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New species of *Psychristus* Andrewes 1930 subgenus *Nipponobradycellus* HABU 1973 (Coleoptera, Carabidae, Harpalini, Stenolophina) from Nepal

D.W. WRASE & B. JAEGER

A b s t r a c t: Three species of genus *Psychristus*, subgenus *Nipponobradycellus* are described as new from Nepal: *P. schmidti* WRASE & JAEGER nov.sp. (loc. typ.: Nepal, Rolwaling Himal, above Simigau village, 2700-2800 m); *P. umbraticornis* WRASE & JAEGER nov.sp. (loc. typ.: Nepal, Manaslu Mts., SE-slopes W Gupchi Danda, 2700-2800 m), and *P. glaber* JAEGER & WRASE nov.sp. (loc. typ.: Nepal, Annapurna Mts., below Thulo Bugin, above Talbagar, 3500-3800 m). A key for distinguishing the species of *Nipponobradycellus* from Nepal is given, and illustrations of the habitus, metepisternum and the median lobe of the species dealt with here and a table with variation of values of some ratios are presented. Members of subgenus *Nipponobradycellus* are recorded from Nepal for the first time.

K e y w o r d s: Coleoptera, Carabidae, Harpalini, Stenolophina, *Psychristus*, *Nipponobradycellus*, new species, key, Nepal.

Introduction

Until present the Himalayan fauna of the stenolophine genus Psychristus ANDREWES 1930 comprises six species belonging to subgenus Psychristus s.str. which was revised by JAEGER (1997). All Himalayan species treated by JAEGER are macropterous and more or less widely distributed in the Himalayas, two species even reach Vietnam and Taiwan, respectively. Recent collections from Nepal included three new Psychristus species, which are apterous and obviously endemic. Contrary to the Himalayan species already known, the new taxa belong to subgenus Nipponobradycellus HABU 1973. This taxon erected as a subgenus of Bradycellus ERICHSON 1837 and founded on B. lewisi SCHAUBERGER 1933, was long time considered as monotypic. In course of describing the first endemic species from Sichuan (P. sichuanensis WRASE & JAEGER 1995), and realizing that Nipponobradycellus agrees in all important characters (frontal and clypeal suture deeply impressed, third antennomere mostly glabrous with exception of the obligatory apical setae, upper surface glabrous and abdominal 1-5 sternites glabrous with only 1 seta on each side of apical margin, the last sternite with 2 or only 1 seta in male and 2 setae in female, sternites 2 and 3 without a setose depression in male), with Psychristus Andrewes 1930 and therefore it was to be treated as subgenus of it. Species of subgenus Nipponobradycellus differ from members of subgenus Psychristus in having

weakly dilated mesotarsi with tarsomeres with some adhesive setae in males (at least this is true in species represented in males), and a pronotum more or less cordate with narrow base. Psychristus itself, described as genus and long time considered as subgenus of Bradycellus by many workers, received back the status of a distinct genus in the same paper (WRASE & JAEGER 1995). JAEGER (1997) in his revision of the Himalayan species of Psychristus divided subgenus Psychristus into two species-groups, the discretus group (agreeing with taxon Taiwanobradyellus ITO 1985) and the liparops group (including also the type species of *Psychristus* s.str.), but did not give them a formal subgeneric rank, because no sure apomorphic character states could be recognized at this time. He underlined that a phylogenetic analysis must show if the P. discretus group and Nipponobradycellus really form monophyletic units and therefore, in accordance with the resulted adelphotaxa relations should be treated as subgenera of the genus Psychristus. Using the character of mesotarsi weakly dilated and with adhesive setae (in subgenus Nipponobradycellus) or simple, not dilated and without adhesive setae (in subgenus Psychristus), we follow WRASE & JAEGER 1995 in treating Nipponobradycellus as subgenus of *Psychristus*. There seem to be also differences in the general construction of the median lobe in both taxa: members of Psychristus have the apical lamella (in dorsal view) in general symmetrically narrowed (with exception of P. liparops ANDREWES where it is slightly turned to the left). The internal sac has only paired foldings without groups of larger teeth or spines. Species of Nipponobradycellus show a median lobe in most cases with apical lamella asymmetric, sometimes spatula-like enlarged, in one case the whole median lobe is extremely curved. The foldings of the internal sac are not as distinctly paired as in *Psychristus* and the sac contains sometimes groups of larger teeth or spines or larger sclerites. Surely the construction of the median lobe including its internal sac in Nipponobradycellus is to be seen as advanced (apomorph) condition. Further investigations must corroborate this point of view and critically check our concept of Nipponobradycellus.

