

## SEXUAL CHARACTERISTICS IN PUPAL AND ADULT STAGES OF *CHILO PARTELLUS* (SWINHOE)\*

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**Abstract.** Males and females of *Chilo partellus* (Swinhoe) can easily be separated in pupal and adult stages by locating the genital opening in relation to abdominal segments. In male pupae genital opening is associated with the sternum of ninth abdominal segment and two rounded pads, one on each side of it, are present. In female pupae genital opening occupies the sternum of eighth abdominal segment and the rounded pads are not present. Although less accurate, the two sexes can also be separated by visual observation as the female pupae and moths are comparatively larger and heavier than male pupae and moths.

It is imperative that before carrying the radiation effect studies the sexes must be separated at suitable stage to differentiate the effects, produced by radiation, on males and females separately. It becomes all the more necessary in mating and behavioural studies that the sexes should be separated before or after irradiation so as to avoid prior mating. Solomon<sup>1</sup> observed that the most reliable character for determining the sex in pupae of elm spanworm, *Ennomos subsignarius*, is the location of genital opening; in male pupae this opening is situated on the ninth abdominal segment whereas in female pupae it is associated with both the eighth and ninth abdominal segments. Peterson<sup>2</sup> used the number of segments posterior to caudal tips of wing pads, which were not sclerotized to an adjacent segment, to separate the sexes in pupae of codling moth, *Carpocapsa pomonella*. The male pupae of hickory shuckworm, *Laspeyresia caryana*, possess pads on the ventral surface of ninth abdominal segment while the eighth abdominal segment of female pupae is divided on the ventral median line by ninth abdominal segment.<sup>3</sup> In *Vogtia mellio* the genital opening is located in between eighth and ninth segments in female pupae and on ninth segment in male pupae; pads are present on each side of genital opening in male pupae whereas in female pupae the last pair of abdominal spiracles is present on the same segment as genital opening.<sup>4</sup>

### Materials and Methods

The sex (male and female) in pupal stage was determined by placing the pupae on their backs under stereoscopic binocular microscope and the position of gonopore in relation to abdominal segments was observed. The segment on which the tips of wing pads were resting was considered as fourth abdominal segment. The location of gonopore in male and female pupae had also been determined with the help of 10× hand lens.

The sex determination in adult stage was made by visual observations and the sexes were separated by noting the differences in size and the presence of genital and anal openings.

### Results and Discussion

The data in Table 1 show that in male pupae the genital opening is situated ventrally on the ninth abdominal segment; the caudal margin of the eighth abdominal sternum is not divided by genital opening; last pair of abdominal spiracles and the genital opening are not situated on the same abdominal segment and there are two rounded pads one on each side of genital opening. In case of female pupae the genital opening is associated with the ventral side of eighth abdominal segment; the segment is bisected by the genital opening and the slit made by it is broader at caudal margin and it tapers down gradually towards the anterior end. At a point where the tapering arms close each other a black line extends towards the caudal margin of seventh abdominal sternum. This line represents the genital opening of female which is present on the same abdominal segment as the last pair of abdominal spiracles. No

TABLE 1. CHARACTERS DIFFERENTIATING MALES OF *Chilo partellus* (SWINHOE) FROM FEMALES IN PUPAL AND ADULT STAGES.

Character	Male	Female
	<i>Pupae</i>	
Pupae	Small and light	Large and heavy
Location of genital opening	On ninth abdominal sternum	On eighth abdominal sternum
Caudal margin of eighth abdominal segment	Not divided	Divided by genital opening
Last pair of abdominal spiracles	Spiracles and genital opening not on the same abdominal segment	Spiracles and genital opening of the same abdominal segments
Rounded pads	Present on each side of genital opening	Absent
Av. weight	49.20 mg	87.08 mg
Av. length	10.81 mm	15.23 mm
	<i>Moths</i>	
Moth	Small and light	Large and heavy
Genital and anal openings	Not visible	visible
Abdomen	Cylindrical	Swollen

\*From the Ph.D. thesis of A. R. Bughio, Sind University.

rounded pads are present on either side on the genital opening. The female pupae are larger and heavier than the male pupae.

The genital openings of male and female pupae could also be located by counting the segments succeeding the one on which wing pads rest. Thus the genital openings of male and female occupied the sternum of fifth and fourth abdominal segments following the wing pads respectively. There is no difference in the number of segments visible behind the wing pads, number of moveable segments and colour of male and female pupae.

Apart from the pupae the sexes could also be differentiated in adult stage. The females are larger and heavier than males; their abdomen is swollen as compared to that of males having slender abdomen. Observing the abdomen ventrally two black points are visible near the tip of the abdomen; these two points represent the anal and genital openings in female. However, in males these points are not visible.

In the present studies it has become quite clear that the two sexes can be differentiated in pupal as well as in adult stage by locating the genital openings. Al-

though somewhat taxing and time consuming yet these characters provide cent per cent accuracy in separating the two sexes.

Generally the length and breadth of females in pupal as well as in adult stage are more than the males and the two sexes can easily be separated by visual observation but as these characters are affected by food and environmental conditions so their utility becomes limited. Although in comparison with genital opening these characters are less reliable yet they can be used efficiently to separate the sexes in pupal and adult stage where speed becomes limiting factor.

#### References

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