Kontyû, Tokyo, **56** (2): 354–364. June 25, 1988

Redescription of *Antocha* (*Proantocha*) *spinifer* (Diptera, Tipulidae)

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Abstract *Antocha* (*Proantocha*) *serricauda* ALEXANDER, 1924, and *Antocha* (*Proantocha*) *quadrivittata* (ALEXANDER, 1932) are synonymized under *Antocha* (*Proantocha*) *spinifer* ALEXANDER, 1919, on the basis of the observation on the holotypes and 236 males and 186 females of this species collected in various localities of Japan. Male and female of *A.* (*P.*) *spinifer* are redescribed and figured. *A.* (*P.*) *spinifer* is newly recorded from Kyushu.

Proantocha, one of the subgenera of *Antocha*, was established by ALEXANDER (1919) based on *Antocha* (*Proantocha*) *spinifer* ALEXANDER, 1919. Four species have been described under *Proantocha* and they are distributed only in Japan.

ALEXANDER (1924) described *A.* (*P.*) *serricauda* and distinguished it from *A.* (*P.*) *spinifer* by the following respects: the male of *A.* (*P.*) *spinifer* is larger, with wing length more than 12 mm, leg ratio (hind tarsal length / hind tibial length) smaller than 0.25; the male of *A.* (*P.*) *serricauda* is smaller, with wing length less than 8 mm, leg ratio larger than 0.25. ALEXANDER (1919, 1924) described and figured the male terminalia of the latter, but not of the former. TAKAHASHI (1976) reported that the wing length of *A.* (*P.*) *serricauda* is larger (9.5–10 mm) than that ALEXANDER (1924) originally described. According to ISHIDA (1957, 1965), *A.* (*P.*) *spinifer* is distributed in Honshu, while *A.* (*P.*) *serricauda* in Hokkaido, Honshu and Shikoku.

ALEXANDER (1932) characterized *A.* (*P.*) *quadrivittata* in having distinct mesoscutal stripes in the male, but he did not describe its male terminalia. It is distributed in Honshu (ISHIDA, 1957, 1965).

In the present study, the holotypes of the three species are examined and compared with 236 males and 186 females which seemed to belong to these species. Redescription, figures, and a new locality of *A.* (*P.*) *spinifer* are also given.

Male and female terminalia were figured after the treatment with hot 10% KOH except those preserved as slides. Morphology and terminology follow those of ALEXANDER and BYERS (1981), MCALPINE (1981) and SNODGRASS (1904).

Antocha (*Proantocha*) *spinifer* ALEXANDER, 1919

[Japanese name: Usuba-gaganbo]

(Figs. 1–10)

Antocha (*Proantocha*) *spinifer* ALEXANDER, 1919, Annls. ent. Soc. Amer., **12**: 331; type loc., Chichibu,

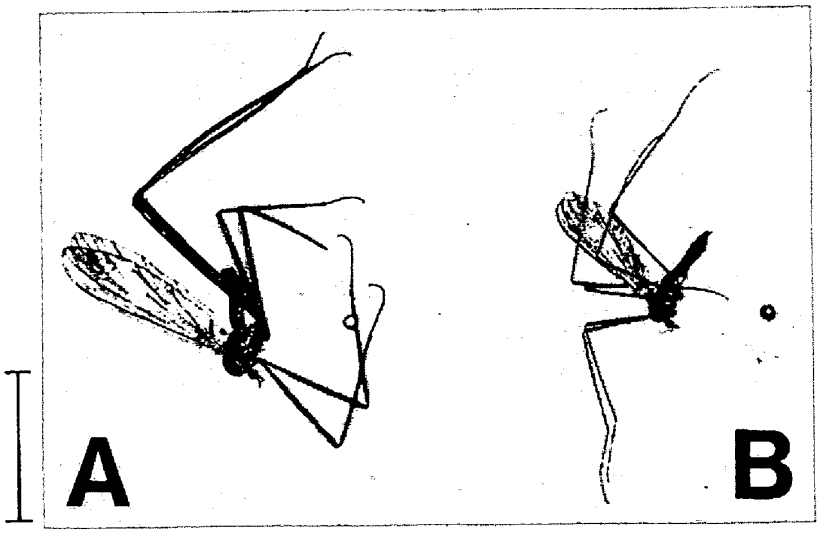

Fig. 1. *Antocha* (*Proantocha*) *spinifer*; A, male; B, female; scale, 10 mm.

