

Notes on Species of Cardiophorinae (Candèze, 1860) From Pakistan with Description of a New Species (Coleoptera: Elateridae) and New Records

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Abstract.- A new species of genus *Cardiophorus* Eschscholtz is described from Punjab, Pakistan with special reference to its male and female genitalia. The present new species is compared to its closest allied species. A key to all the species of genus *Cardiophorus* Eschscholtz from Pakistan is formulated and the relationship of the present new species is also briefly discussed. Notes on other species of Cardiophorinae are given and new country records for Pakistan are provided.

Key words: Coleoptera, Elateridae, Cardiophorinae, *Cardiophorus*.

INTRODUCTION

Cardiophorinae Candèze (1860) is a cosmopolitan subfamily of the family Elateridae Leach (1815). It includes 38 genera harboring 1100 species from throughout the World. This subfamily includes two tribes, Cardiophorini Candèze (1860) and Nyctorini Gurjeva (1966), of which Nyctorini consists of a monotypic genus.

Candèze (1891) described this group as tribe Cardiophorites comprising seven genera. Schwarz (1906) also treated Cardiophorinae as a tribe. Fleutiaux (1941) raised it to subfamily. Stibick (1979) and Vats and Chauhan (1991) also treated it as subfamily. Cate (2007) listed 11 Genera from Palaearctic region including six subgenera with 676 species. Fleutiaux (1947) described 23 species from Indo-Chinese region. Platia and Gudenzi (2003) divided 9 species of the genus *Dicronychus* Brullé of Greece in two groups, the first group with parameres apex more or less conspicuously toothed, the second group (two species) with apex of parameres simple and more or less pointed. Platia and Gudenzi (2004) added nine new species in the genus *Dicronychus* Brullé to the Palearctic fauna. Vats (1984) described two new species of genus

Dicronychus Brullé, while Vats and Chauhan (1991) described 18 species of genus *Cardiophorus* Eschscholtz including 14 new species from North India. Cate *et al.* (2002) listed species of the tribe Cardiophorini with seven new species in three Genera from Iran. Chakraborty and Chakrabarti (2006) redescribed five species and one new species within the genus *Cardiophorus* Eschscholtz from Bengal.

Fleutiaux (1931) described two species in subgenus *Platynychus* s.str and 22 species in subgenus *Paraplatynychus* in Indo-Chinese fauna. Most of these species were later transferred to other genera. Kishi (1987) listed nine species including subspecies from Japan.

A new species of *Cardiophorus* Eschscholtz from Kalar Khar, Punjab, Pakistan is described in this paper with a special reference to its male and female genitalia. The new taxon is compared to its most closely related species. A key to the three species of *Cardiophorus* Eschscholtz presently known from Pakistan including the present new species is given and in this light the relationships of the present new species within the genus *Cardiophorus* are also briefly discussed.

MATERIALS AND METHODS

Body Measurements

The measurements and illustrations were made by using an ocular grid microscope.

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Body length is measured along the midline from the anterior margin of the frons to the apex of the elytra; the width is measured across the broadest part of the entire beetle.

Pronotal measurements

The pronotal length is measured along the midline; the width at the broadest part which is most usually located at the hind angles.

Preservation

For the study of male genitalia, the abdomen was excised at the base and boiled in 10 % KOH solution for about 10 minutes. It was then washed in tap water. The aedeagus was dissected out and examined under glycerin. After studying, the male genitalia were placed in microvials with a drop of glycerin and attached with the respective specimens for Natural History Museum, University of Karachi.

Abbreviations

The names of institutions, museums and collections containing study material are abbreviated as follows: CAP, Akhter collection. Department of Zoology, University of Karachi, Pakistan; NHMUK, Natural History Museum, University of Karachi, Karachi, Pakistan.

RESULTS

Genus *CARDIOPHORUS* Eschscholtz, 1829

Cardiophorus Eschscholtz, 1829:34; Candèze, 1891: 125; Schwarz, 1906: 162; Hyslop, 1921: 633; Vats and Chauhan, 1991: 11; Cate *et al.*, 2002: 60.

Caloderus Stephens, 1830: 269; Castelnau, 1840: 249.

Dicronychus Brulle, 1832:138.

Drasterius and *Dolopius* Falderman, 1835: 172-177.

Platynychus Motschulsky, 1858: 59.

Gauroderus Thomson, 1859: 104.

