

## *Agonotrechus horni* (Coleoptera, Trechinae), a Taiwanese Species Showing an Altitudinal Wing Dimorphism<sup>1)</sup>

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The genus *Agonotrechus* is a group of trechine beetles distributed on the mountain areas of South Asia. Five species of this genus have hitherto been described, one each from the western Himalayas, the eastern Himalayas, northern Burma, northern Viet Nam and the Island of Taiwan (BATES, 1892, pp. 297–298; JEANNEL, 1923, pp. 428–431, 1928, pp. 23, 28, 85–90; CSIKI, 1928, p. 284; JEDLIČKA, 1932, p. 82, 1939, p. 1; ANDREWES, 1935, pp. 61, 74–78).<sup>2)</sup> Each has previously been known from a very small number of specimens scattered to several European museums, and though two earlier species were carefully described or redescribed by JEANNEL, the remaining three were based upon rather poor descriptions. Besides, no account has ever been given of their habitats, probably because none of them were collected by specialists of carabid beetles. This is unfortunate, since the genus was assigned by JEANNEL to the type-genus of his “série phylétique d’*Agonotrechus*”, to which a series of more specialized genera has been attached. *Agonotrechus* has been currently considered to consist of fully winged species, whereas all the trechines belonging to the other genera of the same genus-complex are devoid of hind wings.

Through the courtesy of Messrs. Yasutoshi SHIBATA and Taichi SHIBATA as well as by my own efforts, I was able to obtain a fairly long series of specimens of *Agonotrechus* from the central mountains of Taiwan. To my surprise, most of them were flightless due to the brachypterous condition, though there were several specimens in which the hind wings were fully developed. A careful examination revealed that all the macropterous specimens were obtained at localities below 1,500 m in altitude and that the specimens collected at higher places were invariably brachypterous, and though slight differences in the body form were observed between the two forms, they were considered to belong to the same species, *Agonotrechus horni* JEDLIČKA (1932, *loc. cit.*).

Then, a problem arose: to which form does the type-specimen of *A. horni* belong? Since I had been unable to locate the whereabouts of that specimen, I endeavoured to obtain some topotypical materials, but failed in getting any in spite of my own visits to the type-locality, made in 1961 and 1965. It was surmised that the type was a

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2) A species of this genus was recently found in the Nepal Himalaya.

macropterous individual, since the type-locality, Shui-ch'e-liao, is a small village at an altitude of 1,250 m, and since two specimens of the beetle taken at Fen-ch'i-hu, which is only 3.5 km distant to the east from Shui-ch'e-liao, were fully winged. This supposition was proved right by my re-examination of the type-specimen, which was recently found out by Dr. HIEKE and sent to me for study through his kind arrangement.

In the present paper, I am going to redescribe this interesting species. It differs from the other known members of the genus in that the third elytral stria bears two setiferous dorsal pores instead of one, that the general appearance is thickset, and that the appendages are relatively short and stout. JEDLIČKA appears to have intended to erect a new genus for this trechine, probably in view of these peculiarities, since the specimen in the JEDLIČKA collection, now preserved in the Národní Muzeum v Praze, bears a label inscribed by him "*Uenotrechus* [in litt.] *horni* JEDLIČKA". In my opinion, however, even a subgeneric discrimination is not necessary for placing this species, at least for the time being. A species-group of its own can be recognized within the genus mainly in view of the chaetotaxial peculiarity, but for erecting a new taxon based upon this character, we have to wait for further information, especially from the Chinese Continent.

The abbreviations used herein are the same as those explained in other papers of mine, with the additions of IALE (=Abteilung Taxonomie der Insekten, Akademie der Landwirtschaftswissenschaften der Deutschen Demokratischen Republik, Eberswalde), ENMP (=Entomologické Oddělení, Národní Muzeum v Praze), and TS (=Mr. Taichi SHIBATA's collection).

I wish herewith to express my hearty thanks to Dr. F. HIEKE and the staff of the Abteilung Taxonomie der Insekten, Akademie der Landwirtschaftswissenschaften der Deutschen Demokratischen Republik, Eberswalde, for their kind arrangement of the loan of JEDLIČKA's type-specimen, to Drs. Zdeněk MLYNÁŘ and Josef JELÍNEK for giving me the privilege of re-examining the specimen in the JEDLIČKA collection, and to Messrs. Yasutoshi SHIBATA and Taichi SHIBATA for their kindness in submitting their specimens to my study.

