The Three External Male Genitalia of Cydninae
(Hemiptera: Heteroptera: Cydnidae)

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Abstract

Key words: Cydninae, Morphology, external male genitalia.

The external male genitalia of currently available species of Macroschytus sp., Geotomus sp. and Adrisa sp. are illustrated and described. These three external male genitalia differ significantly from those of other Pentatomomorpha by having the reservoir lumen running outside of the aedeagus channel.

INTRODUCTION

According to the external male genitalia alone, Dinidoridae, Scutelleridae, Tessaratomidae and Cydnidae constitute the Dinidoridae-group. This group is determined by the possession of synapomorphies: 1) The reservoir lumen (ejaculatory duct sensu Singh-Pruthi, 1925; Ductus seminalis distalis sensu Dupuis, 1970) is semiopaque, tube-shaped, or separating into dorsoapical lumen and ventrobasal lumen; 2) The ejaculatory duct connects the reservoir lumen near middle of the aedeagus. Curiously the reservoir lumen in these three species runs wholly outside of the aedeagus channel. This is an amazing diversity. Investigation of this point has become the object of this study.

MATERIALS AND METHODS

The currently available species of Macroschytus sp., Geotomus sp. and Adrisa sp. are selected.

The external male genitalia have been examined in detail whenever possible. Their significant difference from other Heteroptera is searched. All terms follow Yang and Chang (2000).

RESULTS AND DISCUSSION

Macroschytus sp. Fig.1.

Abdominal segment IX in lateral view posteriorly produces caudad triangularly (Fig.1A); elongate oval in dorsal view. Abdominal segment X elongate quadrate in dorsal view. Abdominal segment XI retracts into segment X. Genital plate semicircular in anterodorsal view (Fig.1B).
Fig. 1. *Macroschytus* sp.

A, abdominal segment IX, lateral view; B, abdominal segments IX-XI and genital styles, dorsal view; C, genital plates, anterodorsal view; D, phallus, lateral view; E, the same, dorsal view; F, ejaculatory duct, aedeagus, ejaculatory reservoir and reservoir lumen, lateral view; G, genital style, dorsal view. VIII, IX, X, and XI= abdominal segments VIII, IX, X and XI; aed=aedeagus; cap=capitate processes; con=connective; ejd=ejaculatory duct; ejr=ejaculatory reservoir; gp=genital plates; gs=genital styles; hop=holding plate; phb=phallobase; phc=phallobasal conjunctiva; phcp=phallobasal conjunctival processes; rel=reservoir lumen; sub=support bridge; sut=support tube.

Phallus directs dorsad within segment IX. Connective (con) pear-shaped in dorsal view, two arms unite at apices (Fig.1E). Support bridge (sub) with upper portion in dorsal view as longitudinal rod (Fig.1E), lateral view triangular below connective. Phallobase (phb) lateral view slender, truncates at apex. Phallobasal conjunctival
processes (phcp) three pairs, in repose condition all expose after apex of phallobase (Fig.1D,E). Holding plate (hop) lateral view triangular. Ejaculatory reservoir (ejr) lateral view elongate subquadrate (Fig.1E,F). Reservoir lumen (rel) very long, pigmented along ventral margin, in repose condition apical third after apex of phallobase and below dorsal pair phallobasal conjunctival processes (Fig.1D,F).

Dorsoapical and ventrobasal lumina difficult to recognize. Aedeagus (aed) cylindrical, very long, reaching closely to apex of reservoir lumen (Fig.1F); ejaculatory duct connects reservoir lumen at there. Genital styles symmetrical in size and shape; left genital style dorsal view expands dorsally, dorsolateral margin round, inner margin sinuate (Fig.1G).

**Geotomus** sp. Fig.2.

Abdominal segment IX lateral view posteriorly produces caudad triangularly; dorsal view elongate oval. Abdominal segment X dorsal view elongate quadrate. Abdominal segment XI retracts into the X. Genital plates anterodorsal view triangular.

Phallus directs dorsocaudad within the IX. Connective dorsal view triangular, two arms unite at apices. Support bridge with upper portion dorsal view as cross bar of connective; lateral view triangular below connective; lower portion not carefully examined. Capitate processes each with rather long petiole. Support tube lateral view stout, large, sclerotized. Phallobase lateral view slender, truncates at apex. Phallobasal conjunctival processes three pairs, in repose condition all expose after apex of phallobase. Holding plate lateral view triangular. Ejaculatory reservoir elongate oval. Reservoir lumen long, in repose condition apical two-fifths after apex of phallobase and below dorsal pair phallobasal conjunctival processes. Ventrobasal lumen easily recognizes by spiral tube. Aedeagus cylindrical, very long, reaching closely to apex of reservoir lumen; ejaculatory duct connects reservoir lumen at there. Genital styles symmetrical in size and shape; left style dorsal view dorsal portion subquadrate.

