

# Review and Description for *Theretra alecto* Boisduval 1827, (Lepidoptera: Sphingidae) in Iraq.

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## Abstract

The current study included a review of the registration and description of the *Theretra alecto* Boi, 1827 (Levant hawk moth), samples were collected from various areas of the Baghdad belt and the provinces of the Middle Euphrates, confirmation in the description was on the most important parts of the body included the head and it's appendages, pronotum, wings as well as male and female genitalia.

The morphological characteristics under study were enhanced by illustrations and images. Information on the locations and date of the collection was also confirmed.

This study aims to identify the most important characteristics of the diagnosis of the species and the review of appearance variations, especially the analytical style of wings, coupling wings and venation as well as the structures of the male and female genitalia.

**Key words:-** Lepidoptera, Sphingidae, Heterocera, Macroglossinae, *Theretra*.

## INTRODUCTION

The surname known as the Sphingidae was formulated by the scientist Linnaeus based on the habit of the larvae when they stand in a certain defensive position and this is similar statue of the Egyptian sphinx so it is surprising, it is known as (hawk moth) or (humming bird moth), the shape of the body is flowing and it is rapid flight so give a clear idea of flying hawks, while their feeding behavior is similar to the humming bird as it feeds in the position of flying on flowers, it is also characterized by long distance travel through migrations [1,2].

The family members were diagnosed based on their coloration characteristics, the both shape and size of the wing and the distinctive color patterns, it is members are characterized by strong bodies with long and narrow fore wings, the hind wings are much shorter than the fore wing, the wings are folded back during rest taking a close look to the shape of the arrowhead [3,4].

Sphingidae are great pollinations for flowering plants for a long time because of its ability to fly long distances during the day but they are more active at night, where it can be easily observed by visitation the pale white-coriander flowers as well as by the spurs attached to the coronet in the form of long pipes a reservoir for abundant quantities of nectar [5].

In addition it can be seen at dusk and early evening in most areas, they also fly around many desert plants and it is one of the most important pollinations of desert plants in the American State of Arizona [6,7].

Categorically the hawk moth family Sphingidae belongs to a heterocera antenna [8], genus *Theretra* Hübner, 1819; belongs to a tribe: Macroglossini and sub family: Macroglossinae [9]. The family has more than 1.450 species in the world, 63 species in the western regions of the ancient world and about 115 species in the United States of America, of which 34 species are endemic or temporary in Turkey, except Antarctica and Greenland, approximately one-third of this moth is due to the tropical group [10].

There are 60 species and subspecies of this family in Pakistan of which 14 are new registrations with in the region's animal group [11], a new species of genus was also recorded and described is *Theretra shendurneensis* sp. nov. from (shendurney wild life sanctuary reserve) located South of Gats West in India [12].

Nine species of this family were registered in Jordan [13], as in Palestine the species recorded for moths are 31% of the animal group of the order: Lepidoptera including the studies species [14]. In Iraq this species was recorded by [15].

## MATERIALS AND METHODS

Collection 16 samples (9 male + 7 female) from different areas of Baghdad belt Al- Taji area between latitude 33° 31'47.62' N and longitude 44°16' 38.88' E and Za'faraniyah area between latitude 33° 13' 36' N and longitude 44° 31' 41' E; and some areas of the provinces of the Middle Euphrates, Mahawil (district of Hilla) between latitude 32° 39'40.92' N and longitude 44° 24' 30.69' E and Almsyb (district of Karbala) between latitude 32° 46' 46.99' N and longitude 44° 17' 24.9' E. during the period from March 2016 to May 2017 using a regular insect net and by adopting the method of sweep previously followed by [16], the collection is concentrated in the early hours of the morning by the hour 07:30 minute and 11:40 minute, the samples are killed in plastic killing bottles (diameter × height, 20 × 45 cm) and saved using naphthalene balls, studied and separated the body parts by following the method [17].

With regard to the study of veins and cells wings used the method followed by [18], by putting the wings in a (petri dish) containing 25-35 ml from ethanol solution 99% for 24 hours, a fine paint brush was also used to remove the suspended scales, then put the wing on a microscope slide and washed with drops of distilled water.

