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A New Species of Macrocephalic Carabid from Nagano Prefecture, Japan (Coleoptera: Carabidae: Pterostichini)

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Abstract A new species of macrocephalic carabid, *Pterostichus nagasawai* is described from Suzaka City and Ueda City in Nagano Prefecture. Also It is reported that two macrocephalic *Pterostichus* sympatrically dwell in Sugadaira Highland.

Junior author of this paper (T. Ogai) and students of University of Tsukuba have researched hypogean insects in Sugadaira Highland and Yatsugatake in Nagano Prefecture, Ikawa in Shizuoka Prefecture and Mt. Chichibu in Saitama Prefecture. They collected many species and inclusive of four new species but the most species are only female and further research is needed. Two macrocephalic *Pterostichus* in Sugadaira are inclusive of male. We carefully examine them and one of them is new species and describe it in this paper. They are collected in same spot. Recently many macrocephalic carabids have been found (Sasakawa, 2005, Sasakawa, 2009; Ito, 2010, 2012; Morita *et al.*, 2013, etc.) and the most species dwell narrow restricted area. It is rare that two species dwell in same spot.

Materials and methods

Method for setting trap followed Yoshida (2012) and Nishikawa *et al.* (2014), and our traps are same as in Hayashi *et al.* (2015).

Holotype will be preserved in the Osaka Museum of Natural History, Osaka, and the paratypes will be preserved in the Osaka Museum of Natural History, Osaka and senior author collection.

For everting of inner sac, aedeagus were softened in 60% Ethanol eater in 7 days. After that, cream for washing face was injected from orifice of basal bulb by syringe.

Body parts were measured as follows:

The length of body: the distance between the apex of labrum and the apices of elytra.

The width of body: the maximal transverse distance of body.

The width of head: the maximal transverse distance including compound eyes.

The width of pronotum: the maximal transverse distance between sides.

The length of pronotum: the distance from apical edge to basal edge along the middle.

The length of elytra: the distance between the basal border and the apices along the suture.

The width of elytra: the maximal transverse distance between sides.

Terminology refers to Lawrence & Ślipiński (2013).

Pterostichus nagasawai N. Ito *et* Ogai, sp. nov.

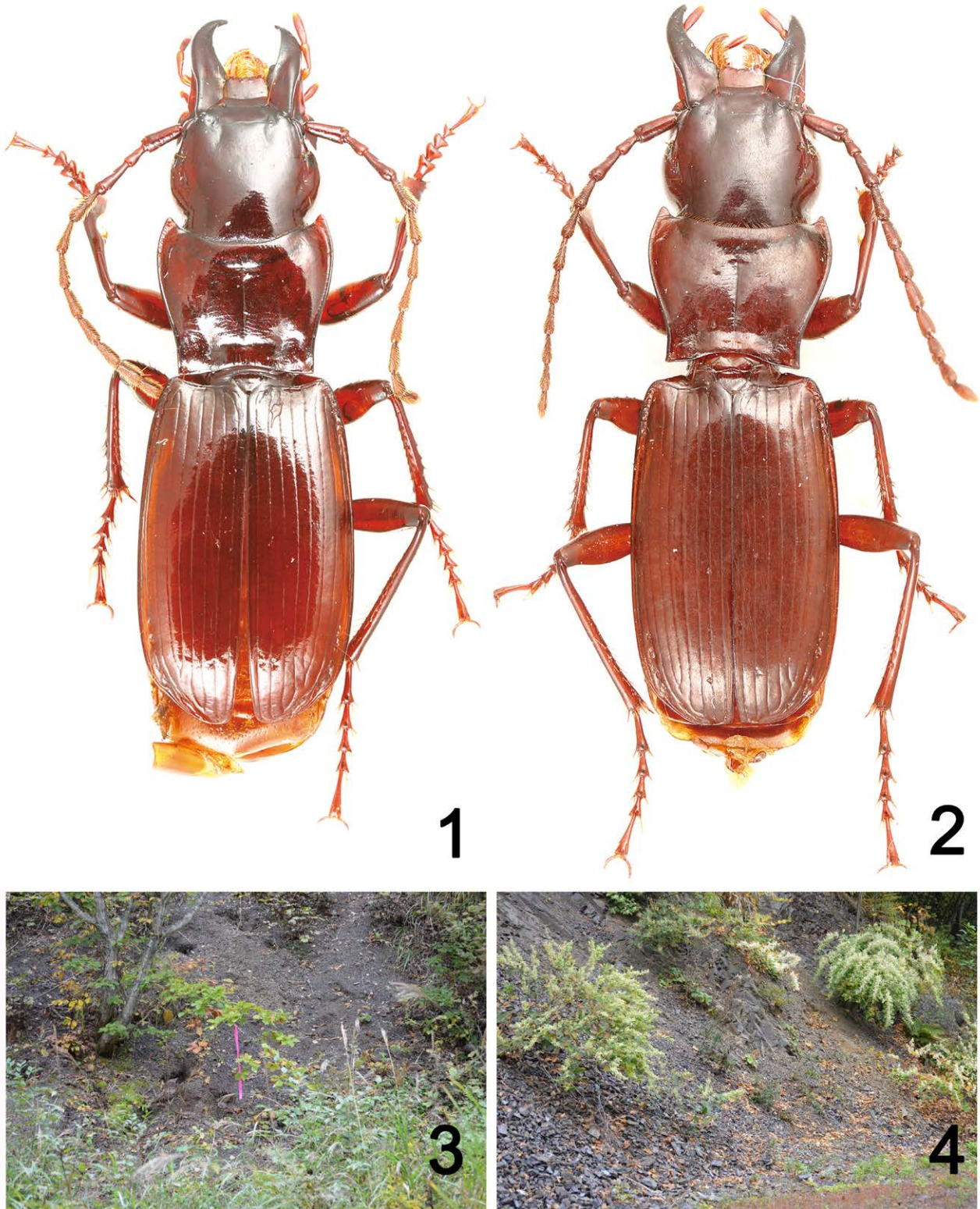
[Japanese name: Hosohirata-ôzu-nagagomimushi]

