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# A New Saproxylophilous Trechine Beetle from Central Taiwan

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Abstract A new saproxylophilous trechine beetle belonging to the Agonotrechus series is described from the subalpine zone of central Taiwan. It closely resembles Iga in general appearance, but is probably closer to Lamprotrechus, both from high mountains of Southwest Japan. A new genus is erected for the new species, which is named Taiwanotrechus subglobosus.

Since 1961 when I made the first collecting trip to the high mountains of Taiwan off the eastern coast of China, it has been known that a strange trechine beetle closely similar in facies to *Iga formicina* S. UÉNO of the high mountains of Shikoku, Southwest Japan, occurs in the subalpine zone of central Taiwan. Only a pair of its specimens were found clinging to the under surface of a rotten log lying at the side of a road near the timber-limit of Mt. Ho-huan Shan. Though its occurrence was preliminarily reported (UÉNO, 1975, p. 150), its proper description has been postponed, mainly in the hope that some additional specimens might turn up by collectings of Japanese coleopterists, especially of those who are interested in ground-living beetles. Unfortunately, however, none of them have been able to come across this interesting species, although a fair number of other trechines have been obtained, above all by Mr. Yasutoshi SHIBATA who always employs a sifting method.

On the other hand, it has become more and more needed to introduce the subalpine trechine into science for making an analysis of the distributional pattern of the subfamily Trechinae in the Far East. The species belongs to the *Agonotrechus* series, whose constituents are distributed from the Himalayas in the southwest to Hokkaido of Northeast Japan and the Maritime Territory of the Soviet Far East in the northeast. Though an endemic species of this genus-group is already known from Taiwan (JEDLIČKA, 1932, p. 82; UÉNO, 1980), it belongs to the plesiomorphic genus *Agonotrechus* widespread in South Asia and is radically different from the species under consideration. The occurrence of an apomorphic species in Taiwan neatly fills in the wide blank in the distribution of derivative forms, which have been recorded so far from the eastern Himalayas to Yunnan and Southwest Japan to the Maritime Territory. Besides, the Taiwanese species is a saproxylophile quite exceptional for a trechine beetle.

In view of the situation delineated above, I have decided to describe the new species in the present paper on the basis of the pair obtained in 1961. It belongs to

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a new genus, and since the genus-group of *Agonotrechus* has been rather poorly known, I will propose a key to the genera first, so as to improve the one proposed by CASALE and LANEYRIE (1982, p. 22). The abbreviations used herein are the same as those explained in other papers of mine.

Before going further, I wish to express my heartfelt thanks to Dr. Hiroyuki MORIOKA and Dr. Ryôsuke ISHIKAWA, whose kind support enabled me to carry out my 1961 expedition to the high mountains of Taiwan.

### Key to the Genera of the Agonotrechus Series

- 1 (16) Elytral stria 3 with less than four setiferous dorsal pores.
- 2 (7) Elytral striae either entire or at least complete on the disc; prehumeral borders complete to the base of stria 5; preapical pore present; humeral set of marginal umbilicate pores aggregated.
- 4 (3) Prothorax cordate, more or less contracted at the base, with the sides narrowly reflexed, especially behind middle.

- 7 (2) Elytral striae either degenerated or at least evanescent at the humeral, apical and lateral parts; prehumeral borders attenuated inwards and not forming a distinct terminal point at the base of stria 5; apterous.
- 8 (9) Body elongate, not constricted between fore and hind bodies; prothorax ample, very wide at the base, with very widely reflexed sides not sinuate behind; elytra with two setiferous dorsal pores on the site of stria 3 and a preapical pore on apical declivity; (Bhutan)......

.....Bhutanotrechus S. Uéno, 1977.

- 9 (8) Body more or less shorter and distinctly constricted between fore and hind bodies; prothorax cordate, contracted at the base, with the side borders either narrow or posteriorly effaced; preapical pore normally absent.
- 10 (15) One or two setiferous dorsal pores present on or on the site of stria 3, none on the site of stria 5; pronotum without discal setae; humeral set of marginal umbilicate pores either perfectly aggregated or nearly so.
- 11 (12) Only one setiferous dorsal pore present on or on the site of stria 3; mentum fused with submentum; protibiae externally grooved; (Himalayas)....

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12 (11) Two setiferous dorsal pores present on the site of stria 3; mentum not fused with submentum; protibiae not externally grooved.

