BIOLOGY OF THE SPIDER *CHEIRACANTHIUM JOVIUM* (ARANEIDA : CLUBIONIDAE)

M.A.RAKHA[1], M.S. NAWAR[2] AND G.M.E. SALLAM[1]

1 Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza.

2 Faculty of Agriculture, Cairo University, Giza , Egypt.

(Manuscript received 2 June 1998)

Abstract

Certain biological aspects of *C.jovium* were studied at constant conditions of 25°C and 60-70% R.H. using *C.capitata* adults as preys. Fertilized spider females deposited one egg sac with 300-350 eggs. The incubation period was 14.06 ± 1.83 days. Females went through 8-9 spiderlings before reaching maturity, while males went through 7-8 spiderlings. The average developmental duration was 230.62 ± 16.07 days and 169.73 ± 14.53 days for female and male individuals, respectively. the corresponding respective averages of total life span were 387.62 ± 0.83 and 234.73 ± 0.83 days. Average pre-oviposition and post oviposition period were 70 ± 1.14 and 77.14 ± 7.6 days, respectively.

INTRODUCTION

The general biology of spiders and their behaviour has been compiled by Foelix (1982). Spiders are predators which trap their preys by making sticky webbing or hunting them. Their food range varies according to habitats. Mackie (1978) stated that spiders have a simple life hisory, commencing with the laying of eggs by the female, protected in a silken cocoon. The eggs hatch into young spiders which resemble their parents in all appearances except that they may have different colour pattern and they are not sexually mature.

Literature on the biology of the spider *Cheiracanthium juvium* is, apparently, very scanty. However, Mansour *et al.* (1980a &·b) studied the biology of *Cheiracanthium mildei* L.Koch (Araneida: Clubionidae) under laboratory conditions (24±1°C and 55-60% R.H.), fed on 1 to 6 days-old *Spodoptera littoralis* Boids. larvae with 87% survival from egg to functional fertility. Males required a mean of 182 days to reach maturity, and lived for 73 days as adults. Females required mean of 231 days to reach adulthood during which they underwent 9-10 moults. Adult females lived for 240 days, mated only once and oviposited 1-5 times, at 30 days intervals.They further mentioned that only the 1st and the 2nd hatchs were 35 and 31 eggs, respectively.

Rahil (1988) studied the biology of two spider species *Cheiracanthium jovium* Denis (Araneida: Clubionidae) and *Steatoda triangulosa* Walckenaer (Araneida: Theridiidae) under different relative humidities, temperatures and preys. Different biological aspects were mentioned, e.g. incubation period, hatching percentage, number of moults, oviposition and post-oviposition periods, mating behaviour and sex ratio.

MATERIALS AND METHODS

A stock culture of the spider, *C.jovium* Denis originated from the field. Collected individuals (about 2 cm in diam.) were solitary confined into translucent 30 ml glass or plastic containers with provisions for air exchange and to facilitated good observation. Containers were examined bidaily to obtain details of the various biological aspects. *C.jovium* was fed on the adults of the medfly, *Ceratitis capitata* (Wied.) (Diptera: Tephritidae), which seem to be a dominant prey of the spider in nature.Work was carried out in an incubator at constant conditions of 25±1°C and60-70% R.H. Food was supplied bidaily.

For biological studies, individual females from the laboratory culture or the field were allowed to oviposit and the newly hatched individuals were transferred to separate vials to continue development under the same above-mentioned controlled conditions.

RESULTS

To obtain eggs, gravid females were colleced from the field and kept in glass tubes until transferred to the laboraory and fed on fruit flies. Gravid females were characterized by enlarged opisthosoma with well developed epigynum.

1. Feeding behaviour

The spider has the ability of watching its prey and catching it fast. The spider usually caught the prey at the area between the thorax and the head (i.e. the weakest part of the body). The spider then used its mouth parts in sucking the prey contents leaving only the wings. Feeding on a fly took 2-3 minutes in which an external digestion is expeced. The 1st spiderling was in mother's grading, feeding on eggs remains (Mansour *et al.*, 1980b). Consumption rate per day ranged 5-6 flies for 2nd - 4th spiderlings, 8-10 flies for 5th-6th spiderlings, and10-15 flies for 7th-9th spiderlings. This species was able to feed upon cotton leafworm larvae *S.littoralis*, up to the 4th spiderling, but extensive feeding on the same host caused the enlargement

of the opisthosoma until it broke down and the spiderling died.

