctive ant-lion fauna of the mountains of Turkmenistan falls into two groups: Irano-Turanian species (*Palpares solidus*, *Myrmecaelurus paghmanus*, *Solter spp.*, *Gepella modesta*, *Cueta kasyi*, *Euroleon parvus*, *Mesonemurus clarus*, *M. sp.*, *Delfimeus intricatus*, and species of *Neuroleon*) and Ancient Mediterranean species (*Cueta lineosa*, *Deutoleon lineatus*, *Neuroleon tenellus*, *Nicarinus poecilopterus*, *Nedroleon maculatus*, and *Megistopus flavicornis*).

Numerous flying *Myrmecaelurus paghmanus* and *Cueta lineosa* have been recorded during the daytime in the Kopetdagh Reserve. Flying species of *Mesonemurus* and *Creoleon* spp. appear during the afternoon. Pits of the *Euroleon parvus* larvae are found in the sand under the rocks.

#### River Valleys and Seashore

Because sands encroach upon river banks, many ant-lion species that are specific for the deserts (such as species of *Lopezus* and *Quinemurus metamerus*) are found in river valleys. Certain mountain species (e.g., *Cueta lineosa* and species of *Neuroleon* spp. etc.) can disperse from the mountains along the river valleys.

Complexes of ant-lions in river valleys of Turkmenistan are different from those in both desert and mountains. In the sandy banks of the Amudarya River near Chardzhou fly *Creoleon plumbeus* and *Myrmecaelurus major*; in the sands under the bushes of *Tamarix* spp. are found pits of larvae of *Cueta lineosa* and *Morter hyalinus*. In the evening fly *Myrmecaelurus varians* and *Creoleon* spp. fly over the sand dunes in the Tedzhen River valley near Serakhs, whereas *Myrmecaelurus paghmanus* and *Cueta lineosa* are active at dawn. Finally, only on the Caspian Sea shore and islands are found numerous *Nohoveus zigan*, which are widespread in the North Palearctic.

## 30. Fauna and Zoogeography of Spiders (Aranei) of Turkmenistan

KIRILL G. MIKHAILOV AND VICTOR FET

### Abstract

In Turkmenistan, 335 species of spiders (Aranei) belonging to 162 genera and 38 families are found. Data on their distribution are given for Turkmenistan and worldwide. The most diverse spider families are Salticidae (62 species), Gnaphosidae (52 spp.), Linyphiidae (33 spp.), Thomisidae (28 spp.), Lycosidae (26 spp.), and Araneidae (24 spp.). Two new combinations are proposed: *Orthobula charitonovi* (Mikhailov, 1986), *comb. nov.* (= *Trachelas charitonovi* Mikhailov, 1986) (Liocranidae), and *Psammitis turanicus* (Charitonov, 1969), *comb. nov.* (= *Xysticus turanicus* Charitonov, 1969) (Thomisidae). Distribution of spider species within the republic is influenced primarily by the diverse landscape structure. A specific and impoverished xerophilic fauna of lowland deserts, including the great sand desert of Karakum, is almost entirely different from the rich mesophile spider fauna found in the Kopetdagh Mountains. Zoogeographic analysis reveals details of origin and possible directions of dispersal of spider fauna. The unique historical role of the Kopetdagh region is discussed; this area could have served as an important island/peninsular corridor before the Tethys Sea recession (Oligocene). With mountain uplift and aridization in the Pliocene, Kopetdagh became a sublatitudinal dispersal pathway for mesophilic spiders. About half of araneofauna is represented by widely distributed species; of the other half, such zoogeographic groups as Iranian, Iranian-Turkestanian, European, European-Caucasian, and European-Mediterranean comprise the majority of the mountain araneofauna. Turanian desert species are predominant in the lowland deserts. A number of spider species are currently known only from Turkmenistan, but the degree of local endemism cannot be estimated since the araneofaunas of the adjacent Middle Asian republics, Iran, and Afghanistan are poorly known.

## Introduction

In his 1878 treatment of arachnids from the Caucasus, Ludwig Koch described several forms from the other side of the Caspian Sea – namely from Krasnovodsk, then a new Russian colonial settlement in the deserts of Transcaspiya (Koch 1878). The first detailed study of spiders from Turkmenistan was begun by the famous French arachnologist Eugene Simon, who described a number of new species collected in 1886 by G. Radde, A. Walter, and A. Konchin during one of the first zoological expeditions to the former Transcaspiyan Region (Simon 1889, 1899). Part of this material is deposited in Simon's collection in Museum National d'Histoire Naturelle, Paris, France; several specimens are also deposited in the State Museum of Georgia (former Caucasian Museum), Tbilisi, Republic of Georgia.

Turkmenian spider species known by the 1930s were included in the only catalogue of USSR spiders compiled by D.E. Kharitonov (1932, 1936). In the 1930s extensive spider collections were organized by Ya. Vlasov and identified by V. Sytshevskaya (Pereleshina) (Vlasov 1937a,b,c; Vlasov and Sytshevskaya 1937). Materials of V. Sytshevskaya's expedition to Turkmenistan in 1929, deposited in the Zoological Museum of Moscow State University (Moscow, Russia), remained unidentified until the 1980s.

A number of new species from Turkmenistan were described by S. Spassky (1934, 1936, 1937, 1939, 1941). Some unpublished data based on Spassky's personal collection (now in Zoological Institute, St. Petersburg) are included in this paper. Spassky (1952) included all existing data on spiders of Turkmenistan in his zoogeographic analysis of the Middle Asian ("Turanian Zoogeographic Province") araneofauna. Fragmentary faunistic data from Turkmenistan were published by the arachnologists of Perm University (Kharitonov 1955; Utochkin 1956, 1960a,b,c, 1964, 1968) and, later, by Bakhvalov (1978) and Sternbergs (1979). More regular collections in this republic started in the 1970s under the direction of the Zoological Institute (St. Petersburg, then Leningrad, Russia). Faunistic data and descriptions of new species were published specifically on Turkmenistan (Ovtsharenko and Fet 1980; Fet 1982, 1983, 1984b,c,e, 1985a, 1986, 1993; Kuznetsov and Fet 1982, 1986; Dunin and Fet 1985; Nenilin and Fet 1985; Zonshtein and Fet 1985; Mikhailov and Fet 1986; Tanasevitch and Fet 1986) or were incorporated into broader faunistic publications (Dunin 1985, 1990, 1992; Nenilin 1984a,b, 1985; Zonshtein 1985, 1987; Zyuzin 1985; Nenilin and Pestova 1986; Mikhailov 1986, 1987, 1992; Tanasevitch 1989; Platnick and Ovtsharenko 1991; Marusik and Logunov 1990; Ovtsharenko, Platnick, and Song 1992). A number of ecological works also have been recently produced specifically focused on the spider species of this area (Kaplin 1975; Fet 1984d, 1985b; Atamuradov and Sukh 1985; Krivokhatsky and Fet 1981, 1982; Kuznetsov 1985a,b). Other works mention certain spider species and give notes on their ecology (Sabiroya 1975, 1977, 1981, 1985, 1986, 1989; Kaplin 1978; Soyunov 1979; Krivokhatsky 1981, 1982a,b, 1983, 1985a,b).

This work is designed to serve as a catalog of spiders from Turkmenistan as well as a review of their distribution with some zoogeographic observations. We incorporated all known literature, as well as some unpublished data from collections of the Zoological Museum of Moscow State University (Moscow, Russia) and the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia) (all spider collections from Turkmenistan compiled by V. Fet from 1975 to 1987 are deposited in these two institutions). During the many years of faunistic and taxonomic studies, numerous type specimens have been analyzed and revised (including those of E. Simon, O. Pickard-Cambridge, S. Spassky, D. Kharitonov, and V. Sytshevskaya). Identification was conducted using modern taxonomic revisions and consultations with available experts and included analysis of external and internal genitalia of adult males and females. Of significant help have been works of Denis (1958) and Roewer (1955, 1960, 1961a,b) on Afghanistan and Iran, and Andreeva (1976) on Tajikistan, all of which include many spiders found also in Turkmenistan. In placement, synonymy, and taxonomy of spiders we followed recent catalogs by Brignoli (1983) and Platnick (1987) as well as classic works of Bonnet (1937–1961) and Roewer (1942, 1954, 1955). Bibliographic references for this paper were compiled using the database "Spider Literature: A Computerized Bibliography Version 1.0," edited by J.A. Coddington (Smithsonian Institution, Washington, DC, USA). Both authors contributed to this project by submitting all known Russian references.

The list below includes names and data on distribution (within Turkmenistan and worldwide) of 343 species of spiders belonging to 164 genera and 38 families. This list undoubtedly will be extended in the future. The most diverse spider families in the Turkmenistan fauna are Salticidae (62 species), Gnaphosidae (54 spp.), Linyphiidae (33 spp.), Thomisidae (28 spp.), Lycosidae (26 spp.), and Araneidae (24 spp.).

## A List of Spiders of Turkmenistan

### Fam. Atypidae

*Atypus muralis* Bertkau, 1890. Kopetdagh (Southwest and Central).  
Mediterranean species.

### Fam. Dipluridae

*Phyxioschema raddei* Simon, 1889. Krasnovodsk, Kopetdagh (Southwest and Central), Serakhs, Badkhyz, Repetek. Iranian species.

## Fam. Nemesiidae

- Nemesia birulai* (Spassky, 1937). Kopetdagh (Southwest, Central, and East). Serakhs, Badghyz. Iranian species.  
*Raveniola fedotovi* (Charitonov, 1946). Kopetdagh. Iranian species.  
*R. kopetdaghensis* (Fet, 1984). Kopetdagh (Southwest and Central). Iranian species.  
*R. redikorzevi* (Spassky, 1937). Badghyz, Serakhs. Iranian species.