(Figs. 1–6)

Body narrow, parallel-sided, flattened. Coloration brown to light brown; frons, mandibles and antennae blackish brown, buccal parts reddish brown.

Head large, 9/10 as wide as the width of pronotum, well thick, very sparsely and microscopically punctate, a little coarsely so on clypeus; labrum transversely quadrate, moderately emarginate at apex (deeply so in individuals of *Daimyoujin-zawa*); clypeus not convex, smooth or two or three short and obscure rugosities near each basal side (deeper in individuals of *Daimyoujin-zawa*); clypeal suture shallow, linear; frontal impressions fairly shallow, short, arcuately running to outwards, not or hardly prolonged to clypeus (clearly prolonged to middle of clypeus in individuals of *Daimyoujin-zawa*); eyes very small, not or feebly raised, space between genuine ventral margins of each eye and buccal fissure very wide, 3.0 times as wide as width of eye; temples strongly humped, very long, 4.0 times the eye length; supraorbital grooves each short, reaching apical 1/3 of temple; front supraorbital seta situated near apical third level of eye, the hind so at middle of temple apart from the groove, smooth between the seta and groove (thin line lying there in individuals in *Daimyoujin-zawa*); mandibles elongate, almost symmetrical or a little shorter in right mandible (seeming to be worn out); antennae submoniliform, rather long, and reaching basal 1/4 of elytra, 1st segment unisetose at apex, 2nd and 3rd segments clearly depressed and 4th to 11th segments weakly so near dorsal and ventral bases, 2nd one not setose, 3rd one quinquisetose apically (one specimen from Mt. Hashigoyama bisetose behind the apical setae), nearly 1.9 times as long as the 2nd and 1.1–1.2 times as long as the 4th; labial palpi slender, 3rd segment 1/10 shorter than the 2nd; ligula wedge-shaped, wide, rounded at apical corners, two setae situated beside middle; paraglossae narrow; mentum bifid at apex of median tooth, rounded at each tip, with two long near middle and shorter four setae in both foveae beside middle; submentum bisetose at each side; microsculpture minutely meshed, a little clearer in female than in male, observed as a little clearly isodiametric meshes in apical 1/2 of clypeus, partly so on frons, and entirely so in sides of vertex.

Pronotum flattened, cordate, widest at apical 1/5, 2/5



Figs. 1–4. Habitus and habitats of the genus *Pterostichus nagasawai* N. Ito *et* Ogai, sp. nov. 1, male, holotype; 2, female, paratype; 3, Mt. Hashigo-yama; 4, Ōyafudo.

wider than long, mostly impunctate, minutely and very sparsely punctate in basal foveae, short, vague, shallow and transverse rugosities along median line; sides gently arcuate in apical 4/5, thence shallowly sinuate; apex deeply emarginate,

mostly unbordered, vaguely bordered in lateral 1/6, widely flattened in protruding areas; base 0.87 times as wide as apex, shallowly emarginate in middle half, feebly arcuate at sides, not bordered; apical angles well protruding, very narrowly

