

Notes on the genus *Nepalorthogonius* Habu, 1979, with description of a new species from Bhutan (Coleoptera: Carabidae: Orthogoniini)

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Abstract

The third species of the poorly known ground beetle genus *Nepalorthogonius* Habu, 1979, is described and illustrated from the Kingdom of Bhutan. Because specimens of both sexes are available for *N. micheli* n. sp., they provide important evidences to show the relationships of related genera in the tribe Orthogoniini. Subsequently, the Indian genus *Neoorthogonius* Tian & Deuve, 2006, is proposed as a junior synonym of *Nepalorthogonius*, and *Neoorthogonius orientalis* Tian & Deuve, 2006, is transferred into *Nepalorthogonius*. The main morphological characters of *Nepalorthogonius* are redefined, together with a key to species of the genus.

Key words: Ground beetles, new synonym, new species, Himalaya

Nepal and Bhutan are fascinating countries for naturalists because of the beautiful highland landscapes and the peculiar fauna. However, the fauna of the termitophilous tribe Orthogoniini in Nepal and Bhutan is not so rich since the beetles are only distributed in tropical and subtropical areas where the termites are living. TIAN & DEUVE (2005) described three *Orthogonius* species (*O. himalayicus*, *O. dureli* and *O. longiphallus*) from Bhutan and Sikkim. Later, they added two species of *Orthogonius* from Nepal and one from Bhutan: *O. nepalicus* Tian & Deuve, 2006, and *O. uncipennis* Tian & Deuve, 2006, *O. himalaya* Tian & Deuve, 2006 (Bhutan). The record of *Orthogonius opacus* Schmidt-Göbel, 1846 (ANDREWES 1923, CSIKI 1932, TIAN & DEUVE, 2005) is doubtful as the single type of *O. opacus* is a female which might lead a mis-identification of other species which are belonging to the same species group. Based on a single female specimen collected in Kathmandu area during the expedition of Hokkaido University to Nepal Himalaya, 1968, HABU (1979) set up the genus *Nepalorthogonius* and described the species *N. monilicornis*. Since that time, this specimen remains

the unique record about this interesting genus and species. *Nepalorthogonius* is much different from other congeners of the termitophilous tribe Orthogoniini and represents a peculiar lineage. Among the genera of orthogoniines in the Oriental Region, *Nepalorthogonius* is the most remarkably modified genus by having several particular character states, viz. trapezoid pronotum, depigmented body, short and moniliform antennae, extremely dilated metafemora, and very stout tibiae (HABU 1979).

Based on a single male specimen in the Bates' collection in Muséum National d'Histoire Naturelle, Paris, TIAN & DEUVE (2006) established the genus *Neoorthogonius* for containing the species *N. orientalis* Tian & Deuve, which was recorded in Bombay, western India. Thanks to the late Dr. Michel Brancucci (Basel Museum of Natural History, Switzerland), we have a chance to identify and study numerous orthogoniine specimens collected from several Asian countries. Among them, three peculiar specimens collected from Bhutan were very interesting. Further studies revealed that they are members of *Nepalorthogonius* and representatives of a new species.

Because both male and female specimens of the Bhutanese species are available, it is possible to compare and discuss the systematic relationship of *Nepalorthogonius* and its Oriental congeners. The evidences of the extraordinary sexual dimorphism on pronotum demonstrated that the Indian genus *Neoorthogonius* is identical to *Nepalorthogonius* and therefore it is proposed as a junior synonym of the latter.

Materials and methods

The three specimens of *Nepalorthogonius micheli* n. sp. were from the collection of the Expedition of the Basel Museum of Natural History in Bhutan in 1972. The holotype of *Neoorthogonius* Tian & Deuve, 2006 is in the collection of Bates, the Paris Museum of Natural History. All are dry and well mounted specimens.

Study methods and abbreviations of measurements are same as in TIAN & DEUVE (2013) except for: PWb (width of pronotum at base), and PWf (width of pronotum at front).

