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Description of a New Species of *Pseudopanotrogus* Petrovitz 1969 (Coleoptera: Scarabaeidae: Melolonthinae) from Uttarakhand (India)

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ABSTRACT

Pseudopanotrogus Petrovitz 1969 is genus of the Melolonthinae, tribe Rhizotrogini (Scarabaeidae) that currently contains 13 species, of which 7 species have been recorded from Himalaya and plains of India. A new species *Pseudopanotrogus nileshi* Kumar, Pandey & Keith, sp. nov. is described from Uttarakhand, India and illustrated.

Keywords: Coleoptera, Scarabaeidae, Melolonthinae, Rhizotrogini, *Pseudopanotrogus,* new species, taxonomy.

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INTRODUCTION

Pseudopanotrogus Petrovitz, 1969 (Scarabaeidae, Melolonthinae, Rhizotrogini) is one of the phytophagous genera found in both palearctic and oriental region. The adults of *Pseudopanotrogus* genera are characterized by their elongated body-shape, strong transverse clypeus with anterior angles usually straight and marked, antennae with 10 antennomeres, 3 of which forming the antennal club, apically incised claws, male ventrites with a central depression, aedeagus with fine parameres, not hairy and often with subapical accessory branches, strongly indented, longer than phallobase, the endophallus complex with strong, visible sclerotized structures (Petrovitz, 1969, Frey 1971; Keith, 2001, 2002, Keith 2009). It includes to date 13 species from which 11 are distributed in the Palearctic region and the remaining two in the Oriental region: *P. baehri Keith, 2012* (Myanmar)*; P. brevipilosus* Keith, 2009 (Nepal); *P. carinifrons* (Moser, 1909) (India); *P. donckieri* (Brenske, 1892) (India, Nepal); *P. extrarius* Keith, 2005 (India, Nepal); *P. holotrichius* Keith, 2009 (Nepal); *P. kuluensis* (Moser, 1919) (India); *P. lassallei* (Keith, 2010) (India); *P. longiceps* (Moser, 1918) (Indial); *P. obscurus* Keith, 2007 (Nepal); *P. pilifera* (Moser, 1915) (Bhutan, China); *P. pusillus* (Arrow, 1912) (India); *P. rosettae* (Frey, 1971) (India). In India there are 8 species of *Pseudopanotrogus* from which 7 species are mainly recorded from the Palearctics (Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim) and the remaining one from Oriental (West Bengal) (Bánki et al., 2024). This genus, which is close to *Panotrogus* Petrovitz, 1969, can evidently be differentiated by the shape of claws: cleft in *Pseudopanotrogus,* bassaly dented , in *Panotrogus* Reitter, 1902. Genitalia of *Pseudopanotrogus* species are usually of complex structures while in *Panotrogus* they most often show a elongate parameres with a basal secondary branch.

Recently the authors collected and examined an interesting series of specimens elonging to the genus *Pseudopanotrogus* from India (Uttarakhand) and after comparing it with all available material and with the literature (mainly Brenske, 1892; Moser 1915; Moser, 1919; Arrow, 1921; Frey, 1971; Keith, 2005; Keith 2007, Keith, 2009, Keith, 2010), they came to the conclusion that it represents a new species which we describe below.

MATERIALS AND METHODS

Study Area

For the collection of adult beetles, surveys were conducted in Almora district of Western Himalaya Uttarakhand, Northern state of India, during summer of 2022 with the aim to collect new species and determine their distribution pattern. The locations of surveys lay between 29.5945°N 79.6474°N (Khatiyari) and 29.6428°N 79.6327°E (Hawalbagh) (Fig. 1). During May to September of the respective year, when the adult beetles emerge from the soil during dusk and settle on the nearby trees to feed and mate, a strong mercury vapour lamp light trap (150w) was installed in aforesaid locations in evening hours from 7:15 pm to 10:30 pm.

