

Research Article

Systematic studies of *Canthecona furcellata* (Wolf 1851) (Hemiptera: Pentatomidae: Asopinae) from Khairpur, Sindh, Pakistan

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Abstract

During Pentatomid bugs studies of *Canthecona furcellata* (Wolf 1851) was collected from the Sobhodero, Gambat, Faizgang Taluka of district Khairpur is a predator of various larva of Lepidoptera, Coleoptera and Hymenoptera of pests, the taxonomical features of current specimens differ from the body measurements coloration, male, female genitalial structures pygophore, aedeagus, parameres, different taxonomical characteristics, dorsolateral lobe of pygophore, narrow, short stem of paramere, female genitalial features^{1st} gonocoxae triangular in , 9th para tergites elongates, spermathecal bulb elliptical, this species is a new recorded from the district Khairpur.

Keywords: Asopinae; Genitalia; Khairpur; Morphology; New record

Introduction

Asopinae predatory stink bugs belong to order Hemiptera, they are feed on the different larva of Coleoptera, Hymenoptera and Lepidoptera and larva pest on different crops, their role as important biological pest control agents has been manipulated in the field, (Schuh and Slater 1995) they have 300 species, 60 genera they are differs from other Pentatomid within subfamilies mainly having a predaceous feeding habits, they are scattered at worldwide [1-9]. The genus *Canthecona* was belong to subfamily

Asopinae commonly called predatory stink bugs, contains the new species first reported from Pakistan along with male, female genitalia, scent gland, the *Canthecona furcellata* (Wolff 1851) is insect-pest species , organization is depend on ecological principles, integration, formation and control on different elements of action of an management system of insect-pest, due to protect the chemical toxicity arising out by the use of insecticides, examined and achieve the benefits from these natural enemies for the control of pest species, identification on

the basis of body coloration, mouthparts, antennae, labium and male, female genitalia, the current thoughts of insect-pest controlling is based on environmental ethics and included the incorporation and combinations of various mechanisms, resistors strategies into an insect-pest management system.

In opinion of chemical threats rising out of indiscriminate use of insecticides, examinations and manipulation of natural enemies for the resistor of recognized important pest becomes essential. Many biotic agents control the population [10-12]. The *Canthecona furcellata* (Wolff 1851) reported from the Karachi in Sindh, Khyber Pukhtainkhuwa, Baluchistan, Islamabad, Changmanga, Rawalpindi in Punjab, Hazara in Peshawar, Balakot in KPK, Sylhet in East Bengal Burma, Bahamas, Java, Ceylon and various parts of Indo-Pak, the genus [13-16]. *Canthecona furcellata* described by (Wolff, 1851), predators on various larva of Lepidoptera, Hymenoptera and Coleoptera, present here we have revised this species first time recorded from the Khairpur District and its adjoining areas Sind Pakistan, the explanation of this species is based not only the morphological characteristics but we too explained the illustrate the male and female genitalia.

Materials and Methods

The samples were together from the various location of the district Khairpur, (from March 2014 to October 2016), kept in bottles, paralyses with chloroform, then preserved in timber boxes, naphthalene balls be used for protection [17]. The abdomen of male specimens was dipped into warm water for about (2 to 3 minutes) after that male genitalia (pygophore) remove from the abdomen with the help of fine tapered forceps. The internal structures of male (pygophore) was heated in 10% KOH for 25-30 minutes After remove (KOH) with tap water, the parameres (clasper) and aedeagus

were extracts from pygophore and out the aedeagus were inflated with the support of pointed forceps below the dissecting microscope was reported [18]. Observing the structures of female, the stuck female sample were dipped into warm water for (2 to 3 minutes), the abdomen was extract and boiled in 10% KOH for 15 minutes, and the spermatheca was visibly by partially extract the tergite as explained [19]. Whole measurements occurred through the millimeters. The measurements of different body portions were taken with the help of an ocular micro, Images were traced with turning pointer upon butter paper beneath the dissecting microscope [19] at Shah Abdul Latif University Khairpur.

