

## BIOLOGICAL AND MORPHOLOGICAL STUDIES ON *CORANUS AEGYPTIUS* F. (HEMIPTERA: REDUVIIDAE)

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### Abstract

Certain biological aspects of *Coranus aegyptius* F. was studied in the laboratory according to literature for the first time by using *Anagasta kuehniella* Zell. larvae as prey under constant hygrothermal conditions of  $30 \pm 1^\circ\text{C}$  and  $70 \pm 5\%$  R.H. The development stages of *C. aegyptius* were described and figured.

The first to fifth nymphal instars lasted 6.5, 6.1, 5.7, 5.9 and 9.4 days, respectively in male. The respective values in female were 6.3, 4.6, 5.1 and 6.8 days. Adult female laid an average of 241.4 eggs and oviposition period of 145 days with a daily rate of 1.6 eggs/female longevity of adult, and fecundity were estimated.

**Key Words:** *Coranus Aegyptius*, Reduviidae, Description, Morphometric, Development, Fecundity, Survivorship

### INTRODUCTION

Several ecological and biological aspects on some predatory reduviids from Egypt have been documented by different authors (Abdella, 1976; Tawfik *et al.*, 1983 a, b, Awadallah *et al.*, 1990; Afifi *et al.*, 1993, 1994; El-Sebaey, 1996). However, little attention has been given to *Coranus aegyptius* F. This species is distributed in Palma de Mallorca, Canary Islands, Palearctic Region to Equatorial Africa (Capriles, 1990). In Egypt, *C. aegyptius* was found all over the country on several wild and cultivated host plants including *Ranthium spinosum* L. (Compositae), *Chenopodium murale* L. (Malvaceae) and *Ammi majus* L. (umbellifera), in addition to citrus trees, and tomatoes (El-Sebaey, 1994). Ecological studies (El-Sebaey, 1994) revealed a positive correlation between the abundance of this species and several phytophagous species including *Spilostethus pandurus* Scop. (Lygaeidae), *Nezara viridula* F. (Pentatomidae), *Brachynema venustum* Hot. (Pentatomidae), *Centrocoris degener* Put. (Coreidae), *Eurdera ornatum* (L) (Pentatomidae), *Scantius aegyptius* L. (Pyrrhocoridae) and *Liorhyssus hyalinus* Devil. (Rhopalidae). The present investigation aims to throw light on some biological aspects of *C. aegyptius* together with the description of different developmental stages to facilitate its use in pest management programmes in economic crops in Egypt.

## MATERIALS AND METHODS

A laboratory culture of *C.aegyptius* F., was initiated from insects collected from desert grasses in the valleys of St. Katherine. Insects were confined in plastic containers of 25 cm. diameter and 15cm. height; each jar was provided with sufficient number of *A.kuehniella* larvae as food. The prey individuals were added twice a week. Strips of corrugated filter paper were placed inside each jar to serve as oviposition sites, and a piece of muslin held in position by a rubber band was used to close each rearing unit.

**Rearing of prey:** A culture of *A.kuehniella* was initiated by moths emerged from infested flour obtained from mills. The moths were confined in laboratory at 27°C and 60% R.H. inside glass-chimney as oviposition cages. The lower opening of the chimney was closed by 20 mesh screen held in position by a rubber band, while its upper opening was covered with a half Petri-dish. Moths were provided with water through a soaked pellet of cotton wool.

The collected eggs were cultured in corn-meal with a rate of 0.5g of flour for each egg (Hassanein and Kamel, 1965). The flour was previously sterilized at 60-70°C for 1-2 hours and scattered in fine layer onto trays covered with muslin and kept under laboratory conditions for several weeks before use to come into equilibrium with the atmospheric humidity (Spencer *et al.*, 1935; Khalifa and Badawy, 1955; Smith, 1966; Abdella, 1976).