## Fam. Filistatidae

- Filistata insidiatrix* (Forskäl, 1775). Kopetdagh (Southwest, Bakharden Cave). Mediterranean and Afrotropical species.  
*F. sp.* Badkhyz. Iranian species (?).  
*Priha crosbyi* (Spassky, 1938). Kopetdagh (Southwest). Irano-Turkestanian species.

## Fam. Scytodidae

- Scytodes bertheloti* Lucas, 1839. Madau, Serakhs District, Repetek. Mediterranean species.  
*S. strandi* Spassky, 1941. Kopetdagh (Southwest), Ashkhabad, Badghyz. Irano-Turkestanian species.  
*S. univittatus* Simon, 1882. Aidere. Paleotropical species.

## Fam. Loxoscelidae

- Loxosceles rufescens* (Dufour, 1820). Madau, Bugdaily, Kopetdagh (Southwest and Central), Bakharden, Ashkhabad. Cosmopolitan species.

## Fam. Pholcidae

- Artema transcaspica* Spassky, 1934. Krasnovodsk, Kopetdagh (Southwest and Central), Ashkhabad, Serakhs, Badghyz, Repetek, Farab. Turanian desert species (?).  
*Ceratopholeus maculipes* Spassky, 1934. Krasnovodsk, Ashkhabad, Badghyz, Repetek. Iranian species.  
*Hoplopholcus forskali* (Thorell, 1871). Ashkhabad. Mediterranean-Turkestanian species.  
*Pholcus nenjukovi* Spassky, 1936. Kopetdagh (Southwest). Iranian species.

## Fam. Dysderidae

- Dysdera aculeata* Croneberg, 1875. Krasnovodsk, Kurum, Tekke, Kopetdagh (Southwest and Central), Ashkhabad, Badghyz, Repetek. Turanian desert species (?).  
*D. limitanea* Dunin, 1985. Known only from Badkhyz. Turanian desert species.  
*D. pococki* Dunin, 1985. Known only from Kizyl-Atrek (may also be present in northeastern Iran). Turanian desert species.  
*D. kugitangica* Dunin, 1992. Known only from Kugitang. Turkestanian species.  
*D. transcaspica* Dunin et Fet, 1985. Known only from southern Turkmenistan (Southwest Kopetdagh, Ashkhabad, Badghyz). Iranian species.

## Fam. Oonopidae

- Dysderina loricata* (Simon, 1873). Ashkhabad, Repetek. European-Mediterranean species.

## Fam. Palpimanidae

- Palpimanus sogdianus* Charitonov, 1946. Kopetdagh (Southwest), Ashkhabad, Badghyz, Repetek. Iranian species.

## Fam. Mimetidae

- Ero furcata* (Villers, 1789). Kopetdagh (Southwest). Holarctic species.  
*Mimetus laevigatus* (Keyserling, 1863). Kopetdagh (Southwest), Repetek. Ancient Mediterranean species.

## Fam. Eresidae

- Eresus cinnaberinus* (Olivier, 1789).  
*E. niger* Petagna, 1787, nomen praecoccupatum (Merrett & Millidge 1992).  
*E. niger rotundiceps* Simon, 1873.  
 Kopetdagh (Southwest, Central, and East), Badghyz. Trans-Palaearctic species (eastward to South Korea).  
*Stegodyphus lineatus* (Latreille, 1817). Krasnovodsk, Kopetdagh, Akhal-Teke, Ashkhabad, Badghyz. Mediterranean species (eastward to Tajikistan).

## Fam. Oecobiidae (= Urocteidae)

- Oecobius nadiae* (Spassky, 1936). Krasnovodsk, Kopetdagh (Southwest, Central, and East), Ashkhabad, Badghyz, Repetek. Irano-Turkestanian species.  
*O. tadzhicus* Andreeva et Tystshenko, 1969. Kopetdagh (Southwest, Central, and East). Irano-Turkestanian species.

*Uroctea limbata* (C.L. Koch, 1843). Kopetdagh (Southwest and Central), Badghyz. Ancient Mediterranean species.

Fam. *Hersiliidae*

*Hersiliola afghanica* Roewer, 1962. Kopetdagh (Southwest and Central), Badghyz. Iranian species.

*H.* sp. n. 1. Kopetdagh (Southwest; foothills). A new species which has not been yet described. Iranian species.

*H.* sp. n. 2 Tuarkyr, Ashkhabad, Repetek, Badghyz. A new species previously listed as *H. maculata* (Dufour, 1831) (Fet 1983, Krivokhatsky and Fet 1982). Turanian desert species.

Fam. *Uloboridae*

*Uloborus plumipes* Lucas, 1846. Kopetdagh (Southwest). Mediterranean-Himalayan species.

*Uloborus walckenaerius* (Latreille, 1806). Kopetdagh (Southwest and Central), Ashkhabad, Mary (= New Merv), Badghyz. Trans-Palaearctic species.

Fam. *Theridiidae*

*Enoplognatha testacea* Simon, 1884. Kopetdagh (Southwest and Central). Mediterranean species.

*E. thoracica* (Hahn, 1831). Kopetdagh (Southwest). European-Mediterranean species.

*Euryopsis laeta* (Westring, 1861). Kopetdagh (Southwest and Central), Badghyz. European-Ancient Mediterranean species.

*E. quinqueguttata* Thorell, 1875. Kopetdagh (Southwest). European-Mediterranean species.

*Latrodectus tredecimguttatus* (Rossi, 1790). Meshed-Messarian Plain, Kopetdagh (Southwest and Central), Ashkhabad, Gyauurs District, Badghyz, Repetek, Kunya-Urgench, Tashauz Oasis. Ancient Mediterranean species.

*L. pallidus* O. Pickard-Cambridge, 1872. Chilmamedkum Sands, Kopetdagh (Southwest and Central), Kizyl-Arvat District, Geok-Tepe District, Ashkhabad, Gyauurs District. East Mediterranean species.

*Steatoda albomaculata* (De Geer, 1778). Krasnovodsk, Kopetdagh (Central), Ashkhabad, Badghyz, Repetek. Holarctic species.

*S. bipunctata* (L., 1758). Kopetdagh (Central). Holarctic species.

*S. castanea* (Clerck, 1757). Kopetdagh (East). European-Siberian species.

*S. grossa* (C.L. Koch, 1838). Gasan-Kuli, Sharlouk, Kopetdagh (Southwest and Central), Ashkhabad, Badghyz, Repetek. Cosmopolitan species.

*S. triangulosa* (Walckenaer, 1802). Kopetdagh (Southwest and Central), Badghyz, Repetek. Holarctic species.

*Theridion pictum* (Walckenaer, 1802). Kopetdagh (Southwest). European-Siberian species.

*T. simile* C.L. Koch, 1836. Repetek. Ancient Mediterranean (trans-Palaearctic?) species.

*T. sisyphium* (Clerck, 1757). Kopetdagh (Southwest). Trans-Palaearctic species.

*T. varians* (Hahn, 1831). Ashkhabad, Repetek. Trans-Palaearctic species.

Fam. *Linyphiidae* (= *Erigonidae*)

*Agyneta fuscipalpis* (C.L. Koch, 1836). Kugitang (1,200–1,300 m), Repetek. European-Siberian species.

*A. kopetdaghensis* Tanasevitch, 1989. Kopetdagh (Southwest: Aidere). Iranian species.

*A. resslii* (Wunderlich, 1973). Kopetdagh (Southwest). Mediterranean species.

*A. rurestris* (C.L. Koch, 1836). Ashkhabad. European-Siberian species.

*Alioranus avanturus* Andreeva et Tystshenko, 1970. Kugitang (1,400 m). Irano-Turkestanian species.

*Ceratinella brevis* (Wider, 1834). Kopetdagh (Southwest). European-Siberian species.

*Diplocephalus bifurcatus* Tanasevitch, 1989. Kopetdagh (Southwest). Iranian species.

*Donacochara speciosa* (Thorell, 1875). Badkhyz. European species.

*Erigone dentipalpis* (Wider, 1834). Kugitang (1200–1300 m). European-Mediterranean-Siberian species.

*Erigonopus niniae* Tanasevitch et Fet, 1986. Kopetdagh (Southwest). Iranian species.

*Frontinellina frutetorum* (C.L. Koch, 1834). Kopetdagh (Southwest). European-Siberian species (eastward to East Kazakhstan Region).

*Gongylidiellum murcidum* Simon, 1884. Kopetdagh (Southwest). European species.

*Janetschekia necessaria* Tanasevitch, 1985. East Karakum (Farab). Turanian desert species.

*Leptyphantes badkhyzensis* Tanasevitch, 1986. Badkhyz. Turanian desert species.

*L. escapus* Tanasevitch, 1989. Kugitang (1,200 m). Turkestanian species.

*L. kuhitangensis* Tanasevitch, 1989. Kugitang (1,200–1,400 m). Turkestanian species.

*L. nebulosoides* Wunderlich, 1977. Kopetdagh (Southwest), Kugitang. Ancient Mediterranean species.

*L. pinicola* Simon, 1884. Kopetdagh (Southwest). European-Mediterranean species.

*L. tenuis* Blackwall, 1852. Kopetdagh (Southwest and Central). European-Mediterranean species (eastward to Tajikistan).

*L. turanicus* Tanasevitch et Fet, 1986. Tuarkyr Plateau (Kafigshem Mts.), Kopetdagh (Southwest and Central), Kugitang (1,300 m). Iranian species.