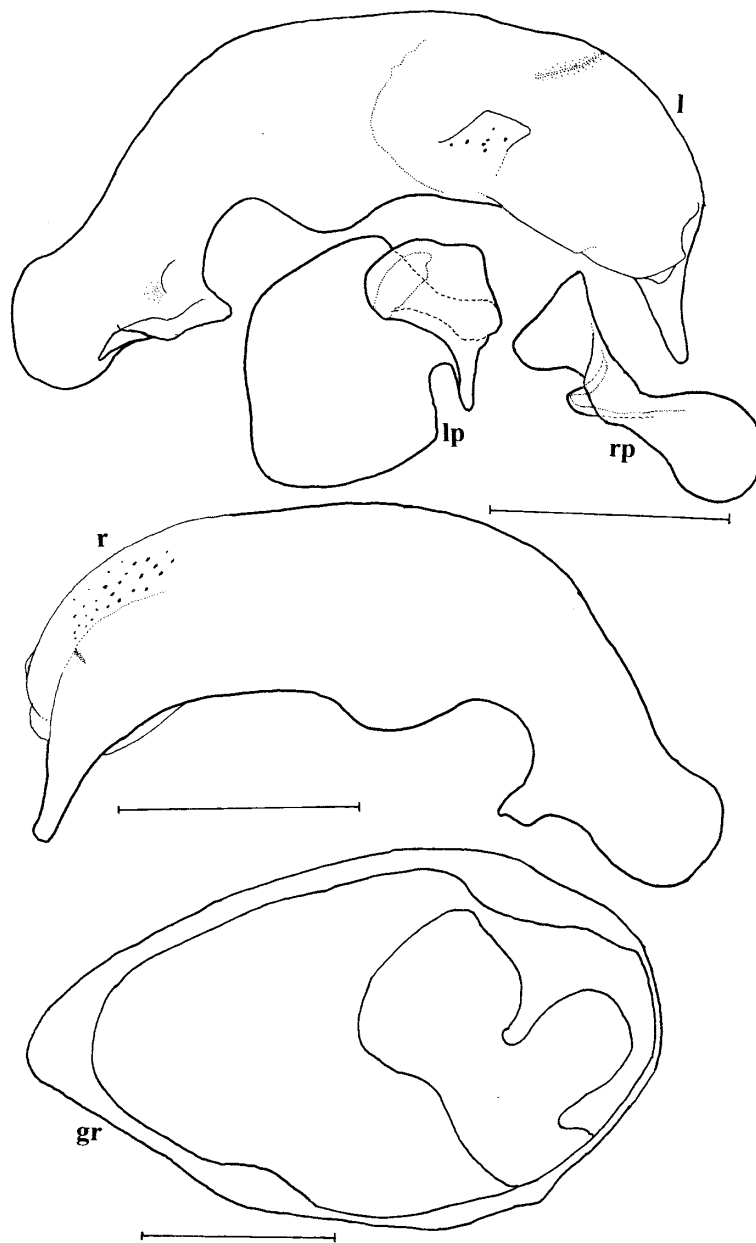


Fig. 5. Aedeagus of *Pterostichus naga-sawai* N. Ito *et* Ogai, sp. nov. l, Left lateral view; r, right lateral view; lp, left paramere; rp, right paramere; g, genital ring. Scales: 1.0 mm.

rounded; basal angles triangularly produced laterad, a little smaller than right angle; lateral furrows narrow throughout; front transverse impression shallow, arcuate, the hind one also shallow, straight; median line thin but clear, more or less deep; basal foveae each narrow, arcuate, isolated from lateral furrow by weak and longitudinal hump; microsculpture partly impressed, observed as square meshes partly on disc and entirely in basal foveae.

Elytra oblong, 1.6–1.7 times as long as wide, almost parallel at sides, flat widely on disc, slightly declivous near sides, obscurely and very sparsely punctate (a little more clearly punctate in individuals of *Daimyoujin-zawa*); sides weakly arcuate in short humeral area, parallel in wide areas, abruptly convergent near apices, very shallow at preapical sinus; apices slightly arcuate in male, sublinear in female, obtuse and almost sharp at sutural angles; bases each shallowly emarginate, forming very obtuse and sharp

angle with lateral border; striae shallow, rather wide, with vague seriate punctures, scutellar striae short, not reaching 1st striae; intervals flat throughout, 3rd interval with two setiferous pores, one pore situated near middle and another so at apical 1/7; marginal series very widely interrupted in middle, the interruption 2/3 of elytral length, fore group consisting of 5 umbilicate pores and the hind one of (5–6) pores; microsculpture clearly impressed (a little more clearly so in individuals of *Daimyoujin-zawa*), consisting of mixtures with square and isodiametric meshes. Hind wings reduced, 0.11–0.12 times as long as the length of elytra.