Results

Number of specimen collected: 493

Number of specimen recognized: 178

Area: District Khairpur, Sindh, Pakistan

Family: Pentatomidae

Subfamily: Asopinae

Tribe: Asopini

Genus: Canthecona Amyot et Serville

Species: *Canthecona furcellata* (Wolff 1851) (Table 1 & Fig. 1)

Body coloration

Body grey, light brown body covered with minor punctuation present, without head, a black in color, head covered with yellowish lines, color of eyes black, pink ocelli, humeral angle black yellowish to brown, segments of antennae 5th, 4th and 3rd brown, densely brown pronotum, scutellum intermediate between black and white, ventral margins of body, legs color grey, deeply brown wings, tibia dark brown and femora light brown.

Head

Head length (1.2mm), width (1.8mm), broader than longer, paraclypeus tip circular, tapered, elongated than clypeus, antennae 3rd section elongated than 2nd section, 1st section measurements is (0.3mm), 2nd section measurements (1.33mm), 3rd section

measurements (1.35mm), 4th section measurements (1.5mm), 5th section measurements (1.4mm), antennal formula (1 < 2 < 3 < 5 < 4), rostrum measurement 1st section (1mm), 2nd section (1.4mm), 3rd section (1.3mm), 4th section (9mm), labial formula (3 < 2 < 1 = 4), rostrum reached to hind coxae, measurements between the anterior anteocular (7mm), posterior anteocular (.2mm) and interocular measurements (9mm).

Thorax

Frontal angles pointed and have bifid spine, pronotum length (1.3mm) and width (4mm), scutellum length (2.2mm), width (1.8mm), base pointed and broader at the anterior region

Abdomen

In female specimens have a 7th abdominal section of Ventroposterior margins of sternum broad, concave, but in male specimen usually have a convex, total body length (9.4mm).

Female genitalia

Conical first gonocoxae, innermost sides parallel, external sides of posterior sides usually have a convex, 9th lengthened paratergites reaching upto posterior sides of 8th paratergites, 2nd gonocoxae fused with posterior sides, Spermathecal bulb have a lengthened oval in shape, middle dilation triangular in shape.

Male genitalia

Aedeagus broader than longer, Pygophore of dorsolateral lobe distinctly thin, broader, median sides of dorsoposterior convex, dorsolateral sides are usually in concave in shape, small stem of paramere, blade broader anterior region concave and posterior region convex, base bigonal, thin, conical at tip, two

section of conjunctival appendages, and a have a pair pouch like structures, dorso median broader inward.

Discussion

Genus *Canthecona* Amyot et Serville commonly known as predatory stink bugs found in Pakistan, Bengal, India, Burma, Java, Bhamo, the predatory found in March to September month of the year, morphological characteristics was given by Ahmad and McPherson [20]. There is no recently work available on the morphology and male, female genitalia, here we described the species on the basis of morphology and genitalia features body grey, brown pale body covered with minute deeply punctuations present, without head, a black in color, head covered with yellowish lines, color of eyes black, humeral angles of pronotum tapered tip bifid spine, the length of pronotum shorter than width, the length of pronotum, Conical first gonocoxae, innermost sides parallel, external sides of posterior sides usually have a convex, 9th lengthened paratergites reaching upto posterior sides of 8th paratergites, 2nd gonocoxae fused with posterior sides, Spermathecal bulb have a lengthened oval in shape, middle dilation triangular in shape, Aedeagus broader than longer, Pygophore of dorsolateral lobe distinctly thin, broader, median sides of dorsoposterior convex, dorsolateral sides are usually in concave in shape, small stem of paramere, blade broad at anterior region concave. *Canthecona furcellata* (Wolff 1851) first time collected from the various localities of district of Khairpur. So therefore it is a new record of this species in Khairpur district in province of Sind Pakistan.

