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TAXONOMICAL STUDIES ON TERESTRIAL SPIDERS (ARACHNIDA, ARANEAE) AT ASSIUT GOVERNORATE, EGYPT

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Although spiders have been such a center of interest, the current knowledge on them especially in Upper Egypt is still scarce. Thus, the present study deals with a key to facilitate the identification of terrestrial spiders by using their morphological characteristics. Spider's samples were hand-picked during the period (from December, 2015 till November 2016). A total number of 3457 specimens of spiders was collected from six different sites covering Assiut Governorate. They belonged to 47 species from 42 genera that fall in 22 families. This key deals with the identification of spiders to the family level.

Key words: Spiders, taxonomy, Key, Assiut Governorate, Upper Egypt.

INTRODUCTION

Spiders (order: Araneae) are air-breathing arthropods that have eight legs and chelicerae with fangs that inject venom. They are the largest order of (class: Arachnida) and ranking seventh in global diversity after insect orders [1, 2].

Anatomically, spiders differ from other arthropods in that they are easily characterized by two main body parts which are joined by a narrow stalk called the pedicel and unlike insects, they don't have antennae or wings. The front part of the body, called the cephalothorax (or prosoma), enclosed within a relatively hard (dorsal) shell of armour called the carapace and (ventral) shell called the sternum. The hind part, called the abdomen (or opisthosoma) is soft and capable of expansion, as happens with feeding or egg development. Cephalothorax contains the brain, poison glands, stomach, eyes, chelicerae, mouthparts, legs and palps and the abdomen contains spinnerets, genetalia, lungs and respiratory tracheae [3, 4, 5, 6 and 7].

Spiders have established themselves as a model group in biochemical (silk and venom proteins), behavioral (sexual and web building behaviors) and ecological (foraging and prey-predator interaction) research. They are also utilized as ecological indicators in many terrestrial communities [7, 8].

Many researchers have provided descriptions of spider species abundance or composition in a variety of agroecosystems [9]. Other researchers provided quantitative observations on the abundance of spiders [10, 11] or recorded spider predation events [12].

Taxonomists recognized about more than 47,300 spider's species embracing 116 families described so far and many thousands of species still awaiting discovery and description [13]. In Egypt, there are 41 Families belonging to 204 genera and 405 species [14]. The present study is an attempt to continue the check lists of the Egyptian spider fauna in Assiut Governorate, the central part of Egypt.