As for the study of male and female genitalia, the method used has been followed by [19], by putting the abdomen in a test tube containing 4-5 drops of potassium hydroxide

KOH with concentration 10% for a period not exceeding five minutes. Some parts are painted using Dissecting Stereomicroscope and under different magnification forces, while the other

parts are photographed using a digital camera type SAMSUNG S8.



Picture1: *Theretra alecto* (Male & Female)

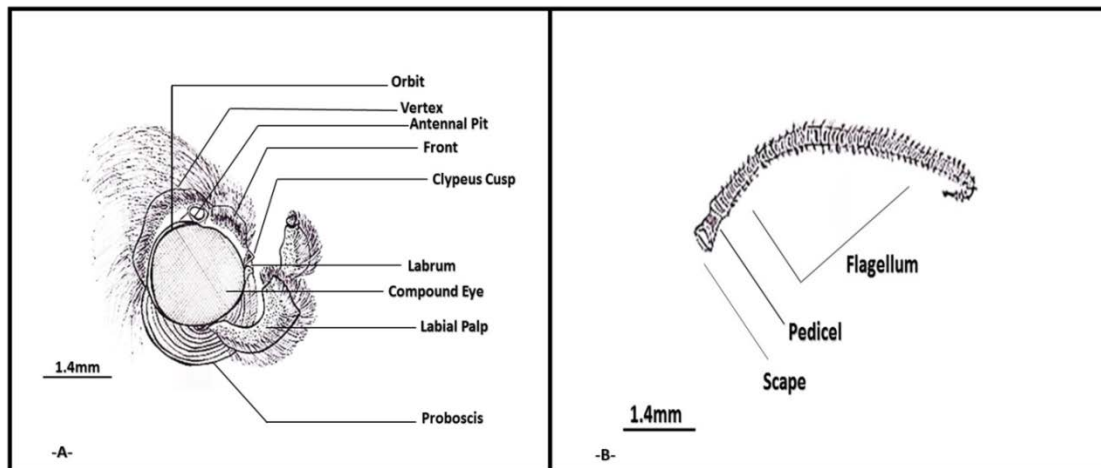


Figure 1: *Theretra alecto* A- Head B- Antennae

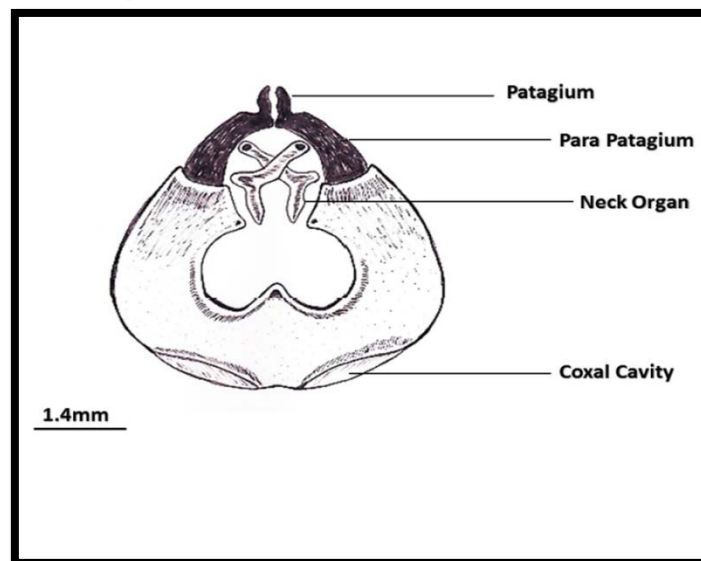
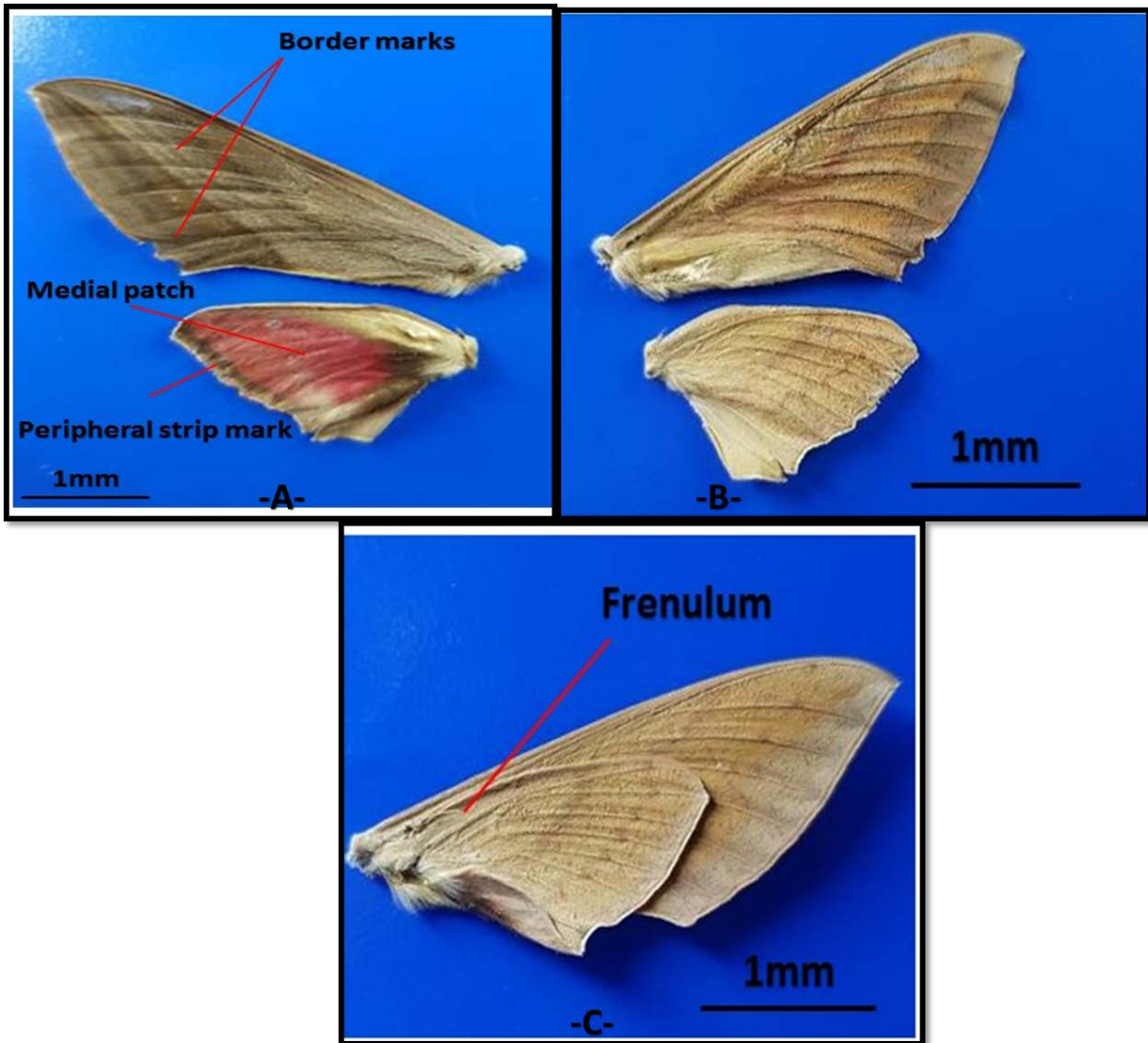
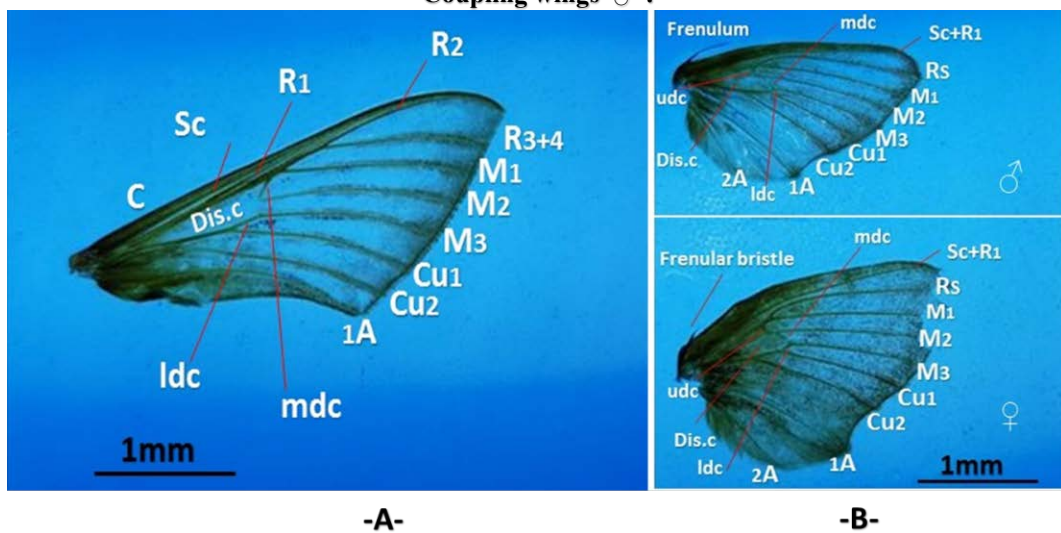