### *Agonotrechus horni* JEDLIČKA, 1932

(Figs. 1-3)

*Agonotrechus Horni* JEDLIČKA, 1932, Čas. Čs. Spol. ent., **29**, p. 82; type-locality: Suisharyo (=Shui-ch'e-liao).

*Macropterous individuals.* Length: 4.40-4.65 mm (from apical margin of clypeus to apices of elytra).

Body short and broad, with small head, transverse prothorax and short broad hind body; inner wings fully developed. Colour black, shiny and iridescent, especially on elytra; basal area of pronotum and reflexed lateral margins of elytra reddish brown;

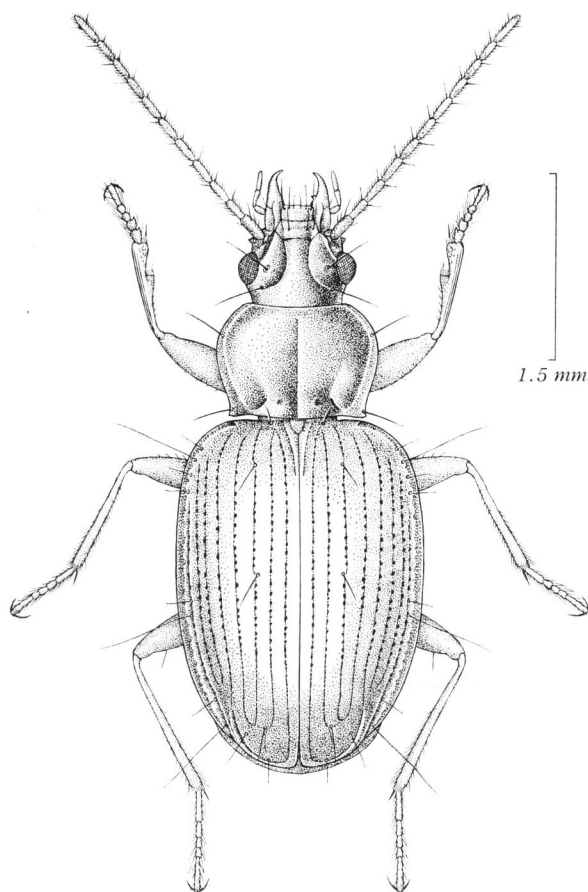


Fig. 1. *Agonotrechus horni* JEDLIČKA, ♂ holotype, from Shui-ch'e-liao in central Taiwan.

elytra brownish black in SAUTER's specimen and dark brown in the Fen-ch'i-hu one taken by SHIBATA, but wholly black in the Fen-ch'i-hu one taken by ITO and black with brownish apical part in the Lu-shan one; palpi, antennae (becoming lighter towards apices), epipleura and legs (and also the ventral surface of hind body in SHIBATA's specimen from Fen-ch'i-hu) reddish brown to dark reddish brown.

Head small, transverse and depressed above; eyes small, but strongly convex, semiglobular and perfectly faceted; frontal furrows entire, hardly angulate at middle, moderately impressed in front, and widely divergent behind towards ill-defined neck constriction; frons and supraorbital areas gently convex, the latter bearing two pair of supraorbital setae, which are situated on lines divergent posteriad; microsculpture fine, partially obliterated, consisting of fine transverse lines partially forming transverse meshes; genae flat, glabrous and evidently less than a half as long as eyes (one-third

to two-fifths as long as eyes though the accurate length of genae cannot be measured because of the absence of distinct neck constriction), rapidly converging posteriad and continuing to wide neck without marked boundaries; labrum transverse, with the apical margin very slightly bisinuate; mandibles fairly slender though not so long, sharply hooked at apices; mentum fused with submentum, the former with a simple broad tooth in apical emargination, the latter with a transverse row of eight setae; palpi short though fairly slender, penultimate segments moderately dilated towards apices, apical segments gradually tapering towards blunt extremities; antennae filiform though not long, reaching basal three-tenths of elytra; antennal segment 2 about three-fourths as long as segment 3 or 4, segments 8–10 each cylindrical and about 2.5 times as long as wide, terminal segment the longest though obviously narrower than scape.

