

## On the Morphology of Reproductive Organs in the Grass Midge, *Orseolia difficilis* Gagne (Cecidomyiidae: Diptera), from India

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### ABSTRACT

The reproductive organs of the grass-midge, *Orseolia difficilis* Gagne are described. The egg laying apparatus is simple and lamellate, but the ovary is characteristic; it possesses about 75 ovarioles arranged like a bunch of grapes. Each ovariole has a large ripe ovum and a small unripe ovum. The male genitalia is simple but sclerotized. The testes are unique in having a terminal filament.

### INTRODUCTION

A good number of grass midges has been described from India and abroad (Grover, 1968), but sufficient information about their reproductive organs is still not available. In India, the reproductive organs of a *Lasiöptera* sp. alone have been worked out (Ansari, 1967a). An investigation of the reproductive organs of other grass-midges is therefore necessary. This paper deals with the morphology of the male and female reproductive organs of *Orseolia difficilis* Gagne, described from India under the name *Tristephanus cynodontis* Grover (Grover, 1968).

### MATERIALS AND METHODS

The pupae of the midge were collected from infested *Cynodon dactylon* (L.) Pers. from Kashi Naresh Government College, Gyanpur in September, 1982. The midges emerging from them were used in the present study for dissection and microtomy. Freshly emerged midges were dissected in 1% saline water under a binocular microscope and the permanent mounts were prepared by the usual procedure. Serial sections, both transverse and longitudinal, were cut at 8  $\mu$  and their slides were made for detailed study. External genital organs were mounted in polyvinyl alcohol.