Figure2: Pronotum of *Theretra alecto*



Picture 2:wings of *Theretra alecto* , A-Fore & Hind wing (Upper side), B- Fore & Hind wing (Under side), C- Coupling wings ♂ .



Picture 3: wing venation of *Theretra alecto*, A-Fore wing, B- Hind wing (male & female).

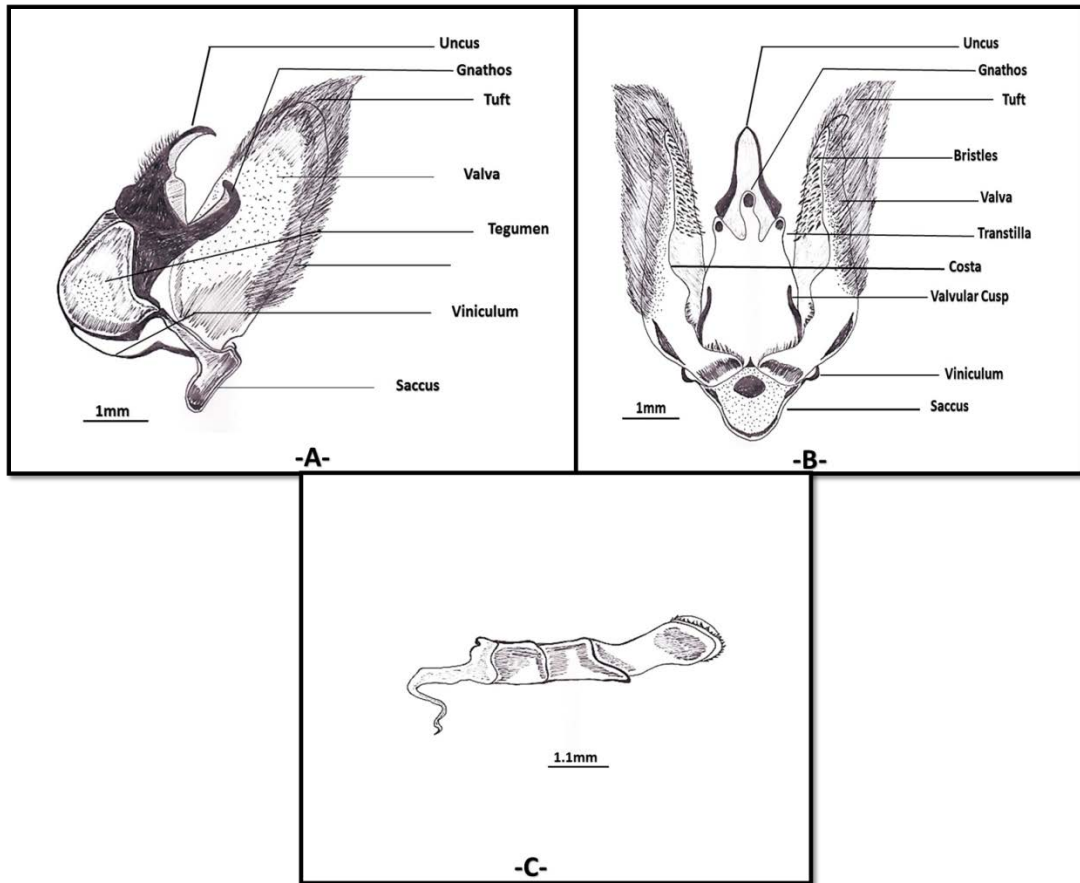


Figure3: Male genitalia of *Theretra alecto*, A-Lateral view, B- ventral view, C-Aedeagus.

