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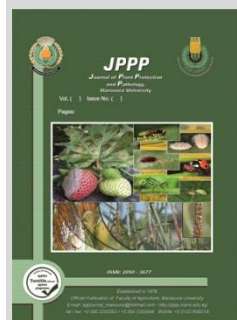
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Studies on *Scytodes Univittata* Simon (Scytodidae: Arachnida) with Special Notes on its Biology

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ABSTRACT

This study's aims to examine the age of *Scytodes univittata* Simon, 1882, (Scytodidae: Arachnida). This species was discovered between and under stones on the ground in the mango groves in Tahta, Sohag governorate, Egypt, Males had an average life cycle of 392.8 ± 7.39 days, while females completed its life cycle in 484.0 ± 3.20 days. The first and second stages of the investigated spider consumed the greatest number of the prey species *Aphis spp.*, and Larvae in their first three instars *Spodopetra littoralis* (Boisd.), In contrast, the third and fourth spiderling instars, which dined on the first through third instars of *S. littoralis* and larvae of *Galleria mellonella* (Linn.). Spider individuals fed on various phases of larvae and adults of spiderlings from fifth instars to adulthood of *S. littoralis* and larvae of *G. mellonella*. The female spiders lived for an average of 309.8 ± 8.01 days.

Keywords: *Scytodes univittata*; Scytodidae; Sohag

INTRODUCTION

After the five greatest insect orders (Diptera, Hymenoptera, Coleoptera, Lepidoptera, Hemiptera), and Acari among the arachnids (Kevan & Parker, 1982), the order Araneae ranks sixth in terms of worldwide diversity in terms of species described or projected. Among the most varied groups on the planet are the spiders. Spiders stand out among these taxa due to their total reliance on predation as a trophic strategy (Mitter et al., 1988). On the other hand, the variety of nutritional tactics used by insects and mites, particularly phytophagy and parasitism, may account for their diversity (Mitter et al., 1988). Family Scytodidae Blackwall, 1864, at present there are 248 species in five genera occur worldwide, World Distribution: Mediterranean, Cape Verde Is., Seychelles (WSC, 2020), and six specie in one genus recorded locally in Egypt at Badr district, Cairo, Giza, Menoufiya, Ismailia, Sadat City, Siwa Oasis, Wadi Natron (El-Hennawy, 2017). Scytodidae commonly known as "spitting spiders", most of them. are nocturnal, hiding in holes and under stones during the day; noted in distinct habitats. Feeding on the prey with glue to subdue it. Chelicerae carry an egg sac. Toxic spiders are a part of the Scytodidae family, and they use a liquid that freezes when delivered to catch their prey, which is how they are characterized. (Wise 2006). It is straightforward to believe that spiders which spit are not likely to be social but they might have a solitary lifestyle. Research on the species in this genus has revealed various forms of sociality (Bowden, 1991). The present study was created to clarify different biological characteristics of the spiders, *S. bertheloti*, *S. immaculata*, *S. obelisci*, *S thoracica*, *S univittata* and *S. velutina*. both species were described and documented as newfound to the Egyptian fauna, as per El-Hennawy (2017).

MATERIALS AND METHODS

With a particular emphasis on *S. univittata*, adult individuals of spider, which were collected from different

parts of Sohag were housed in plastic containers with moist cotton and a piece of bark and kept at temperature of 25°C and 70%R.H. From May 7th to October 26th, 2021, individuals of *S. univittata* were gathered from citrus orchards in Tahta district, Sohag governorate. After being housed in glass tubes (measurements of the tubes?), the specimens were moved to the laboratory. Individual spiderlings numbered one through four were arranged in clear plastic cylinder containers (15 cm in depth and 5 cm in diameter). The third and fourth spiderlings were raised on the first via third instars of *S. littoralis* and larvae of *G. mellonella* as a prey. The spider individuals fed on various phases of larvae and adults of spiderlings from fifth instars to adulthood. The first two spiderlings on *Aphis spp.* and the first three instars of *S. littoralis* and *G. mellonella* larvae were raised by the spider individuals individually. Each of female and male couple was placed within a jar measuring 10 cm in width and 15 cm in length of spiders and left to mate and put their egg sacs. Each experiment was carried out at $25 \pm 2^{\circ}\text{C}$ and 60–70% R.H. and placed in a jar (15 cm in length and 10 cm in width) and covered with muslin. Each tube received a predetermined quantity of the previous tested preys and inspected twice daily. Up to the experiment's conclusion, there were fifty tubes and jars for each replicate. Different biological aspects of biology and the quantity of prey consumed were noted and subjected to further analysis.

