

A Revision of the Tychine Pselaphids (Coleoptera, Pselaphidae) of Japan and its Adjacent Regions

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Abstract Fourteen species of the pselaphid tribe Tychini from Japan, the Russian Far East, Korea and Taiwan are revised. Seven species of the genus *Tainochus* are recognized and four new species, *iwaoi*, *nitidus*, *puncticeps* and *minutus* are described. Four species of the genus *Tychus* are recorded including two new species, *yezoensis* and *yuki-hikoi*. A new genus, *Hyugatychus*, is defined and three new species, *teizonagatomo*, *tokunoshimensis* and *formosanus* are described.

Introduction

The tribe Tychini is a relatively small group of pselaphid beetles comprising ten genera and about 150 species. This tribe is widely distributed in the Holarctic Region, and only the genus *Atychodea* is known from the tropical area of the Oriental Region. In East Asia, two genera and six species were previously recorded from the Russian Far East, South Korea and Japan.

The present study deals with fourteen species of three genera including a new genus and nine new species from Japan and its adjacent regions. The systematic positions of these genera are also discussed.

Tribe Tychini RAFFRAY

Tychini RAFFRAY, 1904, *Anns. Soc. ent. Fr.*, **73**: 254; RAFFRAY, 1908, *Gen. Ins.*, (64): 256; RAFFRAY, 1911, *Coleopt. Cat.*, (27): 111; JEANNEL, 1949, *Mém. Mus. Hist. nat., Paris*, (n. s.), **29**: 42; JEANNEL, 1950, *Fn. Fr.*, **53**: 331; JEANNEL, 1958, *Mém. Mus. Hist. nat., Paris*, (A), **18**: 105; CHANDLER, 1988, *Trans. Am. ent. Soc.*, **114**: 147; KURBATOV, 1992, *Zool. Zh., Moscow*, **71** (10): 143; NOMURA & LEE, 1992, *Esakia, Fukuoka*, (32): 72; NOMURA & LEE, 1993, *ibid.*, (33): 32.

Remarks. This tribe belongs to the section Tychomorphi defined by JEANNEL (1959) together with the small tribe Speleobamini PARK, 1951 known from the Nearctic Region. The tribe Tychini is characterized by the large maxillary palpus with the elongate and internally expanded third segment. In this tribe, nine genera and more than 140 species have been known from the Holarctic Region, and only the genus *Atychodea* including four species are recorded from Tropical Asia.

Key to the Genera of the Tychini of the Oriental Region

1. Elytra each with 3 basal foveae 2.
- Elytra each with 2 basal foveae 3.
2. Third segment of maxillary palpi with an acute projection on its inner side, 4th segment without apophysis [*Atychodea* REITTER].
- Third segment of maxillary palpi with an obtuse angle or a round expansion on its inner side, 4th segment with a small apophysis just inside palpal spine *Tainochus* KURBATOV.
3. Postgena with a large ventral process, abdomen short, 7th to 8th tergites each with a large sexual patch on posterior side in male *Hyugatyclus* nov.
- Postgena flat or roundly expanded, abdomen normal, without sexual patch in male *Tychus* LEECH.

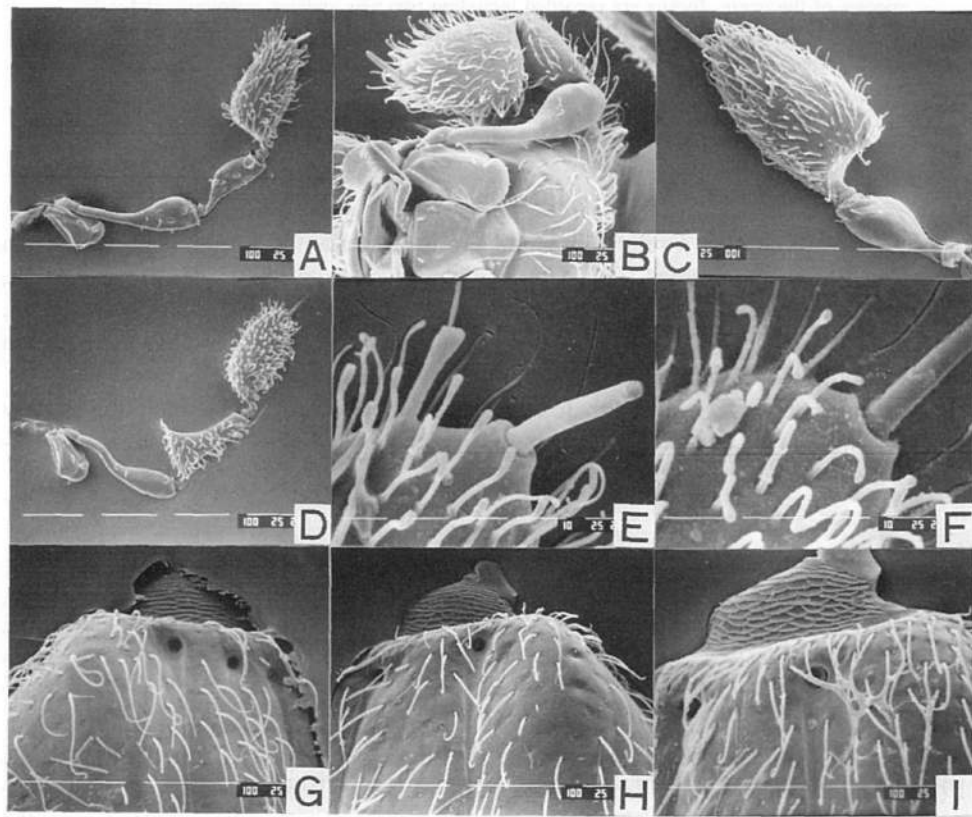


Fig. 1. Diagnostic characters of the four genera of Tychini. — A, E, G, *Tainochus iwaoi* sp. nov.; B, H, *Tychus yezoensis* sp. nov.; C, I, *Hyugatyclus teizonagatomoi* sp. nov.; D, F, *Atychodea simoniana* REITTER. — A–D, Maxillary palpi; E, F, ditto, enlarged; G–I, elytra.

Genus *Tainochus* KURBATOV

[Japanese name: Mukuge-arizukamushi Zoku]

Tainochus KURBATOV, 1992, Zool. Zh., Moscow, **71** (2): 32; NOMURA & LEE, 1993, Esakia, Fukuoka, (33):32. Type species: *Tainochus imperator* KURBATOV, by original designation.

Body elongate and thick, broadened posteriorly, densely covered with long pubescence. Head nearly ovoid and thick, constricted behind bases of antennae, convex on posterior part of vertex, with large ventral process projecting posteriorly. Antennae strongly thickened at 9th to 11th segments. Maxillary palpi (Fig. 1 A) large and elongate, 1st segment very short, 2nd large and long, thickened distally, 3rd shorter than 2nd, narrowed basally, 4th large and ovoid, with a short and slender palpal spine at apex, and with a pick-like apophysis near apex (Fig. 1 E). Mesosternum short and transverse, with a pair of median and a pair of lateral foveae, metasternum large and transverse, with a pair of mesocoxal foveae at lateral sides of mesocoxae and a pair of metasternal foveae just behind mesocoxae. Elytra (Fig. 1 G) wider than long, broadened posteriorly, each elytron with 3 basal foveae and 2 longitudinal sulci. Legs short and slender. Abdomen short and rounded posteriorly, 8th tergite nearly pentagonal, 8th sternite transverse, more or less emarginate at postero-median part in male, with a basal expansion and a membranous sac (see Remarks), 9th sternite weakly sclerotized, composed of a median and a pair of lateral plates, median plate well sclerotized and attached to emargination of 8th sternite at apical part, lateral plates broad and lamellar, each with a well sclerotized and narrowed ventral strut at base. Aedeagus well sclerotized, symmetrical to completely asymmetrical, parameres paired and lamellar, median lobe generally composed of large basal bulb, ventral stalk, and movable and more or less complicated dorsal apophysis.

Remarks. This genus is characterized by having some primitive characters, namely trifoveate each elytron, the rudimentary organ of the defence gland on eighth abdominal sternite, the ninth abdominal sternite consisting of three sclerites, and the symmetrical aedeagi of some species with complete parameres. On the other hand, it also has very unique derived characters, the ventral process of the head and the pick-like apophysis on the fourth segment of the maxillary palpus. This genus is similar to the genus *Atychodea* REITTER in having trifoveate each elytron. However, it seems more closely allied to the genus *Lucifotychus*, because of the presence of the pick-like apophysis on the 4th segment of the maxillary palpus.

**Key to the Species of the Genus *Tainochus* from Japan
and its Adjacent Regions**

1. Body small (length 1.3–1.5 mm); head densely covered with coarse punctures on dorsal surface; metasternum without median projection in male 2.
- Body large; head sparsely covered with minute punctures; metasternum with median projection in male 3.

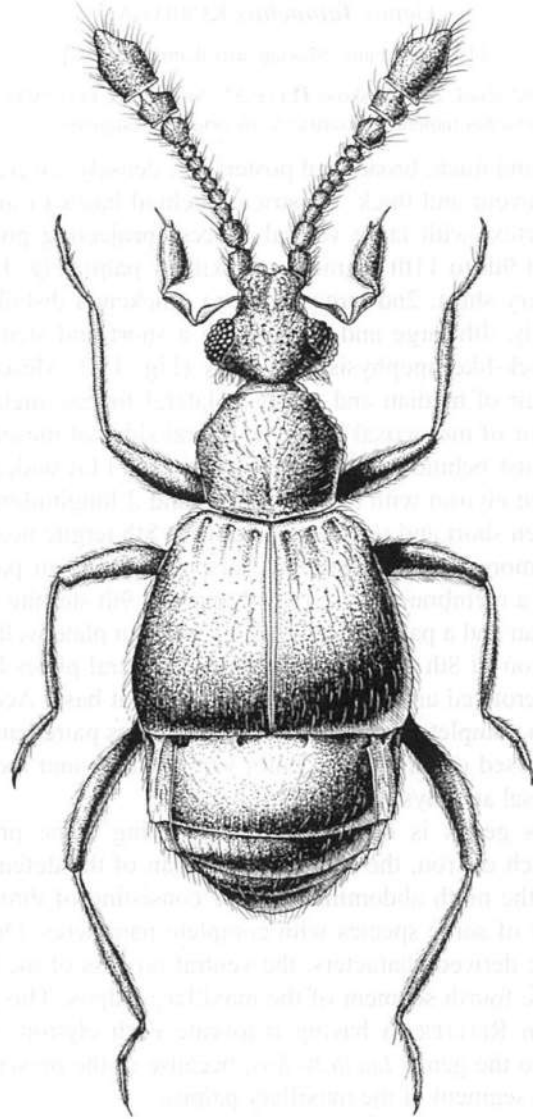


Fig. 2. Dorsal aspect of *Tainochus puncticeps* sp. nov., male.

2. Eyes large, each composed of about 30 facets in male; aedeagus with asymmetrical ventral stalk. *T. puncticeps* sp. nov.
 — Eyes small, each composed of about 20 facets in male; aedeagus with symmetrical and trapezoidal ventral stalk *T. minutus* sp. nov.
3. Pronotum with coarse punctures on ante-basal part. 4.
 — Pronotum without coarse punctures. 6.

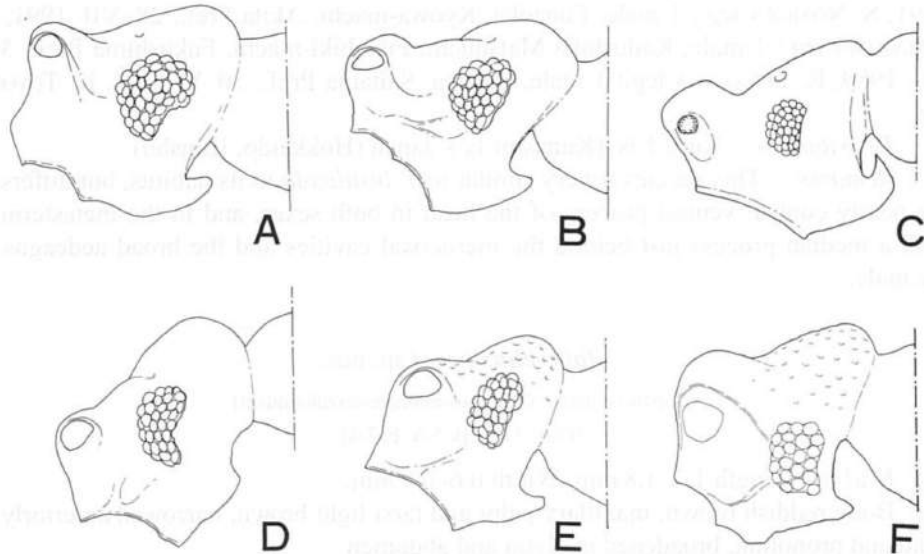


Fig. 3. Heads of *Tainochus* spp. in lateral view. — A, *T. insulicola* (NOMURA et LEE); B, *T. iwaii* sp. nov.; C, *T. exiguus* KURBATOV; D, *T. nitidus* sp. nov.; E, *T. puncticeps* sp. nov.; F, *T. minutus* sp. nov.

4. Ventral process of head well projected posteriorly, though rounded at apex, metasternum with a median process at middle in male *T. insulicola* (NOMURA et LEE).
 — Ventral process of head nearly conical, pointed at apex, metasternum with a median process just behind mesocoxal cavities in male. 5.
5. Aedeagus with a narrow ventral stalk and a pair of ventrally curved apical spines on dorsal apophysis *T. imperator* KURBATOV.
 — Aedeagus with a broad ventral stalk and a pair of dorsally curved apical spines on dorsal apophysis *T. iwaii* sp. nov.
6. Ventral process of head large and acute; aedeagus with an asymmetrical dorsal apophysis *T. exiguus* KURBATOV.
 — Ventral process of head short and angulate; aedeagus symmetrical, without dorsal apophysis. *T. nitidus* sp. nov.