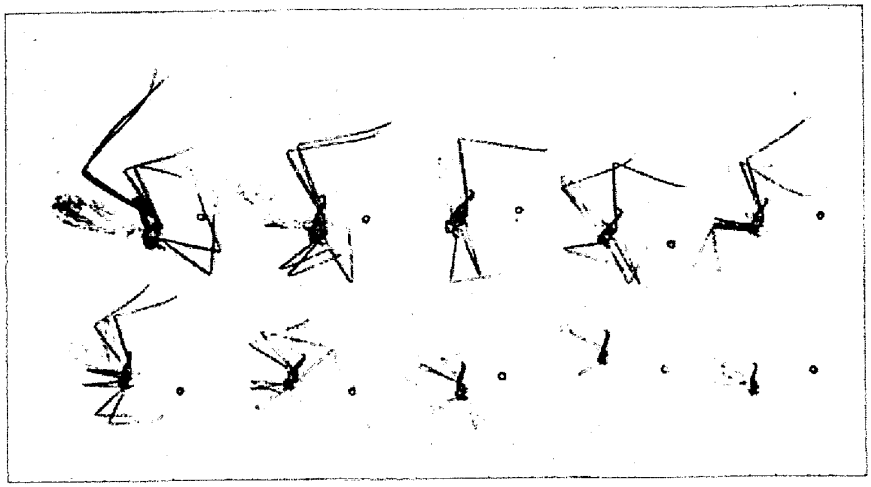

Fig. 2. Size variation in *Antocha* (*Proantocha*) *spinifer*, male; scale, 10 mm.

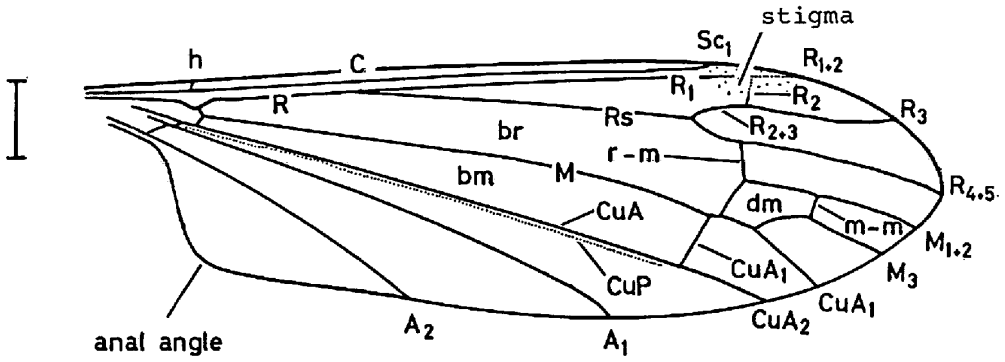

Fig. 3. *Antocha* (*Proantocha*) *spinifer*, male; wing; scale, 1 mm.

Saitama Pref.

Antocha (*Proantocha*) *serricauda* ALEXANDER, 1924, Philipp. J. Sci., **24**: 563–564, pl. 2, fig. 9 (male terminalia); type loc., Jôzankei, Sapporo, Hokkaido. (N. syn.)

Proantocha quadrivittata ALEXANDER, 1932, Philipp. J. Sci., **49**: 115, pl. 1, fig. 8 (wing); type loc., Saga, Kyoto Pref. (N. syn.)

Antocha serricauda: ESAKI, 1950, Icon. Ins. Japon., 2nd ed., p. 1519, fig. 4356.

Antocha (*Proantocha*) *serricauda*: ALEXANDER, 1954, Philipp. J. Sci., **82**: 288, pl. 4, fig. 34 (female terminalia).

Antocha (*Proantocha*) *quadrivittata*: ISHIDA, 1957, Annual Rept. Hyogo Agr. Coll., **6**: 146.

Antocha (*Proantocha*) *serricauda*: ISHIDA, 1957, Annual Rept. Hyogo Agr. Coll., **6**: 146.

Antocha (*Proantocha*) *spinifer*: ISHIDA, 1957, Annual Rept. Hyogo Agr. Coll., **6**: 146.

Antocha (*Proantocha*) *serricauda*: TAKAHASHI, 1976, Icon. Ins. Japon. Col. nat. ed., 7th ed., **3**: 172, pl. 86, fig. 20.

Holotypes comparison. The holotypes (males) of *Antocha* (*Proantocha*) *spinifer*, *A.* (*P.*) *serricauda* and *A.* (*P.*) *quadrivittata*, preserved in the National Museum of Natural History, U. S. A., are not different from one another in the wing (Fig. 5 B), midleg, and claws (Fig. 5 C). (The holotypes of *A.* (*P.*) *quadrivittata* and *A.* (*P.*) *serricauda* are complete, but the holotype of *A.* (*P.*) *spinifer* is represented by only a wing and a midleg.) They are different only quantitatively: the holotype of *A.* (*P.*) *spinifer* is larger, with wing length 12.3 mm, and leg ratio 0.22 (ALEXANDER, 1919); the holotype of *A.* (*P.*) *serricauda* is smaller, with wing length 7.2 mm, and leg ratio 0.29. These values indicate both ends of variation curves of *A.* (*P.*) *spinifer*, male. The holotype of *A.* (*P.*) *quadrivittata* (wing length 9.2 mm, leg ratio 0.21) has three distinct mesoscutal stripes, and is distinguished from the two other species only by this character, as ALEXANDER (1932) mentioned.

