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FIVE NEW SPECIES OF THE GENUS *PAGARONZA* BALL
(HOMOPTERA, CICADELLIDAE-CICADELLINAE)
FROM CENTRAL HONSHU

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Abstract

Five new species of the genus *Pagaronia* are described from central Honshu ; *caudata* from Saitama, Tokyo, etc., *tridens* from Mt. Fuji, Yamanashi, *debilis* from Mt. Hotaka, Gumma, *ornata* from Sado Is., Niigata, and *maculiceps* from Mt. Mitsu-tôge, Yamanashi.

The genus *Pagaronia* is a large group of the Cicadellinae including more than 30 species from eastern Palearctic Region. Of these, 26 species have been known from the Japanese Archipelago.

As a result of our taxonomic studies based on rather sufficient material mainly from eastern Japan, we have been able to recognize many undescribed species belonging to the genus *Pagaronia*. In this paper, we are going to describe five new species from central Honshu.

Before going into detail, we wish to express our cordial thanks to Dr K. Baba (Kurokawa, Niigata), Mr Y. Hori (Nagoya City Health Research Institute) and Dr S. Tachikawa (Tokyo University of Agriculture; TUA) for their kind help in various way toward this study. We are grateful to Dr S.- I. Uéno (National Science Museum (Nat. Hist.), Tokyo) for critically reading the manuscript. We are also indebted to the colleagues of our laboratory for offering valuable material.

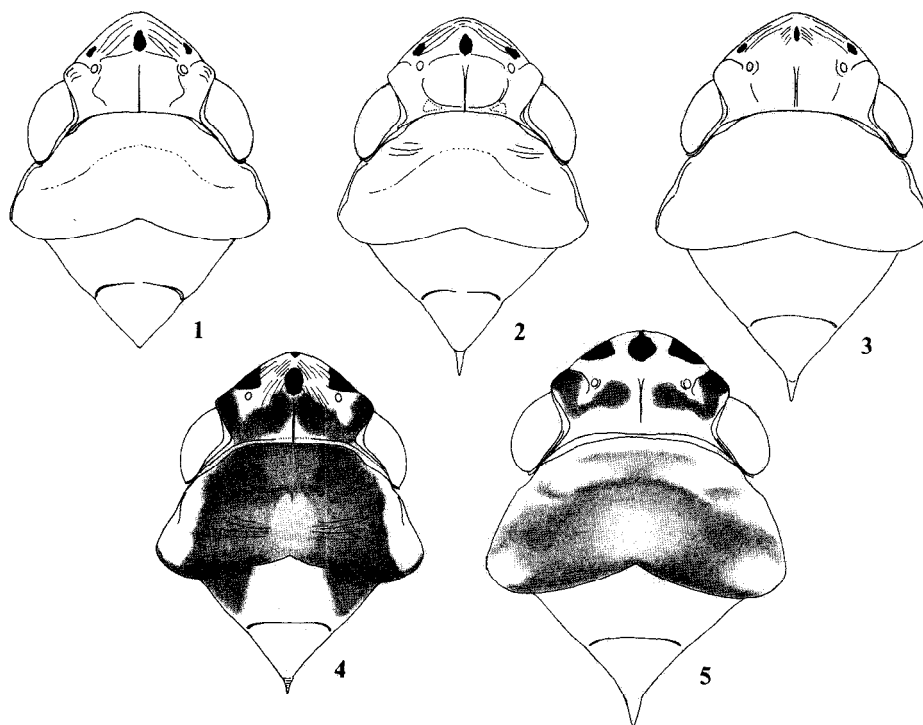
Pagaronia caudata M. Hayashi et Arai, sp. nov. (Figs. 1, 6-11)

Body ochreous ; head ochreous, furnished with 3 small black spots (central one larger) on dorsal angle of frontoclypeus ; anal margin of forewing faintly infuscated, forming an obscure longitudinal stripe on dorsum medially.

Head triangularly produced anteriorly, widely concave on vertex ; pronotum comparatively long, almost as long as head in the median line ; mesonotal scutellum short, slightly longer than pronotum, without apical projection ; ratio of hind tarsal segments about 7 : 3 : 3 ; ♀ 7th abdominal sternum ca. 1.6~ as wide as long, with caudal margin convex and deeply notched at middle.

