

**THE BIOLOGICAL CHARACTERISTICS STUDY OF THE SPIDER,
THERIDION SPINITARSE O. PICKARD-CAMBRIDGE, 1876
(ARANEAE:THERIDIIDAE) IN EGYPT**

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ABSTRACT: *Theridion spinitarse* was described as a new species for the first time from female by O. Pickard-Cambridge, 1876, then Knoflach, et al. (2009) re-described this species from female specimens. Spider specimens were collected from mango trees in Fayoum Governorate and from grapes at El-Sadat sector of Menoufia Governorate. Individuals of the spider were reared and biological aspects were studied under laboratory conditions (25°C and 60-70% R.H). Individuals of this species fed every two days on second larval stage of *Spodoptera littoralis* (Boisduval 1833). Males and females reached maturity in the fifth spiderling stage after 67 & 72.27 days, respectively. Adult longevity, lifespan, fecundity of female and food consumption were also studied.

Key words: *Theridion spinitarse*, life cycle, food consumption, spiders, *Spodoptera littoralis*, life history, fecundity, Theridiidae, Egypt.

INTRODUCTION

Spiders have a wide host range where they feed on insects and some other arthropods. They can play an important role in pest control. There are about 114 families, 3981 genera and 45,862 identified and described species have been in the world (Platnick, 2014). Theridiids show large areas of distribution, *Theridion* Walckenaer, 1805 is the type genus of Family Therididae Sundeall, 1833, as defined by Levi (1957, 1959, and 1963). Also *Theridion* the largest genus of the theridiids and considered as one of the largest genera amongst all spiders (Levy and Amital 1982). *Theridion* has more than 587 species worldwide (Platnick, 2014). *T. pictum* (Walckenaer) the type species of *Theridion*. In Egypt, there are 8 species recorded of genus *Theridion*: *T. melanostictum* O.P.-Cambridge, 1876, *T. musivum* Simon, 1873, *T. nigrovariegatum* Simon, 1873, *T. spinitarse* O.P.-Cambridge, 1876, *T. varians* Hahn, 1833 (El-Hennawy, 2006), *T. cairoense* (Wunderlich, 2011), *T.*

incanescens Simon, 1890 and *T. jordanense* Levy & Amitai, 1982 (Knoflach & El-Hennawy 2012).

Knowledge of the biological characters for different species of *Theridion* has been targeted by many scientists around the world. Liu Hancai et al. (2002) studied the living habit and biological character of *T. octomacutatum*, Abo-Taka et al. (2004) reared *T. melanostictum* Rahil (2004) studied the biological characters of *T. spinitarse* Zhuang Su et al. (2005) observed the biological characters of *T. pinastri*, Yu hong-guo et al. (2009) studied the biological characters of *T. tepidariorum*, Abd El-Azim (2014) reared *Theridion melanostictum*, Ahmad and Abd El- Maaboud (2014) studied the biological aspects of the spider *T. incanescens* and Sallam et al. (2015) reared *T. jordanense*.

T. spinitarse was first described from female specimens only collected on a low plant near Cairo by O. Pickard-Cambridge et

al. 1876. Knoflach *et al.* (2009) re-described female specimens collected on Asswan, Egypt. The first description of the male was conducted by El-Hennawy & Ahmad (In Press).

MATERIALS AND METHODS

Spiders rearing:

Adult females of *T. spinitarse*, was collected from mango trees in Fayoum Governorate and from grapes at El-Sadat sector, Menoufia Governorate. Identification of the species depended on the re-description of El-Hennawy and Ahmad (2016). Specimens were reared under laboratory conditions, 25°C and 60-70% R.H in plastic vials (3cmdiameter x 5cm height). Each two egg sacs were placed in one plastic vial and replicated 20 times. Hatched spiderlings were individually reared and fed every two days on second larval stage of *Spodoptera littoralis* (Boisduval, 1833) handled by camelhair brush.