2. Mating behaviour

Mature females were fed on flies for 20 days before a male was introduced into the rearing container. To avoid the female's feeding on the male as a prey no direct exposure was allowed. Therefore, some plant leaves were provided into the container to emulate the natural conditions and to allow escape route for the male. The female was placed in the container first and allowed ample time to web to get ready for mating. Later on, the male was introduced into the container. Courtship took place for few minues where the female stopped moving around and started to come close to the male in retractive movement for few times. Then, the male started to come closer to the female moving his front legs up and down and pedipalps alternatively. The female started also a similar behaviour, then corrected her position inside the siky webbing to be ready for courtship. By then, the male moved under her and started the copulation process which elapsed about 10 seconds.Immediately after copulation, the male rapidly escaped away.

3. Oviposition and egg incubation

The spider female usually stopped feeding for a day before sarting egg deposition, and devoted her effort to web a silky webbing using the spinneret at one of the container corners. Eggs were deposited once in a mass (an egg sac). The number of eggs per mass sac ranged from 300 to 350. The egg is yellowish white in colour, and almost spherical in shape. The female spider then completely covered the egg sac with a second layer of dense silky webbing. Then, the spider female resumed feeding on fruit flies again and collected leftovers (mainly prey wings) and its faeces encapsulated into siky webbing away from the egg sac and range of movement. The female escorted the egg sac and never tried to escape outside the container whenever it was opened. (normally female spiders escape out of the containers if they have no egg sacs).

4. Development

After an incubation period of 14.06 ± 1.83 days, the 1st spiderlings hach and remain within the egg sac for 2-3 days after which they cut the webbing and get off it. At this stage, the eyes are not clear and the hatched individuals remain close to the female mother for about 10 days. Newly hatched spiderlings did not feed during the 1st-2nd days of their life, but they started noticeable activity after their eyes became well developed, and fed on adult individuals of *Tetranychus urticae* Koch (Acari : Tetranychidae). After the mother's escort period, the newly hatched indi-

viduals were separated to avoid feeding on each other (cannibalism).

The durations of the different spiderling stages are presented in Table 1. Female spiders went through 8-9 spiderlings before reaching maturity,while males went through 7-8 spiderlings. Photographs of the different stages of *C.jovium* are also shown in Fig. 1.

5. Longevity

Female spiders spent 70.1 ± 6.71 days as pre-oviposition period and 87.14 ± 7.6 days as post-oviposition period.The female life span was 387.76 days. On the other hand, male spiders lived for 65 ±5.4 days,with a mean of 234.73 days, Table1.

Table. 1. Durations of the different developmental stages of *Cheiracanthium jovium* (/days) at constant conditions of 25°C and 60-70% R.H. using *Ceratitis capitata* adults as food.

Stage	Females					Males				
	N	Min.	Max.	M	SD	N	Min.	Max.	M	SD
Egg incubation	15	10	16	14.06	1.83	15	10	16	14.06	1.83
1st spiderling	15	24	28	26.20	1.20	15	20	24	22.00	1.46
2nd spidrling	15	24	27	24.40	1.10	15	19	23	21.00	1.46
3rd spiderling	15	23	26	24.66	1.05	15	18	22	20.06	1.46
4th spiderling	15	23	26	24.66	1.17	15	18	22	20.06	1.43
5th spiderling	15	22	26	24.33	1.44	15	16	22	19.33	1.79
6th spiderling	15	21	26	23.80	1.78	15	16	21	18.93	1.86
7th spiderling*	15	20	26	23.53	2.06	15	15	20	17.33	1.98
8th spiderling**	15	18	26	22.73	2.78	10	15	18	16.60	1.26
9th spiderling	8	20	24	22.25	1.66	-	-	-	-	-
Total		215	245	230.62	16.07		159	181	169.73	14.53
Pre-oviposition period	70.0±1.14					-				
Post-oviposition period	87.14±7.6					-				
Total longevity	157.14					65±5.4				
Total life span	387.76					234.73				

* 5 males reached maturity after 7 spiderlings
** 7 females reached maturity after 8 spiderlings

6. Ecdysis

Before an individual moults to the next stage, it stops feeding for 1-2 days and starts building up a resting cell, where it rests on its back and kills any prey that accidently comes close to it, but never feed on such killed preys. The resting cell was usually constructed under the container cover or at a corner. Ecdysis occurred as a lateral split on both sides of the cephalothorax or prosoma. The individual usually spiked his tarsi on the inner surface of the resting cell. The upper part of the cuticle became loose and the individual pulled itself out of the old cuticle which the split continued around the opisthosoma. The individual usually moves out after the ecdysis and rests for 15-20 minutes after which it resumes normal feeding on fruit fly adults.

