First report of genus *Coelosternechus* Heller (Coleoptera: Curculionidae) from India along with redescription of *Coelosternechus carinulatus* (Heller)

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**Abstract**
Cryptorrhynchinae is one of the largest and diverse subfamily of family Curculionidae which includes serious pests causing enormous losses to forest trees. This subfamily currently includes 99 species under 23 genera and 99 species from India. The present study focuses on genus *Coelosternechus* Heller, which is currently represented by two species namely *C. philippinensis* and *C. carinulatus* from Philippines and Java respectively. In this paper genus *Coelosternechus* with its known species *C. carinulatus* Heller is being reported for the first time from India from Nilgiri hills in Tamil Nadu and Silchar in Assam. This genus can be diagnosed with the following set of diagnostic characters: pectoral canal passing anterior margin of mesocoxae; mesosternal receptacle cavernous, U-shaped; mesosternum arched posteriorly, its apex close to a line between the posterior margins of hind coxae; femora bidentate, not sulcate beneath. *Coelosternechus carinulatus* has been redescribed along with illustrations and photographs of important diagnostic characters.

**Keywords:** *Coelosternechus*, Cryptorrhynchinae, Curculionidae, India, new record

1. **Introduction**
Cryptorrhynchinae is one of the largest and diverse subfamily of the family Curculionidae includes serious pests causing enormous losses to forest as well as horticultural trees. Nearly 581 genera and 6500 species are reported worldwide, out of which 23 genera and 99 species have been reported from India [1,2]. However, most of these listed Indian species were studied in the early nineteen’s. In recent years, studies on this subfamily are very rare, especially the Indian genera, as there exists tremendous gap in classification of Cryptorrhynchinae, even in understanding faunistics, ecology and field observations.

Sahlberg [3] erected genus *Coelosternus* with *C. balleatus* as its type species. Heller [4] described two species *C. philippinensis* and *C. javanus*, under it. Later in 1937, Heller [5] erected another genus *Coelosternechus* with *Coelosternus philippinensis* as its type species and transferred the other known species *Coelosternus javanus* to the newly erected genus *Coelosternechus*, along with description of another species *C. carinulatus*. But in 1940, Heller [6] synonymized *C. philippinensis* with *C. javanus* and thus, the genus was earlier known to be distributed only in two countries of Indo-Australian Region, i.e., Philippines and Indonesia (Java) [1]. Currently, the genus is represented by only two species *C. philippinensis* and *C. carinulatus* under tribe Cryptorrhynchini and subtribe Cryptorrhynchina. With the present study, the genus *Coelosternechus* Heller [1] with its known species *C. carinulatus* is reported for the first time from India, Oriental Region.

2. **Materials and methods**
The material for the study were from the insect museum of National Pusa Collection (NPC), Division of Entomology, Indian Agricultural Research Institute, New Delhi-110012, India and collections from Silchar, Assam. The specimens were suitably cleaned with Ultrasonic cleaner and the morphological characters including genitalia were examined under a Leica EZ4 stereozoom microscope. Photography was done with Leica DFC425C digital camera attached onto a Leica 205FA stereozoom microscope. Line diagrams were drawn using a camera lucida attached to a Leica MZ16A stereozoom microscope. The specimens were identified to genus and species level with the help of available keys and literature [1-3].
The terminology followed was that of Lyal [8]. The abbreviations used herein include: F(n) referring to funicular segments, T(n) and V(n) referring to tergites and ventrites respectively of the abdominal segments. The length of the weevil included the head length, but excluded the length of the rostrum. All the voucher material has been deposited in NPC, India.