- 13 (14) Pronotum entirely bordered at the sides and with two pair of marginal setae; labrum very deeply emarginate at the apex, almost bilobed; dor-sum moderately convex; ventral surface sparsely pubescent at the median parts; humeral set of marginal umbilicate pores perfectly aggregated; (Is. Yaku-shima off southern Kyushu)....Lamprotrechus S. UÉNO, 1975.
- 14 (13) Pronotum not bordered at the sides behind middle and with only a single pair of marginal setae, postangular pair absent; labrum moderately emarginate at the apex; dorsum strongly convex; ventral surface glabrous except for prosternum; humeral set of marginal umbilicate pores imperfectly aggregated; (Taiwan).....Taiwanotrechus S. UÉNO, gen. nov.
- 16 (1) Elytral stria 3 with five or six setiferous dorsal pores; preapical pore present; humeral set of marginal umbilicate pores perfectly aggregated.

# Genus Taiwanotrechus S. UÉNO, nov.

Type species: Taiwanotrechus subglobosus S. Uéno, sp. nov.

Belonging to the Agonotrechus series and intermediate between Iga S. UÉNO (1953, p. 30) and Lamprotrechus S. UÉNO (1975, p. 144). Closer to the former in the body form including the convexity of dorsum, the shape of labrum, the degeneration of the lateral borders of prothorax, and so on, but identical with the latter in the absence of such peculiarities as the discal setae on pronotum, the third dorsal pore on the site of elytral stria 3, the dorsal pore on the site of elytral stria 5, and the external groove on each protibia. The humeral set of marginal umbilicate pores is not perfectly aggregated, but the fourth pore is closer to the third than in Iga. Besides, this new genus is different from either of the two northern genera in the absence of the postangular pair of marginal setae on prothorax.

Habitus somewhat myrmecoid, with small fore body and large semispherical



Fig. 1. Taiwanotrechus subglobosus S. UÉNO, gen. et sp. nov., S, from Mt. Ho-huan Shan in central Taiwan.

elytra; surface glabrous and polished on both dorsum and venter, with the exception of prosternum which bears several hairs in the middle; microsculpture entirely absent; colour light brown; inner wings absent.

Head fairly large, transverse, with deep entire frontal furrows which are rather widely divergent in front and behind but not angulate at middle; two pair of supraorbital pores present on lines rather widely divergent posteriad, the anterior one being foveiform and fairly close to the posterior; eyes small though longer than genae, which are convex and completely glabrous; labrum transverse and moderately emarginate at the apex; mandibles stout though sharply hooked at apices, bidentate; mentum free, not fused with submentum, with a broad porrect tooth in apical emar-

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gination, which is truncated and very slightly emarginate at the tip; submentum sexsetose; ligula porrect, octosetose as usual; paraglossae thin and arcuate, extending much beyond ligula. Palpi short and stout; penultimate segments widely dilated towards apices, especially in maxillaries, quadrisetose in labial palpus and with a few minute hairs around the apex in maxillary palpus; apical segments elongated subconical, about as long as penultimate segment in labial palpus, obviously longer than the penultimate in maxillary palpus. Antennae short and stout, submoniliform.

Prothorax small, cordate and strongly convex on dorsum, strongly contracted at the base, which is narrowly subpedunculate; side borders incomplete, disappearing behind middle; front angles rounded off; hind angles very obtuse; only a pair of marginal setae present just behind the widest part, postangular pair absent; disc smooth, with a shallow median depression just behind apical transverse impression which is slight but detectable; basal transverse impression sulciform and parallel to basal margin, laterally joining basal foreae which are small but distinct.

Elytra oval, short and broad, fused together, and strongly convex; shoulders rounded off; prehumeral borders slightly arcuate, attenuated inwards, and reaching the outer ventral side of the convex basal portion of interval 5 as a fine innermost point; sides narrowly reflexed, the borders becoming narrower behind middle; striae vestigial excepting the sutural one and apical half of stria 8, scutellar striole short but deeply impressed, apical striole very short and irregular though deep, being directed to the site of stria 5; intervals completely flat, apical carina obtuse; two setiferous dorsal pores present on stria 3 but none on the site of stria 5; preapical pore absent; apical pores normal; marginal umbilicate pores almost aggregated, though the fourth pore of the humeral set is somewhat isolated.

Ventral surface smooth; prosternum with several, fairly long hairs in the middle; sternites 3-5 each with usually three, sometimes two pair of setae along the posterior margin; anal sternite longer and more narrowly rounded at the apex in  $\mathcal{J}$  than in  $\mathcal{Q}$ , with a pair of sexual setae in  $\mathcal{J}$ , with two pair of them in  $\mathcal{Q}$ . Legs short but fairly slender; protibiae straight, moderately dilated towards apices, entirely pubescent, and not externally grooved; tarsi fairly thin, segment 4 with a hyaline ventral apophysis in pro- and mesotarsi; in  $\mathcal{J}$ , two proximal segments of each protarsus feebly dilated, inwardly denticulate at apices, and furnished beneath with sexual adhesive appendages.

