

Venomous Spiders of Turkey (Araneae)

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Abstract

Over 50.000 species have been described on the world. Among them about 100 species are dangerous for human. Members of *Latrodectus* and *Loxosceles* share the habitats of human beings. Chemically, spider venom is heterogeneous, and contains poly peptide, poly amine, nucleic acid, free amino acid, monoamine, neurotoxin, enzyme and inorganic elements. In enzymes, proteases, hyaluronidase, sphingo-myelinase, phospholipase and isomerase form necrosis. Venom is neurotoxic, and it causes paralysis. In Turkey, some species of *Latrodectus*, *Steatoda*, *Loxosceles*, *Cheiracanthium*, *Segestria*, *Agelena*, *Tegenaria*, *Araneus* and *Argiope* are venomous. The specimens that collected from different habitats and localities of Turkey were examined under stereo microscope. They were identified as species level, and the venom organs of some spiders were investigated morphologically with the light and electron microscope.

Key words: Spider, Venom, Turkey, Araneae.

INTRODUCTION

About 50.000 species have been described on the world. All of the spiders have venom glands except the members of Uloboridae and Archaeidae. Preys of spiders are insects, other arthropods and invertebrates, and from vertebrates small fishes, frogs, lizards, birds and even mammals such as mice. Among spiders, nearly 100 species can affect human beings and big mammals with their venom. Envenomation with spider bites call as "araneism".

In spiders, the venom organs take place anterior of prosoma, and they consist of a pair of glands, a pair of fangs on apical of the chelicerae and a pair of canals that lie from the glands through the chelicera to the tip of the fangs [1, 2, 3].

Venomous species of *Latrodectus*, *Loxosceles*, *Phoneutria*, *Atrax* and *Hadronyche* share the habitats such as baths, toilets, garages, workshops, as well as living rooms [4]. They live also on or in fences, stack of woods, huts and walls [5,6].

Spider venom are mainly in two characters; neurotoxic and necrotoxic. Neurotoxins cause paralysis the nerves system in arthropods and vertebrates. Necrotoxins form ulcer and heavy destruction in the issue [7,8]. Also, the venom damages the muscle system and blood cells, cause breathe difficulty and death. Venom of some species is fifteen time effective than venom of a wiper. In addition, some venomous of spiders can leave and circulate for two years in human body.

Spider venom is chemically heterogeneous, and contains polypeptide, poly amine, nucleic acid, free amino acid, monoamine, neurotoxin, enzyme and inorganic elements. Among enzymes, protease, hyaluronidase, sphingo-myelinase, phospholipase and isomerase form necrosis [9,10,2].

The aim of this article is to explain the venomous spiders, and inform their habitats and distributions in Turkey.

MATERIAL AND METHODS

The specimens were collected from different habitats and localities in Northeast Blacksea Region, East Anatolia, Southeast Anatolia, Central Anatolia and Mediterranean Region in the period of 1993-2005. The specimens were examined under stereo microscope, identified as species level, and venom organs of some spiders were morphologically investigated with the light and electron microscope (SEM, TEM) [3,11,12,13]. Keys of Heimer and Nentwig [5], Roberts [6], Tyschenko [14] were used in identification. The specimens were preserved at the Zoological Research Laboratory of Kırıkkale University.

RESULTS

Venomous spider's groups of Turkey can be arranged as follow:

Black Widows (Theridiidae): The most venomous spider of the world is *Latrodectus mactans* (Fabricius, 1775) (Fig. 1). LD₅₀ is 0,05 mg/kg in mice (i.v.). It is a holarctic species. It has been seen in most of the Mediterranean countries but not yet in Turkey. Every year, many cattle have been lost by these spiders in Russian steppes. Its venom is neuro and cyto toxic. *L. tredecimguttatus* (Rossi, 1790) called as "Mediterranean black widow" has been recorded from İstanbul, Ankara, Adana, Mardin, Erciş and Kars (Fig. 2). LD50 is 0.013 mg/mice (13-17 g), 0.032 mg/rat (50-60 g). It shows Palaearctic distribution. This spider built its web on huts, coops, stacks of woods and stones. From steatods (spiders with globe abdomen) *Steatoda grossa* (Koch CL, 1838) (Fig. 3) and *S. paykulliana*

(Walckenaer, 1806) are dangerous. They can be seen in many places in Turkey.



Figure 1. *Latrodectus mactans*



Figure 2. *Latrodectus tredecimguttatus*



Figure 3. *Steatoda grossa*

Violin Spiders (Loxoscelidae): *Loxosceles rufescens* (Dufour, 1820) (Fig. 4). It is dangerous. It likes cellars huts; workshops etc., and go into shoes, boots and jump suit. Also, it is hided under cardboards, panels and pictures on walls. In North America, more than 80 percent of the spider bites are because of this species. The venom forms a button first. The swelling recedes and turns a reddish reaction area (lesion). Then it transforms a necrosis (gangrene, Fig. 5). This species was seen in Mardin, Muğla, Hatay and Elbistan (Kahramanmaraş). *L. reclusa* Gertsch & Mulaik, 1940 that distributed in North and South America, the Pacific Islands, Africa and some Mediterranean countries is more dangerous. Besides of necrosis its venom can cause haemolysis, disorder ness in coagulation and death. Dispersion of *L. rufescens* from the South America and Africa to the northern is by planes and ships.