To date (JAEGER & KATAEV 2003) four species of *Nipponobradycellus* have been described: *P. lewisi* SCHAUBERGER 1933; *P. sichuanensis* WRASE & JAEGER; *P. accessor* WRASE 1997; *P. curvus* WRASE 1997. The three new species from Nepal, which will be described in this paper, increase the number of known species to seven (but some further species new to science are known from China but not yet described: Wrase & Kataev, in preparation).

Methods and Acknowledgements

Total body length (BL) is measured from the tip of the apical margin of clypeus to the apex of the longer elytron; the width of the head (HW) as the maximum linear distance across the head, including the compound eyes; the length of the pronotum (PL) from the anterior to the posterior margin along the midline; the length of the elytra (EL) from the anterior margin at scutellum to the apex of the longer elytron; the width of the pronotum (PW) and elytra (EW) at their broadest point; the width of the pronotal base (PBaW) between the tip of the hind angles.

These measurements, made at a magnification of 16X (body length) and 25X, respectively, and using an ocular micrometer in a Leica MZ 16 stereobinocular microscope, were combined in ratios or added as follows:

PW/PL: width /length of pronotum;

HW/ PW: width of head/ width of pronotum; PW/HW: width of pronotum /width of head;

PW/PBaW: width of pronotum/width of the pronotal base;

EL/EW: length/width of elytra;

EW/PW: width of elytra/width of pronotum.

Microsculpture was examined at a magnification of 100X.

Line drawings of median lobes and metepisterna were prepared by using an ocular grid (10X10 squares) attached to a Leica MZ 16 stereobinocular microscope. Habitus drawings were based on digital images. Dissections were made with standard techniques; genitalia were preserved in Euparal on acetate labels, and pinned beneath the specimens from which they had been removed.

Most main characters for genus *Psychristus* in general and for subgenus *Nipponobradycellus* mentioned above (frontal and clypeal suture deeply impressed, upper surface glabrous and abdominal sternites 1-5 glabrous with only 1 seta on each side of apical margin, sternites 2 and 3 without a setose depression), are not repeated in descriptions.

We are very grateful to our colleague and friend Joachim Schmidt (Admannshagen) for providing us with the material this study deals with, and to Jon Cooter (Oxford) for reading a previous draft of the manuscript on which this paper is based.

Results

Key to species of subgenus Nipponobradycellus from Nepal

Classification

Psychristus (Nipponobradycellus) schmidti WRASE & JAEGER nov.sp.

T y p e m a t e r i a l : <u>Holotype</u> ♂: "NEPAL Rolwaling Himal, above Simigau village, 2700-2800 m 1.6.2000 leg. J. Schmidt" (Coll. J. Schmidt, Admannshagen, Germ.).

D i a g n o s i s: An apterous species of average size in *Nipponobradycellus*, dark reddish brown with appendages partly darkened, antennae relatively short for a stenolophine, with pronotum strongly sinuate toward weak-obtuse but sharp posterior angles, and with elytral striae distinctly punctured (habitus see Fig. 1, for values of measurements and ratios see also Tabl. 1).

Description: Body length 4.6 mm; width 1.9 mm, respectively.