MATERIALS AND METHODS

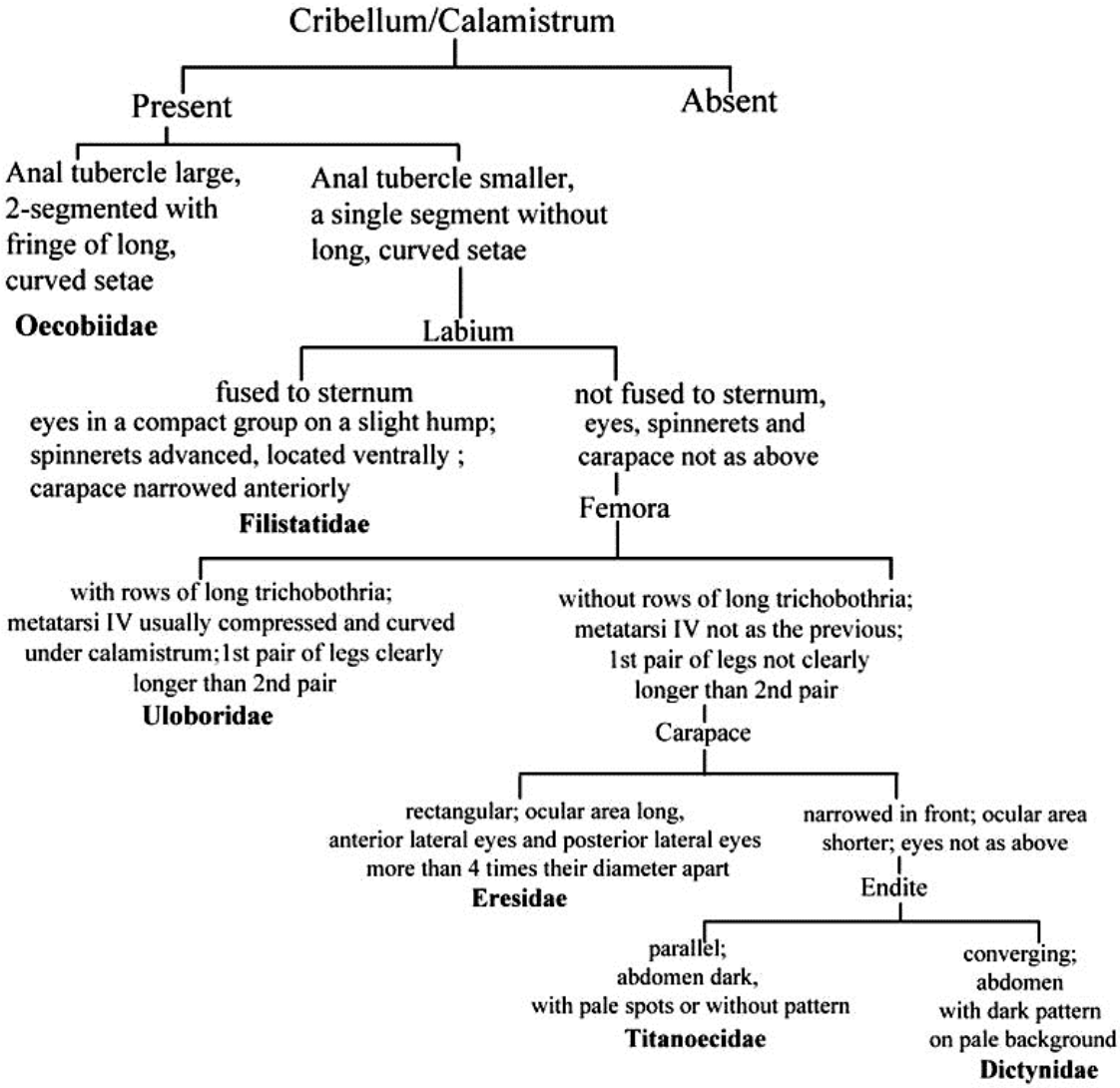
Spider's samples were collected by hand for one year of studying (from December, 2015 to November 2016) from six different sites covering Assiut governorate (Fig.1). Examination was carried out with the aid of trinocular stereomicroscope. The collected specimens were individually preserved in a glass vial (3 x 5cm) containing 70 % ethanol [15]. The identification of specimens was carried out on the light of the available taxonomical knowledge. Many keys, papers and catalogues were used for identification of the recorded species. The collected specimens were identified to the species level whenever possible and others on genus or family level. Identification of the specimens was done by the help of the following literature; [16,17,18,19,20,5,21,22,23,24,25,26,27,28and29]. Finally, species identification were confirmed by Mr. H. K. El-Hennawy the experts in spider's identification in Egypt.