Type species

Elater gramineus Scopoli, 1763

Diagnosis

Head capsule usually wider than long, oval,

depressed, frons ridged between and above antennae; mouth parts inferior; prosternum variable; pronotum usually wider than long occasionally as wide as long, convex, prosternal process short, truncate; mesepisternum and mesepimeron cut off from mesocoxal cavity by meso- and metasternum, mesepimeron reduced in size; scutellum cordate; tarsi, simple; claws, simple, dentate or undentate.

KEY TO THE SPECIES OF *CARDIOPHORUS* FROM PAKISTAN

1. Elytra without patches 2
- Elytra with four broad patches
..... *Cardiophorus quadrillum* Candèze
2. Aedeagus with median lobe, narrower, apically long apex, parameres contact to median lobe, basal plate rounded, median strut slightly passes in the cavity, female genitalia with bursa copulatrix leaf-like with several denticles, tubercles on surface
..... *Cardiophorus varius* Cate *et al.*
- Aedeagus with median lobe, broadened up to apex, parameres distinctly isolated from median lobe, median strut reaches up to base of basal plate, female genitalia with bursa copulatrix sickle-like with four external denticles, without tubercles on surface
..... *Cardiophorus kaharensis*, new species

1. *Cardiophorus kaharensis*, new species (Fig. 1A)

Type locality

Pakistan; Kalar Kahar, Punjab Province.

Coloration

Head, pronotum, scutellum and elytra piceous brown, legs and antennae castaneous brown, garishly recumbent pubescence.

Head

Moderately lobate, clypeus margin slightly excised in the middle, transverse laterally, frons almost flattened with deep punctation, dense recumbent long pubescence; antennae extending to the base of pronotum, basal segment broad and robust, 1st segment small but cylindrical.

Thorax

Slightly broader than long, sides entire, subrounded, hind angles broadly acute, disc slightly

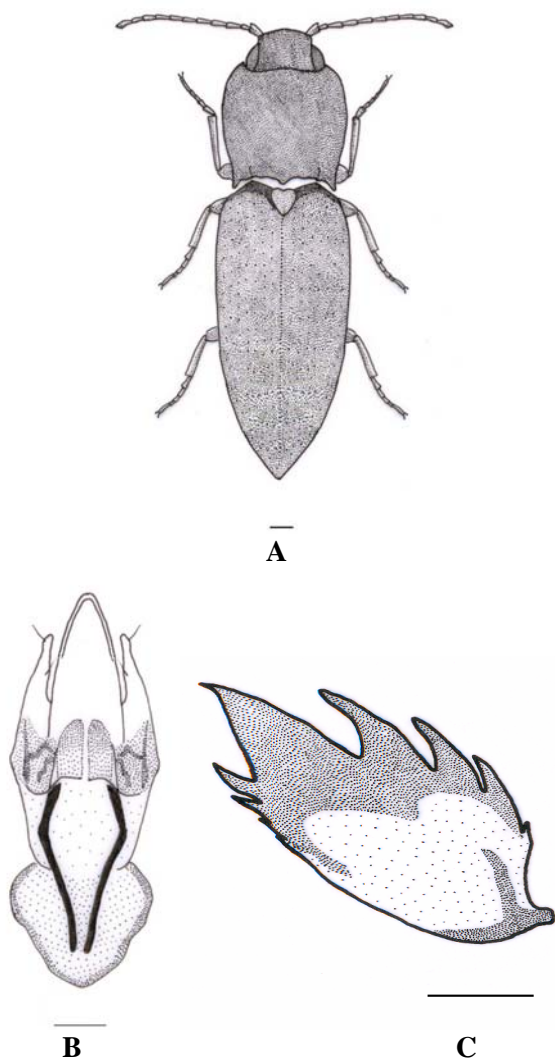


Fig. 1. *Cardiophorus kaharensis*, new species; A, male adult; B, male genitalia; C, bursa copulatrix. Scale line: A, 0.6mm; B, 0.25mm; C, 0.25mm

convex, strongly bisinuate basally, dense but deep punctures on disc, scattered recumbent pubescence; Scutellum cordiform, medially depressed, pit-like; elytral shoulders slightly broader than base of pronotum, parallel to apex, striae margins with distinct groove, interstriae with fine puncture, very dense pubescence on the entire elytra, 1st elytral interval at the apex of the elytra carinate.

Male genitalia

Aedeagus (Fig. 1B) with median lobe longer

than parameres, broadened up to apex, towards apex slightly narrower, apex truncated; parameres evidently away from median lobe, thin, tubiform apically, broad at base; two median struts elongate, lying in the cavity of basal plate, reaching at base; basal plate pear-shaped, apically broad, sides rounded then obliquely turned, forming rounded base.