Colour: Head and pronotum dark reddish brown, elytra somewhat darker, piceous with sutural interval a little lighter. Femora and antennomeres 3-6 distinctly darkened, antennomere 2 and the remaining last with a blackish stripe at middle, also tibiae and tarsi slightly to moderately infuscate, palpi yellowish.

Head: Of average size in *Nipponobradycellus*, narrower than pronotum (0.79 times as wide as pronotum), with eyes moderately prominent. Tempora oblique, of about one sixth of eye diameter. Antennae pubescent from antennomere 4.

Pronotum (Fig. 1): Transverse, cordate (1.23 times as wide as long, 1.27 times as wide as head), widest at about anterior third, lateral seta inserted a little before this. Disc only sligthly convex, median line moderately deeply impressed, becoming shallow almost reaching anterior margin, toward base somewhat deepened and reaching posterior margin; anterior transverse impression almost indistinct, posterior transverse impression indistinct. Anterior margin only weakly emarginate, anterior angles weakly projecting forward, narrowly rounded at tip. Sides slightly curved apicad, from widest point weakly convex and strongly sinuate toward the weakly obtuse-angled posterior angles, sharp at tip, denticle not present. Base somewhat narrower than anterior margin, evenly concave (maximum width 1.53 times as wide as base). Lateral furrows narrow, somewhat before posterior angles vanishing, anterior margin only laterally bordered. Basal foveae somewhat elongately impressed, reaching the basal margin. Base coarsely and moderately sparsely (in and around basal foveae somewhat denser) punctured, puncturation continuing along lateral margin to anterior angles, some irregularly and scattered fine to coarse punctures behind anterior margin.

Elytra (Fig. 1): Short-oval, (1.51 times as long as wide, 1.50 times as wide as pronotum), on disc moderately convex, with humeri weakly developed, broadly rounded, without humeral tooth; toward behind somewhat enlarged, widest at about middle. Basal bead weakly sinuate, arcuately curving inside humerus and with a weak angle turning to lateral margin. Scutellar pore puncture present, scutellar stria normal long. Third interval shortly before middle with a setigerous pore puncture at stria 2. Stria weak, distinctly punctured, intervals flat. Subapical sinuation weak. Last sternite with 2 setae on each side.

Hind wings: Strongly reduced to small scales.

Sterna: Prosternum impunctate, pro- and mesepisternum sparsely and coarsely punctured. Metepisternum (Fig. 4) impunctate, short, ventral margin about 1.3 times as long as anterior margin, moderately narrowed posteriad.

Legs: Male protarsi weakly, mesotarsi very weakly dilated, both with adhesive vestiture ventrally, consisting of not numerous biseriate, elongate hyaline setae difficult to see (in protarsi apically distinctly, in metatarsi weakly widened).

Microsculpture of surface: Strongly reduced (except strong isodiametric meshes on labrum and scutellum), on head and pronotum practically invisible, on elytra microsculpture mesh pattern consisting of strong-transverse meshes weakly impressed, surface of forebody strongly shiny, elytra very faintly iridescent.

Median lobe of aedeagus (Figs 2, 3): Arcuate, with apex flattened and somewhat reflexed (lateral view), middle part almost parallel, apicad apruptly narrowed into a long, parallel apical lamella (dorsal view). Internal sac without any larger teeth, but with specific folding pattern.

Female genitalia: Unknown.

C o m p a r i s o n s: Though similar to the second new species *P. umbraticornis* nov.sp. from Nepal with completely developed elytral striae, described below, in being wingless and having middle antennomeres and femora darkened, *P. schmidti* nov.sp. differs in having antennomere 2 and the last ones with a blackish stripe at middle, by a different pronotal shape (from widest point weakly convex and strongly sinuate toward the longer, weakly obtuse-angled posterior angles, sharp at tip, in *P. umbraticornis* nov.sp. almost rectilinearly narrowed toward the short posterior angles), by more strongly developed humeri (with more reduced humeri in *P. umbraticornis* nov.sp.), and by a different construction of the median lobe (with a long, parallel-sided apical lamella, in *P. umbraticornis* nov.sp. apical lamella evenly narrowed). Judging from the single specimens in both species, *P. schmidti* nov.sp. has also a larger body size. See also key.

