

A Redescription of the Myrocheine Genus *Arniscus* Distant (Hemiptera: Pentatomidae: Pentatominae) on the Basis of the Male and Female Genital Structures and Their Bearing on the Phylogenetic Relationships*

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Abstract.- *Arniscus humeralis* (Dallas) is redescribed with special reference to the male and female genitalia including the pygophore, paramere and inflated aedeagus and components of female genital plates which clearly go hand in hand not only with other Myrocheine genera *i.e.*, *Laprius* Stål and *Dorpius* Distant but also with the western Australian genus *Tholosanus* Distant. The two genera were placed in the same generic group *i.e.*, *Tholosanus* group Gross and appear very close to the western Australian genera of *Dictyotus* group Gross.

Keyword: Heteroptera, Pentatominae, Myrocheini, *Arniscus*, Genitalia, Phylogeny.

INTRODUCTION

Distant (1899) described the genus *Arniscus* to accommodate the species *Sciocoris humeralis* Dallas (1855), which became the type species by monotypy, followed by Bergroth (1908), Kirkaldy (1909), Gross (1975) and Cassis and Gross (2002). Gross (1975) placed *Arniscus* Distant in his *Tholosanus* group with *Tholosanus* Distant as its type genus and noted that on examination of *Laprius* Stål and *Dorpius* Distant it appeared that the latter genera strikingly resembled four Australian genera, *Utheria* Gross, *Tholosanus* Distant, *Dictyotus* Dallas and *Paradictyotus* Gross, but commented that availability of more examples of each should help to resolve the bounds of the *Dictyotus* Dallas, *Tholosanus* and *Dorpius* groupings.

The male and female genitalia including the pygophore, paramere and inflated aedeagus and components of female genital plates of *A. humeralis* (Dallas) appear to resemble not only with those of other Myrocheine genera as noted above but also with the western Australian genera *i.e.*, *Tholosanus*, *Utheria*, *Dictyotus* and *Paradictyotus*

as these go hand in hand in external morphological characters according to Gross (1975) and those of metathracic scent auricles as per results of Ahmad and Kamaluddin (1986), Ahmad and Afzal (1989) and Ahmad *et al.* (1996). On this basis the phylogenetic relationships of *Arniscus* is also briefly discussed specially in the light of characters of genitalia within Myrocheini of Oriental, Australian, eastern Palaearctic and Ethiopian regions.

MATERIALS AND METHODS

The aedeagus was inflated and the female genital plates were studied using the technique of Ahmad (1986), Ahmad and Afzal (1989) and Ahmad and McPherson (1990).

For the study of male genitalia the pygophore was removed in 10% KOH solution and was warmed on a bench lamp for 15 minutes. It was then washed with the tap water and was dissected and inflated under Leitz binocular microscope in the same medium. The examination of various structures and their diagrams were made placing these on cotton threads immersed under glycerine with the help of eyepiece graticule. The male genital parts were preserved in a microvial with a drop of glycerine, pinned with the specimen. For female genitalia the abdomen was removed from the base and was warmed in 10% KOH on a bench lamp for about 10 minutes after the diagram of the

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terminalia was made. The Spermatheca was dissected and after washing the abdomen thoroughly with water and examined in glycerine. The abdomen later was soaked with filter paper and glued with the specimen. The spermatheca was preserved in a microvial with a drop of glycerine, pinned with the specimen after its illustration was completed. The species of *Tholosanus* and of *Dictyotus* were examined by the second author at Natural History Museum London by the courtesy of Mr. Mick Webb In charge Hemiptera section of that Museum during his visit in 2005. However the diagrams of genitalia presently used were modified from Gross (1975).

RESULTS

Arniscus humeralis (Dallas) (Figs. 1 and 2)

Sciocoris humeralis Dallas 1851: 135; Dohrn, 1859: 10; Walker, 1867:178; Stål, 1876:128; Lethierry and Severin, 1893: 108.

Arniscus humeralis: Distant, 1899: 435; Bergroth, 1908:160; Kirkaldy, 1909: 44; Gross, 1975: 218; Cassis and Gross, 2002: 511.

Colouration and general shape

Body (Fig. 1A) brownish with thick brown punctures; eyes brownish; ocelli pinkish; membrane light brown with simple venation; ovate.