**Biological experiments:** Experiments were conducted at  $30\pm1^{\circ}\text{C}$  &  $70\pm5\%$  R.H. in incubators. The relative humidity was maintained constant by means of a saturated solution of sodium chloride (Buxton and Melanby, 1934).

To obtain newly-emerged adults of the predator, mature nymphs were collected from the stock cultures, to be confined in Petri-dishes containing discs of moistened filter papers to facilitate insect movement and ecdysis, and some flour meal for feeding *Anagasta* larvae that serve as prey for the predator. The rearing dishes were inspected daily and at time, newly-emerged adults were collected and paired.

For oviposition experiments, 25 plastic cages of 2.5cm. diameter and 5cm. height were used. Each cage that contained a couple (25 pairs were used), provided with a filter paper disc and covered with a perforated plastic cover. A supply of 2-3 larvae of the prey was added daily to each cage which kept at  $30\pm1^{\circ}\text{C}$  and  $70\pm5\%$  R.H. The oviposition cages were examined daily and the deposited eggs were trans-

ferred to other cages. Daily observation took place to count the hatched nymphs and to estimate the percentage of hatchability. To estimate development period, the newly hatched nymphs were immediately isolated in the individual rearing tubes. Each tube (1.5cm. diameter x 3.5 cm. height) was provided with a disc of filter paper and covered with a perforated plastic lid. The predatory nymphs were provided daily with 1-2 *Anagasta* larvae, and kept continuously at  $30\pm 1^{\circ}\text{C}$  and  $70\pm 5\%$  R.H. Moulting and mortality of the nymphs were recorded till emergence of adults which were sexed and confined inside the oviposition cages. This experiment was initiated with 100 nymphs.

**Description:** Description and measurements were made from both life and alcohol preserved specimens using wild M.S. dissecting microscope. Length of insects was measured from the tip of stylus to the tip of abdomen. The description of nymphs and adults followed the patterns used by El-Sebaey (1994 & 1996) and 20 specimens were used for each instar.

## RESULTS AND DISCUSSION

### Description and duration of immature stages

#### Egg stage (Fig. 1-A).

The egg kidney shaped,  $1.33\pm 0.16$  mm long,  $0.91\pm 0.07$ mm. wide, dark brown with longitudinal dark yellow strips laterally.

Operculum white,  $0.35\pm 0.06$  mm diameter, consisting of two circles; inner one elevated with two rows of white sculptures proximally, outer circle with two rows of white sub rectangular sculptures distally and proximally and two rows of white sub rectangular sculptures medially.

**Biology:** About twenty four hours before hatching, the colour of the egg turned very dark brown. Hatching process lasted about 10 minutes.

The incubation period of *C.aegyptius* egg was  $11.0\pm 1.0$  days (7-12) at  $30\pm 1^{\circ}\text{C}$  and  $70\pm 5\%$  R.H. with a rate of 92% hatchability.

**Nymphal stage:** *C.aegyptues* passes its nymphal stage through five instars. The average dimensions of the different parts of each nymphal instar are shown in table 1.



Table 1. Average dimensions (Imm.) of various nymphal instars of *Coranus aegyptius* F.