- L. turkestanicus* Tanasevitch, 1989. East Karakum (Farab). Turanian desert species.
- Mecopisthes orientalis* Tanasevitch et Fet, 1986. Kopetdagh (Southwest). Iranian species.
- Mesasisgona mira* Tanasevitch, 1989. Kugitang (1300 m). Iranian species.
- Microctenonyx subitaneus* (O. Pickard-Cambridge, 1875). Kopetdagh (Southwest and Central), Farab. Holarctic species (with a range disjunction in Siberia).
- Microlinyphia pusilla* (Sundevall 1830). Kopetdagh (Southwest). Ashkhabad, Badghyz, Farab. Holarctic species.
- Oedothorax apicatus* (Blackwall, 1850). Kopetdagh (Southwest), Kugitang. European species.
- Pelecopsis laptevi* Tanasevitch et Fet, 1986. Badghyz. Turanian desert species.
- P. paralleloides* Tanasevitch et Fet, 1986. Kopetdagh (Southwest). Iranian species.
- Prinerigone vagans* (Audoin, 1826). Kopetdagh (Southwest and Central), Bakharden District, Ashkhabad District, Farab. European-Mediterranean (steppe?) species.
- Sphecozone romana* (O. Pickard-Cambridge, 1872).
- Ceratinopsis romana* O. Pickard-Cambridge, 1872.
- Sphecozone asiatica* (Andreeva et Tyschchenko, 1970) (Tanasevitch 1983: 1786).
- Repetek. Mediterranean species.
- Trachelocampus asiaticus* Tanasevitch, 1989. Repetek. Turanian desert species.
- Trichoncoides piscator* Simon, 1884. Kopetdagh (Southwest). Mediterranean species.
- Walckenaeria monoceros* (Wider, 1834). Kopetdagh (Southwest). European species.
- Fam. Tetragnathidae**
- Metellina kirgisisica* (Bachvalov, 1974).
- Meta kirgisisica* Bachvalov 1974) (Marusik 1989).
- Kugitang. Irano-Turkestanian species.
- Tetragnatha extensa* (L., 1758). Kopetdagh (Southwest). "Tekke". Holarctic species.
- Zygiella caspica* (Simon, 1889). Imambaba. Turanian desert species.
- Fam. Araneidae**
- Aculepeira sogdiana* (Charitonov, 1969). Kopetdagh (Southwest and Central), Badghyz. Turanian desert (or Iranian?) species.
- Agalenatea redii* (Scopoli, 1763). Kopetdagh (Southwest). European-Mediterranean species (from North Africa to Middle Asia).
- Araneus angulatus* Clerck, 1757. Kopetdagh (Southwest). European-

- Mediterranean forest species. Records from the New World are erroneous!
- A. armida* (Auduin, 1825). Ashkhabad. European-Mediterranean species (present in the Caucasus).
- A. bituberculatus* (Walckenaer, 1802). Kopetdagh (Southwest and Central), Badghyz. European-Ancient Mediterranean species.
- A. pallasi* (Thorell, 1875). Kyzylsu (Krasnovodsk Region), next to the water. Turkestanian-Turanian desert species (eastward to Mongolia and Tuva).
- A. repetecus* Bachvalov, 1978. Repetek. Turanian desert species.
- A. spasskvi* Brignoli, 1983.
- A. cruciferoides* Spassky 1952.
- Kopetdagh (Southwest). Irano-Turkestanian species.
- A. tartaricus* (Kroneberg, 1875). Ashkhabad, Badghyz. Irano-Turkestanian species.
- A. tedgenicus* Bachvalov, 1978. Tedzhen? (place of collection is absent from the original description). Turanian desert species.
- Araniella inconspicua* (Simon, 1874). Kopetdagh (Southwest). European-Caucasian (European-East Mediterranean?) meadow species.
- Argiope ahngeri* Spassky, 1932. Akhal-Teke. Irano-Turkestanian species.
- A. bruemichi* (Scopoli, 1772). Kopetdagh (Southwest). Trans-Palaearctic meadow-steppe species.
- A. lobata* (Pallas, 1772). Krasnovodsk, Kopetdagh (Southwest and Central), Bakharden, Ashkhabad, Badghyz, Murghab, Takhta-Bazar. Paleotropical and Palaearctic species (in Palaearctic, occupies steppe habitats).
- Cyclosa conica* (Pallas, 1772). Kopetdagh (Southwest). Holarctic forest species.
- Hypsosinga albovittata* (Westring, 1851). Kopetdagh (Southwest). Trans-Palaearctic species.
- H. turkmenica* Bachvalov, 1978. Repetek. Turanian desert species.
- Larinia nenilini* Marusik, 1986. Repetek, Chardzhou. Turanian desert species.
- L. pubiventris* Simon, 1889.
- L. turkmenica* Spassky 1939.
- Krasnovodsk, Tedzhen, Kalaimor (= Mor-Kala), Imambaba, Repetek. Turanian desert species.
- Larinioides folium* (Schränk, 1803). Gasan-Kuli, Ashkhabad, "Tekke," Amudarya. European-Mediterranean steppe-desert species, found next to the water (eastward to Middle Asia).
- Mangora acalypha* (Walckenaer, 1802). Kopetdagh (Southwest). European-Ancient Mediterranean species; eastward to southern Urals, Tajikistan, Kyrgyzstan, and East Kazakhstan Region.
- Neoscona adianta* (Walckenaer, 1802). Kopetdagh (Southwest), Karakum District (Karakumkanal State Farm). Trans-Palaearctic meadow-steppe species.
- N. subfusca* (C.L. Koch, 1837).
- Araneus dalmaticus* Doleschall 1852.
- Kopetdagh (Southwest). Mediterranean species (the easternmost record!).

*Zilla diodia* (Walckenaer, 1802). Kopetdagh (Southwest). European-Caucasian (meadow?) species.

Fam. *Lycosidae*

*Arctosa soror* (Simon, 1889). Mary ("New Merv"). Turanian desert species.

*A. variana* (C.L. Koch, 1848). Badghyz. European-Mediterranean species.

"*Arctosa*" *cereipes* (L. Koch, 1878). Krasnovodsk. Turanian desert species.

*Aulonia kratochvili* Dunin, Buchar, et Absolon, 1986. Kopetdagh. Caucasian-Iranian species.

*Evippa badchysica* Sternbergs, 1979. Badghyz. Turanian desert species.

*E. onager* Simon, 1895. Repetek. Sindian-Turanian desert (steppe) species (?).

*E. schenkeli* Sternbergs, 1979. Badghyz. Turanian desert species.

*E. turkmenica* Sternbergs, 1979. Badghyz. Turanian desert species.

*Hippasa partita* (O. Pickard-Cambridge, 1876).

*H. deserticola* Simon, 1889.

Murghab, Imambaba. Saharo-Sindian species.

*Lycosa alticeps* Kroneberg, 1875. Krasnovodsk, Ashkhabad, Badghyz. Turanian desert species.

*L. nordmanni* (Thorell, 1875). Ashkhabad. Mediterranean species.

*L. radiata* (Latreille, 1819). Kopetdagh (Southwest and Central). Mediterranean species.

*Pardosa italica* Tongiorgi, 1966. Kopetdagh (Southwest and Central). Mediterranean species.

*P. morosa* (L. Koch, 1870). Kopetdagh (Southwest and Central). Mediterranean species.

*P. nebulosa* (Thorell, 1892). Kopetdagh (Southwest). Badghyz. Sultanbent, Iolatan, Mary (= New Merv). Mediterranean species.

*P. pontica* (Thorell, 1875). Kopetdagh (Southwest and Central). Caucasian-Iranian species (?).

*P. proxima* C. L. Koch, 1847. Kopetdagh (Southwest). European-Mediterranean species.

*Tarentula albofasciata* (Brullé, 1832). Kopetdagh (Southwest). Ashkhabad. Mediterranean species.

*T. bergsoei* (Thorell, 1875). Ashkhabad. Caucasian-Iranian species (?).

*T. cronebergi* (Thorell, 1875). Murghab District. Ancient Mediterranean species.

*T. cursor* (Hahn, 1831) *cursorioides* Charitonov, 1969. Kopetdagh (Southwest and Central). Iranian subspecies of an European-Ancient Mediterranean species.

*T. raddei* (Simon, 1889). Mary ("New Merv"). Amudarya. Turanian desert species.

*Trochosa ruricola* (De Geer, 1778). Kopetdagh (Southwest). Trans-Palaearctic species.

*T. terricola* Thorell, 1856. Kopetdagh (Southwest). Trans-Palaearctic species.

*Wadicosa commoventa* Zyuzin, 1985. Badghyz (Kushka). Turanian desert species.

*Xerolycosa brunneopicta* Loksa, 1965. "Duldsch (Sudüfer d. Balchanbühels)", Krasnovodsk. Mongolian desert (steppe) species.

Fam. *Pisauridae*

*Pisaura mirabilis* (Clerck, 1757). Kopetdagh (Southwest). European-Mediterranean species.

*P. novicia* (L. Koch, 1878). Ashkhabad. Caucasian-Iranian species (?). Taxonomic status in relation to *P. mirabilis* is not clear.

Fam. *Agelenidae*

*Agelena labyrinthica* (Clerck, 1757). Kopetdagh (Southwest and Central). Trans-Palaearctic species (eastward to Manchuria and Japan; southward to the Himalayas).

*Tegenaria domestica* (Clerck, 1757). Kopetdagh (Southwest and Central). Cosmopolitan species.