Female genitalia

Bursa copulatrix (Fig. 1C) sclerotised without tubercle on surface, with four external teeth, upper long pointed teeth; remains smaller than previous but all of spiny, posteriorly form a short stalk, which ended in a subrounded apex.

Etymology

This species name was derived from the type locality.

Measurement

Holotype; Length 4.5 mm; width 1.3-1.7 mm.

Material examined

Pakistan: Punjab: Kalar Kahar; Holotype 1♂; 2.ix.2007, leg., Akhter (NHMUK). Allotype 1♀, with same data as holotype(CAP).

Comparative note

This species is most closely related to *C. varius* Cate *et al.* (2002) in having elytra without any patches, head moderately lobate, prothorax slightly broader than long, hind angles acute but it can easily be separated from *C. varius* by its aedeagus broader up to apex, parameres distinctly isolated from median lobe, median struts reaching up to base of the basal plate, female genitalia with bursa copulatrix sickle-like with four external denticles.

Discussion

The new species *C. kaharensis* is remarkably closely related to *C. varius* Cate *et al.* (2002) and appears to form a sister group to this species. Both the species are brown, head moderately lobate, prothorax slightly broader than longer, hind angles acute, aedeagus with median lobe longer than parameres. *C. varius* is represented in Pakistan from

Sindh province but *C. kaharensis* n.sp. appears to be restricted to Punjab province in Pakistan, the new species also seems to be more advanced than *C. varius* in having parameres evidently away from the median lobe, thin, tubiform apically, basal plate pear-shaped. The species *C. quadrillum* Candèze appears to play out-group relationship with *varius* and *kaharensis* and is quite advanced with four broad yellow patches on elytra.

The new species appears to be quite isolated in the entire genus as the 1st elytral interval at the apex of the elytra carinate. The new taxon is not only the smallest in all the Indian species but Aedeagus with median lobe, broadened up to apex, parameres distinctly isolated from median lobe, median strut reaches up to base of basal plate, female genitalia with bursa copulatrix sickle-like with four external denticles, without tubercles on surface are entirely different among all the described Indian species. This bizarre looking elaterid appears endemic distributed as far as Kalar Khar in the Punjab province of Pakistan. It basically appears to be a Palearctic species just extending itself into the Northern borders of Oriental region.

2. *Cardiophorus quadrillum* Candèze

Cardiophorus quadrillum Candèze, 1860:207.

Type locality

Hindoustan.

Material examined

Pakistan: Sindh: Thatta; 1 ♂; 13.vii.2005, leg. Akhter (NHMUK). Tandojam; 1 ♂, 14.iiiiv.2007, leg. Imran (CAP).

3. *Cardiophorus varius* Cate et al.

Cardiophorus varius Cate et al., 2002: 50.

Type locality

Southern Iran: Hormozgan Province; Dar-pahn

Material examined

Pakistan: Sindh: Karachi; 4 ♂, 16.iv.2007, leg. Ahmed (CAP). Thar; 05 ♂, 23.iiiiv.2007, leg.

Ahmed (CAP). Mirpur Khas; 3 ♀, 10.iv.2007, leg. Ahmed on light (NHMUK).

New record for Pakistan

4. *Dicronychus hobertlandi* Cate et al.,

Dicronychus hobertlandi Cate et al., 2002:55.

Type locality

Southern Iran: Hormozgan Province: Issin.

Material examined

Pakistan: Sindh: Thar, 31 ♂, 20.x.2007, leg. Ahmed (CAP). Kantio, ♂ male and 4 ♀, 23.iiv.2007, leg. Ahmed(CAP). Islamkot, 3 ♂ and 1 ♀, 23.vii.2007, leg. Ahmed on light (CAP). Punjab: Kalar Kahar, 2 ♂, 2.ix.2007, leg. Ahmed(NHMUK).

New record for Pakistan

5. *Platynychus marginalis* (Candèze), 1860

Cardiophorus marginalis Candèze, 1860:138.

Platynychus marginalis Fleutiaux, 1905:328.

Type locality

Hindoustan.

Material examined

Pakistan: North West Frontier Province: Dader, 1 female, 29.iiv.2004, leg. Ahmed(CAP).

New record for Pakistan

6. *Platynychus systemus* (Candèze), 1860

Cardiophorus systemus Candèze, 1860:210.

Platynychus systemus Schenkling, 1925:240.

Type locality

Hindoustan.

Material examined

Pakistan: Punjab Province: Kalar Kahar 3 ♂, 2.ix.2007, leg. Ahmed (CAP). Bhakar, 01 ♂, 14.ix.2007, leg. Ahmed(CAP).

New record for Pakistan

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