Figure 4. *Loxosceles rufescens*

Foliage Spiders (Clubionidae): These spiders are mostly found in fallen foliage in gardens and fields. However, the most dangerous species *Cheiracanthium puncturium* (Willers, 1789) and *C. mildei* Koch L, 1864 (Fig. 6) live in or around houses. Like *L. rufescens* this species prefers cellars and workshops. It is attractive. Epidemiology of cheiracanthism looks like that of loxoscelism. In Gnaphosidae, the species *Nomisia aussereri* (Koch L, 1872) and in Liocranidae, the species *Liocranum annulipes* Kuczynski, 1897 are dangerous.



Figure 5. Gangrene



Figure 6. *Cheiracanthium mildei*

Hunter Spiders *Oxyopes lineatus* Latreille, 1806 (Lynx spider, (Oxyopidae); *Lycosa tarantula* (Linnaeus, 1758), *L. narbonensis* Latreille, 1806 and *L. singoriensis* (Laxmann, 1770) (The Mediterranean tarantulas, Fig. 7, are borrowing spiders, dig and live in vertical tubes in the ground, Lycosidae), *Pisuara mirabilis* (Clerck 1757) (Tent spider, Pisauridae); from the funnel spiders (Agelenidae) *Agelena labyrinthica* (Clerck 1757) (a cosmopolitan species, and can be seen all over Anatolia, Fig. 8), *A. gracilens* Koch CL, 1841, some *Histopona* species, *Tegenaria agrestis* (Walckenaer, 1802) (it is an attractive spider), *T. domestica* (Clerck, 1758) (House spider); also, the water spider *Argyroneta aquatica* (Clerck 1758) (Argyronetidae) are dangerous. Bites of *Tegenaria* cause typical necrosis.



Figure 7. *Lycosa singoriensis*



Figure 8. *Agelena labyrinthica*

Garden Spiders (Araneidae): *Araneus diadematus* Clerck 1757 (Garden spider, Fig. 9), *A. angulatus* Clerck 1757, *A. marmoreus* Clerck 1757; *Argiope lobata* (Palas, 1772) (Tiger spider), *Neoscona adianta* (Walckenaer, 1802), *Larinioides cornutus* (Clerck, 1758) and *L. folium* (Schrank, 1803). These species built vertical orb-webs between the branches of bushes and trees. Diameter of some webs is more than 1 meter. The spider is either in the central of the web or under a leaf near to the web.



Figure 9. *Araneus diadematus*

Crab and Jumping Spiders: *Heriaeus oblongus* Simon, 1918, *Misumena vatia* (Clerck, 1758), *Synaema plorator* Cambridge O.P, 1872 and *Thomisus onustus* Walckenaer, 1805 (from Thomisidae); *Tibellus oblongus* (Walckenaer, 1802) and *Thanatus striatus* Koch C.L, 1845 (from Philodromidae); *Heteropoda variegata* (Simon, 1874), *Micrommata virescens* (Clerck, 1757) (Green spider) and *Olios argelasius* (Walckenaer, 1805) (from Heteropodidae); *Philaeus chrysops* (Poda, 1761) and some species of *Phidippus* (from Salticidae); *Eresus cinnaberinus* (Olivier, 1789) (Ladybird spider, from Eresidae); *Pritha nana* (Simon, 1868) and *P. insidiatrix* (Foskoel, 1775) (from Filistatidae) are venomous and dangerous.

Six-eyed Spiders: *Segestria florentina* (Rossi, 1790) and *S. senoculata* (Linnaeus, 1758) (Fig. 10, from Segestriidae) were recorded from Muğla, İzmir and İstanbul; some species of *Dysdera* that leave under stones and logs in gardens and fields or in splits of walls are dangerous.



Figure 10. *Segestria senoculata*

DISCUSSION

It is recorded that venom of some spiders is effective fifteen times than venom of a wiper [15]. However, spider venom does not cause important destructions like that done by snake venom. This is because of smallness of spider and weak injection mechanism. For instance, while a black widow injects 0.02-0.03 mg (dry) venom, the long nosed wiper injects 20 mg, and the American rattlesnake injects 437 mg in one bite [16]. Because of the following causes spiders are not dangerous as far as scorpions and snakes: The chelicerae are too weak to pierce the skin of human (1), the venom injected is not enough for envenomation (2), most of spiders are not proud for biting human, they bite only in panic situation (3), most of the venom are not enough toxic for human they are effective for invertebrates (4), most of spiders live far from human habitats (5).

In many cases, because of the smallness the victim can not see the spider. So, it is hard to identify the spider in general. This situation can cause misperceiving. On the other hand, it is possible that mix each other the spider bites and other arachnids such as mite, bug and flea. For instance, according to Russell and Gertsch [17], from 600 suspected spider bites with local signs and symptoms, recorded by them 80 percent were bites by other arthropods (ticks, bed bugs, fleas, etc).

There is no research on venom of most species of spiders. Venom analysis of the limited species is known. Hundreds of species are need of analysis.

The spiders *Phoneutria fera* (Ctenidae, LD50 = 0.0009 mg/kg mice) and *Atrax robustus* (Dipluridae) which are very dangerous in the South and North America do not distributed in Turkey and the Palaearctic region [18].

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