Male genitalia. Pygofer slender, prominently oblong caudad, with a lineate spine on the inner surface ; genital plate long, ca. 3 × as long as wide (across basal margin), nearly parallel-sided and narrowed subapically, with obtuse apex ; aedeagus compressed, strongly curved basad and nearly straight in the rest, with apex possessing a pair of subulate processes protruding caudally ; gonopore

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Figs. 1-5. Head and thoracic nota. 1: *Pagaronia caudata* sp. nov. 2 : *P. tridens* sp. nov. 3 : *P. debilis* sp. nov. 4 : *P. ornata* sp. nov. 5 : *P. maculiceps* sp. nov.

opening ventral side near aedeagal apex.

Body length* : ♂, 8.5-9.5 mm (mean 9.1 mm) ; ♀, 8.8-10.0 mm (mean 9.5 mm).

Holotype : ♂, Iimori Pass (780 m), Oku-Musashi Mts., Saitama Pref., Honshu, Japan, 3. VII. 1984, M. Hayashi *et al.*

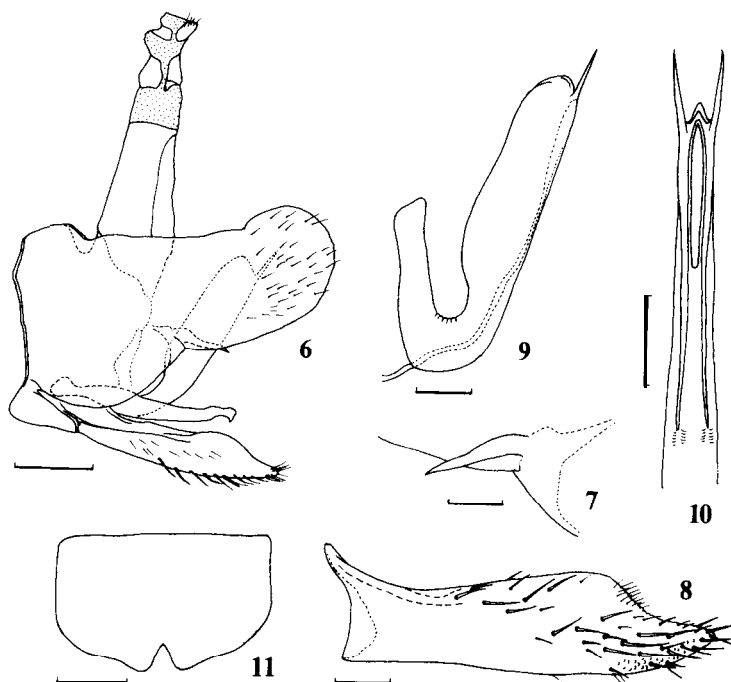
Paratypes : 4♂♂ 599, Daibosatsu Pass (1,600 m), Yamanashi Pref., Honshu, Japan, 30. VII. 1985 [LT], M. Hayashi *et al.* ; 1♂, Yanagisawa Pass (1,300-1,450 m), Yamanashi Pref., 30. VII. 1985, M. Hayashi *et al.* ; 1♂ 1♀, Kasasugi Pass ~ Takayama, Oku-Musashi Mts., Saitama Pref., Honshu, Japan, 3. VII. 1984, M. Hayashi *et al.* ; 4♂♂ 399, Mt. Hiwadayama, Saitama Pref., 28. V. 1980, M. Hayashi *et al.* ; 1♂ 1♀, same locality, 27. VI. 1980 ; 1♀, same locality, 19. VI. 1984 ; 1♂, same locality, 14. VI. 1989 ; 1♀, Shukuya (180 m), Saitama Pref., 16. VI. 1985, M. Hayashi *et al.* ; 3♂♂ 1♀, Buna-tôge Pass, Oku-Musashi Mts., Saitama Pref., 24. VI. 1981, M. Hayashi *et al.* ; 3♂♂ 4♀♀, Iimori Pass, Oku-Musashi Mts., Saitama Pref., 24. VI. 1981 ; 399, same locality, 3. VII. 1984 ; 12♂♂ 1♀, Hikagezawa, Mt. Takao, Tokyo Metrop., 1. VI. 1976, S. Tachikawa, T. Kamio & M. Satake leg. (TUA) ; 2♂♂ 799, same locality and collector, 8. VI. 1976 (TUA).