***Tainochus imperator* KURBATOV**

[Japanese name: Chishima-mukuge-arizukamushi]

(Fig. 7A)

Tainochus imperator KURBATOV, 1992, Zool. Zh., Moskow, **71** (2): 33.

Specimens examined. 1 male, Noboribetsu, Noboribetsu-shi, Hokkaido, 18-IX-1994, N. TAMIYA leg.; 2 males, 1 female, Mt. Komagatake, Oshima, Hokkaido, 30-VI-

1991, S. NOMURA leg.; 1 male, Funaoka, Kyôwa-machi, Akita Pref., 28-VII-1991, E. TERAZAWA leg.; 1 male, Kadoshika Matsuuchi, Funahiki-machi, Fukushima Pref., 30-VII-1989, E. TERAZAWA leg.; 1 male, Sugaya, Saitama Pref., 30-V-1994, K. TOYODA leg.

Distribution. Kuril Isls. (Kunashir Is.), Japan (Hokkaido, Honshu).

Remarks. This species is very similar to *T. insulicola* in its habitus, but differs in the nearly conical ventral process of the head in both sexes, and in the metasternum with a median process just behind the mesocoxal cavities and the broad aedeagus in the male.

Tainochus iwaoi sp. nov.

[Japanese name: Okamoto-mukuge-arizukamushi]

(Figs. 3 B, 4 B, 5 A-F, 7 A)

Male. Length 1.7-1.8 mm. Width 0.6-0.7 mm.

Body reddish brown, maxillary palpi and tarsi light brown, narrowed anteriorly in head and pronotum, broadened in elytra and abdomen.

Head rounded at base, strongly constricted at anterior 1/3, frons swollen, strongly convex dorsad in front of the constriction, vertex roundly convex posteriad, postgenae rounded and covered with long hairs, ventral process nearly conical, shorter and acuter than in *insulicola*. Eyes small and ovoid, each composed of about 30 facets. Maxillary palpi very large, reaching 9th antennal segment, 1st segment short and slender, 2nd elongate, strongly swollen in apical half, 3rd shorter than 2nd, strongly narrowed in basal 1/4, broadened at apical part, widest at middle, 4th largest, strongly narrowed at base, widest at basal 2/5, then gently narrowed distad, rounded at apex, with long and slender palpal spine and a short apophysis just inside the apex. Antennae short and robust, reaching basal margin of pronotum, 1st segment large and cylindrical, 2nd subcylindrical, slightly longer than wide, 3rd to 8th subequal, each short and subglobose, 9th subcylindrical, about as long as wide, 10th wider than 9th, transverse, 11th largest, 1.5 times as long as wide, conical at apical part; relative length (width) of each segment from base to apex: 1.0 (0.9): 0.8 (0.7): 0.6 (0.6): 0.5 (0.5): 0.5 (0.5): 0.5 (0.5): 0.5 (0.5): 0.5 (0.5): 0.9 (0.9): 0.9 (1.0): 2.2 (1.5).

Pronotum slightly longer than head, transverse, weakly convex on dorsal surface, roundly expanded on both sides, widest at middle, sparsely punctate on anterior surface, coarsely and densely punctate on dorso-median part, with a pair of indistinct depressions on both basilateral sides. Elytra wider than long, weakly broadened posteriad, slightly convex and sparsely punctate, each elytron with expanded humerus, 3 basal foveae and 3 shallow longitudinal sulci running from basal foveae. Metasternum transverse, with a median process just behind mesocoxal cavities and shallow depression between the median process and metacoxae. Legs short and slender.

Abdomen slightly narrower than elytra, rounded posteriorly, 4th segment longest, with a small and transverse basimedial depression, 5th slightly shorter than 4th, 6th to

8th successively shortened posteriad, 8th sternite transverse, shallowly emarginate at postero-median part, with a short and membranous expansion at basimedial part, 9th sternite composed of 3 plates, lateral plates paired, narrowed and strongly sclerotized at basal part, broadened and lamellar at apical part, median plate small, apical part nearly pentagonal, basal part membranous.

Aedeagus well sclerotized, parameres very slender, median lobe bulbous at basal part, with large and pentagonal basal foramen, robust ventral stalk and dorsal apophysis, ventral stalk weakly narrowed apicad, slightly broadened and truncate at apex, with a pair of small spines on both sides at apical 1/4, dorsal apophysis broad at base, with a pair of slender and dorsally curved dorso-apical spines at apical part.

Female. Length 1.7–1.8 mm. Width 0.6–0.7 mm. Very similar to male, but eyes smaller than in male, 8th sternite arcuate on apical margin, without emargination.

Holotype, male (preserved in National Science Museum, Tokyo), Kurose-chô, Kamo-gun, Hiroshima Pref., 4~12-VI-1988, I. OKAMOTO leg. Paratypes: 10 males, 1 female, same data as holotype; 1 female, same locality as above, 12-XII-1987, I. OKAMOTO leg.; 1 male, same locality as above, 30-I-1988, I. OKAMOTO leg.; 1 female,

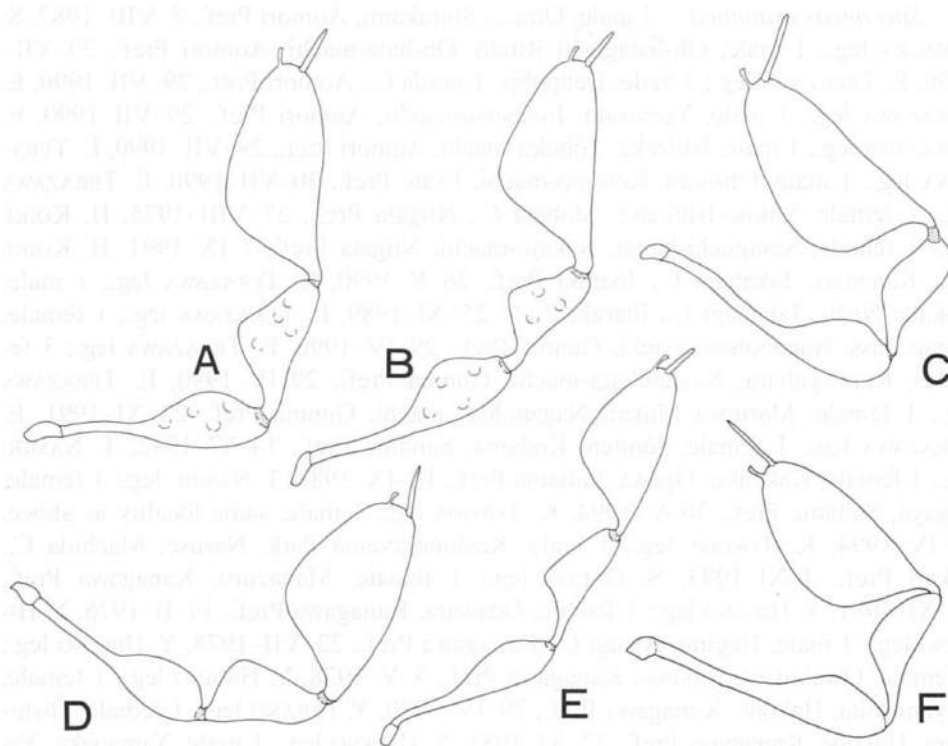


Fig. 4. Maxillary palpi of *Tainochus* spp. — A, *T. insulicola* (NOMURA et LEE); B, *T. iwaii* sp. nov.; C, *T. exiguus* KURBATOV; D, *T. nitidus* sp. nov.; E, *T. puncticeps* sp. nov.; F, *T. minutus* sp. nov.

Akiyoshidai, Yamaguchi Pref., 20–XI–1983, collector unknown; 1 female, same locality as above, 29–VI–1987, S. NOMURA leg.

Distribution. Japan (Honshu: Chûgoku District).

Remarks. This new species is very closely allied to *T. imperator* in the conical ventral process of the head and the metasternum with a median process just behind the mesocoxal cavities, but this species is distinguished by the aedeagus with a broad ventral stalk of the median lobe and the dorsally curved apical spines of the dorsal apophysis.

This species is dedicated to an excellent amateur entomologist, Mr. Iwao OKAMOTO for his kind assistance to my work.

Tainochus insulicola (NOMURA et LEE)

[Japanese name: Shima-mukuge-arizukamushi]

(Figs. 3 A, 4 A, 7 B)

Atychodea insulicola NOMURA et LEE, 1992, Esakia, Fukuoka, (32): 74.

Tainochus insulicola: NOMURA & LEE, 1993, Esakia, Fukuoka, (33): 32.

Specimens examined. 1 male, Oirase, Shirakami, Aomori Pref., 8–VIII–1987, S. NOMURA leg.; 1 male, Oh-hatagoshi Rindô, Oh-hata-machi, Aomori Pref., 29–VII–1990, E. TERAZAWA leg.; 1 male, Denpohji, Towada C., Aomori Pref., 29–VII–1990, E. TERAZAWA leg.; 1 male, Yamazaki, Imabetsu-machi, Aomori Pref., 29–VII–1990, E. TERAZAWA leg.; 1 male, Ishizaka, Tôhoku-machi, Aomori Pref., 29–VII–1990, E. TERAZAWA leg.; 1 male, Oh-hora, Kotomo-machi, Iwate Pref., 30–VII–1990, E. TERAZAWA leg.; 1 female, Shimo-Ishikawa, Shibata C., Niigata Pref., 27–VIII–1975, H. KOIKE leg.; 1 female, Sasaguchi-hama, Nakajô-machi, Niigata Pref., 7–IX–1991, H. KOIKE leg.; Kanenari, Takahagi C., Ibaraki Pref., 26–V–1990, E. TERAZAWA leg.; 1 male, Ohkada Nishi, Takahagi C., Ibaraki Pref., 25–XI–1989, E. TERAZAWA leg.; 1 female, Sugao Pass, Naganohara-machi, Gunma Pref., 29–IV–1990, E. TERAZAWA leg.; 3 females, Kami-yuhara, Naganohara-machi, Gunma Pref., 29–IV–1990, E. TERAZAWA leg.; 1 female, Maruiwa Mukai, Naganohara-machi, Gunma Pref., 24–XI–1991, E. TERAZAWA leg.; 1 female, Jûniten, Kodama, Saitama Pref., 14–VI–1992, T. NAMBU leg.; 1 female, Kakkaku, Ogawa, Saitama Pref., 18–IX–1988, T. NAMBU leg.; 1 female, Sugaya, Saitama Pref., 30–V–1994, K. TOYODA leg.; 1 male, same locality as above, 20–IV–1994, K. TOYODA leg.; 1 male, Kashinokiyama Park, Naruse, Machida C., Tokyo Pref., 1–XI–1993, S. ONODA leg.; 1 female, Manazuru, Kanagawa Pref., 22–XI–1981, Y. HIRANO leg.; 1 female, Odawara, Kanagawa Pref., 14–II–1976, Y. HIRANO leg.; 1 male, Hagino, Atsugi C., Kanagawa Pref., 22–VII–1978, Y. HIRANO leg.; 1 female, Ôwakidani, Hakone, Kanagawa Pref., 3–V–1978, Y. HIRANO leg.; 1 female, Miyanoshta, Hakone, Kanagawa Pref., 29–IV–1980, Y. HIRANO leg.; 1 female, Ôshidaira, Hakone, Kanagawa Pref., 22–XI–1981, Y. HIRANO leg.; 1 male, Yamanaka, Yamanashi Pref., 22–VII–1978, Y. HIRANO leg.; 1 female, Mt. Shiritaka, Tsurugi-machi, Ishikawa Pref., 16–XI–1991, K. NAKATA leg.; 1 female, same locality as above,

15–XII–1991, K. NAKATA leg.; 1 female, Mt. Shiroyama, Takayama C., Gifu Pref., 27–X–1980, G. IMADATÉ leg.; 1 male, Mt. Mikusayama, Osaka Pref., 26–VIII–1993, Y. SAWADA leg.; 1 male, Mt. Daisen, Tottori Pref., 24–V–1985, S. NOMURA leg.; 1 female, Nanatsukahara, Shôbara C., Hiroshima Pref., 2–VIII–1987, I. OKAMOTO leg.; 1 male, Kurose-chô, Hiroshima Pref., 12–XII–1987, I. OKAMOTO leg.; 1 male, Kurosegawa, Hiroshima Pref., 11–14–II–1988, I. OKAMOTO leg.; 1 female, Akiyoshidai, Yamaguchi Pref., 20–XI–1983, collector unknown.

Distribution. South Korea (Cheju Is.), Japan (Honshu).

Remarks. This species is very similar to *T. imperator* KURBATOV in its habitus, but is different in the well projected but dull ventral process of the head, the metasternum with a median process at the center in male and the slender aedeagus. It was described from Cheju Is. off South Korea and is recorded for the first time from Japan.

***Tainochus nitidus* sp. nov.**

[Japanese name: Tsuya-mukuge-arizukamushi]

(Figs. 3 D, 4 D, 5 G–L, 7 C)

Male. Length 1.8 mm. Width 0.7 mm.

Body reddish brown and shiny, maxillary palpi and legs light brown, narrowed anteriorly, broad in elytra and abdomen.