Fam. *Desidae*

*Cedicus ephthalitus* Fet, 1993. Known only from Southwest Kopetdagh. Iranian species.

*C. gemadii* Fet, 1993. Kopetdagh (Southwest and Central), Tuarkyr (Kalfigshem Mountains). Iranian species.

*C. maerens* Simon, 1889. Known only from the foothills of Southwest Kopetdagh and Bolshoi Balkhan. Iranian species.

*C. parthus* Fet, 1993. Known only from Kopetdagh (Southwest and Central). Iranian species.

Fam. *Hahniidae*

*Hahnia* sp. Kopetdagh (Southwest and Central). Iranian species.

Fam. *Dictynidae*

*Archaeodictyna ammophila* (Menge, 1871). Kopetdagh. European-Caucasian meadow species.

*A. consecuta* (O. Pickard-Cambridge, 1872). Kopetdagh (Central). East Mediterranean species (from Middle East to Turkestan).

*Brigittea latens* (Fabricius, 1775). Kopetdagh (Southwest). European-Caucasian meadow species, eastward to Tajikistan and Kyrgyzstan.

*Devade tenella* (Tystshenko, 1965). Badghyz. Turanian desert (or steppe) species.

- Dictyna cronebergi* Simon, 1889. Mary (= New Merv). Turanian desert species.  
*D. pusilla* Thorell, 1856. Kopetdagh (Southwest). Trans-Palaearctic species (eastward to Kamchatka).  
*D. uncinata* Thorell, 1856. Ashkhabad. Trans-Palaearctic species (eastward to Kamchatka).  
*Dictynomorpha strandi* Spassky, 1939. Meshed-Messerian Plain. Ashkhabad. Turanian desert species.

## Fam. Amaurobiidae

- Coelotes charitonovi* Spassky, 1939. Krasnovodsk, Badkhyz. Turanian desert species.

## Fam. Titanoecidae

- Titanoeca albomaculata* (Lucas, 1846). Kopetdagh (Southwest). Mediterranean species.  
*T. lehtineni* Fet, 1986. Kopetdagh (Southwest, Central, and East), Badkhyz. Iranian species.  
*T. tristis* (L. Koch, 1872). Kopetdagh. European-Caucasian meadow species (the easternmost record!).  
*T. veteranica* (Herman, 1879). Kopetdagh (Southwest). Mediterranean steppe species.

## Fam. Oxyopidae

- Oxyopes badkhyzicus* Mikhailov et Fet, 1986. Known only from Badkhyz (Lake Yeroyulanduz). Turanian desert species.  
*O. heterophthalmus* Latreille, 1804. Ashkhabad, Bagir. European-Ancient Mediterranean species.  
*O. lineatus* Latreille, 1806. Kopetdagh (Southwest), Badkhyz. European-Mediterranean species.  
*O. maracandensis* Charitonov, 1946. Kopetdagh (Southwest and Central), Badkhyz, Sultanbent, Murghab District, Karakum District, Repetek. Turanian desert species.  
*O. takobius* Andreeva et Tystshenko, 1969. Kopetdagh (Southwest and Central), Badkhyz. Iranian-Turkestanian species.

## Fam. Anyphaenidae

- Anyphaena accentuata* (Walckenaer, 1802). Kopetdagh (Southwest). European-Mediterranean species.

## Fam. Liocranidae

- Agroeca pullata* Thorell, 1875. Kopetdagh (Southwest and Central). European-Mediterranean-Siberian species.  
*Mesiotelus kulczynskii* Charitonov, 1946. Kopetdagh (Southwest and Central). Iranian species.  
*M. tenuissimus* (L. Koch, 1866). Kopetdagh (Southwest and Central). Mediterranean species.  
*Orthobula charitonovi* (Mikhailov, 1986) *comb. nov.* by K. Mikhailov.  
*Trachelas charitonovi* Mikhailov, 1986.  
 Kopetdagh (Southwest and Central). Eastern Mediterranean species (from the Caucasus to Kyrgyzstan).  
*Phrurolithus pullatus* Kulczynski, 1897. Kopetdagh (Southwest). Mediterranean species.

## Fam. Clubionidae

- Cheiracanthium erraticum* (Walckenaer, 1802). Kopetdagh (Southwest). Trans-Palaearctic species.  
*C. mildei* L. Koch, 1866. Kopetdagh (Southwest). European-Mediterranean species (introduced to the USA).  
*C. seidlitzii* L. Koch, 1864. Kopetdagh (Southwest), Badkhyz, Kalaimor (Mor-Kala). European-Mediterranean species.  
*Clubiona alpicola* Kulczynski, 1882. Kopetdagh (Southwest). European meadow species (the easternmost record!).  
*C. genevensis* L. Koch, 1866. Kopetdagh (Southwest). Ancient Mediterranean species.

## Fam. Zodariidae

- Zodarium prozyskii* Nenilin et Fet, 1985. Kopetdagh (Southwest and Central). Iranian species.  
*Z. raddei* Simon, 1889.  
*Z. vlasovi* Sytshevskaya in Vlasov et Sytshevskaya, 1937.  
*Z. denisi*: Ovtsharenko and Fet 1980, Krivokhatsky and Fet 1981; misidentification, non *Z. denisi* Spassky, 1938.  
*Z. raddei*: Fet 1985b.  
 Kopetdagh (Southwest and Central), Archman, Ashkhabad, Badkhyz, Repetek. Iranian species.  
*Z. sytshevskayae* Nenilin et Fet, 1985. Kopetdagh (East), Babadurmaz, Badkhyz, Repetek. Turanian desert species.



## Fam. Gnaphosidae

- Aphantaulax seminigra* Simon, 1878. Kopetdagh (Southwest and Central). Mediterranean species (eastward to Kyrgyzstan).
- Asiabadus asiaticus* (Charitonov, 1946). Badghyz. Turanian desert species.
- Berlandina afghana* Denis, 1958. Repetek. Turanian desert species.
- B. caspica* Ponomarev, 1979. Murghab District. Turanian desert species.
- B. plumalis* (O. Pickard-Cambridge, 1872). Badghyz. Mediterranean and Palearctic (Burma, Himalayas, China) species.
- B. sp.* Kopetdagh (Central).
- Drassodes jakkabagensis* Charitonov, 1946. Badghyz. Turanian desert species.
- D. lapidosus* (Walckenaer, 1802). Kopetdagh (Southwest and Central). Trans-Palearctic species.
- D. proximus* (Denis, 1958). Krasnovodsk, Kopetdagh (Central). Iranian species.
- D. sp.* Kopetdagh (Southwest and Central). Iranian species.
- "*D.*" *flavomaculatus* (L. Koch, 1878). Krasnovodsk. Turanian desert species. Does not belong to the genus *Drassodes* (V. Ovtsharenko, pers. comm.).
- "*D.*" *thimei* (L. Koch, 1878). Krasnovodsk. Turanian desert species. Does not belong to the genus *Drassodes* (V. Ovtsharenko, pers. comm.).
- Echemus angustifrons* (Westring, 1861). Kopetdagh. European species.
- Gnaphosa haarlovi* Denis, 1958.
- G. ajdahania* Roewer, 1961 (Ovtsharenko, Platnick, et Song, 1992.). Ashkhabad Region (Gyuaur). Irano-Turkestanian species.
- G. kuldzha* Ovtsharenko, Platnick, et Song, 1992. Murghab District. Irano-Turkestanian species.
- G. leporina* (L. Koch, 1866). Kopetdagh (Southwest and Central). Ancient Mediterranean species.
- G. turkmenica* Ovtsharenko, Platnick, et Song 1992. Known only from Badghyz (Lake Eroyulanduz).
- G. lugubris* (C.L. Koch, 1839). Record for Repetek (Kaplin 1978) is not confirmed (Ovtsharenko et al. 1992).
- Haplodrassus dalmatensis* (L. Koch, 1866). Kopetdagh (Southwest and Central). European-Mediterranean species.
- H. signifer* (C.L. Koch, 1839). Kopetdagh (Southwest and Central). Ashkhabad, Badghyz. Holarctic species.
- Micaria albimana* O. Pickard-Cambridge, 1872. Kopetdagh (Central and East). Badghyz, Repetek. East Mediterranean species.
- M. kopetdaghensis* Mikhailov in Mikhailov et Fet, 1986. Kopetdagh (Southwest). Caucasian-Iranian species.
- M. lenzi* Bösenberg, 1899. Sarykamysh. Trans-Palearctic species.
- M. pygmaea* Kroneberg, 1875. Sharlouk. Ancient Mediterranean species (from Canary Islands to Tajikistan).
- M. romana* L. Koch, 1866. Kopetdagh (Southwest). European-Mediterranean species.
- M. rossica* Thorell, 1875. Kopetdagh (Southwest, Central, and East), Dushak, Badghyz, Repetek, Farab, Tashauz Region (Chirishli, Kankakyr). Holarctic species.
- M. septempunctata* O. Pickard-Cambridge, 1872. Gasan-Kuli, Kopetdagh (Central), Bairam-Ali, Repetek, Farab. East Mediterranean species.
- Minosia karakumensis* (Spassky, 1939). Kopetdagh (Southwest and Central), Ashkhabad, Badghyz, Repetek. Turanian desert species.
- Minosiella intermedia* Denis, 1958. Kopetdagh (Southwest), Serakhs District, Badghyz, Repetek. Iranian species (?).
- Nomisia aussereri* (L. Koch, 1872). Kopetdagh (Southwest and Central), Ashkhabad. Mediterranean species.
- N. conigera* (Spassky, 1941). Kopetdagh (Southwest, Central, and East), Badghyz. Irano-Turkestanian species.
- N. exornata* (C.L. Koch, 1839). Kopetdagh (Southwest, Central, and East), Badghyz. Ancient Mediterranean species.
- Poecilochroa conspicua* (L. Koch, 1866). Ashkhabad, Repetek. European-Ancient Mediterranean species.
- Prodidomus redikorzevi* Spassky, 1940. Kopetdagh (Southwest), Serakhs, Badghyz. Iranian species.
- Pterotricha strandi* Spassky, 1936. Kopetdagh (Southwest and Central), Akhal-Teke, Serakhs District, Badghyz. Iranian species.
- Scotophaeus scutulatus* (L. Koch, 1866). Kopetdagh. European species.
- Synaphosus* see Addendum (p. 524).
- S. sp. 2.* Badghyz. Iranian species.
- Talanites dunini* Platnick et Ovtsharenko, 1991. Kopetdagh (Southwest and East). Iranian species.
- T. fagei* Spassky, 1938. Kopetdagh (Central), Serakhs. Iranian species.
- "*Talanites*" *aculeatus* Charitonov, 1946. Kopetdagh (Southwest and Central), Repetek. Turanian desert species. Does not belong to the genus *Talanites* (V. Ovtsharenko, pers. comm.).
- "*T.*" *sp.* Repetek. Turanian desert species. Belongs to the same genus as "*Talanites*" *aculeatus* Charitonov.
- Theuma walteri* (Simon, 1889). Kalaimor (= Mor-Kala). Turanian desert species.
- Trachyzelotes jaxartensis* (Kroneberg, 1875). Kopetdagh (Southwest), Badghyz. Ancient Mediterranean species (introduced to the USA, Mexico, India, China, Senegal, South Africa, and Hawaii).
- Zelotes aerosus* Charitonov, 1946. Kopetdagh (Southwest and Central). Turanian desert species.
- Z. arnoldii* Charitonov, 1946. Ashkhabad, Meshed-Messerian Plain. Turanian desert species.
- Z. bucharensis* Charitonov, 1946. Kopetdagh (Central), Badghyz, Repetek. Turanian desert species.
- Z. caucasicus* (L. Koch, 1866). Kopetdagh (Central). Mediterranean species.
- Z. longipes* (L. Koch, 1866). Kopetdagh (Southwest). European-Siberian species.