Table 1. Showing a comparative morphological measurement and features of *Canthecona furcellata* (Wolf 1851)

Body parts	Current species	<i>C. neotibialis</i> (1985) 15.7 +15.6 (mm)	<i>C. parva</i> (1978) 11.8 + 12.1 (mm)	<i>C. populusai</i> (1985) 10.1+12.1(mm)	<i>C. binotata</i> (1978) 15 +11.7(mm)	<i>C. ornatula</i> (1909) 14+15(mm)	<i>C. robuata</i> 11+14(mm)
Coloration and body size	Grey to pale brown and elongated, slightly broaded	Body dark brown and elongated size	Dark ochraceous	Lacteous to redish brown	Brown to blackish	Green, metallic	Lacteous to brown
Head	paraclypeus round, narrow longer than clypeus	paraclypeus convex, wide than clypeus	Lengthened , wider paraclypei flat, clypeus shorter	Lengthened as well as wided paraclypei narrow	Head covered with punctured	Convex, elongated, width between the outer sides of eyes	Concave lengthened
Antennae(mm)	lengthened I=0.3, ii=1.33, iii=1.35, iv=1.5, v=1.4.	Lengthened I=0.4,ii=1.2,iii=1.36,i v=1.6,v=1.5	Mutilated I=0.3,ii=1.3,iii=1.3,iv=1.6,v=damag ed	Elongated I=0.3,ii=1.1,iii=1.1,iv =1.3,v=1.1	lengthened I=0.2,ii=1.3,iii=1.4, iv=1.6,v=0.4	3 rd , 4 th sectionsreaced to half of eyes,5 th mutilated	Lengthened I=0.3,ii=0.12,iii =0.3,iv=1,v=0.1
Antennal formula	1<2<3<5<4	1<2<4<35<1	2<1<4,ii=iii	1<2=3<5<4	Ii=ii, iv<v<i	3=4, 2=4	1=3, 2<5,
Labium(mm)	I=1,ii=1.4,iii=1.3, iv=9	I=0.4,ii=1.8,iii=1.6,iv =1.3	I=1.1,ii=1.3,iii=1.1,iv=0.9	I=0.9,ii=1.2,iii=1.0,iv =0.9	I=0.3,ii=1.5,iii=1.1, iv=1	4 sectioned	Mutilated
Labial formula	3<2<1=4	4<1<3<2	4<3,1<2	1=4<3<2	2<3<4<1	Not	Not
Thorax	flat	Wide	Deflected	Broaded	wider	Wider than longer	Broaded
Pronotum (mm)	Wider than longer and prontal angles pointed	Distinctly wider than longer	Broader, prontal angles slightly tapered	Broader than longer, acute tubercles	Wide, flat, sinuate	Longer than wider, fully punctate	Anterior narrow, broaded at posterior
Length	1.3	2.6	2.8	2.6	2.4	1.6	1.2
Width	4	6.6	7.3	6.7	5.4	4	4
Scutellum	Anterior margins wider than posterior tip round	Anterior margins slightly broader tip slightly pointed	Longer than wider	Slightly longer than wider at base, apical lobe circular	Wider, prontal angles obscures, thick, with black spine	Covered with finely punctuation	With orange to yellow spot at basal angle
Length	2.2	4.0	4.3	3.9	4.2	2.9	11
Width	1.8	3.3	3.4	3.3	3.1	2.5	9
Abdomen	Convex in male& concave in female	Ventrolateral sides narrow	Ventrolateral margins minutely narrow	Elytra narrow, lateral margins thick	Margins with green punctures	Slightly convex	Narrow at anterior, broaded at posterior
Male genitalia Pygophore	Wider than longer	Narrow, concave, lobe like	Dorsolateral lobe prominent, widely, concave	lobes narrow circular, concave,	Dorsolateral lobe prominent, widely, concave	Broader than longer	Wider than longer

Aedeagus	Wide , convex	Trunk like lengthened		Lengthened , base convex, tip concave	elongated	Inflated aedeagus	Anterior margins are wider
Paramere	Sickle shaped	Stem short, blade wide	Short, stem ,blade wide, tip narrow	With small stem ,blade lengthened	Blade long	Slightly rounded	Slightly tapered
Female genitalia	9 th paratergies elongates & Spermathecal bulb elliptical	1 st gonocoxae concial, spermathecal bulb narrow	1 st gonocoxae triangular, 9 th paratergies lengthened	1 st gonocoxae concial, inner sides sinuate, posterior convex	1 st gonocoxae triangular, 9 th paratergies lengthened	1 st gonocoxae wider at base rounded at tip	9 th paratergies slightly concial
Host	Grass, herbs, shrubs	<i>Dalbergia sissoo</i>	<i>Uthesia pulchela</i>	<i>Populous nigra</i>	Naga hills	Himalayan foot hills	<i>Dalbergia sissoo</i>
Locality	Sobhodero (Khairpur)	Islamabad, Punjab	Bangladesh	Punjab	India	India	Ratnadhvajpal