Aedeagus gutter-like, flattened and widely open on the dorsal surface, though the basal bulb is complete and bears a large sagittal aileron; apical lobe not particularly long, flattened at the apical part which forms an ovate horizontal disc; inner sac armed with a large asymmetrical copulatory piece but devoid of teeth-patches; copulatory piece elongate, with an elongate apical lamella at the right side which is protruded from apical orifice. Styles slender, with very narrow apical parts, each bearing four short setae.

Range. Known so far only from a high mountain in the Island of Taiwan. Notes. Though closely similar to Iga in general appearance and reduction of

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the lateral borders of prothorax, this new genus seems more closely related to *Lamprotrechus* because of the similarity in the chaetotaxy and the conformation of protibiae. From *Stevensius* of the Himalayas, it can be readily distinguished by the degeneration of pronotal lateral borders, the absence of postangular setae on pronotum, the presence of a second dorsal pore on the third elytral stria, the free mentum, and the absence of the external groove on each protibia.

Within the Agonotrechus series, Agonotrechus itself is the most primitive and unspecialized genus. Its members are usually alate and live in temperate forests at relatively low altitudes, beside running waters or in wet places. From ancestors similar to existing Agonotrechus, two different lineages have become differentiated. One comprises Bhutanotrechus, Paragonotrechus and Masuzoa, which are longlegged and ground-living, more or less heading for subterranean life like many trechines belonging to other genus-groups. The other lineage consists of Lamprotrechus, Taiwanotrechus, Stevensius and Iga, whose members are always short-legged and have short convex body constricted between pro- and mesothoraces. Of these, Lamprotrechus is humicolous like many other mesophilous trechines, but the others spend more specialized life. The members of Stevensius are either muscicolous or saproxylophilous; muscicolous species live under mosses growing on trunks of living conifers or rhododendrons, and climb up to a height of 2 m or more; saproxylophilous species usually inhabit decayed trunks of fallen trees, often half-buried in the ground, but are sometimes found in decayed debris accumulated in shallow holes on standing trunks of dead trees. Taiwanotrechus is similar to saproxylophilous species of Stevensius, though it is not known if it burrows its way into the rotten cores of tree trunks. Lastly, Iga is primarily muscicolous, living under moss-mats covering rocks in shaded places, though it may be found from under dead leaves in such spots as the population density is relatively high.

Thus, Taiwanotrechus falls in the Stevensius lineage not only morphologically but also ecologically. I have spent many words in explaining the peculiar habitats of Stevensius and its relatives, since they are quite exceptional for trechine beetles but have never been recorded before. Judging from the morphological features, "Stevensius" gregoryi JEANNEL from southern China, which may belong to a new genus, doubtless falls in the same lineage, but I am not sure about the true affinity of Kozlovites caviceps JEANNEL from Tibet. I have examined the unique holotype of this remarkable species at the Zoological Institute of the Academy of Sciences, Leningrad; its morphological features show that the species is neither saproxylophilous nor muscicolous but ground-living. This suggests that contrary to the comment made by JEANNEL (1937, p. 88), "S." gregoryi may not be a direct relative of Kozlovites as was already noted (UÉNO, 1977 b, p. 246).

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# (Figs. 1-3)

Length: 3.35-3.45 mm (from apical margin of clypeus to apices of elytra).

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Body strongly constricted between prothorax and hind body, fore body small and narrow, hind one semispherical. Colour light brown, very shiny, with fore body somewhat darker and more or less reddish; palpi, terminal segment of antennae, epipleura and legs yellowish brown, more or less lighter than body.

Head fairly large, obviously wider than long, with very wide neck; frons and supraorbital areas moderately convex and smooth; frontal furrows deep throughout, more strongly arcuate in front than behind; eyes small though moderately convex; genae gently convex, about two-fifths as long as eyes, and strongly contracted posteriad; neck constriction deep, sharply marked at the sides; antennae submoniliform, reaching basal two-sevenths of elytra, scape thick, broader than any of the other segments and about as long as the terminal, segments 2 and 4–10 subequal in length, each subovoid and about twice as long as wide, segment 3 about 1.2 times as long as its neighbouring ones and about three-fourths as long as the terminal.