- Z. praeficus* (L. Koch, 1866). Kopetdagh (Southwest and Central). European-West Siberian species.  
*Z. pumilus* (C.L. Koch, 1839). Kopetdagh (Southwest). European-Mediterranean species.  
*Z. pusillus* (C.L. Koch, 1833). Kopetdagh (Southwest and Central). Trans-Palaearctic species.  
*Z. subterraneus* (C.L. Koch, 1833). Kopetdagh (Central), Repetek. Holarctic species.

Fam. Zoridae

- Zora nemoralis* (Blackwall, 1861). Kopetdagh (Southwest and Central). European species.  
*Z. silvestris* Kulczynski in Chyzer et Kulczynski, 1897. Kopetdagh (Southwest). European species.

Fam. Heteropodidae (= Sparassidae, = Eusparassidae)

- Cebrennus* sp. Repetek. Turanian species.  
*Eusparassus oculatus* (Kroneberg, 1875). Kopetdagh (Southwest and Central). Archman, Ashkhabad, Badghyz, Repetek. Irano-Turkestanian species.  
*Micrommata ligurinum* C.L. Koch, 1845. Kopetdagh (Southwest and Central). Mediterranean species.  
*Olios sericeus* (Kroneberg, 1875). Kopetdagh (Southwest and Central). Ashkhabad, Badghyz, Kushka, Repetek. Irano-Turkestanian species.

Fam. Philodromidae

- Paratibellus oblongiusculus* (Lucas, 1846). Kopetdagh (Southwest). Bagir. Mediterranean species.  
*Philodromus aureolus* (Clerck, 1757). Kopetdagh (Southwest). Trans-Palaearctic species [? – many records probably belong to *P. cespitum* (Walckenaer 1802)].  
*P. fallax* Sundevall, 1832. Kopetdagh (Southwest). European species.  
*P. lepidus* Blackwall, 1870. Mary (= New Merv). Uch-Adzhi. Mediterranean species.  
*P. rufus* Walckenaer, 1825. Kopetdagh (Southwest). Holarctic species.  
*Thamatus formicinus* (Clerck, 1757). Kopetdagh (Southwest and Central). Holarctic species.  
*T. imbecillus* L. Koch, 1878. Kopetdagh (Southwest). Archman. Caucasian-Turkestanian species.  
*T. vulgaris* Simon, 1870. Kopetdagh (Southwest and Central). Holarctic species.  
*Tibellus oblongus* (Walckenaer, 1802). Kopetdagh (Southwest). Ashkhabad. Holarctic species.

Fam. Thomisidae

- Diaea dorsata* (Fabricius 1777). Kopetdagh (Central) (the record is dubious). European-Ancient Mediterranean species.  
*Heriaca buffonopsis* Loerbroks, 1983. Krasnovodsk. Turanian desert species.  
*H. fedotovi* Charitonov, 1946. Kopetdagh (Southwest). Turanian desert species.  
*H. mellotiei* Simon, 1886.  
*H. oblongus* Simon, 1918.  
 Kopetdagh (Southwest). European-Ancient Mediterranean species.  
*H. spinipalpus* Loerbroks, 1983. Krasnovodsk, Firyuza. Caucasian-Turkestanian species.  
*Monaeses israelensis* Levy, 1973. Kopetdagh (Southwest). East Mediterranean species.  
*M. paradoxus* (Lucas, 1846). Kopetdagh (Southwest), Geok-Tepe, Repetek. Mediterranean-Afrotropical species.  
*Oxyptila bauduerei cribrata* (Simon, 1885).  
*Oxyticus cribratus* Simon, 1885.  
*Psammitis cribratus* (Simon, 1885).  
 Kopetdagh (Southwest and Central). Synonymy of this Mediterranean form is not clear. Kritscher (1961) placed it as a subspecies into *O. bauduerei* Simon, 1877.  
*O. sanctuaria* (O. Pickard-Cambridge, 1871). Kopetdagh (Southwest). European species.  
*O. tricoloripes* Strand, 1913. Kopetdagh (Southwest and Central). East Mediterranean species.  
 "O". *lugibris* (Kroneberg, 1875). Kopetdagh (Southwest and Central), Ashkhabad, Repetek. Irano-Turkestanian species; belongs neither to the genus *Oxyptila* nor to *Xysticus* (Marusik and Logunov, 1990: 52).  
*Psammitis tristrami* (O. Pickard-Cambridge, 1872). Durun, Bairam-Ali. Mediterranean species.  
*P. turanicus* (Charitonov, 1969), *comb. novi*.  
*Xysticus turanicus* Charitonov, 1969.  
 Kizyl-Atrek, Sharlouk, Kopetdagh (Southwest and Central), Bakharden District, Badghyz. Irano-Turkestanian species.  
*Runcinia lateralis* (C.L. Koch, 1838). Kopetdagh (Southwest). European-Mediterranean species.  
*Stiphropus strandi* Spassky, 1938. Kopetdagh (Southwest and Central), Badghyz, Repetek. Irano-Turkestanian species.  
*Synema globosum* (Fabricius, 1775). Kopetdagh (Southwest). Trans-Palaearctic species.  
*S. plorator* (O. Pickard-Cambridge, 1872). Kopetdagh (Southwest). Mediterranean species.  
*Thomisus onustus* Walckenaer, 1805. Krasnovodsk, Kopetdagh (Southwest and Central), Ashkhabad, Gaudan, Bagir, Badghyz, Islimcheshme, Imambaba. Mediterranean-Paleotropical species.

- Xysticus acerbus* Thorell, 1872. Kopetdagh (Southwest and Central). Ashkhabad, Repetek. Trans-Palaearctic species.
- X. caperatus* Simon, 1875. Badghyz. Mediterranean species.
- X. caspius* Utotchkin, 1968. Kopetdagh (Southwest), Repetek. Turanian desert species.
- X. concinnus* Kroneberg, 1875. Badghyz, Kopetdagh (Central and East). Turanian desert species.
- X. kaznakovi* Utotchkin, 1968. Kopetdagh (Southwest). Irano-Turkestanian species.
- X. kochi* Thorell, 1872. Kopetdagh (Southwest). European-Mediterranean species.
- X. lapidarius* Utotchkin, 1968. Iolatan. Irano-Turkestanian species.
- X. marmoratus* Thorell, 1875. Kopetdagh (Central). Mediterranean species.
- X. minor* Charitonov, 1946. Kopetdagh (Southwest and Central), Ashkhabad, Badghyz, Repetek. Irano-Turkestanian species.
- X. nimii* Thorell, 1872. Kopetdagh (Southwest). European-Mediterranean species.