Diameter	Nymphal instars				
	1st	2nd	3rd	4th	5th
Length of head	0.54±0.05 (0.44-5.56)	0.67±0.03 (0.61-0.72)	0.98±0.08 (0.89-1.11)	1.29±0.09 (1.22-1.44)	1.45±0.09 (1.33-1.44)
Width of head	0.44±0.03	0.56±0.04 (0.5-0.61)	0.71±0.05 (0.67-0.78)	0.69±0.02 (0.67-0.72)	1.09±0.08 (1.00-1.22)
Peak	0.66±0.03 (0.61-0.68)	0.98±0.08 (0.89-1.11)	1.00±0.04 (0.94-1.06)	1.40±0.09 (1.33-1.56)	1.52±0.11 (1.33-1.61)
Antenna					
1st segment	0.11±0.00	0.13±0.03 (0.10-0.17)	0.14±0.03 (0.11-0.17)	0.22±0.02 (0.22-0.26)	0.23±0.02 (0.22-0.26)
2nd segment	0.33±0.00	0.44±0.04 (0.38±0.50)	0.69±0.08 (0.56-0.78)	0.68±0.01 (0.67-0.70)	1.00±0.01 (0.42-0.48)
3rd segment	0.11±0.00	0.23±0.02 (0.20-0.28)	0.29±0.05 (0.22-0.33)	0.36±0.04 (0.33-0.43)	0.44±0.02 (0.42-0.48)
4th segment	0.11±0.00	0.23±0.03 (0.20-0.28)	0.29±0.06 (0.22-0.33)	0.37±0.04 (0.33-0.43)	0.44±0.02 (0.40-0.44)
5th segment	0.44±0.03 (0.39-0.50)	0.45±0.03 (0.43-0.50)	0.68±0.02 (0.67-0.71)	0.71±0.09 (0.56-0.78)	1.00±0.02 (0.98-1.04)
Length of pronotum	0.22±0.00	0.33±0.03 (0.28-0.39)	0.69±0.08 (0.56-0.78)	0.90±0.02 (0.89-0.93)	1.33±0.07 (1.22-1.44)
Width of pronotum	0.33±0.03 (0.28-0.39)	0.44±0.00	0.74±0.05 (0.78-1.00)	1.01±0.02 (1.00-1.04)	1.56±0.07 (1.44-1.67)
Wing pad	0.06	0.12±0.03 (0.10-0.17)	0.44±0.10 (0.33-0.56)	0.90±0.02 (0.89-0.93)	2.00±0.07 (1.89-2.11)
Length of body	1.71±0.3 (1.33-2.00)	2.10±0.06 (2.00-2.17)	3.56±0.16 (3.33-3.78)	4.91±0.02 (4.71-5.20)	6.33±0.07 (6.22-6.44)
Width of body	0.8±0.12 (0.56-0.89)	0.89±0.03 (0.83-0.44)	2.20±0.11 (2.11-2.33)	2.29±0.09 (2.22-2.44)	2.44±0.16 (2.22-2.67)

**First instar nymph (Fig. 1-B & Table 1):** Body, oval hairy and reddish. Head globular, anteocular area black; post ocular area yellow reddish with hairs on surface and margins. Eyes blackish. Antenna: Five jointed, first two joints deep black, third and fourth joints deep brown, fifth one reddish and swollen. Rostrum: Three segmented, first two segments black, last one yellow with tapering end. Thorax: yellow in colour, quadrate; with one pair of erected black hairs in each lateral margin. Mesonotum: yellow with two red spots medially; each spot provided with one black hair, lateral side grey, each provided with one pair of erected black hairs. Metanotum similar to mesonotum. Legs hairy, with black and yellow areas. Foreleg. Coxa and trochanter yellow, femur yellow distally, proximally black with two red lines, and erected hairs; tibia black distally, yellow proximally; provided with erected hairs, tarsus yellow, terminated with two brown claws. Abdomen: Oval, yellowish; lateral margin red; 8 segmented, each segment with red strip, medially, two sclerotized plates, appear on IV & V segments, apex deep black.

**Biology:** The duration of the 1st instar nymph averaged 5.6 days for male and 6.3 days for female. Mortality at this stage was 16.6%.

**Second instar nymph (Fig. 1-C & Table 1):** Body oval, yellowish brown, hairy. Head and thorax as the first instar. Wing pad appeared as small extensions on mesonotum. Abdomen: Each segment with dark brown strip medially and brown oval spots laterally, two sclerotized plates appear more conspicuous on IV & V segments.

**Biology:** The average duration of this stage was 4.1 days for male and 4.9 days for female and showed a mortality rate of 12%.