Variation in males (Figs. 2, 4–9). A wide variation in wing length, leg ratio

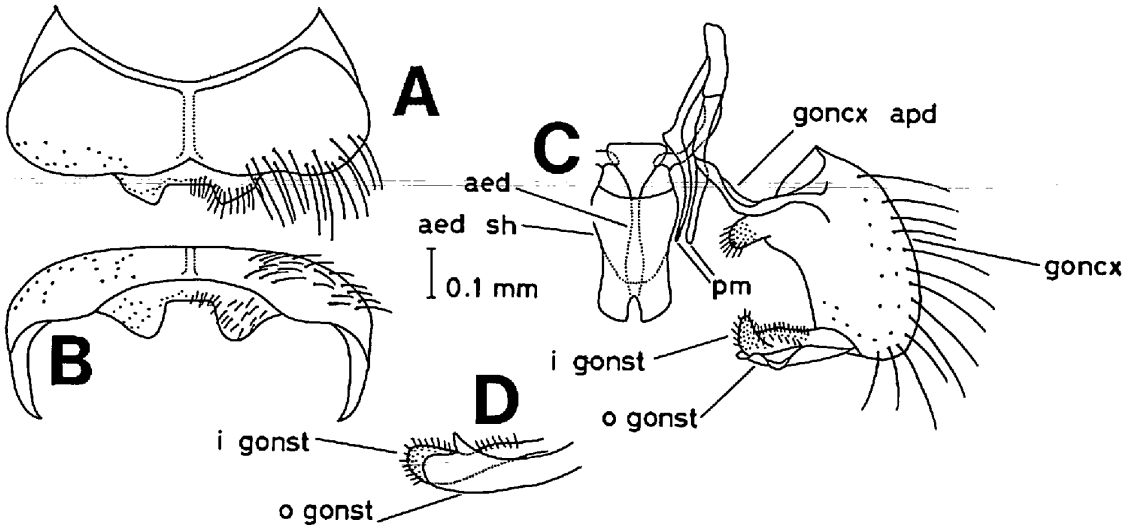

Fig. 4. Male terminalia of *Antocha* (*Proantocha*) *spinifer*; A, tergite 9, dorsal; B, same, posterior; C, aedeagus, aedeagal sheath, paramere and gonopod, dorsal; D, gonostyli, posterior; aed, aedeagus; aed sh, aedeagal sheath; goncx, gonocoxite; goncx apd, gonocoxal apodeme; i gonst, inner gonostylus; o gonst, outer gonostylus; pm, paramere.

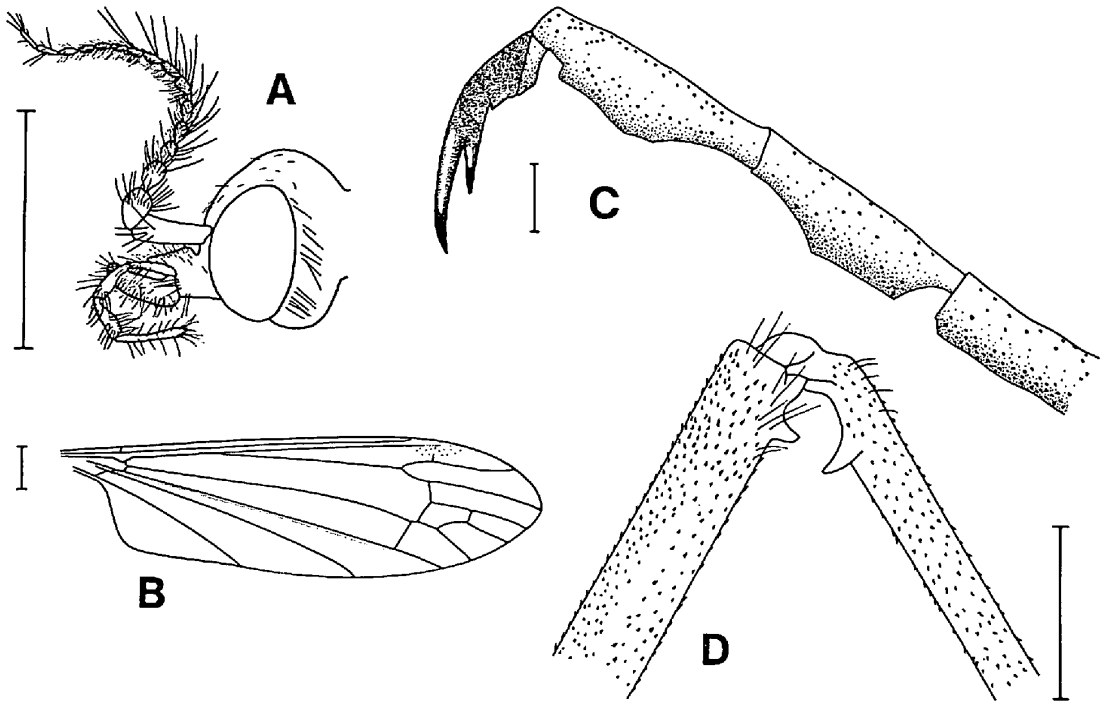

Fig. 5. *Antocha* (*Proantocha*) *spinifer*, male; A, head; B, wing; C, claw; D, femoro-tibial joint (hindleg); scales, A, B, D, 1 mm; C, 0.1 mm.

and mesoscutal stripes is recognized in males of *A.* (*P.*) *spinifer*. Males taken from three regions are examined as follows ("N" indicates total number of specimens).

(A) Hokkaido, N=67.