#### Fam. Salticidae

- Aelurillus andreevae* Nenilin, 1984; *nomen novum* for specimens misidentified as *A. variegatus* (Kroneberg, 1875) by Andreeva (1976). Ashkhabad. Irano-Turkestanian species.
- A. affinis* (Lucas, 1846). Ashkhabad. Ancient Mediterranean species.
- A. ater* (Kroneberg, 1875). Ashkhabad, Imambaba, Kaplankyr. Turanian desert species.
- A. concolor* Kulczynski, 1901.
- A. iranus* Roewer, 1955 (Nenilin 1984). Kopetdagh (Southwest and Central), Murghab District. Caucasian-Turkestanian (East Mediterranean?) species.
- A. m-nigrum* (Kulczynski in Chyzer et Kulczynski, 1891). Gasan-Kuli. Kopetdagh (Southwest and Central), Badghyz. Ancient Mediterranean species (eastward to Sinkiang).
- A. variegatus* (Kroneberg, 1875). Badghyz. Turanian desert species.
- A. v-insignitus* (Clerck, 1757). Kopetdagh (Southwest). European-Siberian species.
- Ballus chalybeius* (Walckenaer, 1802). Kopetdagh (Southwest). European-Mediterranean species (eastward to Tajikistan).
- Bianor albomaculatus* (Lucas, 1846). Bakharden. Ancient Mediterranean species.
- Chalcoscirtus infimus* (Simon, 1868). Kopetdagh (Southwest and Central). European-Mediterranean species.
- C. martensi parvus* Marusik, 1991. Kopetdagh (Southwest). Irano-Turkestanian subspecies.

- Cyrra algerina* (Lucas, 1846). Kopetdagh (Southwest). Mediterranean and Palearctic species.
- C. ocellata* (Kroneberg, 1875). Kopetdagh (Southwest and Central), Repetek. Mediterranean and Palearctic species.
- Eris nidicolens* (Walckenaer, 1802). Kopetdagh (Southwest). European-Mediterranean species.
- Euophrys frontalis* (Walckenaer, 1802). Kopetdagh (Southwest). Trans-Palaearctic species.
- Evarcha arcuata* (Clerck, 1757). Kopetdagh (Southwest), Repetek. Trans-Palaearctic species.
- Heliophamus auratus* C. L. Koch, 1835. Lower Murghab. European-Siberian species.
- H. curvidens* (O. Pickard-Cambridge, 1872). Bakharden. East Mediterranean species.
- H. flavipes* (Hahn, 1832). Kopetdagh (Southwest). European-Siberian species.
- H. lineiventris* Simon, 1868. Badghyz. Trans-Palaearctic species.
- H. melinus* L. Koch, 1867. Kopetdagh (Southwest). Ancient Mediterranean species.
- H. niveiventris* Simon, 1889. Bairam-Ali (= Old Merv). Turanian desert species. Taxonomic status is not clear.
- H. patagiatus* Thorell, 1875. Exact locality in Turkmenistan is not published (A. Nenilin, personal notes). European-Siberian species.
- H. turanicus* Charitonov, 1969. Kopetdagh (Southwest), Khozli-ogly-olum (collected by K. Ahnger, November 1 to 11, 1903). Turanian desert species.
- Langona tartarica* (Charitonov, 1946). Kopetdagh (Central). Irano-Turkestanian species.
- Leptorchestes berolinensis* (C.L. Koch, 1846). Kopetdagh (Southwest). European-Mediterranean species.
- Menemerops afghanus* (Roewer, 1961). Kopetdagh (Southwest), Badghyz. Iranian species.
- Menemerus marginatus* (Kroneberg, 1875). Sultanbent, Repetek. Irano-Turkestanian species (northwestward to Nakhichevan).
- Mogrus antoninus* Andreeva, 1976. Kopetdagh (Southwest and Central), Ashkhabad, Badghyz. Irano-Turkestanian species.
- M. valerii* Kononenko in Andreeva, Kononenko, et Proczynski, 1981. Repetek. Turanian desert species.
- Pellenes epularis* (O. Pickard-Cambridge, 1872). Exact locality in Turkmenistan is not published (A. Nenilin, personal notes). East Mediterranean species.
- P. limbatus* Kulczynski, 1895. Ashkhabad (Berzengi), Badghyz. Turkestan-Siberian species.
- P. kulabicus* Andreeva, 1976. Ashkhabad, Badghyz. Irano-Turkestanian species.
- P. nigrociliatus* (L. Koch, 1875). Kopetdagh (Southwest). European-Mediterranean and Japanese (possibly Trans-Palaearctic) species.

- P. simoni* (O. Pickard-Cambridge, 1872). Exact locality in Turkmenistan is not published (A. Nenilin, personal notes). East Mediterranean species.
- P. tripunctatus* (Walckenaer, 1802). Kopetdagh (Southwest). European-Siberian species.
- Philaeus chrysops* (Poda, 1761). Kopetdagh (Southwest and Central), Ashkhabad, Serakhs, Badghyz. European-Ancient Mediterranean species (eastward to Sinkiang).
- Phlegra fasciata* (Hahn, 1826). Kopetdagh (Southwest). Ancient Mediterranean species (eastward to Sinkiang).
- P. sogdiana* Charitonov, 1946. Kopetdagh, Kugitang. Irano-Turkestanian species.
- Plexippoides starmuehlneri* (Roewer, 1955). Murghab Oasis. Iranian species.
- Plexippus coccineus* Simon, 1902. Kopetdagh (Southwest and Central), Badghyz. Ancient Mediterranean (Caucasian-Iranian?) species.
- P. setipes* (Karsch, 1879). Krasnovodsk. Paleotropical species (from Turkestan to Vietnam).
- Pseudicius cinctus* (O. Pickard-Cambridge, 1872).
- P. vittatus* Simon, 1889. Krasnovodsk, Kopetdagh (Southwest), Badghyz, Murghab Oasis, Sary-Yazy, Repetek. Irano-Turkestanian species (eastward to Sinkiang).
- P. spasskyi* Andreeva, Heçjak et Proczynski, 1984. Krasnovodsk, Murghab District. Irano-Turkestanian species.
- Salticus tricinctus* (C.L. Koch, 1846). Krasnovodsk, Badghyz (Kushka). East Mediterranean species.
- Sitticus caricis* (Westring, 1861). Farab. European-Siberian (?) species.
- S. distinguendus* (Simon, 1868). Krasnovodsk, Kopetdagh (Central), Repetek. European species.
- S. karakumensis* Logunov, 1992. Badghyz, Repetek. Turanian desert species.
- S. terebratus* (Clerck, 1757). Locality in Turkmenistan is not published (Proczynski 1991). European-Siberian (?) species.
- S. zimmermanni* (Simon, 1877). Kopetdagh (Southwest). European species.
- Synageles charitonovi* Andreeva, 1976. Murghab Oasis. Irano-Turkestanian species.
- S. hilarulus* (C. L. Koch, 1846). Exact locality in Turkmenistan is not published (Azheganova 1968). European species (Proczynski 1991).
- S. ramitus* Andreeva, 1976. Badghyz. Irano-Turkestanian species (eastward to Mongolia).
- Thyene imperialis* (Rossi, 1846). Kopetdagh (Southwest), Sharlouk, Sultanbent, Gasan-Kuli. Mediterranean-Paleotropical species.
- Yllenus albocinctus* (Kroneberg, 1875). Deinau. Caucasian-Mongolian species.
- Y. auspex* (O. Pickard-Cambridge, 1885). Repetek. Turan-Mongolian desert species.
- Y. bajan* Proczynski, 1968. Krasnovodsk, Repetek. Turan-Mongolian desert and steppe species.
- Y. hamifer* Simon 1895.

*Y. flavociliatus* Simon, 1895.

"Southern Turkmenistan," Repetek. Turan-Mongolian desert and steppe species.

*Y. mongolicus* Proczynski, 1968. Repetek. Turan-Mongolian desert and steppe species.

*Y. univittatus* Simon, 1871. Sultanbent, Repetek. Ancient Mediterranean species.

*Y. validus* Simon, 1889. Badghyz, Bairam-Ali (= Old Merv), "Bewüste Murghab." Irano-Turkestanian species.

*Y. vittatus* Thorell, 1875. Kaplankyr. Mediterranean species.

### Zoogeographic Connections of the Spider Fauna of Turkmenistan

The spider species listed above belong to a wide assemblage of genera and families with various ecological requirements. Due to their adept dispersal abilities (including the well-known "ballooning" of young spiderlings on silk threads), spiders commonly are not believed to be a very useful group of animals for a zoogeographic analysis. Nevertheless, we can detect certain patterns in their distribution within Turkmenistan and thus, will attempt to reveal zoogeographic connections of the local araneofauna. Of course, these conclusions will be subject to change when more knowledge is gained about distribution of spider species.

More than half of the entire faunal list (184 species, or 54.9%) comprises spiders whose range within the Palearctic Realm is limited to one or a few biogeographic provinces. These species can be classified into several faunistic complexes which show current species distribution (and may also reflect centers of origin).

*Iranian and Caucasian-Iranian species.* Within Turkmenistan, these species are found in Kopetdagh (including Badghyz). Iranian species (38 spp., or 11.3% of the fauna) are *Phyxioschema raddei*, *Nemesia birulai*, *Raveniola fedotovi*, *R. kopetdaghensis*, *R. redikorzevi*, *Filistata* sp., *Ceratopholcus maculipes*, *Pholcus nenjukovi*, *Dysdera transcaspica*, *Palpimanus sogdianus*, *Hersiliola afghanica*, *H. sp.*, *Pelecopopsis paralleloides*, *Cedicus ephthalitus*, *C. gennadii*, *C. parthus*, *C. maerens*, *Agyneta kopetdaghensis*, *Diplocephalus bifurcatus*, *Erigonoplus ninae*, *Lepthyphantes turanicus*, *Mecopisthes orientalis*, *Mesaspigone mira*, *Hahnina* sp., *Titanoeca lehtineni*, *Zodarion proszynskii*, *Z. raddei*, *Drassodes proximus*, *D. sp.*, *Berlandina* sp., *Minosiella intermedia*, *Prodidomus redikorzevi*, *Pterotricha strandi*, *Synaphosus* sp., *Talanites dunini*, *T. fagei*, *Menemerops afghanus*, and *Plexippoides starmuehlneri*. The five Caucasian-Iranian species are *Aulonia kratochvili*, *Tarentula bergsoei*, *Pardosa pontica*, *Pisaura novicia*, and *Micaria kopetdaghensis*.