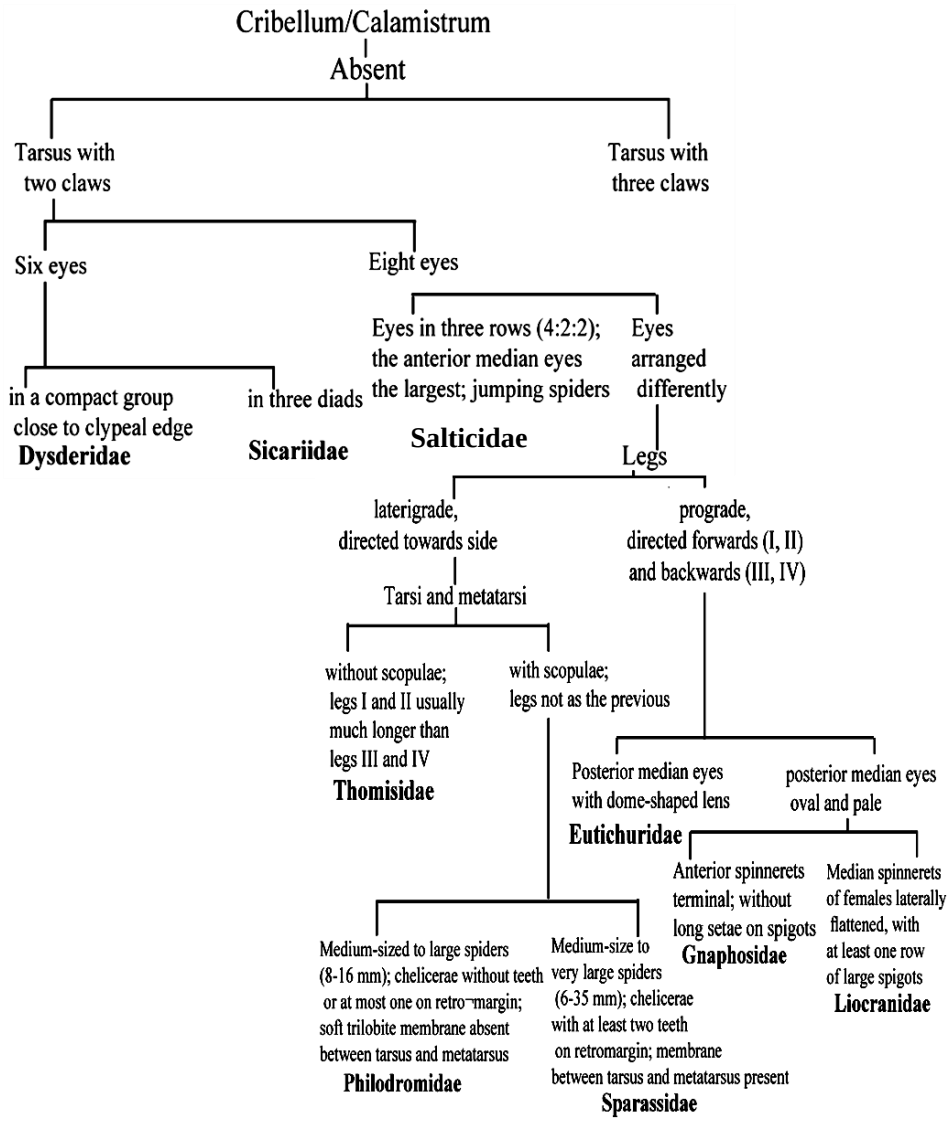
RESULTS

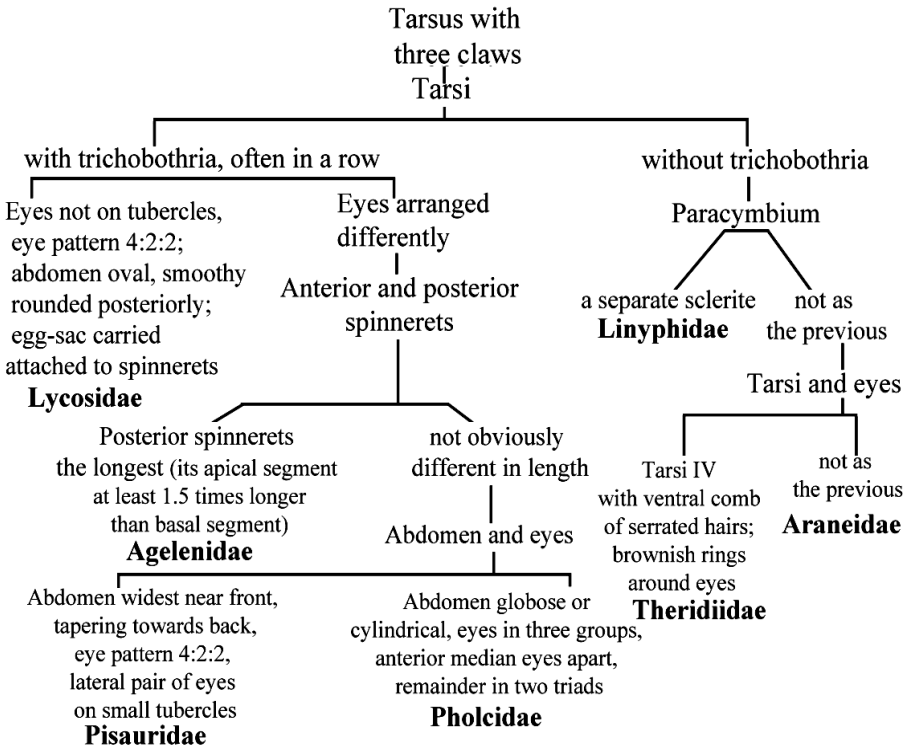
Total number of 3457 specimens was collected during the present study. Different taxa of spiders forming 47 species belonging to 42 genera which fall in 22 families (Table 1) could be recorded. Among these collected specimens, only two genera belonging to the families: (Pisauridae and Dictynidae) could not be identified since they were juveniles. The 10 unidentified species namely: *Larinia* sp., *Synaphosus* sp., *Zelotes* sp., *Uroctea* sp., *Heliophanillus* sp., *Phlegra* sp, *Eusparassus* sp., *Euryopis* sp., *Theridion sp. and Xysticus* sp. Among the recorded taxa

the two unknown genera and the 10 unidentified species proved to be new records for Egypt. All of the collected spiders belong to order: Araneida. The families included: Agelenidae, Araneidae, Dictynidae, Dysderidae, Eresidae, Eutichuridae, Filistatidae, Gnaphosidae, Linyphiidae, Liocranidae, Lycosidae, Oecobiidae, Philodromidae, Pholcidae, Pisauridae, Salticidae, Sicariidae, Sparassidae, Theridiidae, Thomisidae, Titanoecidae and Uloboridae.

Key to Spider Families presented by the survey study




Cribellum/Calamistrum
Absent
Tarsus with two claws
Tarsus with three claws
Six eyes
Eight eyes
in a compact group close to clypeal edge
Dysderidae
in three diads
Sicariidae
Eyes in three rows (4:2:2); the anterior median eyes the largest; jumping spiders
Salticidae
Eyes arranged differently
Legs
laterigrade, directed towards side
prograde, directed forwards (I, II) and backwards (III, IV)
Tarsi and metatarsi