E t y m o l o g y: Dedicated to our dear friend and colleague Joachim Schmidt (Admannshagen at Rostock), excellent specialist in Carabidae who collected the holotype of this and the other new species from Nepal.

D i s t r i b u t i o n : Currently only known from the type locality in the upper Tama Koshi Valley in the Rolwaling Himal in Central-Nepal.

H a b i t a t: The specimen was taken by sifting leaf-litter in the middle cloud forest zone, composed of *Abies spectabilis*, *Quercus semicarpifolia* and *Rhododendron arboreum*.

Psychristus (Nipponobradycellus) umbraticornis WRASE & JAEGER nov.sp.

Type material: <u>Holotype</u> 3: "NEPAL Manaslu Mts. SE-slope W Gupchi Danda 25-2600 m 28°08'59N 84°46'06 E 19/20.5.2006 leg. J. Schmidt" (Coll. J. Schmidt, Admannshagen, Germ.).

D i a g n o s i s: An apterous species of small size in *Nipponobradycellus*, dark reddish brown with antennae partly darkened, antennae relatively short for a stenolophine, with pronotum almost rectilinearly narrowed toward the short, weakly obtusely angled but sharp posterior angles, and with elytral striae distinctly punctured (habitus see Fig. 5, for values of measurements and ratios see also Tabl. 1).

Description: Body length 3.9 mm; width 1.6 mm, respectively.

Colour: Head, pronotum and elytra dark reddish brown, sutural interval a little lighter. Antennomeres 3-6 distinctly darkened, legs reddish brown, palpi yellowish.

Head: Large for a species in *Nipponobradycellus*, somewhat narrower than pronotum (0.81 times as wide as pronotum), with eyes only moderately prominent. Tempora oblique, of about one fifth of eye diameter. Antennae pubescent from of antennomere 4.

Pronotum (Fig. 5): Transverse, cordate (1.20 times as wide as long, 1.23 times as wide as head), widest at about anterior third, lateral seta inserted a little before this. Disc only sligthly convex, median line moderately deeply impressed, becoming shallowly and not reaching anterior margin, toward base somewhat deepened and reaching posterior margin; anterior transverse impression indistinct, posterior transverse impression almost indistinct. Anterior margin rectilinear with anterior angles hardly projecting forward. Sides slightly curved apicad, from widest point weakly convex and almost rectilinearly narrowed toward the short, weakly obtuse-angled posterior angles, sharp at tip, denticle small but distinct. Base a little narrower than anterior margin, evenly and weakly concave (maximum width 1.42 times as wide as base). Lateral furrows narrow, anterior margin only laterally bordered, lateral border at basal margin reaching almost basal foveae. Basal foveae somewhat elongately impressed and somewhat curved laterad, not reaching the basal margin. Base except middle coarsely and moderately sparsely punctured, puncturation continuing along lateral margin to anterior angles, some irregularly scattered fine punctures behind anterior margin.

Elytra (Fig. 5): Short-oval (1.48 times as wide as long, 1.55 times as wide as pronotum), on disc moderately convex, with humeri weakly developed, widely rounded, without humeral tooth; toward behind distinctly enlarged, widest at about middle. Basal bead weakly sinuate, arcuately curving inside humerus and without angle turning to lateral margin. Scutellar pore puncture present, scutellar stria short at left, and reduced at right side. Third interval with a setigerous pore puncture at stria 2 shortly before middle. Striae weakly impressed, distinctly punctured, intervals flat. Subapical sinuation weak. Last sternite with 2 setae on each side.

Hind wings: Strongly reduced to small scales.