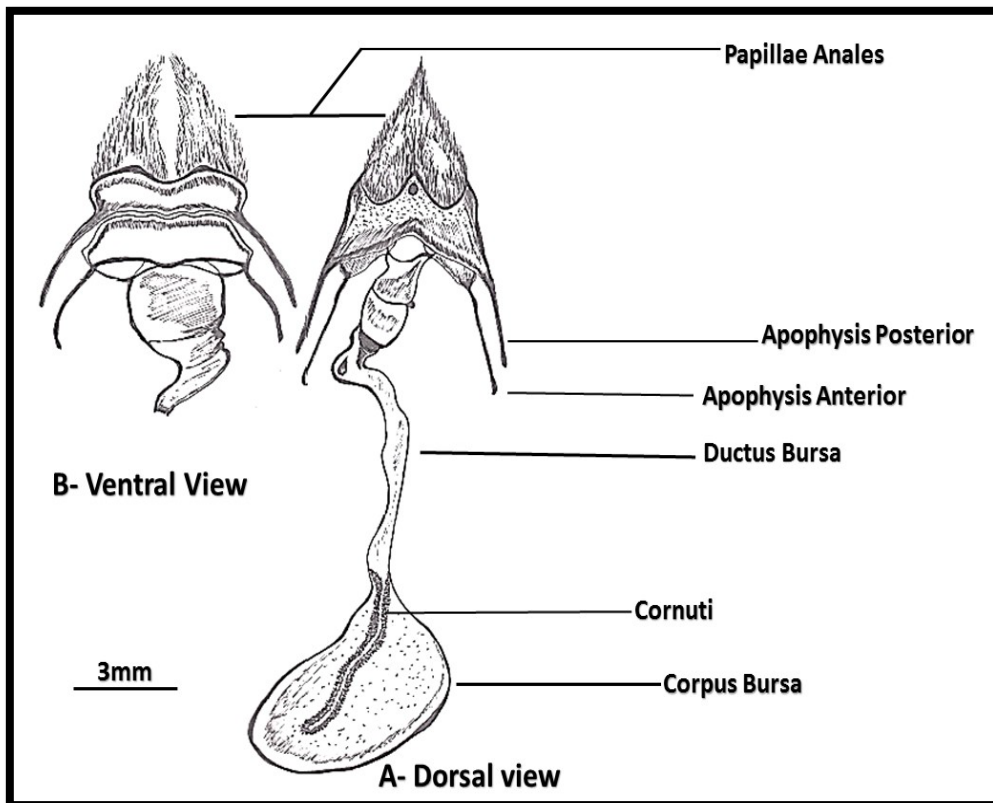


Figure4: Female genitalia of *Theretra alecto*



## RESULTS AND DISCUSSION

### Describe of *Theretra alecto* Boisduval, 1827

- **Body of ♂ ♀:-** Large oversized, the head and thorax are dark brown, with sides covered with whitish pilose hairs by a side strip; the abdomen is pale brown. (Pic.-1)
- **Head of ♂ ♀:-** A large black oval is covered with dark brown scales often with a slightly white (Fig 1-A).
- **Vertex:-** A convex protruding and coated with dense dark brown hairs with a quiff pointing back.
- **Front:-** It's wide, outer edge is strongly tilted to the inside, coated with hairs similar to vertex hairs but less density.
- **Clypeus cusp:-** It's transformed into a small triangular plate in a manner cusp.
- **Labrum:** Antique plate integrated with clypeus cusp.
- **Proboscis:-** Long dark brown-reddish wrapped under the head.
- **Compound eye:-** Large oval, protruding outside and dark brown.
- **Orbit:-** A narrow plate that surrounds the eye sideways.
- **Antennal pit:-** It's protruding adjacent to the eye.
- **Labial palp:-** Large elongated and coated with brown-bleached hairs, consist of three segments, the basal is the largest crescent shaped segment, the medium is externally convex and internally undulating edges, the apex segment is small pointed.
- **Antennae:-** It's long, thickened, bleached, large scape segment, the pedicel is small polygon, the flagellum segments a thread and homogeneous thickness, bearing each segment of black fluff from both sides, the 4-5 segments strongly tend to the inside are a hook shape (Fig. 1-B).
- **Pronotum ♂♀:-** Middle-size, pearly shape, dark black coated with brown-dark reddish scales, wide at its base and gradually narrowing towards the apex, consist of the following plates: (Fig. 2).
  - o **Patagium:** A pair of small pointed plates ends with a similar forceps.
  - o **Parapatagium:-** It's pair of expanded large plates, apical edge sharply tilted to the inside and the broad base.
- **Neck organ:-** It's pair of free, discrete, bony looking is responsible for the movement of the head at multiple angle.
- **Coxal cavity:-** Prolonged disc represents the contact location of the fore leg's coxa.
- **Wings:-**
- **Fore wing ♂♀.**
  - o **Upper side:-** Identical in both sexes, brown, long, narrowness, the costal margin is straight, outer margin is convex, inner margin is undulant, apex angle is pointed, the wing base is pale brown, stretch along the apex third of the wing 5-6 lines of dark brown scales reach between the apex of the wing and the inner margin known as the border marks (Pic. 2-A).
  - o **Under side:-** Similar to the upper side but more paleness (Pic. 2-B).
- **Hind wing ♂♀.**