(B) Iwate Prefecture, Honshu, N=150.

(C) Tokyo and Yamanashi Prefectures, Honshu, N=13.

Variation curves of wing length (Fig. 6 A, B) and leg ratio (Fig. 7 A, B) in Hokkaido specimens and Iwate specimens are continuous, and it is impossible to distinguish *A.* (*P.*) *serricauda* ALEXANDER, 1924, from *A.* (*P.*) *spinifer* ALEXANDER, 1919, based on these characters. Variation curves in Tokyo and Yamanashi specimens (Fig. 6, 7 C) are not continuous because "N" is too small. There is a negative correlation between the wing length and leg ratio (Fig. 9), and the shape of male terminalia (Fig. 4) and aedeagal length (Fig. 8) are less variable. There is no significant difference in head, wing, claw, and femoro-tibial joint of hindleg (Fig. 5 A–D) among all the specimens from the three regions, which are considered to represent *A.* (*P.*) *spinifer* ALEXANDER, 1919, and *A.* (*P.*) *serricauda* ALEXANDER, 1924.

The mesoscutal stripes are so variable, from indistinct to distinct, in all the specimens of the three regions. Thus *A.* (*P.*) *quadrivittata* (ALEXANDER, 1932) cannot be distinguished from *A.* (*P.*) *spinifer* ALEXANDER, 1919, definitely.

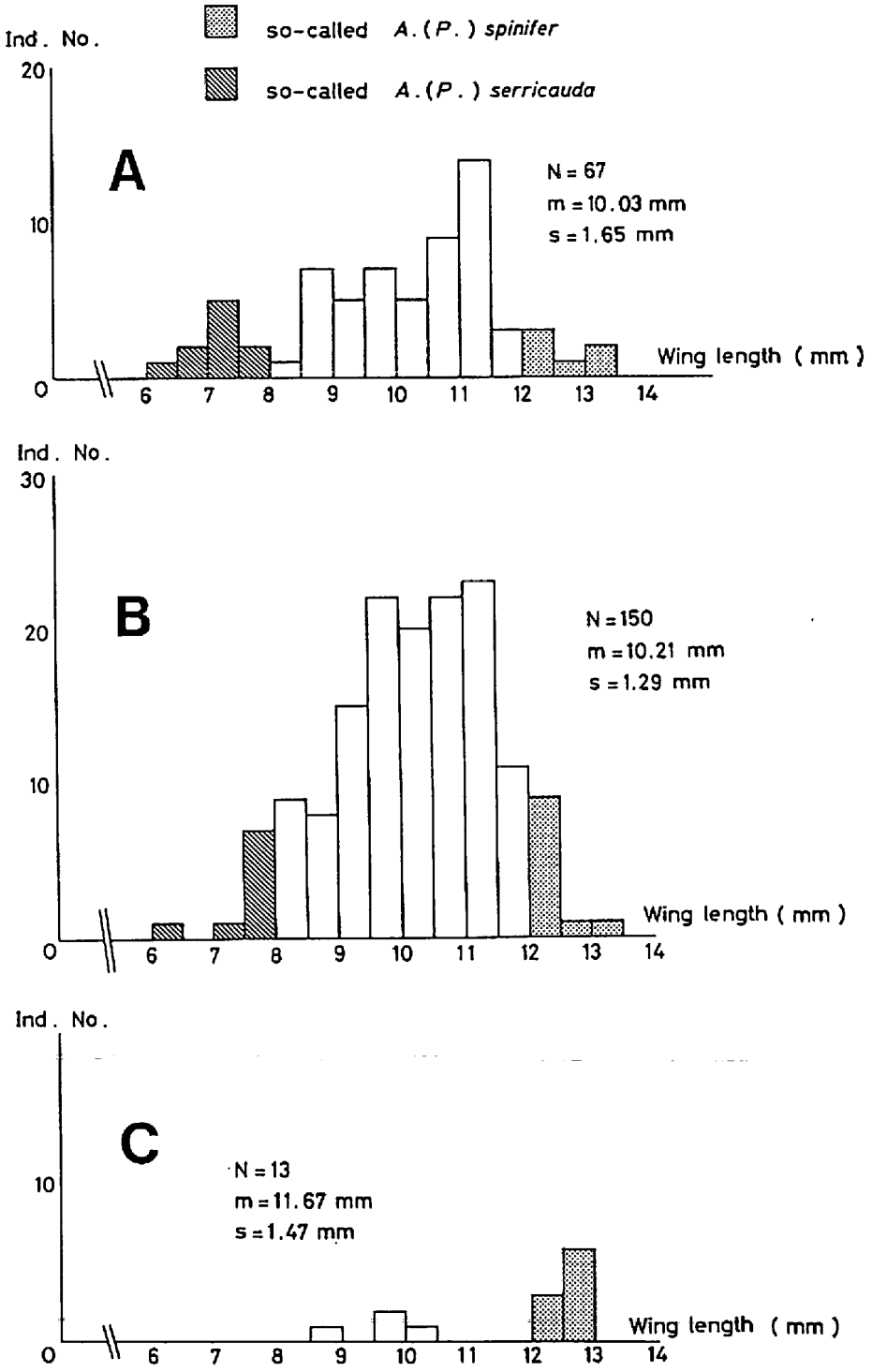

Fig. 6. Wing length variation in *Antocha* (*Proantocha*) *spinifer*, male; A, Hokkaido; B, Iwate; C, Tokyo and Yamanashi; N, total number of specimens; m, mean; s, sample standard deviation.