RESULTS AND DISCUSSION

Habit and behavior:

Temporal plateau forests are home to biting spiders, which usually noticed in dark corners, ceilings, cabinets, and courtyards of homes and further buildings generally connected to humans. Spitting spiders are a family of spiders, which get their prey by spitting a fluid that congeals into a venomous and sticky mass. Spitting spiders do not build webs but hunt freely on the ground or on vegetation. They are mostly nocturnal and disappear under stones or bark

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throughout the day. Some species of spitting spiders demonstrate prosocial behavior, in which mature spiders live together and assist the young with food. This is rare among spiders individuals of *S. univittata*, which were noted in high or moderate numbers on orchard fruit trees (citrus, banana, guava, and grapes) at Tahta, Sohag governorate. Spider individuals were observed to reside at the orchard trees' base, where they coexist with various mites and insect's species that infest the same hosts. Vegetable and field crops are also considered as a home to these spider individuals. This species did not create webbings on plants to serve as living nests; instead, the female chose to lay her egg sac in secret.

Feeding behavior:

Because of their long, thin legs, these wandering, solitary spiders move slowly while actively hunting their prey. Because of their incredibly low vision, they must walk around holding up their sensory-covered front legs to detect their surroundings. Under laboratory circumstances, the spiders were reared on *Aphis* spp., and larvae in their first three instars of the cotton leaf worm *S. littoralis*, and larvae of the greater wax moth *G. mellonella*. Collaborative prey acquire requires spitting, biting, and sharing prey among siblings on large prey. The feeding groups had different sizes, but the majority consisted of more than four individuals. The solitary spider larva tended to capture and feed on the small prey. The majority of late second and early third instar spiderlings engaged in cooperative prey collection and sharing. Juveniles rarely engage in cooperative prey acquisition and sharing until they reach the later phases of the third instar. Cooperative prey capture seems to be the answer because it would allow the spiders to catch more prey than they normally would on their own. Maybe the adhesive that one early-phase spider emitted wasn't enough to render the enormous prey immobile. Their bodies continue to swell until they have enough spit to catch large prey on their own. If not, they might depart the natal nests once they reach the third instar phase or older, in which case cooperative prey acquire and prey sharing might not be needed.

Mating behavior:

As a mating behavior, males should approach females with caution as these spiders are aggressive hunters and could confused with their prey. When a female chooses a male, she is influenced by the male's pheromone production. Both sexes create pheromones, which are detected when they come into touch with the chemosensory hairs on the pedipalps and first pair of legs. Mate location is not determined by visual cues, and mating typically happens after a male and female come into accidental contact. Male spitting spiders deposit sperm into their palp organs, which are auxiliary reproductive organs on the tips of each pedipalp. To gather sperm droplets, they use their third pair of legs to create a sperm web across their vaginal openings. Males approach females anteriorly and induce them to elevate their cephalothoraxes in order to put both palp organs into their genital opening. The female's seminal receptacles are then used to deposit and store sperm. Immediately following mating, both male and female separates

Incubation period:

The eggs were incubated for a duration of 20 to 25 days, with an overall of 20.5 days at 25 ± 2°C and 60-70% R.H. (Table 1). The transparent eggshell of the hatchling spiderlings

was peeled off, revealing the ecdysis cuticle within, which is known as the incomplete phase (Foelix, 2011).

Table 1. *Scytodes univittata* female fecundity and longevity when fed on different prey in a lab setting at 25±2°C and 60–70% R.H.

