Spiders (Arachnida: Araneae) from Libya and their Clinical effect on humans

Dr. Hoda M. Elmareme

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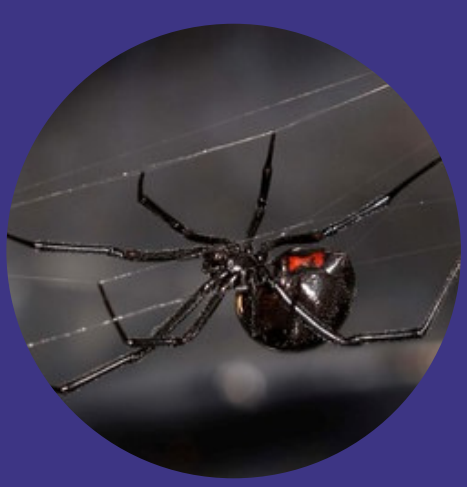
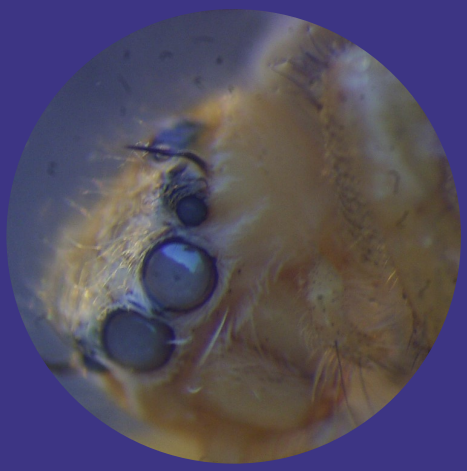



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Hoda M. Elmareme

Hoda Mohamed Elmareme obtained a Bachelor's degree in science in 1994, Master's degree in Biology in 2007 from April 7 University, Zawia, doctorate degree in zoology, environmental biology and biodiversity from the University of Degli Studi di Palermo - Italy - in 2016. She worked in the middle and higher education sector for twenty years and is currently working assistant professor in the Department of Zoology, College of Science, University of Tripoli, Libya. Her fields of research are the biodiversity and taxonomy of spiders and the medical importance of spiders and insects.

Author

Dedication

To my parents, my husband, sisters, and brothers.

Acknowledgment

This book would not have been possible without the collaborative efforts of a group of individuals, and we are particularly grateful to everyone who helped collect spiders from the study areas in northwestern Libya, and contributed to completing the identification of the specimens to the species level. Thanks are due to the people working in the laboratories in which the classification was done. The National Center for Disease Control (NCDC), Tripoli, Libya, the Zoology Department of University Degli Studi di Palermo – Italy, thanks to the doctors from the Department of Dermatology of the Tripoli Medical Center**,** and the Central Hospital of Tripoli**, and all thanks and gratitude to my family members and friends and to my colleagues at the University of Tripoli and the University of Zawia who had a role in contributing and providing great support without which this book would not have been implemented. Last, but certainly not last, All Gratitude to my country, Libya, which supported my education and studies until I reached this stage.**

CONTENTS

1

Biodiversity and systematic of spider fauna (Arachnida: Araneae) of the Libyan Northwest coast

Part: I. Biodiversity of spider fauna in Northwest coast of Libya

Spiders have been identified as a meaningful additional indicator taxon by the European Commission FP7-BioBio project (Targetti et al., 2012) not only because they represent the local micro-fauna richness well, but also because they are easy and cheap to sample, sensitive to changes (Cardoso et al., 2008), have little dispersal potential (New, 1999), are abundant and diverse (Foelix, 1996), represent differences in other species richness and diversity (Cardoso et al., 2008) and are recognized by stakeholders. Moreover, rigorous sampling protocols have just been set up (Cardoso, 2009) and locally adapted (Vedel & Lalagüe, 2013). Ecologically, spiders function as top predators of soil and lower vegetation communities (Cardoso et al., 2008) and are extremely diverse especially in tropical rain forest (Sørensen et al., 2002; Pinkus-Rendón et al., 2006; Coddington et al., 2009). The last integrative spider list for Libya is almost 100 years old (Zavattari, 1934).

This book is to establish a biodiversity and classification reference for the enable further studies which will set spider monitoring as an efficient "tool" for assessment and monitoring local biodiversity and clinical effect.

Spiders belong to Phylum (Arthropoda), Subphylum (Chelicerata), Class (Arachnida), Order (Araneae), (Barrion, & Litsinger, 1995; Astri & Leroy, 2000); they are common and distinctive organisms present in various ecosystems. Spiders are among the oldest animals on earth, where they have been known by the fossils of the species *Attercopus fimbriunguis* back to the Carboniferous period (400 million years ago), well before the appearance of flowering plants and flying insects, or before the emergence of amphibians (Herberstein, 2011). They differ from insects and other arthropods because their body is divided into two main parts: the cephalothorax (Prosoma) and the abdomen (opistosoma), and both regions are united by a pedicle. The region is covered by a carapace. The chelicerae are placed in the Prosoma, each of them having large parts containing venom glands. Also, spiders have four pairs of legs. Each leg has seven segments: the coxa or basal segment, followed by the trochanter, femur, patella, tibia, metatarsus and tarsus. The tarsus end in either two or three claws depending on the family, and use the middle claw to grasp the silk strand. Several types of specialized setae (hair) or macrosetae (spines) are found on the legs these include

long, fine sensory hair called trichobothria, which ordinates in sockets with multiple nerve endings. Most spiders have eight eyes arranged in two rows although some families are characterized by only six or even by only two eyes (Blets and Taylor, 1977; Schaible et al., 1986) and some cave dwelling species have lost their eyes altogether. They also differ for their small eyes known as ocelli; shape, number and arrangement of the ocelli on the head play a major role in the classification of the families (Kaston, 1972). The lower region of the abdomen is characterised by the epigynum, Colulus, the book lung opening, 6 to 8 spinnerets and the silk gland at the end of the abdomen, near the exit. The ventral side of the abdomen is marked near the front end by a curved transverse line – the epigastria fold. In the midline, just in front of this fold, are the genital openings. This area is inconspicuous in most adult males and in immature females, but in most adult females it is modified into a variably shaped, more or less sclerotized, structure called the epigynum. The pedipalp of the adult male and epigynum of the adult female are the single most important structures for identifying male and female spiders to species level (Fig.1).

http://biologyandbiodiversityinspiders.weebly.com

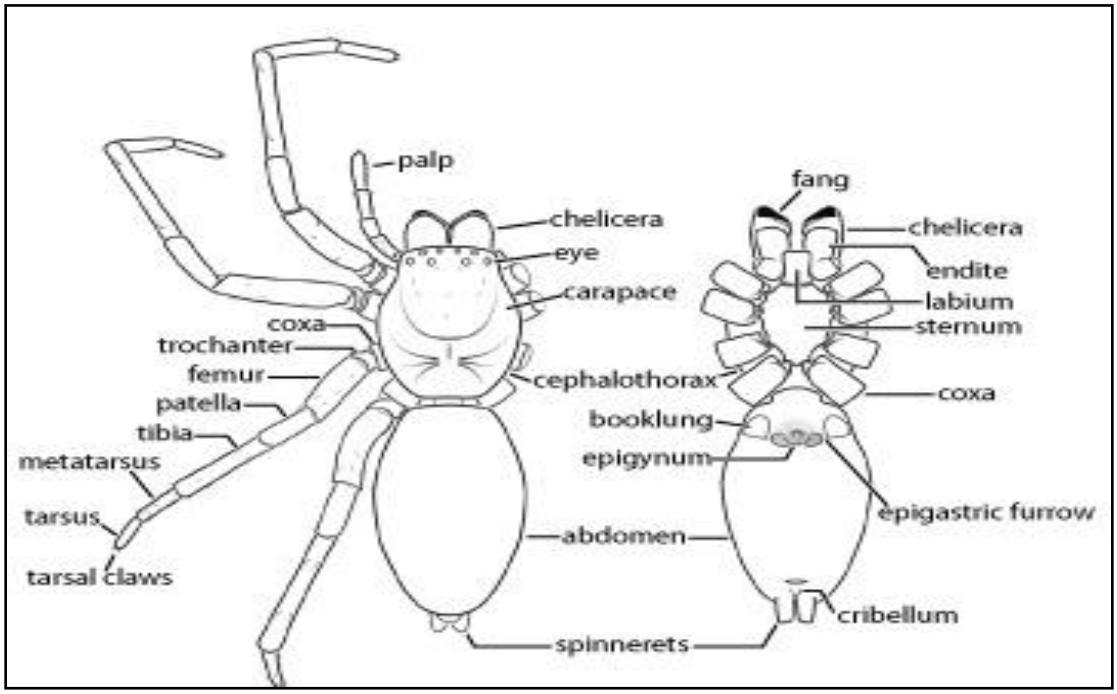
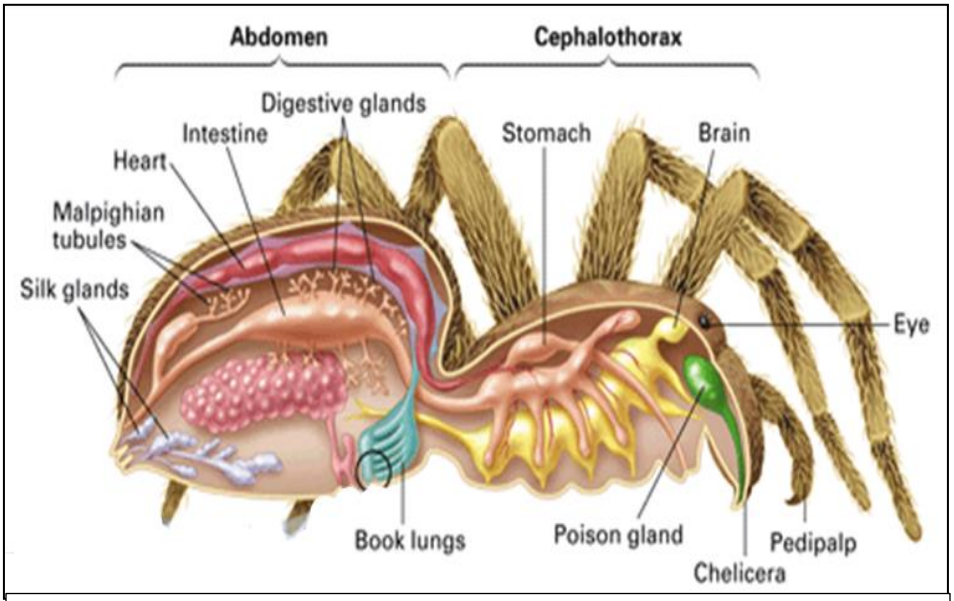


Fig. 1. External morphology of spider.

The internal spider anatomy was illustrated by Trotta, 2005; Dippenaar-Schoeman & Jocquè, 1997 (Fig. 2.). The cephalothorax contains the venom glands, nervous system and some of the digestive system. The abdomen contains the silk glands, reproductive system, the heart and the other part of the digestive system.

Body length ranges from approximately less than one millimetre in dwarf spiders to a length of 90 mm in *Tarantula* spp, the largest of them being the *Theraphosa leblondii* which lives in Guyana (Astri & Leroy, 2000). Geographically distribution, spiders are present in all continents except the Polar Regions, and the live in at different altitude, from sea level up to 6000 meters in the Himalayas. Most species of spiders are found in the tropical and temperate regions. They live mostly on land, but some species live near water basins and beaches. Young spiders disperse at low altitudes due to the movement of air which is called balloon operation. (Glick, 1939; Gertsch, 1949; Astri & Leroy, 2000). Can be said that it is present in all environments possible on the ground can be seen the fields, forests, swamps, caves and deserts, there is a species of spider spends most of his life under water, some of them live in houses, grain stores and remnants of buildings, (Astri & Leroy, 2000).



(small vertebrates | Brain and heart, Biology, Hive game (pinterest.com))

Fig. 2. Internal anatomy of a spider.

Spiders vary in size, shape and behaviour and all this makes classification difficult. Number, location and size of the spider eyes, genital structures, silk spinnerets, fangs, claws and chin are the most important in the classification of spider families. Spiders have the capacity and ability to weave webs with high engineering dexterity. The web is a spider home, refuge and source of nourishment. Spiders weave their webs in different shapes and dimensions, such as the funnel web, webs including silk hooks, or the orb web. In the same way, some spider species build a bed or a horizontal pavement on the web, from which they capture flying or jumping insects, Arthropoda predators against flying and crawling insects and some small vertebrates. As some spiders feed on other spiders, (females are stronger and larger than the males sometimes feed on males) (Foelix, 1996; Preston-Mafham et al., 2004). They're deft at hunting both with their home web and with their excellent day- and night-vision, injecting their venom in the preys' body, paralyzing and then killing them. Because of the nature of their nourishment, Spiders are beneficial to humans because they feed on pest insects that damage crops, also feed on flies and mosquitoes and other disease vector (Diaz, 2004).

Spiders play an active role in their diversity, classification and environmental adaptation and spiders' acclimatization with various ecosystems. Environmental climate conditions such as heat, humidity, cold and rain and living factors such as predators, killer parasites, pathogens and competition play an important role in natural equilibrium and the food chain. Spiders have distinctive and diverse behavior of mating. Mating begins when the male fills up with sperm the bulbs on his pedipalp and meets with a female. These bulbs act as reproductive organs. All spiders have separate sex internal fertilization and indirectly, where the male does not enter the sperm to the inside female body by the male member, but through pulps and transported the male to be pulps and through injection of sperm inside the female (Ruppert et al., 2004). The ways males and females seek and meet each other vary depending on species. Males usually move to find the females who sit waiting in the middle of the web. Female spiders don't usually kill the male as it is believed, but males commonly die soon after mating. In some species of spiders both male and female live peacefully on the same web, unlike other spiders such as the black widow. As far as the spiders' life cycle is concerned, females generally lay their eggs inside silk cocoons

which constitute a strong protection. Depending on species, the number of eggs contained in each cocoon varies, ranging between 100 and 300, but sometimes much less. The female usually dies after laying the eggs to become a source of protein-rich nourishment for the young. The eggs hatch accordingly to vital and environmental conditions. Young spiders mould a number of times depending on species. In most spiders, the duration of the life cycle varies from several months up to four years. Male spiders mature within a few months and usually die a few months later. Spiders have an important role in the ecological balance within the food chain and contribute to the reduction of the number of pest insects.

The spider web chemical composition raises scientific interest. In addition, some species of spiders, such as the black widow *Latrodectus mactans,* are venomous to humans. Spiders have the ability to adapt their life in accordance with the structure and function of the body, and can hunt their prey's day and night with great skill depending on body structure and by building a web.

Spider Taxonomy

Spider taxonomy is the alpha taxonomy of the spiders, members of the Araneae order of the Arthropoda class Arachnida with about 4,000 described species. However, there are likely many species that have escaped the human eye to this day. Many specimens stored in collections waiting to be described and classified. It is estimated that only one third to one fifth of existing species have been described. Arachnology currently divides spiders into two suborders with about 38 super families, and 111 families. Seven of the 111 families are their placement into super families are not agreed upon; several other families are not placed in any super family (Reiskind, 1965) (Gould, 1990; Platnick, 2009).

Spiders can be divided depending on the chelicerae movement and fang to two Infraorder: Mygalomorpha and Araneomorpha (Homann, 1985; Foelix, 1996).

Suborder: Mesothelae:

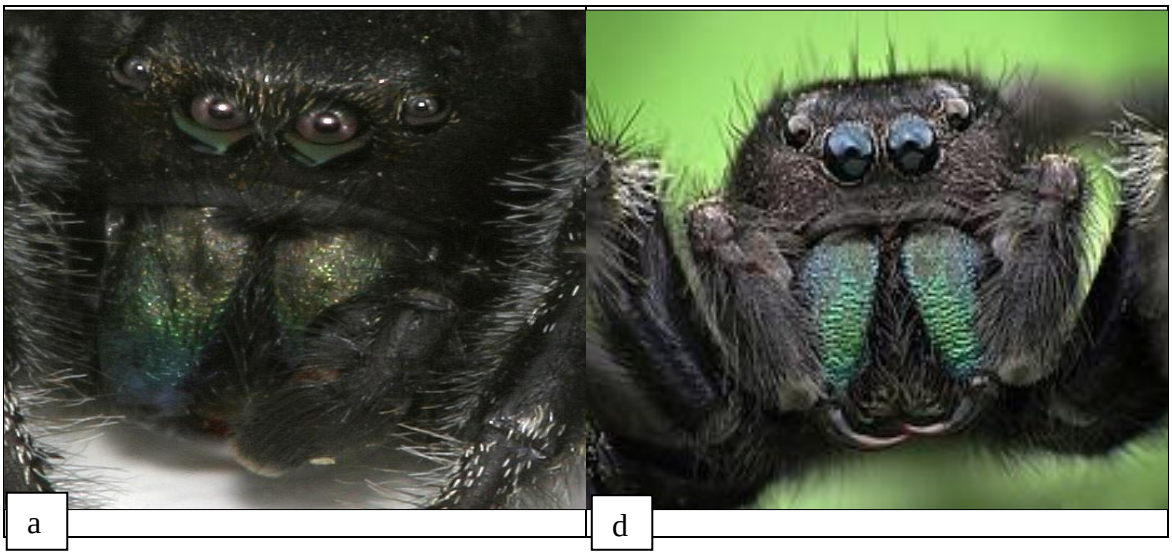
Mesothelae resemble the Solifugae ("wind scorpions" or "sun scorpions") in having segmented plates on their abdomens that create the appearance of the segmented abdomens of these other arachnids.

Suborder: Opisthothelae:

Suborder Opisthothelae contains the spiders that have no plates on their abdomens. It can be somewhat difficult on casual inspection to determine whether the chelicerae of members are of the sort that would put them into the infraorder of the Mygalomorpha (tarantulas) or the infraorder of the Araneomorpha (Jumping spiders).

Spiders in infraorder Mygalomorpha are characterized by the vertical orientation of their chelicerae and the possession of four book lungs (Fig. 3 a, b, c).

Infraorder Araneomorphae: Most, if not all, of the spider's one encounter in everyday life belong to this infraorder. It includes a wide range from the spiders that web weave, crab spiders, jumping spiders. They are characterized by having chelicerae whose tips approach each other as they bite, and (usually) having one pair of book lungs (Reiskind,1965) (Fig. 3 d, e, f).



a d

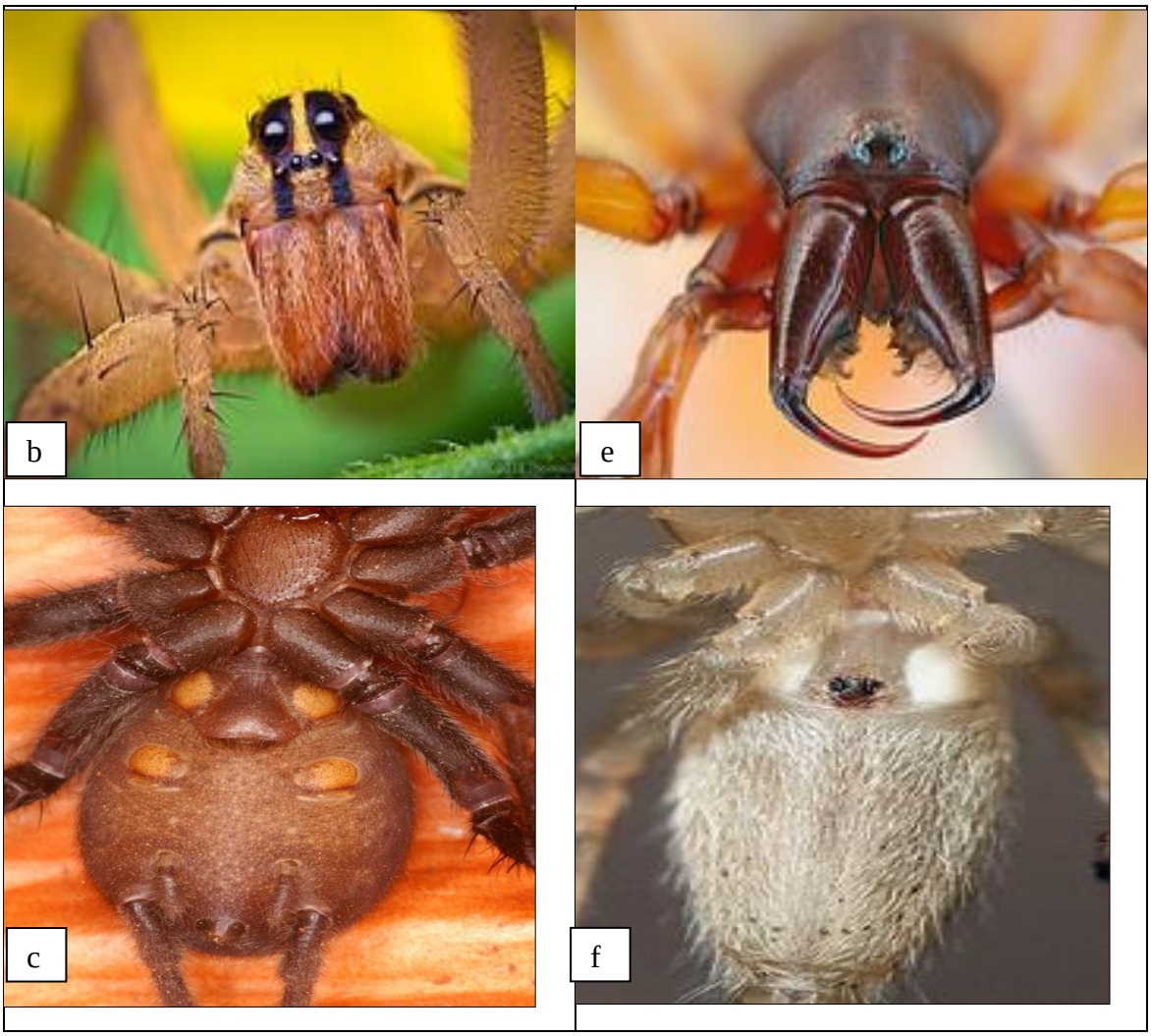


Fig. 3. Spider fangs and opening of book-lung; a, b, c Mygalomorpha: (Paraxial); d, e, f Araneomorpha: (Diaxial).

Materials and Methods

The sites and sampling were performed in 37 sites in Northwest coast of Libya at different season periods during one year (2005–2006). Name of sites are given to areas where samples were collected (Fig 4).

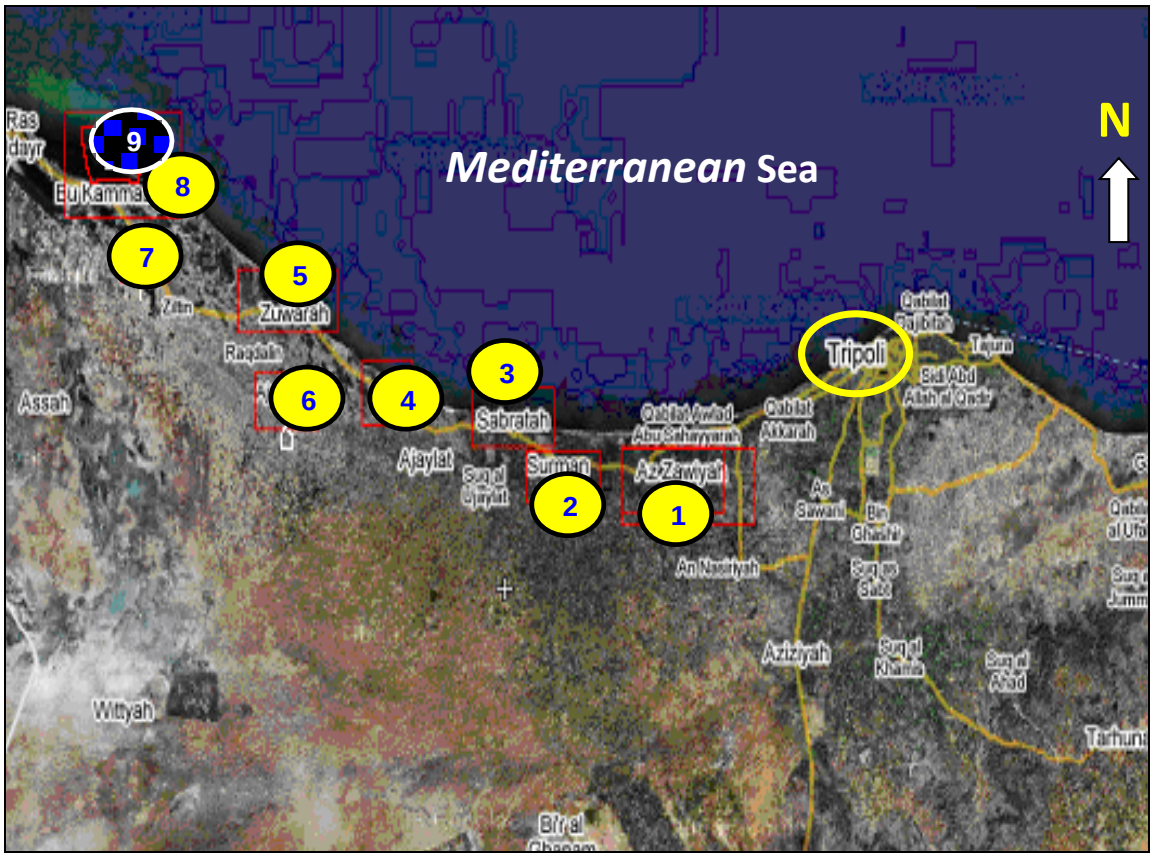


Fig. 4. Geographical location of the collection area, Libyan Northwest coast.

1.Goddaúm and Zawiya area. 2, 3, 4 - Surman, Sabratha and Mellita area. 5,6,7,8 - Zuwarah and Ibokmash area. 9 - Farwa Island. http://wikimapia/ #y = 32789584&x= 13131065&x.

Sampling protocol:

Collecting:

Given the diversity of spiders' living environments, this requires the following collection methods:

Hunting (Direct collection method)

This method by hand to collect visible spiders on trunk or on silk webs, Searching and combing under stones, under fallen tree leaves, between plants, in the remains of dilapidated furniture, and in cracks near water sources. If there are spider holes, they are dug with a shovel to extract the spiders from them. we can to try methods of hunting of

which: sweeping with a Net, Beating, Sieving, Bark-brushing. Uses a triangular (sweep net) for catching spiders inhabiting the low vegetation from 10 cm to 1.5 m.

In environments where there are trees to collect individuals living from 1.5 m to 2.5 m in the higher vegetation, A white piece of cloth (1 x 1.5 m) is used by spreading it under the tree and shaking it well so that the spiders fall into it and are collected. While when collecting web-building spiders, the spider is taken from, inside, or near the web in which it is located. When collecting nocturnal spiders, a light source is used to see them clearly. Spiders were also photographed in their environment using a camera, as well as some of the habitats and environments from which samples were collected that could be used in the classification process. All observations were recorded in a small notebook. A small booklet for spiders is also used to try to identify them while collecting them from their environments.

Trapping (Indirect assembly method)

Different active techniques were used in this method. Through it, spiders are thus equivalent to many hours of hand collecting. They also remain for several days or weeks and are therefore more vulnerable to the presence of terrestrial spiders, especially nocturnal ones. A number of methods can be used to trap spiders which may otherwise be elusive, depending on where the spiders are located such as: Pitfall Traps, Litter Traps, Artificial Traps, Bark Traps.

Pitfall traps are used, which are transparent plastic cups placed two inside the other inside a hole dug in the ground with an axe. Materials are placed in the cups to help preserve the samples to prevent their decomposition.

It is worth noting that creating a habitat for spiders is one of the best collection methods, especially for terrestrial spiders (such as placing an old, thick, damp cloth from a large mattress) in collection sites.

In order to collect maximum number of spiders from every ecological habitat stratum, different active techniques such as Pitfall traps were used. Active techniques consist of sampling spiders using a sieve for soil and the leaf litter, a triangular sweep net for catching

spiders inhabiting the low vegetation from 10 cm to 1.5 m, a beating tray to collect individuals living from 1.5 m to 2.5 m in the higher vegetation and by hand to collect visible spiders on trunk or on silk webs.

Preservation and identification:

Spiders were stored in labeled tubes containing 70-75% ethanol and 5% Glycerol- to keep the samples flexible so that they can be identified in the laboratory easy- after placed in plastic tubes of different sizes, or large glass containers for large samples.

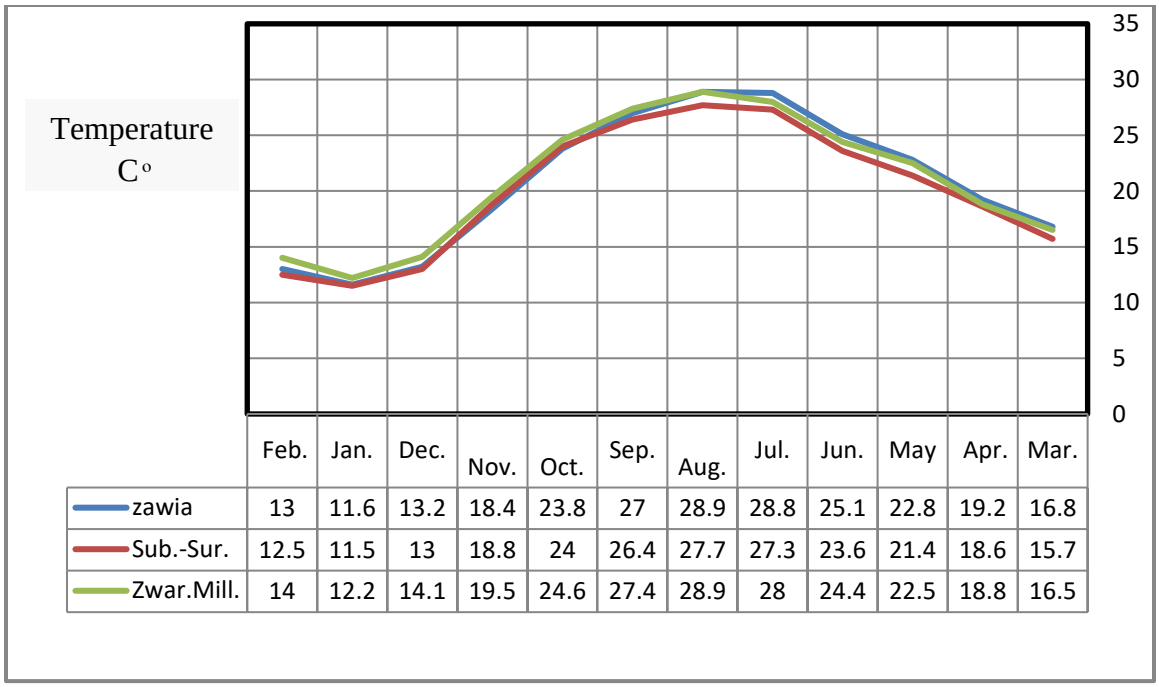
The data for the samples is written on the preservation tubes, which are: date. – Name of the collector – Collection method – Collection location – Collection time on sticky scraps using a pencil. As for the samples collected indirectly using ground traps, their contents are sorted and separated first, and spider samples are taken and preserved in the same manner as before.

Samples were identified to families and juveniles were separated individually. Data obtained were tabulated analyzed and photographed.

The samples were identified using a microscope with two lenses and a special light source, and another magnifying device with a special photographic camera, where the spider was placed in a petri dish containing distilled water to make its parts appear clearer, and special forceps for the process of classifying spiders according to their external characteristics using the following taxonomic references of which:

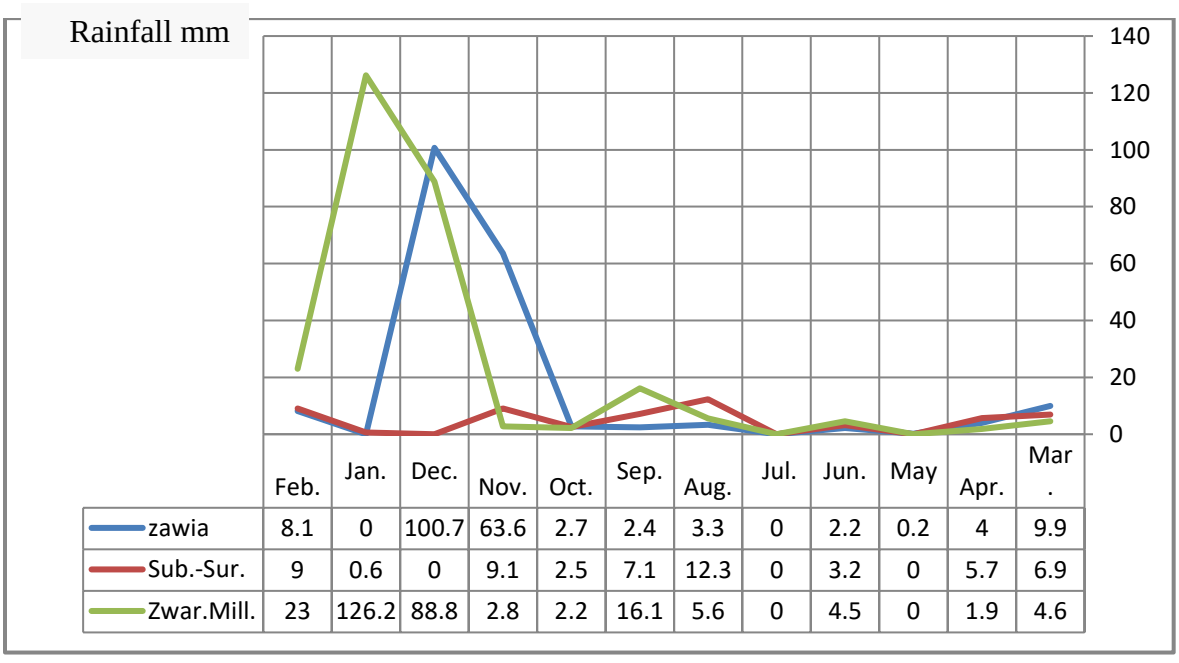
- Ragni Italiani Introduzione ai (Arachni by Araneae) Trotta (Trotta, 2005)
- Spiders of Britain and Northern Europe by Micheal J. Roberts (Roberts, 1996)
- Catalog World Spiders (catalog 2016)
- Astri & John Leroy Spider Watch In Southern Africa (Leroy, 2000)
- HHPS://araneae.nmbe.ch

During the collection period to samples air temperature was ranged from 12 C° to 28 C°, the average rainfall was from 5 mm in summer to 58 mm in winter, while the average relative humidity was 70 % during the four seasons. (Fig. 5-7).



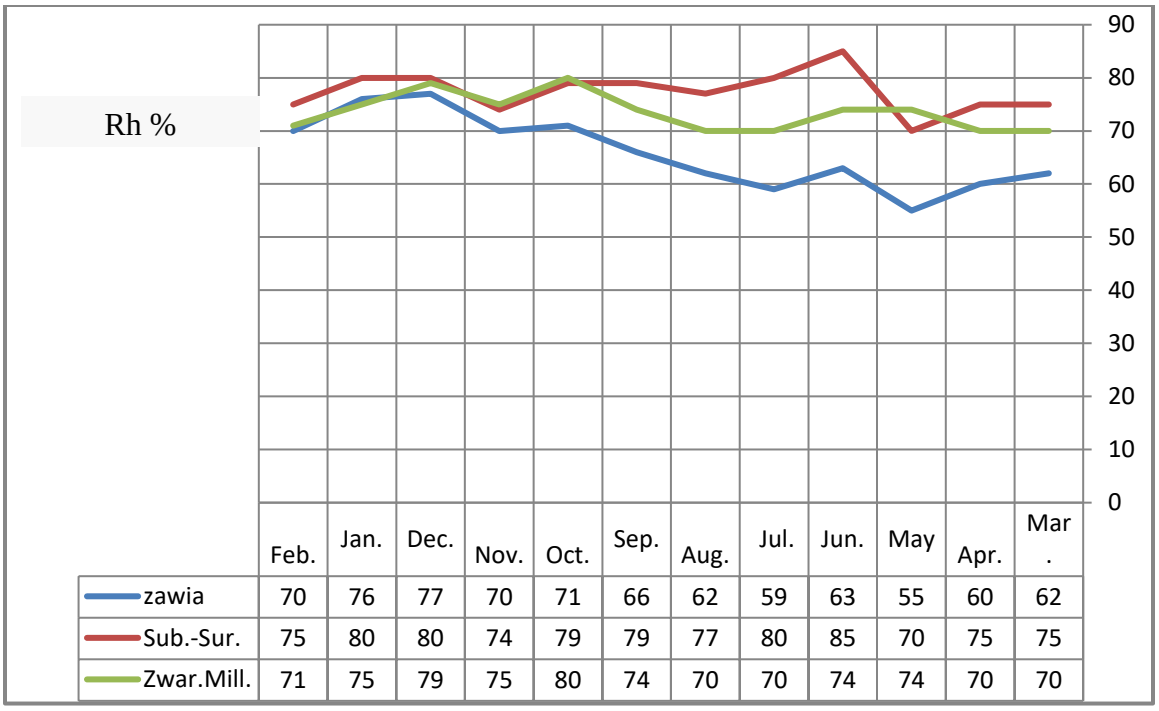
	Feb.	Jan.	Dec.	Nov.	Oct.	Sep.	Aug.	Jul.	Jun.	May	Apr.	Mar.
zawia	13	11.6	13.2	18.4	23.8	27	28.9	28.8	25.1	22.8	19.2	16.8
Sub.-Sur.	12.5	11.5	13	18.8	24	26.4	27.7	27.3	23.6	21.4	18.6	15.7
Zwar.Mill.	14	12.2	14.1	19.5	24.6	27.4	28.9	28	24.4	22.5	18.8	16.5

Fig. 5. Average temperatures °C March, 2005 – February, 2006.



	Feb.	Jan.	Dec.	Nov.	Oct.	Sep.	Aug.	Jul.	Jun.	May	Apr.	Mar.
zawia	8.1	0	100.7	63.6	2.7	2.4	3.3	0	2.2	0.2	4	9.9
Sub.-Sur.	9	0.6	0	9.1	2.5	7.1	12.3	0	3.2	0	5.7	6.9
Zwar.Mill.	23	126.2	88.8	2.8	2.2	16.1	5.6	0	4.5	0	1.9	4.6

Fig. 6. Average rainfall mm, March, 2005 – February, 2006.



	Feb.	Jan.	Dec.	Nov.	Oct.	Sep.	Aug.	Jul.	Jun.	May	Apr.	Mar.
zawia	70	76	77	70	71	66	62	59	63	55	60	62
Sub.-Sur.	75	80	80	74	79	79	77	80	85	70	75	75
Zwar.Mill.	71	75	79	75	80	74	70	70	74	74	70	70

Fig. 7. The average relative % humidity Rh March, 2005 – February, 2006.
The National Center for Meteorological air – Tripoli.

Results and Discussion

Total of 3335 spider specimens were collected. About 3280 specimens were identified to 35 families. Identification results are summarized in Table 2. Around 2513 females and 767 males were singled out. A number of males and juveniles could not be identified and therefore are not included in the families list. Data also showed that the families of Gnaphosidae, Lycosidae, Theridiidae, Salticidae, Araneidae and Pholcidae were represented by higher numbers of specimens than the others. The results revealed the presence of Dipluridae, Idiopidae and Oxyopidae from Mellita-Zuwarah and Ibokmash only. Oonopidae and Hahniidae were recorded in Sabratha-Surman habitats. The existence of Prodidomidae was mainly in Zawiya (Table 2).