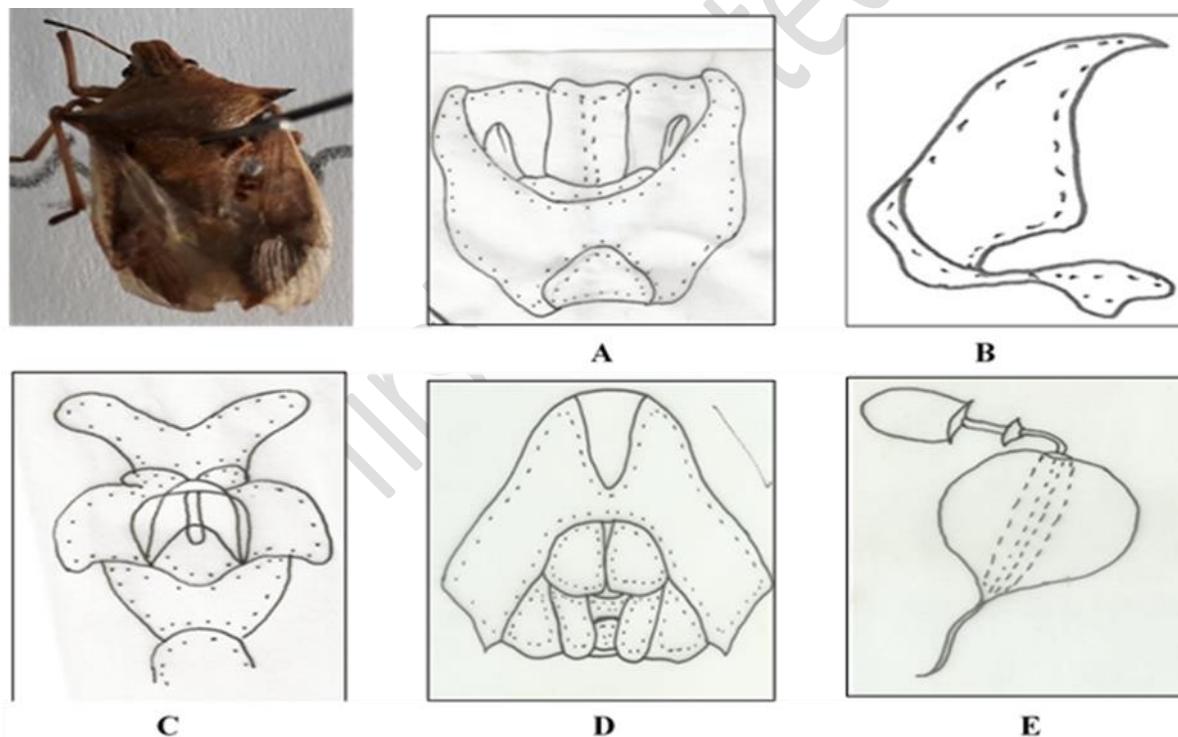


Figure 1. (A-E); A; Pygophore 2mm B. Aedeagus: 3mm C.Paramare: 2mm D. Terminalia 4mm E. Spermatheca : 2mm

Conclusion

Genus *Canthecona* Amyot et Serville first time reported from the district Khairpur Sind Pakistan from the larva lepidopterous, Hymenoptera on grass, herbs and shrubs

Authors' contributions

Conceived and designed the experiments: S Mangi & WA Panhwar, Performed the experiments: S Mangi, Analyzed the data: AM Shaikh & M Shah, Contributed materials/ analysis/ tools: S Mangi & W Khan, Wrote the paper: S Mangi & WA Panhwar,

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References.