Biological aspects	In days	Fecundity	Numbers
Pre-oviposition duration	28.4± 0.98	Egg sac	3.2± 0.49
Oviposition duration	44.1± 1.23	Total average of eggs	40.8± 1.46
Post-oviposition duration	237.3± 7.59		
Longevity	309.8± 8.01		

Oviposition:

Motherly care is shown by this (females carry egg cocoons) and following hatching, as freshly hatched juveniles stay with their mother until they go through their first molt. The time for juveniles spends with their mother and the age at which males accomplish maturity are highly variable because the rate of molting and speed of growth are directly correlated with the availability of prey (Ramel 2011). The information presented in Table (2) clearly demonstrated that the adult female of *S. univittata*, needs to wait in a pre-oviposition period before laying her first eggs. In laboratory, the average duration was 28.4 days, when kept at 26±5°C and 65–70% R.H. Before beginning oviposition, the female often stopped feeding for a day and focused all of her energy on creating a silky web with her spinnerets. The female favored laying her eggs within an egg sac in clusters. During the oviposition phase, each mated female laid an average of 3.2 egg sacs with an average of average, 40.8 egg sacs under laboratory conditions of 26 ± 5°C and 65-70%R.H.. The female appeared to be semispherical and coated each egg sac with an additional layer of silky, thick webbing. A spherical egg is white when it is first laid and gradually becomes yellow in preparation for hatching. During the incubation phase, the female was seen to embrace and protect her eggs with the exception of feeding periods. The oviposition time averaged 44.1 days, and the post-oviposition interval was 237.3 days as shown in Table (2).

Longevity:

There were gender differences in adult longevity, where males often had a shorter lifespan than females. Under laboratory settings of 26±5°C and 65-70%R.H., the longevity of adult females was found to be 309.8 days (Table 1).

Life span:

The average life span go *S. univittata* averaged 499.5 days for males and 793.8 days for females, respectively.

Development:

Each spider reproduces sexually, and meiosis determines sex. After egg fertilization and copulation, females lay eggs in a cocoon carried beneath their bodies, which they leave there for two to three weeks until the eggs hatch. Spiderlings stay with their mothers until their first molt, after which they separate to lead solitary lives and eventually mature into adults after five to seven molts (Larsen, 2005). Spiderlings leave their mothers after their first five or six molts and live on their own until they reached adulthood, where a female can take up to three years to reach maturity. Following an incubation period of 20.5 days on average under lab conditions, hatching took place, and the spiderlings crawled out, leaving the clear eggshell inside the webbed egg sac behind. Before becoming adults, *S. univittata's* male and female go through six phases of spiderling development (Table 2).

Table 2. Period of *Scytodes univittata* developmental phases when fed on mobile phase of distinct prey species at 25 ± 2°C and 60-70% R.H.

Phases	Prey species	Period in days	
		Females	Males
Incubation interval	.	20.5±0.57	-
1 st spiderling	<i>Aphis</i> spp	26.9±0.61	20.0±0.82
2 nd spiderling		33.1±0.99	22.8±1.11
3 rd spiderling	Larva of	45.4±0.89	42.8±1.09
4 th spiderling	<i>Spodopetra littoralis</i> <i>Galleria mellonella</i>	88.0±2.26	78.0±3.14
5 th spiderling	Larva and adult of	111.1±1.77	93.5±1.71
6 th spiderling	<i>Spodopetra littoralis</i> <i>Galleria mellonella</i>	150.0±3.25	119.3±3.25
Life cycle		484.0±3.20	392.8±7.39
Life span		793.8±8.39	499.5±9.94