  - o **Upper side:-** Identical in both sexes, pink, short, little transversal, costal margin is slightly undulant, the outer margin is convex at the outer third and pointed by a protruding cusp at the back third, inner margin is convex, wing base for a flesh color, the inner margin is dark brown, the front and middle thirds of the wings are coated with bright pink scales known as medial patch, the outer wing borders are coated with a dark brown stripe known as peripheral strip mark (Pic. 2-A-).
  - o **Under side:** Pale yellowish brown in both sexes (Pic. 2-B).
- **Coupling wing:-**
  - o In the male one strong and long fork is formed at the base of the hind wing coupled with a small hook at the hind third of the fore wing (Pic. 2-C).
  - o In the female, a fine of the thistles is formed at the base of the hind wing coupled with a tuft at the inner margin of the fore wing (Pic. 2-B).
- **Wing venation.**
- **Fore wing ♂♀:-** The Sc vein arises from the wing base, R<sub>1</sub> arises from the discoidal cell, Sc + R<sub>1</sub> are tightly thickly together and they represent about three-quarters of the costal margin, R<sub>2</sub> arises from apical angle of the discoidal cell, long and closed at the apical angle of the wing, R<sub>3</sub> + R<sub>4</sub> arises from the middle third of the R<sub>2</sub> and is far from it, M<sub>1</sub> arises near the stem base of the R<sub>2</sub>, M<sub>2</sub> + M<sub>3</sub> are arises from the middle disco cellular (mdc), M<sub>1</sub>, M<sub>2</sub> and M<sub>3</sub> are parallel, Cu<sub>1</sub> arises from the lower of the discoidal cell (ldc), Cu<sub>2</sub> arises from the discoidal cell, A<sub>1</sub> arises from the wing base and closed at the anal angle, discoidal cell is narrow and less than half the length of the wing, upper disco cellular (udc) is missing, mdc is longer than ldc (Pic. 3-A-).
- **Hind wing:-**
  - o **Male:-** Sc vein represents Sc + R<sub>1</sub>, arises from the wing base and closed at the apex also is being near to the coastal margin, R<sub>s</sub> combined at the base with M<sub>1</sub> and arises from the upper disco cellular (udc), R<sub>s</sub> curved at the beginning and straight at the end, M<sub>2</sub> arises from the (mdc), M<sub>3</sub> arises from the (ldc), M<sub>1</sub>, M<sub>2</sub> and M<sub>3</sub> are parallel, Cu<sub>1</sub> arises from the lower angle of the lower cell and be very near to M<sub>3</sub>, Cu<sub>2</sub> arises from the discoidal cell, <sub>1</sub>A long, arises from the wing base and closed at the end of the wing external margin in a small cusp and be divergent from Cu<sub>2</sub>. <sub>2</sub>A short, arises from the wing base and closed at the middle of the inner margin, Discoidal cell (Dis.c) is about a quarter of the length of the wing, (mdc) oblique and longer than the (udc) and (ldc). (Pic. 3-B)