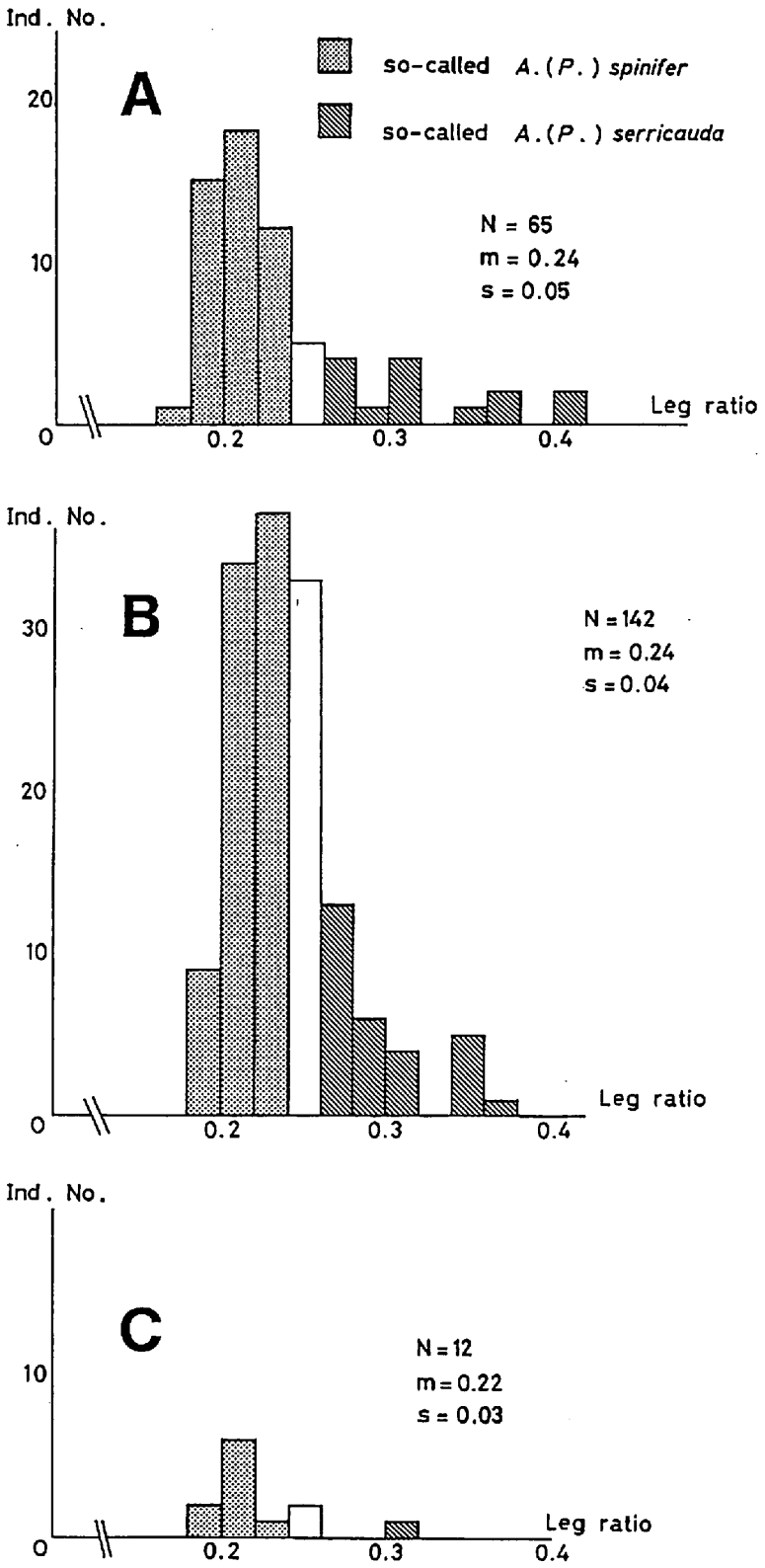

Fig. 7. Leg ratio (hind tarsal length / hind tibial length) variation in *Antocha* (*Proantocha*) *spinifer*, male; A, Hokkaido; B, Iwate; C, Tokyo and Yamanashi; N, total number of specimens; m, mean; s, sample standard deviation.