**Third instar nymph (Fig. 1-D & Table 1):** Body oval, yellowish brown, hairy. Head: Oval, with silvery erected hairs. Anteocular area yellow, postocular area yellowish brown with white sulcus medially, each lateral margin with three teeth like projections. Eyes deep black with small tubercles laterally. Antenna: Five jointed, yellowish, first segment and distal half of the second segment dark brown. Rostrum: Three segmented, yellowish; third segment tapering. Thorax: Pale brown, with silvery hairs, lateral margins serrate. Pronotum sub quadrate; lateral margins curved, serrate, with dark brown sculptures. Legs: Yellow, hairy. Forelegs appear clearly modified for seizing; coxa oval, yellow, hairy; trochanter, femur and tibia yellow with red punctuation lateral margins serrate, with erected silvery hairs; tarsus two segments, dark brown, terminated with two black claws. Second and

third legs as first one in general, colour pattern. Wing pad: dark brown extending behind mesonotum. Abdomen: brown yellowish, provided with erected silvery hairs, apparently 8 segmented, each segment provided with teardrop like brown spots sub-laterally; three sclerotized plates appear on III, IV, V segments, abdominal apex deep black.

**Biology:** The third instar nymph lasted 3.6 and 4.6 days in male and female, respectively. Mortality was 4.6%.

**Fourth instar nymph (Fig. 1E & Table 1):** Body, head, eye and Rostrum as third instar. Antenna: five jointed, yellowish. Thorax: brownish, hairy. Pronotum sub quadrate, starminous, hairy, with brown sculptured; ecdysial line yellow. Legs: yellow, lateral margin serrate; femur with red punctuate; tibia with dense hairs, tarsus two jointed, brownish, terminated in two black claws. Wing pad: surpassing mesonotum and metonotum, dark brown, hairy, extending behind first abdominal segment. Abdomen: similar to third instar.

**Biology:** Fourth instar nymph lasted 6.0 days for male and 5.1 days for female, mortality rate was of 2.33 %.

**Fifth instar nymph (Fig. 1F & Table 1):** Body as fourth instar. Head: starminous, oval with smooth margins. Antecular area, hairy, yellow; postocular area brownish, hairy, with black triangular area below the eyes; yellow sulcus extended from interocular furrow to pronotum. Antenna: 5-jointed, hairy yellowish. Rostrum: similar to fourth instar. Thorax: similar to previous instar. Wing pads: Hairy, brown, extending to third abdominal segment. Abdomen: Red brownish, other characters similar to fourth instar.

The first through fifth nymphal instars can be recognized on the bases of the morphometrical parameters given in Table 1., especially the lengths of the body and pronotum which exhibited a marked increase in successive instars.

**Biology:** Fifth nymphal instar lasted 6.2 and 6.8 days for male and female, respectively. No mortality was recorded.

**Total nymphal period:** By feeding *C.aegyptius* nymphs on *A.kuehniella* larvae at the hygrothermal conditions of  $30\pm1^{\circ}\text{C}$  and  $70\pm5\%$  R.H., the total nymphal period averaged 24.6 and 27.6 days for male and female, respectively. Statistically, significant ( $P<0.01$ ) difference existed between the total nymphal periods of both sexes. The total percentage mortality was 31.6%.

**Adult stage (F. 1):** Previously described by El-Sebaey (1994).

**Longevity and fecundity:** Using *Anagasta* larvae as food under the previously described conditions, the female lived an average of 154.9 days, while male exhibited a shorter adult longevity (96.5 days).

The female deposited her eggs singly on a piece of filter paper which served as an artificial substrate of oviposition. First eggs were laid after an average pre-oviposition period of 7.2 days, Table 3. The female deposited an average of 241.4 eggs throughout an oviposition period of 145 days with a daily rate numbers of eggs laid by each female averaged 1.6 eggs. The maximum weekly number of eggs among the experimental females was 30.6 eggs (ranged from 15 to 41 eggs). Oviposition ceased for a post-oviposition period of 3.43 days.