Libyan spider fauna for the period between 1879-1928 was gathered by the Italian scientist Zavattari in 1934 in his book "The group list of animal fauna in Libya" showing the presence of 22 family and nearly 84 genus, 161 species in areas of the east coast, central and south of the country (Table 1). This indicates that the compatibility of the spread of this group of spiders in the country's regions and environments except the two families Uoroctidae and Palpimanidae (Zavattari, 1934 Currently there are 308 species and nearly 37 families in Libya (https://araneae.nmbe.ch/biodiversity/countrylist). This indicates that the distribution agreement of this group of Families spiders in the regions, with the exception of the nine families: Cithaeronidae, Corinnidae, Palpimanidae, Phrurolithidae, Pisauridae, Selenopidae, Sparassidae, Theraphosidae, Titanoecidae were not found in the results in this work.

Table 1. Spider families, genus and species identified from East coast, central and south of Libya.

Family	**Genus**	**Species**	**Family**	**Genus**	**Species**
Uloboridae	1	1	Uoroctidae	1	1
Dictynidae	3	3	Hersiliidae	1	2
Oecobiidae	1	2	Pholcidae	3	4
Eresidae	2	2	Theridiidae	8	11
Filistatidae	1	2	Argiopidae	9	19
Sicariidae	2	4	Thomisidae	8	11
Dysderidae	1	5	Clubionidae	9	16
Prodidomidae	1	1	Agelenidae	3	4
Gnaphosidae	13	36	Lycosidae	3	15
Palpimanidae	1	1	Oxyopidae	1	2
Zodariidae	1	3	Salticidae	11	16
Total			**22**	**84**	**161**

Table 2. Total number of spider families collected from Northwest Libyan coast line.

Areas / Family	Zawiya	Surman and Sabratha	Mellita and Zuwarah	Farwa Island	Total
Agelenidae	67	7	3	1	78
Amaurobiidae	13	2	1	0	16
Araneidae	218	61	26	49	354
Clubionidae	41	3	3	7	54
Desidae	27	0	0	2	29
Dictynidae	6	0	0	0	6
Dipluridae	1	0	3	0	4
Dysderidae	16	5	6	0	27
Eresidae	13	4	2	0	19
Filistatidae	7	26	2	0	35
Gnaphosidae	195	69	115	33	412
Hahniidae	0	1	0	0	1
Heteropodidae	32	26	4	5	67
Hersiliidae	22	12	2	0	36
Idiopidae	0	0	1	0	1
Linyphiidae	91	9	14	3	117
Liorcranidae	1	0	0	0	1
Lycosidae	278	102	19	20	419
Cheiracanthiidae	34	2	0	0	36
Oecobiidae	106	31	14	1	152
Oonopidae	0	1	0	0	1
Oxyopidae	0	0	4	0	4
Pholcidae	89	60	15	0	164
Philodromidae	46	26	5	0	77
Prodidomidae	2	0	0	0	2
Salticidae	284	67	45	22	418
Scytodidae	5	11	12	0	28
Segestriidae	0	0	0	1	1
Sicariidae	30	26	3	0	59
Theridiidae	211	115	42	4	372
Thomisidae	77	21	15	27	140

Areas / Family		Zawiya	Surman and Sabratha	Mellita and Zuwarah	Farwa Island	Total
Titanoecidae		0	0	3	0	3
Tetragnathidae		45	13	0	0	58
Uloboridae		73	5	0	0	78
Zodariidae		1	8	2	0	11
Total		2031	713	361	175	3280
Maturity	A.	1246	371	160	57	1834
	Y.	785	342	201	118	1446
Sex	♂	503	158	76	30	767
	♀	1528	555	285	145	2513

Mygalomorpha

Dipluridae (Funnel web spiders)

Four samples were collected of Zawiya (1) in spring, Mellita (3). The family Dipluridae occurs Worldwide and is represented by 24 genera and 188 species in four subfamilies. (Platnick, 2015). Small to large (3.5- 22 mm) mygalomorpha spiders with three claws, and lacking abdominal tergites, by rastellum, and claw tufts; endites small and lack of cupules; thoracic furrow longitudinal or a shallow to deep pit; four spinnerets (fig.8); PLS at least 3/4 length of carapace, distal article of PLS digitiform. Live in ground webs of irregular flattened tubular retreats and sheets largely or wholly hidden under rocks, moss mats or other materials. (Upick et al., 2005).

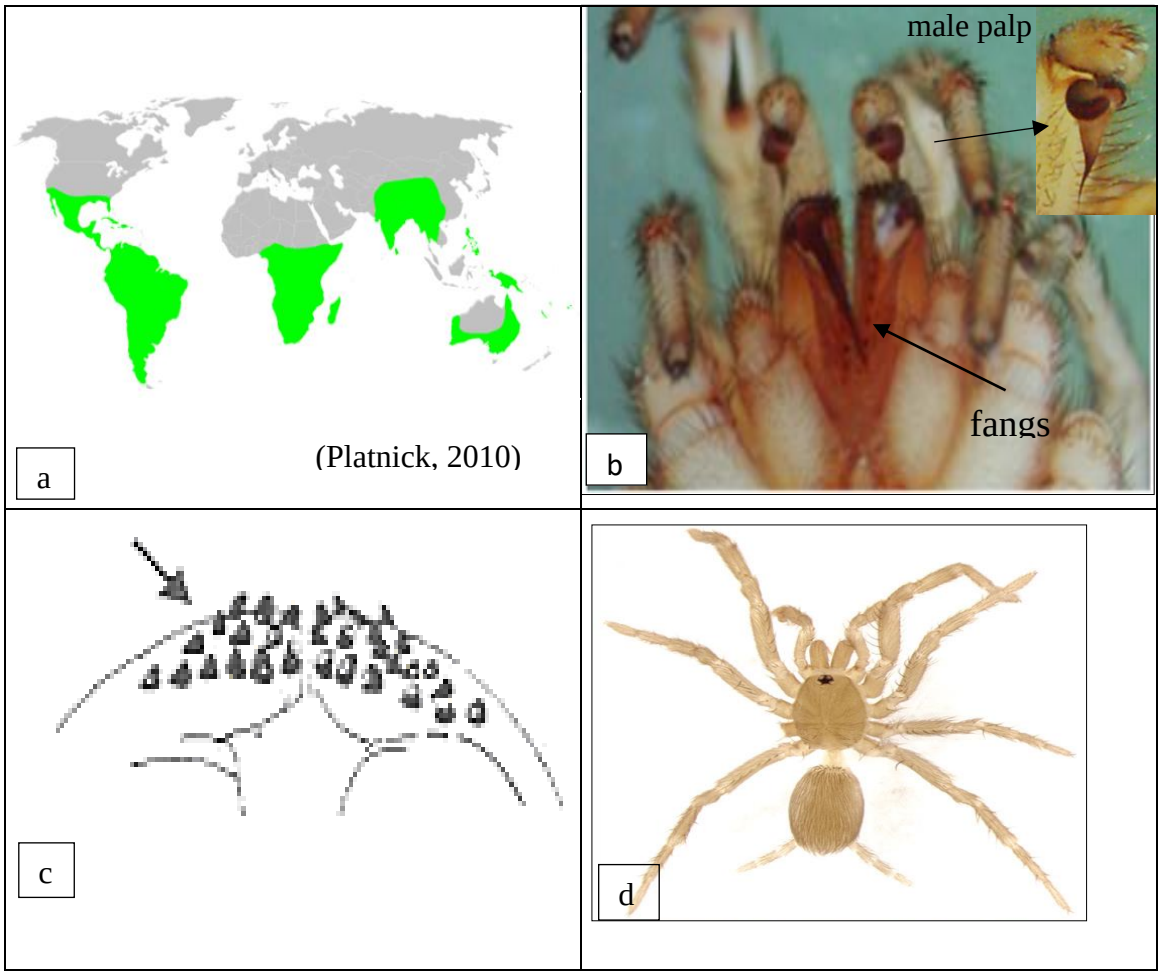


Fig.8. Dipluridae**:** a: World distribution; b. fangs, male palp, c. rastellum, d. adult.

Idiopidae (Spurred trapdoor spiders)

One specimen of family Idiopidae was collected from Zuwarah at the furthest location in the Northwest of Libya between stones and thorny shrubs. Idiopidae occurred worldwide in Latin America, Africa, India and Australia; the family represented by 22 genera and about 323 species in four subfamilies (Platnick, 2015). Medium-sized to very large (8-33 mm) mygalomorph spiders with three claws and a rastellum: Male pulp provided with a distal haematodocha extending almost to tip of embolus: palpal tibia of males usually with an excavation prolaterally, bearing short, thorn-like spines.

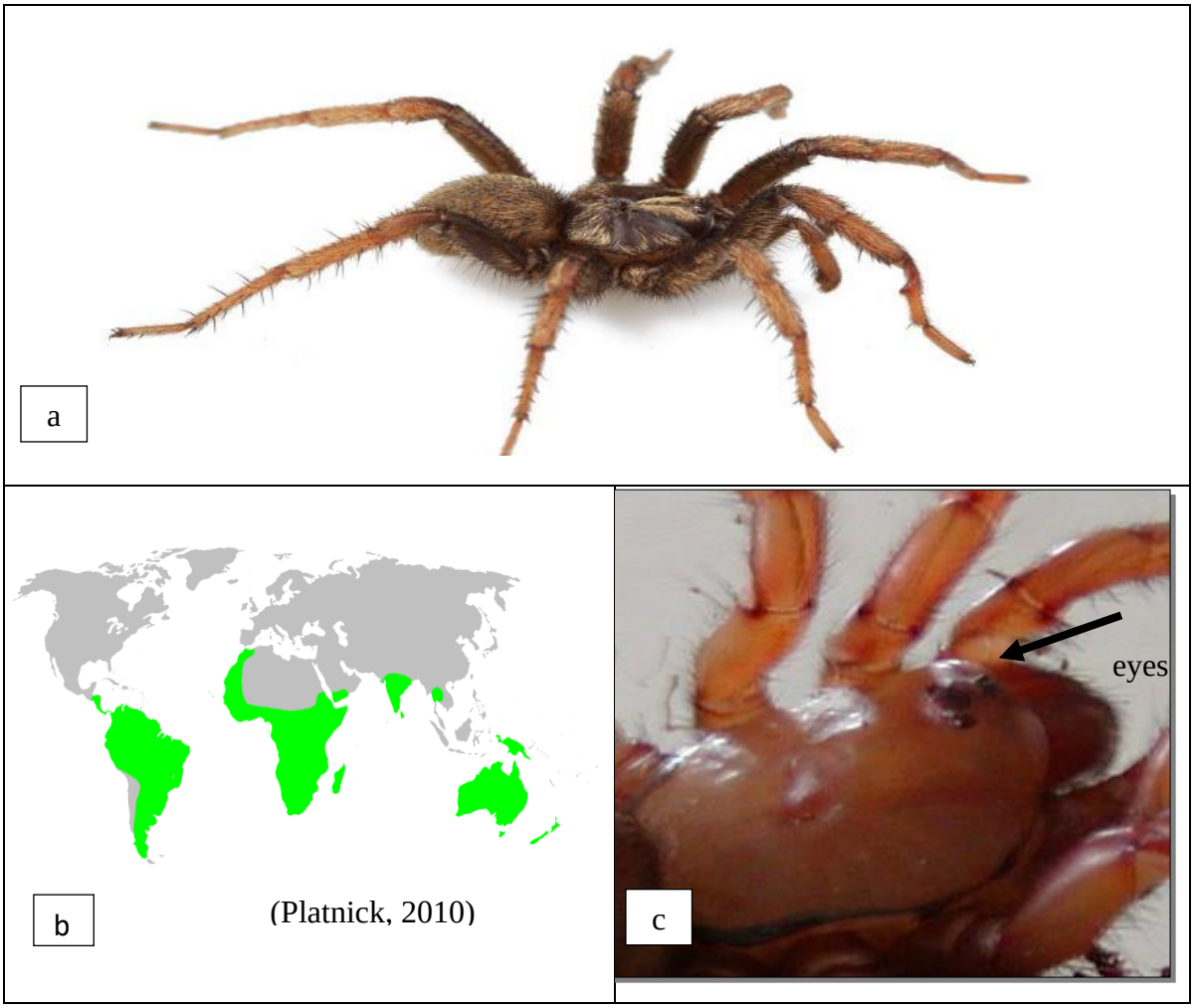


Fig. 9. Idiopidae; a. Adult, b. world distribution, c. eye distribution.

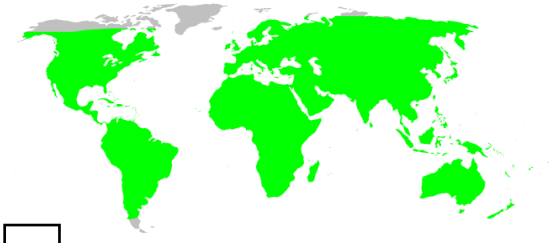
Araneomorphae

Agelenidae (Funnel-Web Spiders, funnel weavers)

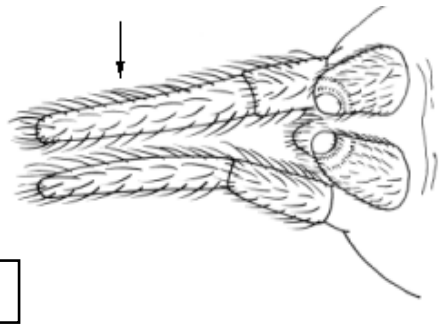
Total of 78 samples were collected from different habitats of collection area for samples. It is a rather small family, which is represented by about 1168 species in 70 genera (Platnick, 2015). They vary greatly in size from 4.5 mm to 20 mm. The main characteristic of this family is that they have spinnerets longer rear of the other composed of two segments which are visible even when viewed from above. Many species have long limbs and thorny that taper at the ends. They live and hunt on web sheet non-adhesive built in low vegetation and bushes, some species inhabit the hollows of tree trunks, caves, and inside the houses. The "sheet" is covered by a series of wires suspended slightly whose function is to obstruct the passage of insects, which unwary end up on the web. The spider lurks inside a funnel-shaped shelter that, in the genus *Tegenaria* is on the edge of the sheet, while *Agelena* in the genre to a more central. This fold and stretches underneath the web to form even an emergency exit. The prey is bitten repeatedly and dragged into the shelter to be consumed. Zavattari recorded 4 species under Agelenidae while currently in Libya, there are species: *Benoitia lepida, Lycosoides Coarctata, Pseudotegenaria parva, Tegenaria domestica, Tegenaria pagana, T. parietina, T. vallei.* araneae - Biodiversity (nmbe.ch)

a

(Platnick, 2010)



b



c

Araneidae (orb weavers)

Approximately 354 individuals of Araneidae were collected from the collection area of Northwest of Libya. Araneidae are the third largest family in the world with more than 3096 species in 169 genera (Platnick, 2015). Members of this family vary in size from 2 - 30 mm. The epigenous is strongly sclerified with a long flexible scope present in most species; similarly, the pulp of the male has a very complex structure. The spinulation limbs are very obvious. Quaint, is usually the abdomen, globular or special humps and fitted with special designs with bright colors, even with the presence of chelicerae lateral condyle is characteristic of the family.

The species occupy different habitats and are found in terrestrial ecosystems around the world with the exception of some arctic areas, islands and archipelagos. The web can be built into the layer of grass, the bushes, trees and buildings, and generally has a vertical or slightly inclined. Some are wrapped with new silk, and finally bites. The adult male, as in most species of weavers, ceases to feed and moves in search of the female. Great care is taken in the process of courting the female (always larger than the male). The male - behavior. Those are found in four seasons in the autumn and winter in particular. Zavattari, 1934 recognized 19 species in Libyan fauna while currently in Libya, there are species: *Aculepeira armida*, *Agalenatea redii*, *Araneus klaptoczi*, *Araneus triguttatus*, *Argiope lobate*, *Argiope sector*, *Cyclosa concolor*, *Cyrtophora citricola*, *Gibbaranea bituberculata*, *Hypsosinga albovittata*, *Hypsosinga heri*, *Larinia chloris*, *Larinioides patagiatus*, *Larinioides suspicax*, *Mangora acalypha*, *Nemoscolus niger*, *Nemoscolus semilugens*, *Neoscona adianta*, *Neoscona subfusca*, *Singa semiatra*, *Zilla diodia* araneae - Biodiversity (nmbe.ch).

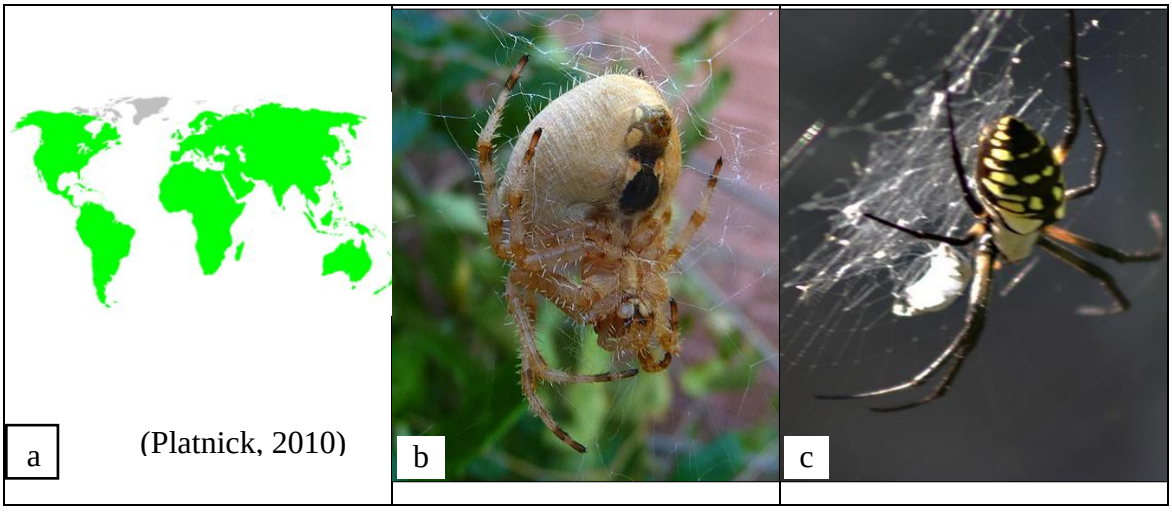


Fig. 11. Araneidae: a. World distribution; b. female spinnerets, c. female orb.

Clubionidae (Running spiders, Sac spiders, Foliage spiders)

Nearly 54 samples specimens of family Clubionidae were collected from different of Northwest of Libya. It is relatively rich in species, including 587 species in 15 genera (Platnick, 2015). They vary in size from 2.5 mm to 12 mm. The sexes are quite similar, with males slightly smaller than females and often with the chelicerae and longer limbs. The eyes are uniform in size, arranged in two rows of four eyes and wide enough. The back row is slightly wider than the front. The chelicerae are rather long and strong with teeth in the inner margin and the outer one. Some males have developed chelicerae with a tooth particularly longer. The tarsi are strongly scapula to get a good grip on slippery surfaces. The abdomen is often oval, tapered towards the chains, uniform color and equipped with a midline dark. The shape of the tibial of apophysis' pulp of the male is an important morphological character at the time of the identification of the species. The species usually live on the ground in open habitats, but may also populate leaves, branches and trunks of trees. This is erring nocturnal species; they spend the day or periods of inactivity in "sacs" of web, under rocks, inside the rolled leaves and under bark. During the night they are active hunters and fast runners; do not use cloth or wires. They capture their prey pursuing them and grabbing with the powerful chelicerae. Females' guard the eggs in a lot of silk are under the rocks either by folding or sealing with more leaves. Zavattari, 1934 listed 16 species of family Clubionidae in Libya while currently in Libya, there are species: *Clubiona straminea.* (araneae - Biodiversity (nmbe.ch))

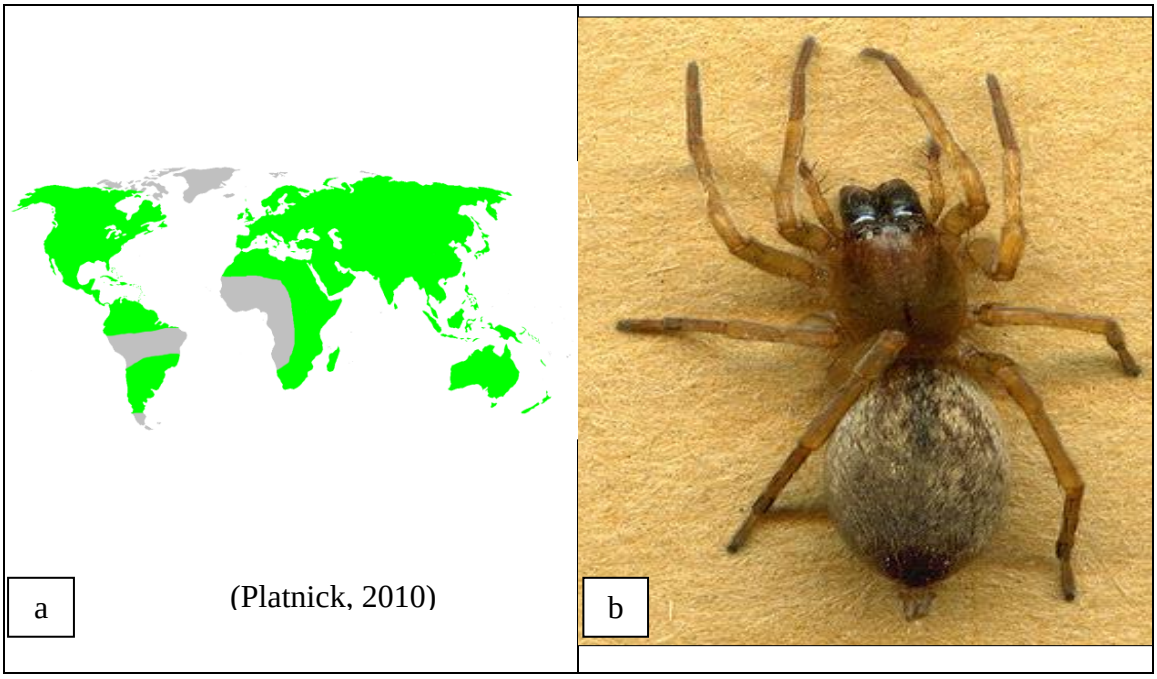


Fig. 12. Clubionidae: a. World distribution; b. Adult.

Cheiracanthiidae (yellow sac spiders)

Data analyses showed that 36 samples were collected from collection areas in the Northwest of Libyan coast. The family consists of 33 genera and 159 species (Platnick, 2015). The largest genus currently recognized as belonging to this family is Cheiracanthium, which has previously been placed in both the Clubionidae and the Miturgidae. The males resemble females, but are smaller and have the chelicerae longer and larger and secrete a toxin that can cause local tissue necrosis. Body colors are various shades of yellow, orange, brown and green. Present under the tarsi very dense tufts of bristles (scapula) that allow it to adhere to any surface.

They are almost cosmopolitan, with the exception of Canada, northern Siberia and the deserts of Saudi Arabia. They are excellent and fast nocturnal predators that hunt primarily on vegetation, for these reasons, they are well regarded by farmers as they are stealing all insects which are harmful to crops. Currently in Libya, there are species: *Cheiracanthium auenati,* C. *equestre*, C. *isiacum*. (araneae - Biodiversity (nmbe.ch))

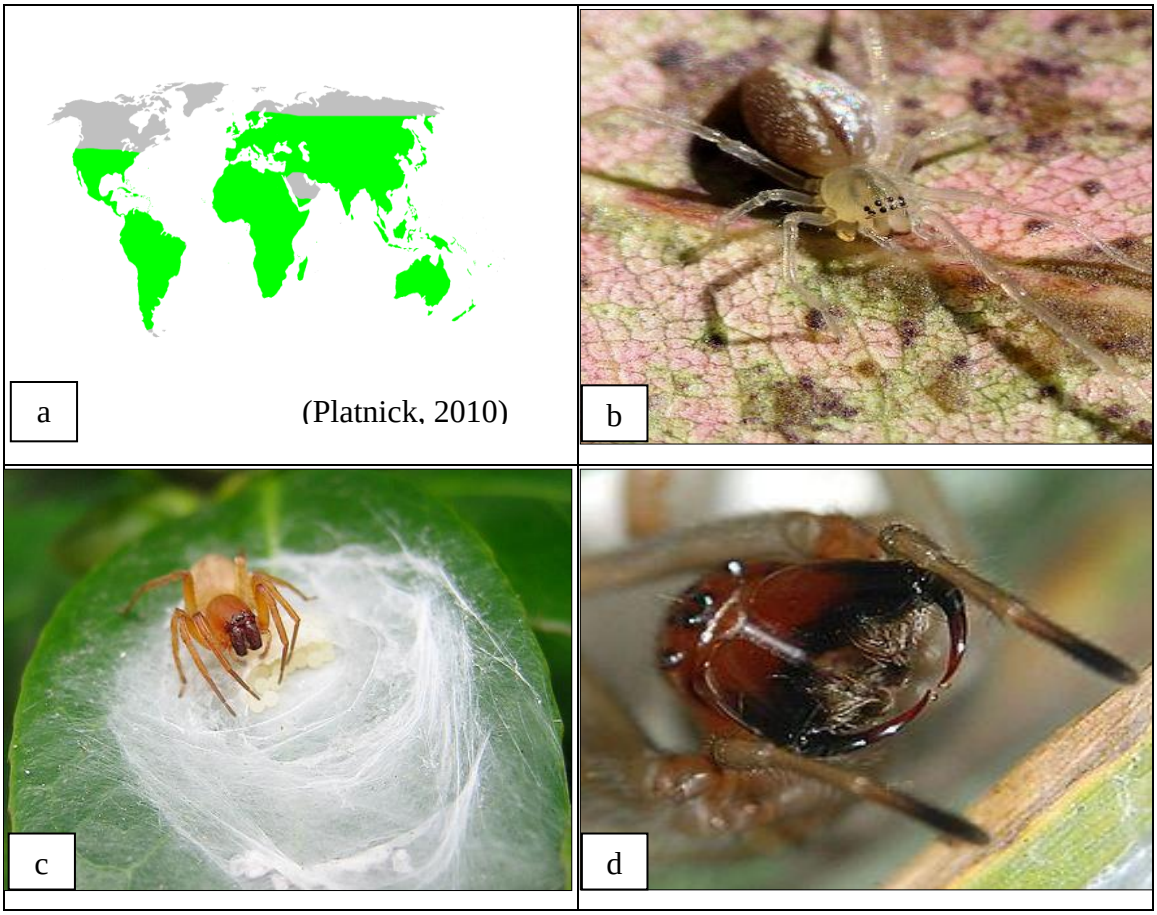


Fig. 13. Cheiracanthiidae: a. World distribution; b. Adult *Cheiracanthium* sp., c. *C. mildei* on leaf with eggs, d. *Cheiracanthium* sp. shows Chelicerae.

Dictynidae (Mesh**web weavers**)

Sampling data revealed that 6 specimens of Dictynidae family were obtained. This family is a relatively rich in species, which includes 578 species in 52 genera (Platnick, 2015). They are characterized by having three tarsal claws. The number of eyes is not constant, some species have 8, 6 more, while those who live in caves or houses are blind. The cephalic region is generally high, to enclose the large venom glands, presents longitudinal rows of hairs. The legs are moderately long and usually without spines. The abdomen is oval and elongated, often truncated on the carapace and densely covered with fine hairs.

It is the largest family of Cribellate, the highest diversity is found in temperate regions. The family is grouped into three subfamilies quite different from each other: *Dictyninae*,

Cicurininae, and *Tricholathysinae*. The pattern of life is very different between the subfamilies. *Dictyninae*, including genus such *Dictyna*, *Emblyna Nigma* preferably live on plants or on low vegetation and wetlands, and build irregular web with layers of silk produced by the woolly cerebellum. The *Cicurininae* (e.g. *Cicurina* and *Lathys*) and *Tricholathysinae* (e.g. *Argenna* and *Altella*) live on the ground by building their webs under logs, stones and other objects on the ground. They feed mainly on small Dipteral and aphids. Zavattari, 1934 recorded 3 species among Libyan spider fauna while currently in Libya, there are species: *Rchaeodictyna anguiniceps, Devade indistincta*. (araneae - Biodiversity (nmbe.ch))

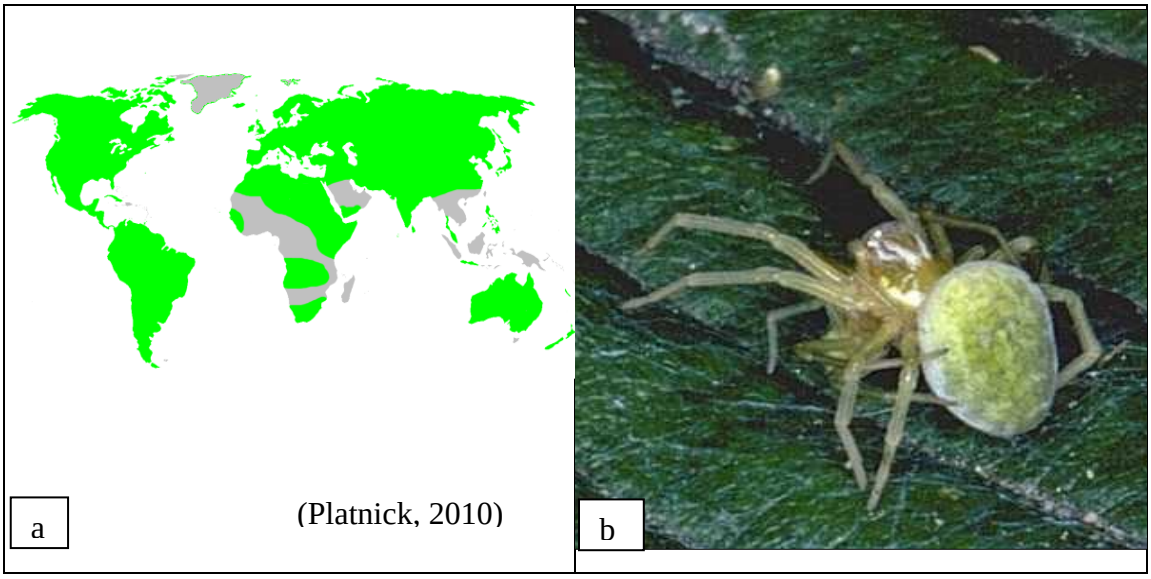


Fig. 14. Dictynidae: a. World distribution; b. Adult *Nigma* sp.

Dysderidae (Wood louse spiders)

Data shows that about 27 spider samples were collected from different collection areas in the Northwest of Libya. The family consists of 24 genera and 534 species (Platnick, 2015). They vary in size from 5 to 14 mm; the body has an elongated shape. The Prosoma is visible with six eyes arranged in a circular or semi-circular compact group. The chelicerae are often prone (facing forward) and developed much in fact, are used to penetrate the thick skin of wood lice and beetles, their favorite prey. The carapace can be almost hairless blood

red, purple or dark brown. The legs are sturdy and hairless, usually with little or no plug. The male pulps are relatively simple.

They are mainly nocturnal wanderers. They prowl for moist and shady places without using a permanent dwelling but can be discovered within their webs lot during the day and other periods of inactivity. They are agile runners and the female is aggressive. In winter, it is not difficult to be at home, where they seek refuge at low temperatures outside. Some species of the genus *Dysdera*, if threatened, do not hesitate to bite, although their venom has not been thoroughly studied, it seems that does not cause redness and edema localized. Zavattari, 1934 recorded 5 species in different location in Libya while currently in Libya, there are species: *Dysdera bernardi*, *D. cornipes, D. crocata,D. soleata*. (araneae - Biodiversity (nmbe.ch).

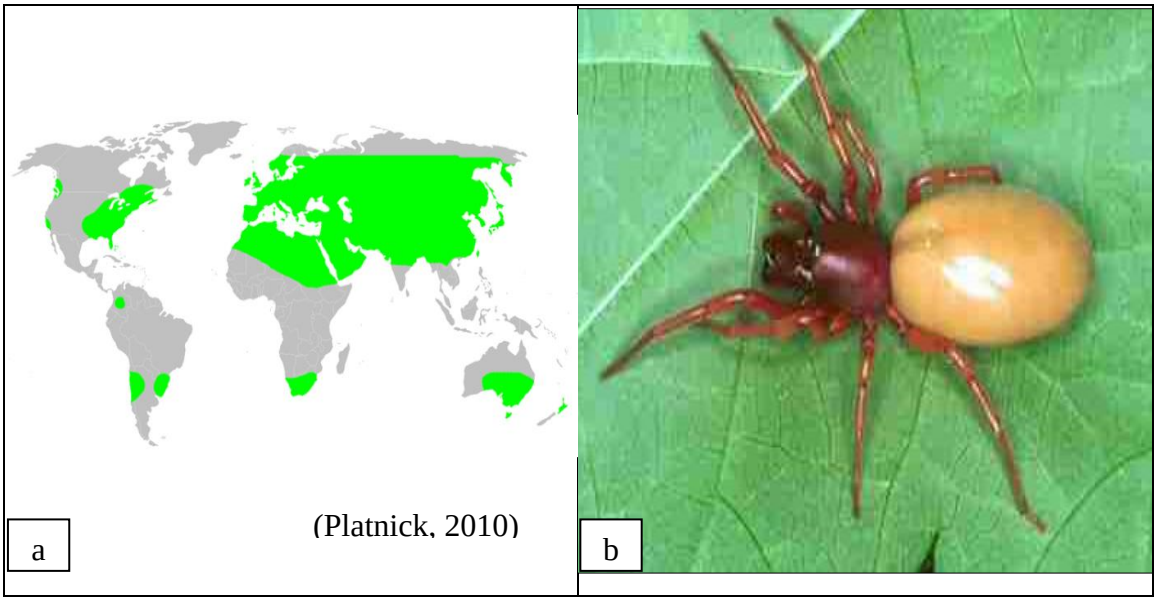


Fig. 15. Dysderidae: a. World distribution; b. Adult *Dysderidae* sp.

Linyphiidae (Sheet-web, Weavers "Line Weaving Spiders")

Total of 117 individual spiders were collected through the collection areas of Libyan Northwest representing the family Linyphiidae, it is the Second largest family of spiders in the world. This family including about 4533 species distributed in more than 601 genera (Platnick, 2015). Spiders are small; *Linyphiidae triangular* is one of the larger species and does not exceed 7 mm in length, while all the others are generally below 5 mm. The eyes

are arranged in 2 rows of 4, thick -rimmed black. The carapace is very variable, particularly in the smaller species belonging to the subfamily Erigoninae. The outer sides of the chelicerae have characteristics of horizontal ridges visible in many species. The limbs are thin and have thorns.

The majority of the species are found at soil level. The Linyphiidae build thin web umbrella horizontal, following its prey from below. This means that it keeps hanging on to the web waiting for small insects which will fall from above. When this happens, they reach the prey by the vibrations that it produces, bite through the veil of silk resulting in tearing of the veil to take possession of the victim and devour it comfortably. In genus such as *Linyphia frontinellina* the placing of the prey over the web chaotic silk threads, which hinder insects in flight by dropping them on the umbrella. Many species are dispersed using the technique of "ballooning". The spiders climb up in the vegetation and emit a silk thread, with the abdomen facing upwards, so as to catch the wind. Adults can be found, from time to time throughout the year. They are known to be active even at very low temperatures abundantly can be found everywhere, for example among the low vegetation and bushes. Smaller one can be found at the adult stage in spring and late summer. Individuals more prevalent eco-system of agricultural and semi-agricultural, forest and between plants. Only found fewest number in Farwa Island a collection place in the far Northwest of Libya. Currently in Libya, there are species: *Brachycerasphora connectens*, *B. monocerotum*, *Gnathonarium dentatum, Prinerigone vagans, Typhochrestus cyrenanius.* (araneae - Biodiversity (nmbe.ch))

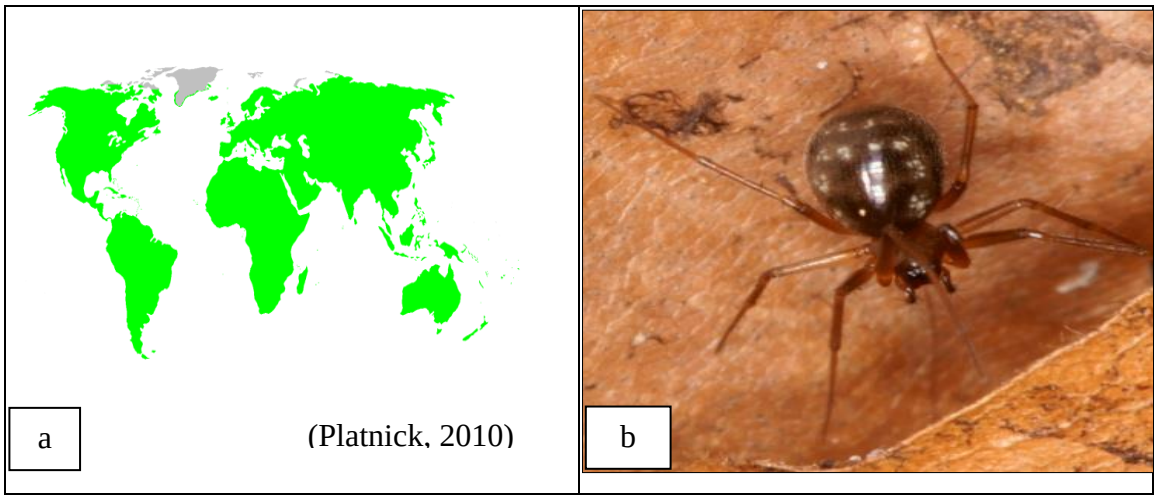


Fig. 16. Linyphiidae: a. World distribution; b. Adult *Linyphia* sp.

Lycosidae (wolf spiders)

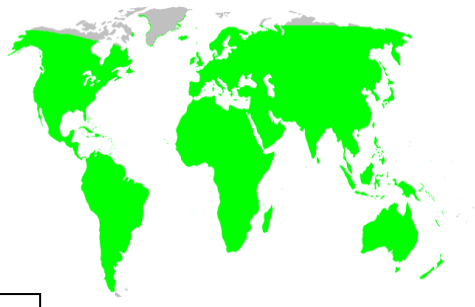
Total of 419 samples were collected from a wide area of Northwest coast of Libya. Family Lycosidae comprises about 2403 species in 123 genera (Platnick, 2015). Ranking the fifth in the world of spiders; the body size of these spiders is relatively high, in fact, ranging from 2.8 mm up to 45 mm. The eyes are all dark colored, placed on three transverse lines, of which the first comprises the four eyes front facing forward, while the second and third are respectively identified by two pairs of eyes big rear, arranged at the sides of the head.