Rearing of *Spodoptera littoralis*:

Laboratory strain of cotton leaf worm *S. littoralis* was obtained as egg masses and larvae from the Economic Entomology and Pesticides Department, Faculty of Agriculture, Cairo University. All stages were kept in glass jars (20 cm height and 12.5 cm diameter) covered by muslin and cultured under room temperature. Larvae were reared on leaves of castor-oil plant, *Ricinus communis* (L.), which were washed in running water and dried before being placed in rearing jars. Larvae faeces were removed and *R. communis* old leaves were replaced by new ones every two days. As larvae reached the fifth larval stage, saw dust was placed in the jars to absorb any excess moisture and to allow pupation at the end of larval stage. Pupae were collected and placed in separate jars under the same conditions. The newly emerged male and female moths were allowed to mate. The rearing jars were lined with paper to provide

an egg laying site and daily provided with cotton pads moistened with 10% honeybee solution for the nutrition of the adults. Egg masses laid on the paper were daily removed and transferred to clean jars according to Ahmed (2009). Second larval stage produced from these egg masses were used as a prey for the spider.

RESULTS AND DISCUSSION

Incubation period, sex ratio:

Spherical light-gray egg sacs were laid, became dark gray before hatching. The incubation period was 15 days under laboratory conditions of 25°C ± 2 and 60-70% R.H.

After leaving the egg-sac 40spiderlings were reared, all of them reached adult stage (18 males and 22 females). The sex ratio of adult individuals was 1: 1.2 (Male: female).

Spiderlings development:

Maturity was started at the fifth spiderling stage for males and females (Table 1) and Fig (1-3). The obtained data were agree with (Hussein *et al.*, 2003) & (Sallam *et al.*, 2010) and (Ahmad and Abd El-Maaboud, 2014) where they studied the biological aspects of *Kochiura aulica* and *Theridion incanescens*. This may be due to the convergence of size between three species also between male and female in the same species. This reason is consistent with Foelix (2011) who reports that the number of molts depends on the ultimate body size, therefore, small spiders need only a few molts (about 5), whereas large spiders pass through about 10 molts to reach adult stage (Bonnet, 1930). The small males achieve maturity with one or two fewer molts than the larger females, but may be disagree with the results with those of Abo-Taka *et al.*(2004), Rahil (2004), Abd El-Azim (2014) and Sallam, *et al.*(2015). The duration of the different stages of *T. Spinitarse* was directly proportional to spiderlings. The shortest duration was first

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spiderling (lasted average 3 days for male and female).The longest duration was that of the fifth spiderling in males and females in spite of the last molting of the male was faster than counterpart in the female (Table 1). This compatible with Foelix (2011) who found that early nymphal stages may molt every few days but later spiderlings need several weeks to prepare for the next molt.

Total spiderlings duration was 52.00 ± 1.55 and 57.27 ± 8.15 days for males

and females, respectively. Life cycle duration was 67 ± 1.55 and 72.27 ± 8.15 days for males and females, respectively.

Adult longevity and Life span:

The adult longevity was recorded as 93.17 ± 2.93 and 83.00 ± 13.78 days for males and females, respectively.

The Life span lasted on 160.17 ± 2.04 and 155.27 ± 8.88 days for male and female, respectively.

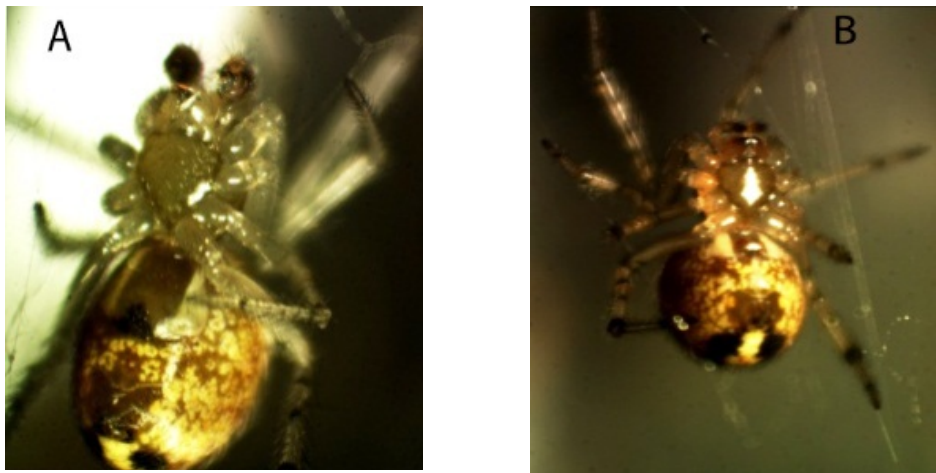


Fig. (1): *Theridion spinitarse* O.Pickard-Cambridge Adult. A (Male) and B(Female) ventral view.