*Irano-Turkestanian Species.* These spiders are more widely found than Iranian

ones and inhabit mountains and foothills of Middle Asia (including Chinese Turkestan), Afghanistan, and Iran. This group includes 36 species (10.7% of the fauna): *Pritha crosbyi*, *Scytodes strandi*, *Oecobius nadiæ*, *O. tadzhicus*, *Oxyopes takobius*, *Eusparassus ocellatus*, *Olios sericeus*, *Alioranus avanturus*, *Metellina kirgisisca*, *Araneus spasskyi*, *A. tartaricus*, *Argiope ahngerii*, *Gnaphosa haarlovi*, *G. kuldzha*, *Nomisia conigera*, *Tarentula cursor cursorioides*, "*Oxyptila*" *lugibris*, *Psammittis turanicus*, *Stiphropus strandi*, *Xysticus kaznakovi*, *X. lapidarius*, *X. minor*, *Mesiotelus kulczynskii*, *Aelurillus andreevae*, *Chalcoscirtus martensi parvus*, *Langona tartarica*, *Menemerus marginatus*, *Mogrus antoninus*, *Pellenes kulabicus*, *Phlegra sogdiana*, *Pseudicicus cinctus*, *P. spasskyi*, *Synageles charitonovi*, *S. ramitus*, and *Yllenus validus*. Some Turkestanian species, such as *Dysdera kugitangica*, *Metellina kirghizica*, *Lepthyphantes escapus*, *L. kuhitangensis*, and *Mesasigone mira*, are found in Turkmenistan only in the Kugitang mountains (an offspur of the Pamiro-Alai range). Three species, *Thanatus imbecillus*, *Heriaeus spinipalpus*, and *Aelurillus concolor*, are found from the Caucasus to Turkestan.

*European and European-Caucasian Species.* These are spiders of mesophilic habitats; in Turkmenistan, they are found only in the mountains of Kopetdagh, which often represent the easternmost limit of their distribution. The European group includes 16 species (4.8% of the fauna): *Enoplognatha thoracica*, *Donacochara speciosa*, *Gongylidiellum murcidum*, *Oedothorax apicatus*, *Walekenaria monoceros*, *Anyphaena accentuata*, *Echemus angustifrons*, *Scotophaeus scutulatus*, *Clubiona alpicola*, *Zora nemoralis*, *Z. silvestris*, *Philodromus fallax*, *Oxyptila sanctuaria*, *Sitticus distinguendus*, *S. zimmermanni*, and *Synageles hilarulus*. Spiders of the European-Caucasian group include five species: *Araniella inconspicua*, *Zilla diodia*, *Archaeodictyna ammophila*, *Brigittea latens*, and *Titanoeca tristis*.

*East Mediterranean Species.* This small group includes 11 species: *Latrodectus pallidus*, *Micaria albimana*, *Archaeodictyna consecuta*, *Orthobula charitonovi*, *Micaria septempunctata*, *Oxyptila tricoloripes*, *Monaeses israelensis*, *Heliophanus curvidens*, *Pellenes epularis*, *Pellenes simoni*, and *Salticus tricinctus*. Their range extends from the Middle East to Kopetdagh but not further eastward.

*Turanian Desert Species.* These species inhabit the lowland deserts of Karakum and Kizylkum in Middle Asia, may penetrate into semidesert foothills but are not found in mountainous habitats. Some of these species are adapted to sand desert habitats and are specialized psammophiles (e.g., *Sitticus karakumensis*); many inhabit rodent burrows (e.g., *Minosiella intermedia*, Krivokhatsky and Fet 1982). The Turanian desert group, which includes 58 spp., or 17.3% of the total fauna, comprises the following: *Artema transcaspica*, *Dysdera aculeata*, *D. limitanea*, *D. pocoeki*, *Hersiliola* sp., *Janetschekia necessaria*, *Lepthyphantes badkhyzensis*, *L. turkestanicus*, *Pelecopsis laptevi*, *Trachelocampus asiaticus*,

*Aculepeira sogdiana*, *Araneus repetecus*, *A. tedgenicus*, *Hypsosinga turkmenica*, *Larinia nenilini*, *L. pubiventris*, *Zygiella caspica*, "*Arctosa*" *cereipes*, *Tarentula radleki*, *Arctosa soror*, *Evippa badchysica*, *E. schenkeli*, *E. turkmenica*, *Lycosa alticeps*, *Wadicosa commoventa*, *Devade tenella*, *Dictyna cronebergi*, *Dictynomorpha strandi*, *Coelotes charitonovi*, *Oxyopes badhyzicus*, *O. maracandensis*, *Zodarion sychevskayae*, *Asiabadus asiaticus*, *Berlandina afghana*, *B. caspica*, *Drassodes jakkabagensis*, "*D.*" *flavomaculatus*, "*D.*" *thimei*, *Gnaphosa turkmenica*, *Minosia karakumensis*, *Synaphosus* sp., "*Talanites*" *aculeatus*, "*T.*" sp., *Theuma walteri*, *Zelotes aerosus*, *Z. arnoldii*, *Z. bucharensis*, *Heriaeus buffonopsis*, *H. fedotovi*, *Xysticus caspicus*, *X. concinnus*, *Aelurillus ater*, *Heliophanus niveivestis*, *H. turanicus*, *Mogrus valerii*, and *Sitticus karakumensis*. Related to this group are Turanian-Mongolian spiders that are found also farther to the east, in Mongolian deserts (*Xerolycosa brunneopicta*, *Yllenus auspex*, *Y. bajan*, *Y. hamifer*, and *Y. mongolicus*), as well as *Hippasa partita*, which ranges from the Sahara Desert to the Sind, and *Evippa onager*, which is found from the Sind to Turan.

Our approximation shows that faunistic complexes of spiders found in Turkmenistan are roughly divided into mountain semiarid and humid fauna (species with European, European-Mediterranean, Iranian, Irano-Turkestanian and related types of ranges) and arid fauna of lowland deserts (species with Turanian and related types of ranges).

The remainder of the araneofauna (150 spp., or 44.8%) includes spider species which are broadly distributed within the Palearctic Realm or even more broadly. Several Holarctic species, spiders with Paleotropical connections, and a few cosmopolitan species are found in Turkmenistan. The majority of broadly distributed species are, however, those of the southern Palearctic, or so-called Ancient Mediterranean area, with all kinds of ranges, often including Europe or its southern part. Most of these species in Turkmenistan are found only in the mountains but not in the Karakum Desert. These include, for example, Mediterranean or European-Mediterranean species *Atypus muralis*, *Scytodes bertheloti*, *Dysderina loricata*, *Enoplognatha testacea*, *Agyneta resslis*, *Lepthyphantes pinicola*, *Sphecozone romana*, *Trichoncoides piscator*, *Agalenatea redii*, *Araneus angulatus*, *A. armida*, *Larinioides folium*, *Mangora acalypha*, *Neoscona subfusca*, *Titanoeca albomaculata*, *T. veteranica*, *Pisaura mirabilis*, *Tarentula albofasciata*, *Arctosa variana*, *Lycosa nordmanni*, *L. radiata*, *Pardosa italica*, *P. morosa*, *P. nebulosa*, *Cheiracanthium mildei*, *C. seidlitzii*, *Mesiotelus tenuissimus*, *Phrurolithus pullatus*, *Haplodrassus dalmatensis*, *Aphantaulax seminigra*, *Micaria romana*, *Nomisia aussereri*, *Zelotes caucasicus*, *Z. pumilus*, *Paratibellus oblongiusculus*, *Philodromus lepidus*, *Runcinia lateralis*, *Synema plorator*, *Xysticus caperatus*, *X. kochi*, *X. marmoratus*, *X. ninnii*, *Oxyopes lineatus*, *Aelurillus affinis*, *A. m-nigrum*, *Ballus chalybeius*, *Chalcoscirtus infimus*, *Eris nidicolens*, *Leptorchestes berlinensis*, and *Yllenus vittatus*. All these spiders are mesophilic or xeromesophilic, but definitely not adapted to extreme desert conditions. Their dispersal must have been prevented by deserts in at least the last two or three million years. Thus, whatever the origin of a broadly

distributed species, it must have migrated through the mountains of Middle Asia in order to disperse along the southern Palearctic region.

In Turkmenistan, mountains and desert are divided only by a narrow (10 to 20 km) belt of the arid foothills. The biogeographic border between the Mediterranean-type mountains of Kopetdagh and the lowland continental desert of Karakum is one of the best expressed (and least studied) ecological and biogeographic boundaries that exists on the earth (Kryzhanovsky 1965). Over its geological history, Kopetdagh could have served as a biogeographic corridor for spider dispersal. In the Late Oligocene-Miocene (25 to 10 million years ago), reduction of the ancient Tethys Sea revealed an island/peninsular chain from the modern Balkans to the Armeno-Iranian Plateau. This chain was a natural corridor for dispersal (Kryzhanovsky 1965), as many island chains are today (e.g., the Antilles or Sunda Islands). With aridization continuing from the Eocene through the Oligocene, landscapes gradually changed. By the Miocene-Pliocene (from 5 to 2 million years ago), the mountain uplift and receding Tethys Sea aridization separated deserts of Middle and Central Asia from those of Sind, the Middle East, and North Africa and promoted the vicariant speciation on desert lowlands. However, the mountain chains of Zagros, Elburz, and Kopetdagh still could have served as effective dispersal routes. The sublatitudinal position of this uplifting mountain chain suggests that migrations of animals through it eastward or westward was not limited by latitudinal climatic changes (a common problem in such well-known dispersal cases as, for example, North/South American exchange). Moreover, the altitudinal zonation in mountains allowed dispersal of ecologically different animals migrating within specific mountain belts. Located between northern and southern deserts of Asia, these mountains could house mesophile fauna which could not survive aridization of adjacent lowlands.