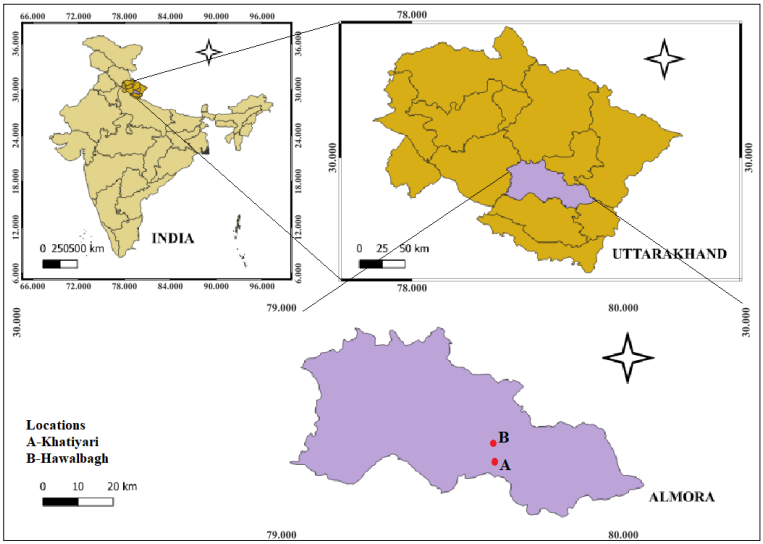

Figure 1. Locations of surveyed area Almora Uttarakhand.

Along with light trap collection, the beetles were also searched on their host plants with the help of powerful torch light since few species avoid light (Pal, 1977; Prathibha, Kumar, Subaharan, & Venugopal, 2018). As beetles were collected from light traps and host plants, they were brought into the laboratory where they were killed with ethyl-acetate and finally labelled, pinned and placed in insect cabinets for further identification.

Specimen preparation

The specimens of genus *Pseudopanotrogus* were collected during 2022 from the Hawalbagh and Khatiyari village of Almora locality. Other samples belonging to the same genus were also examined for species confirmation by comparison with types in the collection DK and literature (Brenske, 1892; Moser 1915; Moser, 1919; Arrow, 1921; Frey, 1971; Keith, 2005; Keith 2007, Keith, 2009, Keith, 2010). Later, the abdomen was removed with the help of pointed needle from the specimen's body. Genitalia and speculum gastrale were carefully extracted with forceps from the abdomen and placed in watch glass under 10% KOH for muscle removal and finally glued on a pointed card and pinned along with the adult male specimen and label. The external morphological characters of genitalia of specimens were observed through Nikon SMZ745T stereo zoom microscope and adults' images were obtained with Nikon D5600 digital camera while genitalia image with attached to the microscope using Leica auto montage software. The terminology follows for the aedeagus structures by D'Hotman and Scholtz (1990). Length measurements are from anterior margin of clypeus to the apices of the elytra.

RESULTS

Pseudopanotrogus nileshi sp. nov (Fig. 2 a, b)

Holotype: ♂, India, State Uttarakhand District Almora, Khatiyari 1454 m (29.5945°N, 79.6474°E) Paratype: 02 ♂, 01♀, same data; 01♂, 01♀ Hawalbagh 1213 m (29.6428°N, 79.6327°E); 28.v. 2022 (HT and all PT are deposited in National Zoological Collection (NZC, ZSI-NRC Dehradun; A-18561, A-18562).

Description of Holotype

Male: Length: 12-13 mm, from anterior margin of clypeus to apex of elytra. *P. nileshi* is entirely golden brown in colour. Appendages partially longer clear with darker margins, such as the underside and the lateral margin of the elytra and tibia.

Clypeus transverse, lateral margins diverging briefly at the base. Anterior margin slightly sinuates from the center with blunt edges of the clypeus. Punctations quite large and moderately dense in vertex as compared to clypeus, with a partial line of punctation, parallel to the frontal carina. Clypeo-frontal suture semicircular. Back of vertex with integument, rough and smooth. Eyes prominent with a fine ocular canthus, bearing a fine series of erect setae. Antennae with ten antennomeres, club trimerous (Fig. 3a), which is apically slightly outwards bent, longer than the scape without the funicle. Maxillary palps fusiform, with frosted area, but partially depressed (Figs. 3b, c).

Pronotum transverse, its greatest width towards the middle, margins lateral converging towards the front and base in an almost regular curve. Apical margin with a well-shaped thick very finely punctuated rim. Basal margin without visible rim especially from laterally, replaced in front of the scutellum by a row of large inverted points. Punctuation very dense on disc, medium sized provided with yellowish setations , dense at the margins. Scutellum almost punctured bearing setation obliterated on its base by a fringe dense yellowish white bristles emerging from between the pronotum and elytra.