The holotype is deposited in the National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

DISTRIBUTION. Japan (Central Honshu : Saitama, Tokyo and Yamanashi).

This species is peculiar in the shape of the ♂ genitalia ; rather thick aedeagus with a pair of apical spines protruding caudad.

* Body length : length to folded forewings.



Figs. 6-11. *Pagaronia caudata* sp. nov., ♂ genitalia (6-10) and ♀ 7th abdominal sternum (11). 6, Pygofer in lateral view ; 7, pygofoval projection on the inner surface ; 8, left genital plate ; 9, aedeagus in lateral view ; 10, apical part of aedeagus in ventral view. Scales, 0.5 mm (6, 11) and 0.2 mm (7-10).

Pagaronia tridens M. Hayashi et Arai, **sp. nov.** (Figs. 2, 12, 14-21)

Body pale ochreous (pale green when alive) ; dorsal part of frontoclypeus striated anteriorad, with 3 small black spots ; an area along anal and apical margins of forewing prominently infuscated (the infuscation generally wider in ♂♂), forming a median longitudinal stripe, either linear or cuneate, on dorsum when the forewing is folded.

Head triangularly swollen anteriorad, and the width between eyes ca. 1.4 × as wide as the median length ; pronotum obliquely straight laterad and widely rounded posterolaterad ; mesonotum (mesonotal scutellum) almost as long as pronotum in median length ; ratio of hind tarsal segments about 8 : 3 : 3 ; caudal margin of ♀ 7th abdominal sternum roundly convex, slightly emarginate at middle.

Male genitalia. Pygofer very short, with caudoventral margin strongly sinuate, bearing a prominent trifurcated process on the inner surface ; genital plate, bent upward near middle, gradually narrowed apicad, with many setae scattered on the surface ; stylus stout and recurved, hooked apically ; aedeagus roundly curved inward, with a pair of small apical spines protruding backward and with a narrow elongate tectiform projection, which is as wide as aedeagal shaft, separated near the middle and situated behind the shaft ; aedeagus weakly sclerotized as a whole, membranous ventrally.

Body length : ♂, 9.1-9.8 mm (mean 9.5 mm) ; ♀, 9.7-10.5 mm (mean 10.1 mm).

Holotype : ♂, Motosu (930 m), Mt. Fuji, Yamanashi Pref., Honshu, Japan, 21. VI. 1984, M.

Hayashi *et al.*

Paratypes : 23♂♂12♀♀, same data as holotype ; 2♂♂ 399, same data [LT] ; 3♂♂, same locality, 11. VI. 1987, M. Hayashi leg. ; 4♂♂, same data [LT] ; 3♂♂, Shōji (920 m), Mt. Fuji, Yamanashi Pref., 11. VI. 1987, M. Hayashi leg.

The holotype is deposited in the National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

DISTRIBUTION. Japan (Central Honshu : Mt. Fuji).

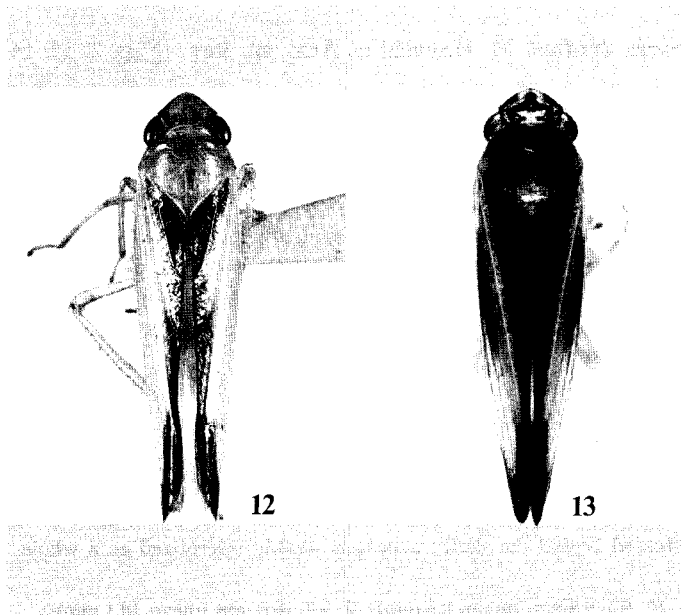
This leafhopper is very similar and most probably allied to *P. protecta* Okada from Mt. Dogoyama, northeastern part of Hiroshima Prefecture, western Honshu, but differs in some morphological characters of the ♂ genitalia such as a trifurcated projection on the inner surface of the pygofer, width of the tectiform projection on the aedeagal shaft, etc.