Ventral surface mostly smooth, moderately and sparsely punctate on lateral areas of metaventricle, metepisterna, and lateral areas of 2nd and 3rd sternites; metepisterna short, 1/5 shorter than wide. Seventh sternite in male (Fig. 6-as) unisetose at each side, shallowly and roundedly concave in apical half, slightly and longitudinally ridged in basal half

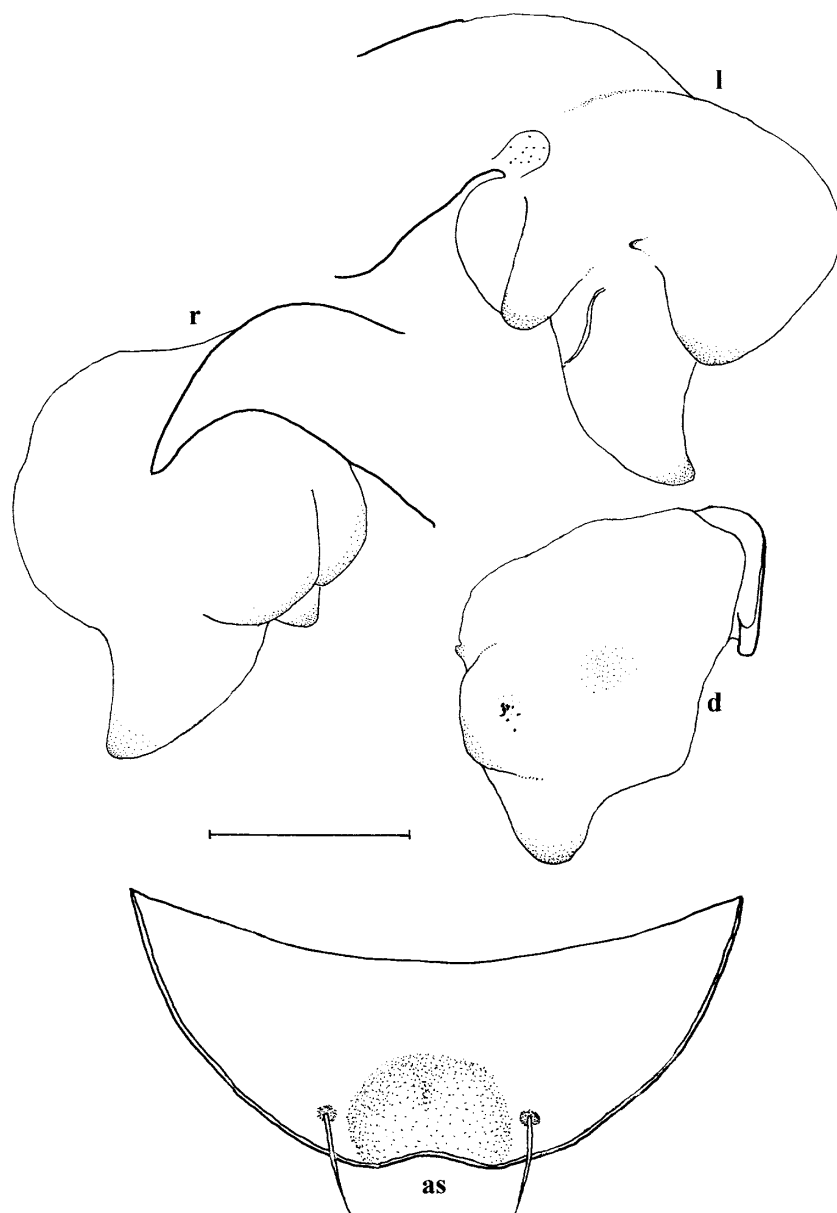


Fig. 6. Everted inner sac of aedeagus and 7th sternite of *Pterostichus nagasawai* N. Ito *et* Ogai, sp. nov. l, left lateral view; r, right lateral view; d, dorsal view; as, 7th sternite. Scale: 1.0 mm.

of the concavity, gently arcuate and with very shallow notch at apical margin; female bisetose, transversely depressed in apical third area and rugose in the depression, sublinear in wide area where very shallowly emarginate in middle.