A diagnostic distinguished character for this family is the lack of rear lateral tibial epiphysis on the male pulp. The carapace, usually, is densely covered with hair, has lateral or medial longitudinal bands with a characteristic U-shaped or Y. The abdomen is oval, always covered with thick hair. The epigenous is well sclerified, with a median septum that can be large. The tip of the male pulp may have one or more claws. The wolf spiders are found in many types of habitats, from woodland, wet coastal forest, alpine meadows, suburban gardens. They disperse by air and this he did in order to make them very adaptable. Even the wandering nature of many species has contributed to a spread almost worldwide.

They hunt close to the ground, chasing prey or ambushing for short stretches, do not build webs. The sense of sight, which is crucial in predation and in courtship, is well developed

both in diurnal species as those in the night. Some genus of Lycosidae dig burrows in the ground, both for shelter and for guarding the eggs. Feature of many adult females is to carry around the cocoon with the eggs until they hatch, holding it firmly attached to networks. Later, after hatching spiders spend their first weeks of life on the mother's back and then disperse and start their own life.

Members, of Lycosidae are widespread in large numbers in all collection areas especially agricultural habitats, buildings. Nymphs were observed riding on mother's back. Zavattari, 1934 recoded 15 species among the Libyan spider fauna while currently in Libya, there are species: *Allocosa tarentulina,* A. *tremens,* A. *albofasciata,* A. *atis,* A. *garamantica,* A. *pelusiaca, Arctosa annulipes, Cinerea depuncta,* C. *dissonans, C. fessana,* C. *fulvolineata,* C. *lacustris, C. perita, C. variana, Cynosa agedabiae, Evippa arenaria,* E. *jocquei,* E. *praelongipes. Geolycosa Cyrenaica, Hippasa partita, Hogna ferox,* Ho. *Radiata,* Ho. *radiata,* Ho. *minor, Lycosa cretacea,* L. *intermedialis, ,* L. *sylvatica, ,* L. *tarantula, , Pardosa confalonierii,* P. *gefsana,* P. *injucunda,* P. *inopina,* P. *observan,* P. *paleata, Trochosa urbana, Wadicosa fidelis*. (araneae - Biodiversity (nmbe.ch))



a (Platnick, 2010)

b

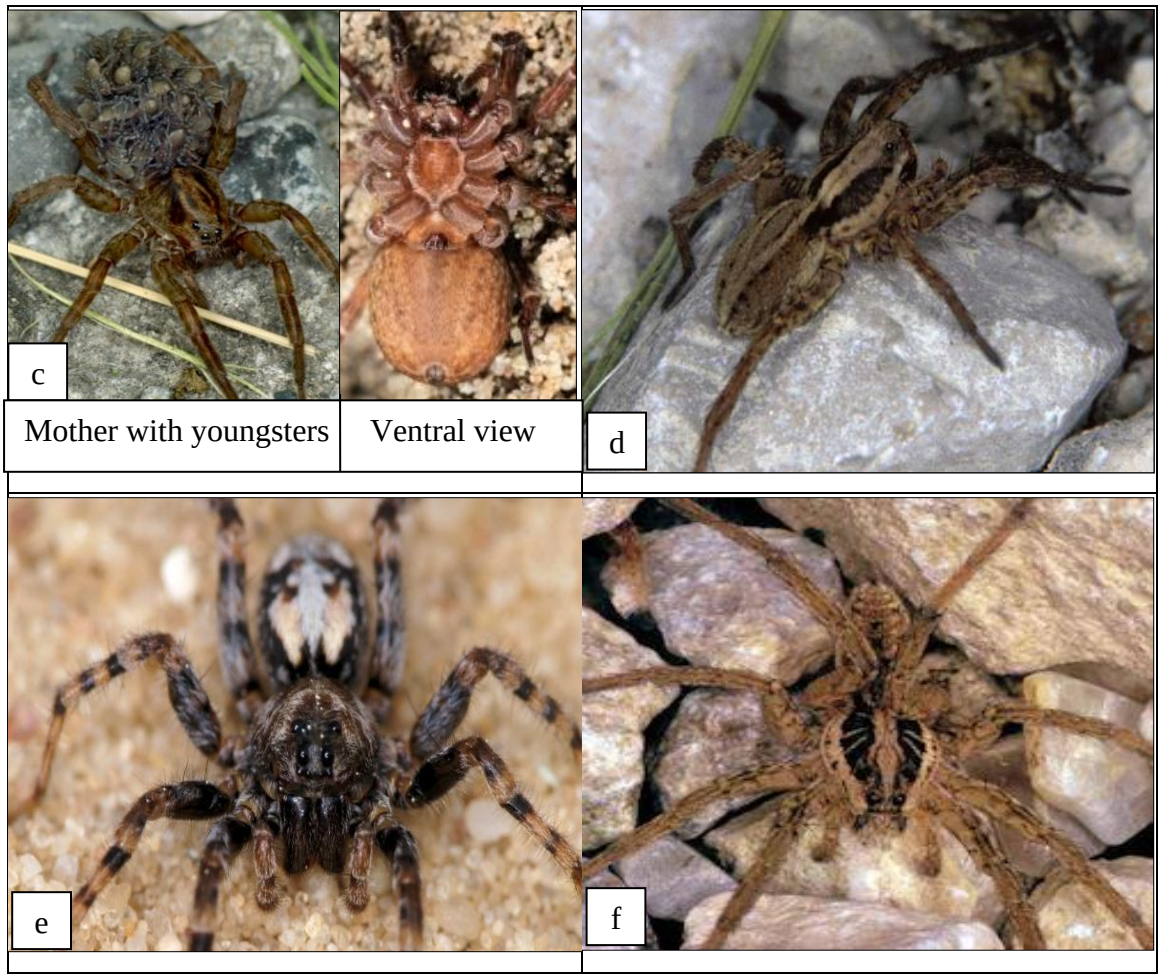


Fig. 17. Lycosidae: a. World distribution; b-f. Different genera members of Lycosidae: b. *Pardosa,* c. *Trochosa,* d. *Alopecosa,* e. *Arctosa,* f. *Hogna*.

Oecobiidae (Dwarf round headed spider, Disc spider)

Collected spider samples from Libyan Northwest location indicated that a total of 152 individual spiders were obtained. The family consists of 6 genera and 110 species (Platnick, 2014), Body size rather small, less than 3 mm. The genus *Oecobius* has cribellate, while genus *Uroctea* without. They have a characteristic circular carapace hence the common name of spider's disc. Rear eyes are triangular or irregular. The first two pairs of legs have the tips curved backward. Another characteristic is the tubercle anal very developed and surrounded by A collarette of long bristles.

The preferred habitat is homes. The webs are built in cracks, under rocks, floors, behind walls and ceilings. The only European genus are Oecobius and Uroctea. In year 2009 there are 43 species of Oecobius, 42 of which are known in Europe. Spinners and eyes are the diagnostic taxonomic features of Oecobiidae.

Results of this book showed that members of this family found on wall corners of buildings and on ground soil. These spiders were observed during all seasons of the year in Zawiya, Sabratha and Surman. While in marshes of Mellita, Zuwarah are not available in winter. During the summer season, spiders were not collected from Farwa Island. According to Zavattari, 1934 he recorded two species on his list of Libyan spiders while currently in Libya, there are species: *Oecobius annulipes*, O. *cellariorum*, O. *navus*, O. *putus*, *Uroctea limbate*. (araneae - Biodiversity (nmbe.ch).

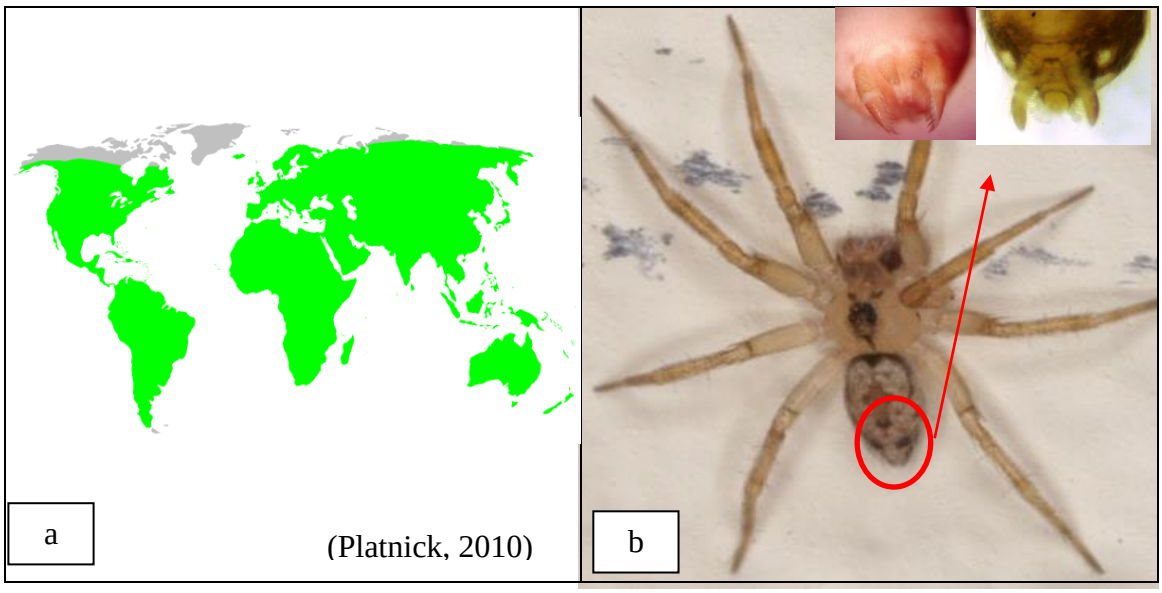


Fig. 18. Oecobiidae: a. World distribution; b. *Oecobius* sp. male; anal tubercle.

Philodromidae (Running crab spiders)

Data indicated that 77 spider samples of Philodromidae from the loclaleties of collection areas in Northwest of Libya were collected. The Philodromidae are a family of medium-sized fauna comprising a world of about 539 species in 30 genus (Platnick, 2015).

Body size varies from 2 to 16 mm. They have eight eyes arranged in two rows, curved, with sometimes more arched back row of the front row. The anterior tibia has sometimes a long row of spines. The carapace is often marked by a longitudinal band of a different color. The palps of the female have a small claw toothed. The shape of the abdomen is oval, in some species is slightly longer than wide, in other decidedly stretched. The epigyne is usually small with a median septum. The palp of the male has a tibial apophysis, the shape of which is important for the identification of the species.

Most of them live in the northern temperate. Populate the leaves, branches and stems of trees and shrubs, but many can also be found on the ground, such as the species of Thanatus. Many species have cryptic colors that blend into the substrate, making them very difficult to detect. Many species of the genus Philodromus are able to change the color tone in response to the type of environment. The Philodromidae do not remain lurking for a long time, but move frequently during the day. The conformation of the limbs allows them to be fast in changing direction and running on uneven surfaces, so that the human eyes can hardly follow the movements. Occasionally they stop in a sunny position, waiting for an insect happens nearby. The use of silk is limited. The female builds the cocoon silk to lay its eggs on the leaves. Currently in Libya, there are species: *Philodromus bigibbus,* P. *cufrae,* P. *dubius,* P. *erythrops,* P. *fuscolimbatus,* P. *grazianii,* P. *multispinus,* P. *venustus,* P. *lepidus, Thanatus fabricii,* T. *lineatipes,* T. *oblongiusculus,* T. *setiger,* T. *vulgaris*. (araneae - Biodiversity (nmbe.ch).

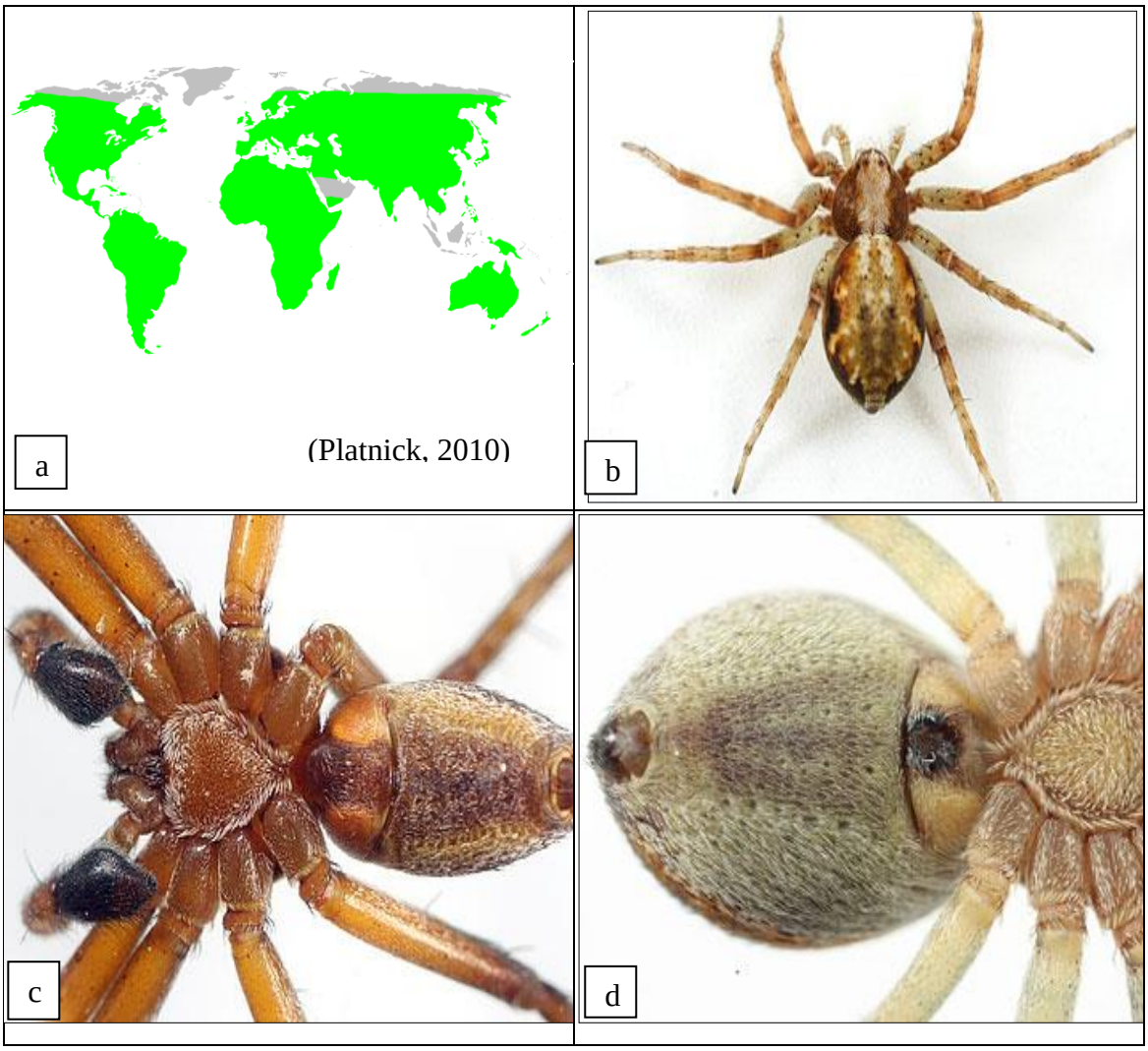


Fig. 19. Philodromidae: a. World distribution; b. female *Philodoromus cespitum* from above, c. Male *P. cespitum* from above, d. Female *P. cespitum* from below.

Pholcidae (Cellar- spiders)

Collection of the collection areas revealed that 164 samples of Pholcidae were obtained from Northwest Libyan coast line. The family includes about 1461 species and 79 genus; Ranking the ninth in the world of spiders (Platnick, 2015). The size of the body varies from 1- 10 mm. The main features are the long legs, which can exceed 60 mm in some species. Limbs are thin and devoid of thorns, have several false joints that make their end more flexible.

The eyes are small and black, the other six the largest and glassy, gathered in two groups of three. The carapace is nearly circular with the cephalic region often raised. In some species the fovea is well developed. The shape of the abdomen varies from spherical to elongate cylindrical.

The most common colors of the abdomen are light gray and brownish dark gray. The species occupy a wide range of habitats and are found worldwide with the exception of some islands and the Arctic regions. It is synanthropic species that, in recent decades have gradually increased their numbers in temperate regions. They build tela concave down, three-dimensional and irregular, as in dark corners and damp places in buildings and cellars, caves, cavities among the rocks, under rocks and in burrows.

The web has no properties viscous, but is constituted by a chaotic tangle of wires in the upper part, which delays the escape of the prey. The spider moves quickly to wrap its prey with silk and then settles the fatal bite. If disturbed or threatened vibrate along with their web so as to become almost invisible due to their constitution so thin. After mating, the female lays eggs that are held together by a few threads of silk and transported with the chelicerae. The male often stays near the female until death.

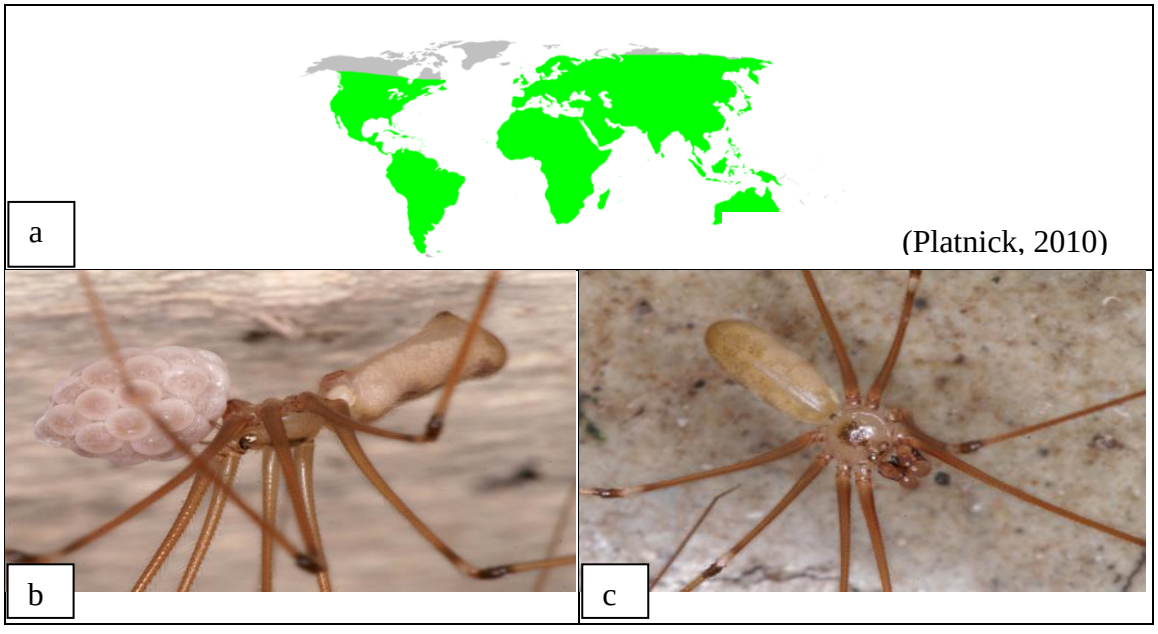


Fig. 20. Pholcidae: a. world disruption; b. *Pholcus phalangioides*.

This species is widely-spread in buildings and houses and among the trees in agricultural environments. Zavattari recoded four species in tracking this family in Libya. Exist in all

regions of Sabratha and Surman, in spring and winter. It was found that it has fascinating ability to survive without eating for up to 50 days and which results in female killing the male for survival. Currently in Libya, there are species: Currently in Libya, there are species: *Artema atlanta, Holocnemus pluchei, Micropholcus fauroti, Pholcus phalangioides.* (araneae - Biodiversity (nmbe.ch).

Prodidomidae (Long- spinnered)

Two samples of the family Prodidomidae were collected from Northwest collection areas. The family consists of 31 genera and 309 species. These spiders are easily identified from the base with very elongated pear-shaped gland which protrudes from the chains and the median eyes and silver plates with a rough rectangular shape which are quite irregular. Some parts of their bodies are covered with shiny silky layers. Taxonomically are considered, such as Gnaphosidae, precisely because they have the most advanced supply chains that are more efficient and better structured. They are found in the inter-tropical belt and in the southern latitudes. Cave spiders are nocturnal, hiding during the day through the foliage below. Just only one species *Myandra* has diurnal habits, probably to look outwardly similar to that of an ant. Zavattari recorded only one of species under in his list of Libyan spiders while currently in Libya, there are species: *Prodidomus amaranthinus*, P. *rollasoni, Zimirina vastitatis*. (araneae - Biodiversity (nmbe.ch).

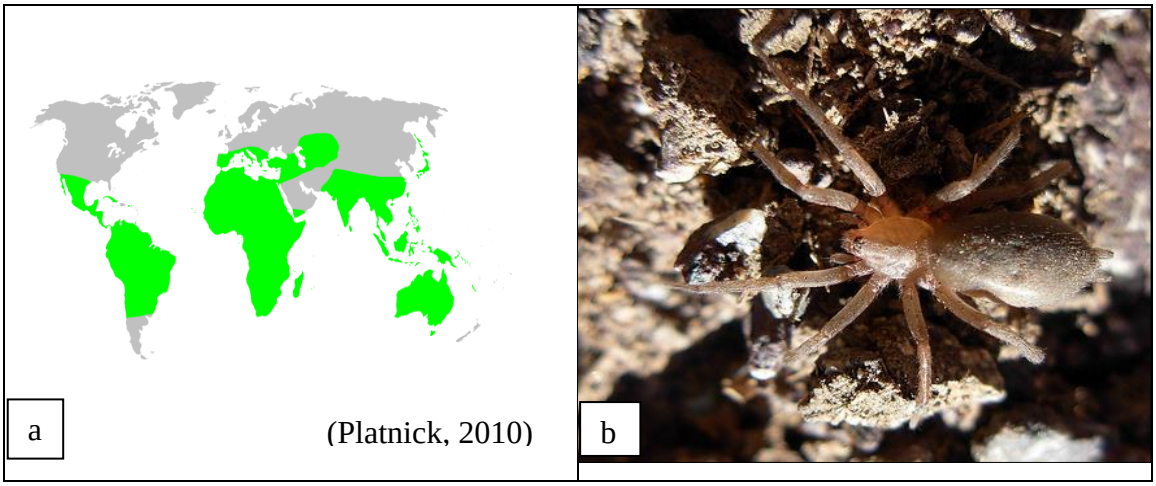


Fig. 21. Prodidomidae: a. world distribution; b. *Prodidomus* sp.

Salticidae (jumping spiders)

Data showed 418 spider samples were collected from Northwest of Libya. Over 5841 species in 588 genera is first largest family in the world (Platnick, 2015). With approximately 13 % of all known species of spiders, even though most of them live in the tropical belt and for this reason, they are less well represented in the coldest environment. Spiders are small and medium-sized (2-10 mm).

The most obvious character of the salticides is a pair of disproportionately large eyes (Jackson, et al., 2001). They have eight eyes arranged in three rows; the two large ones are facing forward and can be focused very accurately from as far away as 50 cm. The anterior median eyes (AM) are highly developed, the other eyes are smaller, and they help in detecting movement which is fixed on the preys' position (Preston-Mafham, et al., 1998). With keen binocular vision and great agility over plants and stones, they detect their prey by sight. These spiders can leap up to 30 times their own length. Before leaping they fasten a safety thread to the substrate and are thus able to regain their position, even on vertical walls, after taking to the air.

The Prosoma has a square shape, sometimes almost rectangular, with the cephalic region higher and more robust, except that they are extremely important in hunting, as they deliver the majority of the power required at the time of the jump.

The Salticidae are all diurnal and free-living. They live in the most disparate building and small shelters which allows them only to spend periods of inactivity. They feed on various species of insects which are much larger than them. In courtship of females, sexual dimorphism exists between males and females; they are more likely to exhibit hair colored, metallic, fringed, and other devices to attract their male.

It was clear observant of these activities and widely-spread of jumping spiders in all collection areas of this project. Zavattari recorded 16 species under this family on his list of spiders of Libya while currently in Libya, there are species*: Aelurillus ambiguous, Ae. luctuosus, Afraflacilla asorotica, Af. Berlandi, Af. tamaricis, Bianor albobimaculatus, Carrhotus affinis, Chalcoscirtus infimus, Cosmophasis fazanica, Cyrba algerina, Euophrys convergentis, Eu. Frontalis, Eu. Marmarica, Evarcha arcuate, Ev. Jucunda, Ev. Laetabunda, Habrocestum latifasciatum, Habrocestum verattii, Hasarius adansoni,*

Heliophanillus fulgens, Heliophanus decorates, He. Edentulous, He. equester, He. Glaucus, Icius congener, Ic. hamatus, Mendoza canestrinii, Menemerus animates, Me. davidi, Me. Illigeri, Mexcala nigrocyanea, Mogrus dalmasi, Mogrus incertus, Myrmarachne myrmicaeformis, Myrmarachne tristis, Pellenes minimus, Philaeus chrysops, Phintella castriesiana, Plexippus clemens, Pl. paykulli, Pseudicius picaceus, Pseudomogrus auriceps, Ps. Saliens, Ps. Tschoni, Rafalus insignipalpis, Saitis latifrons, Salticus mutabilis, Stenaelurillus nigricaudus, Thyene imperialis. (araneae - Biodiversity (nmbe.ch).

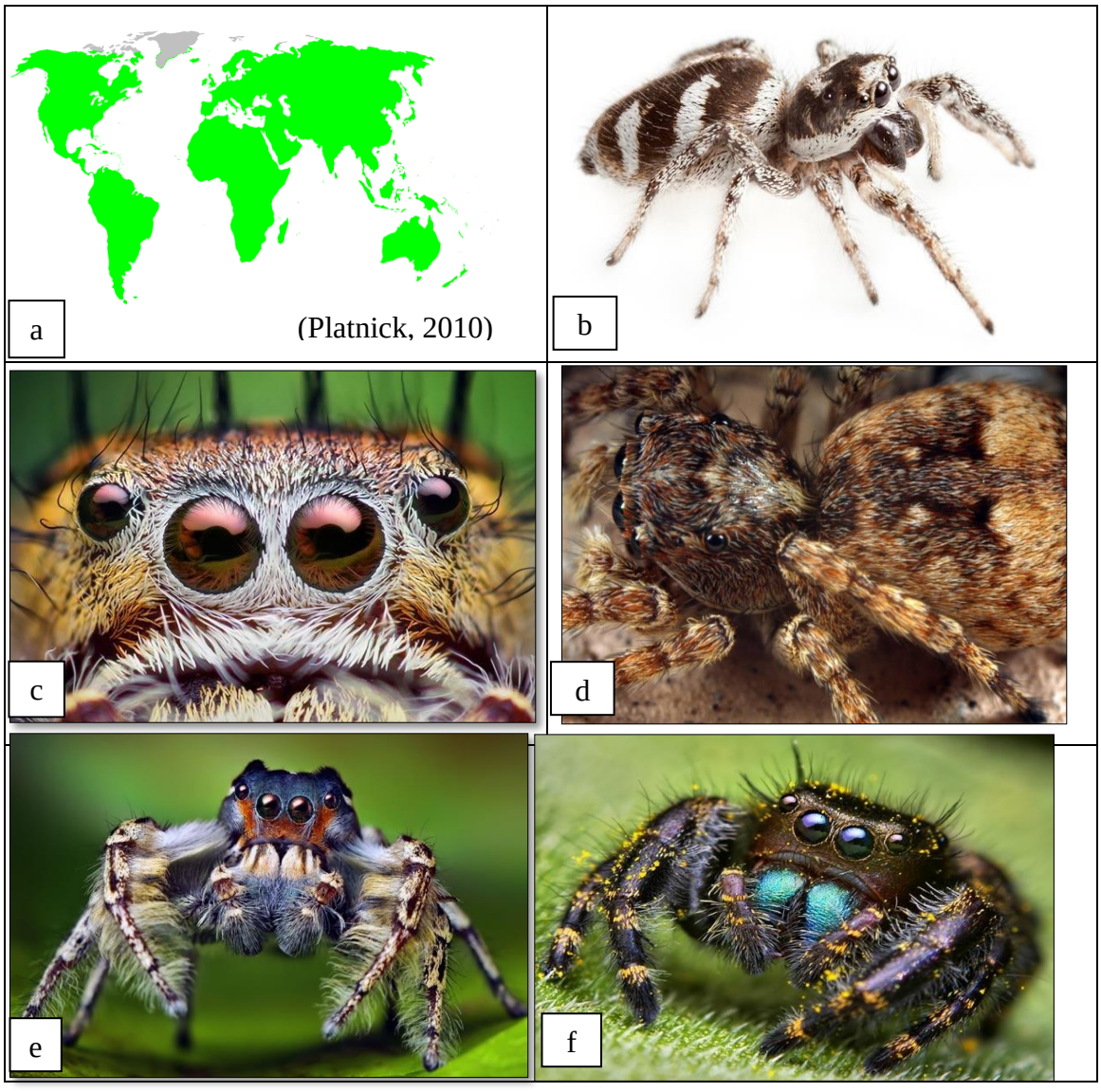


Fig. 22. Salticidae: a. World distribution; b-f showing body structure of different species of Salticidae and eyes combination and arrangement.

Scytodidae (Spitting spiders)

Twenty-eight spider samples were collected from the Northwest region of the Libyan coast. The family consists of 5 genera and 232 species distributed worldwide (Platnick, 2015). The Scytodes is the only genus present in Europe. The size varies between 3 and 6 mm, legs included. They have six eyes distributed in three groups of two, and a carapace with colorful swirls and spots. Contrary to most of the spiders, the cephalothoraxes are much larger in the abdomen which has the shape of a dome.

The chelicerae are extremely small, with relatively large holes venomous. The legs are long and often annulate black. The female does not make a nest, but carries its eggs under the abdomen, with a silk net retained until they hatch.

There are spiders with nocturnal habits. The feature that makes them unique, in order Araneae is the fact that they are able to spit from chelicerae a poisonous sticky substance on preys. This is due to the presence of the silk glands in the cephalothoraxes also connected to venom glands of the chelicerae. In addition, they are connected to networks abdomen thus providing the spiders with the ability to make a silk poisonous. It hunts very slowly, by moving towards the prey with a wavering step zigzag along the ground a sort of Z. It is assumed that the spider uses special sensory hairs (trichobothria) along the legs to locate the prey. The spider's approach with great attention to the prey. Finally, spits two poisonous silk threads on the victim, which immediately immobilize and kill.

Currently in Libya, there are species: *Scytodes annulipes*, S. *major*, S. *obelisci*, S. *thoracica*, S. *velutina*. (araneae - Biodiversity (nmbe.ch).

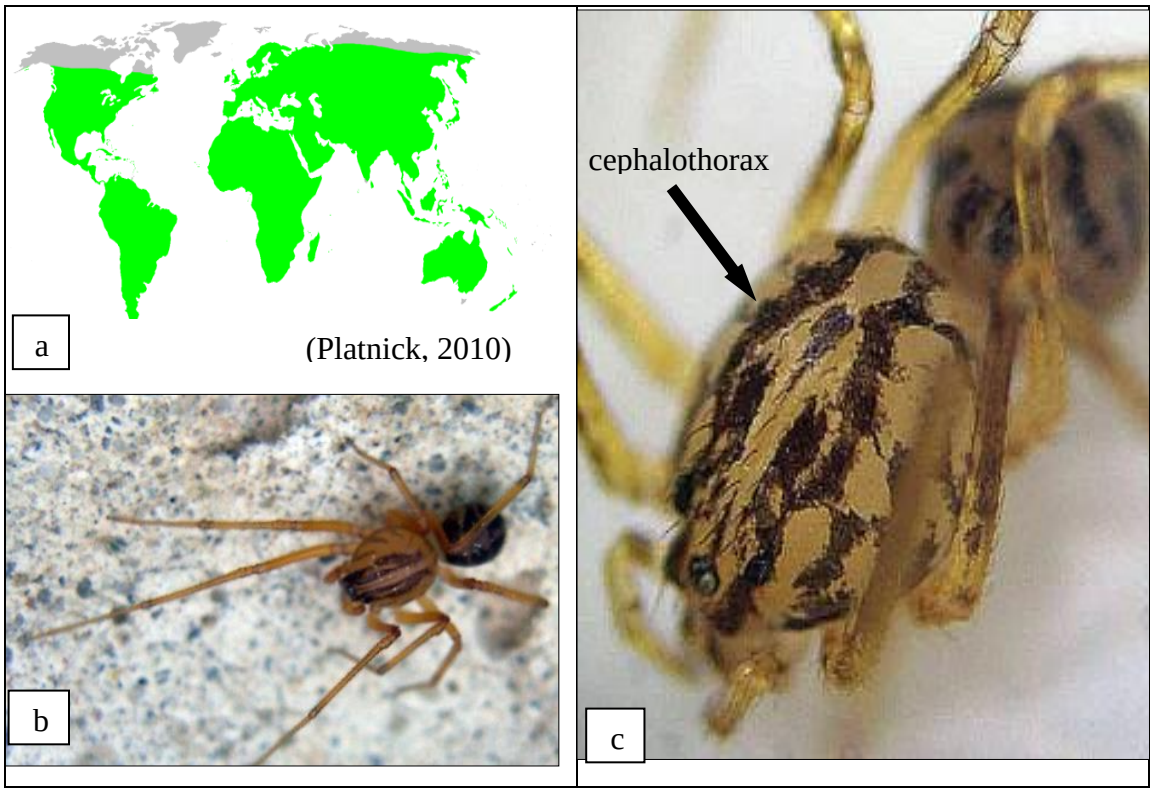


Fig. 23. Scytotidae: a. world distribution; b. *Scytodes velutina*, c. *Scytodes thoracica*.

Segestriidae (Tube-dwelling spiders)

Members of this family are scares in Libya. Only one spiders' sample was obtained from the Northwest of the Libyan coast. It is a small family which consists of 4 genera and 120 species (Platnick, 2015). In particular, *Segestria* and *Ariadna* are two genera which are quite extensive, while *Gippsicola* is a genus monophyletic Australia.

They are easily recognizable; having six eyes arranged in a semicircle, with the first three pairs of legs directed forward, while most of the spiders have two, a condition unique among spiders. They have a hairy integument dark grayish-brown in color, with the back opistosoma affected by a drawing clearer. They are Haplogine and rather primitive like the Dysderidae.

The large number of species is not common in most of the world except Canada Northern Saharan Africa, the region of the Horn of Africa to Pakistan, the Indonesian region and part of central Australia. They are closely related to Dysderidae but, unlike most, these are sedentary and construct a tubular web within natural fissures where they remain there for the majority of the time. In fact, this shelter is also their hunting location. Some radial wires that branch off from the opening of the spider lair warn of the approach of prey. This family was not listed by Zavattari, 1934 Libyan fauna while currently in Libya, The species: *Ariadna insidiatrix Segestria florentina* (araneae - Biodiversity (nmbe.ch).

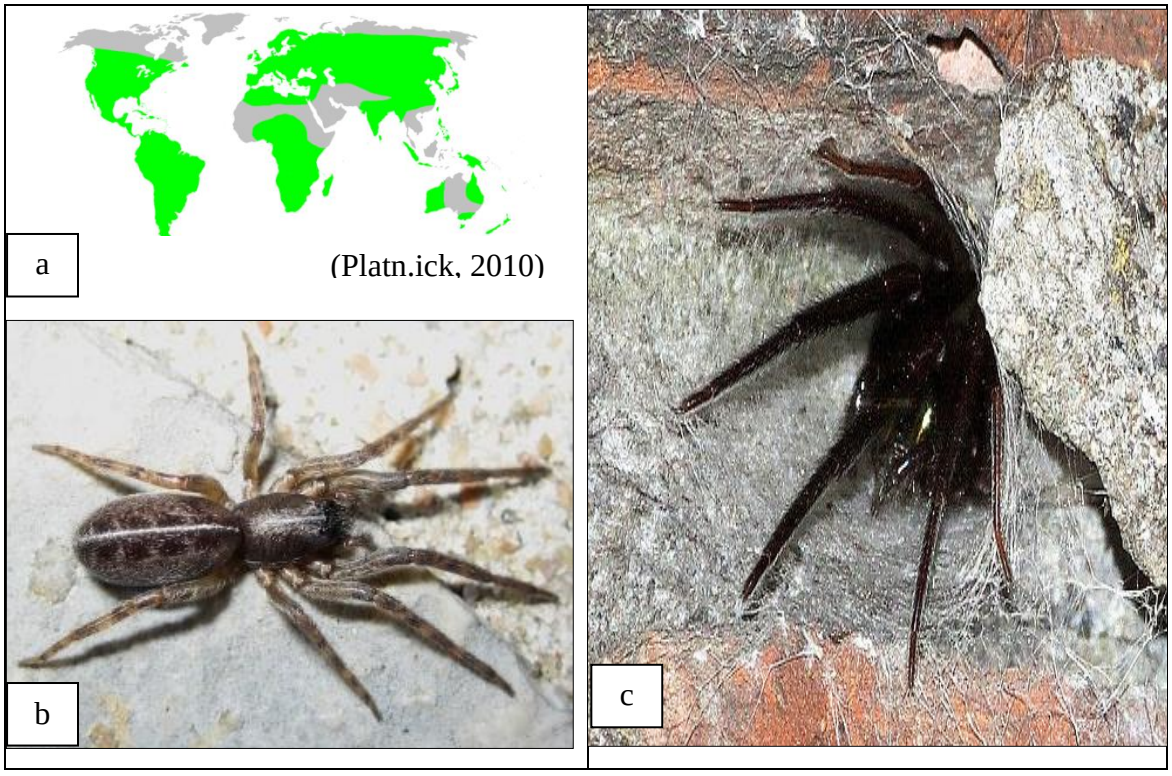


Fig. 24. Segestriidae: a. World distribution; b. *Segestria* sp., c. *Segestria* sp. In tube.