Sterna: Prosternum impunctate, pro- and mesepisternum sparsely, coarsely and somewhat irregularly punctured. Metepisternum (Fig. 8) impunctate, short, ventral margin about as long as anterior margin, strongly narrowed posteriad.

Legs: Male protarsi weakly and mesotarsi very weakly dilated, both with adhesive vestiture ventrally, consisting of not numerous biseriate, elongate hyaline setae difficult to see (in protarsi apically distinctly, in metatarsi weakly widened).

Microsculpture of surface: Strongly reduced (except strong isodiametric meshes on labrum and scutellum), on head and pronotum practically invisible, on elytra microsculpture mesh pattern consisting of strong-transverse meshes weakly impressed, surface of forebody strongly shiny, elytra very faintly iridescent.

Median lobe of aedeagus (Figs 6, 7): Arcuate, with apex flattened and somewhat reflexed (lateral view), apicad moderately narrowed into middle-long apical lamella, twisted somewhat to the left (dorsal view). Internal sac without any larger teeth but with a specific folding pattern.

Female genitalia: Unknown.

C o m p a r i s o n s: See under *P. schmidti* nov.sp. and key. Differing also from the other species described here in having elytra laterally more convex.

E t y m o l o g y : The new species is named for the partly darkened antennae (Latin "umbra": shadow, and "cornu": horn = antenna).

D i s t r i b u t i o n : Currently only known from the type locality in the southeastern slopes of the Manaslu Himal in Central-Nepal.

H a b i t a t: Collected by sifting leaf-litter in a mixed broadleaf forest of the lower cloud forest zone.

Psychristus (Nipponobradycellus) glaber JAEGER & WRASE nov.sp.

Type material: <u>Holotype</u> 3: "NEPAL Annapurna Mts. below Thulo Bugin, above Talbagar 3500-3800 m 30/31.5.04 leg. Schmidt" (Coll. D.W. Wrase, Berlin, Germ.).

D i a g n o s i s: An apterous species of small body size in *Nipponobradycellus*, dark reddish brown to piceous, with appendages, first interval of elytra, apical half of head somewhat paler, with antennae relatively short for a stenolophine, and with pronotum cordiforme, strongly convex to anterior angles, roundly narrowed toward the base, with a weak sinuation before the well marked denticulate posterior angles, and with elytra with first stria weakly impressed and punctured, second stria partly reduced, remaining ones indicated only by single punctures and the remaining striae completely reduced, only marked by shallow punctures (habitus see Fig. 9, for values of measurements and ratios see also Tabl. 1).

Description: Body length 3.6 mm; width 1.5 mm, respectively.

Colour: Head, pronotum and elytra dark brown to piceous, with margins and sutural interval of elytra and apical half of head lighter. Appendages light brown to testaceous.

Head: Head of average size in *Nipponobradycellus* (0.79 times as wide as pronotum), with eyes moderately prominent. Tempora oblique, of about one sixth of eye diameter. Antennae pubescent from antennomere 4.

Pronotum (Fig. 9): Transverse, cordiform (1.20 times as wide as long, 1.26 times as wide as head), widest at beginning of second third, lateral seta inserted somewhat behind this. Disc convex, median line smooth, weakly impressed medially, becoming shallow to anterior and posterior margin and not reaching them, anterior and posterior transverse impressions only suggested. Anterior margin slightly convex, anterior angles not projecting forward, narrowly rounded at tip. Sides strongly curved apicad, from widest point weakly convex, distinctly sinuate to the weakly obtuse-angled posterior angles, sharp at tip, denticle very small but distinct, protruding laterally. Base about as wide as anterior margin (maximum width about 1.33 times as wide as base), medially weakly and laterally strongly convex with hind angles strongly produced. Lateral furrows narrow, becoming finer toward anterior angles, anterior margin only laterally bordered, at basal margin border reaching the basal foveae. Basal foveae small and indistinct, somewhat elongately impressed, base with only a few shallow punctures in and around foveae.