Fore tibia smooth dorsally, with slim and edentate terminal spur; tarsi dorsally not rugose and with microscopic and very sparse punctures, hind tarsus 1/6 shorter in male and one-fourth shorter in female than the width of head, 1st segment 0.81–0.83 times as long as the 2nd and 3rd taken together, 3/4 longer than the 3rd and 2.2 times as long as the 4th, claw segment not setose ventrally.

Aedeagus (Fig. 5) stout, twisted towards left, strongly humped ventrally behind curving point; apical lobe elongate, rounded at tip; dorsal orifice wide and directed towards left, everted inner sac (Fig. 6) bearing two large lobes and rather small and elongate lobe directed obliquo-ventrad, and two widely rounded small lobes, middle one of the large lobes long and directed ventrad.

Length of body: 12.4–13.2 mm. Width of body: 3.9–4.2 mm.

Holotype: ♂, Ôyafudô, Nire (= Nirei), Susaka (= Suzaka) City, Nagano Pref., Japan, 10. VI–16. VII. 2014, T. Ogai *et* R. Nagasawa leg. Paratypes: 5♂♂, 7♀♀, same data as the holotype; 3♂♂, 1♀, Mt. Hashigo-yama. Nire (= Nirei), Susaka (= Suzaka) City, Nagano Pref., Japan, 10. VI–16. VII. 2014, T. Ogai *et* R. Nagasawa leg.; 1♂, 1♀, ditto, 28. VIII–2. X. 2014, T. Ogai *et* R. Nagasawa leg.; 1♀, ditto, N. 36°34'12.03", E. 138°21'30.15", alt. 1,160 m, 28–29. VIII. 2014, M. Yoshida leg.; 1♀, ditto, 28. VIII–4. X. 2014; 2♀♀, Daimyoujin-zawa, SMBC (= Sugadaira Montane Research Center, University of Tsukuba), Sugadaira Kôgen, Ueda City, Nagano Pref., 20. VI–15. VII. 2014, T. Ogai *et* R. Nagasawa leg.; 1♀, ditto, 15. VII–22. VII. 2014.

Remarks. This new species is allied to *Pterostichus koheii* Nakane 1963, (Nakane 1963a, b; Morita and Hirasawa, 1996) in wide middle space of the marginal series, but is easily

distinguished from the latter by the body smaller and more flattened, the colour is lighter, the eyes are much smaller, and aedeagus is strongly humped ventrally.

The macrocephalic *Pterostichus* in Honshu seems to be clustered in several complexes and now we are trying to clear systematics of these carabids by both aspects of morphological characters and DNA phylogenetic analysis. In future we shall study in detail. At the present estimation, this new species and *P. koheii* might be in the same complex as they have marginal series of elytra widely interrupted in middle etc.

Ecology: Habitat of the new species is talus slope as Figs. 3 and 4. They were collected mostly by traps set under 50 cm depth from the ground surface. This ecology is the same in manner of the other macrocephalic *Pterostichus*.

Two individuals of the macrocephalic carabid, *Pterostichus macrogenys* Bates were collected in same points (Mt. Hashigoyama and Ôyafudo) where the new species were found. Also a specimen of *macrogenys* was collected in Ôbora, Ueda City, which is situated nearly 3.5–5.0 km from collecting points of the new species. The new species and *macrogenys* are sympatric to each other. This phenomenon is very interesting. Sasakawa (2009: 268) suggested that both large-sized and small-sized species dwell near regions but such a complete sympatry is not reported.

Specimens of *P. macrogenys* in the areas: 1♀, Mt. Hashigoyama. Nire (= Nirei), Susaka (= Suzaka) City, Nagano Pref., Japan, 10. VI–16. VII. 2014, T. Ogai et R. Nagasawa leg.; 1♂, Ôyafudô, Nire (= Nirei), Susaka (= Suzaka) City, Nagano Pref., Japan, 28. VIII–2. X. 2014, T. Ogai et R. Nagasawa leg.; 1♂, Ôbora, Sugadaira Kôgen, Ueda City, Nagano Pref., 10. X–30. X. 2013, T. Ogai leg.

Specimens compared of *Pterostichus koheii*: 1♂, Natsuzawa Pass, (Mts. Yatsugatake), Nagano Pref., 13. VIII. 1978, N. Ito leg.; 3♂♂, Gokô bokujô (= ranch) Campsite, Minamisaku-gun, Nagano Pref., 2. VIII–8. IX. 2014, T. Ogai et R. Nagasawa leg.

Etymology. The specific name is dedicated to Mr. Ryô Nagasawa, Yokohama, former student of Tsukuba University, who actively supported in field of many areas with junior author.

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