without scopulae; legs I and II usually much longer than legs III and IV
Thomisidae
with scopulae; legs not as the previous
Posterior median eyes with dome-shaped lens
Eutichuridae
posterior median eyes oval and pale
Anterior spinnerets terminal; without long setae on spigots
Gnaphosidae
Median spinnerets of females laterally flattened, with at least one row of large spigots
Liocranidae
Medium-sized to large spiders (8-16 mm); chelicerae without teeth or at most one on retro-margin; soft trilobite membrane absent between tarsus and metatarsus
Philodromidae
Medium-size to very large spiders (6-35 mm); chelicerae with at least two teeth on retromargin; membrane between tarsus and metatarsus present
Sparassidae



DISCUSSION

Even spider faunistic studies in Egypt, especially in Upper Egypt are not complete, only very limited areas have been comprehensively studied. The present study surveyed a total number of 3457 spider specimens which was assigned in 42 genera and 47 species that fall in 22 families. In Egypt, there are 41 families belonging to 204 genera and 405 species [14].

This study indicated that Assiut governorate minimally contains 54% of the families (22 vs 41), 21% of the genera (42 vs 204), and 12% of spider species (47 vs 405) found in Egypt.

In the present study, the 22 families recorded are: Agelenidae, Araneidae, Dictynidae, Dysderidae, Eresidae, Eutichuridae, Filistatidae, Gnaphosidae, Linyphiidae, Liocranidae, Lycosidae, Oecobiidae, Philodromidae, Pholcidae, Pisauridae, Salticidae, Sicariidae, Sparassidae, Theridiidae, Thomisidae, Titanoecidae, and Uloboridae.