Thomisidae (crab spiders)

An outstanding spider family has a great biodiversity in Libya. Data revealed that more than 140 spider samples were collected from the Northwest region of the Libyan coast line. The family Thomisidae comprises of about 2155 species in 175 genera; Ranking the seventh in the world of spiders (Platnick, 2015). They range in body size from 2 mm to 23

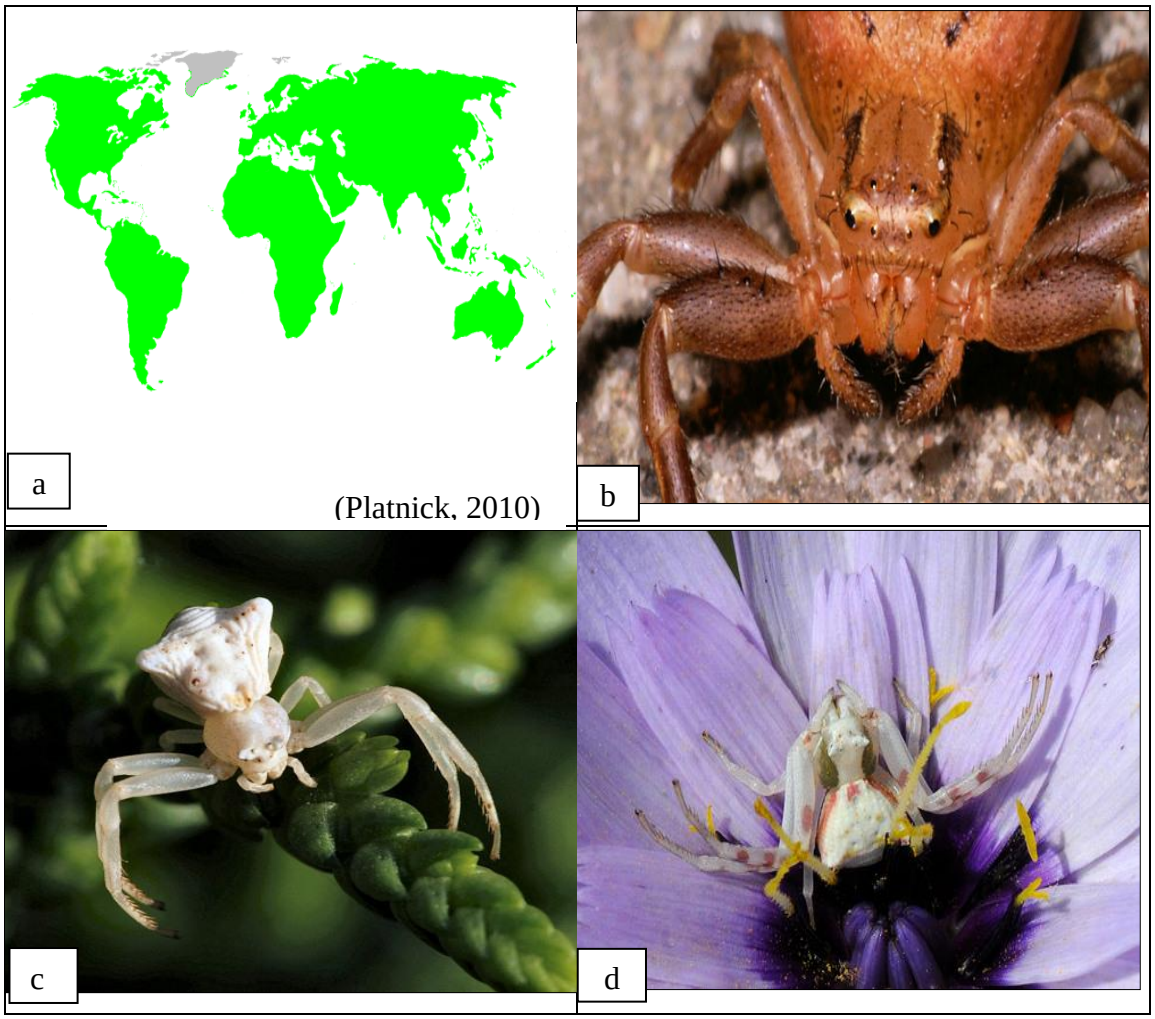
mm. The eyes with all blacks and white circles are often arranged in two lines, both curved. The front and rear side often lie on a common tubercle.

The chelicerae are relatively small and weak, adapted for biting and quick kill of the prey to the head. The first two pairs of forelegs are noticeably longer and more robust than the rear ones, which are articulated in terms of the body. The front legs are often equipped, on the tibia and the metatarsals, of a series of strong thorns. The abdomen is variable in shape and color, can be round, ovoid or elongated, almost always wider in the rear half, and often presents simple hair or clavate. They prey wanders usually diurnal, which do not build ever webs, and hunt on flowers or other parts of the property where vegetation awaits their prey, often much larger than their pollinators.

These spiders have an appearance of "crab" very marked and also move as crabs, both of which traverse back and forth. The spiders in this and the Philodromidae are crab like in both shape and movement, walking forward, sideways or backward, with equal facility (Preston-Mafham, et al., 1998). The Thominids are mainly dark-bodied, rather flat hunting spiders. These spiders are wanderer and secure their prey by stealth; some ambush pollinating insects. They do not weave snares or retreats. They have long strong front legs with which they grapple and hold prey while they feed. Most species are inhabitants of ground litter in grasslands and forests. (Dondale and Redner 1978, Dondale et al., 1997, Kaston, 1978).

The first two pairs of legs are used for grasping prey that casually rests near them. The legs III and I, with scapula, help the spider to remain anchored to the substrate during the brief struggle with prey. Once bitten, the prey dies within a few seconds due to the effectiveness of the poison. The most colorful species are active during the day. These spiders are able to blend in with the color of the petals of the flowers on which they live, changing color passively, in a period of time ranging from a few hours to several days. The species that inhabit the bark have dark colors to gray and brown camouflage excellently in this environment. Often there is a great disparity in size and coloration between males and females, males are usually much smaller and darker than females. As seen for many other families are dispersed through the small ballooning. Zavattari, 1934 recorded 11 species in

the List of spiders while currently in Libya, there are species: *Bassaniodes bufo, lalandei rectilineus*, *Heriaeus hirtus*, H. *numidicus*, *Monaeses paradoxus*, *Pistis tru ncates*, *Runcinia grammica*, *Thomisus citrinellus*, Th. *Onustus*, *Xysticus barbatus*, X. *nubilus*, X. *peccans*, X. *promiscuus*, X. *quadrispinus*, X. *quadrispinus concolor*. (araneae - Biodiversity (nmbe.ch))



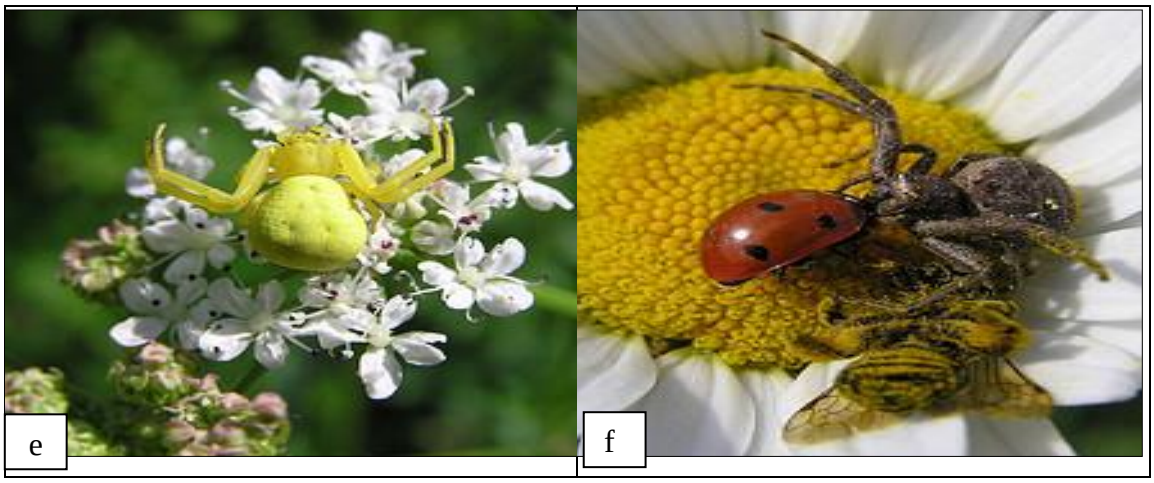


Fig. 25. Thomsidae: a. World distribution; b-f. biodiversity of crab spiders; b. *Ozyptila trux*, c. *Thomisus onustus*, d. *Thomisus* sp., e. *Misumena vatia*, f. *Xysticus* sp.

Zodariidae (Spotted ground spiders, Ant spiders)

Data collection from the collection areas of the Northwest of Libyan coast line revealed that 11 spider samples were obtained. The family consists of 81 genera and 1095 species (Platnick, 2015). Spiders are of small and medium sizes, from 2 to about 20 mm, also called "spider's ant", for the shape and the behavior similar to these Hymenoptera.

Their anterior median eyes are much larger than all the others. Chelicerae margins smooth not serrated. They are found worldwide especially in tropical regions. It is only feed on ants' diurnal wandering spiders. They do not build web but can be spotted in the vicinity of ant nests in rocky places, where they build their nests.

The Zodariidae perfectly mimic the behavior of ants, this allows them to enter and exit from ant hills undisturbed, still with some circumspection. To avoid being caught and killed by ants, three pairs of walking on its hind legs and if, on entering the hive, they encounter an ant, touching the antennae with the pair of front legs thinner. If the spider has already captured an ant, and the ant meets another coming out, offering it to him, just as he would an ant carrying a dead nonspecific outside, so do not raise any suspicion, and manages to bring the prey into its den, typically a small tunnel in the ground.

This work showed that members of this family are widespread areas of agricultural ecosystem, trees, gardens and homes and found all year around. Zavattari, 1934 listed 11 species of the family while currently in Libya, there are species: *Acanthinozodium spinulosum*, *Zodarion cyrenaicum*, Z. *fazanicum*, Z. *immaculatum*, Z. *maculatum*, Z. *nitidum*, Z. *pileolonotatum*, *Zoropsis spinimana*. (araneae - Biodiversity (nmbe.ch).

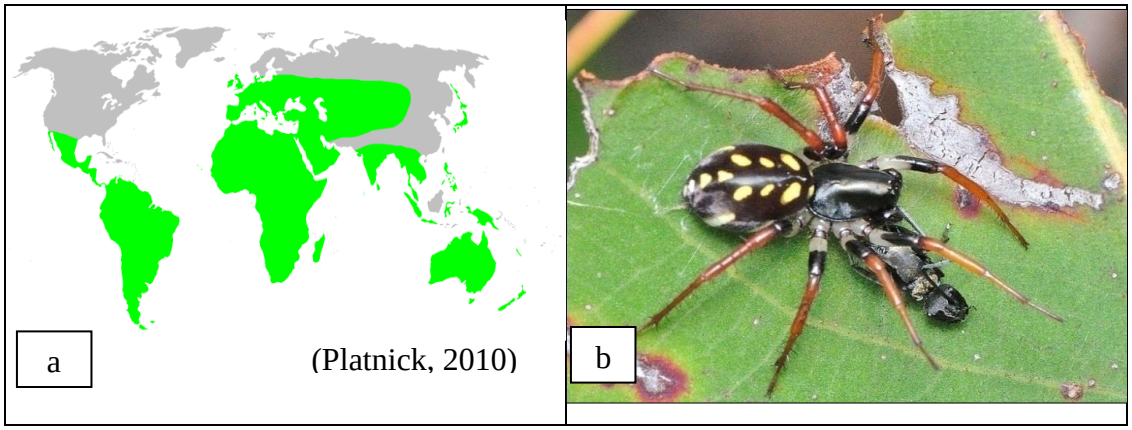


Fig. 26. Zodariidae: a, World distribution; b. *Habronestes hunti*....

Community of spiders

Community composition of spider's fauna in Northwest coast of Libya was analyzed according to families' habitats, predation and web making Table 3. Second, families that do not make "web hunting", better known as ground dwellers, were divided into "active hunters, ambush hunters (Hubert, 1979; Zschokke, 1999). Webs are irregular three-dimensional and complex, or "tangle", consisting of a mass, apparently chaotic, more or less conspicuous of crossed wires, often also with a geometric part dome shaped or pagoda; irregular two-dimensional web, or "sheet", consisting of a thick veil of silk placed more or less horizontally; webs geometric, or "orbicular", to plant more or less circular and developed only in two dimensions, which may, however, present different variations while maintaining the general scheme.

Table 3 describes the 6 main habitats in which the environment of Northwest coast of Libya is divided in relation to spider's community; excluding special habitats such as the interior and exterior of buildings, walls and rocks. It must be pointed out that there are no sharp boundaries between habitats, and therefore families can be present simultaneously in multiple habitats.

Distribution of spider's fauna in Fig. 27 reveals the Abundance of spiders of Northwest coast of Libya according to their life activities: terrestrial families (54%), web makers (27%) and tubular burrows (19%).

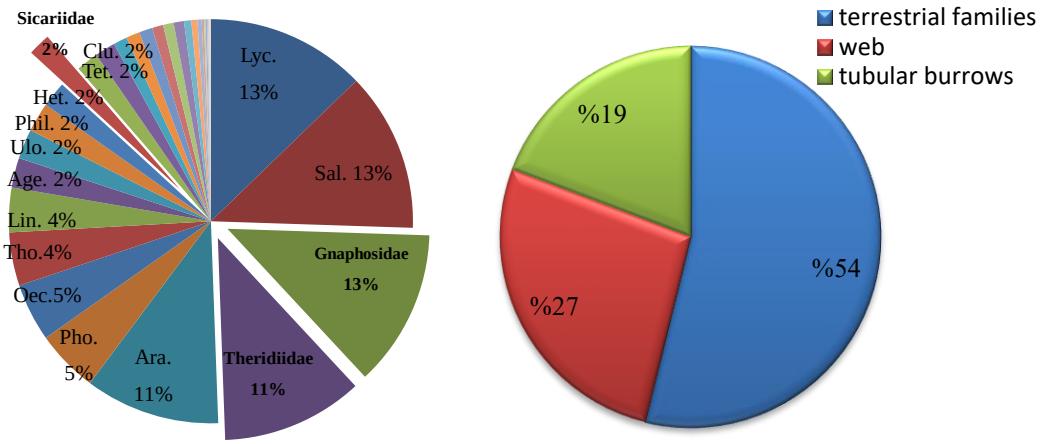


Fig. 27. Major types of spider predation in Northwest coast of Libya.

Table 3. Family distribution of spiders in the Northwest coast of Libya in relation to theirs of predation and different habitats.

		On or near the ground	Shrubs and tall trees, under bark, and grass	Low or medium leaves	Under stones , logs, litter	Inside and outside of the buildings	Rock walls
No Web	Active hunters	Scytodidae	Clubionidae	Clubionidae	Clubionidae	Scytodidae	Dysderidae
		Salticidae	Cheiracanthiidae	Cheiracanthiidae	Dysderidae		Philodromidae
		Segestriidae	Salticidae	Salticidae	Gnaphosidae		Salticidae
		Zodariidae	Gnaphosidae	Gnaphosidae	Liocranidae		Segestriidae
		Lycosidae			Zodariidae		Zodariidae
							Prodidomidae
	Ambush hunters		Philodromidae	Philodromidae			
			Thomisidae	Thomisidae			
Web	Orbicular		Araneidae	Araneidae			Araneidae
	A tangle	Theridiidae	Linyphiidae	Dictynidae	Dictynidae	Pholcidae	Pholcidae
			Theridiidae	Linyphiidae	Oecobiidae	Oecobiidae	Theridiidae
				Theridiidae	Theridiidae	Theridiidae	
	A sheet	Agelenidae		Agelenidae	Agelenidae	Agelenidae	
		Linyphiidae		Linyphiidae	Linyphiidae	Linyphiidae	
Web retreat or shelter tubular		Agelenidae		Sicariidae	Lycosidae	Agelenidae	Filistetidae
		Lycosidae			Segestriidae	Sicariidae	Segestriidae
		Sicariidae			Sicariidae		Sicariidae

The Abundance and the distribution of spiders in northwest Libya:

Table 4 describes distributions of adult and immature spiders in general are found all over the world such as Gnaphoside, Oecibuiide and Lycisudae. Their mating and multiplication is noted specially in spring and summer time for food is abundant on top of the suitable climate for their reproduction. On the other hand, there is an overlap from April to August for Araneidae, Agelenidae and Herterropodae in term of producing and multiplying.

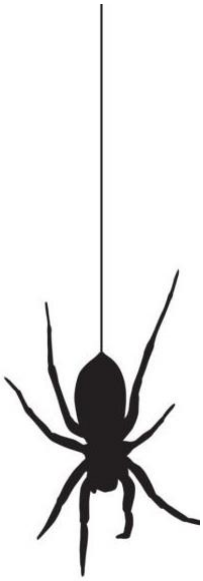
For Hersiliidae, Heteropodidae their individual's immature is more active in producing from September to January. And dipluridae, dictynidae and desidae reach maturity from January to February. The Cheiracanthiidae has become mature and ready for mating in May and January; in addition, sicariidae and Theridiidae are found to reach maturity from August to October and for the rest species regarding their maturity are distributed randomly throughout the year.

Table 4. Abundance and distribution of families collected monthly in the Northwest coast of Libya from February 2005 - January 2006.

Family	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
Agelenidae	A, Y	A, Y	A, Y	Y	Y	Y	Y	A, Y	A, Y	A, Y	A, Y	A
Amaurobiidae	A, Y		Y	A	A							A, Y
Araneidae	A, Y	A, Y	Y	Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y
Cheiracanthiidae	A, Y	A, Y		A	A, Y	A		A	A	A	A	A
Clubionidae	A, Y	A, Y	A, Y		A, Y				Y	A, Y	A, Y	A, Y
Desidae	A	A			A							
Dictynidae					A							
Dipluridae					A					A		
Dysderidae	A, Y	A, Y	Y		A					A, Y		A, Y
Eresidae	A	A, Y			A		A			A	A	
Filistatidae	A, Y	A, Y	Y	A, Y	A, Y	A		A, Y		A	A	Y
Gnaphosidae	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y
Hahniidae												Y
Heteropodidae		A, Y	Y	Y	Y	A, Y		Y	Y		A, Y	A, Y
Hersiliidae		A, Y	A				A, Y			Y	Y	Y
Idiopidae		A										
Linyphiidae	A, Y	A, Y		A	A, Y	A		A	A, Y	A, Y	A	A, Y
Liorcranidae										A		
Lycosidae	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y
Oecobiidae	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y		A, Y	A, Y	A, Y	A, Y	A, Y
Oonopidae												Y
Oxyopidae		Y									A, Y	
Pholcidae	A, Y	A, Y	A, Y	A, Y	A, Y	A	A	A, Y	Y	A, Y	A, Y	A, Y
Philodromidae		A, Y	A, Y	A, Y	A, Y	A, Y	A			Y	A, Y	A, Y
Prodidomidae					A			A				
Uloboridae	A, Y	A, Y	A, Y	A	A, Y			A	A, Y	A, Y	A, Y	A, Y
Salticidae	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y
Scytodidae	A, Y	A, Y	A, Y		Y	A	A			A	A, Y	Y
Segestriidae		Y										
Sicariidae	A, Y	A, Y	A, Y	A, Y	A, Y	Y	A	A	A	A, Y	Y	A, Y
Theridiidae	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y	A	A		A	A, Y	A, Y
Thomisidae	A, Y	A, Y	A, Y	A, Y	A, Y	A, Y		A		A, Y	A, Y	A, Y
Titanoecidae							Y	A, Y	A, Y	A, Y		
Tetragnathidae	A	A				A						A, Y
Zodariidae		A								A, Y	A	A, Y

LEGEND:		Adults mature		Individuals ' immature		Adults &immature		Absent

2



Morphological taxonomy key of selected Families to species

Part: II. Morphological taxonomy key of selected families to species

Accurate identification of a spider is done by viewing the tiny structures of their anatomy under a microscope. Most important for species level identifications is the examination of the spider reproductive organs. This can only be done when those organs are completely developed, which means the spider must be a fully matured adult. The epigynum of the female spider and the pedipalp of the male are unique to each species.

1. Family Gnaphosidae

Background

This family is closely related to the family Clubionidae. It is a world widely-distributed. Forty-one species of this family are known in NW-Europe. The majority of spiders in this family are grayish-brown to jet-black. Their abdomen has no clear markings. These are nocturnal hunters, spending the daytime in a silken retreat. The females make their thick-walled egg sacs in the summer and guard it until the youngsters are born gnaphosidae.

Gnaphosidae spiders have been recognized by their abdomen, and spinnerets is large cylindrical, and parallel spinners the anterior pairs are widely separated at base, composed of one segment, and with enlarged spigots, and usually project from the posterior end of the abdomen.

Is one of the big spider families which include about 2178 species in 122 genera (Platnick, 2015). It is one of familiar families of spiders in Northwest coast of Libya. The known collected Gnaphosids of Libya are 412 samples including 13 genus Tables 5,6.

Materials and Methods

Samples were collected by hand, a net, beating, brush, suction, and shaking. And pitfall traps in some areas. Samples preserved in 70% ethanol and 5% glycerine to give them the necessary flexibility and classified to family using microscope taxonomic keys. Work has been established and materials were deposited in Zoology Department of University degli Studi di Palermo – Italy.

Results and Discussion

Gnaphosidae (Ground spiders)

Nearly 412 spider samples were collected from Northwest coast of Libya Gnaphidae is the sixth largest in the world. The dimensions of the body vary from 2 to 18 mm. The spiders are Gnaphosidae ecribellate, have a flat abdomen and elongated and are recognizable from the front sectors cylindrical and very spaced out. They have cylindrical spinners, the anterior pair of which are slightly longer than the rear end which is separated from each other by roughly the diameter of one of them. The spinners are not typical in the genus Micaria (anterior spinners are close). They have eight eyes arranged in two rows that have silvery reflections, except the anterior median, which are dark. In most species, the posterior median eyes (PME) are oval, flattened, to irregular, triangular or narrowed. The curvature of the rear row of the eyes. The position and shape of the teeth of chelicerae is distinctive characters. Chelicerae are robust, and the fang furrows are provided with teeth. The retromargin may have a sclerotized lamina (flat, keel-like plate) in place of teeth. This lamina is serrated in some genus. Endites usually have an oblique or transverse depression. They are provided with a serrula (row or cluster of tiny teeth on the front margin).

Gnaphosids are also characterized by having 2 tarsal claws, claw tufts, and scapulae. Legs are stout and, in some species, there are small brushes of more and less stiff hairs present distally on metatarsus IV. Female pulp is furnished with small spines and a finely toothed claw.

Most Gnaphosids spend their day under logs, plant debris or stones. Spiders are mainly nocturnal hunters, However Micaria spiders of the genus are diurnal hunters, even if mistakes again and again to direct sunlight and that rely on touch and smell, rather than sight, to locate prey. Their bodies are usually uniformly dark in colour and many species appear superficially alike. The colours of the abdomen vary widely, from uniformly colored gray-brown or blackish spots.

Gnaphosids are entelegyne spiders often having rather large epigynes with sclerotized structures. They are somewhat variable and closely related species may be difficult to

identify. Male pulps are usually provided with a large tibia apophysis and the shape of this is important when identifying the species.

Zavattari, 1934 recorded 13 genera and 36 species of Gnaphosidae while currently in Libya, there are species: *Anagraphis pallens, Berlandina deserticol*, B. *plumalis*, B. *punica,* B. *venatrix, Drassodes deserticola,* D. *lutescens,* D. *unicolor, Gnaphosa cyrenaica,* G. *zeugitana, Haplodrassus dalmatensis,* H. *omissus*, H. *rufipes, Leptodrassex algericus, Leptodrassus fragilis, Leptopilos tenerrimus, Marinarozelotes barbatus,* Ma. *Bardiae, Megamyrmaekion algericum,* Me. *Audatum, Micaria coarctata,* Mi. *marchesi,* Mi. *pallipes, Minosia pharaoh,* Min. *santschii, Minosiella pharia, Nomisia aussereri*, No. *castanea,* No. *exornata,* No. *recepta, Odontodrassus mundulus, Poecilochroa pugnax,* Po. *senilis, Pseudodrassus scorteccii, Pterotricha algerica,* pt. *cambridgei,* pt. *chazaliae*, pt. *conspersa,* pt. *egens,* Pt. *paupercula,* pt. *schaefferi,* pt. *vicina, Pterotrichina elegans, Scotophaeus microdon,* Sc. *Validus, Setaphis carmeli, St. fuscipes, St. mollis, St. simplex, Synaphosus minimus,* Sy. *Syntheticus, Urozelotes rusticus, Zelotes davidi,* Ze. *fuscorufus,* Ze. *incertissimus,* Ze. *laetus,* Ze. *scrutatus,* Ze. *stolidus,* Ze. *tarsalis,* Ze. *tragicus.* (araneae - Biodiversity (nmbe.ch)**.** Data of this project showed that 83 samples were males and 329 were females. Spring time more than 166 samples were collected in comparison to 73 in summer, 66 in autumn and 107 in winter in different localities of Northwest of Libya. In addition, several samples need to be classified Tables 5-9 and Figures 28-30.

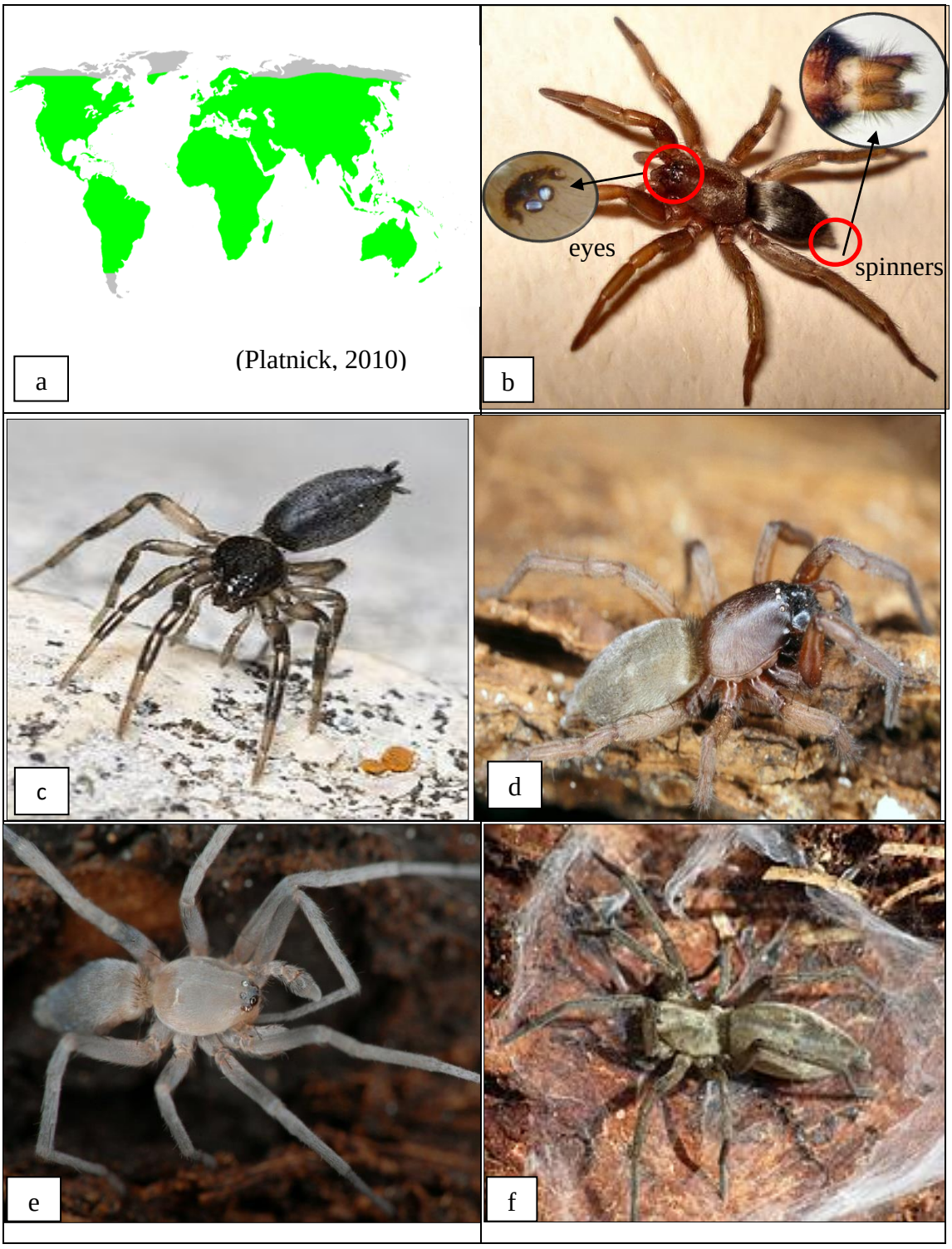
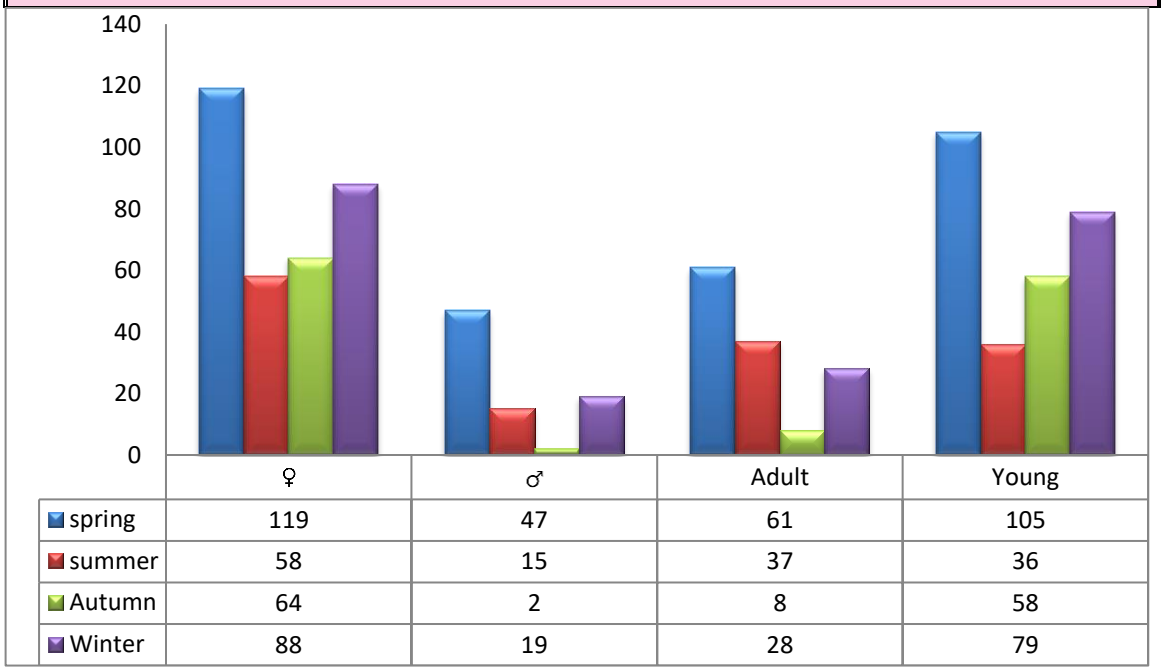


Fig. 28. Gnaphosidae: a. World distribution; b. eyes, spinners. c- f. Biodiversity of ground spiders.

Table 5. The distribution of Gnaphosidae; male and female and areas of collection.

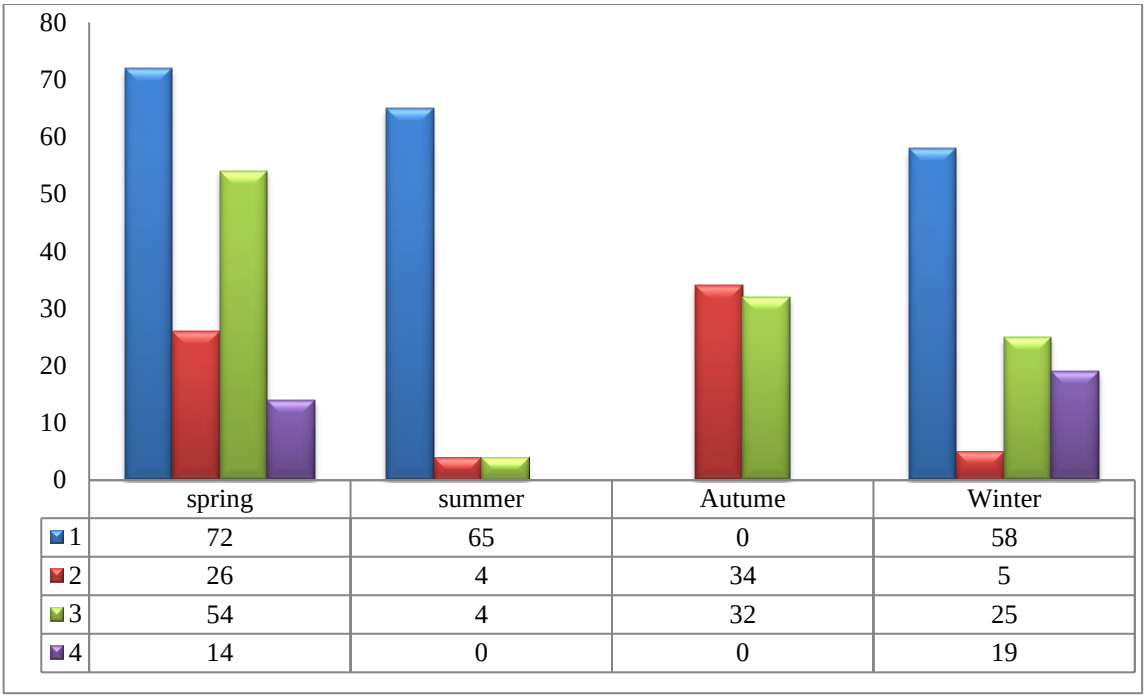
Season / year	Spring				summer				Autumn				winter				Total
Sex / Area	♀		♂		♀		♂		♀		♂		♀		♂		
	A	Y	A	Y	A	Y	A	Y	A.	Y	A	Y	A	Y	A	Y	
1	14	33	14	11	20	30	14	1	0	0	0	0	13	35	5	5	195
2	8	11	4	3	2	2	0	0	5	27	1	1	0	2	1	2	69
3	10	36	2	6	1	3	0	0	2	30	0	0	3	19	1	2	115
4	5	2	4	3	0	0	0	0	-	-	-	-	4	12	1	2	33
Total	37	82	24	23	23	35	14	1	7	57	1	1	20	68	8	11	412
	119		47		58		15		64		2		88		19		412
	166				73				66				107				412
♀	119				58				64				88				329
♂	47				15				2				19				83
A	61				37				8				28				134
Y	105				36				58				79				278

A; Adult, Y; young. / 1. Zawiya, 2. Surman &Sabratha, 3. Mellita & Zuwarah, 4. Farwa Island



	♀	♂	Adult	Young
spring	119	47	61	105
summer	58	15	37	36
Autumn	64	2	8	58
Winter	88	19	28	79

Fig. 29. Distribution of females to males and Individuals adult to young of Gnaphosidae in the collection areas during year seasons.



	spring	summer	Autume	Winter
1	72	65	0	58
2	26	4	34	5
3	54	4	32	25
4	14	0	0	19

Fig. 30. Numerical density of the spiders Gnaphosidae in the collection areas during year seasons; 1: Zawiya; 2: Surman and Sabratha; 3: Mellita, Zuwarah and Ibokmash; 4: Farwa Island.

Table 6. The distribution of genus within the Gnaphosidae in the Zawiya, Sabratha areas.

Genus	**A**	**B**	**A**	**B**	**Total**	**Genus**	**A**	**B**	**A**	**B**	**Total**
Drassodes	**2**	**-**	**1u+ 3**	**1**	**7**	***Scotophaeus***	**5**	**1**	**2+1u**		**9**
Drassyllu	**1**	**-**	**1**	**1**	**3**	***Setaphis***	**4+1u**	**-**	**0**	**-**	**5**
Haplodrassus	**0**	**1**	**1u**	**-**	**2**	***Sosticus***	**0**	**-**	**3+1u**	**-**	**4**
Leptodrassus	**1a**	**-**	**0**	**-**	**1**	***Trachyzelotes***	**-**	**-**		**1**	**1**
Micaria	**1a**	**-**	**0**	**1**	**2**	***Urozelotes***	**2**		**6+2u**	**-**	**10**
Nomisia	**3**	**-**	**11+3u**	**2a, u**	**19**	***Zelotes***	**6+1u**		**11+2u**	**2a, u**	**22**
Pterotricha	**2a**	**-**	**0**	**-**	**2**	**All Total**	**27**	**2**	**43**	**8**	**87**
A: Zawiya area, B: Surman and Sabratha area. a. Adult, u. Young.											

Table 7. The distribution of confirmed genus within the Gnaphosidae in the Zawiya, Surman and Sabratha areas during the season.

	spring		summer	Autumn		winter	Total
Area / Genus	A1	B1	A2	A3	B3	A4	
Drassodes	4(2♂+♀+u)	1♂	1♀	1♀			7
Drassyllus	1♂	1♀		1♀			3
Haplodrassus	*1♀u	1♂					2
Leptodrassus	1♂						1
Micaria	1♂				1♀		2
Nomisia	8(2♂+4♀2♀u)	2♀ (a+u)	2♀			7(1♂+5♀+u)	19
Pterotricha	1♂u					1♂	2
Scotophaeus	2(1♂+1♀)	1♂	4(1♀+3♂)	1♀		1♀	9
Setaphis	4(3♂+1♀u)			1♂			5
Sosticus	1♀u		3♀				4
Trachyzelotes	*1♂u	1♀					1
Urozelotes	*1♀u		7(5♀+2♂)	1♀		1♀	10
Zelotes	6(2♂+♂*u+♀+2 ♀u)	2♀a, u	8(3♂+5♀)	4(3♀+♂)		2♀	22
Total	31	9	25	9	1	12	87

A: Zawiya Area, B: Surman and Sabratha area - a. Adult, u. Young..

Confirmed Genus, * unconfirmed between two Genus.

Table 8. Distribution of confirmed genus in Zawiya, subarea area from March, 2005 – February 2006.

Month / Genera	Year Season											
	M	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
Drassodes	▬▬▬		▬▬				▬▬▬					▬▬
Drassyllus	▬						▬▬					
Haplodrassus	▬											
Leptodrassus	▬											
Micaria	▬▬					▬▬						
Nomisia	▬▬▬			▬▬							▬▬▬	
Pterotricha		▬▬										▬
Scotophaeus	▬▬			▬▬							▬▬	
Setaphis	▬▬							▬▬				
Sosticus					▬▬							▬▬
Trachyzelotes		▬▬										
Urozelotes	▬		▬▬▬				▬▬			▬▬		
Zelotes	▬▬▬			▬			▬▬▬					▬

Table 9. The distribution of confirmed and unconfirmed genus of Gnaphosidae in surman, Sabratha, Mellita, Zuwarah, Ibokmash, and Farwa Island areas during the season.

Year Season	spring			summer			Autumn			winter		
Area / Genus	B	C	D	B	C	D	B	C	D	B	C	D
Haplodrassus				*×								
Camillina		*×										
Drassodes	×	×	×	×	×	×	×			×		×
Drassyllus	×											
Echemus		*×										
Haplodrassus	×											
Leptodrassus	×											
Micaria							×					
Nomisia	×	×	×	×		×	×	×		×	×	×
Parasyrisca	*×											
Phaeocedus		*×										
Poceilochroa		*×	*×									
Puritanus				*×								
Pterotricha				×								
Scotophaeus							×	×				
Setaphis	×	×										
Trachyzelotes											×	
Urozelotes		×		×								
Zelotes				×	×	×		×		×		

B: Surman and Sabratha area c. Mellita. Zuwarah area and Ibokmash. D: Farwa Island.

***×, New unconfirmed Genus. ×, unconfirmed Genus in area.**

The Spider Genera in Northwest coast of Libya

Genus Drassodes (Walckenaer, 1802)

Several species were observed in the North west coast of Libya. Main characteristics are hairy mouse, grey-brown abdomen and resemble some Clubiona species. However, they are easily distinguished by the long tubular spinners (Fig. 31).

Females seal themselves in silken cells with their egg sac. They are nocturnal hunters. Their size varies between 9 and 18 mm. *Drassodes lapidosus*, Posterior median eyes (PM) angle, the anterior lateral (AL) are clearly separated from the posterior lateral (PL). Two spines on tibiae IV. Usually in livery uniform light brown rocky.
Habitat: stones.
Maturity: spring.