- **Female:-** Sc + R<sub>1</sub> arises from the wing base and closed at the apex, so very near with R<sub>s</sub> in the middle, R<sub>s</sub> and M<sub>1</sub> are combine at the base and arises from near distance of the (udc), M<sub>2</sub>, M<sub>3</sub>, Cu<sub>1</sub> and Cu<sub>2</sub> are almost similar to the veins in the male, the <sub>1</sub>A is long and undulant, the <sub>2</sub>A is short and little curved; (Dis.c) is narrow about a quarter of the length of the wing, (udc) is concave, (mdc) is oblique and longer than the (ldc).
- **Male genitalia:-** (Fig. 3 -A-B)
- **Uncus:-** Elongated plate with a pointed end sharply to the inside, it's base is wide and protruding to the outside, utterly coated with fine forks, it's inner margin is undulating.
- **Gnathos:-** Elongated plate, piggy shape connected with the uncus and opposite for its formed appearance like to the horns.
- **Tegumen:-** Wide plate, it's apex connected to the uncus with a distinguished groove and it's base connected to the vinculum is concave.
- **Vinculum:-** Tubular longitudinal plate, annular shape.
- **Saccus:-** Cross-sectional plate similar to ajar, it has wide base and stiff apex (Fig. 3-B-).
- **Valve:-** Larger genital plate, prolonged, it has wide base and round apex, coated with dark brown rough hairs, it's ventral part is coated with fine thistles.
- **Transtilla:-** Pair of small appendages connect the gnathos to the dorsal part of the valve (Fig. 3-B).
- **Costa:-** Thickening of the inner margins of the valve with a membrane fold (Fig. 3-B).
- **Valvular cusp:-** Pair of promises, piggy shape, elongated of the ventral part of valve (Fig. 3-B).
- **Adeagus:-** Oversized, consist of three segments, apex segment is largest segments, packed with a collar of forks different in size are oriented outward, middle segment is ribbed and slightly oblique. (Fig. 3-C).
- **Female genitalia:-** (Fig. 4)
- **Papillae anales:-** Pair of soft structures coated with soft hair accurate and length.
- **Apophysis posterior:-** Pair of rigid and thin side valves.
- **Apophysis anterior:-** Pair of valves is longer than the posterior counterpart.
- **Ductus Bursa:-** Long crooked tube, oversized at the apex with sac shape and tapering at the base of contact with the opening of the corpus bursa.
- **Corpus Bursa:-** Balloon appearance, wide and diaphanous.
- **Cornuti:-** Striped appearance, a bout rigid and accurate stingy chain, it's occupy two-thirds of the corpus bursa.

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