The weekly rate of deposited eggs for female varied during the successive weeks of oviposition period. This rate attained its highest value during the first week of oviposition period. However, in the successive weeks, this rate decreased gradually till the end of oviposition period, Fig. 2, Mx.

Estimating the survival rates of depositing females, Fig. 2, Lx, it appeared that all females lived to the 19th weeks from adult emergence. The survival rate was 90% in the 20th week, thenafter this rate decreased till 23th week when all females died, Fig. 2, Lx.





Table 2. Duration (/day) and mortality of immature stages of *Coranus aegyptius* F.

Stage	Average and range of duration / day		Mortality
	Male	Female	
Nymphal instar			
1st	5.56±0.76 (4-7)	6.27±0.69 (5-7)	16.60 %
2nd	4.06±1.33 (3-6)	4.86±0.63 (4-6)	12.00 %
3rd	3.61±0.95 (3-6)	4.59±0.65 (4-6)	4.55%
4th	4.95±0.90 (4-7)	5.05±0.56 (4-6)	2.38%
5th	6.22±0.63 (5-7)	6.77±0.85 (5-8)	0.00 %
Total nymphal period	24.56±1.95 (20-27)	27.59±2.10 (25-32)	21.60 %

Table 3. Longevity of *Coranus aegyptius* F.adult female and no. of deposited eggs/female.

Stage	Egg-laying activity				Gross rate of reproduction	Daily rate of reproduction
	Postoviposition	Oviposition	Postoviposition	Longevity		
Female	7.2±1.52 (5-9)	145±5.9 (130-150)	3.43±0.82 (2-4)	154±5.69 (141-164 )	214.43±13.4 (220-270)	1.63 ± 0.19 (1.07-1.93)
Male	-	-	-	96.5±4.01 (89-100)	-	-



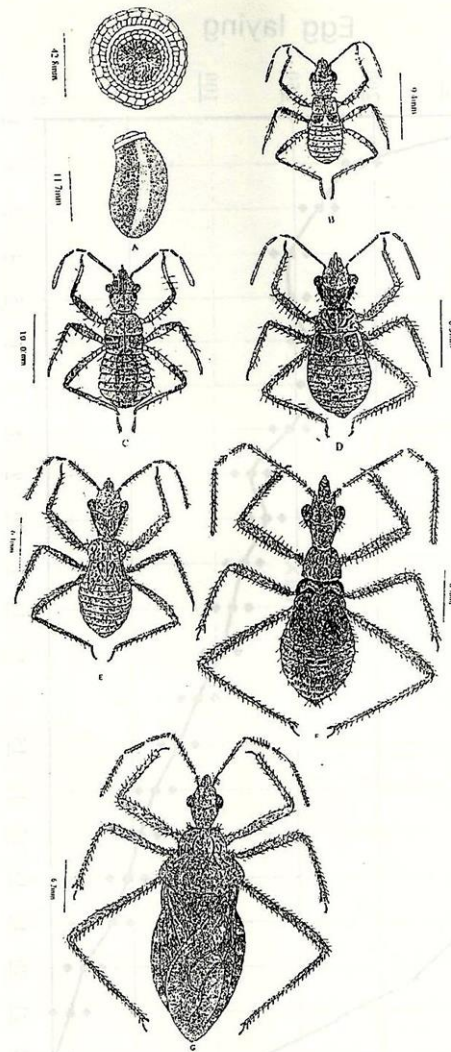


Fig.1. Egg, nymphal instars and adult of *C.aegyptius* A: Egg, (B.F): First to fifth nymphal instars. respectively, G: Adult.