***Pugaronia debilis* M. Hayashi et Arai, sp. nov.** (Figs. 3, 22-27)

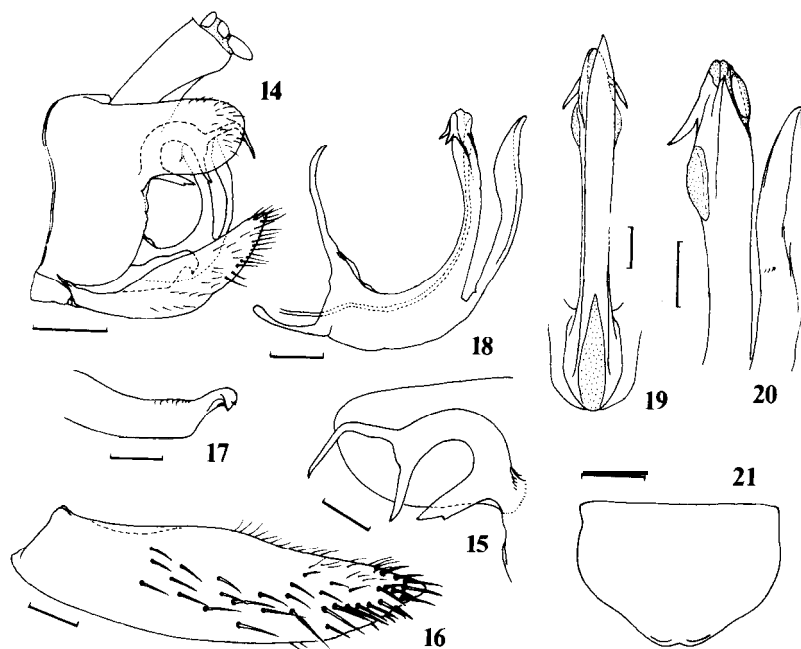
♂. Body pale ochreous ; head pale ochreous slightly tinged with green, bearing 3 minute black spots ; forewing nearly hyaline ; legs also pale ochreous with claws more or less infuscated ; abdomen tinged with orange.

Head rather levigate, the width between eyes ca. 1.6 X as wide as the median length ; pronotum ca. 1.3 X as long as head in the median line ; mesonotum distinctly longer than pronotum ; ratio of hind tarsal segments about 6 : 3 : 3.

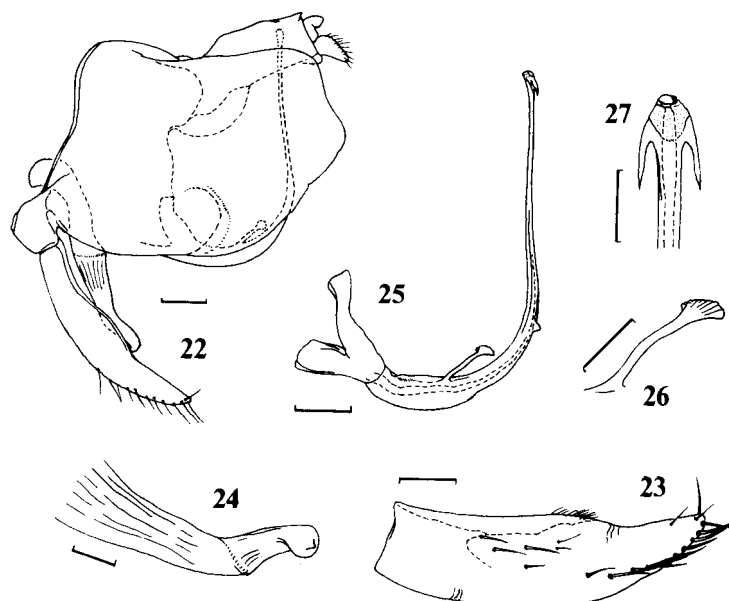
Male genitalia. Pygofer quadrate in shape, with lateral lobe weakly emarginate at two parts ; genital plate comparatively short, ca. 4.6 x as long as wide (measured across basal margin), widened slightly behind middle, with 12 distal setae arranged in a line ; stylus longitudinally striated, somewhat twisted at subapex, with clavate tip bearing an obtuse spine ; aedeagus very long and slender, nearly straight in apical 1/2, furnished with a pair of basal clavate processes compressed apically and