Head as long as wide, nearly ovoid, minutely punctate, covered with long hairs, clypeus very short, connected with frons by a broad vertical carina, frons strongly convex, weakly constricted at base, with a short and shallow longitudinal depression from apex to basal constriction, vertex gently convex, with a pair of small dorsal tentorial pits inside eyes, postgenae rounded, densely covered with long hairs, ventral process short and angulate. Eyes very small, reniform, each composed of about 20 facets. Maxillary palpi (described below under bad condition) long, 1st segment short and tubular, 2nd elongate, strongly swollen in apical half, 3rd short, wider than 2nd, angularly expanded inward at basal 2/5, with a few short setae at apex of the expansion, 4th widest and ovoid, twice as long as wide, with a long and slender palpal spine and small apophysis near apex. Antennae long and slender, reaching base of elytra, 1st segment long, thick and tubular, 2nd thick and subcylindrical, longer than wide, 3rd to 7th subequal, each subcylindrical, slightly longer than wide, 8th short and subglobose, 9th thick and subglobose, 10th larger than 9th, subglobose, 11th largest and ovoid, 1.7 times as long as wide, pointed at apex; relative length (width) of each segment from base to apex: 1.1 (0.8): 1.0 (0.7): 0.6 (0.5): 0.6 (0.5): 0.7 (0.5): 0.6 (0.5): 0.7 (0.5): 0.6 (0.6): 1.0 (1.0): 1.0 (1.1): 2.2 (1.4).

Pronotum slightly wider than long, weakly convex, sparsely covered with very minute punctures, roundly expanded on both sides, with a pair of shallow basilateral foveae and a basimedian depression near the basal margin. Elytra wider than long, weakly convex, each elytron with expanded humerus, 3 basal foveae and 2 shallow longitudinal sulci running from inner and outer basal foveae. Metasternum transverse,

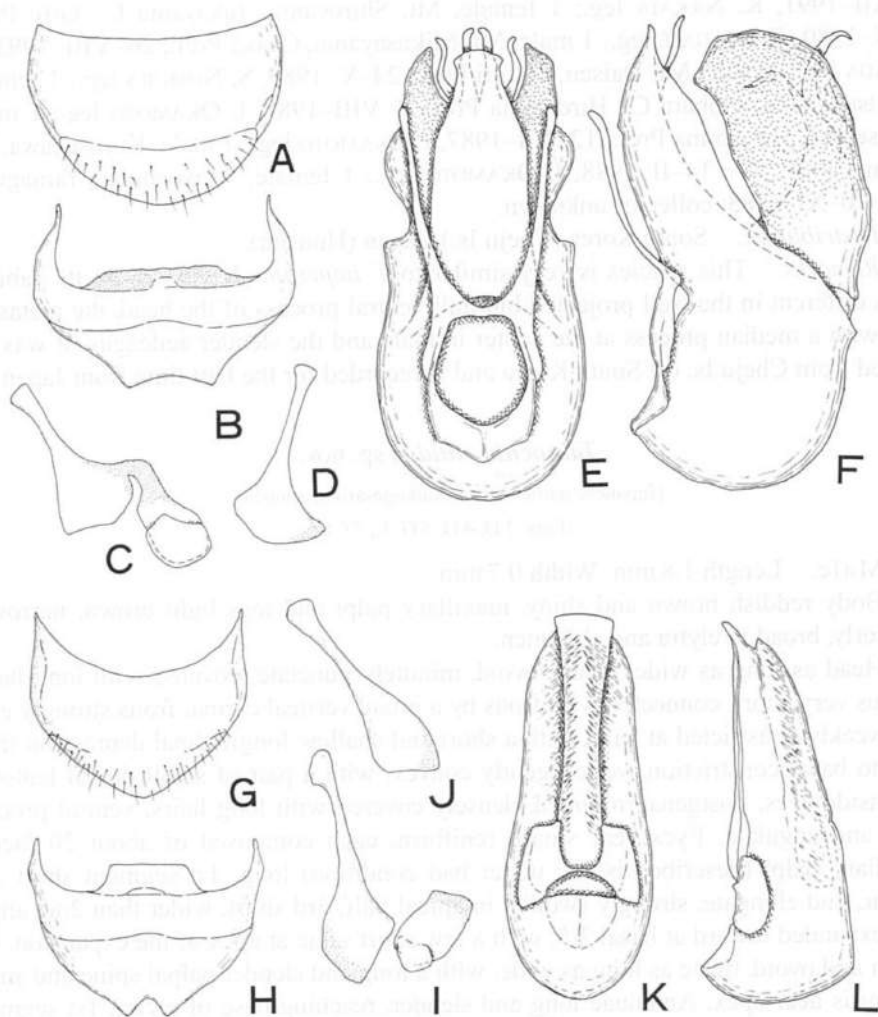


Fig. 5. Male 8th to 9th abdominal segments and aedeagi of *Tainochus* spp. — A-F, *T. iwaoi* sp. nov.; G-L, *T. nitidus* sp. nov. — A, G, 8th tergite; B, H, 8th sternite; C, I, right lateral sclerite (left) and median sclerite (right) of 9th sternite; D, J, left lateral sclerite of 9th sternite; E, K, aedeagus in ventral view; F, L, ditto, in lateral view.

roundly convex at middle. Legs short and thick, hind tibiae almost straight, each with an acute mucro at apex.

Abdomen slightly narrower than elytra, rounded posteriorly, 4th to 5th segments subequal in length in dorsal view, 6th to 8th successively shortened posteriad, 8th sternite transverse, weakly depressed on ventral surface, triangularly emarginate on posterior margin, with a short and trapezoidal expansion at basimedial part, 9th sternite

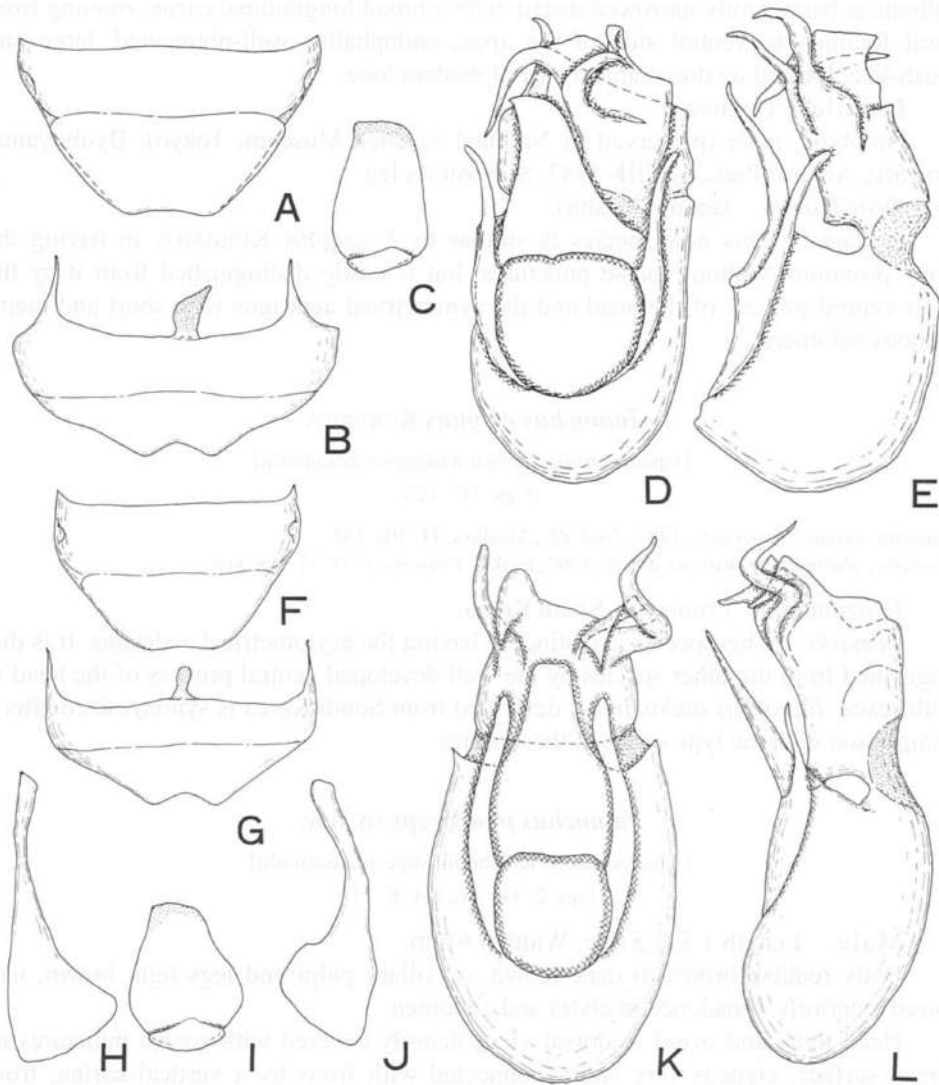


Fig. 6. Male 8th to 9th abdominal segments and aedeagi of *Tainochus* spp. — A–E, *T. puncticeps* sp. nov.; F–L, *T. minutus* sp. nov. — A, F, 8th tergite; B, G, 8th sternite; C, H, median sclerite of 9th sternite; I, right lateral sclerite of 9th sternite; J, left lateral sclerite of 9th sternite; D, K, aedeagus in ventral view; E, L, ditto, in lateral view.

composed of 3 plates, lateral plates paired, each elongate, strongly broadened in apical 1/3, median plate small and ovoid, with a nearly quadrangular lobe attached to the emargination of 8th sternite.

Aedeagus symmetrical, parameres short, broad and membranous, median lobe

bulbous at base, gently narrowed distad, with a broad longitudinal carina running from basal foramen to ventral side of the apex, endophallus well-pigmented, large and brush-like, located on dorso-apical part of median lobe.

Female. Unknown.

Holotype, male (preserved in National Science Museum, Tokyo), Byôbuyama, Tsugaru, Aomori Pref., 6-VIII-1987, S. NOMURA leg.

Distribution. Japan (Honshu).

Remarks. This new species is similar to *T. exiguus* KURBATOV in having the shiny pronotum without coarse punctures, but is easily distinguished from it by the short ventral process of the head and the symmetrical aedeagus with short and membranous parameres.

Tainochus exiguus KURBATOV

[Japanese name: Tairiku-mukuge-arizukamushi]

(Figs. 3 C, 4 C)

Tainochus exiguus KURBATOV, 1992, Zool. Zh., Moscow, **71** (10): 143.

Tainochus abdominalis NOMURA et LEE, 1993, Esakia, Fukuoka, (33): 33. *Syn. nov.*

Distribution. Primorsky, South Korea.

Remarks. This species is distinct in having the asymmetrical aedeagus. It is distinguished from the other species by the well developed ventral process of the head in both sexes. *Tainochus abdominalis* described from South Korea is synonymized after a comparison with the type series of this species.

Tainochus puncticeps sp. nov.

[Japanese name: Kyushu-mukuge-arizukamushi]

(Figs. 2, 3 E, 4 E, 6 A-E, 7 C)

Male. Length 1.3–1.5 mm. Width 0.6 mm.

Body reddish brown to dark brown, maxillary palpi and legs light brown, narrowed anteriorly, broadened in elytra and abdomen.

Head thick and ovoid in dorsal view, densely covered with coarse punctures on dorsal surface, clypeus very short, connected with frons by a vertical carina, frons strongly convex, depressed just before eyes, vertex weakly convex, roundly expanded posteriad, with a pair of indistinct dorsal tentorial pits inside eyes, postgenae very short and flat, with dense pubescence, ventral process large and conical. Eyes very large and ovoid, 1/3 times as long as head, each composed of about 30 facets. Maxillary palpi long and slender, reaching 10th antennal segment, 1st segment short and tubular, 2nd large, swollen in apical half, 3rd elongate, nearly triangular, widest at basal 3/7, 4th widest and ovoid. Antennae short and thick, reaching hind margin of pronotum, 1st segment thick and subcylindrical, 2nd subcylindrical, slightly longer than wide, 3rd small, as long as wide, weakly narrowed basad, 4th to 8th subequal, each short and

subcylindrical, wider than long, 9th to 11th very thick, 9th as long as wide, subcylindrical in basal part, narrowed distally in apical part, 10th slightly larger than 9th, 11th largest and ovoid, 1.6 times as long as wide; relative length (width) of each segment from base to apex: 1.1 (0.7): 0.7 (0.7): 0.5 (0.5): 0.4 (0.5): 0.4 (0.5): 0.4 (0.5): 0.5 (0.5): 0.5 (0.5): 0.8 (1.0): 1.0 (1.0): 1.9 (1.2).

Pronotum wider than long, gently convex, roundly expanded on both sides, sparsely covered with minute punctures on dorso-apical part, sparsely with coarse punctures on basimedial part, with a basimedial and a pair of basilateral foveae on ante-basal part. Elytra wider than long, gently convex, humeri weakly expanded, each elytron with 3 basal foveae and 3 shallow longitudinal sulci, outer sulcus running from outer basal fovea to the middle, median sulcus very short and indistinct. Metasternum transverse, almost glabrous, gently convex. Legs short and slender.

Abdomen short and broad, rounded posteriorly, 4th tergite remarkably large, about 2.5 times as long as 5th, with a small basimedial depression, 5th to 7th subequal in length in dorsal view, successively narrowed posteriad, each short and transverse, 8th tergite short and transverse, nearly trapezoidal, 8th sternite short and transverse, with small, shallow and arcuate emargination on postero-median margin, 9th sternite consisting of a small and ovoid median and a pair of elongate lateral plates.

Aedeagus asymmetrical, parameres weakly sclerotized, short and slender, weakly narrowed distad, median lobe bulbous at basal part, with a large basal foramen and broad ventral stalk, ventral stalk narrowed and pointed apically, weakly curved leftward, dorsal apophysis much complicated, right sclerite very broad and strongly sclerotized, with 3 strongly bent spines, left sclerite short and narrow, with a dorso-apically curved large spine.