3. Results and Discussion

**Coelosternechus Heller** [5]

Type species: *Coelosternus philippinensis* Heller [4]

**Diagnosis**

Body usually oval (Figure 1(A–C)). Rostrum curved, convex (Figure 1(D, E)) and not touching middle coxae, but ending in a receptacle on mesosternum. Scape shorter than funicle and at most reaching eye. Pectoral canal passing anterior margin of mesocoxae. Mesosternal receptacle cavernous, U-shaped. Mesosternum arched posteriorly, its apex close to a line between the posterior margins of hind coxae. Metepisterna distinct, broader. Metasternum longer than V3. Abdominal process narrower than coxa. Ventricle 2 subequal to V3 or much shorter than V3 and V4 combined (Figure 1(H)). Elytra often with rectangular humeri. Femora bidentate, not sulcature beneath. Apex of tibiae without distinct lamellae (Figure 1(J, K)). Tarsal claws simple (Figure 1(L)).

**Coelosternechus carinulatus** (Heller) [5]

(Figures 1(A–L), 2(A–J))

**Redescription**

Length: 9.59–10.97 mm; width: 4.8–5.6 mm. Integument black, with scale like sculpture, set with broad, recumbent, dark brown, black, and whitish scales; scales sparse, separate, scales on pronotum much larger than those elsewhere, scales on ventral surface much smaller and elongated, especially on mesosternal receptacle, metasternum and on V1 (Figure 1(A–C)).

Head slightly transverse, finely punctate, set with sparse, brown, fine, recumbent scales, vertex at a little lower plane, set with normal whitish, black and brown scales, head not depressed above eye, but with a fine ocular sulcus; frons with a feeble elongated median sulcus, 0.57–0.62 x as broad as rostrum (Figure 1(D–E)). Rostrum elongated, curved, 6.02–6.87 x as long as broad, basal half tricarinated, with distinct median carina, set with brown scales, coarsely and densely punctate, apical half smooth without any scales, with fine, elongated punctures (Figure 1(D–E)). Antennae (Figure 1(F)) inserted at scrobe, laterally at middle of rostrum in male and a little behind middle in female (Figure 1(E)); scape shorter, 0.81–0.85 x as long as F1–F7 funicular segments combined, set with elongated scales; F1 1.62–2.11 x as long as broad, 0.6–0.72 x as long as F2; F2 3.26–3.68 x as long as broad, F1–F6 elongated, F7 slightly elongated or nearly as long as broad, F2–F7 progressively decreasing in length, set with few, elongate setae; club compact, subcylindrical, 2.88–2.86 x as long as broad (Figure 1(F)).

Pronotum transverse (Figure 1(A)), 0.69–0.85 x as long as broad, subparallel till middle but shallowly constricted apically, broadest at base, smoothly rounded dorsally, shallowly constricted apically, apex slightly rounded and base bisinuate; punctuation large, deep and rounded except hexagonal at periphery, each punctuation set with broad recumbent scales; median carina distinct from base to middle and becoming feeble apically; postocular lobe on anterior margin of pronotum immediately behind eyes very feeble.

Scutellum (Figure 1(G)) rhomboidal, 0.97–1.1 x as long as broad, set with dense scales. Elytra (Figure 1(A)) 1.41–1.77 x as long as broad, humeri set with a patch of whitish scales; interstria 2, 3 and 5 raised, set with a tuft of brown scales dorsally, parallel to middle, then shallowly constricted apically, round convex at middle, trisinuate basally and sub-rounded apically, interstria 1.14–1.21 x as broad as stria, but at a little higher level than stria; strial punctuation large, oblong, diminishing apically; each punctuation set with broad scales, scales on sutural margin comparatively smaller.

Elytro-tergal stridulatory organs present, with the strigil (file-like structures) at apical portion of ventral sides of elytra in male and with distinct plecetrum (peg-like structures) at the middle of posterior ends of male T VII (Figure 2(D)). While in female, the location of files, and plecetrum are just opposite as that of male; files are located at the wing binding patches of female T VII (Figure 2(I)), and plecetrum at apical portion of ventral sides of female elytra. In both case, structures on left elytra more prominent than those on right; and other structures (layers of short file-like structures) on sutural margin of ventral side, which when rubbed with spines on the T VII produce sound.