Fig. (2): *Theridion spinitarse* O. Pickard-Cambridge adult, A (Male) and B (Female).

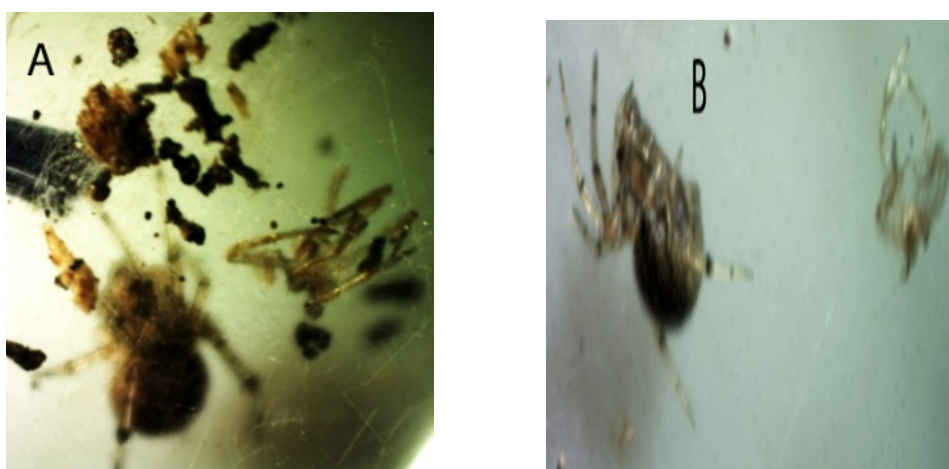


Fig. (3): *Theridion spinitarse* O. Pickard-Cambridge molting. A (Adult) and B (Immature)

Table (1): Developmental duration (indays) of different stages of *Theridion spinitarse* O. Pickard-Cambridge, 1876.

Developmental stage	Male			Female		
	Mean(day)	S.D.	Range	Mean(day)	S.D.	Range
Incubation period	15.00	0.00	15	15.00	0.00	15
1st spiderling	3.00	0.00	3	3.00	0.00	3
2nd spiderling	9.83	2.71	9 -13	9.82	2.23	9 -13
3rd spiderling	12.17	2.86	11- 18	13.64	2.94	7 -18
4th spiderling	12.17	1.83	11- 15	12.55	4.59	7 -25
5th spiderling	14.83	1.47	12- 16	18.27	4.61	15 -28
Total spiderlings	52.00	1.55	50- 53	57.27	8.15	50 -76
Life cycle	67.00	1.55	65- 68	72.27	8.15	65 -91
Adult longevity	93.17	2.93	88- 96	83.00	13.78	56 -98
Life span	160.17	2.04	156-161	155.27	8.88	139 -164

Developmental duration of female:

The oviposition period of *T. Spinitarse* was approximately twice the pre-oviposition period, where they were 41.82 ± 13.25 and 25.73 ± 7.25 days, respectively. Post-oviposition period was 15.45 ± 6.36 days. During oviposition period, the average number of laid egg sacs by female

was 3.55 ± 0.82 . Every one contained 28.8 ± 8.3 eggs (Table 2).

The obtained results disagree with Rahil (2004) who reported that it may be due to nutrition difference in consumed prey, where the white fly, *Bemisia tabaci* adults are

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poorer in protein content compared with cotton leaf worm, *S. littoralis*.

Food consumption:

During the study *T. spinitarse* first and second spiderlings fed on the first instar of *S. littoralis*, while the other instars were fed on the second instar larvae of *S. littoralis* (Table 3).

The number of consumed larvae during various instars increased gradually with increasing individual's instar not with increased numbers of consumed larvae by female in all instars.

The average number of consumed preys during total spiderlings duration was $96.0 \pm$

3.8 and 103.9 ± 15.2 larvae by male and female, respectively.

The average number of consumed preys during duration of adult longevity was 247.3 ± 18.0 and 227.1 ± 34.1 larvae by male and female, respectively.

The obtained results showed that the female of *T. spinitarse* consumed prey slightly more than the male during all stages, this may be due to that females needed more amounts of protein for fertility and lay eggs comparing with males, these results are in agreement with Hussein *et al.* (2003), Abo-Taka *et al.* (2004), Abd El-Azim (2014), Ahmad & Abd El- Maaboud (2014) and Sallam, *et al.* (2015).