- De Clercq (2008). Predatory Stink Bugs (Hemiptera: Pentatomidae, Asopinae). In: Capinera JL (ed) Encyclopedia of insects, 2nd Ed. Kluwer Acad Publ Dordrecht 30: 42–3045.
- De Clercq (2000). Predaceous stinkbugs (Pentatomidae: Asopinae), In: Schaefer C.W., Panizzi A.R., (Eds.), Heteroptera of Economic Importance, CRC Press, Boca Raton, London New York Washington D.C.
- Rolston LH, McDonald FJD & Thomas DB (1980). A conspectus of Pentatomini genera of the Western Hemisphere. Part I (Hemiptera: Pentatomidae). *Jour N Y Entomol Soc* 88: 120–132.
- Rolston LH (1981). Ochlerini, a new tribe in Discocephalinae (Hemiptera: Pentatomidae). *Jour N Y Entomol Soc* 89: 40–42
- Rolston LH (1984). A revision of the genus *Priapismus* Distant (Hemiptera: Pentatomidae). *Jour Kansas Entomol Soc.* (87):119–126.
- Thomas DB (1992). Taxonomic synopsis of the Asopinae Pentatomidae (Heteroptera) of the Western Hemisphere, Monographs 16. The Thomas Say Foundation, ESA, Lanham, pp. 1–156.
- Ahmad I & McPherson JE (1982). Additional information on male and female genitalia of *Parabrachymena lariviere* and *Brochymena* Amyot and serville (Hemiptera: Pentatomidae) *Ann Entomol Soc Am* 91(6): 800-807.
- Ganguli J, Chandrakar S & Puri C (2000). *Canthecona furcellata* a predatory bug on caterpillars of *Clostera* sp. *Insect Environ* 6(2): 79-80.
- Ray SN, Khan, MA & Tiwari S (2002). Role of egg parasitoids in the natural control of *Clostera fulgurita* Walker, a serious pest of poplar. *Indi Jour of Ecol* 29(1): 90-92.
- Sangha KS & Sohi AS (2008). Prospective biological control agents for regulation of population of *Clostera fulgurita* (Walker) on poplar in Punjab. *Indi. Jour of Fores* 31(1): 95-98.
- Ganguli J, Chandrakar S & Puri C (2000). *Canthecona furcellata* a predatory bug on caterpillars of *Clostera* sp. *Insect Environ* 6(2): 79-80.
- Ray SN, Khan, MA & Tiwari S (2002). Role of egg parasitoids in the natural control of *Clostera fulgurita* Walker, a serious pest of poplar. *Indi Jour of Ecol* 29(1): 90-92.
- Sangha KS & Sohi AS (2008). Prospective biological control agents for regulation of population of *Clostera fulgurita* (Walker) on poplar in Punjab. *Indi. Jour of Fores* 31(1): 95-98.
- McPherson JE (1982). The Pentatomidae (Hemiptera) of Northeastern North America. Southern Illinois University Press, Illinois 240.
- Schaefer CW (1968). The homologies of the female genitalia in the Pentatomidae (Hemiptera: Heteroptera) *J ANYE Ento Soc* 76(2): 87-91.
- Afzal & Ahmad I (1981). A new genus and three new species of Halyini Stal

- ((Heteroptera: Pentatomidae: Pentatominae). *Pak J Zool* 3(1&2): 63-71.
17. Ahmad I & Nazeer R (1988). A revision of the genus *Canthecona* Amyot et serville (Hemiptera, Pentatomidae, Pentatominae, Asopini) from Indo Pak subcontinent. *Proc Pak Congr Zool* (8): 147-153.
 18. Ahmad I (1986). A fool proof technique for inflation of male genitalia in Hemiptera (Insecta) Heteroptera. *Pak J Entomol Kar* 1(2): 111-112.
 19. Schuh RT & Slater JA (1995). True Bugs of the World (Hemiptera: Heteroptera). Classification and Natural History. Cornell University Press, Ithaca, New York. xii + pp. 336.
 20. Ahmad I & McPherson JE (1982). Additional information on male and female genitalia of *Parabrachymena lariviere* and *Brochymena* Amyot and Serville (Hemiptera: Pentatomidae). *Ann Entomol Soc Am* 91(6): 800-807.

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