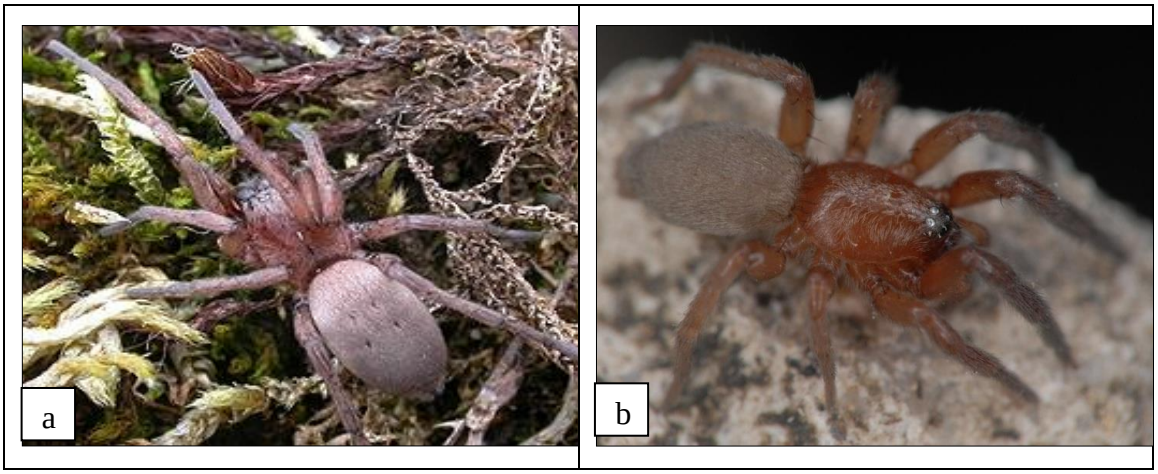


Fig. 31. a. *Drassodes lapidosus*, b. Drassodes unicolo.

Genus Drassyllus (C. L. Koch, 1839)

The genus Drassyllus is redefined to include those Gnaphosids with a preening comb on metatarsi III and IV, closely spaced posterior median eyes, and medially situated, bifid terminal apophysis on the male pulp (Fig. 32). *Drassyllus pumilu, D. pusillus, D. praeficus.*

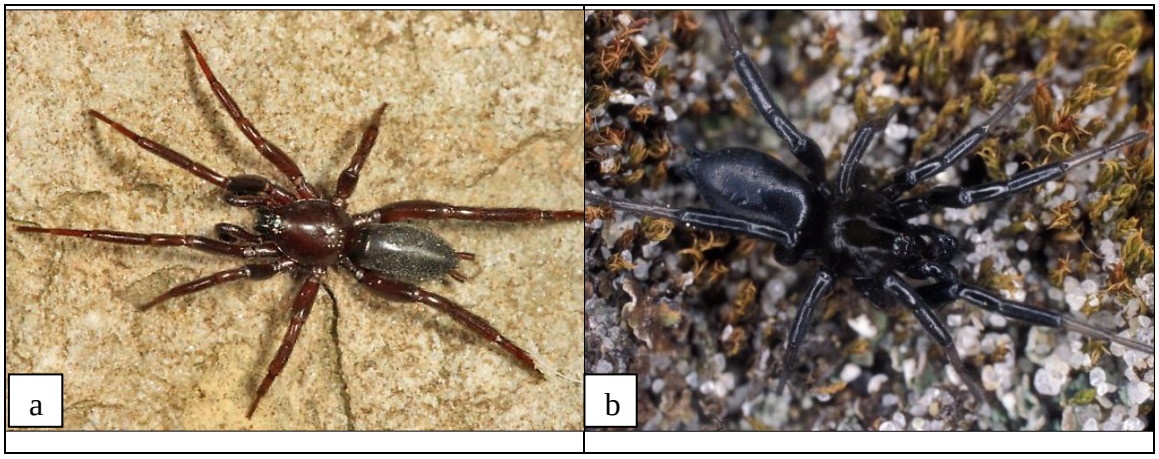


Fig. 32. a. *Drassyllus novus* (male), b. *Drassyllus pusillus*.

Genus Micaria

M. fulgens (Walckenaer, 1802)

These spiders are known as ant-mimicking spiders. Fifteen species are described and their size is between 2.5 and 7 mm. They can be seen running between detritus and stones in an ant-like fashion in the sunshine searching for prey. Micaria spiders have an iridescent abdomen that can become very beautiful in the sunshine (Fig. 33).

Micaria romana, *Micaria pulicaria*, *M. coarctata*.

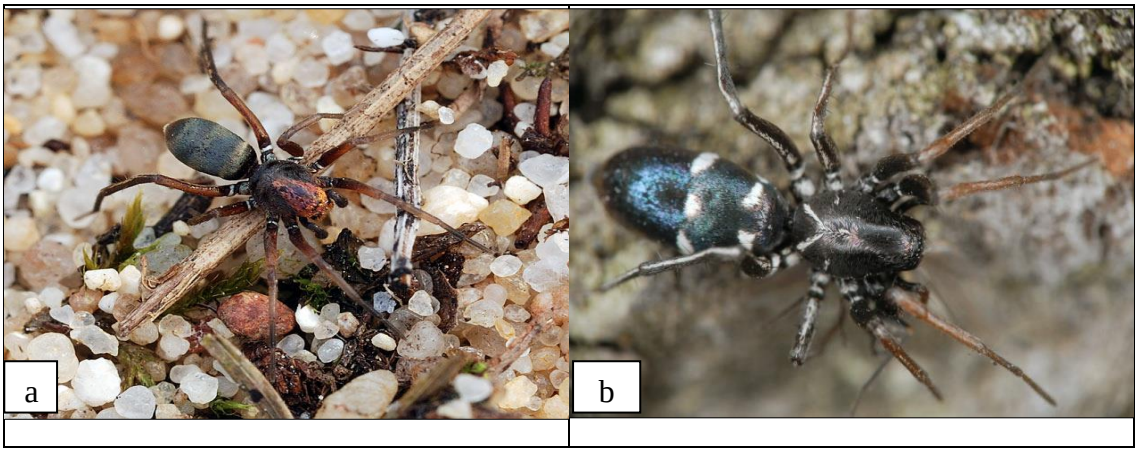


Fig. 33. a. *Micaria fulgens* (male), b. *Micaria coarctata*.

Genus Nomisia

This genus measures between 6 and 12 mm. can be found at daytime predating ants on dry spots on grass and on dunes, *Nomisia aussereri*, *N. exornata* (Fig. 34).

Lower margin of the chelicerae armed with a large serrated keel. Patella III unarmed. Eyes (MA) are equal to or slightly smaller than (LA). Male pulp is with two tibial apophyses. It lives under stones by minimizing the use of silk.
Habitat: rocks in hot, dry places.

Maturity: spring.

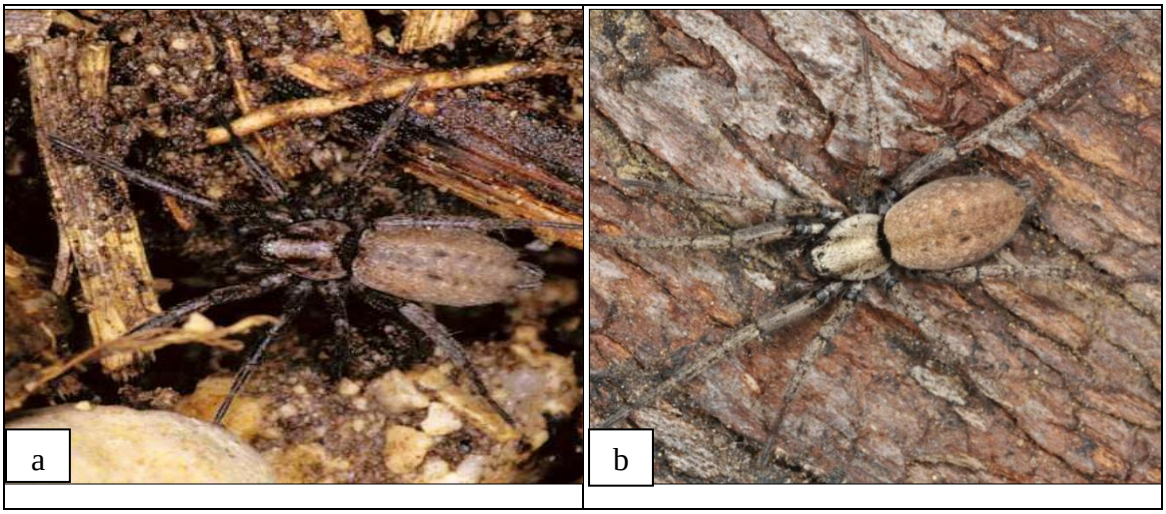


Fig. 34. a. *Nomisia* sp., b. female *Nomisia exornata* .

Genus Zelotes sp. (L. Koch, 1876)

Most spiders of this genus are black and are between 3 - 8 mm in size. They are nocturnal hunters and can be found under stones and detritus. They make a disk-shaped egg sac that is white or pink of color. *Zelotes pusillus*, *Zelotes praeficus*, *Zelotes pusillus*, *Zelotes latreillei.*

Body is entirely black, arts blacks or varying shades of brown (Fig. 35).
Carapace narrowed interiorly, compact eyepiece group: its width is almost always less than 1/3 of the width of the carapace. The cocoon is firmly anchored to the rocks.

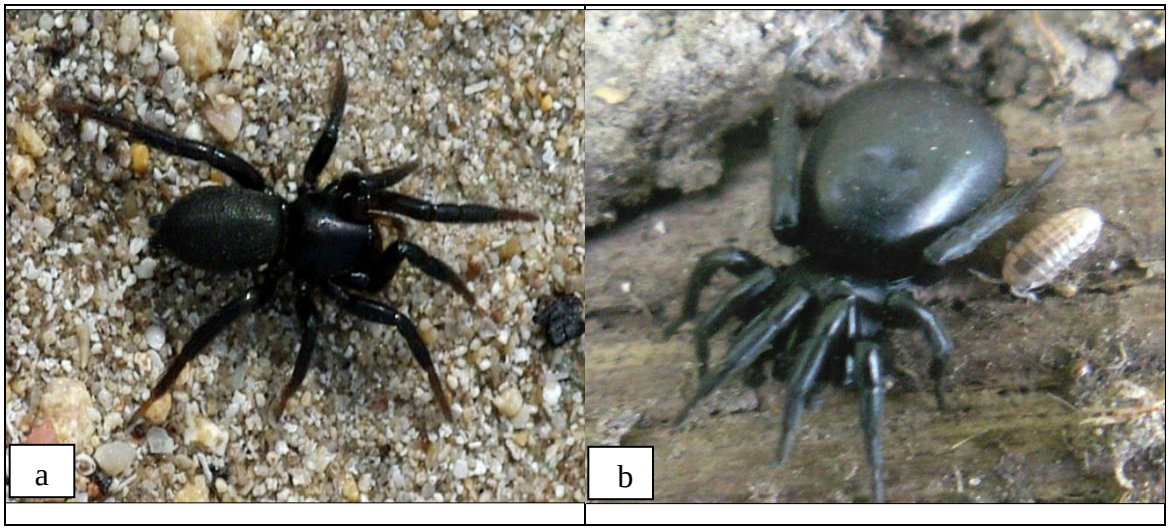


Fig. 35. a, b. *Zelotes* sp.

2. Family Sicariidae

This family is closely related to the family Scytodidae. These spiders are also commonly referred to as "fiddle back" spiders or "violin", a dark violin shape is located on the top of the leg attachment region with the neck of the violin pointing backward toward the abdomen. Unlike most spiders that have 8 eyes, the brown recluse has 6 eyes arranged in pairs - one pair in front and a pair on either side.

Brown spiders found indoors or outdoors. It may be found logs, under stones, rock crevices, and stacks of lumber. Often in and around houses and buildings.

Is one of the small spider families, only represented by 2 genera and 139 species. (Platnick, 2015). Sicariidae is found in Northwest coast of Libya. Data showed 59 members of sicariidae been collected.

Materials and Methods

In this chapter, the samples were collected by hand, net, brush, suction, shaking and beating branches. Pitfall traps have been used in some areas and samples preserved in 70% ethanol and 5% glycerine. Samples classified microscopically using taxonomic key guide. Samples were classified in the National Center for Disease Control (NCDC), Tripoli, Libya.

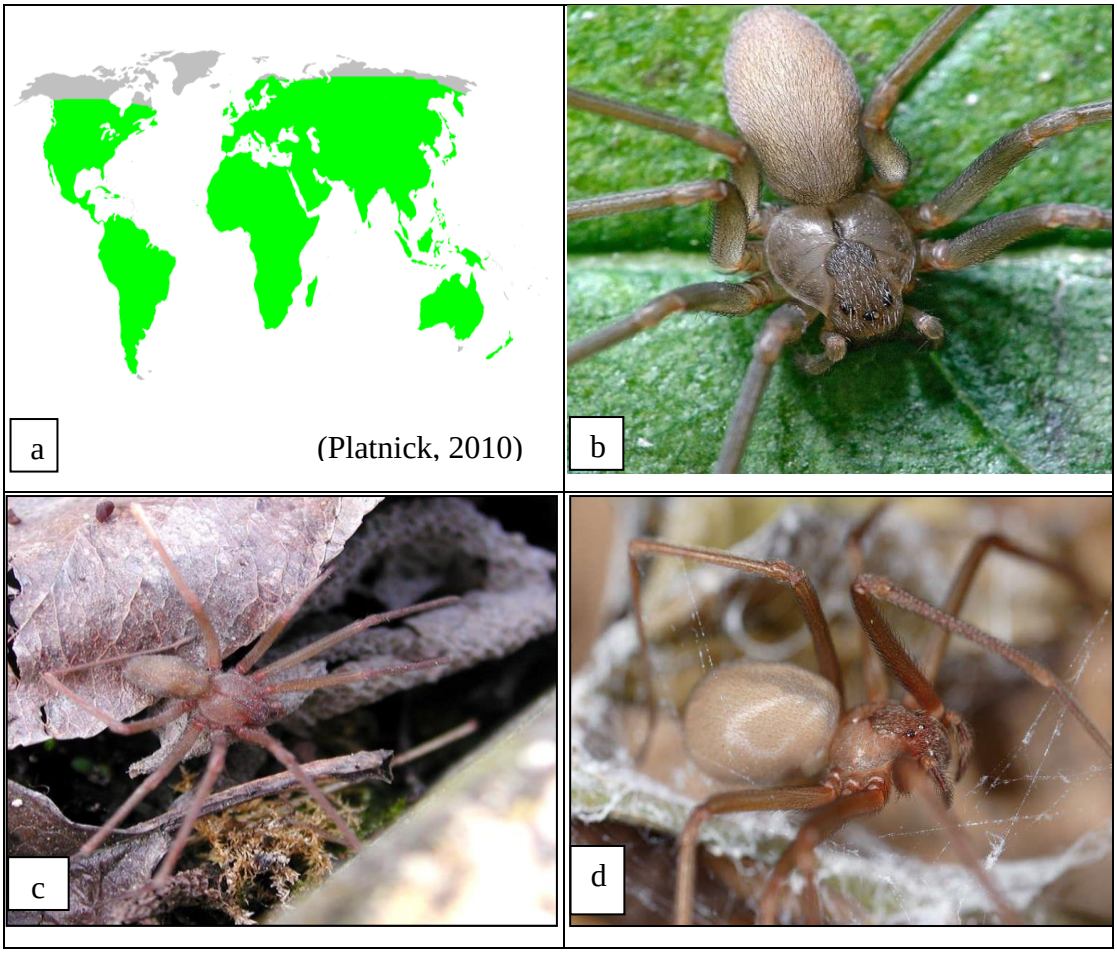
Results and Discussion

Family: Sicariidae (Brown spiders, Violin spiders, Fiddle backs)

As with most spiders Haplogyne, they only have six eyes distributed in three groups of two; carapace low; the color is brown, tending to camouflage where possible and the cephalothorax usually darker color. Those belonging to the genus *Sicarius* are very long-lived; some specimens are over 15 years old.

Their preferred habitats are deserts and semi-arid areas. They can live for long periods of time without food or water. Much of species increases its ability to blend burying in the sand. The genus *Loxosceles* has spread worldwide in warmer areas, while gender Sicarius deals mainly South America and southern Africa. All but two species secrete a very

powerful poison necrotic lesions in humans causing large inflamed area on the skin which is up to 25 millimeters in diameter that employ a very long time to heal and often require skin grafting (Fig. 36) *Loxosceles rufescens*, *Loxosceles laeta*. Zavattari, 1934, listed 2 genera and 2 species in his record of Libyan fauna. Currently in Libya, the species: *Loxosceles rufescens*. (araneae - Biodiversity (nmbe.ch))



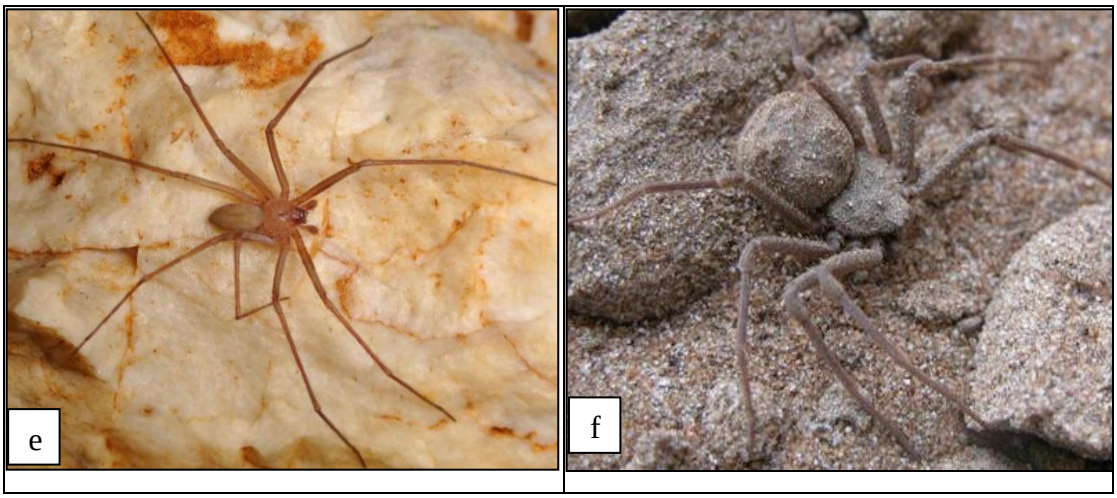


Fig. 36. Sicariidae: a. World distribution; b-f. Biodiversity of Brown spiders, b-e *Loxosceles* genus, f. *Sicarius* genus.

Table 10. Number of Sicariidae specimens collected- showing male/ female and maturity in North-west coast locations of Libya during the year seasons.

	Spring				summer				Autumn				winter				Total
	♀		♂		♀		♂		♀		♂		♀		♂		
	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	
Z.	2	2	2	1	2	6	3	2	3	0	0	0	3	2	1	1	30
S.	0	8	0	0	0	7	2	0	0	0	3	0	0	4	0	2	26
M.	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	3	12	2	1	2	13	5	2	3	0	3	0	3	6	1	3	59
	15		3		15		7		3		3		9		4		59
	18				22				6				13				59
♀	15				15				3				9				42
♂	3				7				3				4				17
A.	5				7				6				4				22
Y.	13				15				0				9				37

A. Adult, Y. Young. Z. Zawiya, S. Surman and Sabratha, M. Mellita. Zuwarah and Ibokmash areas.

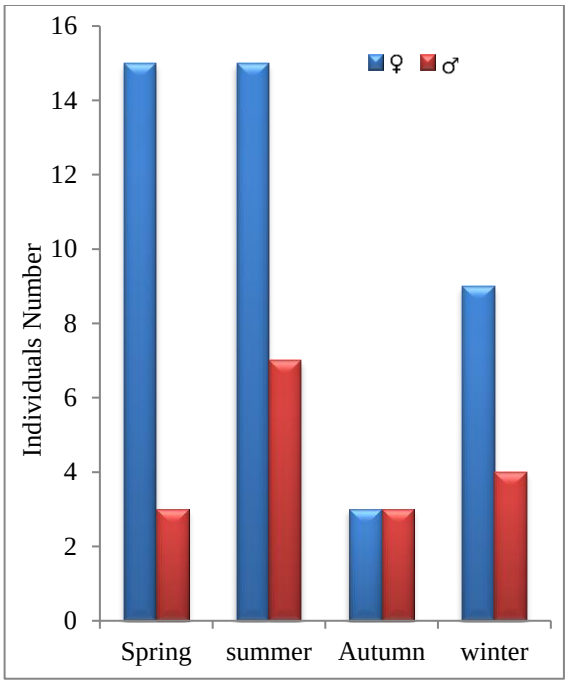


Fig. 37. Distribution of male Individuals and femal Sicariidae during seasons.

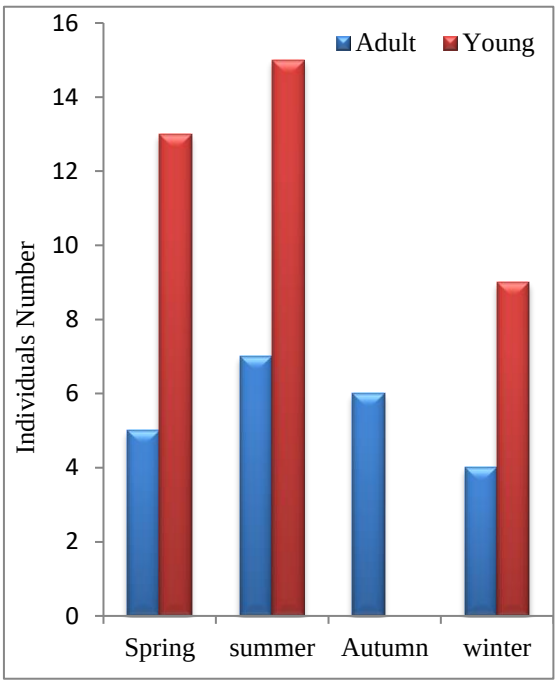


Fig. 38. Distribution of adult Individuals and young Sicariidae during seasons.

The Spider Genus in Northwest coast of Libya

Genus: Loxosceles

Several species were found in the Northwest coast of Libya. They have a yellowish to grayish brown cephalic often darker. Body size 0.5-13.0 mm. They are easily distinguished by chelicerae that are fused basal with median lamina produced into apical tooth: octal margin with stimulatory file, and six eyes (AME absent), arranged in three pairs forming strongly recurved row, the carapace is flat, pyriform, longer than wide, fovea longitudinal.

Abdomen is flattened oval, hairy. Sternum is subcircular, with extensions to coxae, labium elongated, flexibly that is attached to sternum; endites strongly convergent. slender Legs, tarsi with two claws; female pulp lacking claw. The Spinneret, colulus large, pointed, is about twice as long as wide; ALS largest, separated by width of Colulus; PS contiguous. Genitalia: Haplogineze; female lacking external Modification; mail pulp with tibia swollen, tarsus short; bulb spherical, embolus a simple prong. Fig. 39.

Living habitats are rocks, logs, and lumber. Optimum maturity is at spring time.

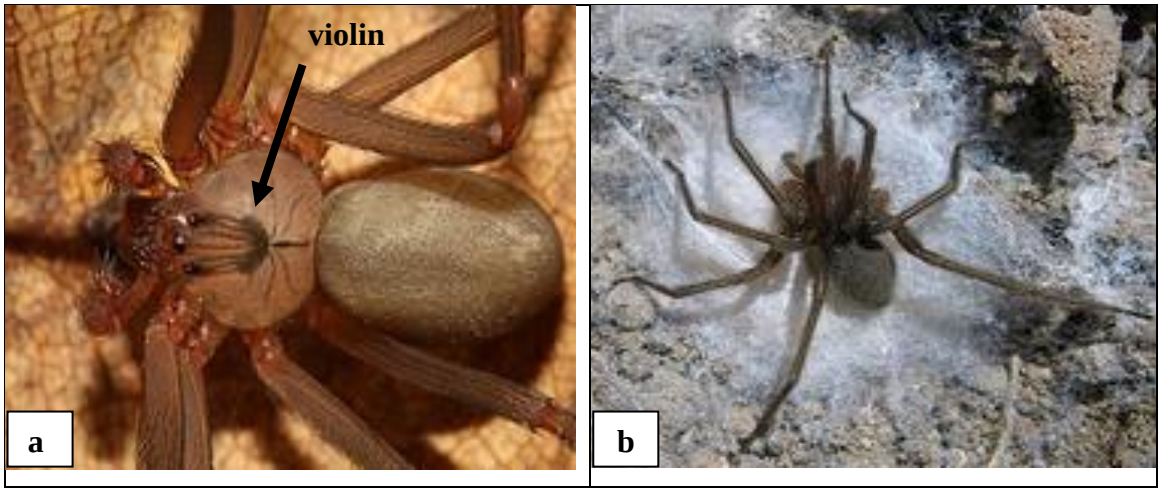


Fig. 39. a. Loxosceles sp., b. Loxosceles sp. with web.

Genus Loxosceles of Libya

Loxosceles rufescens (Dufour, 1820)

Male description:

Pedipalp male: with thickened tibia. Embolus curved, about as long as width of bulbus. Prosoma is orange-brown. Prosoma is 3 mm long. Clypeus is narrower than in female. Legs yellow to orange. Opistosoma grey to yellowish brown.

Body length male: 7-7.5 mm.

Female description:

Vulva with receptacles close together produced into rounded lobes projecting to inner side. Prosoma 3.2 mm long. Prosoma reddish yellow, darker in the front, with sparse hair. Clypeus wide, almost 3 diameters of median eyes. Legs uniformly reddish yellow. Opistosoma grayish to reddish yellow.

Body length female: 7-7.5 mm.

a. Female *L. rufescens* ♀ Epigynum *L. rufescens*

b. Male L. *rufescens* ♂ Pedipalp L. *rufescens*

Fig. 40. a, b. Female and male *Loxosceles rufescens* diagnostic features.

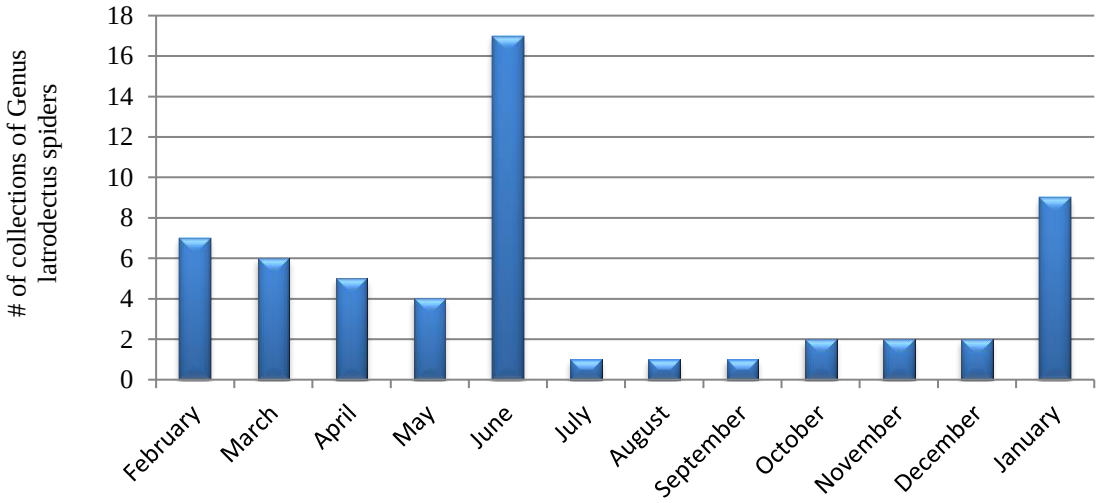


Fig. 41. Seasonality of collections of *Loxosceles rufescens* spiders in Northwest coast of Libya.

3. Family Theridiidae

Background

Large family with over 300 described species in Europe. Most have a globular abdomen with spinnerets on the bottom. The colors range between drab brown to colorful greens and red lack hairs or spines on legs. Theridiidae are also called comb-footed spiders.

Theridiidae are sedentary and usually make an irregular web. It lives on dry rocky walls or walls of house, also found on plants. The spider hides in the dark or debris-covered silken retreat. The Theridiidae are small to medium spiders. Cobweb spiders are sexually dimorphic in size; females are larger than males. Some species practice sexual cannibalism, with the female eating the male after mating. The black widow gets its name from this practice. Is one of the big spider families which contains 2459 species from 122 genera worldwide (Platnick, 2015). It is widespread in Northwest coast of Libya the known Theridiidae collected among fauna of Libya are 469 samples include 7 genus and 8 species.

Materials and Methods

In this chapter, samples were collected by hand, net, brush, suction, shaking and beating the branches of trees and shrubs and Pitfall traps. Samples were preserved in 70% ethanol, 5% glycerine and classified using Taxonomic guides. Samples were also sent to the National Center for Disease Control (NCDC), Tripoli, Libya.

Results and Discussion

Family: Theridiidae (Comb-footed spiders)

During compilation time 372 spider samples were collected from Northwest coast of Libya, Theridiidae is the fourth largest family of spiders in the world. This family includes spiders mostly small (1-22 mm). They are distinguished by the presence of a series of " false nails" consist of hairs thickened, sometimes serrated, on the inner side of tarsi IV, used to throw silk adhesive on the preys. so called because the hind tarsi are fitted with a

row of stiff serrated setae by means of which the spider can fling, from a safe distance, loops of sticky silk over a struggling prey; in this way they can subdue even large fierce beetles or wasps. The web is an irregular tangle placed in shrubs and trees or in litter and among stones. They often suspend themselves from their snares in an inverted position while awaiting their prey.

The carapace usually longer than wide, Sternum is longer than wide, with pointed posterior tip. Eight eyes are arranged in 2 rows of 4 dimensions and have sometimes very different; ME some distance from LE which are adjacent. PME and PLE have a canon-shaped tapetum, Height of clypeus usually more than two diameters of AME, brownish rings around eyes. The chelicerae are weakly sclerotized, often without teeth, or with small teeth, teeth may be large in some genus; fang short except in two genus. Mouthparts are labium lacks the distal swelling of other araneoids endites are longer wide and converge distally. Three clawed; legs of variable length, some quite short ; first usually longest, second or fourth next, third shortest; legs usually have few no thick setae and no femoral macrosetae; fourth legs of most with comb macrosetae, indistinct in only two genus. The abdomen is very variable in color and form, showing oval or round, sometimes globular or extends above the rear part of the cephalothorax, six spinnerets, the median ones hidden by other four; Colulus often absent or only 2 setae remaining.

Genitalia entelegyne; female epigynum has two seminal receptacles, except four in *Latrodectus*, *Dipoena* and most *Europis*; epigynum is usually a simple depression in some genus. Members of the family are present all year except on Farwa Island. Zavattari, 1934 recorded 11 species on his list of Libyan spider fauna while currently in Libya, there are species: *Enoplognatha biskrensis*, E. *mandibularis*, *Euryopis sexalbomaculata*, *Heterotheridion nigrovariegatum*, *Kochiura aulica*, *Latrodectus geometricus*, L. *pallidus*, L. *tredecimguttatus*, *Paidiscura dromedaria*, *Phylloneta sisyphia*, *Simitidion lacuna*, *Steatoda albomaculata*, S. *ephippiata*, S. *paykulliana*, S. *triangulosa*, S. *triangulosa concolor*, S. *venator*, *Theridion melanostictum*, Th. *patrizii*, Th. *pictum*, Th. *spinitarse*, Th. *varians*, Th. *varians*, Th. *cyrenaicum*. (araneae - Biodiversity (nmbe.ch)

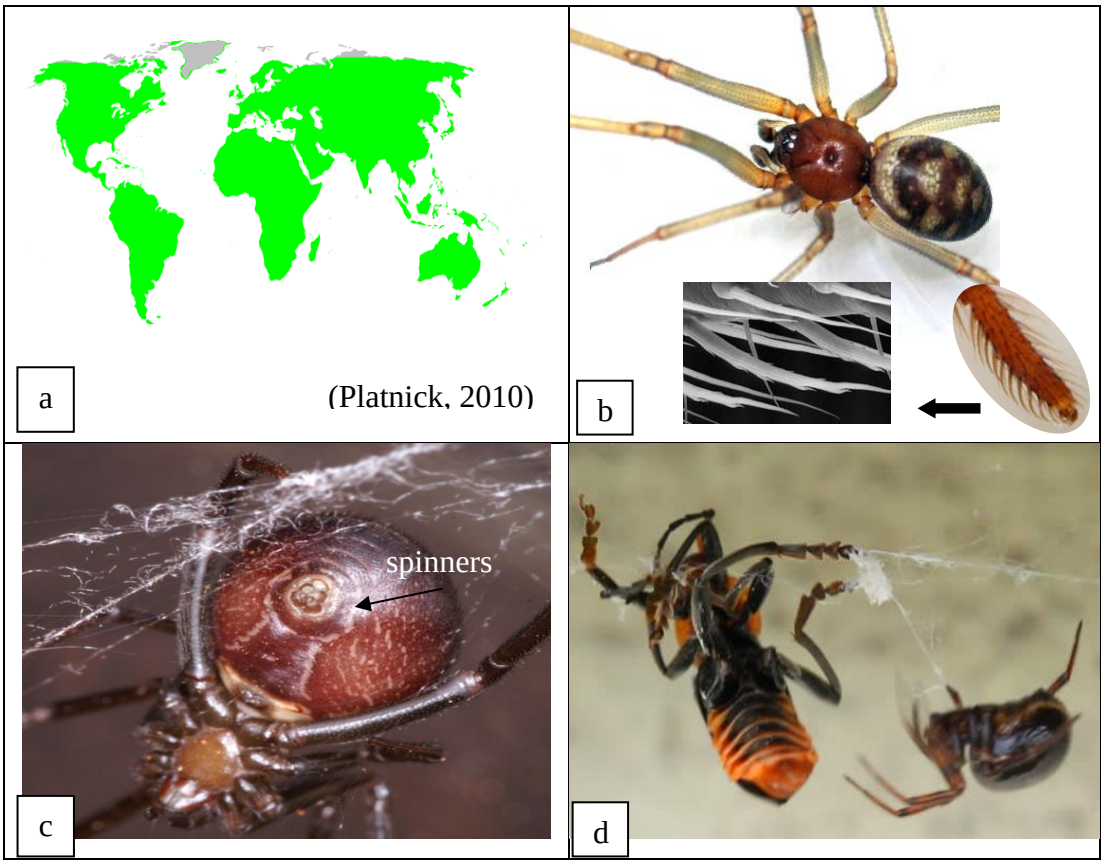


Fig. 42. Theridiidae. a. World distribution; b. leg IV, row of serrated bristles. c. spinners. d. false widow, biting its prey.

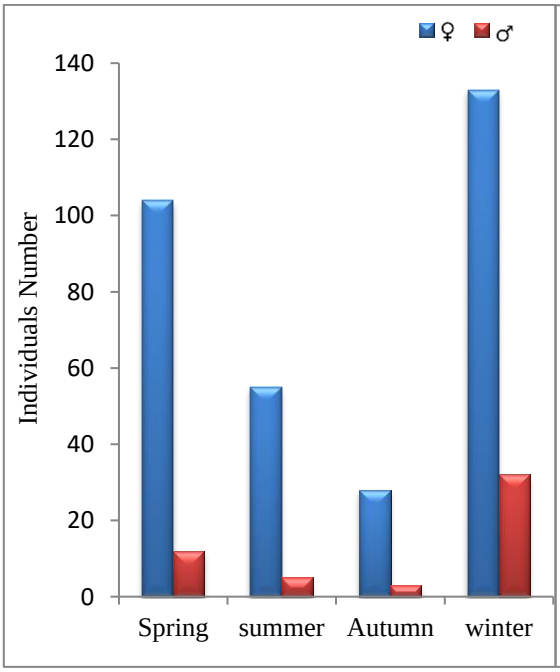


Fig. 43. Distribution of Theridiidae males and individual's females during seasons.

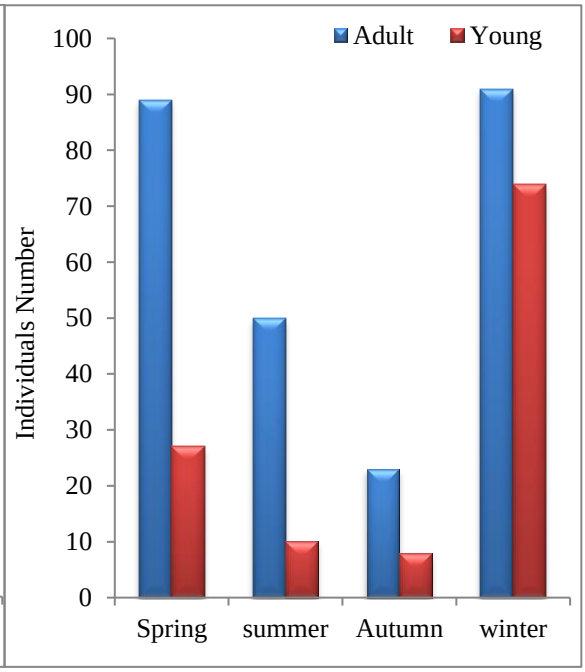


Fig. 44. Distribution of Theridiidae adult and individuals young during seasons.

Table 11. Number of specimens collected for the family Theridiidae- shown male/female. and maturity in the Northwest coast of Libya during seasons of the year.

	Spring				summer				Autumn				winter				Total
	♀		♂		♀		♂		♀		♂		♀		♂		
	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	
1	62	7	3	3	11	5	3	1	15	4	2	1	47	30	7	10	211
2	16	12	3	1	28	2	1	0	4	1	0	0	21	16	5	5	115
3	3	3	1	0	7	2	0	0	2	1	0	0	10	8	1	4	42
4	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	4
Total	82	22	7	5	46	9	4	1	21	7	2	1	78	55	13	19	372
	116				60				31				165				
♀	104				55				28				133				320
♂	12				5				3				32				52
A	89				50				23				91				253
Y	27				10				8				74				119

A. Adult, Y. Young. 1: Zawiya, 2: Surman and Sabratha, 3: Mellita. Zuwarah and Ibokmash, 4: Farwa Island.

The Genus Theridiidae in Northwest coast of Libya

Genus: Enoplognatha

E. ovate: Having different colors with a marked pair of black spots the Colulus great and species can differ greatly in the characteristics of the habitats. Species have livery pale, whitish, with long limbs. They build small paintings on the lower branches of trees or herbaceous vegetation. Male measures 4-5 mm and female 4-7 mm.

habitat: Edge of woods and shrubs.