Pronotum transverse, much wider than head, widest at about three-fifths from base, and much more strongly contracted towards apex than towards base; PW/HW 1.40–1.45 (M 1.42), PW/PL 1.41–1.43 (M 1.42), PW/PA 1.70–1.76 (M 1.73), PW/PB 1.18–1.21 (M 1.20); disc convex, with vague transverse striations; microsculpture vague though consisting of fine transverse lines, partially obliterated altogether; sides widely explanate and reflexed though the reflexed margins become much narrower towards front angles, strongly rounded in front, feebly arcuate behind middle, and briefly sinuate just before hind angles, which are small, nearly rectangular and strongly reflexed; both lateral and postangular setae present, the latter being just in front of hind angle; apex narrow, either straight or very slightly emarginate, with front angles very obtuse and hardly produced; base much wider than apex, PB/PA 1.42–1.47 (M 1.45), bisinuate, with shallow emargination on each side; median line distinctly impressed on the disc and more or less widening in basal area; apical transverse impression indicated only by vague wrinkles; basal transverse impression slight, with a foveole on each side of median line; basal foveae large and deep, smooth at the bottom; no postangular carinae; basal area smooth.

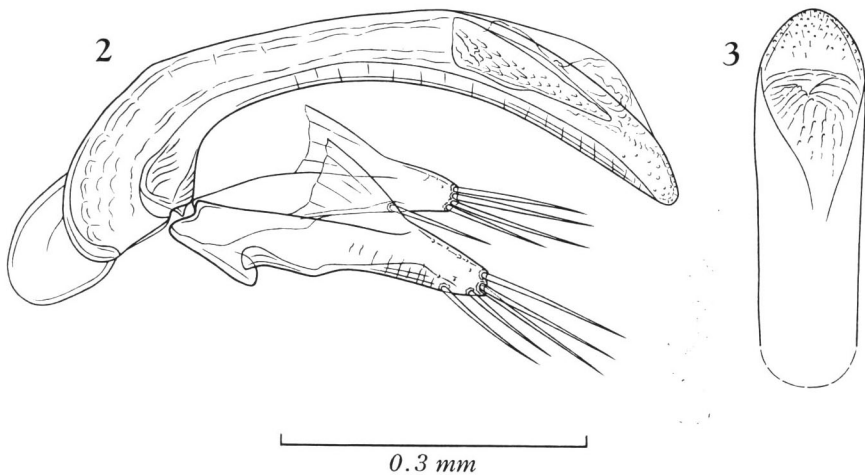
Elytra short, ovate, almost parallel-sided in basal half though widest at about three-eighths from base; in the Lu-shan specimen, the elytra are more widely parallel-sided, widest at about four-ninths from base, and have ampler apical half, hence resembling those in the brachypterous form; EW/PW 1.46–1.54 (M 1.50), EL/EW 1.34–1.41 (M 1.38); surface convex, especially in apical half; microsculpture obliterated, though trace of fine transverse lines is partially perceptible; shoulders distinct though rounded, with prehumeral borders perpendicular to the mid-line at the innermost portions; sides narrowly bordered and reflexed, either feebly arcuate or almost straight behind shoulders, but moderately rounded in apical third without appreciable preapical emargination; apices almost conjointly rounded; striae moderately deep, equally impressed on the disc and at the side, coarsely punctate though the punctures become finer apically; scutellar striole fairly long; apical striole short but deep, moderately curved and joining stria 5; intervals smooth, gently convex especially on the disc; apical carina distinct though obtuse; stria 3 with two setiferous dorsal pores situated

at 1/10–1/8 and 2/5–4/9 from base respectively; preapical pore situated at the apical anastomosis of striae 2 and 3, and at about the same distance from apex and from suture; marginal umbilicate pores perfectly aggregated.

Ventral surface glabrous and smooth; anal sternite with a pair of sexual setae in ♂. Legs fairly slender though not so long; protibia straight, moderately dilated towards apex, with two deep parallel grooves on the external face, and microscopically pubescent on the anterior face at its apical portion; tarsi moderately thin, segment 4 with a long ventral apophysis in pro- and mesotarsi; in ♂, two proximal segments of each protarsus moderately dilated, inwardly denticulate at apices, and furnished beneath with sexual adhesive appendages.

Male genital organ very small though moderately sclerotized. Aedeagus about two-ninths as long as elytra, tubular, slender and arcuate, with small basal part moderately bent ventrad; basal orifice small, with the sides not emarginate; sagittal aileron very large and heavily sclerotized; apical lobe short, widely rounded in dorsal view, blunt at the extremity in lateral view; ventral margin widely emarginate in profile. Inner sac armed with a spatulate copulatory piece near apical orifice. Styles short and broad, left style being larger than the right, each ordinarily provided with four setae at apex; in the holotype, a ventro-subapical seta present on each style in addition to the ordinary ones.

Female unknown.



Figs. 2–3. *Agonotrechus horni* JEDLIČKA, holotype, from Shui-ch'e-liao in central Taiwan. — 2. Male genitalia, left lateral view. — 3. Apical part of aedeagus, dorsal view.