Recently, [30] revealed the occurrence of 14 families that included 23 genera and 23 species of spiders at Qena Governorate, Egypt which is relatively close to the area of this study. All of the recorded families in this research were recovered in the present study except family Oxyopidae. Whereas, 8 families: Dysderidae, Dictynidae, Eresidae, Filistatidae, Liocranidae, Pisauridae, Sicariidae, Titanoecidae and Uloboridae were recorded in the present study did not show in [30] survey.

The present result revealed 40 spider species that were collected and identified as new records at Assiut Governorate namely: *Argiope trifasciata, Cyrtophora citricola, Larinia* sp., *Stegodyphus dufouri, Cheiracanthium isiacum, Filistata insidiatrix, Berlandina venatrix, Poecilochroa pugnax, Setaphis subtilis, Synaphosus* sp., *Trachyzelotes lyonneti, Zelotes lateus, Zelotes* sp., *Mermessus denticulatus , Prinerigone vagans, Sengletus extricates, Mesiotelus tenuissimus, Hogna ferox, Trochosa urbana, Wadicosa fidelis, Pulchellodromus glaucinus, Artema atlanta, Nita elsaff, Pisauridae* sp., *Heliophanillus* sp., *Phlegra* sp., *Plexippus Clemens, Thyene imperialis, Loxosceles rufescens, Eusparassus walckenaeri, Eusparassus* sp., *Euryopis* sp., *Paidiscura dromedaria, Steatoda erigoniformis, Theridion melanostictum, Thomisus spinifer, Xysticus tristrami, Xysticus* sp., *Nurscia albomaculata* and *Uloborus walckenaerius*. Also two unknown genera and 10 unidentified species might be considered as new records in Egypt [31].

Whereas [32] had only 17 spider species considered as new records at Assiut namely: *Heliophanus* sp., *Plexippus paykulli, Thyene imperialis, Theridion* sp., *Thanatus albini, Pardosa* sp., *Arctosa leopardus, Cheiracanthium pelasgicum, Uroctea* sp., *Oecobius* sp., *Lycosoides coarctata, Dysdera crocata, Erigona dentipalpis, Pelegrina* sp., *Xysticus* sp., *Tetranychus* sp., *Tiso vagans* and *Scytodes fusca*.

The above mentioned differences in the number of families and the number of species recorded at the same area can be attributed to differences in climate, differences in the investigated sites, differences in the type and area of soil and plants investigated and differences in the methods of collection.

By the end of this investigation 42 genera and 47 species belonging to 22 families of spider species at Assiut Governorate locality could be identified. The present study is considered the first one of its kind covering the central part of Egypt. Further studies are highly appreciated for identifying the unknown genera and species.

GLOSSARY

Selected taxonomic terms used in key:

Anal Tubercle: a small process, dorsal to the spinnerets, carrying the anal opening.

Calamistrum (p. calamistra): a comb of hairs on metatarsus IV of cribellate spiders; used for combing out silk from the cribellum.

Cephalothorax: anterior portion of the body formed by the fusion of head and thorax.

Chelicerae: enlarged mouth appendages with a fang on their distal end.

Cheliceral teeth: large and/or tiny tooth like projections on the cheliceral furrow margins.

Claw: a strong, curved, sharp-pointed process (often toothed) on the distal extremity of a leg.

Claw tuft: a bunch of hairs at the tip of the leg tarsus in those spiders with two claws.

Clypeus (adj. clypeal): the area between the anterior row of eyes and the anterior edge of the carapace.

Comb: it is a series of serrated spines which they use to comb out the silk from the spinnerets.

Cribellum: a spinning organ in the form of ,a transverse sieve-like plate, just in front of the spinnerets in some cribellate spiders.