Table (2): Developmental duration of *Theridion spinitarse* female.

Developmental periods	Mean	S.D.	Range
Pre-oviposition period(days)	25.73	7.25	13 – 36
Oviposition period (days)	41.82	13.25	20 – 65
Post-oviposition period (days)	15.45	6.36	20 – 65
Number of eggs/egg sac	28.8	8.3	19 – 43
Number of egg sacs/female	3.55	0.82	2 – 5

Table (3): Food consumption of *S. littoralis* larvae for *Theridion spinitarse*.

Developmental Stage	Male				Female			
	consumed larvae			Daily rate	consumed larvae			Daily rate
	Mean	S.D.	Range		Mean	S.D.	Range	
1st spiderling	3.3	0.8	2 – 4	1.1	3.5	1.0	2 - 5	1.2
2ndspiderling	11.2	2.6	9 - 15	1.2	11.2	1.5	9 - 13	1.2
3rdspiderling	16.2	2.7	11 - 18	1.4	18.6	4.7	10 - 27	1.4
4th spiderling	29.7	4.0	25 - 34	2.4	29.8	8.0	20 - 52	2.5
5thspiderling	35.7	3.4	30 - 40	2.4	40.7	9.5	34 - 68	2.3
Total spiderlings	96.0	3.8	90 - 102	1.8	103.9	15.2	90 - 147	1.8
Adult longevity	247.3	18.0	224 - 276	2.7	227.1	34.1	154 - 264	2.8

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REFERENCES

- Abd El-Azim, Nahla A.I. (2014). Rearing *Theridion melanostictum* O. P. Cambridge (Araneae: Theridiidae) on *Tetranychus urticae* Koch and larvae of *Spodoptera littoralis* Boisduval, *Acarines*, Vol.8(2): 79-82.
- Abo-Taka, Safaa M., A. M.Hussein, A. A. Osman, G.I.Zohdi and E.G.I.Hamada (2004). Studies on some biological aspects of *Theridion melanostictum* O.P.Cambridge, 1876 (Arachnida: Araneida). *Serket*, 9(1): 5-9.
- Ahmad, Naglaa F. R. (2009). Biological, toxicological and mass rearing possibility of the spider *Kochiura aulica* (C. L. Koch, 1838).Ph.D. Thesis, Fac. Agric., Benha Univ. Egypt. 226pp.
- Ahmad, Naglaa. F. R. and A. S. Abd El-Maaboud (2014). Biological aspects of the spider, *Theridion incanescens* (Araneae: Theridiidae) feeding on *Tetranychus urticae* and *Ceratitis capitata* with notes on its mating behaviour. *Egypt. Acad. J. Biolog. Sci.*, 7(2): 9 – 14.
- Bonnet, P. (1930). La mue, l'autotomie et la regeneration chez les Araignees, avec une etude des Dolomedes d'Europe. *Bull. Soc. Nat. Hist. Toulouse* 59:237-700.
- El-Hennawy, H. K. (2006). A list of Egyptian spiders (revised in 2006). *Serket*, 10(2):65-76.
- El-Hennawy, H.K. and Ahmad Naglaa. F. R. Redescription of *Theridion spinitarse* O. Pickard-Cambridge, 1876 (Araneae: Theridiidae) from Egypt. *Serket*, In Press.
- Foelix, R.F. (2011). *Biology of Spiders*. Third Edition. Oxford University. 432 pp.
- Hussein, A.M., M.F. Hassan and N.F.R. Ahmad (2003). Biological aspects of *Anelosimus aulicus* (C.L. Koch, 1838) (Arachnida: Araneida: Theridiidae) in Egypt, *Serket*, 8(4): 129-134.
- Levi, H.W. (1957). The spider genera *Enoplognatha*, *Theridion*, and *Paidisca* in America North of Mexico. (Araneae, Theridiidae). *Bulletin of the American Museum of Natural History*, 112: 1– 123.
- Levi, H.W. (1959). The spider genera *Achaearanea*, *Theridion* and *Sphyrotinus* from Mexico, Central America and the West Indies (Araneae, Theridiidae). *Bulletin of the Museum of Comparative Zoology*, 121(3):57–163.
- Levi, H.W. (1963). American spiders of the genus *Theridion* (Araneae, Theridiidae). *Bull. the Museum of Comparative Zoology*, 129(10): 481– 589.
- Levy, G. and P. Amitai (1982). The comb-footed spider genera *Theridion*, *Achaearanea* and *Anelosimus* of Israel (Araneae: Theridiidae). *J. Zool.*, London 196: 81-131.
- Liu Hancai, Li Xiao-hong, ChenQian, Wu Zhengchuan.(2002). Biological characters of *Theridion octomacutatum* and its regularity of outbreak in farmland. *Hubei Agricultural Sciences* 5:99-102.
- Cambridge, O. P. (1876). Catalogue of a collection of spiders made in Egypt, with descriptions of new species and characters of a new genus., *Proc. Zool. Soc. Lond.* 1876: 541-630.
- Platnick, N. I. (2014). The world spider catalog, version 15. American Museum of Natural History, online at: http://research.amnh.org/iz/spiders/catalog_15.0/index.html
- Rahil, A. A. R. (2004). Studies on the biological characteristics of the comb-footed spider *Theridion spinitarse* (Theridiidae) and the crab spider *Thanatus fabricii* (Philodromidae). *Fayoum J. Agric. Res. & Dev.*, 18 (1): 163-169.
- Sallam, M. E.Gihan, Nahla A.I.Abd El-Azim and H. M.G. El-Kawas (2010).