Taxonomy

Genus *Nepalorthogonius* Habu

Nepalorthogonius Habu, 1979: 14

Neoorthogonius Tian & Deuve, 2006: 90, **n. syn.**

Characters of the genus: Main diagnostic characters of *Nepalorthogonius* are as following: (1) body more or less depigmented; median to small sized for orthogoniines, slender and more elongate in form; (2) mandibles well developed, strongly curved inwardly at apices; (3) eyes comparatively small, but strongly prominent; (4) pronotum much different between male and female: trapezoid in female and quadrate in male, base distinctly protrudent backwards at median portion; (5) antennae short, antennomeres 4–10 moniliform; (6) elytra unbordered at base, elongated ovate; (7) legs short and stout; procoxae glabrous, meso- and metacoxae sparsely setose; pro- and mesofemora moderately dilated, metafemora extraordinarily dilated and wholly setose, with several long setae posteriorly; all tibiae very wide,

strongly dilated at apices, apical margins concave in pro- and mesotibiae, but straightly truncate in metatibiae; metatibial spurs very short and broad, ear-like; tarsi rather short and thin, pro- and mesotarsi slightly stouter than metatarsi, meso-tarsomere I much longer than pro- and metatarsomere I, respectively; pro- and meso-tarsomeres 4 deeply bilobed, meta-tarsomere 4 deeply emarginate at apex, lobes shallower; all tarsal claws moderately pectinate; (8) prosternal process unbordered at apex; (9) abdominal ventrite VII of male not modified, bisetose in both sexes; and (10) protarsi of male without spongy setae ventrally.

Sexual dimorphism: In *Nepalorthogonius*, both male and female are distinctly different on the shape of pronotum: quadrate in male and trapezoid in female. Such a sexual dimorphism is an exception in whole Orthogoniini.

Relationship with other congeners. The combined morphological characters of *Nepalorthogonius* mentioned above make it is unique within Orthogoniini.

Range. *Nepalorthogonius* is known for only three species. *N. monilicornis* and *N. micheli* n. sp. are living in subtropical areas in Nepal and Bhutan respectively, and *N. orientalis* (Tian & Deuve) is living in Bombay, a tropical area. Zoogeographical pattern of *Nepalorthogonius* is not clear since in each species it is known only from the type locality.

Key to species of *Nepalorthogonius*

- 1 Body light dark brown, less depigmented, lateral expanded margins of pronotum well marked, strongly reflexed throughout, base of pronotum not protrudent posteriad, sides of pronotum gently concave in median portion, fore angles of pronotum at least angular as hind ones, mesotibiae not suddenly cut off near apex dorsally (India: Bombay) *N. orientalis*
- Body pale, more depigmented, lateral expanded margins of pronotum not well marked, indistinctly reflexed, base of pronotum evidently protrudent posteriad, sides of pronotum not distinctly concave in median portion, fore angles of pronotum not so angular as hind ones, mesotibiae suddenly cut off near apex dorsally 2
- 2 In female, base of pronotum less wider than front (1.29 times), outer margin of protibia with eight tubercles in both male and female, 1st antennomere with only one secondary short seta, apart from the primitive one, pronotum widest a little before basal margin, base bisinuate, apex of elytron distinctly sinuate (Bhutan: Samchi) *N. micheli* n. sp.
- In female, base of pronotum more wider than front (1.32 times), outer margin of protibia with only six tubercles, 1st antennomere with two secondary short setae, apart from the primitive one, pronotum widest at base, base not bisinuate, apex of elytron indistinctly sinuate (Nepal: Kathmandu) *N. monilicornis*

Nepalorthogonius orientalis (Tian & Deuve), n. com.
Neoorthogonius orientalis: Tian & Deuve, 1996: 91

Nepalorthogonius micheli n. sp. Figs. 1–11

Holotype: male, “Sanchi, 300 m, 7–11.5” and “Nat.-Hist. Museum Basel, Bhutan Expedition, 1972”, in NHMB; paratypes: 1 male and 1 female, “Sanchi, 300 m, 7–11.5” and “Nat.-Hist. Museum Basel, Bhutan Expedition, 1972”, in NHMB and MNHN, respectively.

Length: 11.0–12.0 mm in male, 13.0 mm in female; width: 3.5–4.0 mm in male, 4.5 mm in female; habitus as in Figs. 1–2.

Depigmented, light dark brown to brown (male rather mat), but yellow in antennae, palps and underside surface; head and pronotum shiny, elytra mat.

Surface smooth, glabrous and impunctate on head; irregularly striate and impunctate on pronotum; rather rugose and impunctate on elytra (more so in female than in male). Microsculptural meshes obscured isodiametric on head and pronotum, dense and distinctly isodiametric on elytra.