Figs. 12-13. 12: *Pugaronia tridens* sp. nov., ♂. 13: *P. ornata* sp. nov., ♂.



Figs. 14-21. *Pagaronia tridens* sp. nov., ♂ genitalia (14-20) and ♀ 7th sternum (21). 14, Pygofer in lateral view ; 15, trifurcated projection on inner surface of pygofer ; 16, left genital plate ; 17, apical part of left stylus ; 18-19, aedeagus in lateral (18) and caudal (19) views ; 20, apical part of aedeagus in obliquely caudal view. Scales, 0.5 mm (14, 21), 0.2 mm (15-18) and 0.1 mm (19, 20).



Figs. 22-27. Male genitalia of *Pagaronia debilis* sp. nov. 22, Pygofer in lateral view ; 23, left genital plate ; 24, apical part of left stylus ; 25, aedeagus in lateral view ; 26, basal process on aedeagal shaft ; 27, tip of aedeagus in caudal view. Scales, 0.25 mm (22), 0.2 mm (23, 25) and 0.1 mm (24, 26, 27).

protruding from inner angle of aedeagal shaft and a pair of small triangular processes near middle of the shaft ; apex of aedeagus with a pair of acute projections extending backward.

Females unknown.

Body length : ♂, 9.2-10.2 mm (mean 9.5 mm).

Holotype : ♂, Hotaka-Tashiro (1,400 m), Mt. Hotaka, Gumma Pref., Honshu, Japan, 4. VIII. 1988 [LT], M. Hayashi et al.

Paratypes : 216 ♂, same data as holotype ; 36 ♂, same locality and date (1,340 m).

The holotype is deposited in the National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

DISTRIBUTION. Japan (Central Honshu : Mt. Hotaka, Gumma).

Pagaronia ornata M. Hayashi et Arai, **sp. nov.** (Figs. 4, 13, 28-34)

Body ochreous and pale yellow, with distinct dark brown and/or black markings (by individuals) ; head ochreous with 3 large black spots on dorsal angle of frontoclypeus and a small black spot at the top, sometimes widely infuscated to dark brown on vertex; pronotum ochreous, and the almost entire part except for lateral areas widely infuscated by individuals ; mesonotal scutellum ochreous with anterolateral angle sometimes triangularly infuscated ; forewing semiopaquely pale ochreous with claval area (behind vein C u P), basal area between veins Sc + R and CuA and most apical cells, marked fuscous (by individuals) ; venter almost entirely pale ochreous with claws brown. Variation of marking pattern as shown in Fig. 28.

Head triangular, obliquely striated anterior and the width between eyes ca. 1.5 x as wide as the median length ; pronotum trapezoidal, ca. 1.3 x as long as head in median line ; mesonotal scutellum longer, ca. 1.2~ as long as the median length of pronotum ; ♀ 7th abdominal sternum rather quadrate, with caudal margin obtusely sinuate at middle.