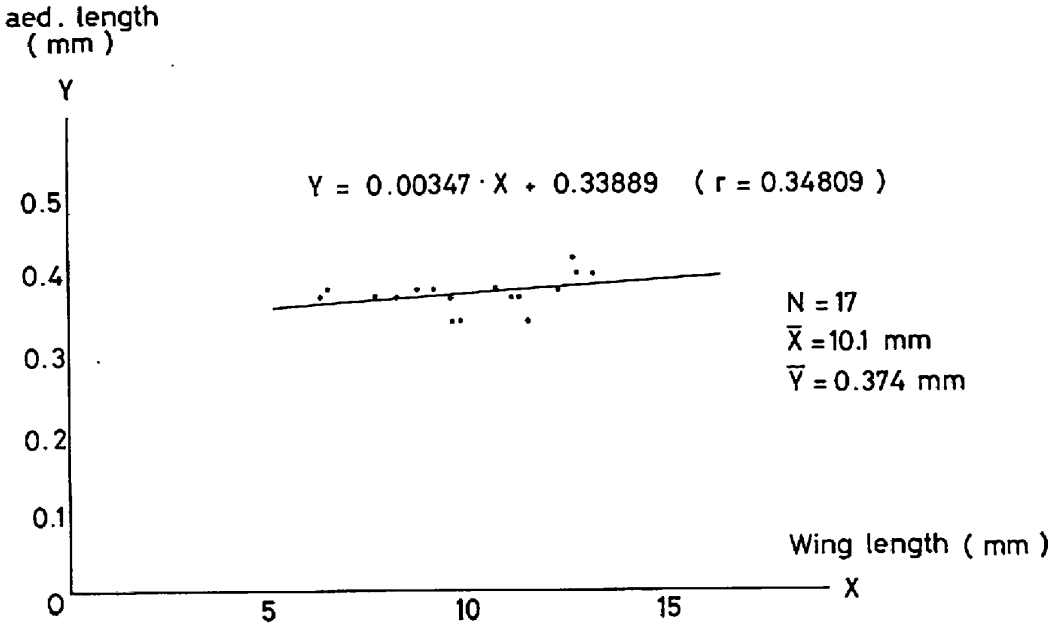

Fig. 8. *Antocha* (*Proantocha*) *spinifer*, male; correlation between aedeagal length and wing length, sampling from three regions; N, total number of specimens; $\overline{X}$, mean X; $\overline{Y}$, mean Y.

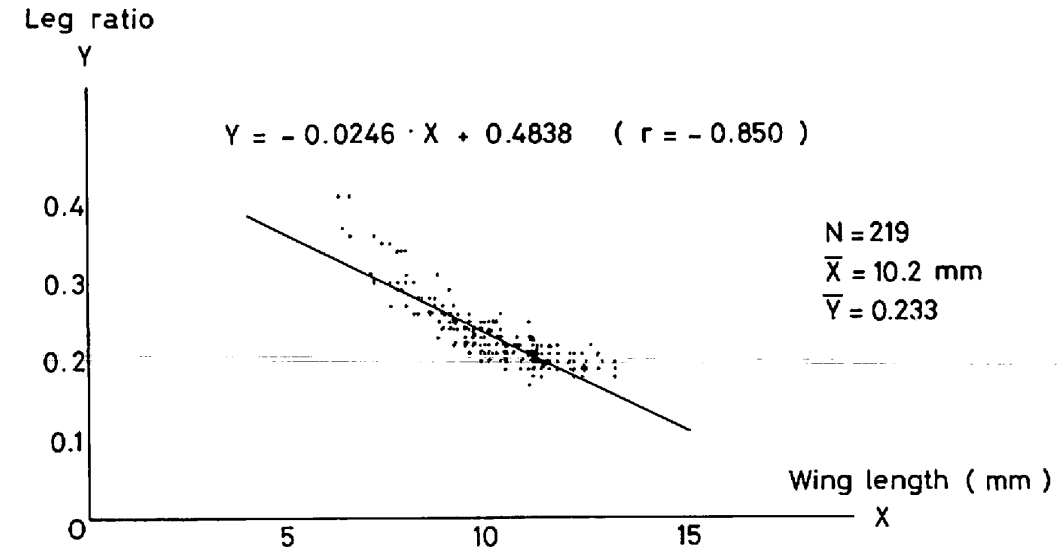

Fig. 9. *Antocha* (*Proantocha*) *spinifer*, male; correlation between leg ratio (hind tarsal length / hind tibial length) and wing length, all specimens from three regions; N, total number of specimens; $\overline{X}$, mean X; $\overline{Y}$, mean Y.

Redescription

Male. Wing length 6–13.5 mm, body length 5–9 mm, antennal length 0.8–1.7 mm, leg ratio 0.18–0.40.

Head (Fig. 5 A) pale yellow or pale yellowish brown, sparsely pruinose. Rostrum pale yellow or pale yellowish brown. Compound eyes black, widely separated both above and below. Antennae with scapes pale yellow or pale yellowish brown, with long setae near tips; pedicels pale yellowish brown or pale brown, with long setae at apical half; flagellomeres 14 in number, pale brown or brown, each flagellomere long oval or longer, distal segments elongate, usually basal eight and terminal two flagellomeres with long setae. Labella and palpi pale yellowish brown or pale brown.