As shown in Table (2) these spiderlings reached adulthood and prepared to transition into the next generation, they go through a one to two hour resting phase. During this time, they stop eating and undergo moulting. For normal females and males, the first spiderling phase lasted 26.9 and 20.0 days, consecutively. When this phase reached adulthood, it ended feeding and underwent a molt to the second spiderling phase, which durated 33.1 and 22.8 days for four female and four male spiderlings, consecutively, to reach adulthood when fed on adult *Aphis* spp. After stopping to feed on *S. littoralis* and *G. mellonella* larvae, the second phase stopped feeding, molting, and transformed into the third spiderling phase, which lasted 45.4 and 42.8 days for both sexes, respectively. Subsequently, the third spiderling shed its skin and transitioned into the fourth phase, lasting 88.0 days for males and 78.0 days for females. When the spiderlings developed into females and males, respectively, from the fifth to the sixth phase, they performed similar tasks by feeding on larvae and adults of *Spodopetra littoralis* and *Galleria mellonella*. their durations are 111.1 and 150.0 days for females and 93.5 and 119.3 days for males, respectively.

Efficiency of *Scytodes univittata* spider on various prey consumption:

The current findings, as shown in Table 3, demonstrated that, throughout the biological examinations of the real spider *S. univittata* phases of adulthood for each of *Aphis* spp., *Spodopetra littoralis*, *Galleria mellonella*. served as the primary food source. The first and second spiderling phases were fed by *Aphis* spp., the third and fourth spiderling phases were fed by *Spodopetra littoralis* larvae, and the fifth and sixth spiderling phases were fed by *Galleria mellonella* larvae and adults. The spider bites its victim from the front of the body, spinning it around several times before suckling out its insides. It attacked the victim at the point where the head and thorax joined, then sucked the prey's contents from there until it had consumed the entire victim's body.

An overall of 26.6 and 23.8 spider mite creatures were consumed by the first spiderling phases of the female and male, respectively. However, an average of 38.0 and 33.5 spider mite individuals were consumed by the second female and male spiderling phases, respectively. (Table 3).

An average of 64.3 and 44.0 individual larvae of *Spodopetra littoralis* and *Galleria mellonella* were consumed by the third and fourth female and male spiderling phases, respectively (Table, 10). Conversely, the average amount of D. Larva of *Spodopetra littoralis* and *Galleria mellonella*

consumed by the third and fourth male fed spiderling phases was 84.5 and 73.8, respectively (Table, 3).

The spiderling phases of the fifth and sixth females consumed 94.3 and 102.1 larvae and adult phases of *Spodopetra littoralis* and *Galleria mellonella*, respectively. However, Table 3 shows that the male spiderlings' fifth and sixth phases fed on larvae and adult *Spodopetra littoralis* and *Galleria mellonella*, respectively, at 88.0 and 93.0 adult phases. This study is consistent with Rahil's (1988) findings. investigated the behavior and life cycle of the *Scytodes univittata* Walckenaer, 1802 spider (family: Scytodidae). It was discovered that while females matured after six spiderling instars (75.3 days), males did so after five spiderling instars (55.28 days). prey types (*S. littoralis* larvae and nymphs, *M. vicin* larvae, and *A. ypsilon* larvae). According to the study, the lifespan and life cycle of the spider. Sallam (1996), El-Erksousy *et al.*, (2002), El-Hennawy and Mohafez (2003), Ahmed (2012) and Rashwan (2017).

Table 3. Food intake of *Scytodes univittata* when fed on different prey under laboratory conditions 25±2°C and 60-70% R.H.

Phases	Prey	Female	Male
		Mean±SE	Mean ±SE
1 st spiderling	<i>Aphis</i> spp	26.6±0.73	23.8±0.45
2 nd spiderling		38.0±1.78	33.5±0.66
3 rd spiderling	Larva of	64.3±1.56	44.0±1.47
4 th spiderling	<i>Spodopetra littoralis</i> <i>Galleria mellonella</i>	84.5±1.31	73.8±3.42
5 th spiderling	Larva and adult of	94.3±1.22	88.0±1.07
6 th spiderling	<i>Spodopetra littoralis</i> <i>Galleria mellonella</i>	102.1±2.14	93.0±1.08

The majority of the results are in agreement with each other. The Spider *Scytodes univittata* as a Biocontrol Agent Against *Tetranychus urticae* Koch in Green Houses was published by Romeih *et al.* (2014). *Scytodes univittata* was delivered at two different rates (one time): 25 individuals per replicate and 50 individuals per replicate on September 29, 2005, and April 20, 2006, at a rate of 25 individuals.