Head longer than wide (HL/HW = 1.18), eyes comparatively small, but extremely prominent, distance between eyes about twice as long as longitudinal diameter of eye; frons and vertex strongly convex; two supraorbital setae present, at the levels of middle and hind margin of eye respectively; frontal impressions small and foveate, clypeus bisetose; labrum somewhat quadrate, nearly straight at frontal margin, sexsetose; mandibles well developed, straight at basal part along mandibular scrobes, then extremely curved towards apex, without distinct median tooth; mentum and submentum well separated by labial suture, both bisetose, setae very long; mentum without tooth, ligula small and thin, adnate to the membranous paraglossae, bisetose at apex; palpiger short and unsetose; palps slender, sub-cylindrical, maxillary palps slightly stouter than labial ones; the 4th maxillary palpomere as long as the 3rd, the 2nd labial palpomere bisetose on inner margin, with one or two additional short setae near apex; the 2nd labial palpomere distinctly longer than the 3rd; antennae short, thin, and moniliform, not extending to base of pronotum, pubescent from apical 2/3 of the 4th antennomere; 1st slightly curve on inner margin, nearly twice as long as the 2nd, the 4th slightly longer than wide, the

5th–10th moniliform, each almost as long as wide; the 11th distinctly longer than wide.

Pronotum transverse, PW/PL = 1.08 in male, 1.30 in female; quadrate in male, trapezoid in female, widest at about 1/6 from base in female, and at about middle in male, PWb/PWf = 1.21 in male, 1.29 in female; both front and base well beaded; front nearly straight, base bisinuate, more so in female than in male, distinctly protrudent backwards in median portion; fore angles more or less rounded, basal angles nearly and broadly rectangular in both sexes; lateral expanded margins not well-marked, narrow and quite even, not reflex; disc moderately convex, without marginal seta; both fore and basal transverse impressions well marked, more so in the latter; basal foveae small, median line clear.

Elytra elongate, EL/EW = 1.67 in male, and 1.71 in female, strongly convex, impunctate; widest at about middle, parallel-sided; base unbordered, deeply depressed against intervals 3–5; shoulders nearly square, sparsely pubescent; apex obliquely truncate, deeply sinuate, outer angle rounded, inner one nearly rectangular, obtused (Fig. 3); scutellary striae present; elytral striae deep, intervals strongly convex; intervals 2–6 subequal in width; interval 3 with three setiferous pores. Scutellum large. Hind wings well-developed.

Legs short and stout; procoxae glabrous, meso- and metacoxae sparsely setose; pro- and mesofemora moderately dilated, metafemora remarkably dilated, wholly setose, with several long setae posteriorly (Fig. 6); all tibiae stout, strongly dilated at apices, apical margins concave in protibiae, straightly truncate in metatibiae; protibiae with outer apical angle strongly protrudent, distinctly serrate on outer margin, with eight tubercles and spinous setae, inner longitudinal impression indistinct, with four to seven spinous setae; mesotibiae with a deep notch just before apex in outer margin (Figs. 1–2, indicated by arrow-head); metatibial spurs very short and broad, obtuse at apex; tarsi rather short and thin, pro- and mesotarsi slightly stouter than metatarsi, the 1st mesotarsomere much longer than those of middle and hind legs respectively; the 4th pro- and mesotarsomeres deeply bilobed, shallower in the 4th metatarsomere though which is deeply emarginate; the 1st metatarsomere longer than the 2nd, the 3rd as long as the 4th, protarsomeres in male without spongy setae ventrally, as in female (Figs. 4–5); all tarsal claws moderately pectinate.

Prosternal process unbordered at apex, sparse pubescent; procoxae small, unsetose, meso- and metacoxae setose. Abdominal ventrite VII similar in both sexes, with two pairs of paramedian setae, though an additional seta present near the outer setae on the right side in both paratype specimens; each ventrites 4–6 bisetose. Male genitalia (Figs. 7–10): Median lobe of aedeagus short and stout; basal part enlarged, dorsal opening wide, extending to apex; ventral margin moderately sinuate, apex blunt in lateral view; gently contracted towards apex in dorsal view, the apical lamella very short, blunt at tip. Parameres similar to other orthogonines; genital ring somewhat more elongate than *Othogonius* species.

Female genital (Fig. 11): very similar to *N. monilicornis*. Both gonocoxite and gonosubcoxite smooth, glabrous and aetose, though gonocoxite of *N. micheli* n. sp. is a little stouter, and blunter at apex.