*Brachypterous individuals.* Length: 4.15–5.00 mm (from apical margin of clypeus to apices of elytra).

Distinguished from the macropterous form by the following points, though none of these features are constant with the exception of the shortening of inner wings.

Body usually shorter and broader, with ampler hind body due to the broader apical part of elytra; appendages usually a little stouter; inner wings degenerated, very narrow and always shorter than elytra. Colour variable as in the macropterous form, though the elytra are usually black with iridescence.

Head usually with smaller eyes and longer genae, the former being less protruding and the latter three-eighths to five-ninths as long as eyes; neck constriction more clearly marked; antennae reaching basal three-tenths of elytra in ♂, two-sevenths of elytra in ♀. Pronotum a little wider on an average, with the sides more distinctly, though not deeply, sinuate just before hind angles; PW/HW 1.41–1.57 (M 1.48), PW/PL 1.35–1.47 (M 1.42), PW/PA 1.66–1.84 (M 1.73), PW/PB 1.18–1.24 (M 1.21), PB/PA 1.35–1.52 (M 1.43). Elytra shorter on an average and more parallel-sided, usually widest at about four-ninths from base, with the apical part almost always broader and ampler, forming more widely rounded apices; EW/PW 1.45–1.58 (M 1.49), EL/EW 1.29–1.38 (M 1.33); sides more widely reflexed, more strongly rounded at the level of the apical set of marginal umbilicate pores; striae less coarsely punctate even on the disc. Anal sternite in ♀ provided with two pair of sexual setae as usual. Aedeagal apical lobe usually with lower lateral walls, giving narrower profile.

*Type depository.* Abteilung Taxonomie der Insekten, Akademie der Landwirtschaftswissenschaften der Deutschen Demokratischen Republik, Eberswalde.

*Macropterous specimens examined.* 1 ♂ (holotype), Suisharyo, Formosa (=Shui-ch'e-liao, ca. 1,250 m alt., Chia-i Hsien, Taiwan), X-1911, H. SAUTER leg. (IALE); 1 ♂, Fen-ch'i-hu, 1,400 m alt., Chia-i Hsien, Taiwan, 30-III-1975, N. ITO leg. (TS); 1 ♂, Fen-ch'i-hu, 6-VIII-1977, Y. SHIBATA leg. (NSMT); 1 ♂, Lushan, 1,500 m alt., Ho-t'so-ts'un, Nan-t'ou Hsien, Taiwan, 29-VII-1977, Y. SHIBATA leg. (NSMT).

*Brachypterous specimens examined.* 1 ♂, Arisan (=A-li Shan, Chia-i Hsien, Taiwan), 10-X-1912, I. NITOBE leg. (ENMP); 1 ♀, Wan-sui Shan, 2,300 m alt., A-li Shan Mts., 3-VII-1961, S. UÉNO leg. (NSMT); 1 ♂, Chieh-mei Ch'ih, 2,260 m alt., Chao-p'ing, A-li Shan Mts., 4-VII-1961, S. UÉNO leg. (NSMT); 1 ♀, Sung-kang, 2,050 m alt., NNE of Jen-ai, Nan-t'ou Hsien, Taiwan, 4-VIII-1969, T. KOBAYASHI leg. (TS); 1 ♀, Sung-kang, 20-VIII-1969, Y. MAEDA leg. (NSMT); 1 ♀, Sung-kang, 22-III-1970, H. NOMURA leg. (TS); 1 ♂, 1 ♀, Sung-kang, 31-III-1970, T. KOBAYASHI leg. (NSMT); 12 ♂♂, 11 ♀♀, Mei-feng, 2,150 m alt., NE of Jen-ai, Nan-t'ou Hsien, Taiwan, 28-VII-1979, Y. SHIBATA leg. (NSMT); 2 ♀♀, Ts'ui-feng, 2,200 m alt., NE of Jen-ai, Nan-t'ou Hsien, Taiwan, 28-VII-1973, Y. SHIBATA leg. (NSMT); 5 ♂♂, 2 ♀♀, Ts'ui-feng, 25~26-VII-1974, Y. SHIBATA leg. (NSMT); 2 ♂♂, Ts'ui-feng, 23-VII-1977, Y. SHIBATA leg. (NSMT); 1 ♂, Ts'ui-feng, 2-VIII-1977, Y. SHIBATA leg. (NSMT); 2 ♂♂, 2 ♀♀, Ts'ui-feng, 3-VIII-1979, Y. SHIBATA leg. (NSMT).