The biological characteristics study of the spider, theridion.....

- Biodiversity of spiders associated with cotton and maize in Sharkia Governorate with a special reference to the spider *Kochiura aulica* (Koch). *Acarines*, 4: 67-71.
- Sallam, Gihan M.E. Nahla A.I. Abd El-Azim and M. A. Mohafez (2015). A study of some biological aspects of the spider *Theridion jordanense* Levy & Amitai, 1982 (Araneae: Theridiidae) in Egypt. *Egypt. Acad. J. Biolog. Sci.*, 8(1): 73 – 77.
- Thaler-Knoflach, B. and H. K. El-Hennawy (2012). *Theridion incanescens* Simon, 1890 and *Theridion jordanense* Levy & Amitai, 1982 new to the fauna of Egypt. (Araneae: Theridiidae). *Serket*, 13(1/2): 91-98.
- Thaler-Knoflach, B., C. Rollard and K. Thaler (2009). Notes on Mediterranean Theridiidae (Araneae) – II. *ZooKeys* 16:227-264.
- Wunderlich, J. (2011). Extant and fossil spiders (Araneae). *Beitr. Araneol.*, 6: 1-640.
- Yu Hong-Guo, Wang Chang-gui, Li Yi-Ming, Lu Qing. (2009). Observation on the Biological Characteristics of *Theridion tepidariorum* Koch. *Jiangxi Plant Protection*, 2: 87-89.
- Zhuang Su-Xue Wang Chang-Gui Chen Dong Yan Feng-Jun Cui Fa-Liang (2005). Biological Characteristics of *Theridion pinastri*. *Chinese J. Z.*, 6:96-98.

دراسة الخصائص البيولوجية للعنكبوت *Theridion spinitarse* Pickard–Cambridge, 1876

(Araneae: Theridiidae) في مصر

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الملخص العربي

تم وصف الأنثى لهذا النوع للمرة الأولى بواسطة O. Pickard–Cambridge, 1876. ثم تم إعادة الوصف بواسطة Knoflach *et al.*, (2009) وتم وصف الذكر للمرة الأولى بواسطة El-Hennawy & Ahmad (تحت النشر). تم جمع أفراد هذا النوع من العنكبوت *Theridion spinitarse* من مزارع المانجو من منطقة ابشواي بمحافظة الفيوم وكذلك من مزارع العنب بمنطقة السادات محافظة المنوفية. تمت التربية ودراسة الخصائص البيولوجية لهذا النوع تحت الظروف المعملية (درجة حرارة 25م° ورطوبة نسبية 60–70 %) حيث تمت التغذية علي بعض الأطوار اليرقية لدودة ورق القطن ، وسجلت النتائج أن كل من الذكور والإناث وصلت الي الطور البالغ بعد خمس انسلاخات استغرقت 67 ، 72,27 يوم للذكور والإناث علي التوالي ، كما تمت دراسة عمر الأفراد البالغة ، وأظهرت النتائج ان طول فترة عمر الذكور اطول من الإناث حيث سجلت 93,17 ، 83,00 يوم على التوالي ، كما تم حساب خصوبة الإناث و حساب عدد الفرائس المستهلكة .