Head

Slightly broader than long; anteocular distance longer than remainder of head; paraclypei broad and longer than clypeus and enclosing the later, lateral margins straight, paraclypeal lobe slightly rounded in front of eyes, apex of paraclypei truncated; antennae with basal segment much shorter than head apex, second segment longer than third but shorter than fourth, fifth longest, length of antennal segments I 0.5, II 1.0, III 0.9 (0.9-1.02), IV 1.3 (1.3-1.4), V, 1.4, antennal formula $I < 2 < 3 < 4 < 5$; labium just touching hind coxae, second labial segment longest, third and fourth equal, length of labial segments I 1.1, II 1.2, III 1.0, IV 1.0; labial formula, $3=4 < 1 < 2$; anteocular distance 1.2, remainder of head 0.8; width of head 2.1; interocular distance 1.4; interocellar distance 0.8.



Fig. 1. *A. humeralis* (Dallas). A, entire body, dorsal view; B, metathoracic scent gland ostiole, ventral view; C, pygophore, dorsal view; D, inflated aedeagus, lateral view; E, inflated aedeagus, ventral view; F, paramere, inner view; G, female terminalia, ventral view.

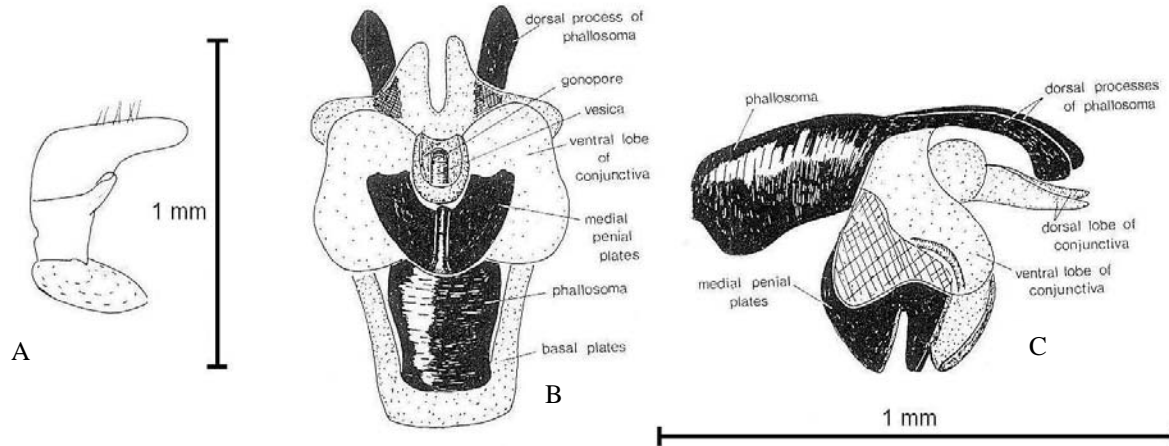


Fig. 2. *A. humeralis* (Dallas) (modified from Gross, 1975). A, paramere, inner view; B, inflated aedeagus, ventral view; C, inflated aedeagus, lateral view.

Thorax

Pronotum more than 2.5 x broader than its length, anterior margin slightly broader than head width across eyes, anterior angles toothed, humeral angles anteriorly broad, anterolateral margin weakly concave, posterolateral margins sinuate, length of pronotum 2.2, width 5.8; scutellum with long apical lobe, apex rounded, length of scutellum 3.5, width 3.1; metathoracic scent gland ostiole (Fig. 1B) very poorly developed with small peritreme; base scutellum-apex clavus 2.5; apex clavus-apex corium 1.5; apex corium-apex abdomen including membrane 1.8; apex scutellum-apex abdomen including membrane 2.5; total length 10.2.

Male genitalia

Pygophore (Fig. 1C) quadrangular, slightly wider than long, parallel sided, lateral margins more or less straight, dorsal margin medially shallowly concave with round convex lobes on either side, dorsolateral lobes conical, ventrolateral margins apically truncated, medially deeply concave; Paramere (Fig. 1D) more or less C-shaped, inner process of the stem finger-like, inwardly curved towards inner basal part of blade, apex curved pointed, stem short, stout more or less quadrangular, blade broad and long, outer margin round, apical margin truncate, apex round, thumb-like, latero-

inner margin slightly concave; Inflated aedeagus (Fig. 1E,F) with pair of remarkably elongate curved prong-like strongly sclerotized appendages with apex dumb-bell-like, laterally truncate, two pairs of membranous conjunctival lobes, medially deeply bifid, basolateral portions rounded, ventral lobes medially shallowly concave with each lateral lobe broadly rounded, medial penial plates basally strongly sclerotized, apically lunate, vesica shorter than penial plates.