Prothorax small, cordate, a little wider than head, wider than long in a similar proportion, widest at about two-thirds from base, and strongly contracted towards base; PW/HW 1.10 in the holotype  $\mathcal{J}$ , 1.16 in the allotype  $\mathcal{P}$ , PW/PL 1.11 in  $\mathcal{J}$ , 1.17 in  $\mathcal{P}$ , PW/PA<sup>11</sup> 1.46 in both  $\mathcal{J}$  and  $\mathcal{P}$ , PW/PB 1.74 in  $\mathcal{J}$ , 1.75 in  $\mathcal{P}$ ; surface strongly convex and smooth; sides strongly arcuate in front, much less so behind middle, and very briefly sinuate just before hind angles, with the borders very fine near front angles though continuing inwards to apical transverse impression; apex slightly arcuate, with front angles rounded off; base much narrower than apex, PA/PB 1.19 in  $\mathcal{J}$ , 1.20 in  $\mathcal{P}$ , arcuate, and briefly oblique just inside hind angles, which are very obtuse, deflexed and foveolate; median line fine though distinct, longitudinally depressed just behind apical transverse impression, somewhat deepening posteriad and reaching basal transverse impression, which is deep though narrow, arcuate and smooth; basal foveae close to hind angles, small but fairly deep, elongate, and smooth; postangular carinae absent; basal subpedunculate area narrow, somewhat carinate and smooth.

Elytra oval, semispherically convex, much wider than prothorax, widest at about middle, and equally narrowed towards bases and apices; EW/PW 1.77 in both 3 and 9, EL/EW 1.38 in 3, 1.34 in 9; basal part briefly subpedunculate, being limited on each side by the convex basal portion of interval 5; prehumeral borders oblique, with the innermost portions not observable from above; sides evenly arcuate, without preapical emargination, apices almost conjointly rounded though forming a very small re-entrant angle at suture; stria 1 entire, fairly deep and smooth, 2 and 3 more or less traceable on the disc though very slight and incomplete, 4–5 or 6 either partially indicated by very fine, sparse punctures or totally effaced, 8 deeply impressed behind the middle set of marginal umbilicate pores, all the striae being indicated by rows of coarse punctures on the inner surface, which can be seen through the translucent integument; scutellar striole distinct, smooth; apical striole briefly arcuate and free at the anterior end; setiferous dorsal pores situated at about basal

<sup>1)</sup> The PA value is approximate, as the front angles are completely rounded off.

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Figs. 2-3. Male genitalia of *Taiwanotrechus subglobosus* S. UÉNO, gen. et sp. nov., from Mt. Ho-huan Shan in central Taiwan; left lateral view (2), and apical part of aedeagus, dorsal view (3).

1/7 and a little before the middle.

Male genital organ fairly large though lightly sclerotized. Aedeagus about four-ninths as long as elytra, elongate, flattened and feebly arcuate; basal part feebly curved ventrad, with rather small basal orifice, the sides of which are deeply emarginate; sagittal aileron large though hyaline; apical part slightly reflexed, with short narrow apical lobe blunt at the tip in lateral view; viewed dorsally, apical part gradually narrowed towards the apex, which is dilated and forms an ovate disc; ventral margin widely emarginate at middle in profile. Copulatory piece very large, nearly a half as long as aedeagus, with an elongate apical lamella narrowly rounded at the apex; dorso-proximal part forming a widely rounded lamella at the left side. Styles long and slender, left style a little longer than the right, each provided with three short setae at apex and a smaller subapical one on the internal face.

Type series. Holotype:  $\Im$ , allotype:  $\Im$ , 15-VI-1961, S. UÉNO leg. Deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

*Type locality.* Mt. Ho-huan Shan (southern ridge of the main peak), 3,000 m in altitude, in Nan-t'ou Hsien, central Taiwan.

*Notes.* As was mentioned in the introduction of this paper, the type specimens of this interesting new trechine were taken in the subalpine zone of Mt. Ho-huan Shan, which is the main peak of the Ho-huan Shan Mountains of the Chung-yang Shan-mo (central mountain range) of Taiwan and attains to a height of 3,416 m. The road leading from Jen-ai to Li-shan and T'ien-hsiang cuts through a very steep slope of the southern ridge above the head of the Ho-huan Ch'i Valley, and climbs

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up to the eastern side of the main peak of the mountain. It was on this ridge that the two known specimens of *Taiwanotrechus* were found together with a specimen of *Epaphiopsis* from under a rotten log, which seemed to have been cut down many years before and to have been carried there from somewhere nearby, as the collecting site was on an open rocky slope. The *Epaphiopsis* was crawling on the ground beneath the log, while the two *Taiwanotrechus* were clinging to the bottom of a soft crack on the under surface of the log. They were not so active when exposed but were readily detected by the shimmer of their polished bodies.

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