Ecdysis elapsed about 20 minutes and marked the beginning of a new spiderling stage. After every ecdysis, the resting cell and old exuvia were always removed from the rearing container.

DISCUSSION

Current studied on the various biological aspects of *C.jovium* revealed more or less similar results to those reported by (Mansour *et al.*, 1980a, and Rahil, 1988). Females and males had 5-7 and 4-6 spiderlings, respectively when fed on houefly larvae *Musca vicina* (L.) and the number of moults was affected by temperature and R.H. (Rahil,1988). The recorded developmental period was relatively longer than that reported by Rahil (1983), but nearly similar to that mentioned by Mansour *et al.* (1980a) for *C.mildei* fed on 1-6 day old *S.littoralis* larvae. The latter authors reported 9-10 moults for females over 231 days and 7-8 moults for males over 182 days with multi-oviposition (i.e. 1-5 egg sacs with a mean of 1.8 sacs), where only one sac per female was observed during the current study.

REFERENCES

1. Foelix, R.F. 1982. Biology of Spiders. Harvard Univ. Press, London, England, 306 pp.

2. Mackie, D.W. 1978. How to begin the study of spiders. Br. Arachnol. Soc., 12 pp.

3. Mansour, F.,D. Rosen and A. Shulov. 1980a. Biology of the spider *Cheiracanthium milde* (Arachnida: Clubionidae). Entomophaga, 25 (3): 237-248.

4. Mansour, F., D. Rosen, A. Shulov, and H.N. Plaut. 1980b. Evaluation of spiders as biological control agents of *Spodoptera littoralis* larvae on apples in Israel. Acta. Oecol. Applic., 1 (3) : 225-232.

5. Rahil, A.A.H. 1988. Ecological and biological studies on the spiders at Fayoum.M. Sc. Thesis, Fac. Agric., Cairo Univ., 133 pp.

النواحي البيولوجية للعنكبوت *Cheiracanthium jovium* (Araneida : Clubionidae)

محمد عبد الوهاب رخا[1]، سامي محمد نوار[2]،
جيهان محمد السيد سلام[1]

١ معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقي – الجيزة.

٢ كلية الزراعة ، جامعة القاهرة ، الجيزة ، مصر.

درست بعض النواحي البيولوجية للعنكبوت *Cheiracanthium jovium* في المعمل تحت ظروف ثابتة (٢٥ ه م ورطوبة نسبية ٦٠ – ٧٠٪) مع التغذية علي الحشرات الكاملة لذبابة فاكهة البحر المتوسط *Ceratitis capitata* وقد وجد أن أنثي العنكبوت المخصبة تضع حافظة واحدة للبيض egg sac تحتوي ٢٠٠ – ٣٥٠ بيضة. وإستغرق متوسط حضانة البيض ١٤,٠٦± ١,٨٣ يوما وكان للأفراد الاناث ٨ – ٩ أطوار غير كاملة قبل البلوغ في حين كان للذكور ٧ – ٨ أطور. وبلغ متوسط فترة التطور قبل الوصول الي الطور البالغ ٢٣٠,٦٢ ± ١٦,٠٧ و ١٦٩,٧٣ ± ١٤,٥٣ للاناث والذكور علي التوالي. واستغرقت الأنثي ٧٠ ± ١,١٤ يوما قبل أن تبدأ في وضع البيض، ٨٧± ٧,٦ يوما كفترة مابعد وضع البيض، واستغرق متوسط طول فترة الحياة الكاملة من البيضة حتي موت الفرد البالغ ٣٨٧,٧٦ ± ٠,٨٣ ، ٢٣٤,٧٣ ± ٠,٨٣ يوما للأنثي والذكر، علي التوالي .