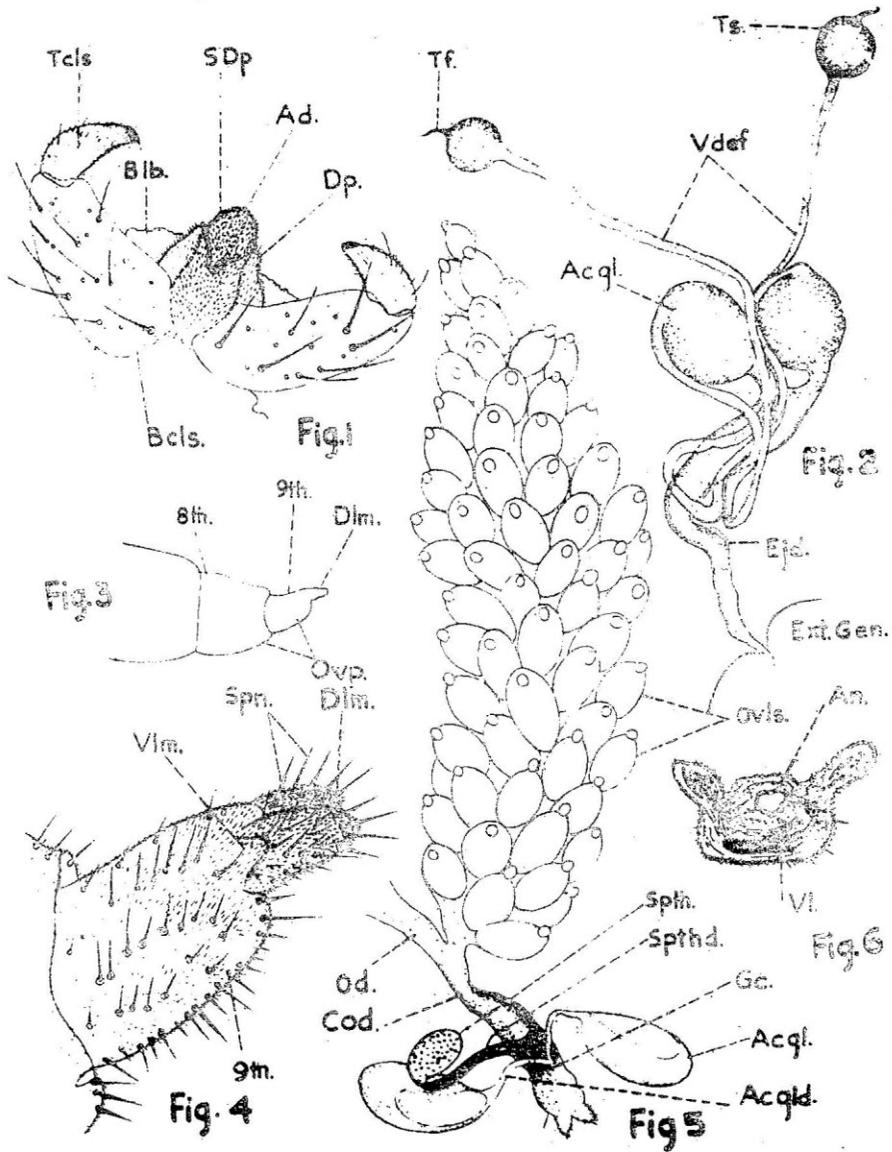
### OBSERVATIONS

#### *Female Reproductive Organs*

*Ovipositor.* The egg laying apparatus (Figs. 3 & 4) is simple and lamellate. It is formed from the last two abdominal segments, which are narrower than the preceding ones. The last abdominal segment carries a pair of leaf-like dorsal lamellae and a triangular ventral lamella

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Caption of figures : *Orseolia difficilis* Gagne, Reproductive organs

## Morphology of reproductive organs in *Orseda difficilis*.

### EXPLANATION OF FIGURES

- Fig. 1 : External genitalia  
Fig. 2 : Internal male reproductive organs  
Fig. 3 : Posterior end of female abdomen showing ovipositor.  
Fig. 4 : Ovipositor (enlarged)  
Fig. 5 : Internal female reproductive organs (left ovary removed)  
Fig. 6 : T.S. through last abdominal segment of female showing anus and vulva

### EXPLANATION OF ABBREVIATIONS

Acgl.	: Accessory gland	S.Dp.	: Sub dorsal plate
Acgld.	: Accessory gland duct	Spn.	: Spines
Ad.	: Aedeagus	Spth.	: Spermatheca
An.	: Anus	Spthd.	: Spermathecal duct
Bcls.	: Basal clasp segment	Tcls.	: Terminal clasp segment
Blb.	: Basal lobe	Tf.	: Terminal filament
Co.	: Common oviduct	Ts.	: Testis
Dm.	: Dorsal lamella	Vdef	: Vas deferens
Dp.	: Dorsal plate	Vlm.	: Ventral lamella
Ej.	: Ejaculatory duct	8th	: Eighth abdominal segment
Ext. Gen.	: External genitalia	9th	: Ninth abdominal segment
Gen.	: Genital chamber		
O.	: Oviduct		
Ovip.	: Ovipositor		
Ovs.	: Ovarioles		

at the tip. They are provided with setae and spines. The vulva or the female gonopore is ventral and sub-terminal in the last segment. It lies below the anus (Fig. 6).

The last abdominal segment, i.e. the ninth segment, is capable of slight retraction into the eighth segment but is incapable of perforating or puncturing the host tissue. The eggs are therefore dropped singly on to the soft offshoots and a viscid liquid, mostly the secretion of the accessory glands, is poured over them. In addition to serving as glue for the attachment of the eggs, the liquid also protects the eggs from dessication.

*Internal organs (Fig. 5).* The ovaries are much enlarged. They occupy most of the abdominal space, extending up to the anterior end of the abdomen. Each ovary consists of about 75 ovarioles which are arranged like a bunch of grapes. Each ovariole contains a large ripe ovum and a small unripe ovum. The average number of ova per ovary is 150 but the number of the eggs in an ovary may vary from 141 to 200.

The ovary is covered by a thin and delicate ovarian sheath, which extends behind to form a short and thin oviduct. The oviducts of the two ovaries join to form a common oviduct. It is median, thick walled and muscular. From the inner to the outer side the wall of the common

oviduct consists of the thin chitinous intima, the epithelium, the basement membrane, a thick layer of circular muscles and a thin layer of longitudinal muscles. The common oviduct joins the genital chamber, which is shorter but wider than the former. Histologically, the genital chamber resembles the common oviduct except that the chitinous intima of the genital chamber has become specially thickened to form a saddle-shaped valvular arrangement. The genital chamber opens outside through the vulva, which is a transverse extensile aperture below the anal opening (Fig. 6.).