Male **genitalia.** Pygofer roundish and comparatively short ; genital plate short, ca. 3.2 x as long

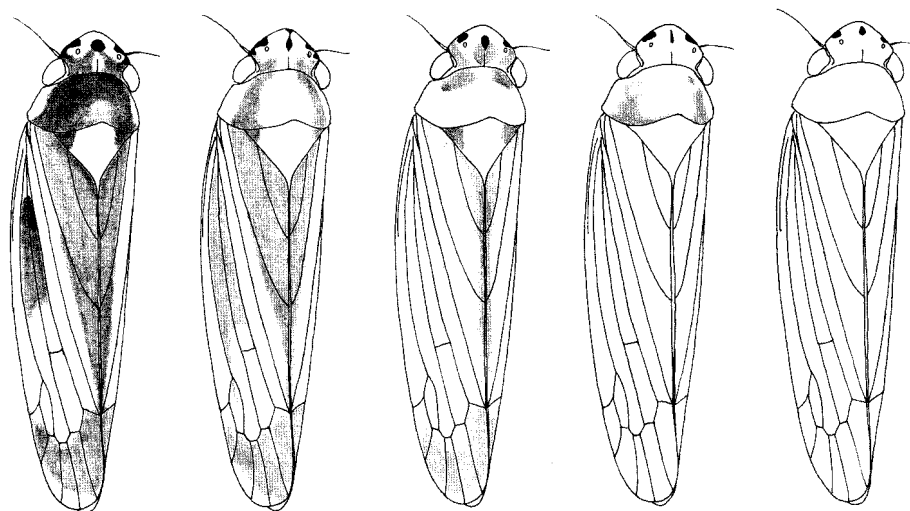


Fig. 28. Variation of marking pattern in ***Pagaronia ornata*** sp. nov.

as wide (across basal margin), abruptly narrowed at **subapex** and obtusely tipped ; stylus **recurved** toward apex, with tip clavate and bidentate; aedeagus relatively short and thick, more or less constricted near apex, with a pair of apical bifurcated projections protruding backward.

Body length : ♂, 7.7-8.3 mm (mean 8.0 mm) ; ♀, 8.2-9.0 mm (mean 8.6 mm).

Holotype : ♂, **Nyūgawa** (410 m), Sado Is., Niigata Pref., Honshu, Japan, 6. VI. 1988, M. Hayashi & T. Arai leg.

Paratypes : 25♂♂ 1599, same data as holotype ; 9♂♂ 999, same locality (500 m), 6. VI. 1988 ; 11♂♂ 12♀♀, Mt. Donden (410-420 m), Sado Is., 7. VI. 1988, M. Hayashi & T. Arai leg. ; 1♂1♀, same locality (550 m), 6. VI. 1988 ; 499, same locality (Aoneba ; 780-830 m), 6. VI. 1988 ; 1♂1♀, Koda, Sado Is., 6. VI. 1988, M. Hayashi & T. Arai leg. ; 1♀, Ogura-toge, Sado, 26. V. 1983, Col. K. Baba.

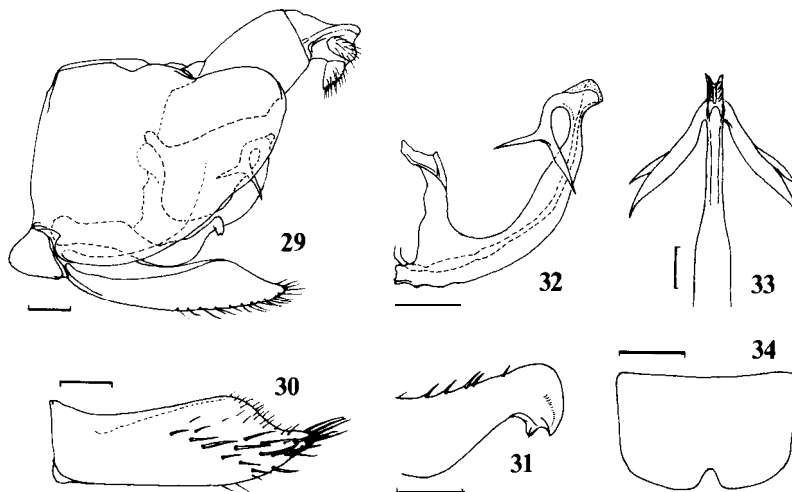
The holotype is deposited in the National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

DISTRIBUTION. Japan (Central Honshu : Sado Is., Niigata).