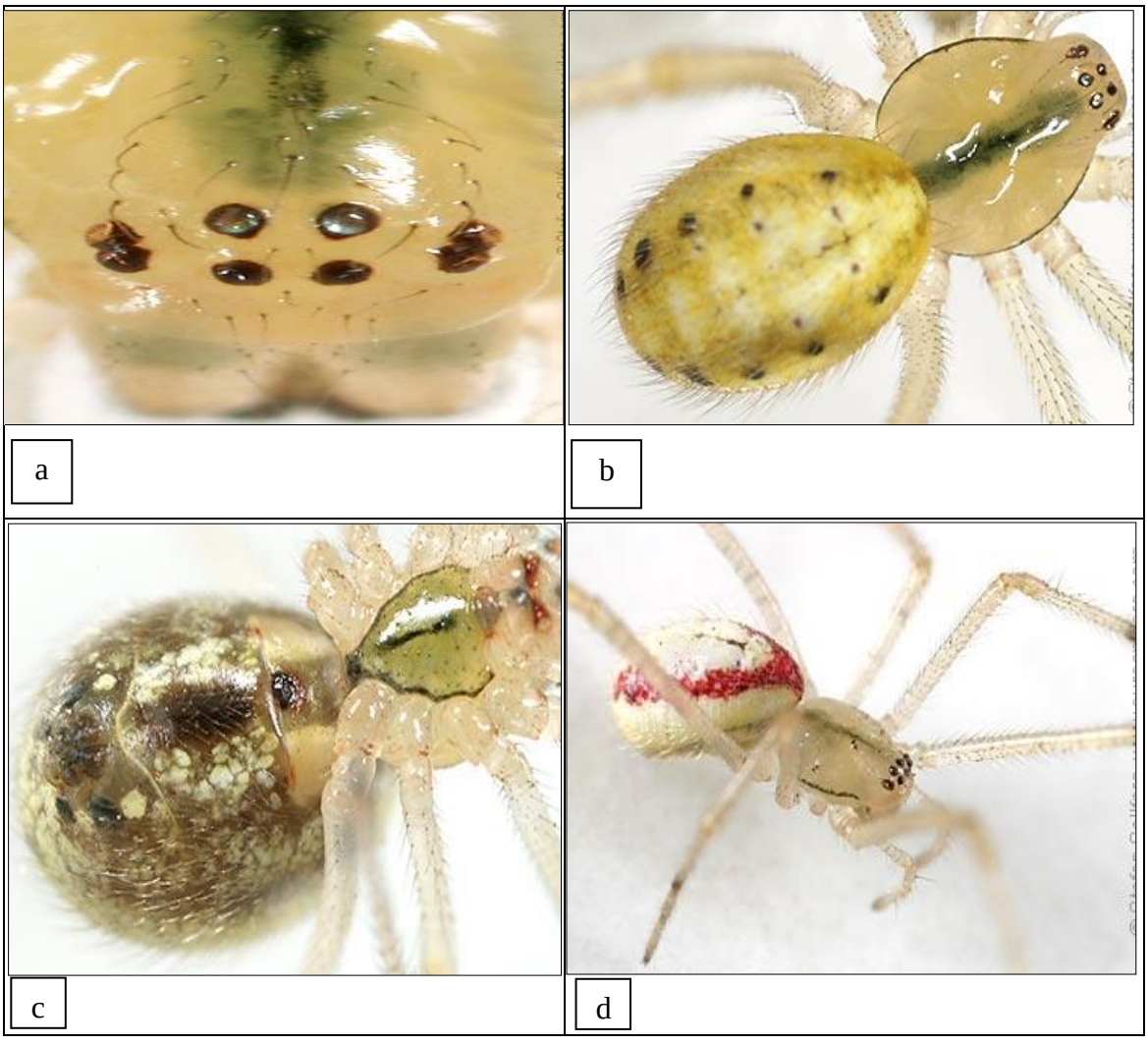


Fig. 45. *Enoplognatha ovate* diagnostic characters; *a.* Eyes and hairs on the head *b*, c. Female from above and below. d. female *E. mandibularis* with red stripes.

Genus: Anelosimus

Three species occur in NW-Europe. They can be distinguished by a dark median band across the abdomen. The spiders are about 3 mm long.

habitat: on bushes and trees.

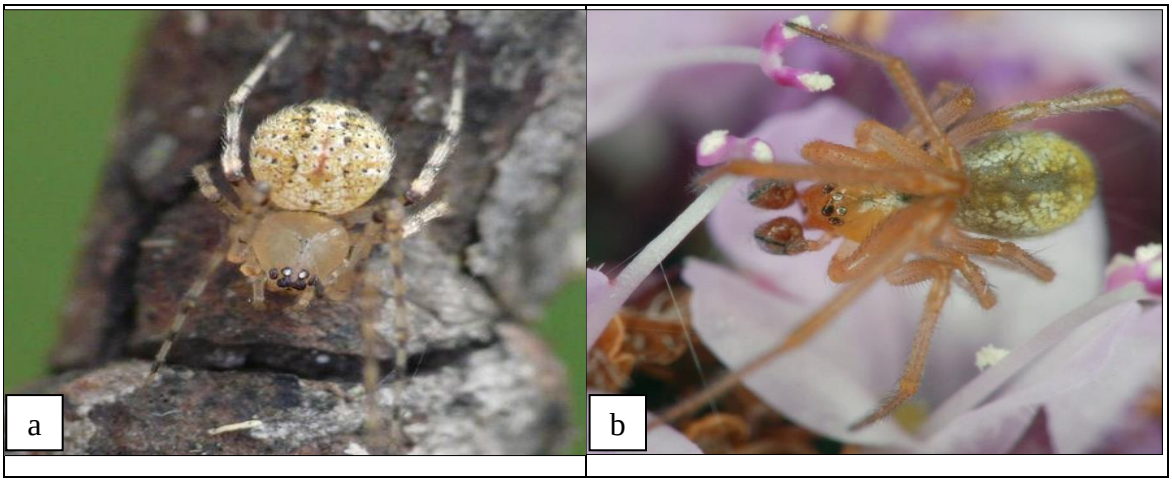


Fig. 46. a. *Kochiura* (*Anelosimus*) sp., b. male *Kochiura aulica*.

Genus: Steatoda

These usually dark spiders have in most species a white line around the anterior back; in addition to other lines or spots. They have a robust appearance. There is always a narrow band around the front of the abdomen, are known as false black widows. *Steatoda* by are round, bulbus abdomens, many have distinct coloring. These spiders have very poor eyesight and depend mostly on vibrations reaching them through their webs to orient themselves to prey or to warn them of larger animals that could injure or kill them. They are not aggressive species *S. bipunctata, S. borealis, S. capensis, S. grossa, S. iheringi, S. hespera, S. nobilis, S. paykulliana, S. triangulosa, S. grossa and, S. nobilis* as an example.

Steatoda paykulliana (Walckenaer 1806)

The opistosoma glossy is black, or red with a white stripe on the front edge opistosoma. Typically, it is a Mediterranean species. Females are 8-10 mm long and the males are 7-10 mm.

Habitat: rocks and crevices in the ground.

Maturity: spring.

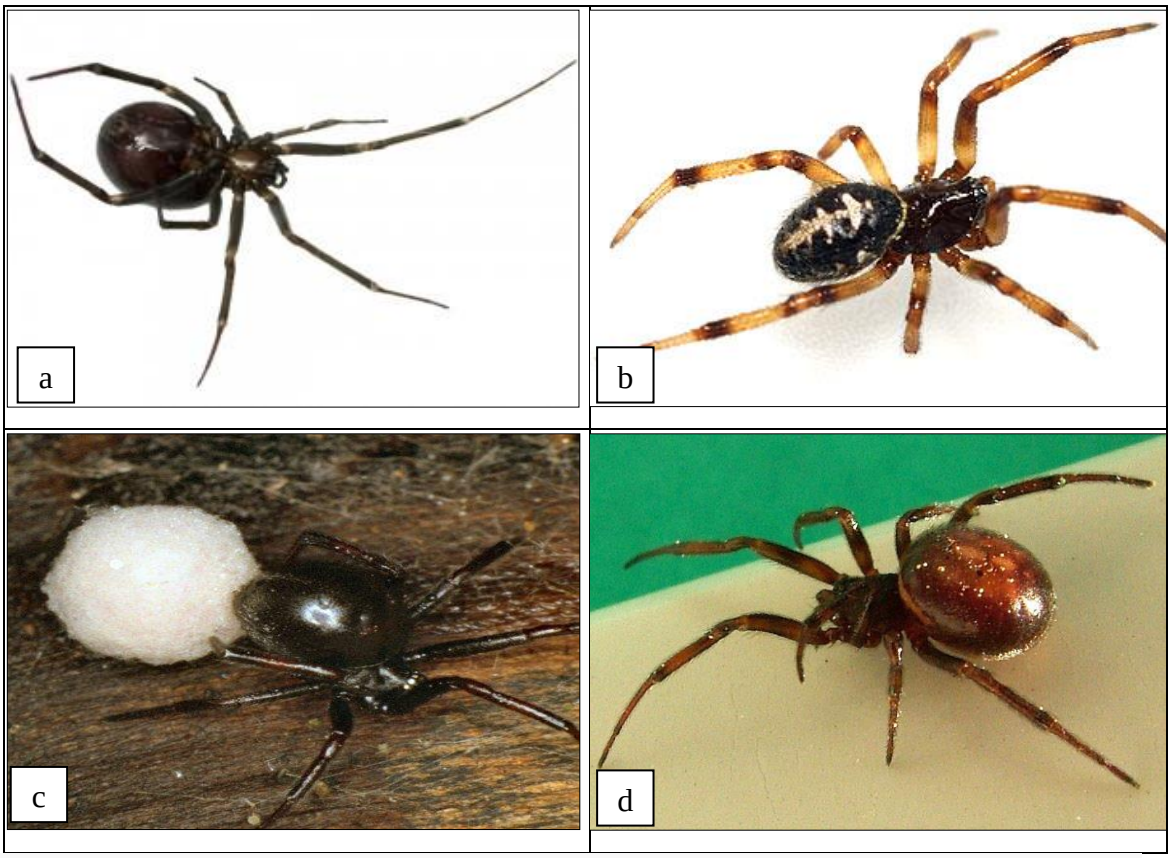


Fig. 47. *Steatoda:* Different species; a. False Black widows (*Steatoda grossa*), b. *Steatoda paykulliana*, c. *Steatoda* sp. d. *Steatoda bipunctata.*

Genus: Latrodectus (Walckenaer, 1805)

Latrodectus builds her web in dark places near the ground, preferring the sheltered sides of buildings, abandoned rodent holes, or openings in stone outcroppings. She seldom ventures indoors, but anyone living in black widow territory should be aware that she sometimes makes a home in outbuildings such as wood sheds or outdoor toilets.

The web is easily recognized by its tangled appearance, a series of vertical trap threads extending to the ground. The web silk is extremely strong. Crawling insects getting stuck on the sticky threads are quickly lifted into the web where they're wrapped in layers of silk, injected with venom, and sucked dry. She lays 50 - 200 eggs usually in 4 or 5 egg-sacs. Female matures over a period of 4-8 months and males in 2-3 months' period. The female can live up to three years and males only 6 months. After 14 days, it emerges from the

eggs. This emerging is often correlated on the onset of rain when temperatures are low and humidity high.

The prevalence of sexual cannibalism a behavior in which the female eats the male after mating in some species of *Latrodectus* has inspired the common name "widow spiders". However, females of some species only rarely show this behavior (Breene & Sweet, 1985). The female 10 mm and the male are 3 mm long.

In Europe we can encounter *Latrodectus tredecimguttatus,* while in Libya *Latrodectus tredecimguttatus, L. dahlia* and *L. geometricus* cannot be also be foung.

Description:

Females of most Latrodectus species are dark or black in color usually exhibiting a red or orange hourglass on the ventral underside or bottom of the abdomen- some may have a pair of red spots or have no marking at all. They often exhibit various red or red and white markings on the dorsal or top side of the abdomen, ranging from a single stripe to bars or spots. Females of a few species are paler browner shades and some have no bright markings. Juveniles and adult male Latrodectus are half the size of the females, and are often grey or brown and usually lighter in color than females; while they may sometimes have an hourglass marking on their ventral abdomen, it may be yellow or white, not red. Variation in specifics by species and genus is great.

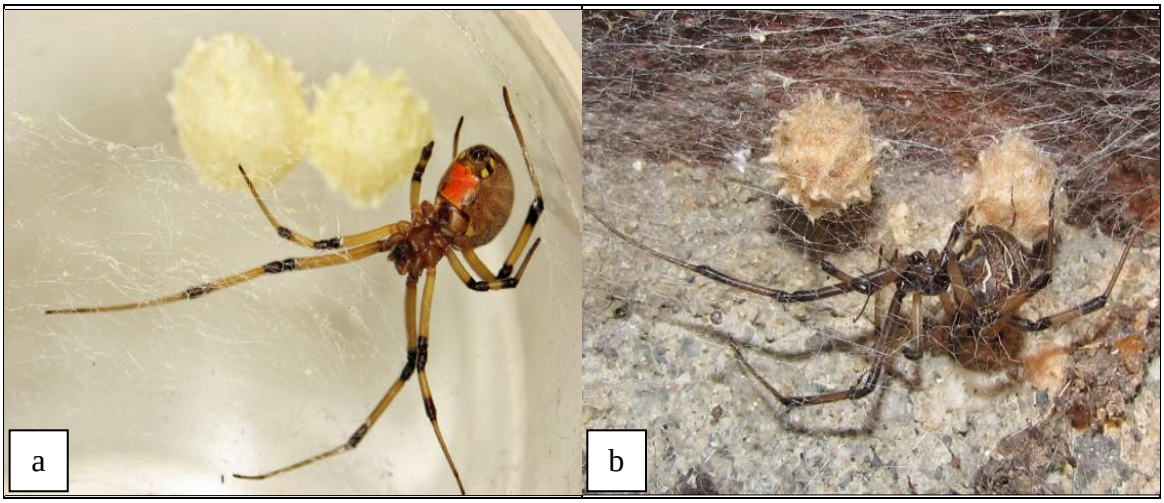
The genus *Latrodectus* in Libyan Northwest coast

Latrodectus geometricus (Koch, 1841)

Ventral side of a *L. geometricus* is displaying the hourglass marking *Latrodectus geometricus* on their egg sac. *Latrodectus geometricus* is commonly known as the brown widow. House button spider or geometric button spider, is one of the widow spiders in the genus Latrodectus (Reagan and Mark, 2011; Vetter and Richard, 2013).

Description:

L. geometricus is slightly smaller generally lighter in color than the black widow species; the color can range from tan to dark brown to black, with shades of grey also possible (Santana & Fred, 2007). *L. geometricus* has a prominent hourglass-shaped marking on the underside of the abdomen; the brown widow's hourglass, however, is usually a vivid orang or a yellowish color. Unlike the black widow, L. geometricus has a black-and-white geometric pattern on the dorsal side of its abdomen. Although the Latin name comes from this pattern, they have stripes on their legs. Brown widows can be located by finding their egg sacs, which are easily identifiable. They resemble a sand-spur, having pointed projections all over; they are sometimes described as "tufted", "fluffy" (Santana & Fred, 2007) or "spiky" in appearance. Eggs hatch in approximately 20 days (Jackman, 2006).



Female brown widows "lies about 120-150 eggs per sac and can make 20 egg sacs over a lifetime". (Vetter & Richard, 2013)**.**

Fig 48. a, b. *Latrodectus geometricus* (Brown Widow Spider) with egg sacs.

***Latrodectus tredecimguttatus* (Rossi, 1790)**

Mediterranean black widow, European black widow, or steppe spider is a species of widow spiders in the genus Latrodectus. It is commonly found throughout the Mediterranean region, ranging from Portugal to southwest and central Asia.

Description female: Opistosoma without pattern and uniformly black.

Body length female: 3.7 - 5.5 mm.

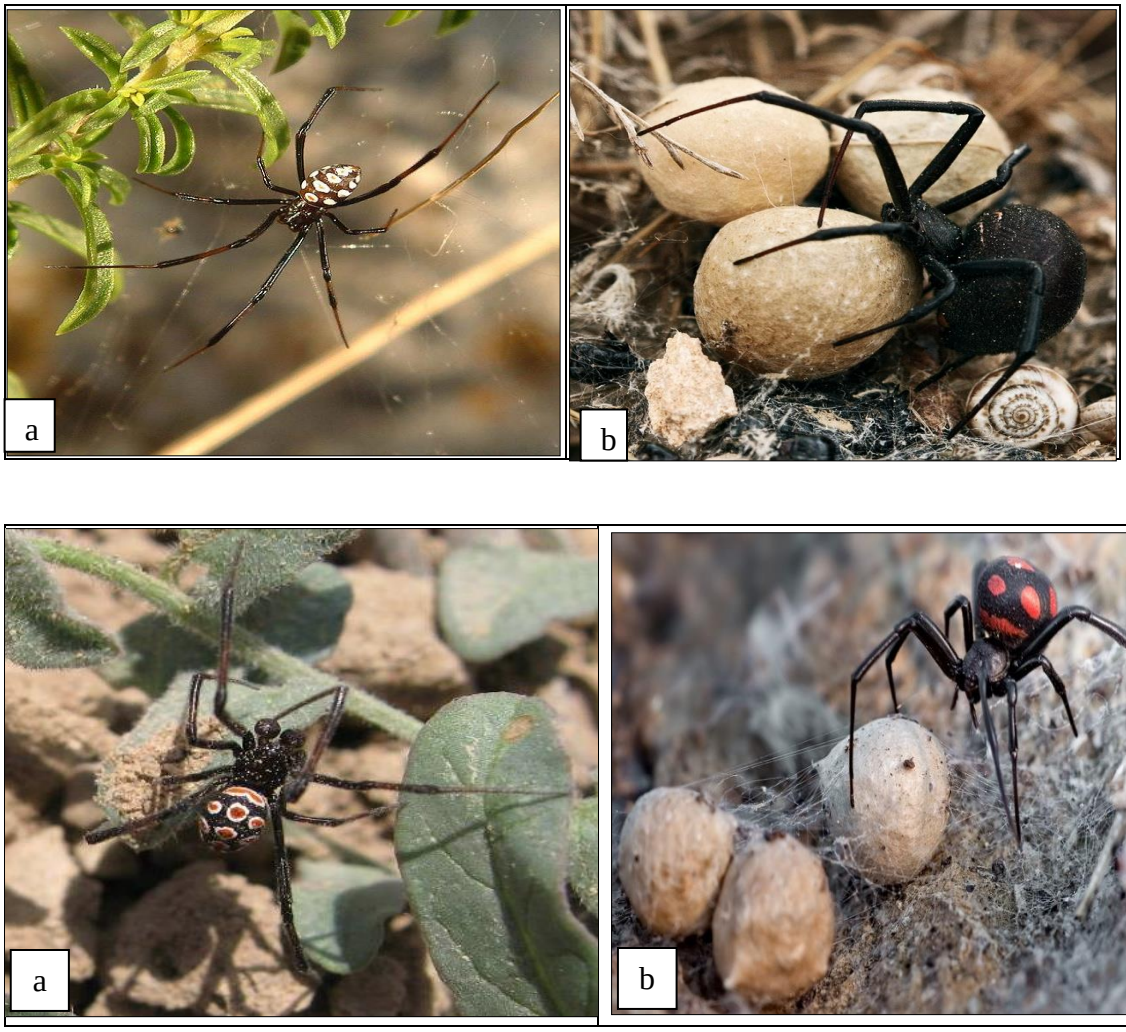
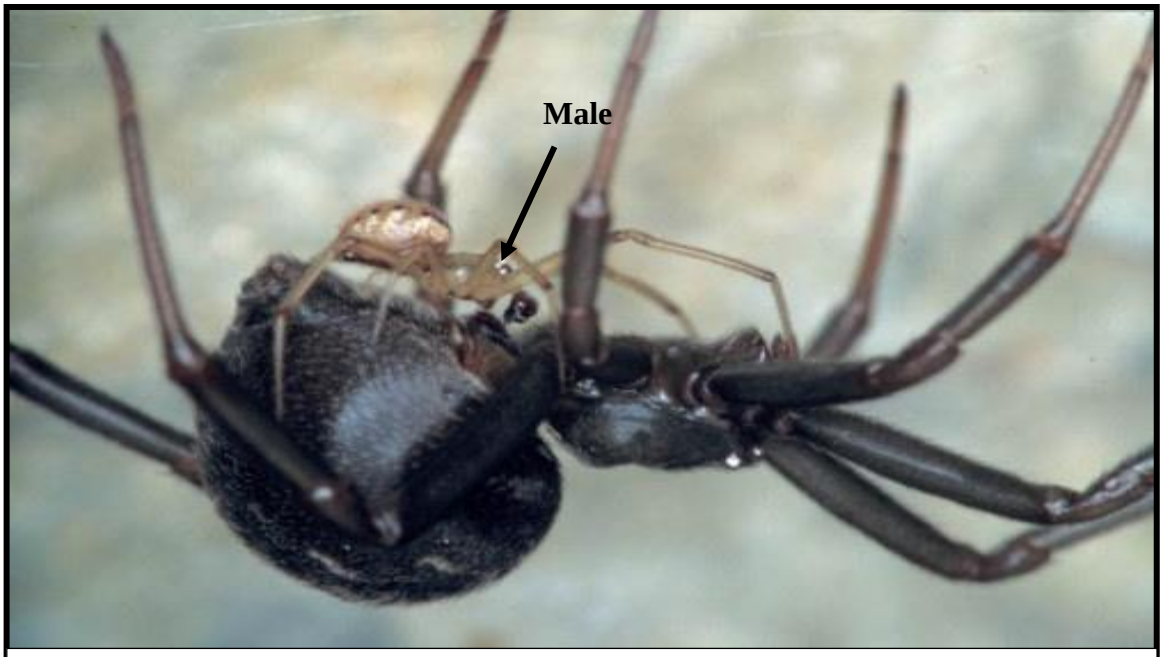


Fig. 49. *Latrodectus tredecimguttatus*; a. male, b. female with egg sacs.

Latrodectus dahli (Levi, 1959)



https://www.researchgate.net/figure/Fig-B168-Latrodectus-dahli-Levi-1959-Male-and-female-living-specimens-C-B_fig75_349961474

Fig. 50. A mating couple of the black-widow spider (*Latrodectus dahli*)**.**

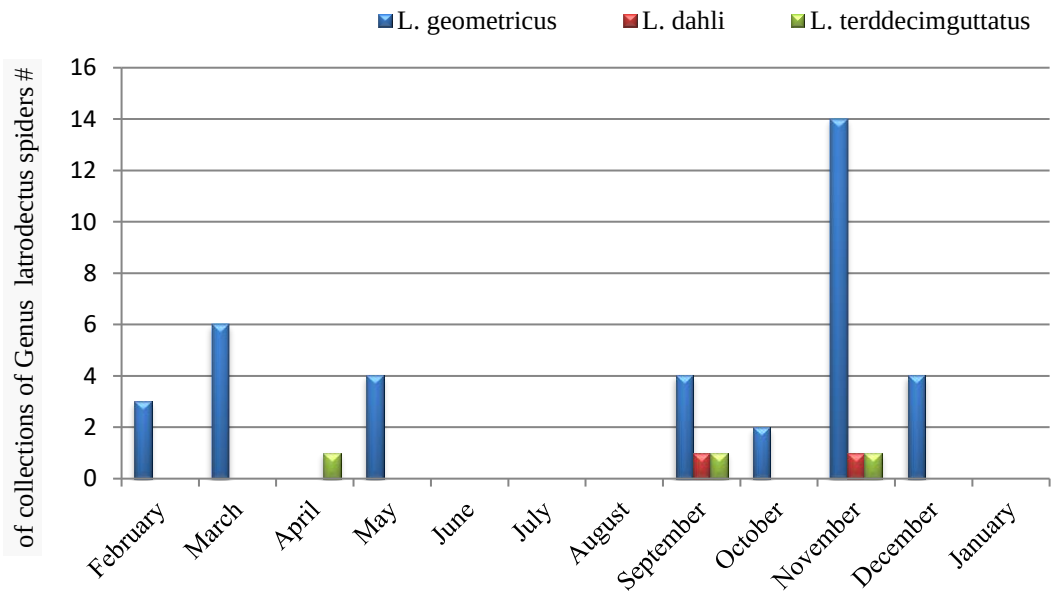


Fig. 51. Seasonal collections of *Latrodectus* Species in North-western coast of Libya.

Genus: Theridon

Their size varies between 2 and 5 mm. This species spins webs of criss-cross strands on bushes and trees. The majority of the species guard their egg-sac and some may carry it around attached to their spinners, popularly known as the happy face spider which is found in Hawaii.

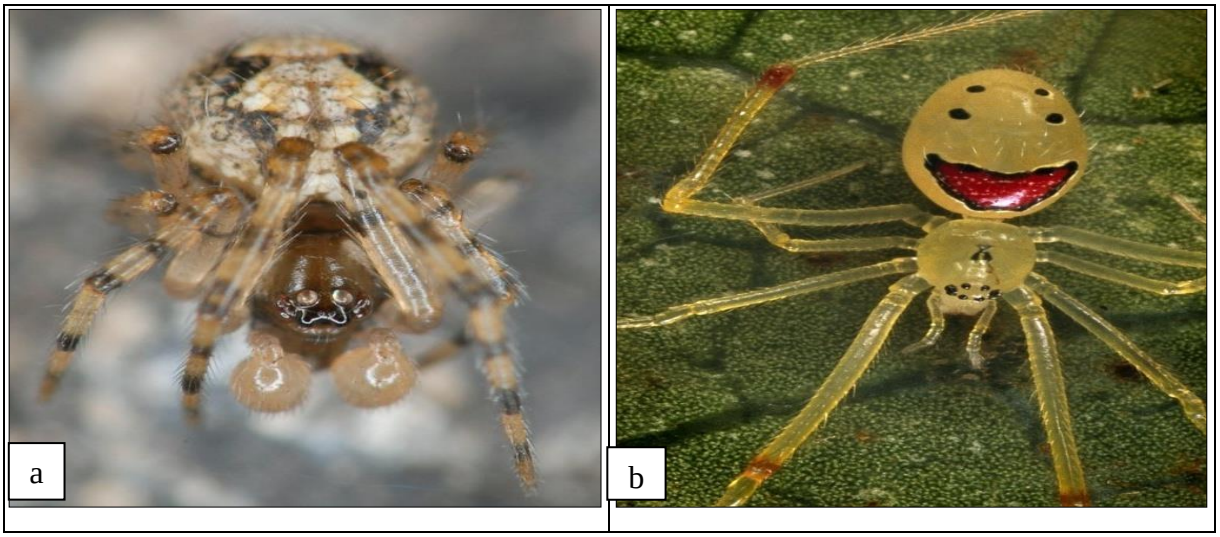


Fig. 52. a. Male *Teridion hannoniae*, b. the happy face spider, *Theridon grallator*.

In general, Table 12 describes distribution of Theridion and Steatoda, mature adults both female and male, is found throughout the year and for the rest species are randomly distributed all the way through the year. Moreover, it was notable that Haplodrassus, Pterotircha and Micaria are not found or absent from the work. For Sosticus is found only in June that their individual adults reach maturity. And for *Loxosceles rufescens* are distributed between the month of February and June. For *Latrodectus geometicus* were reached during the months of February, May and between the months of September and December and for the rest species are distributed randomly throughout the year. For the immature species, it was not clear when they leave immature stage except for the specie *Loxosceles rufescens* which was in June, August, and December that this specie reaches its maturity and became active in mating and for the rest species that were immature were distributed randomly from February to April.

Table 12. Species and number of spiders collected monthly in the Northwest coast of Libya.

		Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
***Drassodes* sp.(cfr.*lapidosus*)**		1	5	1		1				1			
***Drassyllus* sp. (cfr. *pumilus*)**			2			1			1				
***Haplodrassus* sp.**			2										
***Leptodrassus* sp.**			1										
***Micaria* sp. (cfr. *albovittata*)**			1					1					
***Nomisia* sp.**			7	3		2							2
***Pterotricha* sp.**				1									1
***Scotophaeus* spp (cfr. *blackwallii*)**			2			3			1				
***Setaphis* sp. (cfr. *algericaopa*)**			3							1			
***Sosticus* sp.**		1				3							
***Trachyzelotes* sp.**			1	1									
***Urozelotes* sp.**			2		1	6			1				
Zelotes subterraneus		1	4	2	1	7			2	2			2
Loxosceles rufescens		7	9	4	4	17	1	1	2	2	1	2	9
***Enoplognatha* sp. (cfr.*abrupta* , *ovata*)**		14	21	6	2				2		1	12	9
Kochiura oulica				1			3		1		3	2	
Latrodectus	***L. geometricus***	3	6		4				4	2	14	4	
	L. dahli								1		1		
	L. terddecimguttatus			1					1		1		
Steatoda		6	5			3	3	4	6	1	1	5	11
Theridion			1	4	1	2	2	1	4	4	9	2	5
LEGEND:			**Adults mature**			**Individuals' immature**			**Adults &immature**			**Absent**	

3

Clinical effect

of spider fauna in Northwest coast of Libya

Part: III. Clinical effect of spider fauna in Northwest coast of Libya

Background

A handful of spiders are known, worldwide, to be harm for people, and a few deaths attributable directly to spider bites (Astri & Leroy, 2000). It is currently estimated that there are about 45745 spider species which are divided among 3966 genera and 114 families (Platnick, 2015). About 100 species, worldwide have venom demonstrated to be detrimental to humans (Maretic, 1987). There are, however, a few exceptions, and bites from certain species can cause severe dermatological lesions and other symptoms which require urgent medical treatment and care. The recluse spiders, including the brown recluse, in the genus Loxosceles (Sicariidae) and the widow spiders in the genus Latrodectus (Thridiidae) have been definitively shown to have venom of medical importance to humans (Upick et al., 2005).

In 2010, there were 2,168 self-reported black widow bites reported in the United States, with 892 cases treated in health care facilities (Bronstein et al., 2011). Death due to a black widow bite is rarely reported (Timms & Gibbons 1986). In the 2010 survey, over 50% of reported cases occurred in patients over 20 years of age with no deaths (Bronstein et al., 2011). Patients usually recover within 24 hours following treatment or 3 to 5 days without supportive care (Timms & Gibbons, 1986; Edwards 2002) apart from the pregnant women, who should seek medical attention immediately.

Spider venom, in general, is usually almost harmless to humans, since it evolved for capturing or killing small invertebrates and not big mammals like ourselves, as well, antivenin against spider bite has become very effective and thus made the occurrence of death resulting from a spider bite a very rare thing spiders in general, including the black widow and brown recluse, bite only in defence, when being crushed between your skin and another object.

Venomous spider and bite symptoms

Spider bites can be painful, but a spider's venom is the real concern. Fortunately, most spiders don't bite humans, and 98% are harmless. (http://www.pestworld.org/multimedia-center/pest-tv/health/health-checks-spider-bites). We do not know much about the effect of spider venom. Spider venom consists of different proteins, which are used to paralyze or kill their prey, which is usually insects, and all spider families have paired venom glands, but family Uloboridae don ‘t produce venom (Astri & Leroy, 2000). Since nearly all species of spiders have venom, the potential exists for some people to be allergic to components in the venom. Allergic responses to venoms of many different types of biting are possible. Spiders can control the amount of venom released so bites, even from widow spiders, can be asymptomatic if little or no venom is injected. The following may influence the action of the venom of the medically important species: The size of the spider and the amount of venom injected. In most cases only a single drop is administered. As well, other factors have impact on the effect of spider venom:

1. The part of the body where a person is bitten: A bite near the head is more dangerous than one administered on extremities such as a foot.
2. The age and health of the person bitten: Young children and persons with a medical condition may encounter greater problems.
3. The sensitivity of an individual to the venom: Just as some people are more sensitive to bee stings, the same holds true with respect to spiders.
4. The species of spider that administers the bite: The type of venom differs between species and it is therefore important to positively identify the spider so that the correct treatment can be given.

Whenever a person gets bitten, it is critical to collect the offending insect or spider, or collect its remains after it has been killed, and bring it to the physician so the animal can be sent away for identification by an expert. Very few physicians have sufficient training in entomology or arachnology to accurately identify invertebrates. Many, if not most, necrotic lesions, sores blisters, or other dermatological injuries that are diagnosed as spider bites without a spider having been seen at the site of the injury are likely due to other

condition. Spiders, including widow spiders and recluse spiders, are generally timid creatures that are far more likely to try to escape when encountered than to attack and bite. Spiders typically only bite when seriously provoked – e.g., when a person inadvertently presses down on a hidden spider or reaches his/her hand into a spider's retreat. (Upick et al., 2005).

The venom of the medically important spiders can be divided into those that have neuron venom (affects the central nervous system) or cyto venom (affects the tissue around the bite site) venom.

Neuron Venom

The majority of spiders with serious bites possess neuron venom of some sort, though the specific manner in which the nervous system is attacked varies from spider to spider. (Escoubas, & Rash, 2004) (Escoubas, 2006) (Jiang et al., 2008). Widow spider venom contains components known as latrotoxins, which cause the release of the neurotransmitter acetylcholine, stimulating muscle contractions. This can affect the body in several ways, including causing painful abdominal cramps, as well as interfering with respiration, and causing other systemic effects (Diaz, 2004).

Necrotic Venom

Spiders known to have necrotic venom occur most notoriously in the family Sicariidae, which includes both the recluse spiders and the six-eyed sand spiders. Spiders in this family possess a known dermonecrotic agent sphingomyelinase D (Senff-Ribeiro et al., 2008) (Binford et al., 2009), which is otherwise found only in a few pathogenic bacteria (Cordes and Binford, 2006) (Binford et al., 2005). Some species in this family are more venomous than others bites by spiders in this family can produce symptoms ranging from minor localized effects, to severe dermonecrotic lesions, up to and including severe systemic reactions including renal failure, and in some cases, death, (Schenone et al., 1989).

Symptoms

Pain from harmless spider bites typically lasts for 5 to 60 minutes while pain from harm spider bites frequently lasts for longer than 24 hours. The rate of a bacterial infection due to a spider bite is low (0.9%). (http://www.globalfamilydoctor.com).

Usually, a spider bite looks a red, inflamed, sometimes itchy or painful bump on the skin, and may even go unnoticed. Harmless spider bites, typically don't produce other symptoms. Black widow spider bites can cause severe abdominal pain and cramping, while brown recluse spider bites can cause the skin around the bite to die. Severe spider bite symptoms occur as a result of injected spider venom. The severity of symptoms depends on:

1. The type of spider.
2. The amount of venom injected.
3. How sensitive the body is to the venom.

(http://www.mayoclinic.com/health/spider-bites/DS01191**)**

Family: Theridiidae

The spider genus *Latrodectus* includes the widely known black widow spiders

(*L. hasselti*, *L. mactans*) and brown widow (*L. geometricus*), notorious because of the extreme potency of their neuron venom.

Black widow spider bites (Latrodectus sp):

This spider is probably the best known 'dangerous' spider, found throughout the world. The female is responsible for biting humans (the males are considered to be harmless, as they can't pierce the skin). The female black widow's poison is 15 times more potent than a rattle snake. *Latrodectus* has a worldwide distribution and comprises 30 currently recognized species. It is known by a number of common names: Katipo (New Zealand) and Red Back (Australia). An antivenin was developed in 1956 and is effective if used

within 80 hours. The most frequently encountered of this species are: *L. geometricus*, *L. tredecimguttatus* and *L. dahli.* All have a painful bite that is fatal in rare cases. The LD-50 of *L. tredecimguttatus* venom has been measured as 0.59 mg/kg, (Rauber, 1983). *L. geometricus* has a neuron venom that, is as venom as the black widows. However, brown widow bites are usually not very dangerous; usually much less dangerous than the black widow's (Brown, 2012). The effects of the toxin are usually confined to the bite area and surrounding tissue, unlike the black widow's (Santana & Fred, 2007). Mere Venom of the venom is not the only factor in dangerousness. Brown widow bites are minor compared to black widow bites, because they cannot deliver the same amount of venom as the black widow (Vetter & Richard, 2013).

Signs and symptoms of a black widow spider bite may include:

- Pain: Typically beginning within an hour of being bitten, pain can spread from the bite site into your abdomen, back or chest, followed by chills, nausea, trouble breathing, delirium, partial paralysis.
- Cramping: Abdominal cramping or rigidity can be so severe that it's sometimes mistaken for appendicitis or a ruptured appendix.
- Sweating: Excessive sweating can occur around the bite mark or may involve the entire limb.

Fortunately, the amount injected from a black widow bite is very small. With humans, the bite may not be felt at first, although a slight local swelling around two tiny spots may be observed. After a short time, there will be severe pain at the site of the bite which will spread throughout the body. Elevated blood pressure, nausea, vomiting, difficulty in breathing and profuse perspiration may occur in severe cases. Symptoms usually diminish within several hours and are gone after several days. Specific medications can be given by a physician that will reduce pain and reduce muscle spasms.

Bite/ Due to the presence of latrotoxin in their venom, black widow bites are potentially dangerous and may result in systemic effects (latrodectism) including severe muscle pain, abdominal cramps, hyperhidrosis, tachycardia, and muscle spasms (Rohou & Sugita, 2008). Symptoms usually last for 3–7 days, but may persist for several weeks, (Peterson, 2006).

Brown recluse spider bite (Loxosceles sp):

The brown recluse spider is a shy species that bites humans when trapped in clothing or rolled onto when people sleep in bed. Persons bitten by the brown recluse usually do not feel pain for 2-3 hours. A sensitive person may feel pain immediately. The pain associated with the bite typically increases during the first 6-8 hours after the bite. The bite usually heals on its own in about a week. A blister arises around the area of the bite. The local pain becomes intense with the wound sloughing tissue often down to the bone. Healing takes place slowly and may take 6 to 8 weeks. If the bite of a brown recluse spider is suspected, collect the spider and consult a physician immediately.

Even in the absence of systemic effects, serious bites from Sicariidae spiders may form a necrotising ulcer that destroys soft tissue and may take months and very rarely years to heal, leaving deep scars. The damaged tissue may become gangrenous and eventually slough away. Initially there may be no pain from a bite, but over time the wound may grow to 10 inches (25 cm) in extreme cases. Bites usually become painful and itchy within two to eight hours, pain and other local effects worsen 12 to 36 hours after the bite, and then necrosis will develop over the next few days (Wasserman & Anderson, 1983–1984). Systemic effects are unusual but include Mild symptoms such nausea, vomiting, fever, rashes, and muscle and joint pain. Rarely, more severe symptoms occur including red blood cell destruction (hemolytic), low platelets (thrombocytopenia), and loss of clotting factors (disseminated intravascular coagulation) (Wasserman, 2005).

Signs and symptoms of a Brown recluse spider bite may include:

- Severe pain.
- Abdominal cramping.

A growing ulcer starts at the bite site. In a minority of cases, the skin at the centre of the bite can become dusky red swelling and then evolve into a deep open sore (ulcer) that enlarges as the surrounding skin dies because the venom of the brown recluse destroys the walls of the blood vessels near the site of the bite, the ulcer usually stops growing within 10 days after the bite, but full healing can take months. The occurrence of additional symptoms of a recluse bite will depend upon the amount of venom injected by the spider.

A severe bite can produce a necrotic lesion (i.e., an area of dead skin tissue) that may require surgery.

Treatments

In some cases, antibiotics and the drug Dapsone may be used successfully to treat the bites without surgery, but these decisions are made after careful diagnosis by a physician. Prompt medical attention is critical to successful chemical or surgical treatment of the bite.

In the case of black button envenomation, the patient must be hospitalized and vital functions monitored for up to 24 hours. The administration of black button anti- venom is the only effective treatment for severe latrodectism. Anti-venom (10 ml) is administered intravenously. A follow up dose of 5 ml is occasionally necessary after 4-6 hours. Patients usually respond dramatically within 10-30 minutes. The patient should be kept under observation for at least 6-12 hours after treatment for any allergic reaction (not common) to the refined equine Anti-venom serum. The only effective agent for the relief of muscular pain and cramps is intravenous calcium gluconate (effect last only 20-30 minutes). Spider bites may easily become infected and care must be taken.