Remarks: *N. michaeli* n. sp. differs from *N. monilicornis* Habu, 1978 by the following aspects: (1) outer margin of protibia eight tubercles in both male and female (six in *N. monilicornis*); (2) 1st antennomere with only one secondly short seta, apart from the primitive one (several additional setae in *N. monilicornis*); (3) widest part of pronotum before basal margin (at basal margin in *N. monilicornis*); basal margin bisinuate (not bisinuate in *N. monilicornis*); and (4) the apical part of middle tibia distinctly notched dorsally (indistinct in *N. monilicornis*).

Etymology: To dedicate to the late Dr. Michel Brancucci of the Basel Museum of Natural History, Switzerland, a well-known taxonomist on aquatic Adephaga.

Distribution: Bhutan.

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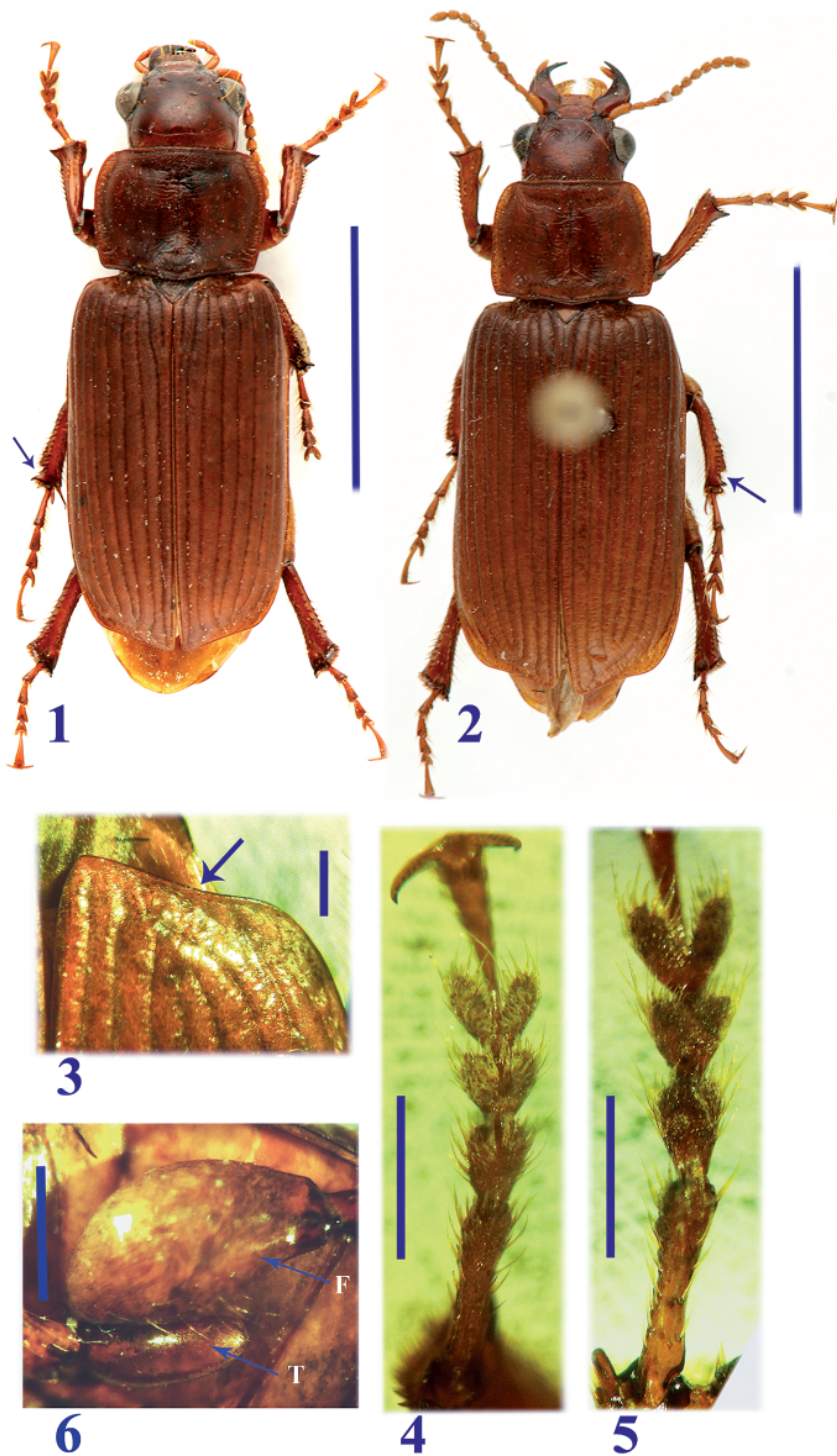
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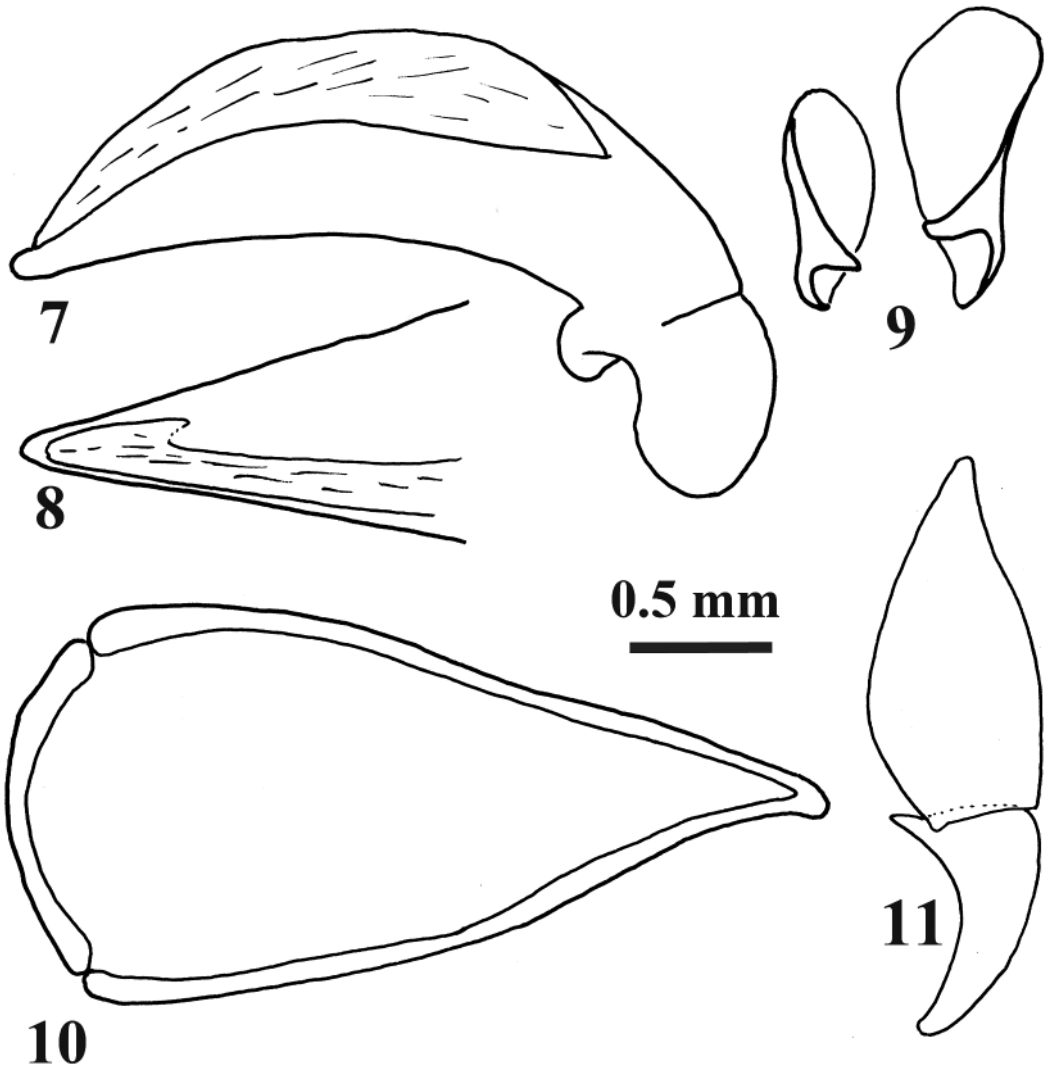
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Figs.1–6: *Nepalorthogonius micheli* n. sp. (1. Habitus, male, the holotype; 2. Habitus, female, paratype; 3. apex of left elytron; 4. protarsomeres 1–4, male; 5. *ibid*, female; 6. left metafemur (F) and trochanter (T), ventral view. Scale bar: 5.0 mm for Figs. 1–2; 0.5 mm for Figs. 3–6).



Figs. 7–11: Genitalia of *Nepalorthogonius michaeli* n. sp. (7. median lobe, lateral view; 8. apex of median lobe, dorsal view; 9. left and right parameres; 10. genital ring; 11. left gonocoxite and gonosubcoxite, dorsal view).

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