Ventrally the prosternal canal passing posterior margin of middle coxae, mesosternal receptacle U-shaped, cavernous and 1.17–1.19 x as long as broad (Figure 1(B)). Metasternum with a deep vertical sulcus just below the mesosternal receptacle, punctation very deep, set with semi-transparent elongated scales; metepisternite distinct, not concealed by elytra; mesepisternum complete, reaching marginal line of metasternum. Abdominal process broader than coxa, punctuation on V1 large, deep, medially set with elongated scales; sutures between ventrites deep; V1 2.71–2.58 x as long as V2; V2, V3 and V4 subequal; V5 1.48–1.51 x as long as V3 and V4 combine; V3 and V4 with a transverse feeble carina at middle (Figure 1(H)). Sclerolepidia not visible externally.

Legs with all the femora set with blackish scales medially, yellowish brown and whitish scales apically; bidentate, proximal tooth much bigger than distal one (Figure 1(I)), without any sulcation, meta-femora longer than other two, pro and meso-femora subequal; tibiae parallel dorso-ventrally, with outer margin even, not serrate, inner carina of tibial apex not laminate; fore tibia set with a row of comb-like outer setose fringe apically (Figure 1(J)), while middle and hind tibia with two rows of comb-like outer setose fringes (Figure 1(K)); first tarsal segment longer than others (Figure 1(L)), tarsal claws simple.

Male genitalia: aedeagus 8.64–9.67 x as long as broad, median lobe nearly 0.69–0.73 x as long as aedeagal apodeme; median lobe subcylindrical but shallowly pointed apically, strongly sclerotised, slightly membranous at middle, internally with a pair of strongly sclerotised, fold-like structures (Figure 2(A–B)); median lobe arcuate in profile (Figure 2(B)); tegmen with Y-shaped structure; spiculum gastrale elongated (Figure 1(C)). Tergite VII strongly transverse, subrectangular 0.55–0.6 x as long as broad, with a pair of spinose patches anteriorly, postero-medially with a pairs of setiferous tubercles (Figure 2(D)); T VIII subquadrat, much convex, 0.94–0.98 x as long as broad (Figure 2(E)).

Female genitalia: spermatheca hook shaped, globose (Figure 2(F)); hemisternite elongated, stylus cylindrical, 1.83–2.75 x as long as broad, with dense elongate setae apically (Figure 2(G)); spiculum ventrale sclerotised, spatula-shaped,
with genital spicule stout, apically with two plates of 8th abdominal sternum (Figure 2(H)). Tergite VII 1.1–1.34 x as long as broad, set with two patches of stridulatory files at wing binding spines (Figure 2(I)); T VIII elongated, constricted apically, and crenulated, 3.18–3.25 x at broadest part and 7.78–7.91 x as long as broad at narrowest part (Figure 2(J)).

Remarks

This species can be differentiated from *C. philippinensis* from the raised elytral interstriae and scattered dark tuft of scales on elytra.

Material examined

INDIA: Male, Assam, 1.viii.1907, Coll. B. Singh; 3 male, Tamil Nadu: Nilgiri hills, 1909; 4 female, Tamil Nadu: Nilgiri hills; male, female Assam: Silchar, 17.i.2011, Coll. Salam Rita Devi, Ex. Betel nut tree (*Areca catechu*).

Fig 1: A–L. *Coelosternechus carinulatus* Heller: A–C, habitus, dorsal, ventral and lateral view; D–E, rostrum, dorsal and lateral view; F, antennae; G, scutellum; H, abdomen; I, pro-leg; J, pro-tibial apex; K, meta-tibial apex; L, tarsi.
4. Conclusion
Cryptorhynchine weevils are important pests of forest wood and thus of great economic significance, therefore their identification is essential. The present study reports genus *Coelosternechus* Heller for the first time from India, Oriental Region. This genus is currently represented by only two species namely *C. philippinensis* and *C. carinulatus* species worldwide. We are reporting this genus with it already known species *C. carinulatus* from Nilgiri hills in Tamil Nadu and Silchar in Assam. *Coelosternechus carinulatus* has been redescribed with additional characters and illustrations.

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6. Disclosure statement
The authors have no conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject of this manuscript.

7. References