Elytra (Fig. 9): Short-oval (1.45 times as long as wide, 1.47 times as wide as pronotum), on disc slightly convex, with humeri well developed, rounded and somewhat projected forward, without humeral tooth; toward behind somewhat enlarged, widest at about middle. Basal bead arcuately curving inside humerus, with a sharp angle turning to lateral margin. Scutellar pore puncture present, scutellar stria completely reduced. Interval 3 without a setigerous pore puncture on disc. Stria 1 weakly impressed and punctured, stria 2 partly, remaining striae completely reduced, only marked by fine and shallow

punctures. Subapical sinuation weak. Last sternite with 1 seta on each side (male).

Hind wings: Strongly reduced to small scales.

Sterna: Prosternum (except some single shallow punctures anteriorly), pro-, mes- and metepisternum impunctate. Metepisternum (Fig. 12) short, ventral margin only about 1.2 times longer as anterior margin, strongly narrowed posteriad.

Legs: Male protarsi weakly and mesotarsi very weakly dilated, both with adhesive vestiture ventrally, consisting of not numerous biseriate, elongate hyaline setae difficult to see (in protarsi apically distinctly, in metatarsi weakly widened).

Microsculpture of surface: Strongly reduced, except for distinct isodiametric meshes on labrum and scutellum, surface strongly shiny.

Median lobe of aedeagus (Figs 10, 11): Relatively short, moderately arcuate, with apex flattened (lateral view), apicad moderately narrowed and twisted somewhat to the left, apical lamella short, triangular (dorsal view). Internal sac without any larger teeth but with a specific folding pattern, medially covered by large and flat honeycomb-like plates of somewhat irregular shape.

Female genitalia: Unknown.

C o m p a r i s o n s: Easily distinguished from *P. schmidti* nov.sp. and *P. umbraticornis* nov.sp. by elytra with only stria 1 impressed, 2 partly and remaining completely reduced and without discal pore puncture in interval 3, and by a completely different construction of the median lobe, additionally by extreme small body size (to date the smallest species known in *Psychristus*).

E t y m o l o g y : The new species is named for the reduced striation of elytra (Latin "glaber": smooth).

D i s t r i b u t i o n : Currently only known from the type locality in the western macroslope of the Annapurna Mountains into the Kaligandaki Valley in Central-Nepal.

H a b i t a t : Taken by sifting leaf-litter in a *Rhododendron arboreum* forest in the upper cloud forest zone.

Zusammenfassung

Aus Nepal werden drei Arten der Gattung *Psychristus*, Untergattung *Nipponobradycellus* beschrieben: *P. schmidti* WRASE & JAEGER nov.sp. (loc. typ.: Nepal, Rolwaling Himal, above Simigau village, 2700-2800 m); *P. umbraticornis* WRASE & JAEGER nov.sp. (loc. typ.: Nepal, Manaslu Mts., SE-slopes W Gupchi Danda, 2700-2800 m), und *P. glaber* JAEGER & WRASE nov.sp. (loc. typ.: Nepal, Annapurna Mts., below Thulo Bugin, above Talbagar, 3500-3800 m). Ein Bestimmungsschlüssel für die Arten von *Nipponobradycellus* aus Nepal, Abbildungen von Habitus, Medianlobus und Metepisternum und eine Tafel mit einigen Indexwerten werden präsentiert. Arten des Subgenus *Nipponobradycellus* werden das erste Mal für Nepal nachgewiesen.