Eye tubercle: Mygalomorphs, eye turret, eyes grouped together on a turret

Labium: lower appendage in the mouth area, fused to the ventral plate of the cephalothorax.

Laterigrade: denotes the orientation of the legs of some spiders, which are rotated on their bases so that the prolateral surface is uppermost; also describes the mode of locomotion of such spiders

Prograde: denotes the normal or nonlaterigrade orientation of the legs in spiders with limbs not rotated on their bases; also used to describe the mode of locomotion of such spiders.

Serrated: saw-like.

Setae: hair-like spines found on the outer body surface.

Spinnerets: paired appendages at the posterior end of the abdomen, through its spigots silk are extruded.

Tarsal claw: sharp curved structure at the tip of the tarsus, typically on the palp and 2 or 3 on the legs.

Trichobothrium: a long, fine hair rising almost vertically from a hemispherical socket on the legs, which detect air vibration and currents.

Table1: Shows the identified families and species at the investigated sites.

No.	Family	Species	No.	Family	Species
1	**Agelenidae** C.L. Koch, 1837	*Lycosoides coarctata*	24	**Oecobiidae** Blackwall, 1862	*Oecobius putus*
			25		*Uroctea* sp.*
2	**Araneidae** Clerk, 1757	*Argiope trifasciata*	26	**Philodromidae** Thorell, 1870	*Pulchellodromus glaucinus*
3		*Cyrtophora citricola*			
4		*Larinia* sp.*	27	**Pholcidae** C. L. Koch, 1851	*Artema atlanta*
5	**Dictynidae** O. Pickard-Cambridge, 1871	Dictynidae species*	28		*Nita elsaff*
6	**Dysderidae** C.L. Koch, 1851	*Dysdera crocota*	29	**Pisauridae** Simon, 1890	Pisauridae species*
7	**Eresidae** C. L. Koch, 1851	*Stegodyphus dufouri*	30	**Salticidae** Blackwall, 1841	*Heliophanillus* sp.*
			31		*Phlegra* sp. *
8	**Eutichuridae** Lehtinen,1867	*Cheiracanthium siwi*	32		*Plexippus clemens*
			33		*Plexippus paykulli*
9	**Filistatidae** Ausserer, 1867	*Filistata insidiatrix*	34		*Thyene imperialis*
			35	**Sicariidae** Keyserling, 1880	*Loxosceles rufescens*
10	**Gnaphosidae** Pocock, 1898	*Berlandina venatrix*			
11		*Setaphis subtilis*	36	**Sparassidae** Bertkau, 1872	*Eusparassus walckenaeri*
12		*Synaphosus* sp.*	37		*Eusparassus* sp.*
13		*Poecilochroa pugnax*	38	**Theridiidae** Sundevall, 1833	*Euryopis sp.**
14		*Trachyzelotes lyonneti*	39		*Paidiscura dromedaria*
15		*Zelotes lateus*	40		*Steatoda erigoniformis*
16		*Zelotes* sp.*	41		*Theridion melanostictum*
17	**Linyphiidae** Blackwall, 1859	*Mermessus denticulatus*	42		*Theridion* sp.*
18		*Prinerigone vagans*	43	**Thomisidae** Sundevall, 1833	*Thomisus spinifer*
19		*Sengletus extricatus*	44		*Xysticus tristrami*
20	**Liocranidae** Simon, 1897	*Mesiotelus tenuissimus*	45		*Xysticus* sp.*
			46	**Titanoecidae** Lehtinen, 1967	*Nurscia albomaculata*
21	**Lycosidae** Sundevall, 1833	*Hogna ferox*			
22		*Trochosa urbana*	47	**Uloboridae** Thorell, 1869	*Uloborus walckenaerius*
23		*Wadicosa fidelis*			