Female. Length 1.3 mm. Width 0.5–0.6 mm. Similar to male, but differs in the following characters: eyes very small, each composed of 3 to 4 facets, abdomen longer than in male, slightly shorter than elytra.

Holotype, male (preserved in National Science Museum, Tokyo), Daisen-rindô, Kujû Mts., Ôita Pref., 5–VI–1983, S. NOMURA leg. Paratypes: 2 females, Mt. Ichifusa, Kumamoto Pref., 27–X–1985, T. TANABE leg.; 1 male, Ebino, Miyazaki Pref., 20–IV–1977, S. TANAKA leg.; 1 female, same locality as above, 9–VI–1979, S. HARADA leg.; 1 female, Takaoka, Miyazaki Pref., 13–III–1980, S. TANAKA leg.; 1 male, Toi-misaki, Kushima C., Miyazaki Pref., 31–VIII–1974, A. NAGAI leg.; 1 female, Aoidake, Yamanokuchi-chô, Miyazaki Pref., 21–XII–1974, A. NAGAI leg.

Distribution. Japan (Kyushu).

Remarks. This new species is very distinct in having the small body, the coarsely punctate head, the large 4th abdominal segment and the asymmetrical aedeagus.

Tainochus minutus sp. nov.

[Japanese name: Shikoku-mukuge-arizukamushi]

(Figs. 3 F, 4 F, 6 F-L, 7 C)

Male. Length 1.3 mm. Width 0.6 mm. Very similar to *puncticeps*, but eyes smaller, each composed of about 20 facets.

Aedeagus weakly flattened dorso-ventrally more than in *puncticeps*, parameres paired and symmetrical, each slender, gently narrowed apicad, basal bulb ovoid, with a large and circular basal foramen, ventral stalk symmetrical, short and trapezoidal, narrowed distally, dorsal apophysis asymmetrical and broad, with 2 pairs of spines, right outer spine largest, slender and of spiral form, acute and bent dorsally at apex, left outer spine slender, weakly curved dorsad, rounded at apex, right and left inner spines each lamellar, projected ventrally.

Female. Unknown.

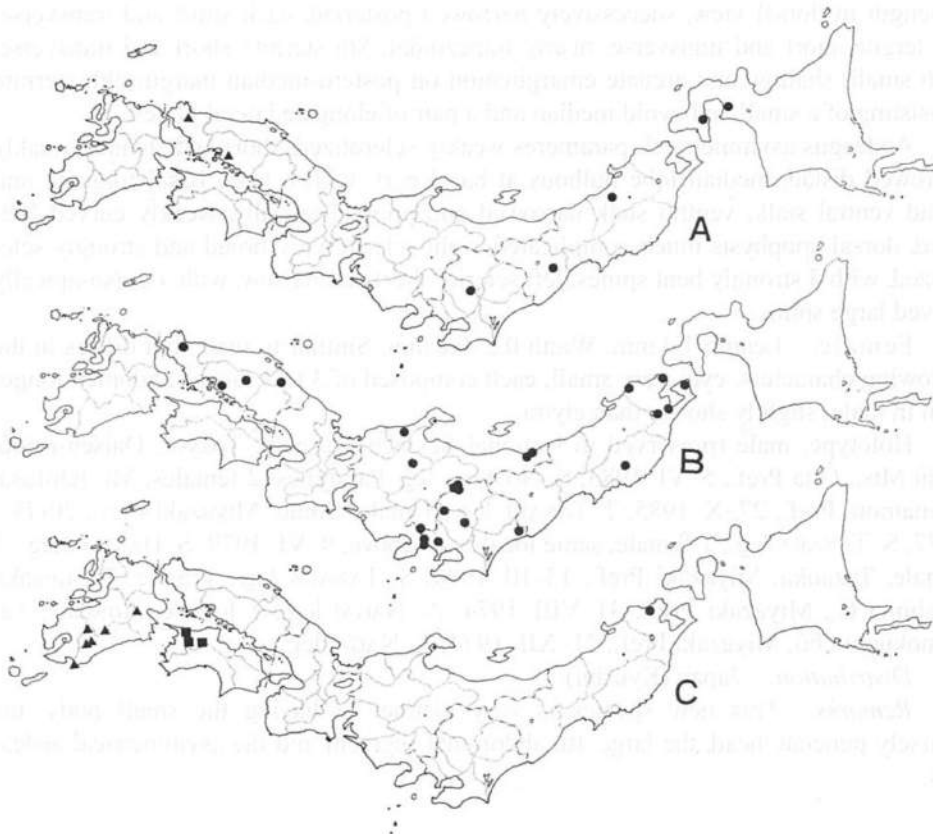


Fig. 7 Distribution of *Tainochus* spp. — A, *T. imperator* KURBATOV (circle) and *T. iwaoui* sp. nov. (triangle); B, *T. insulicola* NOMURA et LEE; C, *T. nitidus* sp. nov. (circle), *T. puncticeps* sp. nov. (triangle), and *T. minutus* sp. nov. (square).

Holotype, male (preserved in National Science Museum, Tokyo), Omogo, Ehime Pref., 26-V-1985, S. TANAKA leg. Paratypes: 1 male, Makigoya, Mt. Odamiyama, Oda-chô, Ehime Pref., 1-VIII-1995, E. YAMAMOTO leg.; 1 male, Shiromeguri, Uchiko-chô, Ehime Pref., 9-VII-1995, E. YAMAMOTO leg.

Distribution. Japan (Shikoku).

Remarks. This species is very closely allied to *puncticeps*, but is different in the small eyes and the aedeagus with a symmetrical ventral stalk and two pairs of spines on the dorsal apophysis. This structure of aedeagus is regarded as a more primitive character, as compared with the completely asymmetrical aedeagus of *puncticeps*.

Genus *Tychus* LEECH

[Japanese name: Mori-arizukamushi Zoku]

Tychus LEECH, 1817, Zool. Misc., **3**: 84; AUBÉ, 1833, Psel. Mon., 42; REITTER, 1881, Verh. zool.-bot. Ges. Wien, **31**: 454; GUILLEBEAU, 1888, Rev. Ent., **7**: 368; PEYERIMHOFF, 1904, Abeille, **30**: 169; RAFFRAY, 1904, Anns. Soc. ent. Fr., **73**: 412; RAFFRAY, 1908, Gen. Ins., (64): 291; RAFFRAY, 1911, Coleopt. Cat., (27): 128; DODERO, 1919, Anni. Mus. civ. Stor. nat. Genova, **48**: 225; JEANNEL, 1950, Fh. Fr., **53**: 332; JEANNEL, 1956, Mém. Mus. Hist. nat., Paris, **14**: 131; JEANNEL, 1958, *ibid.*, (A), **18**: 105; CHANDLER, 1988, Trans. Am. ent. Soc., **114**: 154; NEWTON & CHANDLER, 1989, Fieldiana, Zool., (N. S.), (53): 53; NOMURA & LEE, 1992, Esakia, Fukuoka, (32): 72; NOMURA & LEE, 1993, *ibid.*, (33): 32. Type species: *Pselaphus niger* REICHENBACH, by monotypy.

Tychoides KARAMAN, 1955, Acta Mus. maced. Sci. nat., Skopje, **3**: 124. Type species: *Tychus hirtulus* REITTER, by original designation.

Body generally small, elongate and weakly narrowed anteriorly, densely covered with pubescence. Head nearly ovoid, weakly constricted behind bases of antennae, densely covered with long hairs behind eyes. Antennae short and thick, strongly thickened in 9th to 11th segments. Maxillary palpi (Fig. 1B) large, 4th segment largest and nearly ovoid. Meso- and metanota each with 2 pairs of foveae as in *Tainochus*. Elytra (Fig. 1H) gently narrowed anteriorly, each elytron with 2 basal foveae and 2 longitudinal sulci. Legs short and slender. Abdomen short and rounded posteriorly, 4th segment largest, with a pair of basilateral foveae and a transverse basimedial depression, 9th sternite composed of 3 plates in male as in *Tainochus*, but each lateral plate is more strongly broadened at apical part than in *Tainochus*. Aedeagus completely asymmetrical, parameres rudimentary, median lobe consisting of large basal bulb, asymmetrical ventral stalk and complicated or twig-shaped dorsal apophysis.

Remarks. The genus *Tychus* is a large genus including diversified species distributed in the Holarctic Region. This genus is characterized by the small body, the bi-foveate elytra and the asymmetrical aedeagus.

Key to the Species of the Genus *Tychus* from Japan and its Adjacent Regions

1. Body larger (1.5–1.6 mm) and usually blackish, maxillary palpi and legs yellowish, aedeagus with broad ventral stalk and slender and incurved dorsal apophysis . . .

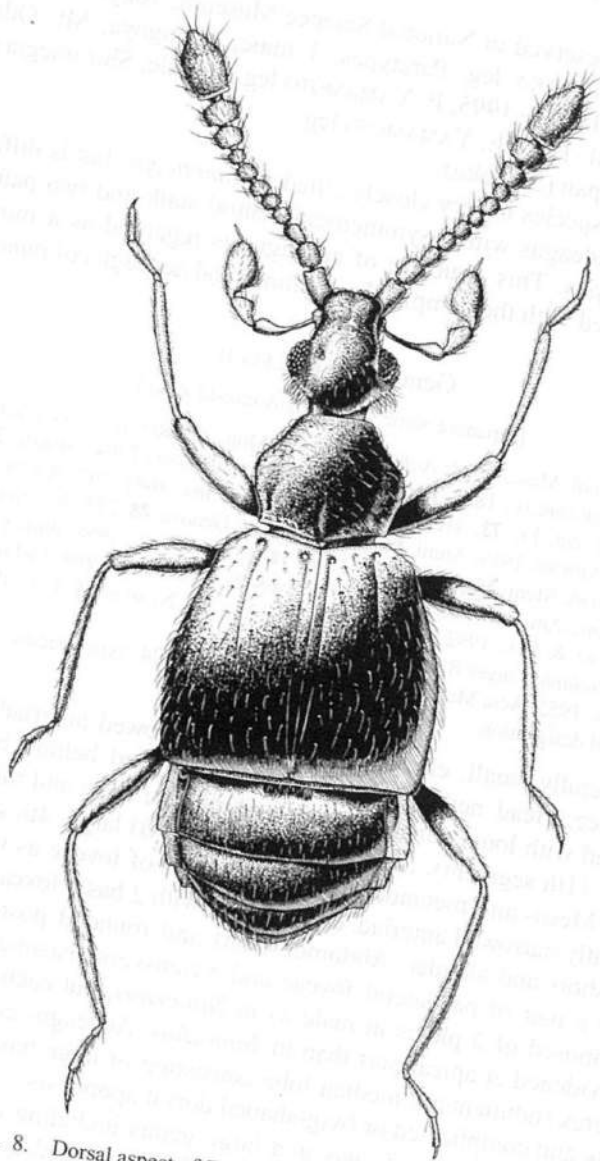


Fig. 8. Dorsal aspect of *Tychus yezoensis* sp. nov., male.

- *Ty. yezoensis* sp. nov.
 — Body smaller (less than 1.5 mm) and reddish brown 2.
 2. Antennae longer, 5th and 9th segments each slightly longer than wide, mid
 trochanters each with a very small spine in male *Ty. yukihihiko* sp. nov.
 — Antennae shorter, 5th and 9th segments each transverse, mid trochanters without

- spine in male 3.
3. Maxillary palpi large, aedeagus with a broad ventral stalk and medially thickened dorsal apophysis *Ty. crassicornis* RAFFRAY.
- Maxillary palpi small, aedeagus with a very slender ventral stalk and bifurcate dorsal apophysis *Ty. dichotomus* NOMURA et LEE.

***Tychus dichotomus* NOMURA et LEE**

[Japanese name: Tairiku-mori-arizukamushi]

(Figs. 9 B, 10 B, 18 A)

Tychus dichotomus NOMURA et LEE, 1992, Esakia, Fukuoka, (32): 72; NOMURA & LEE, 1993, *ibid.*, (33): 32.

Tychus kurilensis KURBATOV, 1992, Zool. Zh., Moskow, **71** (10): 142. *Syn. nov.*

Specimens examined: 1 male, Shimono-Kurosawa, Shizukuishi-machi, Iwate Pref., 29-VII-1990, E. TERAZAWA leg.; 1 male, Iwagasaki, Sanpoku-machi, Niigata Pref., 8-IX-1984, K. BABA leg.; 1 female, Gochi, Jôetsu C., Niigata Pref., 29-III-1981, K. BABA leg.; Mt. Nasudake, Tochigi Pref., 3-VI-1994, S. NAOMI leg.; 2 males, Sakatsura-Isozaki Shrine, Nakaminato C., Ibaraki Pref., 6-VIII-1990, E. TERAZAWA leg.; 1 male, same locality as above, 21-II-1991, E. TERAZAWA leg.; 1 male, Namegawa, Chiba Pref., 17-V-1983, S. TANAKA leg.; 1 male, Ishidojuku, Kitamoto C., Saitama Pref., 26-V-1990, T. NAMBU leg.; 1 male, Sugaya, Saitama Pref., 20-IX-1994, K. TOYODA leg.; Kashinokiyama Park, Naruse, Machida C., Tokyo Pref., 1-XI-1993, S. ONODA leg.; 1 female, Hayama, Kanagawa Pref., 18-IX-1989, H. HARADA leg.; 1 male, Mt. Mikusayama, Osaka Pref., 12-V-1993, Y. SAWADA leg.; 1 female, Mt. Hyônosen, Hyôgo Pref., 5-VI-1984, S. NOMURA leg.; 1 male, Mt. Takasu, Fukutomi-chô, Hiroshima Pref., 31-V-1987, I. OKAMOTO leg.; 1 male, Mt. Noro, Kure C., Hiroshima Pref., 15-IX-1988, I. OKAMOTO leg.; 1 male, Kurose-chô, Hiroshima Pref., 2-V-1988, I. OKAMOTO leg.; 1 male, Kamizaka, Tsushima Is., Nagasaki Pref., 27-IV-1992, K. OGATA leg.; 1 female, Mt. Kurodake, Kujû-machi, Ôita Pref., 9-X-1988, K. SASAKI leg.; 1 male, Ishizakihama, Sadowara-chô, Miyazaki Pref., 5-IX-1993, S. NOMURA leg.