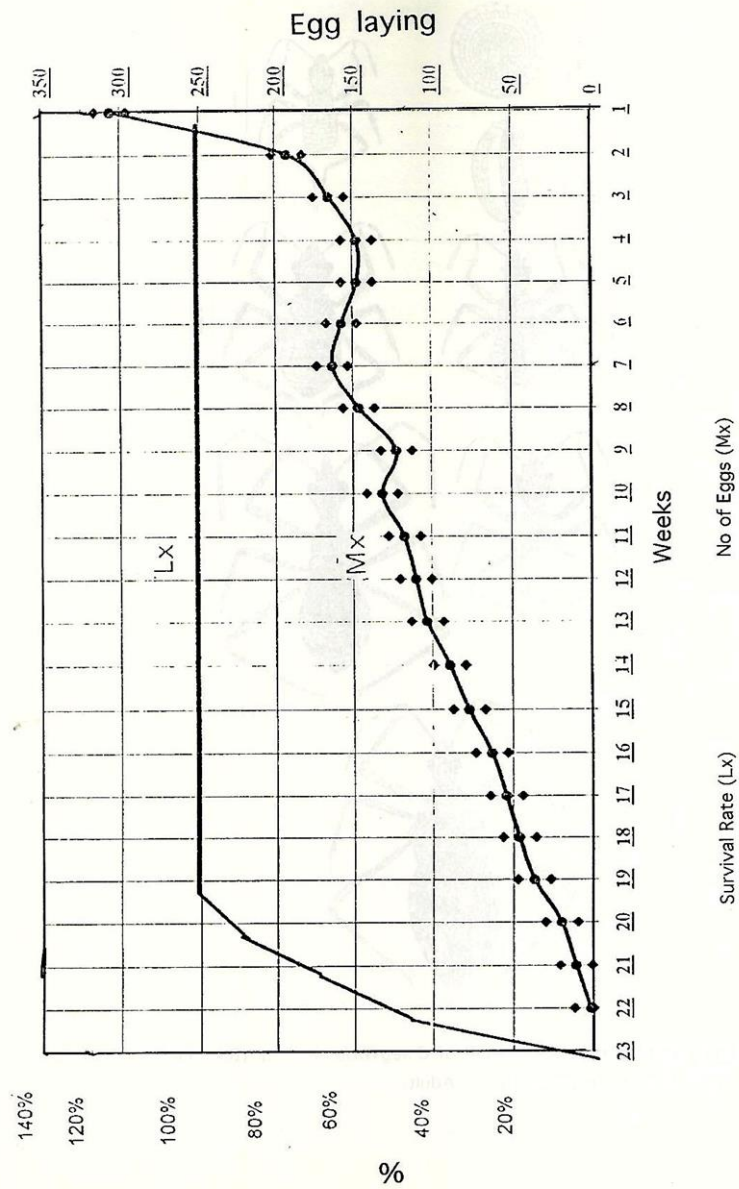


Fig.2. Egg laying activity and survival rate of *coranus aegyptius* female.

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دراسات بيولوجية ومورفولوجية للمفترس *Coranus aegyptius* F.  
(فصيلة البق السفاح - رتبة نصفية الأجنحة)

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تم تربية المفترس *Coranus aegyptius* F. التابع لفصيلة البق السفاح من رتبة نصفية الأجنحة عند درجة حرارة  $20 \pm 5$  م° ورطوبة نسبية  $70 \pm 5\%$  على يرقات فراشة الدقيق *Anagasta kuehniella*. تم وصف ورسم وقياس الأعمار من البيضة حتى العمر الخامس للحورية وأتضح من الدراسة أن طول فترة حياة الأعمار المختلفة من العمر الأول حتى الخامس ٦,٥، ٦,١، ٥,٨، ٥,٩، ٩,٤ يوما على التوالي في حالة الذكور أما الإناث فكانت ٦,٣، ٤,٦، ٤,٦، ٥,١، ٦,٨ يوما على التوالي.

وقد وضعت الأنثى ٢٤١,٤ بيضة خلال فترة ١٤٥ يوما بمعدل يومي ١,٦ بيضة.

كما تم أيضا دراسة طول فترة حياة الأفراد الكاملة سواء ذكورا أو إناثا بالإضافة لدراسة معدلات وضع البيض في حالة الإناث الملقحة.