*Notes.* Of the known localities of *Agonotrechus horni*, Shui-ch'e-liao and Fen-ch'i-hu are situated on the western ridge of the A-li Shan Mountains, while Lu-shan, Sung-kang, Mei-feng and Ts'ui-feng are distributed on the southwestern ridge of the Ho-huan Shan Mountains, which are more than 60 km distant to the northeast from A-li Shan. The two mountains are separated by the deep valley of the Cho-shui

Ch'i, which embraces the famous resort lake, Jih-yueh T'an. However, no geographical differentiation of the trechine beetle has been recognized between the two groups of localities. The species is considerably variable in the body form and the proportions of body parts, but the variation is either individual or altitudinal. Habitat segregation of the two forms, macropterous and brachypterous, seems to occur on respective mountains, and the flightless form usually, if not always, exhibits some morphological modification caused by the shortening of inner wings. This may have masked slight geographical variation, if there is any. It is expected that such will generally be the case with this species when other populations are found on other mountains of central Taiwan.

The trechine beetles belonging to the genus *Agonotrechus* seem to be primarily hygrophilous. In my own field experience, a Himalayan species of this genus lived at the shaded edge of a swiftly running stream, just like bembidiines. One of the two specimens of *A. horni* taken by myself on the A-li Shan Mountains was found clinging to the under surface of a rotten log partly submerged at the shaded edge of the small lake called Chieh-mei Ch'ih. The other one was taken from beneath a rotten board abandoned in a ditch, which had been dug in front of a hut standing at the edge of a coniferous forest. Most of the remaining specimens of *A. horni* are said to have been sifted out from heaps of moist dead leaves in temperate broadleaved forests. It is, therefore, probable that the members of *Agonotrechus* are of ripicolous origin, but that they tend to lose the ability in taking wing and to become humicolous at higher elevations. Incidentally, the holotype of *A. horni* may have been caught at light, seeing that it was partly covered with moth scales (which were mostly removed when my re-examination was made).

As was already pointed out in the introduction of this paper, *A. horni* is different to some extent from the continental species of the genus. Though I have not had an opportunity to re-examine the type of *A. tonkinensis* JEDLIČKA (1939, p. 1), I have seen almost all the known specimens of the Indo-Burmese species. They are invariably winged and characterized by narrow prothorax and the absence of the posterior dorsal pore on elytra. It is possible that the Taiwanese species has been isolated long enough to form its own species-group, but on the other hand, we cannot deny the possibility that the beetle is rather a newcomer from the Chinese Continent, since its macropterous form is by no means a high altitude inhabitant. Anyway, the existence of *Agonotrechus* in Taiwan is of deep interest from the zoogeographic point of view. It marks the eastern limit of the present distribution of *Agonotrechus* and furnishes an irrefutable proof that the genus was once widespread in South Asia (cf. UÉNO, 1975, p. 150).

### References

- ANDREWES, H. E., 1935. Coleoptera. Carabidae. II.—Harpalinae—I. *Fauna of British India, including Ceylon and Burma*. i-xvi+1-323 pp., 5 pls., 1 map. Taylor & Francis, London.
- BATES, H. W., 1892. Viaggio di Leonardo FEA in Birmania e regioni vicine. XLIV. List of the Carabidae. *Ann. Mus. civ. Stor. nat. Genova*, **32**: 265-428.

- CSIKI, E., 1928. Carabidae: Mormolycinae, Harpalinae II. In JUNK & SCHENKLING, *Coleopterorum Catalogus*, pars 98 (pp. 227–345). W. Junk, Berlin.
- JEANNEL, R., 1923. Les Trechinae [Coleoptera, Carabidae] de la Région Orientale. *Ann. Mag. nat. Hist.*, (IX), 12: 393–435.
- 1928. Monographie des Trechinae. Morphologie comparée et distribution géographique d'un groupe de Coléoptères. (Troisième livraison). Les Trechini cavernicoles. *Abeille, Paris*, 35: 1–808.
- JEDLIČKA, A., 1932. Neue Carabiden aus Ost-Asien. Formosa (H. SAUTER's Formosa Ausbeute), Corea, China. *Čas. Čs. Spol. ent.*, 29: 79–86.
- 1939. Neue Carabiden aus Ostasien. (XII. Teil.). 8 pp. Private publication, Praha.
- UÉNO, S.-I., 1975. The trechid beetles of the Island of Yaku-shima, Southwest Japan. *Mem. Natn. Sci. Mus., Tokyo*, (8): 137–153.