Distribution. Kuril Is. (Kunashir Is.), South Korea including Cheju Is., Japan (Honshu, Kyushu, Tsushima Is.)

Remarks. This species is widely distributed, but is reported from Japan for the first time. It is distinguished from the other species by the bifurcate dorsal apophysis of the aedeagus and the small maxillary palpi.

***Tychus crassicornis* RAFFRAY**

[Japanese name: Mori-arizukamushi]

(Figs. 9 A, 10 A, 18 B)

Tychus crassicornis RAFFRAY, 1909, *Annl. Soc. ent. Fr.*, **78**: 40; RAFFRAY, 1911, *Coleopt. Cat.*, (27): 130;

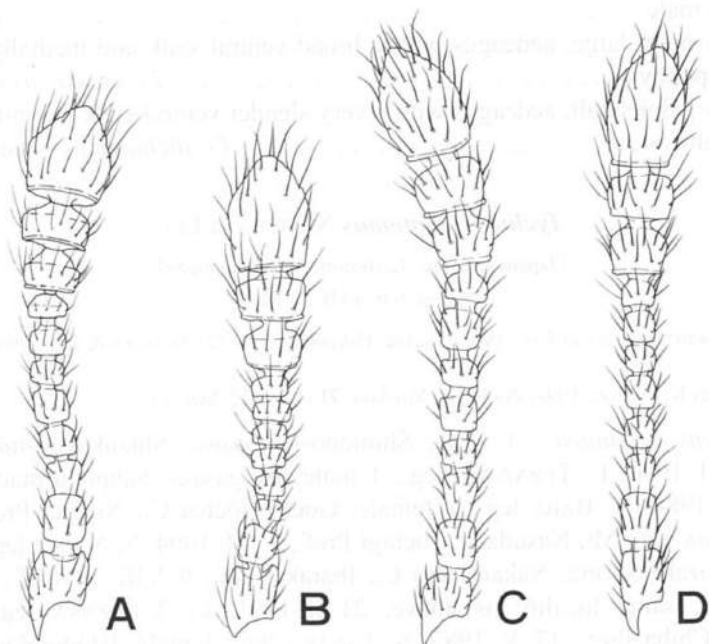


Fig. 9. Male antennae of *Tychus* spp. — A, *T. crassicornis* RAFFRAY; B, *T. dichotomus* NOMURA et LEE; C, *T. yezoensis* sp. nov.; D, *T. yukihihikoi* sp. nov.

JEANNEL, 1958, Mém. Mus. Hist. nat., Paris, (A), **18**: 105; NOMURA, 1989, Check List Jpn. Ins., Fukuoka, **1**: 291.

Specimens examined. 1 male, Nakatsuya Vall., Hiroshima Pref., 8-VI-1987, S. NOMURA leg.; 3 females, Tainai-daira, Kurokawa-mura, Niigata Pref., 2-IX-1991, H. KOIKE leg.

Distribution. Japan (Honshu), Yunnan?.

Remarks. This species is very similar to *T. dichotomus* in the small body and the short antennae, but is separated by the large maxillary palpi and the male genitalia with a broad ventral stalk and medially thickened dorsal apophysis.

***Tychus yukihihikoi* sp. nov.**

[Japanese name: Hirano-mori-arizukamushi]

(Figs. 9 D, 10 D, 11, 18 B)

Male. Length 1.4 mm. Width 0.6 mm.

Body reddish brown, maxillary palpi and legs light brown, weakly narrowed anteriorly.

Head slightly longer than wide, sparsely with minute punctures, shiny on dorsal surface, clypeus very short, arcuate on anterior margin, frons narrowed and strongly

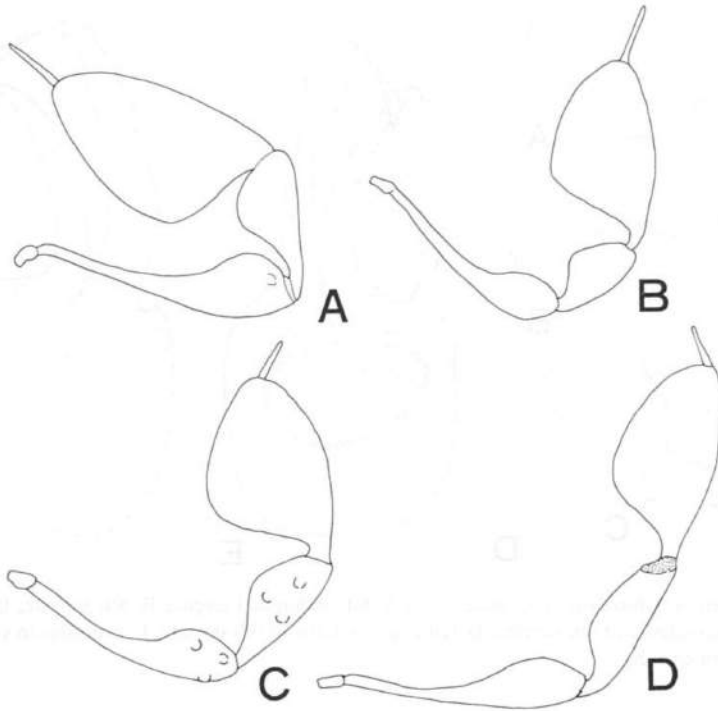


Fig. 10. Maxillary palpi of *Tychus* spp. — A, *T. crassicornis* RAFFRAY; B, *T. dichotomus* NOMURA et LEE; C, *T. yezoensis* sp. nov.; D, *T. yukihikoi* sp. nov.

convex, weakly projected anteriorly, slightly depressed on dorsal side, gently constricted just behind antennal articulation, vertex broad and convex, rounded posteriorly, with a pair of small dorsal tentorial pits just inside eyes and a shallow dorso-median fovea between eyes, postgenae broad and almost flat, densely covered with long hairs. Eyes small and ovoid, each composed of 25 facets. Maxillary palpi large and elongate, reaching 8th antennal segment, 1st segment very short and tubular, 2nd long and slender, tapered in basal half, swollen in apical half, 3rd shorter than 2nd, twice as long as wide, widest at basal 2/5, roundly expanded inward, 4th largest and nearly ovoid, twice as long as wide, palpal spine long and slender, 1/3 times as long as 4th. Antennae elongate, reaching basal part of elytra, 1st segment longer than wide, thick and subcylindrical, 2nd slightly narrower than 1st, 1.2 times as long as wide, 3rd to 8th subequal in width, 3rd slightly longer than wide, weakly narrowed basad, 4th to 8th each subcylindrical, 9th to 11th thick, 9th slightly longer than wide, subglobose, 10th slightly wider than 9th, 11th largest and ovoid, truncate at base; relative length (width) of each segment from base to apex: 1.1 (0.7): 0.8 (0.6): 0.6 (0.5): 0.5 (0.5): 0.6 (0.5): 0.4 (0.5): 0.5 (0.5): 0.4 (0.5): 0.9 (0.8): 0.9 (1.0): 2.0 (1.2).

Pronotum wider than long, roundly expanded on both sides, gently convex and

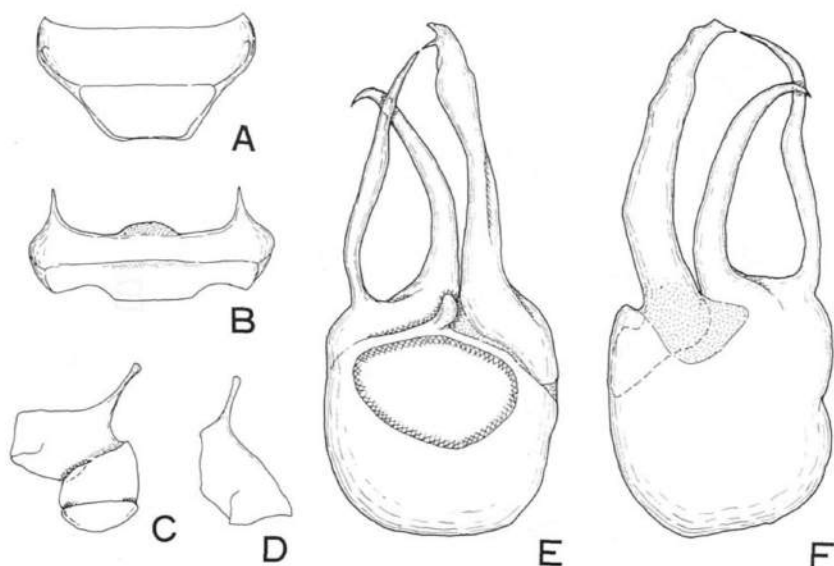


Fig. 11. *Tychus yukihikoi* sp. nov., male. — A, 8th abdominal tergite; B, 8th sternite; C, right lateral and median sclerite of 9th sternite; D, left lateral sclerite of 9th sternite; E, aedeagus in ventral view; F, ditto, in dorsal view.

shiny on dorsal surface, with a shallow median and a pair of lateral depressions at ante-basal part. Elytra wider than long, convex and nearly trapezoidal, sparsely covered with minute punctures, outer longitudinal sulcus reaching the middle. Legs short and slender, mid trochanters short, each quadrangular, with a small spine on posterior side.

Abdomen broad and transverse, rounded posteriorly, 4th segment largest, about 1.3 times as long as 5th on dorsal side, with a small basimedial depression, 8th tergite narrowed posteriorly, arcuately emarginate on apical margin, 8th sternite short and transverse, broadened at median part, 9th sternite well sclerotized and broad, composed of an ovoid median and a pair of nearly quadrangular lateral plates.

Aedeagus well sclerotized and elongate, parameres reduced to a small spine, basal bulb of aedeagus rounded at basal part, with a large and ovoid basal foramen on ventral side, ventral stalk consisting of two very long and slender spines, left spine extending apically from ventro-apical part of basal bulb, weakly bent inward in apical 1/3, right spine slightly bolder than the left, arising from dorso-apical part of basal bulb, weakly narrowed apicad and gently outcurved, dorsal apophysis longer than these spines and elongate, attached to left side of basal bulb, slightly narrowed posteriad and bent ventrally, sharpened and closed to apex of left spine of ventral stalk at apex.

Female. Unknown.

Holotype, male (preserved in National Science Museum, Tokyo), Shôji-ko, Yamanashi Pref., 6-VIII-1987, Y. HIRANO leg.

Distribution. Japan (central Honshu).

Remarks. This new species is very similar to *T. dichotomus* NOMURA et LEE in body size and small maxillary palpi. It is however, separated from *dichotomus* by having the long and slender antennae and the mid trochanters each with a small spine.

Tychus yezoensis sp. nov.

[Japanese name: Ezo-mori-arizukamushi]

(Figs. 8, 9 C, 10 C, 12, 18 B)

Male. Length 1.5–1.6 mm. Width 0.6–0.7 mm.

Body dark brown to blackish, maxillary palpi and legs light brown, broadened posteriorly.

Head about as long as wide, weakly constricted at anterior 1/4, gently convex on dorsal surface, sparsely covered with minute punctures on dorsal side, clypeus very short, hidden by antennal nodule, arcuate on anterior margin, frons strongly convex, weakly concave on median part, vertex roundly expanded posteriad with a pair of small dorsal tentorial pits just inside eyes, postgenae almost flat, densely covered with long hairs. Eyes small and ovoid, each composed of about 25 facets. Maxillary palpi short, reaching 6th antennal segment, 1st segment very short and tubular, 2nd longest, very slender at basal part, strongly swollen and covered with large and semispherical granules in apical 3/7, 3rd as wide as 2nd, short and thick, twice as long as wide, roundly expanded inward, covered with large and semispherical granules, 4th segment widest and ovoid, 1.5 times as long as wide, densely covered with pubescence, palpal spine short and slender. Antennae short and thick, reaching hind margin of pronotum, 1st segment thick and subcylindrical, 2nd slightly longer than wide, subcylindrical, 3rd to 8th subequal in width, 3rd narrowed in basal part, 4th to 8th each subcylindrical, 9th to 11th very thick, 9th as long as wide, slightly thickened apicad, 10th as long as 9th, transverse and thickened distally, 11th largest, nearly ovoid and truncate at base; relative length (width) of each segment from base to apex: 1.2 (0.8): 0.8 (0.7): 0.6 (0.6): 0.5 (0.6): 0.6 (0.6): 0.5 (0.6): 0.6 (0.6): 0.4 (0.6): 0.9 (0.9): 0.9 (1.0): 1.3 (2.0).

Pronotum slightly wider than long, widest at anterior 3/7, weakly convex and sparsely with minute punctures on dorsal surface, with a pair of shallow lateral foveae at posterior 1/3 and a shallow basimedial fovea near basal margin. Elytra wider than long, slightly convex and sparsely with minute punctures on dorsal surface, outer longitudinal sulcus running from outer basal fovea to the middle. Legs short and slender.