Outpatient care following discharge often consists of a weak-to-moderate strength opioid (e.g. codeine or tramadol, respectively) depending on pain scores, an anti-inflammatory agent (e.g. naproxen, cortisone), and an antispasmodic (e.g. cyclobenzaprine, diazepam) for a few days to a week. If the pain and/ or spasms have not resolved by this time, a second medical evaluation is generally advised, and other diagnoses may be considered.

Complications

Very rarely, a bite from a black widow or brown recluse spider may be deadly, particularly in children and in older people with serious health problems, but Complications during pregnancy may arise due to the symptoms experienced by the expectant mother, such as headache, hypertension, cramping, muscle pain, and severe abdominal pain (Sherman et al., 2000). However, research has demonstrated that a direct effect on the fetus from the spider venom is less likely because alpha-latrotoxin is a large compound and should not cross the placental barrier (Handel et al., 1994).

Complications may be summarized in the following:

1- Respiratory difficulty, reactive airway exacerbation.

2- Spontaneous abortion or preterm labor.

3- Hypertensive emergency with or without associated seizures, acute myocardial infarction.

4- Rhabdomyolysis.

5- Venom myocarditis (rare). (Shames et al., 2007)

In Libya there are few studies in regarding spiders but there are no published studies about spider.

Statistical analysis of cases of spider bites in Tripoli Central Hospital and the Tripoli Medical Center during the years 2004-2013

Pathophysiology

A primary concern of the bite of a spider is the effect of its venom. A spider envenomation occurs whenever a spider injects venom into the skin. Not all spider bites involve injection of venom into the skin, and the amount of venom injected can vary based on the spider species and the circumstances of the encounter. The mechanical injury from a spider bite is not a serious concern for humans. Some spider bites do leave a large enough wound that infection may be a concern However, it is generally the Venom of spider venom that poses the most risk to human beings; several spiders are known to have venom that can cause injury to humans in the amounts that a spider will typically inject when biting.

All spiders are capable of producing venom, with the exception of the hackled orb-weavers, the Holarchaeidae, and the primitive Mesothelae. (Other arachnids often confused with spiders, such as the harvestman and sun spiders, also do not produce venom). Nonetheless, only a small percentage of species have bites that pose a danger to people. Many spiders do not have mouthparts capable of penetrating human skin. While venoms are by definition venom substances, most spiders do not have venom that is sufficiently venom (in the quantities delivered) to require medical attention and, of those that do, fatalities are exceedingly rare.

Spider venoms work on one of two fundamental principles; they are either neuron Venom (attacking the nervous system) or necrotic (attacking tissues surrounding the bite, and, in some cases, attacking vital organs and systems).

Table 13 illustrates Families spider, most important medically and families to which it belongs Studies in Libya for a few spiders and there are no published studies about spider bites, both with poison or nervous tissue.

Table 13. Family taxa of medical importance has been based.

Family	Scientific name	Common name	Health risk
Theridiidae	*Latrodectus dahlia.* *L. geometricus.* *L. tredecimguttatus*.	Widow spiders, red-back. Brown widow. Malmignatte.	High
	Steatoda spp	False black widows.	Medium
Sicariidae	*Loxosceles rufescens*. *Sicarius* spp	Brown Recluse. Six-eyed sand spider.	
Thomsidae	*Hadronyche* spp	Venomous Funnel-web.	
Cheiracanthiidae	*Cheiracanthium* spp	Yellow sac spider.	Possible
Agelenidae	*Tegenaria* spp	Hobo spider.	

The aim in this Book is to count the persons were exposed bitten of spiders from all departments' dermatology of the Tripoli Medical Center and Tripoli Central Hospital.

Materials and methods

This chapter was achieved from patients' data files that were bitten by spiders and were housed at Department of Dermatology of the Tripoli Medical Center, and the Central Hospital of Tripoli, and they are located within the city of Tripoli, Libya. The following data were collected from each file: sex, age, place of residence, symptoms, the period spent by the patient in the hospital.

a) Data analysis

Cases were divided as follows:

- By sex to males and females.
- By age: Divided the cases by age to the following age groups: 10>, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69 and <69.
- According to place of residence, the cases were named as follow: (1) Eastern districts of Tripoli including Alhachan, Dahra, Alfornaj, Alhadaba, Tajoura, Hay Damscus, Dahmani, Zenata, Souq Al-Juomaa, Sharaa Al-Zawia, Salah al-Din, Ariadia and Ain Zara.

(2) Western districts of Tripoli including Aldrebe, Al-Riadyah, Asaraj, Mansoura, Abu Salim, Janzur, Hay Al-Andalus, Hay Al-Akwakh, Tareq Almatar, Gargour, Got Alshall, Gurji, Gargaresh and Keshlaf. (3) South of Tripoli including Zahra, Sawani, Azizia, Creamyia, Al-Najiela, Bin Walid, Bier Alghanam, Tarhunah, Souq Al-Khamis, Souq Al-Sabt and Qasr Ben Ghashir. (4) East of Tripoli, including Khums, Alows, Alqrbolli, Qasr Al-Akhiar and Misrata. (5) West of Tripoli including Al-Jamale, Al-Zawia, Al ajailat, Tighi, Zultan, Sabratha and Sorman. (6) Nafusa Mountain including Alasabah, Arabtta, Alrajaban, Zintan, Galaa and Gharyan. (7) Anonymous: included cases that did not indicate the place of residence in the files.

Results

Data were collected from files of 214 cases that were housed in the hospitals, during the period from 2004 to 2013, because of spider bites 112 cases from the Tripoli Medical Center and 102 cases from The Central Hospital of Tripoli. 57 files were for male (27%) and 157 for female (73%), (Fig. 53). There was a significant difference in the number of males and females (χ^2, P <0.001).

The average number of males eight cases per region, while for female was 22 cases. The average was computed as follows: (number of cases / number of areas) (Fig. 54).

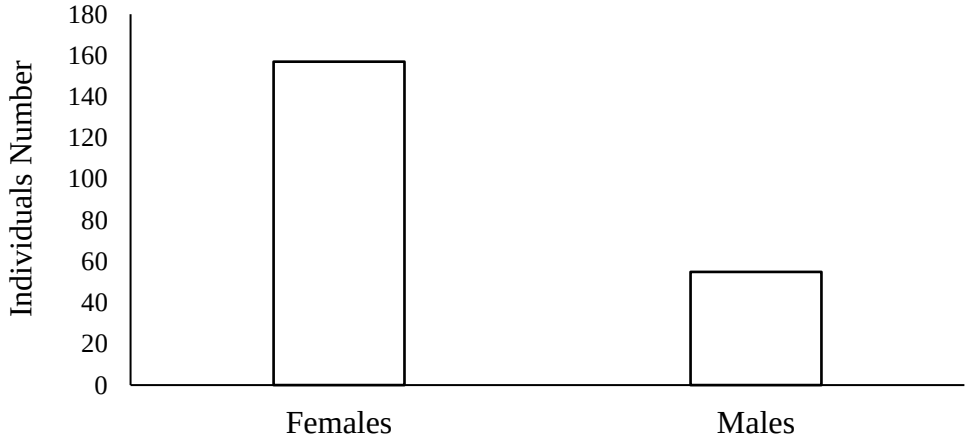


Fig. 53. Number of spider bites cases that were housed in Tripoli Medical Center and the Central Hospital of Tripoli during the period 2004-2013.

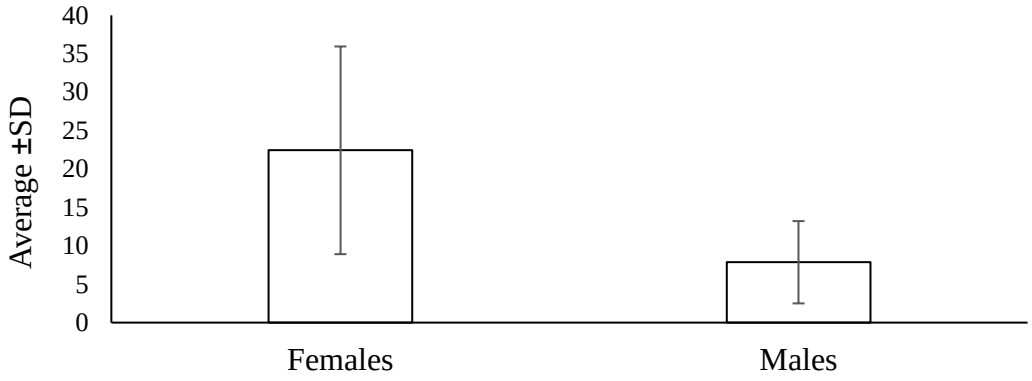


Fig. 54. Average number of spider bites cases that were housed in Tripoli Medical Center and the Central Hospital of Tripoli during the period 2004-2013.

Cases were divided into age groups (Fig. 55) results showed that the younger age groups <10 years' age groups were less represented. However, the cases were increased by age increasing, the Cases reached its peak at the age group 20-29 years, followed by the age group 30-39 and then the case began decreasing (Fig. 56). The number of cases differed significantly among age groups (χ^2, P≤0.001). The same distribution pattern appeared when cases males and females were separated; where the 20-29 age groups accounted for most of the representative category, followed by 30-39 age groups. Males were not represented in the 60-69 age groups. In all age groups, representation of females was higher than the representation of males (χ^2, P≤0.001), (Fig. 56).

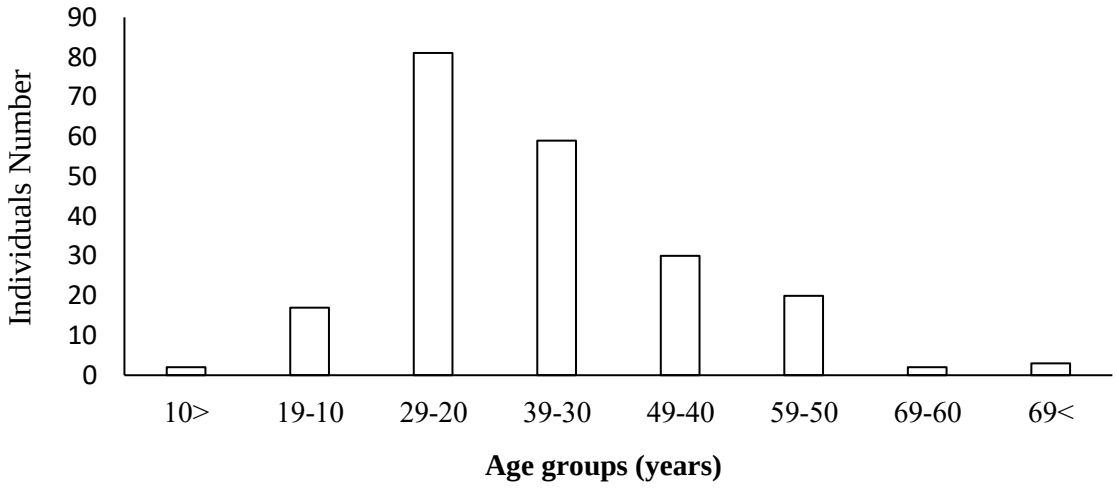


Fig. 55. Number of spider bites cases according to age, that were housed in Tri-Medical Center and the Central Hospital of Tripoli during the period 2004-2013.

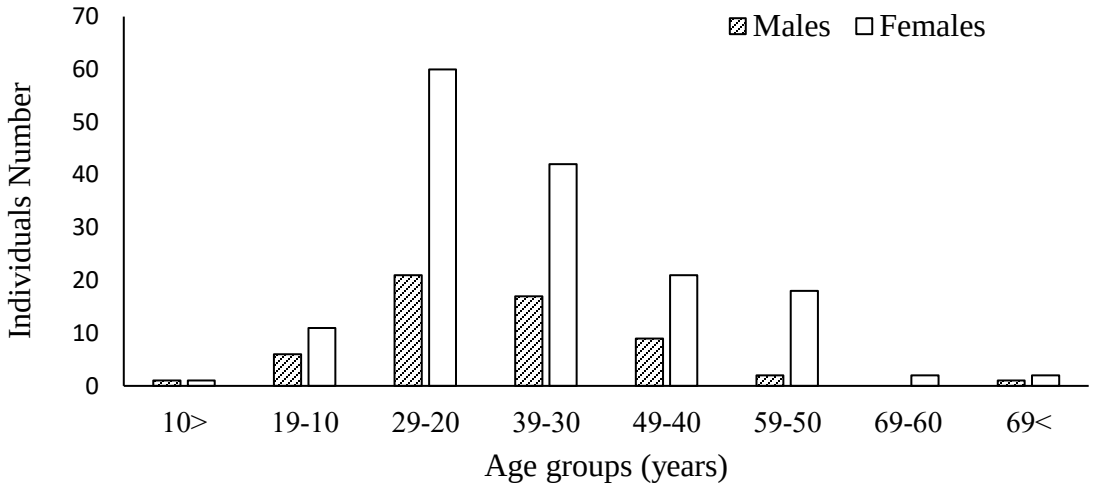


Fig. 56. Number of spider bites cases (males and females) according to age, that were housed in Tripoli Medical Center and the Central Hospital of Tripoli during the period 2004-2013.

Areas differed in the number of housed cases, the eastern and western districts of Tripoli the most represented areas (Fig. 57). The likewise applicable to the distribution when considering the cases number of males and females (Fig. 58.). There were a significant difference between cases number among regions (χ^2, $P \leq 0.001$); but there were not significant differences between the cases number of the eastern districts of Tripoli and both the western districts of Tripoli and the areas east of Tripoli (χ^2, $P = 0.48$); as well as between the cases number in the areas east of Tripoli and both the areas west of Tripoli Nafusa mountain areas (χ^2, $P \geq 0.1$); also, no significant differences between the cases number the areas west of Tripoli and the Nafusa Mountain (χ^2, $P = 0.6$).

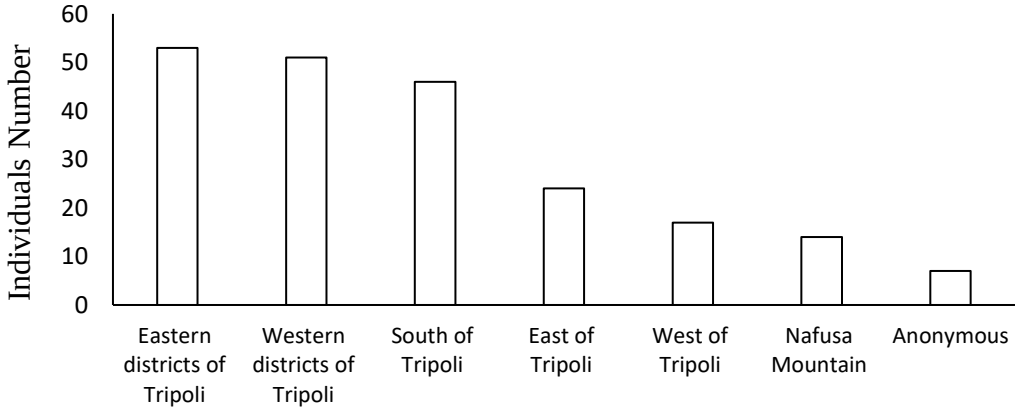


Fig. 57. Number of spider bites cases according to the area residence that were housed in Tripoli Medical Center and the Central Hospital of Tripoli during the period 2004-2013.

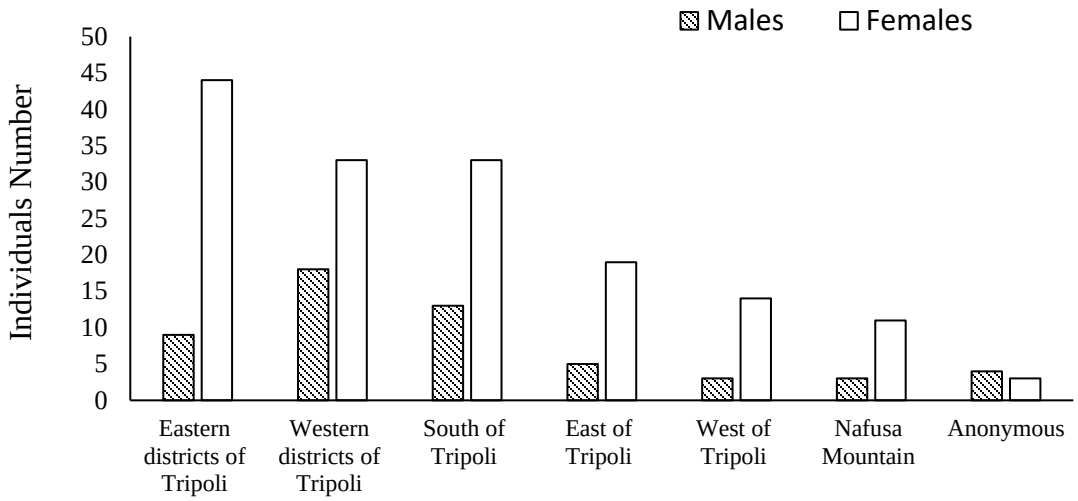


Fig. 58. Number of spider bites cases (males and females) according to the area residence that were housed in Tripoli Medical Center and the Central Hospital of Tripoli during the period 2004-2013.

The Central Hospital of Tripoli

Data were collected on 102 harboring cases due to spider bites from Tripoli hospital Central during the period from year 2004 until 2012; 34 male (28%) and 68 females (72%) (Fig. 59), and this difference was significantly ($\chi 2$, $P = 0.0008$). The average male's number 4.9 cases per area and females was 9.7 cases (Fig. 60). The cases of females have more representation among areas of residence (Fig. 61).

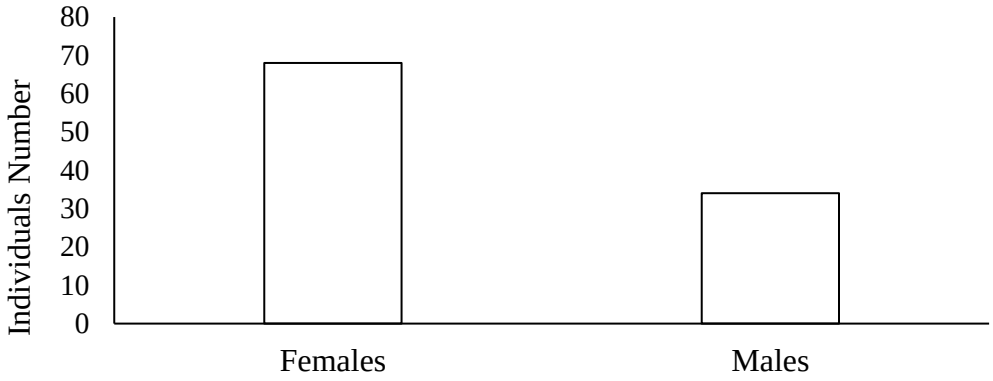


Fig. 59. Number of spider bites cases that were housed in the Central Hospital of Tripoli during the period 2004-2012.

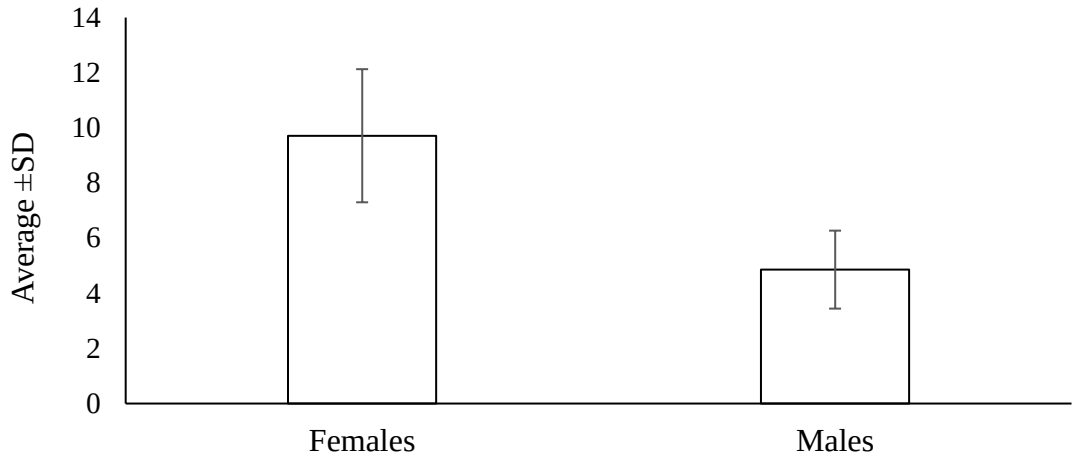


Fig. 60. Average number of spider bites cases that were housed in the Central Hospital of Tripoli during the period 2004-2012.

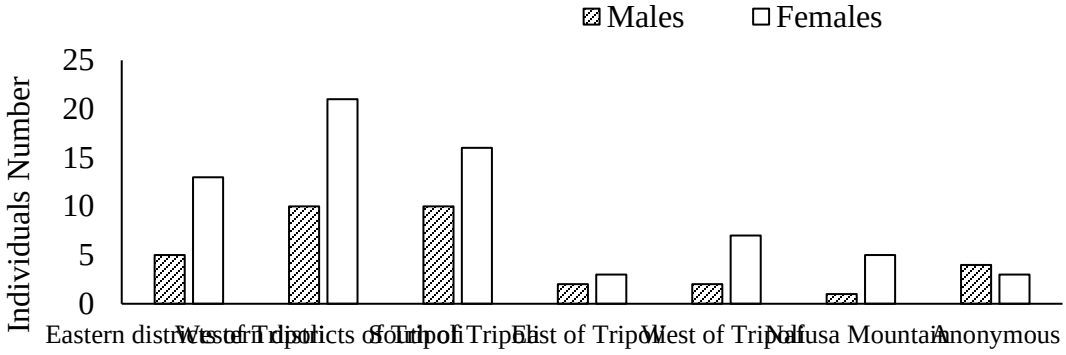


Fig.61. Number of spider bites cases (males and females) according to the area residence that were housed in the Central Hospital of Tripoli during the period 2004-2012.

The results showed a significant difference among age groups in terms of the cases number (χ^2, P ≤0.0001). The younger age groups of the cases were less represented, especially the age group <10 years. With increasing age, the cases number reaching a climax at the age group 20-29 years, followed by the age group 30-39 years and then the cases number began decreasing. Cases were not recorded in the age group 60-69 years (Fig. 62). In general, females were more represented in most age groups but females were not recorded in the age groups <10 and 69 < years (Fig. 63).

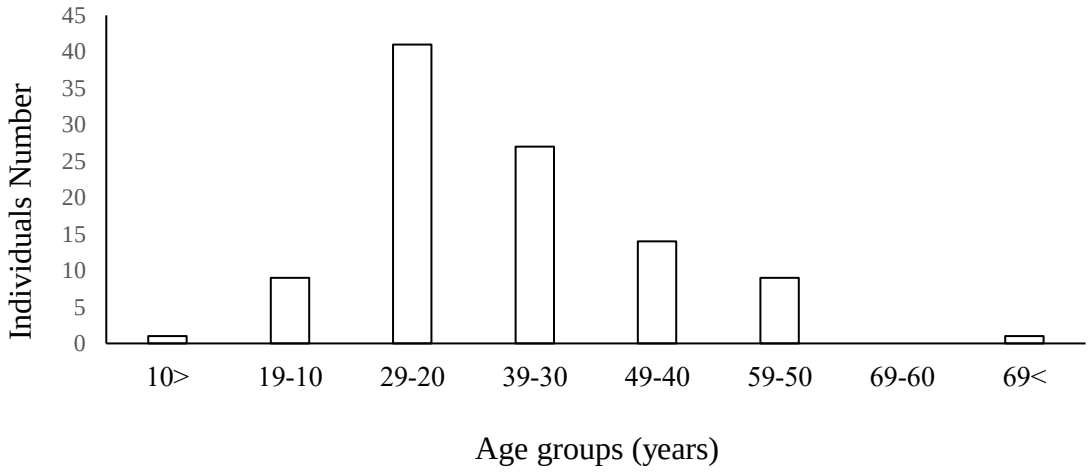


Fig. 62. Number of spider bites cases according to age, that were housed in the Central Hospital of Tripoli during the period 2004-2012.

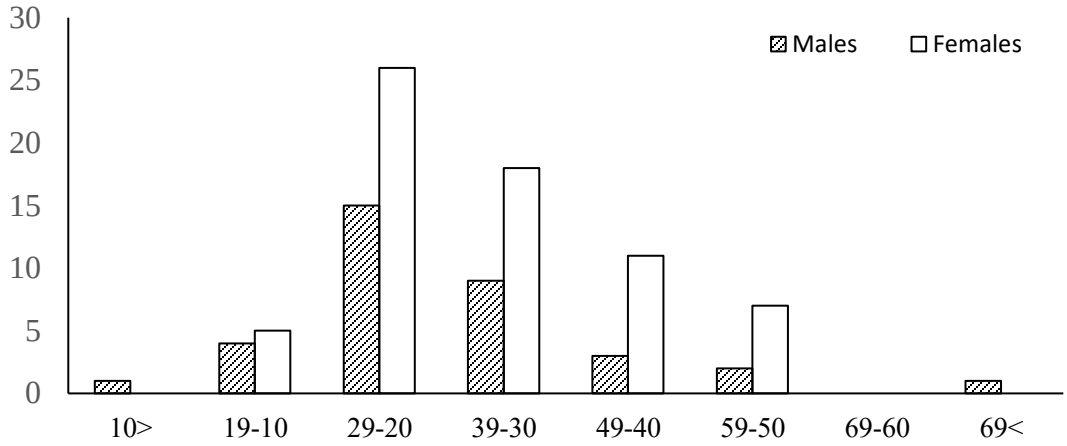


Fig. 63. Number of spider bites cases (males and females) according to age that were housed in the Central Hospital of Tripoli during the period 2004-2012.

The housed patients came from 45 places: the eastern districts of Tripoli (nine districts), the western districts of Tripoli (13 districts), areas south of Tripoli (9), areas east of Tripoli (4), areas west of Tripoli (5) and Nafusa mountain areas (5). The cases of Tripoli formed about 48%, the rest were belonged to the surrounded areas. The western districts of Tripoli were the most represented by 31 cases, followed by the areas south of Tripoli by 26 cases, after that the eastern districts of Tripoli by 18 cases. Unfortunately, some records were not complete so unrecorded place of residence for a number 7 cases (Fig.64). When calculating

the average number of cases (cases number / areas number) the areas south of Tripoli showed the largest value 2.89 ± 0.78, followed by the western districts of Tripoli (2.39 ± 0.71) and then the eastern districts of Tripoli (2.00 ± 0.31). Nafusa mountain areas showed the least value (1.20 ± 0.18) (Fig. 65). Significant difference was record between the cases number among areas (χ^2, P ≤0.001), although some pair wise comparisons did not show significantly difference (χ^2, P≥ 0.05) (Fig. 66).

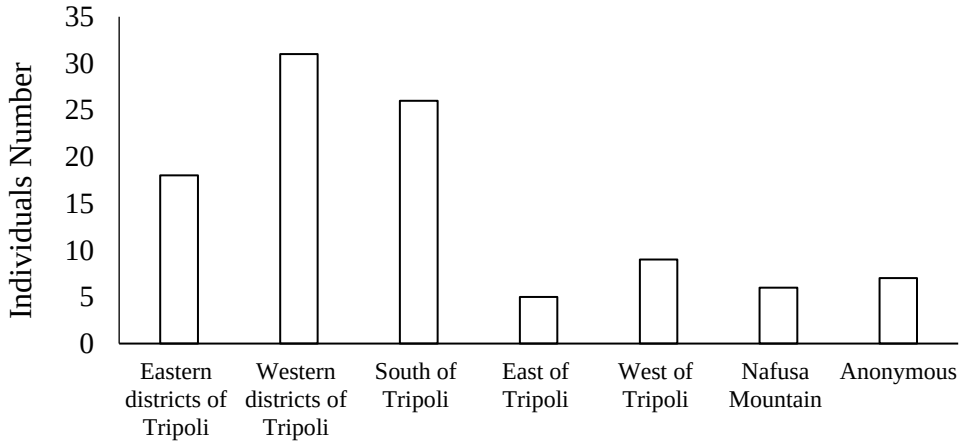


Fig. 64. Number of spider bites cases according to the area residence that were housed in the Central Hospital of Tripoli during the period 2004-2012.

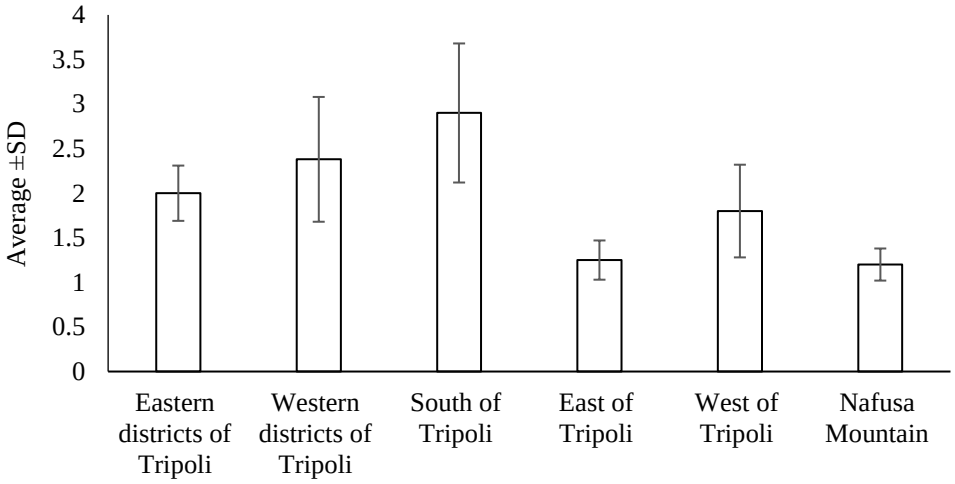


Fig. 65. Average number of spider bites cases according to the area residence that were housed in the Central Hospital of Tripoli during the period 2004-2012.

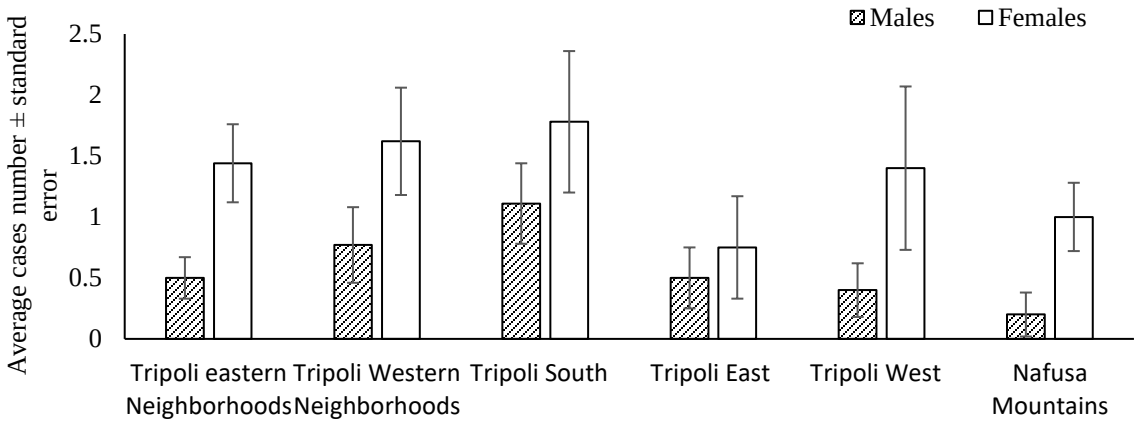


Fig. 66. The average cases number of spider bites from males and females by residential areas, which have been harboring in Tripoli Central Hospital during 2004 - 2012.

Symptoms

Local symptoms: Pain is characteristic, may be severe and is usually the most common symptom. It is related either to ischemia secondary to vasospasm or to disruption by the toxin of myelin sheaths on nerve fibers. The patients came with 3 types of local complains including pain in 48 %, Necrosis at the site of the bite in 40% of them, itching in 33.3% and Swelling 32%. fig. 67 showing the frequency of symptoms.

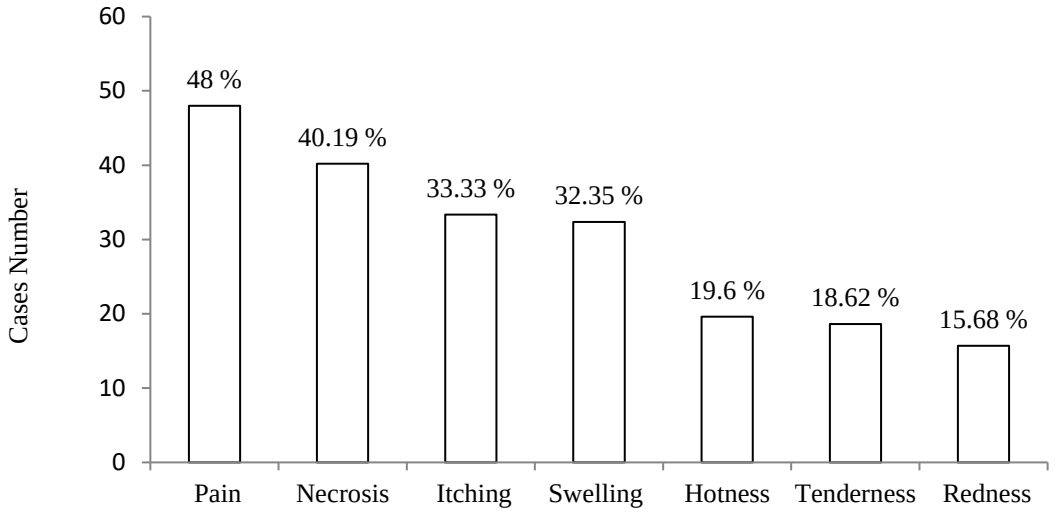


Fig. 67. Distribution of hospitalized spider bites patients by localized symptoms and signs.

General symptoms: Weakness, vomiting, fever, headache, abdominal pain, dizziness, loss of consciousness, and generalized erythema; all had been reported among cases with spider bite, their frequency of occurrence showed in the Fig 68.

The patients came with different clinical symptoms after spider bite including Erythema 65.68%, Fever in 19.6%, abdominal pain 4%, fatigability 3%, chills 2.9% and generalized weakness 0.98% of patients.

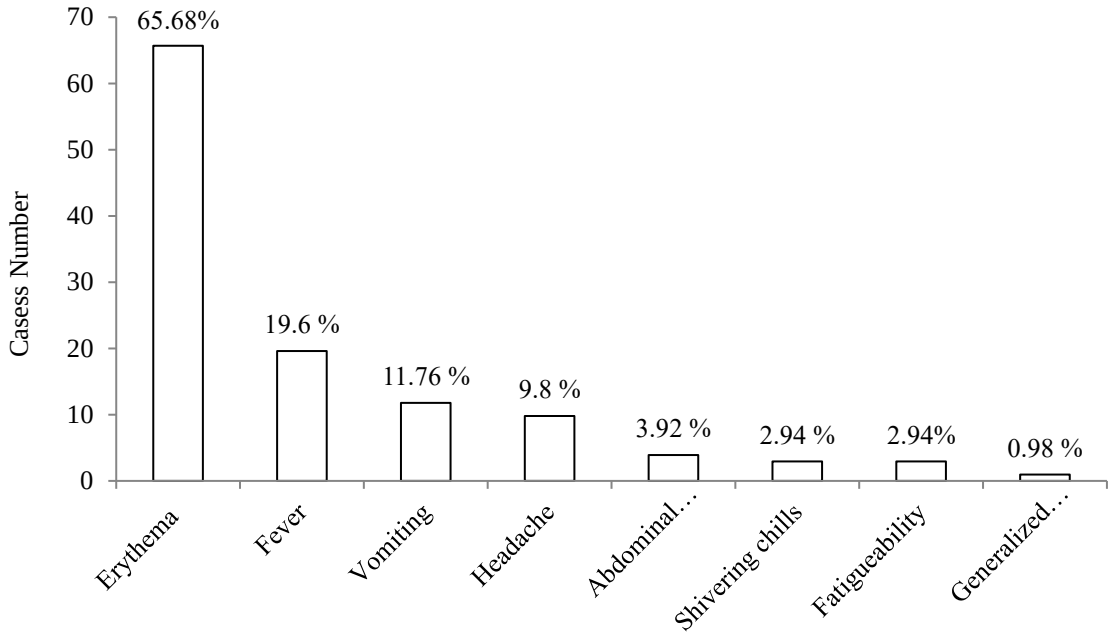


Fig. 68. Distribution of hospitalized spider bite patients by generalized symptoms and signs.

Lateral symptoms

There were three types of lateral symptoms, detected in this chapter, Toxic erythema in 26.5%, and 8.8% of the patients complicated by lymphangitis and 2.94% Systemic. Fig. 69.

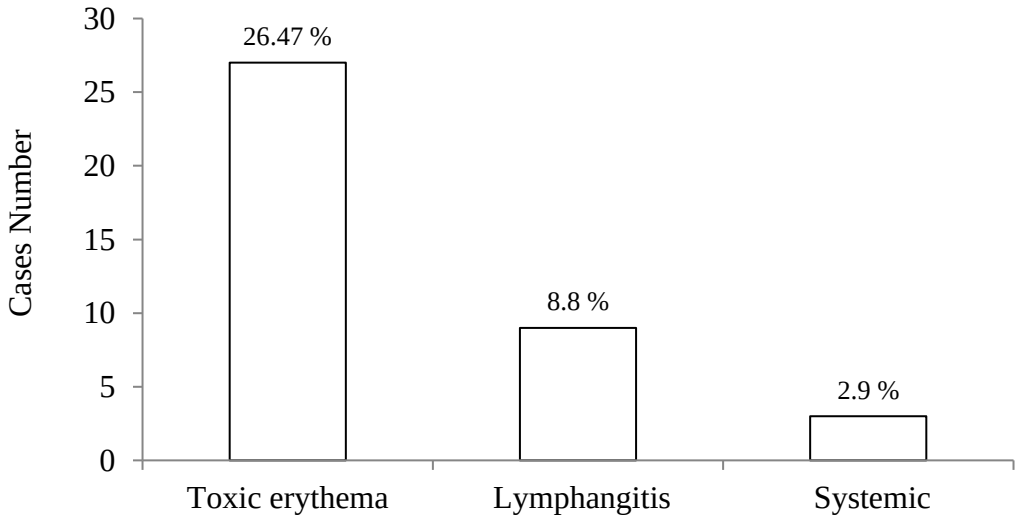


Fig. 69. Distribution of hospitalized spider bites patients by Lateral symptoms.

Tripoli Medical Center

Data were collected from 112 files of cases were housed due to spider bites in the Dermatology Department in Tripoli Medical Center during the period from 2004 to 2013; 22 males (20%) and 90 females (80%) which differed significantly (χ^2, P ≤0.001). (Fig. 70). The average number of males 3.5 cases per area and females 14.8 case (Fig. 71). The cases of females have more representation among areas of residence (Fig. 72).