**Adrisa** sp. Fig.3.

Abdominal segment IX lateral view ventral margin before middle angulates; dorsal view slightly diverging to apex. Abdominal segment X dorsal view elongate quadrate. Abdominal segment XI retracts into the X. Genital plates anterodorsal view arched.

Phallus directs dorsocaudad within the IX. Connective dorsal view U-shaped, two arms not unite. Support bridge with upper portion dorsal view as cross bar of connective; lateral view triangular below connective; lower portion not carefully examined. Capitate processes each with rather long petiole. Support tube lateral view elongate subquadrate. Phallobase lateral view elongate quadrate with dorsoapical angle distinctly produces caudad. Phallobasal conjunctival processes single pair, in repose condition situates within phallobasal cavity. Holding plate lateral view sclerotized, triangular. Ejaculatory reservoir irregular. Reservoir lumen rather stout, pigmented along ventral margin; in repose condition only apical tenth after apex of phallobase; ventrobasal lumen easily recognizes by spiral tube. Aedeagus tubular, about one-third length of reservoir lumen, below median third of reservoir lumen; ejaculatory duct connects reservoir lumen at its base of apical third. Genital styles symmetrical in size and shape; left genital style dorsal view as figured.
Fig. 2. *Geotomus* sp.

A, abdominal segment IX, lateral view; B, abdominal segments IX-XI and genital styles, dorsal view; C, the same, dorsocaudal view; D, genital plates, anterodorsal view; E, phallus, lateral view; F, the same, dorsal view; G, ejaculatory duct, aedeagus, holding plate, ejaculatory reservoir and reservoir lumen, lateral view; H, apex of aedeagus and reservoir lumen, lateral view; I, genital style, dorsal view.
Fig. 3. *Adrisa* sp.

A, abdominal segment VIII, dorsal view; B, abdominal segments IX-XI, and genital styles, lateral view; C, the same, dorsal view; D, the same, dorsocaudal view; E, genital plates, anterodorsal view; F, phallus, lateral view; G, the same, dorsal view; H, the same, everted condition; I, ejaculatory duct, aedeagus, holding plate, ejaculatory reservoir and reservoir lumen, lateral view; J, ejaculatory duct, aedeagus and holding plate, dorsal view; K, genital style, dorsal view.
The evolution of the aedeagus and the reservoir lumen is hypothesized as follows.

1. Singh-Pruthi (1925: 136) defined “Ejaculatory duct is the common duct formed by the vasa deferentia. It runs through the whole length of the aedeagus and ends at its apex, the gonopore.” (Diag.1). Present in all Hemiptera except Pentatomomorpha.

2. *Coridiellus figlinus* (Distant) (Dinidoridae) (Diag.2), is judged to the born ejaculatory reservoir and reservoir lumen taxon. This judgment bases on its ejaculatory reservoir and reservoir lumen appear semiopaque, twist, tube-shaped structure -- the least modification form. The reservoir lumen runs through the whole length of the aedeagus and ends at its apex, the gonopore. It substitutes the position of the ejaculatory duct. Ejaculatory duct connects reservoir lumen at middle of the aedeagus below the the reservoir lumen.

3. In *Eumenotes obscura* Westwood (Dinidoridae) (Diag.3), the median plate has born within reservoir lumen. It separates reservoir lumen into dorsoapical lumen and ventrobasal lumen. The reservoir lumen of Scutelleridae, Tessaratomidae and Cydninae are this evolutionary step.

4. In *Macroschytus* sp. (Cydninae) (Diag.4), the aedeagus falls to lower side of the reservoir lumen. This is the amazing diversity. This judgment based on inferring from Dinidoridae, Scutelleridae and Tessaratomidae. They are close relative. Present in Cydninae.

Holding plate is the plate-form evagination of the phallobasal conjunctiva below basoventral porion of the aedeagus.

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Diag.1. Hemiptera except Pentatomomorpha
Diag.2. *Coridiellus figlinus* (Distant) (Dinidoridae)
Diag.3. *Eumenotes obscura* Westwood (Dinidoridae)
Diag.4. *Macroschytus* sp. (Cydinidae, Cydninae)
References


三種土蜆亞科雄性外性器

楊仲圖 1)

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摘要：繪圖並敘述現有種類 Macroschytus sp., Geotomus sp. 與 Adrisa sp. 之雄性外性器。此三種土蜆亞科雄性外性器顯著異於其他蜂次目者為其貯精囊管通過陽莖腔之外。

關鍵詞：土蜆亞科、雄性外性器、形態學

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