Abdomen short and transverse in dorsal view, rounded posteriorly, 4th segment largest, 1.5 times as long as 5th, with a small basimedial depression, 4th to 7th sternites weakly depressed at median part, 8th tergite arcuately emarginate on apical margin, 8th sternite very short and transverse, with a small concavity at basimedial part, 9th sternite composed of an ovoid median and a pair of quadrangular lateral plates.

Aedeagus well sclerotized, parameres reduced and membranous, basal bulb of aedeagus nearly subglobose, with a small and transverse basal foramen at ventro-api-

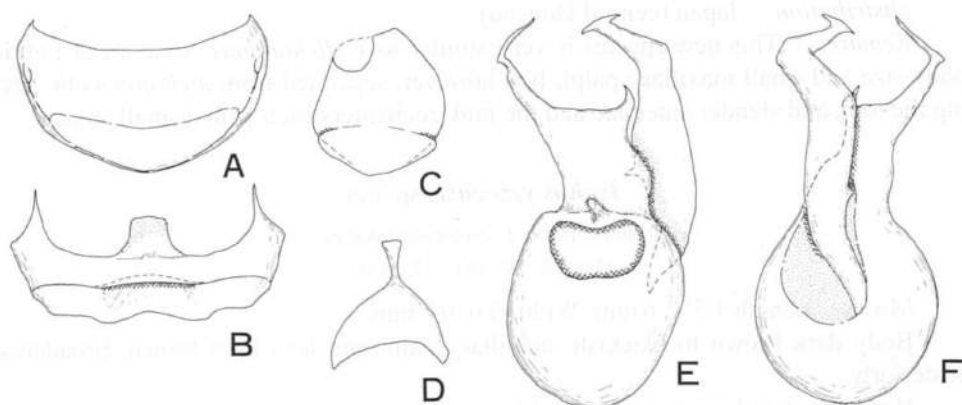


Fig. 12. *Tychus yezoensis* sp. nov., male. — A, 8th abdominal tergite; B, 8th sternite; C, median sclerite of 9th sternite; D, lateral sclerite of 9th sternite; E, aedeagus in ventral view; F, ditto, in dorsal view.

cal part, ventral stalk broad at base, with a short spine at right side, and long and slender spine at the left, left spine tapered distally, sharply curved leftward near the middle, forming about 100° angle, dorsal apophysis very long and elongate, articulated with basal bulb at middle of dorsal surface and base of left spine of ventral stalk, widest near the middle, narrowed and slightly bent in basal part, narrowed and S-curved in apical part.

Female. Length 1.5–1.6 mm. Width 0.6–0.7 mm. Very similar to male, but abdomen gently convex on ventral surface; 8th tergite rounded on apical margin, 8th sternite almost flat at basimedial part.

Holotype, male (preserved in National Science Museum, Tokyo), Higashi-Ohnuma, Nanae-chô, Hokkaido, 14~16-VI-1986, S. NOMURA leg. **Paratypes:** 12 males, 16 females, same data as holotype; 1 male, 1 female, same locality as holotype, 30-VI-1991, S. NOMURA leg.; 1 male, Mt. Komagatake, Oshima, Hokkaido, 30-VI-1991, S. NOMURA leg.; 1 female, Horokayantou Pond, Taiki-chô, Tokachi, Hokkaido, 9-VI-1993, K. SHIBATA leg.

Distribution. Japan (Hokkaido).

Remarks. This new species is easily distinguished from the other Japanese congeners by the large and blackish body and the aedeagus with a broad ventral stalk and a slender incurved dorsal apophysis.

Biological notes. Many individuals of this species were collected from decayed leaves of the common reed (*Phragmites australis* (CAV.) TRIN.) on wetland. Only one male was found from litter of a broadleaved forest with the specimens of the other species.

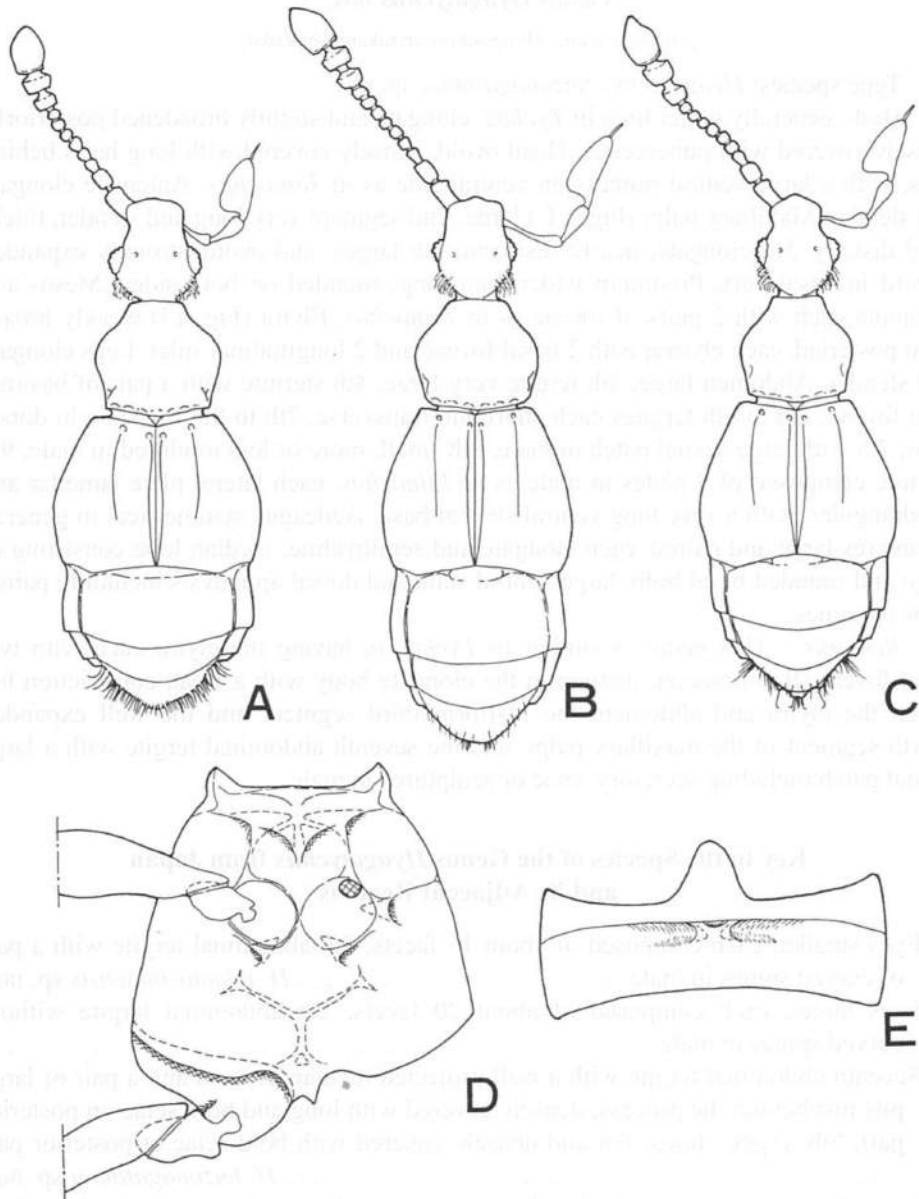


Fig. 13. Genus *Hyugatyclus* nov. — A, D, E, *H. teizonagatomi* sp. nov.; B, *H. tokunoshimensis* sp. nov.; C, *H. formosanus* sp. nov. — A-C, Dorsal aspect; D, meso- and metathoraces in ventral view; E, 3rd to 4th abdominal sternites.

Genus *Hyugatyachus* nov.

[Japanese name: Hyuga-mori-arizukamushi Zoku]

Type species: *Hyugatyachus teizonagatomoi* sp. nov.

Body generally larger than in *Tychus*, elongate and slightly broadened posteriorly, densely covered with pubescence. Head ovoid, densely covered with long hairs behind eyes, with a large ventral process on ventral side as in *Tainochus*. Antennae elongate and slender. Maxillary palpi (Fig. 1 C) large, 2nd segment very long and slender, thickened distally, 3rd elongate, nearly fusiform, 4th largest and ovoid, strongly expanded inward in basal part. Pronotum wider than long, rounded on both sides. Meso- and metanota each with 2 pairs of foveae as in *Tainochus*. Elytra (Fig. 1 I) weakly broadened posteriorly, each elytron with 2 basal foveae and 2 longitudinal sulci. Legs elongate and slender. Abdomen large, 4th tergite very large, 4th sternite with a pair of basimedian foveae, 5th to 6th tergites each short and transverse, 7th to 8th invisible in dorsal view, 7th with large sexual patch in male, 8th small, more or less modified in male, 9th sternite composed of 3 plates in male as in *Tainochus*, each lateral plate lamellar and quadrangular, with a very long ventral strut at base. Aedeagus symmetrical in general, parameres large and paired, each elongate and semihyaline, median lobe consisting of large and rounded basal bulb, large ventral stalk and dorsal apophysis including paired arms or spines.

Remarks. This genus is similar to *Tychus* in having the elytra each with two basal foveae. It is however, distinct in the elongate body with a weak constriction between the elytra and abdomen, the fusiform third segment and the well expanded fourth segment of the maxillary palpi, and the seventh abdominal tergite with a large sexual patch including secretory setae or sculptures in male.

**Key to the Species of the Genus *Hyugatyachus* from Japan
and its Adjacent Regions**

1. Eyes smaller, each composed of about 15 facets, 7th abdominal tergite with a pair of curved spines in male. *H. tokunoshimensis* sp. nov.
- Eyes larger, each composed of about 20 facets, 7th abdominal tergite without curved spines in male. 2.
2. Seventh abdominal tergite with a well projected median process and a pair of large pits just behind the process, densely covered with long and bold setae on posterior part, 8th tergite almost flat and densely covered with bold setae at posterior part *H. teizonagatomoi* sp. nov.
- Seventh abdominal tergite with a densely setose and conical projection and a pair of fringes each including a bold seta, 8th tergite with a trapezoidal postero-median projection *H. formosanus* sp. nov.

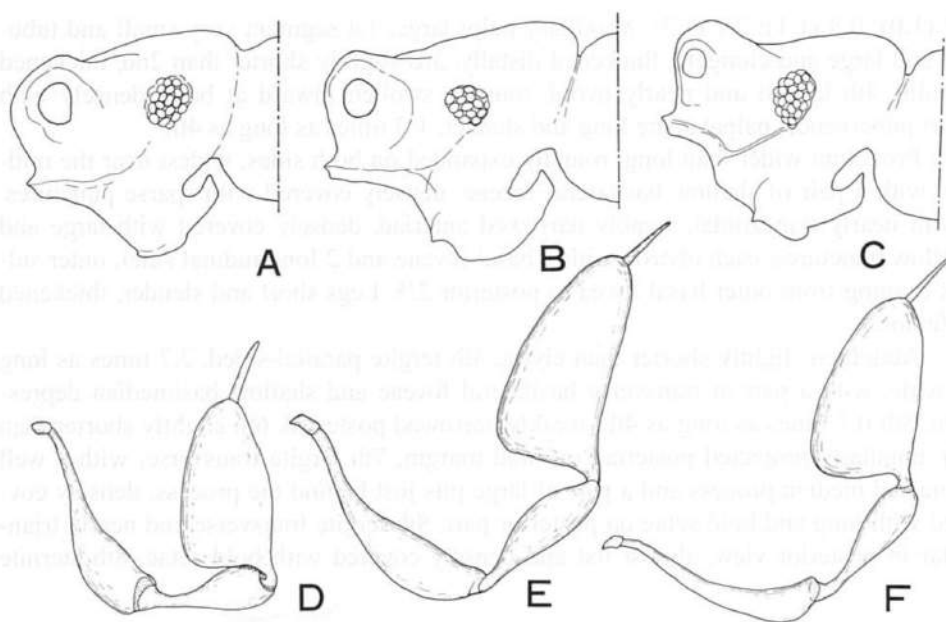


Fig. 14. Heads and maxillary palpi of *Hyugatyclus* spp. — A, D, *H. teizonagatomo* sp. nov.; B, E, *H. tokunoshimensis* sp. nov.; C, F, *H. formosanus* sp. nov. — A–C, Heads in lateral view; D–F, maxillary palpi.

Hyugatyclus teizonagatomo sp. nov.

[Japanese name: Hyuga-mori-arizukamushi]

(Figs. 13 A, D, E, 14 A, D, 15 A–B, 16 A–F, 18 C)

Male. Length 1.5–1.6 mm. Width 0.6 mm.

Body reddish brown, maxillary palpi and tarsi light brown, weakly narrowed anteriorly.

Head longer than wide, nearly ovoid, clypeus very short, invisible in dorsal view, arcuate on anterior margin, frons strongly convex, weakly constricted just behind bases of antennae, densely with minute punctures, vertex gently convex, with a pair of small dorsal tentorial pits, sparsely covered with minute punctures, postgenae broad and almost flat, densely covered with long hairs just behind eyes, with a large and dorsally curved ventral process on ventral surface. Eyes small and ovoid, each composed of about 20 facets. Antennae short and thick, reaching base of pronotum, 1st segment thick, longer than wide, 2nd about as long as wide, subcylindrical, 3rd to 8th subequal in width, successively shortened toward apex, each segment small and subglobose, 9th thick and transverse, 10th slightly larger than 9th, transverse, 11th largest, 1.6 times as long as wide, truncate at base; relative length (width) of each segment from base to apex: 1.5 (0.8): 0.8 (0.7): 0.6 (0.6): 0.5 (0.6): 0.5 (0.6): 0.5 (0.6): 0.5 (0.6): 0.4 (0.6):

0.7 (1.0): 0.8 (1.1): 2.1 (1.3). Maxillary palpi large, 1st segment very small and tubular, 2nd large and elongate, thickened distally, 3rd slightly shorter than 2nd, thickened distally, 4th largest and nearly ovoid, roundly swollen inward at base, densely with short pubescence, palpal spine long and slender, 1/3 times as long as 4th.