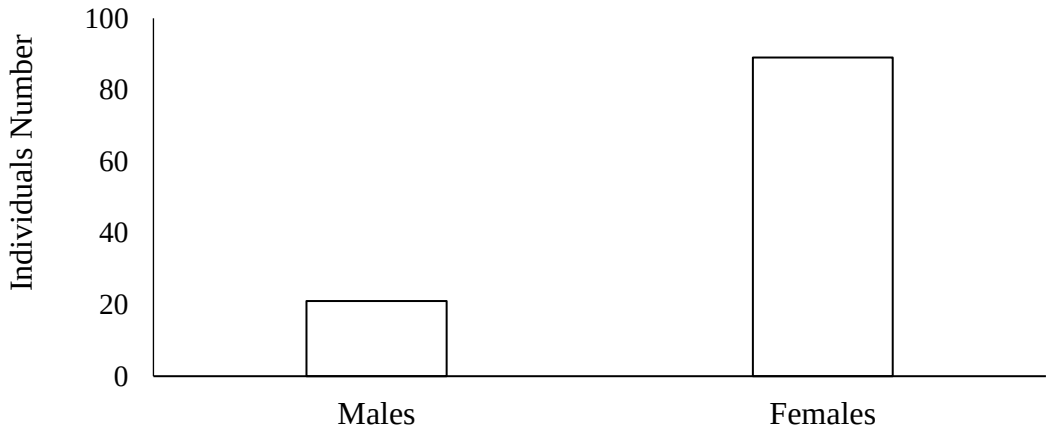


Fig. 70. Number of spider bites cases that were housed in Tripoli Medical Center during 2004-2013.

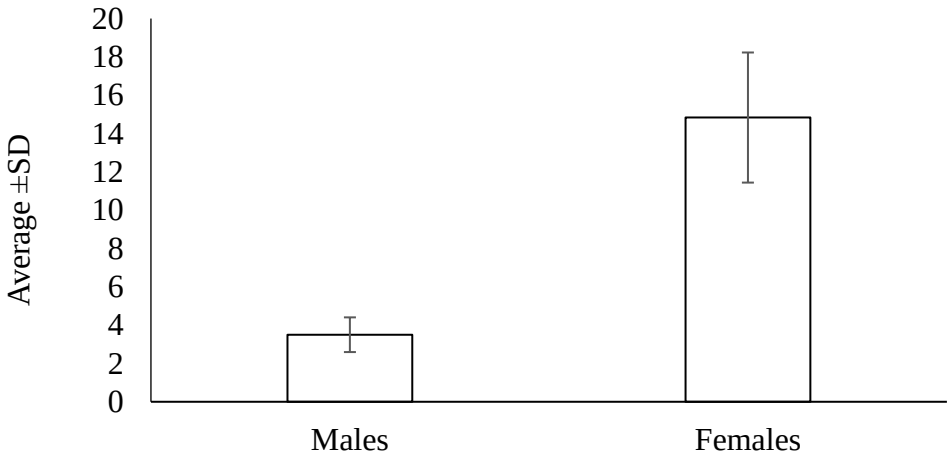


Fig. 71. Average number of spider bites cases that were housed in Tripoli Medical Center during 2004-2013.

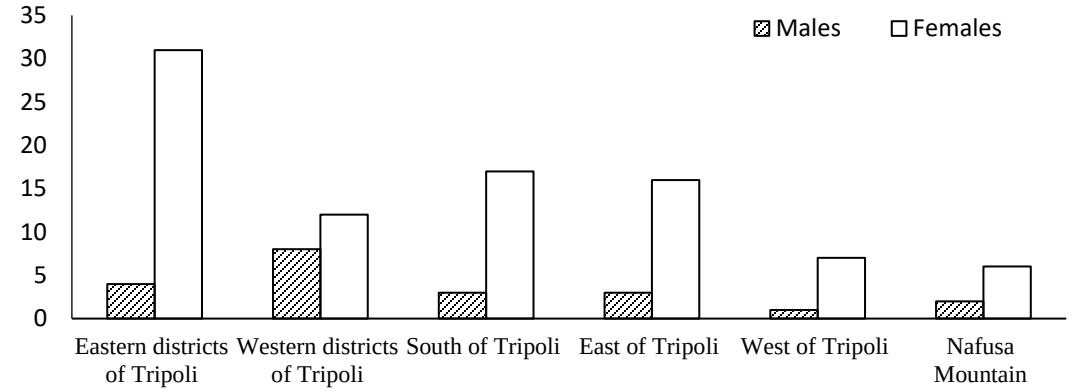


Fig 72. Number of spider bites cases (males and females) according to the area residence that were housed in Tripoli Medical Center during the period 2004-2013.

The results showed a significant difference among age groups in terms of the cases number (χ^2, P ≤0.0001). The age group <10 years represented only one case, in contrast to the other age groups which were represented by numerous cases. The age group 20-29 years showed the largest value (40 cases) followed by the age group 30-39 years and 40-49 years, then the cases number began decreasing until it reached to the two cases in both the categories 60-69 years and <69 (Fig. 73). The results showed a significant difference between age groups in terms of cases number (χ^2, P <0.001).

When separate male and female cases results showed the same distribution; the 20-29 years age group represented more categories, followed by 30-39-year category, while the younger and older groups showed less representation, moreover results showed a significant difference between age groups in terms cases number (χ^2, P <0.001). (Fig. 74).

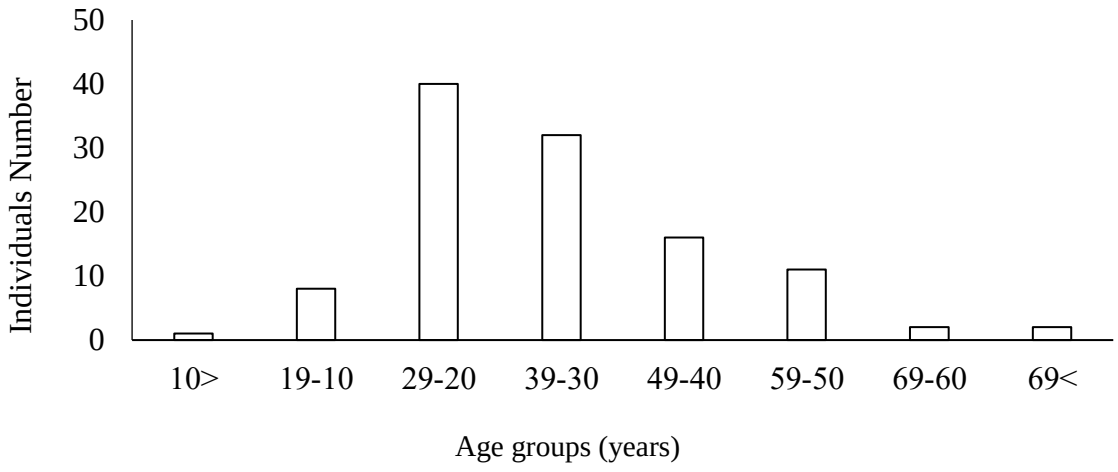


Fig. 73. Number of spider bites cases according to age that were housed in Tripoli Medical Center during 2004-2013.

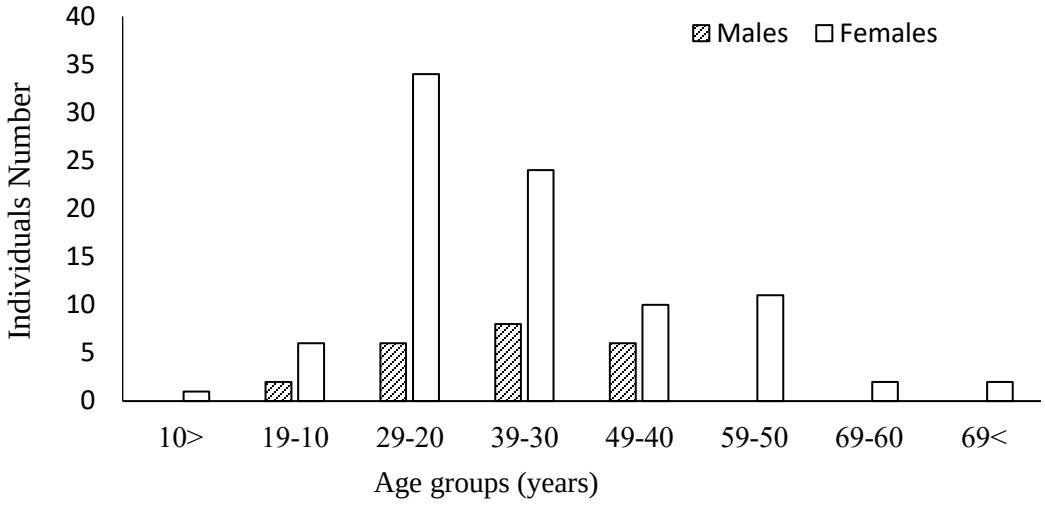


Fig. 74. Number of spider bites cases (males and females) according to ages that were housed in Tripoli Medical Center during 2004-2013.

The housed patients in Tripoli Medical Center came from 43 places: the eastern districts of Tripoli (nine districts), the western districts of Tripoli (ten districts), areas south of Tripoli (11), areas east of Tripoli (5), areas west of Tripoli (4) and Nafusa mountain areas (3). The cases of Tripoli formed about 49% of the cases, the rest were belonged to the surrounded areas. The eastern districts of Tripoli were the most represented by 35 cases, followed by the western districts of Tripoli and the areas south of Tripoli by 20 cases and 19 cases respectively. The rest were represented by eight cases for each (Fig. 75). When calculating the average cases number (Cases number/ Areas number), results showed that the eastern districts of Tripoli showed the largest value of 3.89 ± 1.3, followed by the areas east to Tripoli (3.80 ± 0.42), then areas of Nafusa Mountain (2.67 ± 1.4), the other areas showed similar values (Fig. 76). There was significant difference among areas in terms of number of cases (χ^2, $P \leq 0.001$), although pair-wise comparisons did not show a significant difference (χ^2, $P \geq 0.05$).

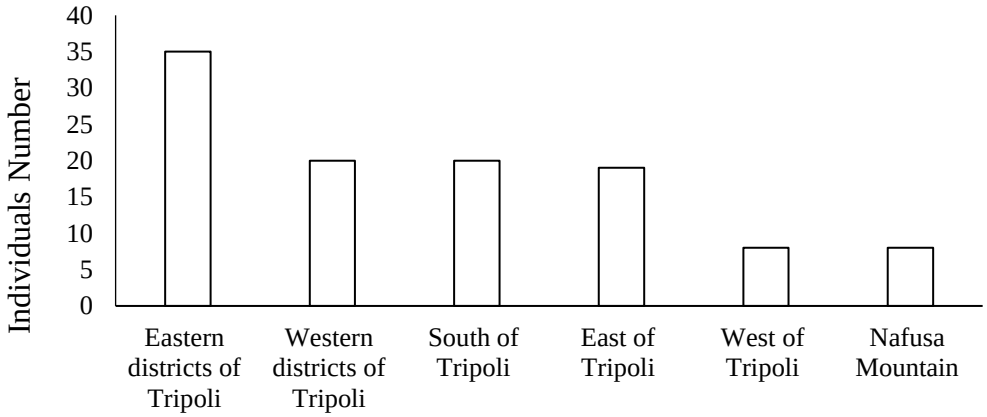


Fig. 75. Number of spider bites cases according to the area residence that were housed in Tripoli Medical Center during 2004-2013.

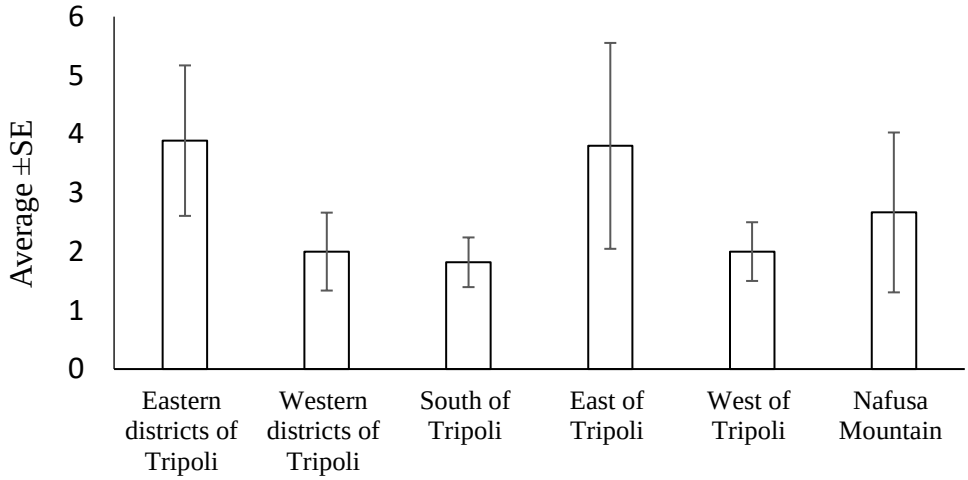


Fig. 76. Average number of spider bites cases according to the area residence that were housed in Tripoli Medical Center during 2004-2013.

The data, which has been obtained from the files of Department Dermatology of Tripoli Medical Center (2004 -2013), showed that the spider bite cases formed 2.34% from total number of cases which have been housed in the Department. The annual percentage varied among years (Table 14).

Table 14. The Cases showed number of housed patients in the Department of Dermatology, Tripoli Medical Center, and the cases number of spider bites and percentage (cases number of spider bites/ Total cases number of shelter X 100).

Year	Cases number of Spider bites	Cases number of shelters in the Dermatology Department	Percentage %
2004	18	683	2.64
2005	12	520	2.31
2006	9	503	1.79
2007	17	458	3.71
2008	15	491	3.05
2009	11	446	2.47
2010	10	446	2.24
2011	7	266	2.63
2012	7	503	1.39
2013	4	376	1.06
Total	110	4692	2.34 %

Discussion

Bites by spiders are considered of the most serious problems related to toxins (Hawdon & Winkel, 1998). All spiders are predators and have Venom glands and spiders inject venoms into their prey by the teeth-like hooks. The medical importance of venomous spiders varies by species of spiders and according to the victim. The venoms of many spiders have no dead effect on humans, as well human skin is protected from the poison of spiders that are short fangs do not allow them access to poison the dermis layer. However, venom of spiders is more effective to children, the elderly and the sick, especially those who have immunological strikes (James et al., 2006).

Spiders - generally - inject two types of venoms: neuron venom, which work to disable track neuromuscular leading to disruption of vital functions that depend on the movement of the muscles as breathing and circulation (George, 2009); the second type of venom is necrotic venom that work on the tissue decomposition (Vetter, 2000). Most spiders' venom contains a form of neuron Venom, but they don´t constitute the basic influential in some spiders that are considered as dangerous to humans, where the part of influential venom is necrotic venom (Escoubas & Rash, 2004). Most spiders that produce necrotic venom belong to the family Sicariidae; producing venom which contains a substance called sphingomyelinase D responsible for necrosis, which affects the skin after the bite of spiders (Binford et al., 2009).

Necrotic venom may not result in symptoms lead to doctor's visit, because it is not painful after bite. But if the bite was by dangerous species may lead to death in some cases due to the reaction of the body caused by venom components in those species, such as kidney failure (Shames et al., 2007.), especially when the bitten person suffering from diseases that weakened the immunity. Since the bite is not painful that causes unaware of the patient and being not known of reason his condition, but after two hours begins showing symptoms, which is characterized by redness, swelling and itching of the bite place where in addition to pain. Often, experienced physicians can recognize the spider bite, but some of physicians may fault to diagnose and attribute the condition to a bacterial infection.

The site of spider bite differs widely from patient to patient including; the thigh, back of the trunk, upper back, lower limb, upper limb arm, face and neck, the lowest frequency was for the areas; abdomen, forearm, and chest, breast. This was compatible with both studies previous two hospitals in the region. Both local and systemic treatments were used for the management of patients included in this chapter.

The treatments were 96% of them received systemic antibiotics, antihistamines and steroids, 5% received Dapsone, 98.8% treated with local treatments, skin grafting was needed in 5% of the patients who were maintained on regular follow up, by studying the type of outcome of patients with spider bite under this chapter, we found that 87.5% of them healed without scar formation but the rest 12.5% healed with scar. (Musbah, 2011).

In Libya, there are some species (about only one species of brown spiders and three species of black widow) including which produce necrotic venoms causing medical problems, the most important genus is *Loxsosceles* where a number of individuals from different regions in northwestern Libya scored (Elmareme 2006; Alkreo 2012; Aburass 2014). The total number of collected spiders from genus *Loxsosceles* that were sampled in the north western part of 121 individuals from Ibokmash (westward) until Tajoura (east), in addition to the National Park of Abogilan; the individuals of *Loxsosceles* formed 1.6% of collected spiders (Elmareme 2006; Alkreo 2012; Aburass 2014).

The numbers of females were higher than males in almost all cases; whether in terms of age groups or areas. This corresponds with Shames et al. (2007), they found that more than 70% of the cases were females, and Musbah (2011) were represented more than 67.5% females. Perhaps due to spiders' bites being occurring in houses, or their vicinities, rather than outdoors. It is known that women who are doing the work at home, and thus were more susceptible to spider bites. This is confirmed by fact that most of the cases were within the middle- age groups 20- 40 years, and women in these ages are in charge to do household work. In a previous study, it was found that most cases were within age 19- 40 years (Shames et al., 2007), and in another study, most cases were within 23- 40-year age (Musbah, 2011).

Nearly, half of the cases that have been housed in Tripoli hospitals were from terrains of the city (Musbah, 2011; Shames et al., 2007), This is logical the since these hospitals are located within the city of Tripoli, but spider bites not expected to occur inside the city; but the reality that most of the districts of Tripoli are not well-planned, because there are a lot of residence blocks are inside remnants of farms and neglected land plots, such as in the areas of Tajoura, Soukaljumah, Janzur and others. It seems clear that there are cases from areas south of Tripoli form high percentage of cases, mostly of those villages are located within the confines of Tripoli major, and no hospitals in these areas, except for hospital Sbaiaa, which does not include a Dermatology Department which makes the population have resorted to hospitals in Tripoli, which contains a Dermatology Department, a hospital Ber-Al-Asitymelad Tripoli Medical Center and Central Hospital of Tripoli.

The percentage of spider bite cases that housed in Tripoli hospitals formed 1.06 - 3.71% (average 2.34 %,) of housed cases in the Department of Dermatology of Tripoli Medical Center, which is relatively large. This converge ratio was between years despite the different number of cases.

Conclusion

Libya is a vast expansion of a semi-arid desert of variable topography located in North Africa. It is bounded by Mediterranean Sea to the north, Tunisia and Algeria to the west, Egypt to the east, and Niger and Chad to the south. Libya covers 1,748,700 km². The strategic locations of Libya in North Africa and its unique landscape features including the geography, vegetation, and climate reflect the ecosystem diversity and biodiversity of this region of the world. Exploration of Libya dates back to the end of the 18th century, but data accumulation began only in the middle of the 19th century mainly by Italian, French, British and German explorers. The need for an updated list of spiders found in Libya rose recently due to upcoming planned studies. In this project, we list spider families from the Libyan Northwest coast, from existing literature and from 3335 spiders collected with different sampling methods after one year along the coast region from Jodyem (32° 47' 42" N 12° 49' 26" E) to Farwa Island (33° 6' 31" N 11° 44' 22" E) in 37 sites. Three thousand two hundred and eighty spiders were classified into 35 families, of which 2513 were females, and 767 were males. And 1834 were mature, 1446 immature. Air temperature, rainfall, and relative humidity were recorded during the four seasons of the year. The book revealed that the diversity of spider faunal density was high in spring and summer and low in fall and winter. The aim of this book is to the biodiversity, weather, and classification of the collected Libyan northwest spider fauna of the families: Gnaphosidae, Sicariidae, and Theridiidae to genus and species level. In addition, is to identify the venom spiders of health concern during 2013 – 2014.

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Appendix

Appendix

We collected all information about spiders of Libya so far known in order to make a check list of this group (Appendix 1). Sources were Zavattari and my sampling, Elmareme, Aburass, Alkreo, https://araneae.nmbe.ch/biodiversity/country.list

You make a comparison between your sampling and Zavattari for instance Zavattari found 22 families, 84 Genus and 161 species, now there are 46 families. Currently there are 308 species in list Species list for Libya, https://araneae.nmbe.ch/biodiversity/country. Zavattari did not find families: Amaurobiidae, Ammoxenidae, Desidae, Dipluridae, Hahniidae, eteropodidae, Idiopidae, Linyphiidae, Liorcranidae, Microstigmatidae, Cheiracanthiidae, Oonopidae, Philodromidae, Scytodidae, Segestriidae, Selenopidae, Sparassidae, Tetragnathidae, Titanoecidae.

while he found families: Agelenidae, Araneidae (Argiopidae), Clubionidae, Dictynidae, Dysderidae, Eresidae, Filastidae, Gnaphosidae, Hersiliidae, Lycosidae, Oecobiidae, Oxyopidae, Palphmonidae, Pholcidae, Prodidomidae, Salticidae, Sicaridae, Theridiidae, Thomisidae, Uloboridae, Zodariidae.

Also, Zavattari found only one family (Urocteidae) we did not get them yet during the Classification of samples collected.

Appendix 1. Check list of Libyan Spider

Family	Genus	Species	Zavattari Species
Agelenidae	*Agelena*		*Agelena lepi da*
	Tegenaria		*Tegenaria (parietina, derhami)*
	Textrax		*Textrax coarctata*
Amaurobiidae	*Amaurobius*	*festae*	
Ammoxenidae	؟		
Araneidae (Argiopidae)	*Aranus*		*Maso galiica/Cyrthophora citricola/ Tetragnatha niten / Eucta isidis, Argiope (lobata, trifasciata) / Aglaena pupia / Cyclosa insulana / Larinia chloreis Araneus"Epeira" patagiatus, drome daries, suspicax , dalmaticus, klaptoczi, armi da, diodius, adiantus)/ Araneus "Singa" (semiater , heri)/*
	Argiope		
	Cyclosa		
	Cyrtophora		

			Araneus "Hyposinga" albovittata
Clubionidae	*Clubiona*	*straminea*	*Eusparassus (walkenaeri, argalesius)/ Selenops radiates/ Nonianus pictus/ Cebrennus (castaneitarsis, sparassoides, pulcherrimus) Marmarica nigropatellata/ Olios spongitarsis/ Chiracanthium (mildei, siedlitzi, isiacum, anceps) Micariosoma festivum/Micaria (coarctata, fausta)*
Cithaeronidae	*Cithaeron*	*praedonius*	
Corinnidae	*Castianeira* *Scorteccia*	*antinorii* *termitarum*	
Desidae	*Desis*		
Dictynidae	*Archaeodictyna*	*anguiniceps*	*Archaeodictyna anguiniceps /Devade hirsutissima, Amaurobius albomaculatus.*
	Devade	*indistincta*	
Dipluridae			
Dysderidae	*Dysdera*	*Bernardi, cornipes, crocata* *soleata*	*Dysdera (noma da, crocata, westringi, cornipes, soleata).*
Eresidae	*Adonea*		*Eresus dufouri.* *Stegodyphus lineatus*.
	Eresus	*kollari*	
	Stegodyphus	*Lineatus*	
	Loureedia	*Annulipes*	
Filastidae	*Filastata*	*Insidiatrix*	*Filistata (insidiatrix, nana).*
	Pritha	*Nana, Vestita*	
Gnaphosidae	*Drassodes*	*Drassodes* sp. *(cfr. lapidosus).*	*Anagraphis vitel* *Berlandia plumalis.* *Cithaeron limbatus.* *Drassodes (lutescens, alexandrines, deserticola,* *Seditiosus, spinicrus).* *Drassus (tarhunensis, nugatorius, sockniensis)* *Echemus pharetratus / Leptodrassus fragilis.* *Nomisia (exornata, castanea).* *Poecilochroa (campestrata, pugnax, bicolor).*
	Drassyllus	*Drassyllus spp. (pumilus, pusillus, praeficus)*	
	Gnaphosa	*Gnaphosa sp.*	
	Haplodrassus	*Haplodrassus sp.*	
	Leptodrassus	*Leptodrassus sp.*	
	Micaria	*Micaria spp (albovittata)*	
	Nomisia	*Nomisia sp.*	
	Pterotricha	*Pterotricha sp.*	
	Scotophoeus	*Scotophoeus spp (cfr. black wallii, Microdon)*	
	Setaphis	*Setaphis sp. (cfr. algerica or parvula))*	
	Sosticus	*Sosticus sp. Loricatus*	

	Trachyzelotes	*Trachyzelotes sp.*	*Pterotricha (conspersa, schafferi,cambridgei, Aegyptiaca, exornata, lentiginosa,elegans). Scotophoeus (mundulus, quadridentatus, desertorum). Zelotes (barbatus, kerimi, scutatus, inauratus, Stolidus, carmeli, davivi, bardiae).*
	Urozelotes	*Urozelotes sp.*	
	Zelotes	*Zelotes sp. (subterraneus)*	
Hahniidae	*؟*		
Hersiliidae	*Hersilia*	*caudata*	*Hersilidia (lucasi, simony).*
	Hersiliola	*macullulata, simoni*	
Heteropodidae	*؟*		
Idiopidae	*؟*		
Linyphiidae	*Linyphia*		
Liorcranidae	*mesitotelus*	*tenuissimus*	
Lycosidae	*Lycosa*		*Lycosa "Trochosina" tremens/ Lycosa"Pirata" lacustris / Lycosa"Trocosa" (fulvolineata, ferox)/ Lycosa "Trochosa" Cyrenaica/ Lycosa "Hogna"radiate\ Lycosa "Tarentula" intermedia/ Lycosa perita/ Lycosa narbonensis/ Lycosa albofasciata .*
	Paradosa		*Paradosa (venatrix, abacata, confalonierii).*
	Trochosa		*Evippa (arenarla, praelongipes)*
Microstigmatidae	*؟*		
Cheiracanthiidae	*Cheiracanthium*		
Oecobiidae	*Oecobius*	*annulipes, cellariorum, navus, putus*	*Oecobius (cellariorum, annulipes).*
Oonopidae	*Opopaea*		
Oxyopidae	*Oxyopes*	*globifer, heterophthalmus, lineatus, sobrinus*	*Oxyopes (globifer, sobrinus).*
	Peucetia	*arabica, virescensm, viridis*	
Palpimanidae	*Palpimanus*	*gibbulus*	Palpiman*us gibbulus*
Philodromidae	*Philodromus*		
	Thanatus		
	Tibellus		

Pholcidae	*Pholcus*		*Artema mauricia, Holocnemus rivulatus,* *Pholcu (phalangioides, fauroti).*
Phrurolithidae	*Phrurolithus*	*festivus*	
Pisauridae	*Pisaura*	*mirabilis*	
Prodidomidae	*Prodidomus*	*amaranthinus, rollasoni*	*Prodidomus amaranthinus.*
	Zimirina	*vastitatis*	
Salticidae	*Aelurillus*		*Attulus saliens / Salticus mutabilis* *Bianor albobimaculatus* *Cyrba algerina* *Evophrys (clemens, frontalis, convergentis, plbeja, marmarica).* *Heliophanus (decoratus, senussus)* *Menemerus illigeri.* *Saitis latifrons.* *Habrocestum insignipalpe.* *Chalcoscirtus infimus* *Telamonia castriesiana*
	Bianor		
	Euophrys		
	Evarcha		
	Icius		
	Menemerus		
	Mogrus		
	Phlegra		
	Plexippus		
	Thyene		
Scytodidae	*Scytodes*		
Segestriidae	*Segestria*		
Selenopidae	*Selenops*	*radiatus*	
Sicaridae	*Loxosceles*	*Loxosceles rufescens*	*Scytodes (major, Velutina, bertheloti)* *Loxosceles distincta.*
Sparassidae	*Micrommata*	*formosa*	
	Cebrennus	*castaneitarsis, wagae,*	
	Cerbalus	*pulcherrimus*	
	Eusparassus	*oraniensis, walckenaeri*	
	Olios	*argelasius, pictus*	
Tetragnathidae	*Tetragnatha*	*Tetragnatha* Sp.	
Theraphosidae	*Ischnocolus*	*valentinus*	
Theridiida	*Argyrodes*	*Argyrodes*	*Euryopis sexalbomaculata* *Theridium (sisyphium, aulicum, ovatum), Theridula drome daria,* *Teutana triangulosa*
	Enoplognatha	*Enoplognatha* sp. (cfr.*abrupta , ovata*)	
	Kochiura	*Kochiura* Spp. *(oulica*, pulchellus)	
	Latrodectus	*L. geometricus*	

		L. dahli	*Lithyphantes (paykullianus, ochraceus)*
			Gnathonarium rohlfsianum
		L. terddecimguttatus	*Latrodectus terddecimguttatus*
	Rugathodes	*Rugathodes* Sp.	*Enoplognatha mandibularis*
	Steato da	*Steato da* Spp.*(nobilis)*	
	Theridion	*Theridion* Spp.	
Thomisidae	*Haeriaeus*		*Xysticus nubilus / Haeriaeus setiger/ Monaeses paradoxus / Tibellus oblongiusculus / Thomisus hilarulus/ Oxyptila (albimana, blitea)/ Thanatus setiger/ philodromus (Lepidus, calidus, aureolus).*
	Ozyptila		
	Thomisus		
	Thomrus		
	Xysticus		
Titanoecidae	*Titanoeca*		
	Nurscia	*albomaculata*	
Uloboridae	*Uloborus*	*walckenaerius*	*Uloborus plumipes*
	Hyptiotes	*flavidus*	
*Urocteidae	----------	----------	*Uroctea limbata*
Zodariidae	*Zdarion*		*Zo darium (nitidum, isabellinum, maculatum).*
46			

* only family of Zavattari

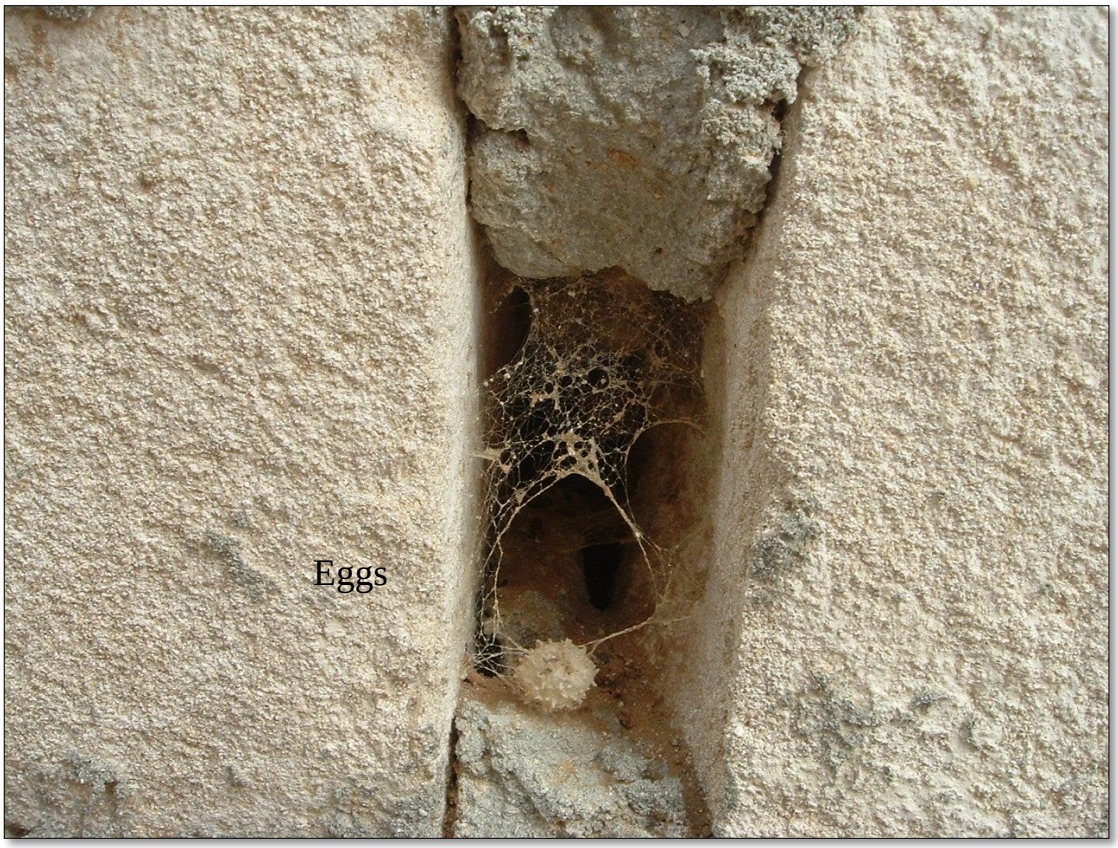
Appendix 2. Spider Families of Libya

Scientific Name	Common Name	Afrikaans Name
Agelenidae	funnel-web spiders	tregterwebspinnekoppe
Amaurobiidae	hackled mesh-web spiders	deurmekaarmaaswebspinnekoppe
Ammoxenidae*	termite-eating spiders or sanddivers	Termitevretende spinnekoppe
Araneidae	Orb-web spiders	wawielwebspinnekoppe
Clubionidae	Sac spiders	sakspinnekoppe
Desidae	Long-jawed intertidal spiders	grootkaak-tussengetyespinnekoppe
Dictynidae	Mesh-web spiders	maaswebspinnekoppe
Dipluridae	Sheet-web mygalomorphs	doekweb-mygalomorphs
Dysderidae	Long-fanged six-eyed spiders	Langkaak-sesoogspinnekoppe
Eresidae	Velvet spiders	fluweelspinnekoppe
Filastidae	Crevice weavers	Rotsskeur-webspinnekoppe
Gnaphosidae	Flat-bellied ground or moues spiders	Platmaaggrond-of muissspinnekoppe
Hahniidae	comb-tailed spiders	kamstertspinnekoppe
Hersiliidae	Long-spinnered bark spiders	Langspintepel-basspinnekoppe
Heteropodidae	Large huntsman or large wandering crab spiders	Grootjagterspinnekoppe of grootdwaalkrapspinnekoppe
Idiopidae	Spurred trapdoor spiders	Gespoorde valdeurspinnekoppe
Linyphiidae	dwarf or hammock-web spiders	dwerg-of hangmatwebspinnekoppe
Liorcranidae	Spiny-legged sac spiders	Stekelbeen-sakspinnekoppe
Lycosidae	Wolf spiders	wolfspinnekoppe
Microstigmatidae*	Micromygalomorphes	mikromygalomorphes
Cheiracanthiidae	Sac spiders	sakspinnekoppe

Oecobiidae	Dwarf round-headed spiders or star-legged spiders	Dwergrondekopspinnekoppe en sterbeenspinnekoppe
Oonopidae	Dwarf huntsman spiders	dwergjagterspinnekoppe
Oxyopidae	Lynx spiders	tierspinnekoppe
Palpimanidae*	Palp-footed spiders	tasterpootspinnekoppe
Philodromidae	Small huntsman spiders	kleinjagterspinnekoppe
Pholcidae	Daddy longlegs spiders	langbeenspinnekoppe
Prodidomidae	Long-spinnered ground spiders	Langspintepel-grondspinnekoppe
Salticidae	Jumping spiders	Springspinnekoppe
Scytodidae	Spitting spiders	spoegspinnekoppe
Segestriidae	Tube-web spiders	buiswebspinnekoppe
Selenopidae *	Flatties or wall spiders	Plat- of muurspinnekoppe
Sicariidae	Six-eyed sand spiders and violin spiders	Sesoog-sand- en vioolspinnekoppe
Sparassidae*	Huntsman Spiders	Wit dame-grootdwaalkrapspinnekoppe
Tetragnathidae	Golden orb-web spiders, long-jawed orb-weavers and silver marsh spiders	Gouewawielwebspinnekoppe, langkaak-wawielwebspinnekoppe
Theridiidae	cobweb and comb-footed spiders	Spinnerak- en kampootspinnekoppe
Thomisidae	crab spiders	krapspinnekoppe
Titanoecidae		----------
Uloboridae	Tangle-wep spiders	deurmekaarwebspinnekoppe
Urocteidae		
Zodariidae	burrowing	Grawende spinnekoppe
40		


Spiders in their habitat

spiderlings next to their eggs capsule


Eggs


Materials
And
Methods
in Lab.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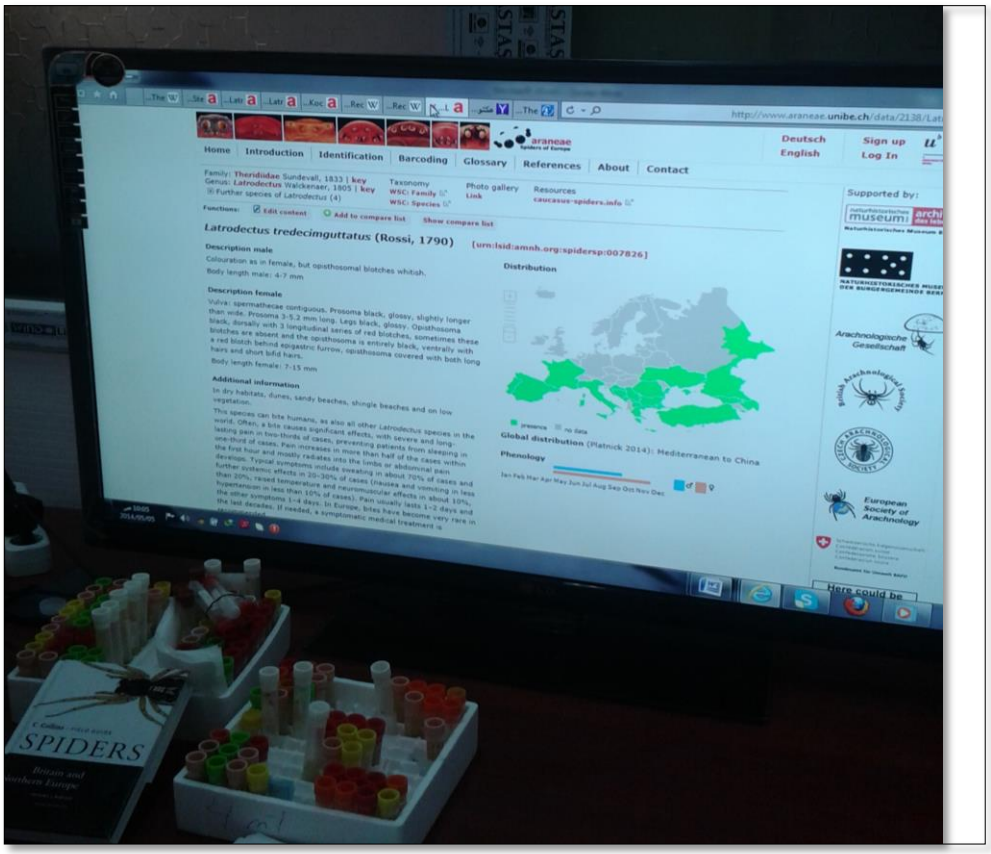
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Latrodectus tredecimguttatus (Rossi, 1790)
Distribution
Global distribution (Platnick 2014): Mediterranean to China
Phenology
SPIDERS


SPIDERS

Some Pictures Cases in the Hospitals from Libya

(Symptoms and signs of the spider bite)

Photo. Dr. Fawzia Khalifa, Tripoli Central Hospital.
Dr. Hoda Elmareme, University of Tripoli

Toxic erythema (Time of presentation)

After 2 weeks

after one year

Scar formation on left thigh after 5 years.