Description

Female: 5.7 mm in total length; male: 3.5 mm. Body pigmentation varies, ranging from light to dark. Pale yellowish-black carapace featuring a black pattern (Fig. 2). A deep-brown tapering line that runs a short distance backward from the central pair of eyes separates the cephalothorax, which is bright orange yellow, from the clypeus, which is truncate, broad, and slightly uptilted at its lower edge (Fig. 4). Erect, bristly hairs cover the cephalothorax's surface in proximity. Six eyes in three pairs (Fig. 2), with the two largest being the fore laterals and the central pair's eyes appearing to be the smallest, albeit not by much. The tibiae of the fourth pair of legs are yellow (Fig. 4). The chelicera is yellow, with a large portion of its foreside having a yellowish brown color. The labium, sternum, and maxilla are yellow. Pale yellowish to deep brown on top and yellow beneath the abdomen (Fig. 1); two broad, transverse, black lines protruding from the anterior and two dark, longitudinal streaks from the posterior. Similar to the cephalothorax, the abdomen has a thin layer of stiff, upright bristle hairs covering it. The male palpal organs are simple (Fig. 3), meaning they are small and thin with a short embolus, and the female epigyne simple (Figs. 1:4) (Changed after El-Gendy, 2020., Le Peru, 2011 and Pickard-Cambridge, O. 1876).

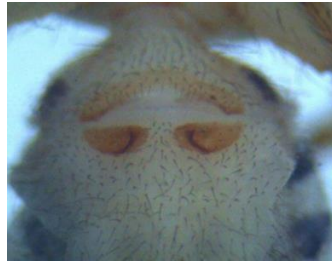


Figure 1. ♀ vulvae, ventral view.



Figure 2. ♀ habitus, dorsal view.



Figure 3. ♂ pedipalp, retrolateral view

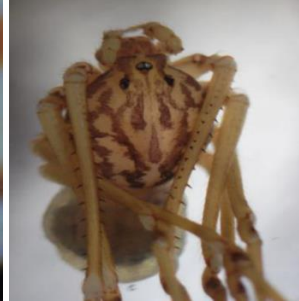


Figure 4. ♂ habitus, dorsal view

Figs. 1- 4. *Scytodes univittata* Simon, 1882

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دراسات على النوع *Scytodes univittata* Simon 1882 مع التركيز على الجوانب الأحيائية

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المخلص

كان الغرض من هذه الدراسة هو التعرف والتنقيح في النوع *Scytodes univittata* Simon، والذي ينتمي إلى عائلة 1882، Family: Scytodidae بالإضافة إلى دراسة بعض الجوانب البيولوجية لهذا النوع. تم جمعه من بستان المانجو في طهطا بمحافظة سوهاج بمصر، تم اكتشاف هذا النوع بين الحجارة وتحتها وعلى الأرض. كان متوسط دورة حياة الذكور 7.39 ± 392.8 يوماً، بينما كان متوسط دورة حياة الإناث 3.20 ± 484.0 يوماً. وفقاً للبيانات، تمت تغذية الانسلاخ الأولى والثاني من العنكبوت على أنواع من فرائس حشرة المن *Aphis spp*، على عكس الانسلاخين الثالث والرابع من العنكبوت تمت تغذيتهم على بركات من دودة ورق القطن *Spodoptera littoralis*، و بركات دودة الشمع *galeria mellonella*. من الطور الخامس إلى مرحلة البلوغ تمت تغذيته على بركات دودة ورق القطن من الانسلاخ الأول إلى الثالث و بركات من دودة الشمع. كانت فترة طول العمر لأنثى العنكبوت 8.01 ± 309.8 يوماً. تم حساب استهلاك الفريسة لمرحل مختلفة. كما تم وصف سلوك التزاوج.

الكلمات المفتاحية: عنكبوت *Scytodes univittata*، عائلة Scytodidae، محافظة سوهاج