Pronotum wider than long, roundly expanded on both sides, widest near the middle, with a pair of shallow basilateral foveae, densely covered with sparse punctures. Elytra nearly trapezoidal, weakly narrowed anteriorly, densely covered with large and shallow punctures, each elytron with 2 basal foveae and 2 longitudinal sulci, outer sulcus running from outer basal fovea to posterior 2/5. Legs short and slender, thickened in femora.

Abdomen slightly shorter than elytra, 4th tergite parallel-sided, 2.7 times as long as wide, with a pair of transverse basilateral foveae and shallow basimedial depression, 5th 0.7 times as long as 4th, weakly narrowed posteriorly, 6th slightly shorter than 5th, angularly projected posteriorly on hind margin, 7th tergite transverse, with a well projected median process and a pair of large pits just behind the process, densely covered with long and bold setae on posterior part, 8th tergite transverse and nearly triangular in posterior view, almost flat and densely covered with bold setae, 8th sternite

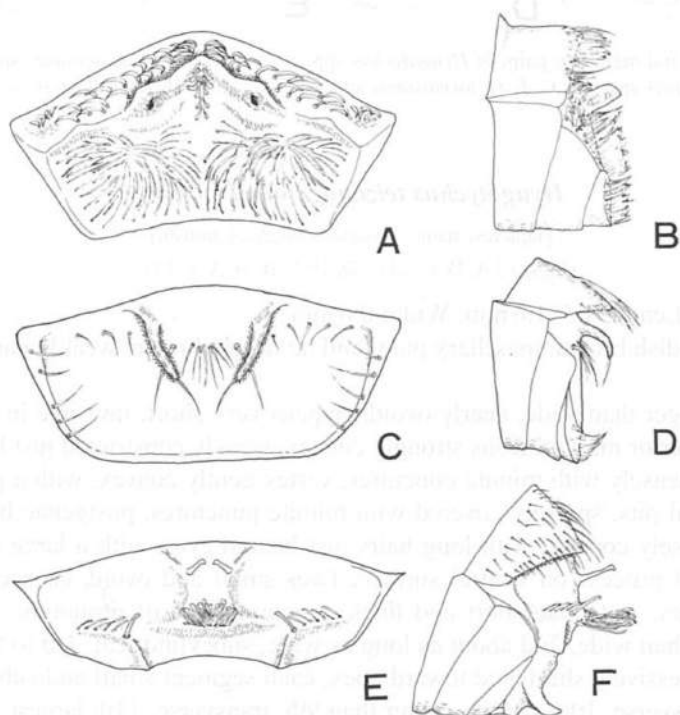


Fig. 15. Male 6th to 8th abdominal segments of *Hyugatyclus* spp. — A, B, *H. teizonagatomoii* sp. nov.; C, D, *H. tokunoshimensis* sp. nov.; E, F, *H. formosanus* sp. nov. — A, C, E, 7th tergite; B, D, F, 6th to 8th segments in lateral view.

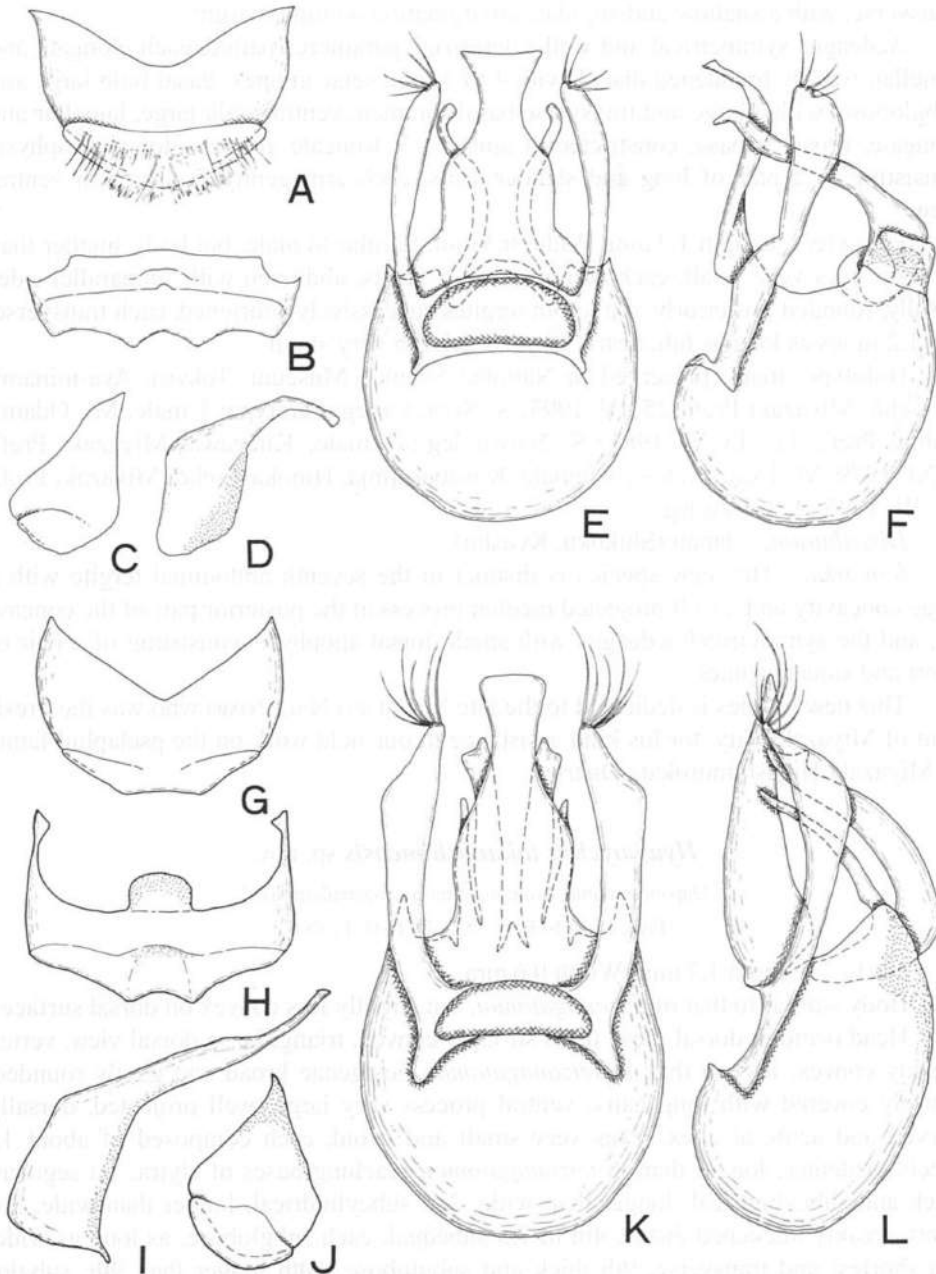


Fig. 16. Male 8th to 9th abdominal segments and aedeagi of *Hyugatyclus* spp. — A-F, *H. teizonagatomoii* sp. nov.; G-L, *H. tokunoshimensis* sp. nov. — A, G, 8th tergite; B, H, 8th sternite; C, J, median sclerite of 9th sternite; D, I, left lateral sclerite of 9th sternite; E, K, aedeagus in ventral view; F, L, ditto, in lateral view.

transverse, with a shallow and angulate emargination on hind margin.

Aedeagus symmetrical and well sclerotized, parameres paired, each elongate and lamellar, weakly broadened distad, with 4 to 5 long setae at apex, basal bulb large and subglobose, with a large and transverse basal foramen, ventral stalk large, lamellar and elongate, broad at base, constricted at apical 1/3, truncate at apex, dorsal apophysis consisting of a pair of long and slender arms, each arm gently S-curved in ventral view.

Female. Length 1.3 mm. Width 0.5 mm. Similar to male, but body smaller than in male, eyes very small, each composed of 5 facets, abdomen with subparallel sides basally, rounded posteriorly, 4th to 6th tergites successively shortened, each transverse, 7th 1.2 times as long as 6th, nearly trapezoidal, 8th very small.

Holotype, male (preserved in National Science Museum, Tokyo), Aya-minami, Aya-chô, Miyazaki Pref., 25-IV-1993, S. NOMURA leg. Paratype: 1 male, Mt. Odami, Ehime Pref., 11-13-VI-1981, S. NAOMI leg.; 1 male, Kitagawa, Miyazaki Pref., 3-XI-1979, M. TAKEISHI leg.; 1 female, Kusubarujinja, Hinokage-chô, Miyazaki Pref., 31-III-1995, A. NAGAI leg.

Distribution. Japan (Shikoku, Kyushu).

Remarks. This new species is distinct in the seventh abdominal tergite with a large concavity and a well projected median process at the posterior part of the concavity, and the symmetrical aedeagus with small dorsal apophysis consisting of a pair of short and sinuate spines.

This new species is dedicated to the late Mr. TEIZO NAGATOMO who was the President of Miyazaki City, for his kind assistance to our field work on the pselaphid fauna of Miyazaki Higashimorokata District.

Hyugatyclus tokunoshimensis sp. nov.

[Japanese name: Tokunoshima-mori-arizukamushi]

(Figs. 13 B, 14 B, E, 15 C-D, 16 G-L, 18 C)

Male. Length 1.7 mm. Width 0.6 mm.

Body similar to that of *teizonagatomoi*, but slightly less convex on dorsal surface.

Head ovoid in dorsal view, frons strongly convex, triangular in dorsal view, vertex weakly convex, less so than in *teizonagatomoi*, postgenae broad and gently rounded, densely covered with long hairs, ventral process very large, well projected, dorsally curved and acute at apex. Eyes very small and ovoid, each composed of about 15 facets. Antennae longer than in *teizonagatomoi*, reaching bases of elytra, 1st segment thick and subcylindrical, longer than wide, 2nd subcylindrical, longer than wide, 3rd short, weakly thickened distad, 4th to 7th subequal, each subglobose, as long as wide, 8th shortest and transverse, 9th thick and subglobose, 10th longer than 9th, subglobose, 11th largest and ovoid, truncate at base; relative length (width) of each segment from base to apex: 1.4 (1.0): 1.0 (0.7): 0.6 (0.7): 0.6 (0.6): 0.6 (0.6): 0.6 (0.6): 0.6 (0.6): 0.5 (0.6): 1.0 (0.9): 1.1 (1.1): 2.2 (1.2). Maxillary palpi similar to those of

teizonagatomoi, 2nd segment elongate, thickened in apical half, with 5–6 indistinct granules in apical 1/3, 3rd shorter than 2nd, elongate, slender in basal 2/5, swollen in apical 3/5, 4th slightly shorter than 3rd, nearly ovoid, palpal spine about 1/4 times as long as 4th, very slender.

Pronotum as long as wide, roundly expanded on both sides, slightly convex on dorsal surface, sparsely covered with minute punctures on dorsal surface. Elytra nearly trapezoidal, weakly flattened on dorsal surface, outer sulcus of each elytron reaching the middle. Legs slender, hind trochanter short, with a short, broad, and antero-ventrally curved process on posterior side.

Abdomen as long as elytra, angularly expanded posteriad on dorsal surface, 4th tergite longer than in *teizonagatomoi*, transverse, 2.3 times as wide as long, 5th tergite short, 0.7 times as long as 4th, 6th 0.8 times as long as 5th at median part, densely covered with long hairs on posterior margin, 7th transverse, hidden by 6th in dorsal view, broadly flattened posteriad, with a pair of large, acute and ventrally curved spines on basal part, 8th very short and transverse in posterior view, densely setose, 8th sternite transverse, weakly emarginate on posterior margin, slightly concave at the middle, 9th sternite consisting of small and quadrangular median plate and a pair of large lateral plates each with very long ventral struts.

Aedeagus symmetrical and well sclerotized, parameres each large and elongate, widest at apical 1/3, then narrowed distally, with 5 to 6 long setae at apex, basal bulb large and rounded posteriorly, ventral stalk elongate and narrowed in apical half, dorsal apophysis with two pairs of spines, dorsal spine long and thick, broadened at apex, ventral spine short and very slender, simply narrowed distad.

Female. Unknown.

Holotype, male (preserved in National Science Museum, Tokyo), Mt. Inokawadake, Tokunoshima Is., Kagoshima Pref., 2–V–1988, S. NOMURA leg.

Distribution. Japan (Tokunoshima Is.).

Remarks. This new species is similar to *teizonagatomoi*, but differs in having very small eyes, the longer antennae and the seventh tergite with a pair of curved spines.

Hyugatyclus formosanus sp. nov.