Total: 22 Families, 42 genera and 47 species

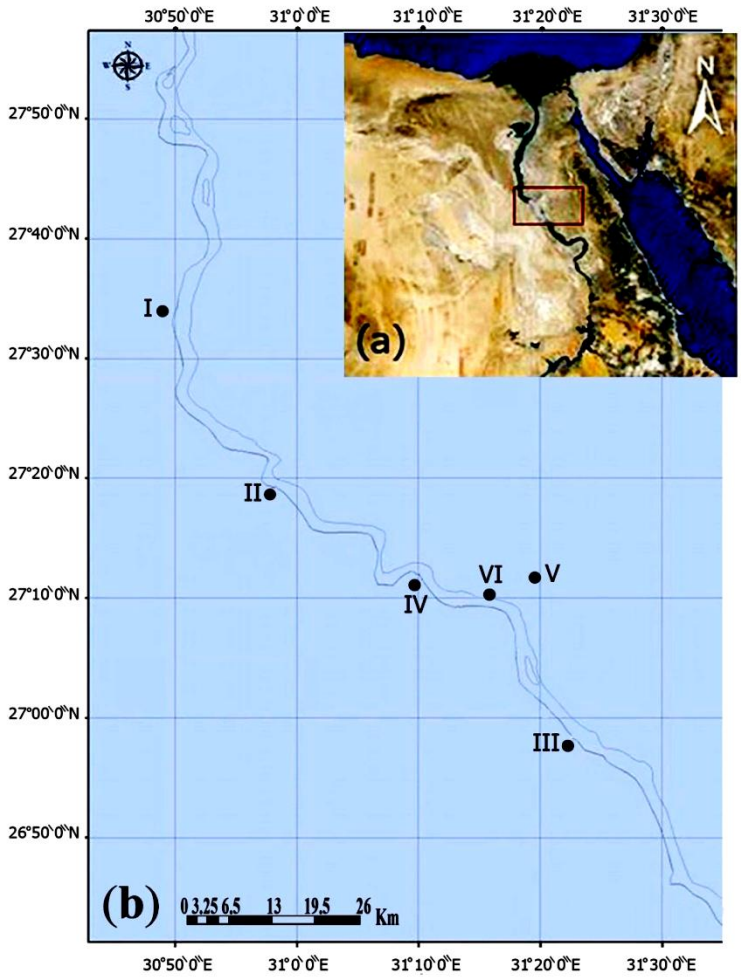


Figure 1 (a) Egypt map showing the location of Assiut governorate. (b) Assiut governorate map showing sites of collection I: Dirot city, II: Manfalout city, III: Sidfa city, IV: the Ornamental farm of Assiut University, V: El-Wadi El-Assiuty and VI: El-Wasta village.

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دراسات تصنيفية علي العناكب في محافظة أسيوط –مصر

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علي الرغم من أن للعناكب دورا هاما في بنية المجتمعات والشبكات الغذائية والتوازن البيئي نتيجة تأثيرها وتأثرها بالبيئة المحيطة مما يجعلها من المجموعات المهمة للدراسة إلا أنه بمراجعة الأبحاث السابقة والتي تهتم بتصنيف العناكب وبيئتها وجد أن هذه الأبحاث قليلة على المستوى العالمي والمحلي. لذلك فقد كان الهدف الأساسي هو إجراء دراسة تصنيفية لمعرفة هذه المجموعه في محافظة أسيوط من خلال عمل مفتاح تعريفي لأنواع العناكب الأرضية التي تعيش في محافظة أسيوط. ولتحقيق الهدف المنشود من الدراسة فقد جمعت العينات لمدة عام (في الفترة من ديسمبر ٢٠١٥ حتي نوفمبر ٢٠١٦) من ستة مواقع مختلفة داخل محافظة أسيوط ، والتي اختيرت لتغطي جميع أنحاء المحافظة ، وقد تم استخدام التجميع اليدوي لذلك، بعد ذلك حفظت العينات في كحول إيثيلي ٧٠%. وقد أظهرت الدراسة وجود ٤٧ نوع من العناكب الأرضية تنتمى الي ٤٢ جنسا متمثلة في ٢٢ عائلة وقد تم استخدام الصفات الظاهرية المميزة لكل مرتبة تصنيفية لتسهيل عملية التعرف عليها.