Female genitalia

Posterior margins (Fig. 1G) of 7th abdominal sternum deeply concave in the middle, sides sub straight, first gonocoxae with posterior margins laterally rounded, convex, medially slightly concave, inner margins straight, almost meeting each other, second gonocoxae rectangular, apical margin truncate, curving inwardly, outer margin straight, inner margin sub straight, 9th paratergites reaching slightly beyond fused posterior margins of 8th paratergites, apex broadly rounded, outer margin straight, inner margins sub straight; eighth paratergites with posterior margins laterally convex and curved, medially sub straight, proctiger quadrangular, parallel sided, posterior margin weakly concave.

Tholosanus proximus (Dallas)
(Fig. 3)

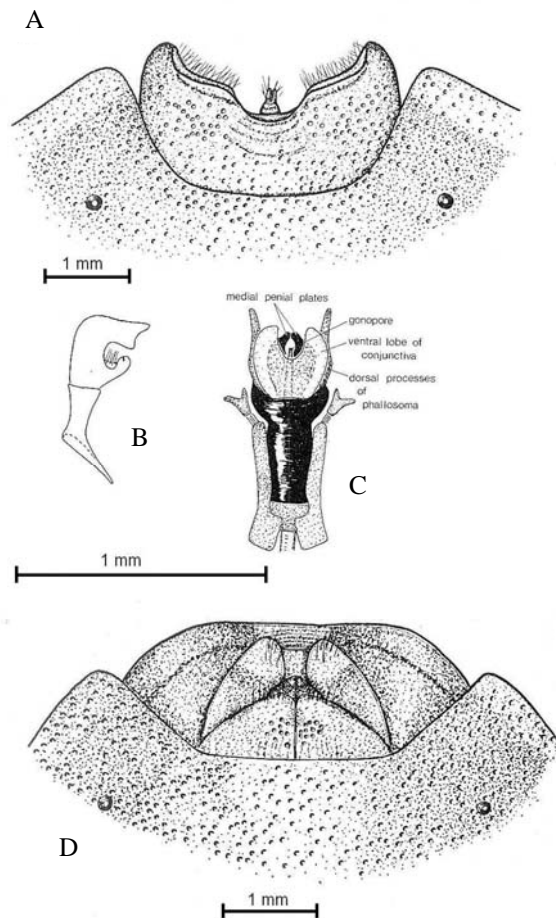


Fig. 3. *Tholosanus proximus* (Dallas) (modified from Gross 1975). A, pygophore, ventral view; B, paramere, inner view; C, inflated aedeagus, ventral view; D, female terminalia, ventral view.

Male genitalia

Pygophore rounded, much broader than long, lateral margins rounded, dorsal margins medially deeply concave, cup-like, shallowly concave laterally, dorsolateral lobes weakly pointed, ventrolateral margins apically slightly concave, medially deeply excavated; Paramere more or less F-shaped, inner process of the stem thumb-like, inwardly curved towards apex of blade, apically rounded, stem straight, elongated proximally, blade transverse, broad and short, outer margin hump-

shaped, apical margin slightly concave, apex bilobed convex, outer lobe slightly more projected, latero inner margin distinctly concave; Inflated aedeagus with pair of remarkably elongate medially curved, slim, sclerotized appendages with apex conical, two pairs of membranous conjunctival lobes, dorsal lobes rounded, ventral lobes medially fused, medially deeply excavated, lateral margins rounded, apex slightly pointed, medial penial plates strongly sclerotized, apically meeting with pointed apices, vesica distinctly shorter than penial plates.

Female genitalia

Posterior margins of 7th abdominal sternum medially truncated, sides sub straight, first gonocoxae with posterior margins convex, outer margin markedly convex medially, inner margins meeting each other; second gonocoxae with posterior margin markedly convex, 9th paratergites distinctly shorter than fused posterior margin of 8th paratergites, apex broadly rounded, outer margin markedly convex, inner margin slightly rounded; eighth paratergites with posterior margins laterally distinctly convex and curved, medially lightly concave or sub straight; proctiger rectangular, parallel sided, posterior margin sub straight.

Dictyotus caenosus (Westwood)
(Fig. 4)

Male genitalia

Pygophore rounded, much broader than long, lateral margins rounded, dorsal margin broadly and uniformly concave, dorsolateral lobes rounded, ventrolateral margins slightly convex, medially slightly or weakly concave, in dried specimen within 7th sternum appearing broadly v-shaped in the middle; Paramere more or less L-shaped, stem almost as broad as blade, erect, more or less rectangular without inner process distally, blade transverse broad and of moderately sized, apex round and slightly directed upward, outer margin of blade medially hump shaped apical margin sub straight, inner margin apically markedly convex following a depression appearing basally sinuate; Inflated aedeagus without elongate, curved appendages but apically adjacent to base of apical lobes knob-like sclerotized processes present, apical

conjunctival lobe single, markedly broad basally and rounded lobe-like at apex, a pair of basal membranous ventral conjunctival appendages, basally broad and apically lobe-like, penial plates much shorter than vesica.