[Japanese name: Taiwan-mori-arizukamushi]

(Figs. 13 C, 14 C, F, 15 E–F, 17, 18 C)

Male. Length 1.7 mm. Width 0.6 mm. Similar in body form to *teizonagatomoi*. Head longer than wide, ovoid, frons strongly convex, with a short vertical carina at median part of anterior margin, vertex gently convex as in *teizonagatomoi*, but with a pair of large dorsal tentorial pits, postgena broad and gently rounded, densely covered with long hairs, ventral process very large and well projected, curved dorsally and sharpened at apex. Eyes small and ovoid, each composed of about 20 facets. Antennae short and thick, reaching base of pronotum, 1st segment longer than wide, thick and

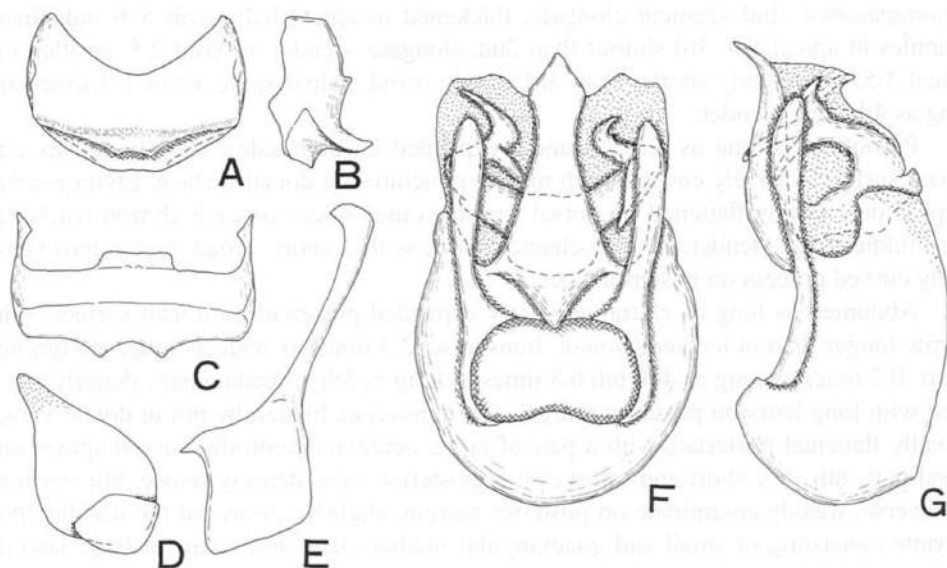


Fig. 17. *Hyugatychus formosanus* sp. nov., male. — A, 8th abdominal tergite in dorsal view; B, ditto, in lateral view; C, 8th sternite; D, median sclerite of 9th sternite; E, left lateral sclerite of 9th sternite; F, aedeagus in ventral view; G, ditto, in lateral view.

subcylindrical, 2nd thick, nearly ovoid, 3rd to 5th subequal, each as long as wide, subglobose, 6th to 8th subequal, each short and transverse, 9th to 10th thickened, 10th as long as wide, 11th wider than 10th, wider than long, 11th largest and ovoid, 1.5 times as long as wide, truncate at base; relative length (width) of each segment from base to apex: 1.2 (0.8): 0.7 (0.6): 0.6 (0.6): 0.6 (0.6): 0.6 (0.6): 0.5 (0.6): 0.5 (0.6): 0.5 (0.6): 0.8 (0.8): 0.9 (1.0): 2.0 (1.3). Maxillary palpi large, 1st segment very small and tubular, 2nd elongate and slender, weakly thickened in apical 1/3, 3rd shorter than 2nd, elongate, thickened distally, 4th widest, slightly longer than 3rd, nearly ovoid, palpal spine slender, 1/3 times as long as 4th.

Pronotum wider than long, roundly expanded on both sides, widest at anterior 2/5, sparsely covered with minute punctures. Elytra wider than long, weakly broadened posteriad, slightly convex, each elytron with shallow outer sulcus reaching the middle of elytra. Legs short and slender, fore trochanters very short, each with a small and pointed denticle at anterior side, hind trochanters short and thick, each with a small and ventrally curved process on posterior margin.

Abdomen slightly longer than elytra, narrowed posteriorly, 4th segment largest, 4th tergite with a pair of shallow and transverse basilateral foveae and a transverse basimedial depression, 5th 0.6 times as long as 4th, weakly narrowed posteriad, 6th slightly shorter than 5th, densely covered with long hairs, 7th slightly shorter than 6th, with a pair of bold setae at basimedial part, a densely setose and conical projection at the middle, and a pair of fringes each including a bold seta, 8th short and transverse,

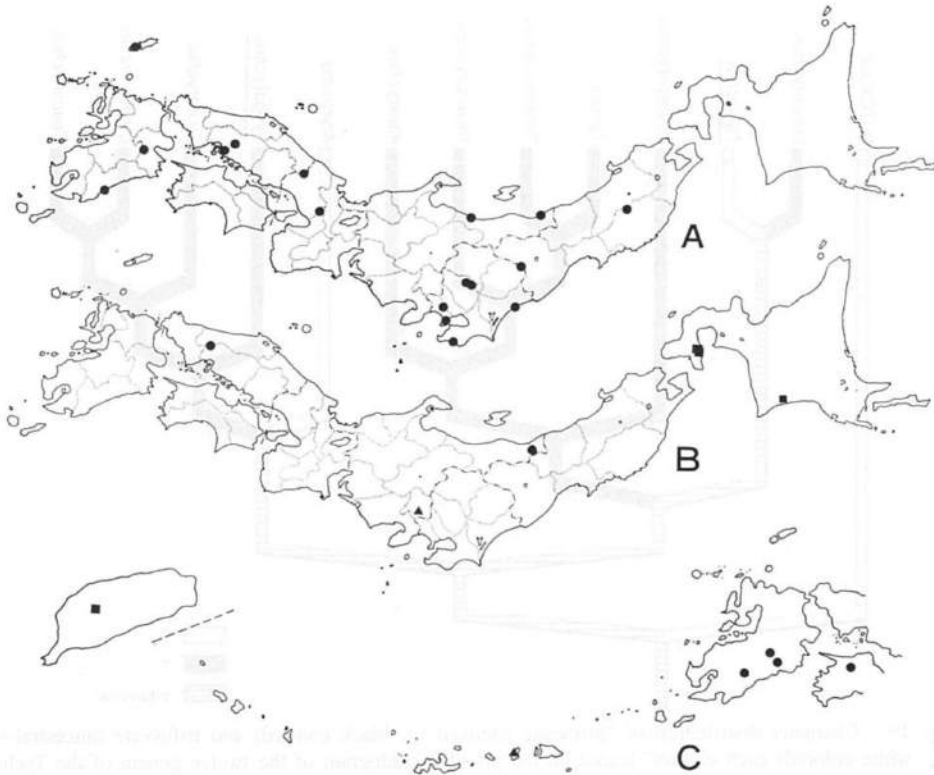


Fig. 18. Distributions of *Tychus* and *Hyugatyclus* spp. in Japan and Taiwan. — A, *Tychus dichotomus* NOMURA et LEE; B, *T. crassicornis* RAFFRAY (circle), *T. yukihikoï* sp. nov. (triangle), and *T. yezoensis* sp. nov. (square); C, *Hyugatyclus teizonagatomoï* sp. nov. (circle), *H. tokunoshimensis* sp. nov. (triangle), and *H. formosanus* sp. nov. (square).

with a trapezoidal projection at postero-median part, 8th sternite short and transverse, weakly emarginate at postero-median part, 9th sternite composed of a nearly ovoid median plate and a pair of large and quadrangular lateral plates, each bearing a very long and slender ventral strut.

Aedeagus nearly symmetrical, parameres each large and elongate, basal bulb very large and rounded basally, ventral stalk elongate, weakly constricted at apical 1/3, triangular at apex, dorsal apophysis including membrane and a pair of asymmetrical and bifurcate arms, right arm with a long basal and a short apical spines, left arm with an incurved basal and an outcurved apical spines.

Female. Unknown.

Holotype, male (preserved in National Science Museum, Tokyo), Fenchihu, Chiai Hsien, S. Taiwan, 25-VIII-1993, H. URUSHIHARA leg.

Distribution. Taiwan.

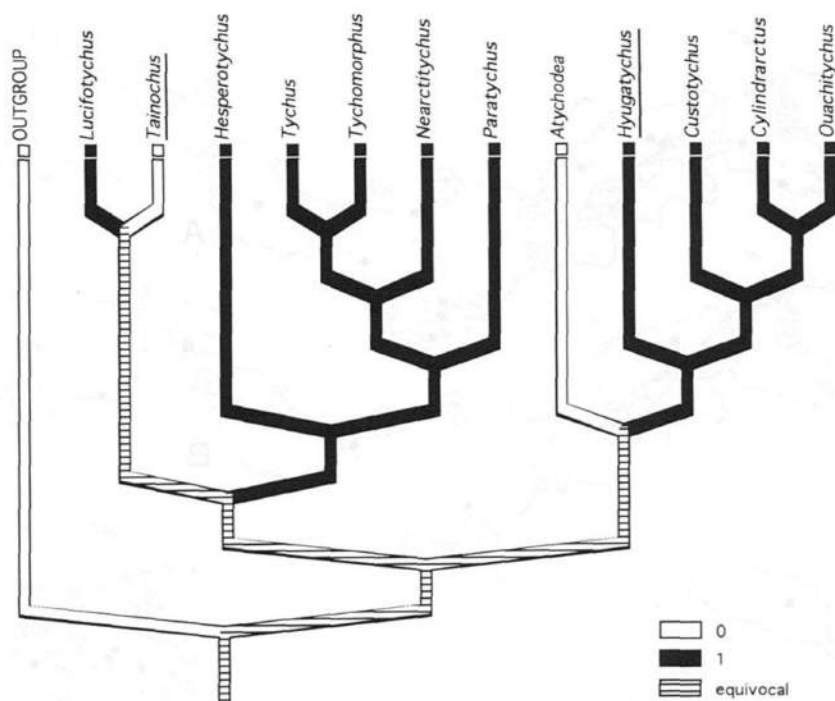


Fig. 19. Character distribution of "bifoveate (derived=1: black colored) and trifoveate (ancestral=0: white colored) each elytron" traced on the possible cladogram of the twelve genera of the Tychini (grey parts indicate equivocal clades).

Remarks. This new species is similar in habitus to the other species of the genus, but it is distinguished from them by having the seventh abdominal tergite with a conical median projection and a pair of fringes, and the eighth tergite with a trapezoidal postero-median projection.

Phylogenetic Notes

The phylogenetic relationship of the world genera of the Tychini is discussed by CHANDLER (1988), who presented a cladogram of ten genera. On the basis of his phylogenetic hypothesis, the systematic positions of the genera *Tainochus* and *Hyugatychus* are inferred as follows.

As to the genus *Hyugatychus*, its similarity to the clade containing *Custotychus*, *Cylindrarctus* and *Ouachitychus* is suggested, because these genera share the bifurcate dorsal apophysis ("dorsal lobe" in CHANDLER, 1988) of the aedeagus. However, this genus is separated from the three genera by having the unique maxillary palpus with nearly fusiform 3rd and basally expanded 4th segments and the complete parameres of

male genitalia. As the result, *Hyugatyclus* should be considered to take position between the former three genera and the genus *Atychodea*.

On the other hand, the genus *Tainochus* is apparently close to *Lucifotyclus* in having pick-like projection of the 4th segment of the maxillary palpus as a synapomorphic character 8b numbered by CHANDLER (1988), though this genus is different from the latter in possessing the trifoveate elytron.

In conclusion, cladistic relationship of the twelve genera of the Tychini is resumed as shown in Fig. 19. This cladogram contains several homoplasies, for example, the bifoveate elytron, the asymmetrical aedeagus, the reduced medio-basal foveae of the 4th abdominal sternite, and so on. The bifoveate elytron as a derived character is traced on this cladogram as Fig. 19 (drawn by MacClade, ver. 3.04). In the case that this character is considered to be an irreversible change, the equivocal branches (grey colored in Fig. 19) must represent an ancestral state (white colored) and the derived state is estimated to have been evolved three times at least.

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要 約

野村周平：日本およびその周辺地域産モリアリヅカムシ族の分類学的再検討（コウチュウ目，アリヅカムシ科）。——日本ならびに極東ロシア，韓国，台湾に産するモリアリヅカムシ族の3属14種を記録した。*Tainochus*（ムクゲアリヅカムシ属）は7種を記録し，4新種，*iwaoi*, *nitidus*, *puncticeps*, *minutus*を記載し，*insulicola* NOMURA et LEEを初めて日本から記録した。*Tychus*（モリアリヅカムシ属）は2新種，*yezoensis*, *yukihikoi*を記載し，日本初記録の *dichotomus* NOMURA et LEEを含む合計4種を記録した。さらに新属 *Hyugatyclus*（ヒュウガモリアリヅカムシ属）を定義し，3新種，*teizonagatomoi*, *tokunoshimensis*, *formosanus*を記載した。また，CHANDLER（1988）の系統仮説に基づき，*Tainochus*, *Hyugatyclus*の2属の系統学的位置を推定した。*Tainochus*属は北米産の *Lucifotyclus*属，*Hyugatyclus*属は *Ouachityclus*など3属からなる単系統群の，それぞれ姉妹群であると推定された。しかしこの系統仮説には多数の同型形質が含まれているので，その信頼性にはなお検討の余地がある。

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Elytra, Tokyo, **24** (2): 278, November 15, 1996

A New Record of *Rybaxis lamellifer* LÖBL (Coleoptera, Pselaphidae) from Kyushu, Japan

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Rybaxis lamellifer is described by LÖBL (1973) from North Korea. NOMURA and LEE (1993) recorded this species from Kangweon Do, South Korea. This report presents the first record of this species from Japan.

Rybaxis lamellifer LÖBL

Rybaxis lamellifer LÖBL, 1973, *Annls. zool., Warszawa*, **30**: 326; KURBATOV, 1989, *Opred. Nasek. Dal'nego Vostoka*, **3** (1): 357; NOMURA & LEE, 1993, *Esakia, Fukuoka*, (33): 19.

Specimen examined. 1 ♂, Ike, Mt. Hachimandake, Nishitaku-machi, Taku C., Saga Pref., 21~22-III-1989, S. NOMURA leg.

Distribution. North Korea, South Korea and Japan (Kyushu).

Remarks. This species is similar to the other congeners in the habitus, but is very distinct in having the slender and bifurcate each paramere of the aedeagus.