Elytra elongated, enlarged towards the rear, with uniform punctuation bearing small yellow hairs all over. Scutellum triangular wider than long. Juxtasutural Interval obsolete behind the scutellum, then well convex and widening towards the apex of the elytra, keeled inside. Humeral callus strong and apical callus weak. Pilosity consisting of long erect setae, sparse on the disc, denser laterally. Epipleural margins wide under the humerus, then very gradually tapering to the apex of the elytra, bearing a long flexuous yellowish white setation, barely narrowed to the apex elytra.

Protibia clearly tridentate, the basal tooth evident, directed forward, internal apical spur thin, inserted at the level of the external middle tooth. All the three pair of legs, Protarsi I, II strong, with a accessory lower apical denticle. Both claws are clearly curved, with the apex deeply incised, the interior accessory denticle almost twice as thick as the upper denticle, apically almost straight truncated. Mesofemur with some pilose punctures in their apical third, otherwise smooth. Mesotibia elongated, swollen in the middle, with a pilose notch in the apical third. Meta-femur with some pilose punctures on the disc and the usual row of pilose punctures in the apical third. Metatibia almost straight, laterally compressed, with a row of weak but quite dense punctures on its inner upper surface.

Genitalia

Aedeagus with the apex of the parameres bird's billed (Fig. 4), dorsally compressed. In between two paramere dorsally, presence of flagellum (Figs. 4a, b).

Female: bigger, stouter, the legs and antennae are shorter, pronotum more transverse and elytra more elongated.

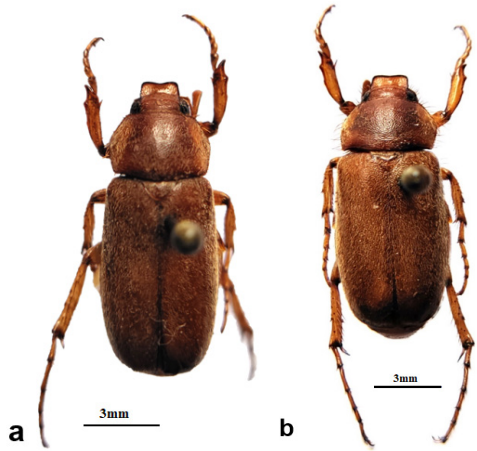

Figure 2. *Pseudopanotrogus nileshi* sp. nov.; a) male, b) female.

Figure 3. *Pseudopanotrogus nileshi* sp. nov male; a) antennae, b) maxillary palp, c) clypeus.

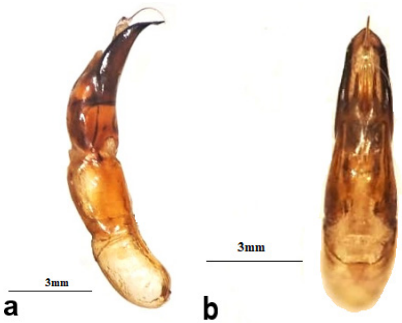

Figure 4. Male genitalia *Pseudopanotrogus nileshi* sp. nov.; a) lateral, b) dorsal.

Diagnosis: This new species of *Pseudopanotrogus* differs from all other so far known species of this genus by its aedeagus, acuminate at simple parameres as well as by the presence of an evident flagellum. The last character is so far unknown in this genus, as well as in affine ones, but the other morphological characteristics are consistent with this generic treatment.

Pseudopanotrogus nileshi is close in its external morphology (especially the short pilose pronotum and elytra) to *P. brevipilosus* Keith, 2009 from Nepal: Karnali (Holotype studied) , and *P. kuluensis* (Moser, 1919) from Himachal Pradesh (Type studied), but differs by the less deep emarginate clypeal margin, more robust protibiae, with less pronounced dents, shape and less coarse punctuation of pronotum and parameres apically dorsoventrally flattened; it is also close to *P. longiceps* (Moser, 1918) from West Bengal (Type studied) and *P. pusillus* (Arrow, 1921) from Jammu & Kashmir and Uttarakhand (Type studied), but pronotal punctuation is less dense and dorsal pilosity sparser and less evident. Furthermore, the anterior clypeal margin is very shallowly emarginate in *P. longiceps* and the parameres are simple, vertically flattened, their apical part expanded. *P. kuluensis* shows parameres apically not tapering at all.

Etymology: Adjective in the nominative singular. This species is most cordially dedicated to the collectors' MK friend (Nilesh Sharma).

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