In the Pleistocene (less than one million years ago), the Iranian mountain corridor undoubtedly was a site of constant dispersal and, probably, also of local speciation. Many local endemic species probably are of this age, especially plant species (Kamelin 1970, 1979). Transgressions of the Proto-Caspian Sea periodically returned these desert mountains to the island condition.

During the recent glaciation (16,000 to 10,000 years ago) this corridor could have been invaded by almost modern European and Asian "refugee" species. Then, a new aridization disrupted many ranges and effectively isolated European forest and meadow species in mountain valleys such as the Aidere Valley in Southwest Kopetdagh. Spider fauna in walnut and elm forests of this magnificent (ca. 30 km long) gorge bears strong European features and includes mesophile species of such genera as *Anyphaena*, *Echemus*, *Aulonia*, *Mesiotehus*, *Walckenaeria*, *Zora*, *Zelotes*, and *Clubiona*.

Extensive local vicariant speciation (well demonstrated, for example, in numerous plant genera) along mountain systems from the Caucasus to Turkestan is observed also in spiders. For instance, a mygalomorph genus *Raveniola* Zonshtein, 1987 inhabits mountain forests at elevations above 1,000 m and has several vicariant species from Georgia to the Himalayas, including *R.*

*kopetdaghensis* from Southwest and Central Kopetdagh (Fet 1984). Another example is spider genus *Zodarion*, which has numerous endemic species throughout the Ancient Mediterranean area, with three species found only in Turkmenistan. Of these, *Z. raddei* is a very common ant-eating spider in all arid habitats, including sand desert (where it is one of the common inhabitants of rodent burrows; Krivokhatsky and Fet 1982), foothills (Krivokhatsky and Fet 1981; Fet 1983), and mountains (Fet 1985b). Two other species, *Zodarion proszynskii* and *Z. sytchevskayae* (Nenilin and Fet 1985), are vicariant in mountain valleys and desert foothills of Kopetdagh respectively. A third example of local vicariant speciation in Kopetdagh is a recently described (Fet 1993) subgenus *Paracedicus* belonging to the genus *Cedicus*. It includes two closely related species, *Cedicus (Paracedicus) ephthalitus*, which is found in the mountain valleys and humid meadows, and *C. (P.) gemadii*, found in semiarid mountain habitats.

Addressing the problem of local endemics (those of the Kopetdagh Mountains or Karakum Desert), we should remember that southern Palearctic spiders are still poorly studied. Within the Middle Asian republics of the former USSR, special araneological studies have been conducted only in Tajikistan and Turkmenistan; araneofauna of Uzbekistan, Kyrgyzstan, and Kazakhstan is poorly known, as are faunas of adjacent Afghanistan and, especially, Iran. In other areas of the Middle East and Central Asia, only faunas of Israel and India are known to some extent; no serious studies of spiders from Syria, Iraq, Pakistan, or Mongolia exist. Therefore, it is not practical to treat most spider species known presently only from Turkmenistan as endemics of local level. Mountain species may, in the future, be found within the Iranian or Turkestanian mountain systems, and desert spiders may turn out to be widespread Turanian desert elements. Nevertheless, examples from many other groups of animals and plants, some with good dispersal abilities, suggest that local endemism may be found among Turkmenistan spiders. As possible candidates for Kopetdagh endemics, we can list several species of the Iranian faunistic complex which are found so far only in the humid mountain forests of Kopetdagh: *Raveniola kopetdaghensis*, *Cedicus ephthalitus*, *Hahnia* sp., *Zodarion proszynskii*, *Erigonoplus ninae*, *Mecopisthes orientalis*, and *Drassodes* sp. A few spider species, discovered so far only in the sand desert of Karakum (e.g., *Sitticus karakumensis*, *Mogrus valerii*, *Cebrennus* sp., and "*Talanites*" sp.), may belong to the Karakum psammophile endemics, which are quite common in most groups of animals and plants. The narrow belt of sagebrush-covered, loess foothills of Turkmenistan that separates desert from the mountains may also have been a site of speciation in spiders. Among species found only in these habitats (including the hilly plateau of Badkhyz) are, e.g., *Nemesia birulai*, *Raveniola redikorzevi*, *Hersiliola* sp., *Pelecopopsis paralleloides*, *Cedicus maerens*, *Titanoecca lehtineni*, *Minosia karakumensis*, *Prodidomus redikorzevi*, and *Zodarion sytchevskayae*. Only from the salty depressions of Baghyz are known *Oxyopes badkhyzicus* and *Gnaphosa turkmenica*. The long and complicated geological history of landscapes of Turkmenistan has provided a diverse arena

for differentiation of all ecological forms of spiders, from psammophiles of sand desert to mesophiles of mountain meadows.

#### Acknowledgements

We thank all the people who contributed to spider collection and helped in the field trips in Turkmenistan, and, first of all, we give thanks to Gennady T. Kuznetsov, Svyatoslav I. Zabelin, Nina S. Ustinova, Lyudmila A. Mitroshina, Tamara M. Telyushenko, and Galina N. Fet. Rostislav A. Danov (1941–1993) and Yuri K. Gorelov were always helpful with their advice on natural history and biogeography as well as with their aid in field logistics. Identifications of many spider species were conducted or checked at different times by our colleagues Andrei B. Nenilin (1960–1986), Vladimir I. Ovtsharenko, Sergei L. Zonshtein, Alexei A. Zyuzin, Andrei V. Tanasevich, Yuri M. Marusik, Kirill Yu. Eskov, and Pyotr M. Dunin. Vladimir I. Ovtsharenko kindly helped to clarify recent synonymy of Gnaphosidae from Turkmenistan. We also thank for their constant support of our araneological studies Norman I. Platnick, Jerzy Proszynski, Gershon Levy, Pekka T. Lehtinen, Seppo Koponen, Alexander B. Lange, Yuri S. Balashov, Mikhail V. Heptner, Yaroslav I. Starobogatov, and Gary A. Polis.

#### Addendum to the List of Spiders of Turkmenistan

##### Fam. Dysderidae

- Dysdera brignolii* Dunin, 1989. Repetek. Turanian desert species.  
*D. kusnetsovi* Dunin, 1989. Central Kopetdagh. Iranian species.  
*D. nenilini* Dunin, 1989. Tuarkyr, Kaplankyr. Turanian desert species.  
*D. tystshenkoi* Dunin, 1989. Southwest Kopetdagh. Iranian species.  
*Harpactea parthica* Brignoli, 1980. Krasnovodsk. Iranian species.

##### Fam. Gnaphosidae

- Synaphosus karakumensis* Ovtsharenko, Levy et Platnick, 1994, Repetek. Turanian desert species.  
*S. palearecticus* Ovtsharenko, Levy et Platnick, 1994. Kopetdagh (Central), Ashkhabad, Badkhyz, Mary, Chardzhou, Amudarya Valley. Ancient Mediterranean species.  
*S. soyunovi* Ovtsharenko, Levy et Platnick, 1994. Sarykamysh, Tashauz Region. Turanian desert species.  
*S. turanicus* Ovtsharenko, Levy et Platnick, 1994. Kopetdagh (Central), Tashauz Region, Ashkhabad, Badkhyz, Mary, Repetek, Amudarya Valley. Iranian-Turanian species.

## 31. Fauna and Zoogeography of Scorpions (Arachnida: Scorpions) in Turkmenistan

VICTOR FET

#### Abstract

Scorpion fauna in Turkmenistan includes six genera and seven species of Buthidae, all belonging to the Saharo-Gobian (desert Palearctic) genera. *Mesobuthus eupeus*, *M. caucasicus*, and *Orthochirus scrobiculosus* are nearly ubiquitous and exhibit intraspecific variation; they are also widespread beyond the boundaries of Turkmenistan. Specialized Turanian sand desert genera include *Liobuthus kessleri* and *Anomalobuthus rickmersi*, and the endemic *Pectinibuthus birulai*. The last species, *Kraepelinia palpator*, is found in Turkmenistan only at salt lake shores (Yeroyulanduz Depression in the Badkhyz Reserve); it is also known from Iran. Scorpion fauna of lowland Turkmenistan is a combination of widespread Asian and endemic Turanian and Iranian desert elements. There are no endemic species in the mountains; only one species, *Mesobuthus eupeus*, is commonly found in Kopetdagh.

#### Introduction

The fauna of scorpions of the former Russian Empire/USSR (i.e., primarily that of Caucasus and Middle Asia) was reviewed by Birula (1911, 1917a,b) and Fet (1990). In preparing this paper, we used data on scorpion fauna and ecology of Turkmenistan and adjacent countries published by the author (Fet 1980, 1984, 1987a,b, 1990) and other researchers (Simon 1889; Pocock 1899; Radde 1899; Morits 1922; Shestoporov 1934, 1935; Pavlovsky 1934; Vlasov 1937a,b; Vachon 1958a,b, 1966, 1974; Sabirova 1977, 1981, 1986). The largest museum collections reviewed by the author included those of the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia) and the Zoological Museum of Moscow State University, Moscow, Russia). Detailed data on museum collections, complete synonymy of Turkmen species and subspecies of scorpions, and complete references have been published (Fet 1990).