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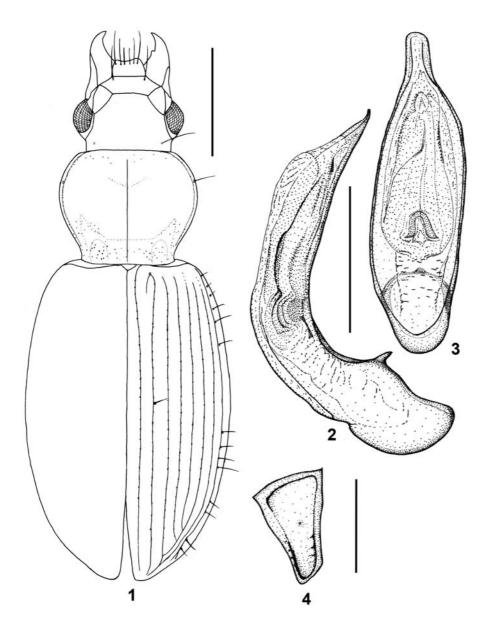
D-10437 Berlin, Germany E-mail: carterus@gmx.de

Bernd JAEGER Zingster Str. 40

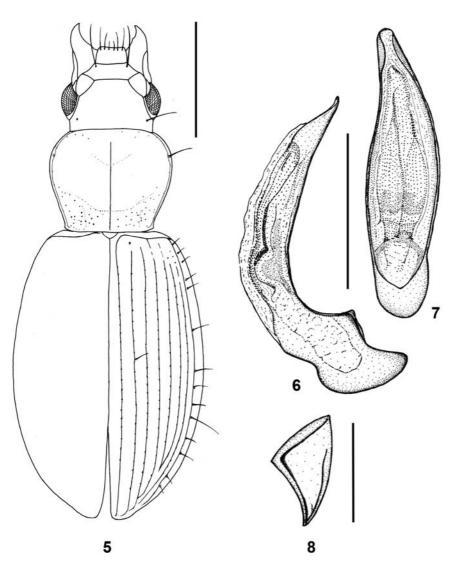
D-13051 Berlin, Germany E-mail: acupalpus.bj@gmx.de

Table 1: Data on variation in some values among Nipponobradycellus species

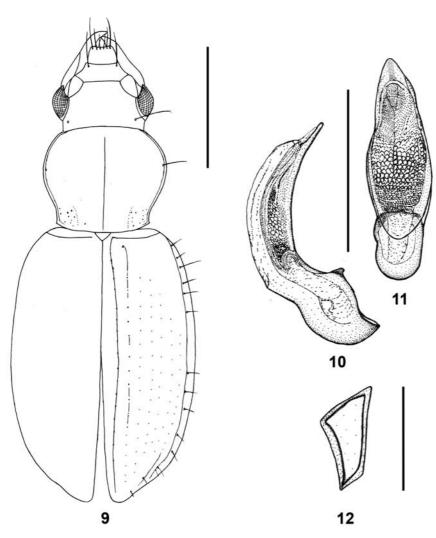
taxon	sex	BL	PW/	PW/	HW/	PW/	EL/	EW/
		mm	PL	HW	PW	PBaW	EW	PW
schmidti HT	ð	4.6	1.23	1.27	0.79	1.53	1.51	1.50
umbraticornis HT	ð	3.9	1.20	1.23	0.81	1.42	1.48	1.55
glaber HT	ð	3.6	1.20	1.26	0.79	1.33	1.45	1.47



Figs 1-4: *Psychristus (Nipponobradycellus) schmidti* nov.sp. Habitus (1). Median lobe, lateral view (2), median lobe, dorsal view (3). Left metepisternum (4). Scale bars: 1 mm (1); 0.5 mm (2, 3, 4).



Figs 5-8: *Psychristus (Nipponobradycellus) umbraticornis* nov.sp. Habitus (**5**). Median lobe, lateral view (**6**), median lobe, dorsal view (**7**). Left metepisternum (**8**). Scale bars: 1 mm (**5**); 0.5 mm (**6**, 7, 8).



Figs 9-12: *Psychristus (Nipponobradycellus) glaber* nov.sp. Habitus (9). Median lobe, lateral view (10), median lobe, dorsal view (11). Left metepisternum (12). Scale bars: 1 mm (9); 0,5 mm (10, 11, 12).

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