Thorax pale brownish yellow in ground color; pronotum usually slightly darker; mesoprescutum usually darker, but lateral portions paler; mesoscutum pale brownish yellow, usually with three indistinct broad darker stripes, but sometimes distinctly or barely indicated, the middle one ending before transverse suture; paratergites, scutellum, mediotergite and laterotergites pale brownish yellow or pale brown, sometimes two large brown spots present at posterior margin of mediotergite; episternum and epimeron pale brownish yellow or pale brown; metanotum pale brownish yellow. Setae present on pronotum and katepisternum; pleura basad of hind coxae with short setae. Halteres with stems pale and with setae, knobs usually slightly darkened. Legs with coxae and trochanters yellow, terminal tarsomeres brown or yellowish brown, remainder of legs brownish yellow; fore- and midlegs stout, densely clothed with long setae; hindlegs long and very stout, densely clothed with spinules or short spinous setae, armed with opposable pointed tubercles (Fig. 5 D) at tips of femora and bases of tibiae, tibiae slightly curved near tips. Setae present on all coxae and trochanters. Claws (Fig. 5 C) black and very long, at about midlength with a long tooth, and with an additional tiny basal tooth. Wings (Fig. 3, 5 B) subhyaline, very faintly tinged with yellow; stigma pale yellow, indistinct. Macrotrichia present on C, R_1, R_{1+2}, distal two-fifths to three-fifths of distal section of R_{4+5}, distal half of distal section of M_{1+2}, and on wing margin, macrotrichia usually present sparsely on distal one-fourth to two-thirds of distal section of M_3. Veins brown or yellowish brown. Venation: tip of Sc_1 about the level of fork of Rs or slightly beyond; R_2 indistinct in stigma, about opposite r–m or slightly beyond; basal section of CuA_1 usually joining M about one-fifth to one-third its length basal to fork of M; cell dm present, its length about twice to 2.5 times of width.

Abdominal tergites pale brown to dark brown, lateral and caudal margins of each tergite usually pale yellow; each tergite with setae sparsely, relatively densely on caudal ones. Abdominal sternites pale yellow to pale brown, medial and cephalic portions of caudal sternites usually dark brown; each sternite with numerous setae, especially on caudal ones. Male terminalia (Fig. 4) brown. Tergite 9 with long setae on its caudal area except median portion, bearing two setiferous processes at its medio-caudal margin. Sternite 9 simple, with long setae on its latero-caudal portion. Gonocoxite provided with long setae, and with a setiferous lobe at its baso-mesal part. Aedeagus simple, length 0.35–0.39 mm. Aedeagal sheath well

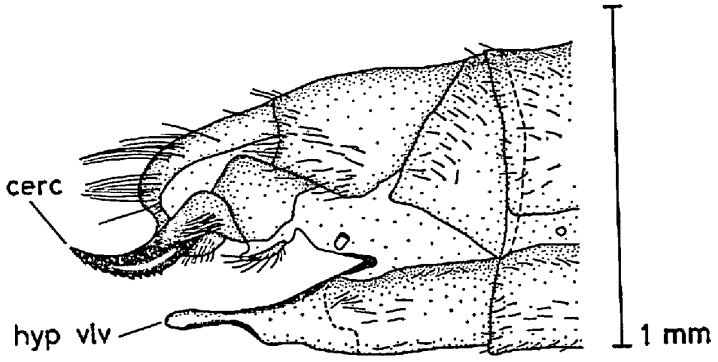

Fig. 10. Female terminalia of *Antocha* (*Proantocha*) *spinifer*; cerc, cercus; hyp vlv, hypogynial valve.

developed. Tips of inner and outer branch of parameres reaching about mid-length of aedeagus, tip of the inner one somewhat more acute than that of the outer one. Outer gonostylus glabrous, its distal part paddle-like, bearing a tooth. Inner gonostylus densely setiferous, bending at tip, slightly longer than outer one.

Female. Wing length 5.9–9 mm, body length 4–7.5 mm, antennal length 0.9–1.3 mm.

Different from male as follows: all legs less stout, fore- and midlegs clothed with shorter setae, hindlegs clothed with not spinous setae, opposable tubercles absent at tips of hind femora and bases of hind tibiae, hind tibiae not curved near tips; claws smaller in individuals of the same body size; abdomen less setiferous, usually almost uniformly pale brown (coloration of eggs seen through), caudal segments pale yellow, abdomen of female without eggs almost uniformly pale yellow.

Female terminalia (Fig. 10) with cerci heavily chitinized, short and stout, their ventral margins serrate, with about a dozen teeth, the distal ones smaller; hypogynial valves moderately chitinized, without setae, shorter than cerci; dense pencils of long yellow setae present on either side of tergite, directed caudad.