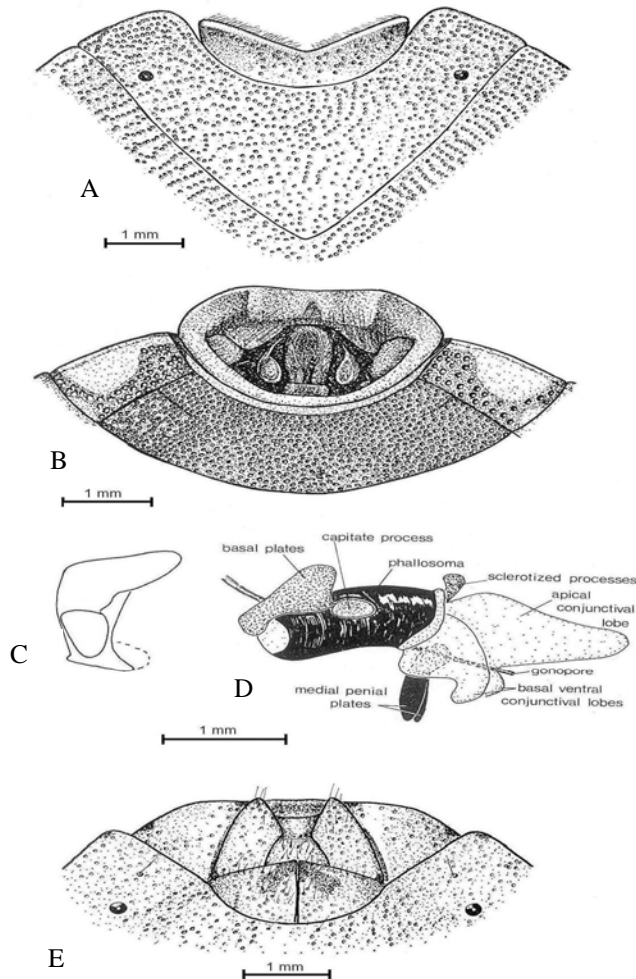


Fig. 4. *Dictyotus caenosus* (Westwood) (modified from Gross 1975) A, pygophore, ventral view; B, pygophore, dorsal view; C, paramere, inner view; D, inflated aedeagus, lateral view; E, female terminalia, ventral view.

Female genitalia

Posterior margin of 7th abdominal sternum deeply concave in the middle, sides sub straight; first gonocoxae with posterior margin sub-straight, medially convex, inner margin straight adjacent to each other; second gonocoxae almost rectangular,

anterior margin convex, posterior margin straight; 9th paratergites slightly reaching beyond fused posterior margins of 8th paratergites, apex conically produced, outer margin weakly convex, inner margin basally concave, distally straight; eighth paratergites with posterior margins convex at sides, medially weakly so; proctiger with posterior margin straight.

DISCUSSION

The species of *A. humeralis* and *T. proximus* were placed in *Tholosanus* group by Gross (1975) nearer to the group of western Australian genera of the *Dictyotus* group. These species according to Gross (1975) appeared related to *Laprius* and *Dorpius* of the tribe Myrochieni but he suggested that male and female genitalia of all these genera should be examined to determine their true relationships. In the male genitalia the lateral lobes of all genera possess sub prominent lateral lobes without inner process, theca and conjunctiva with sclerotized and membranous appendages in the inflated aedeagus and in female genitalia the posterior margin of the first gonocoxae are markedly concave. These characters go hand in hand with second antennal segment longer than third, forefemora spinose and metathoracic scent auricle reduced. Indeed the species of the two western Australian genera *Arniscus* and *Tholosanus* appear remarkably close to each other playing sister group relationship with much elongated prong like highly sclerotized thecal appendages, pair of broad membranous bilobed dorsal and ventral conjunctival appendages basally markedly broad and penial plates longer than vesica. Paramere "C" or "F" shaped with inner processes at distal part of stem, blade transverse apically, rounded or bilobed. On the other hand, species of *Dictyotus* group do not appear to have sclerotized prong like thecal appendages, dorsal conjunctival appendage is single not paired and penial plates much shorter than vesica. In female genitalia first gonocoxae with inner margin straight adjacent to each other.

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