The genital chamber receives ducts from the spermatheca and accessory glands. The two ducts from the accessory glands join and open into the genital atrium by a common pore. Similarly, the duct of the spermatheca also join and open into the genital chamber by a common pore. The opening of the spermathecal ducts is dorsal but posterior to the opening of the ducts of the accessory glands.

The spermatheca is single and sac-like, but with two ducts. These ducts possess spiral thickenings. They join distally and open into the genital chamber by a common pore.

The accessory glands are filled with a viscid fluid and are paired and sac-like. Each gland has a short duct. The two ducts of the two glands join behind and open into the genital chamber by a common opening.

#### Male Reproductive Organs

*External genitalia.* This includes basal clasp segments, terminal clasp segments, dorsal plate, sub-dorsal plate and aedeagus as described by Grover (1968), but the sub-dorsal plate is tongue-shaped and highly sclerotized. There is no trace of parameres (Fig. 1).

*Internal organs.* The paired testes, paired accessory glands, their ducts and ejaculatory duct form the internal reproductive organs of the male (Fig. 2).

The testes are small and rounded, each with a terminal filament at the free end. In newly emerged males the testes are prominent and milky white structures but in ones that have copulated, they are smaller and lose their original shape. The testes contain mature spermatozoa from the very beginning of the emergence. Each testis is connected to its accessory gland by a long and tubular but convoluted vas deferens, which does not show a division into anterior and posterior parts.

The two almost spherical accessory glands are applied closely to each other and are larger than the testes. The small lumen of the accessory glands is filled with a viscid fluid secretion. From each gland emerges a small duct which joins the median ejaculatory duct. The ejaculatory duct is thick walled and muscular. It tapers behind and opens at the tip of the aedeagus by the male gonopore.

#### DISCUSSION

The simple and lamellate ovipositor of this species resembles those of *Coquillettomyia indica* (Rao and Saksena) (Ansari 1969), *Horidiplosis ficicola* Gagne (Ansari, 1969) but differs from those of these species in being incapable of puncturing the host tissues. The ovaries of this species resemble those of *Horidiplosis ficicola* in occupying most of the abdominal space and extending up to the anterior end of the abdomen. Unlike in other midges, the ovarioles of *Orseolia difficilis* Gagne are arranged on either ovary like a bunch of grapes. Each ovariole contains a large ripe ovum and a small unripe ovum. The oviduct of this species, like that of *H. ficicola* and *C. indica*, is not long due to the lamellate nature of

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the ovipositor. Furthermore, the present species also resembles these two species in having a saddle-shaped thickening of the chitinous intima in the genital chamber.

*Orseolia difficilis* Gagne resembles *Lasioptera* sp. (Ansari, 1967 a), *Erosomyia indicica* Grover and Prasad (Ansari, 1967 b) and *Coquilletomyia indica* Rao and Saksena (Ansari, 1969) in having a single sac-like spermatheca with two ducts, but differs from *H. ficicola* (Ansari, 1968 a), *Dasineura sesame* Grover and Prasad (Ansari, 1968 b) and *Pipaldiplosis pipaldiplosis* Mani (Ansari, 1967 c) which have two spermathecae and two ducts.

The external reproductive organs of the present species are generally the same as have been described by Grover (1968). However, the sub-dorsal plate is tongue-shaped and not linear as described by Grover (1968). Furthermore, the parameres labelled by Grover in one of the text figures are not traceable; they are wanting.

The presence of a terminal filament to the testis of the present species is characteristic, it not having been reported in any of the known species. In addition, the testes of this species contain mature spermatozoa, suggesting that spermatogenesis is probably already completed in the pupal stage. The accessory glands of the present species are larger than the testes, whereas it is the reverse in other reported midges.

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