Specimens examined. Hokkaido:— 2 ♂♂, Ashoro-mura, Tokachi, VII. 29. 1949, R. Matsuda leg. (in coll. Ent. Lab., Kyushu Univ.); 1 ♂, Riv. Yanbetsugawa, 900 m alt., Shikaoi-chô & Kamishihoro-chô, Katô-gun, Tokachi-shichô, VII. 14. 1984, T. Torii leg.; 10 ♂♂ 23 ♀♀, near Hotspring Kanno-Onsen, ca. 700 m alt., Shikaoi-chô, Katô-gun, Tokachi-shichô, VII. 16–17. 1984, T. Torii leg.; 1 ♂, Hokkaido Univ., 15 m alt., Sapporo, VII. 16. 1984, K. Furukawa leg.; 55 ♂♂ 48 ♀♀, Bankei, 300 m alt., Sapporo, VII. 18. 1984, T. Torii leg.; 2 ♀♀, Jôzankei, 300 m alt., Sapporo, VII. 10. 1984 (at light), T. Torii leg.; 1 ♀, same locality as above, VII. 12. 1984 (at light), T. Torii leg.; 1 ♂, Jôzankei, VIII. 20. 1922, T. Esaki leg. (holotype of *A.* (*P.*) *serricauda* Alexander, 1924, in coll. Dept. Ent., U. S. Natn. Mus. Nat. Hist.); 1 ♀, same locality as above, VIII. 19. 1922, T. Esaki leg. (paratype of *A.* (*P.*) *serricauda* Alexander, 1924, in coll. Ent. Lab.,

Kyushu Univ.).

Honshu:— 2 ♂♂ (in ethanol), Kohinokiyama-sawa, Kawai-mura, Shimohei-gun, Iwate Pref., VIII. 6. 1983, S. UCHIDA leg.; 15 ♂♂ 2 ♀♀, Taimagura & Kagura, ca. 400 m alt., Kawai-mura, Shimohei-gun, Iwate Pref., VIII. 15. 1983 (resting on *Carex*), T. TORII leg.; 55 ♂♂ 59 ♀♀, Mt. Kohinokiyama (Riv. Yakushigawa), ca. 400 m alt., Kawai-mura, Shimohei-gun, Iwate Pref., VIII. 17. 1983, T. TORII leg.; 1 ♂, Tate & Nakaimura, ca. 450 m alt., Iwaizumi-chô, Shimohei-gun, Iwate Pref., VIII. 17. 1983 (at light), T. TORII leg.; 37 ♂♂ 7 ♀♀, Hitsudori & Komagasawa, 780 m alt., Iwaizumi-chô, Shimohei-gun, Iwate Pref., VIII. 17–18. 1983, T. TORII leg.; 42 ♂♂ 37 ♀♀, Matsukusa, 580 m alt., Kawai-mura, Shimohei-gun, Iwate Pref., VIII. 19. 1983, T. TORII leg.; 1 ♀, Okkai, Gumma Pref., VII. 28. 1923, T. ESAKI leg. (in coll. Ent. Lab., Kyushu Univ.); 1 ♂, Chichibu, Saitama Pref., VI. 1. 1919, R. TAKAHASHI leg. (holotype of *A.* (*P.*) *spinifer* ALEXANDER, 1919, in coll. Dept. Ent., U. S. Natn. Mus. Nat. Hist.); 1 ♂ 3 ♀♀, Mt. Takaosan, ca. 200 m alt., Hachiôji, Tokyo Pref., VI. 30. 1982, T. TORII leg.; 1 ♂, Jûrigi, ca. 200 m alt., Itsukaichi-machi, Nishitama-gun, Tokyo Pref., VIII. 4. 1982 (at light), T. TORII leg.; 1 ♂, Mt. Mitôsan, ca. 700 m alt., Hinohara-mura, Nishitama-gun, Tokyo Pref., VI. 15–16. 1984, T. TORII leg.; 10 ♂♂ 2 ♀♀ (in ethanol, but two males were dried), Kanafuro, ca. 600 m alt., Kosuge-mura, Kitatsuru-gun, Yamanashi Pref., VII. 3. 1984, S. UCHIDA leg.; 1 ♂ 1 ♀, Kiso-Odakimura, Miure, Nagano Pref., VIII. 19. 1937, T. ESAKI & K. YASUMATSU leg. (in coll. Ent. Lab., Kyushu Univ.); 1 ♂ (once in ethanol, now dried), Saga, 150 m alt., Kyoto Pref., VIII. 10. 1929, M. TOKUNAGA leg. (holotype of *A.* (*P.*) *quadrivittata* (ALEXANDER, 1932), in coll. Dept. Ent., U. S. Natn. Mus. Nat. Hist.).

Shikoku:— 2 ♀♀, Omogo, Ehime Pref., VII. 14. 1952, S. MIYAMOTO leg. (in coll. Ent. Lab., Kyushu Univ.).

Kyushu:— 1 ♂, Naidaijin (new locality), Kumamoto Pref., VII. 3. 1976, M. YAMAMOTO leg.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu).

Remarks. This species is newly recorded from Kyushu. Readily distinguished from species of the other subgenera by long and very stout hindlegs in male and cercal serration in female, and from species of the same subgenus by male terminalia, male hind tibiae, and coloration in male and female.

Acknowledgments

I wish to acknowledge my indebtedness to Prof. R. ISHIKAWA of Tokyo Metropolitan University for his helpful guidance and suggestions during the course of this study. Special thanks are due to Dr. H. B. WILLIAMS of the National Museum of Natural History, U. S. A., and Prof. Y. HIRASHIMA of Kyushu University for the loan of the materials. I also thank Mr. M. YAMAMOTO of Kyushu University, Mr. S. UCHIDA of Tokyo Metropolitan University, and Dr. K. FURUKAWA of

Hokkaido University for their collecting the samples.

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