This species is probably allied to *P. guttigera* (Uhler) from the Kantō District, but *P. ornata* (both in ♂♂ and ♀♀) is characterized in having some distinct markings (infuscation) on the dorsum (head, thorax and forewing) by individuals. The leafhopper is often found on *Artemisia* sp. (Compositae).

Pagaronia maculiceps M. Hayashi et Arai, **sp. nov.** (Figs. 5, 35-41)

Large species. Body ochreous (light green in live specimens), widely smoked on pronotum and forewing ; head smooth-surfaced, with 3 wide black spots on dorsal angle of frontoclypeus, a lateral pair of which is widely triangular and situated inside lateral margin of frontoclypeus, and a round black spot on top of frontoclypeus, often connected with a dorsal central spot, and with a pair of lateral acute-angled markings on vertex dark brown; pronotum widely infuscated, somewhat variable by individuals, with posterior margin much darkened ; legs ochreous with tip of femur, most parts of fore and mid tibiae, and tarsi infuscated ; forewing semiopaque, with slight violet reflection, widely smoked except for the costal area toward base and an area along claval suture (vein C uP).



Figs. 29-34. *Pagaronia ornata* sp. nov., ♂ genitalia (29-33) and ♀ 7th sternum (34). 29, Pygofer in lateral view ; 30, left genital plate ; 31, apical part of left stylus ; 32, aedeagus in lateral view ; 33, apex of aedeagus in caudal view. Scales, 0.5 mm (34), 0.2 mm (29, 30, 32) and 0.1 mm (31, 33).

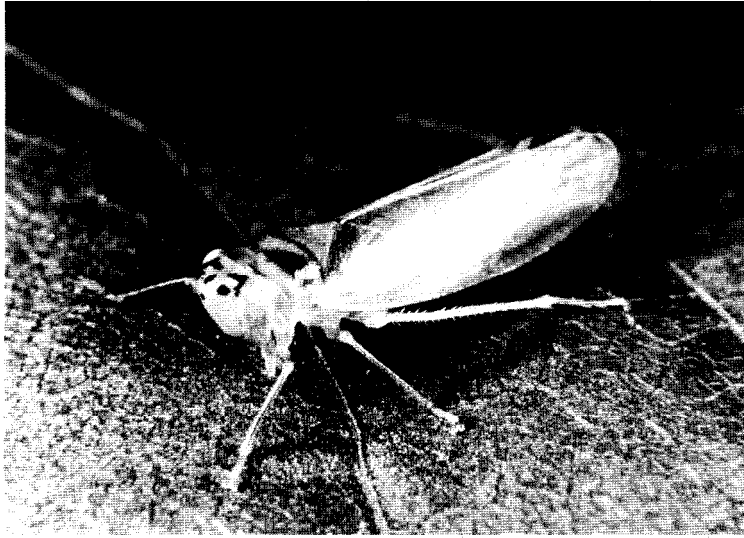
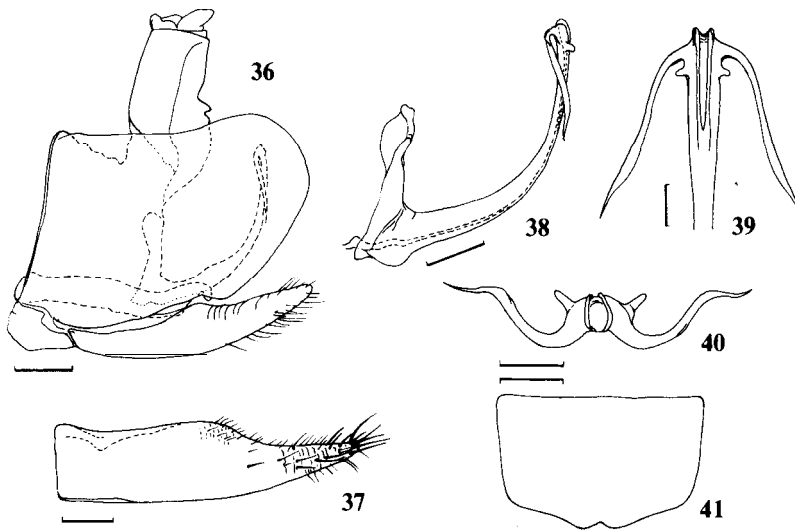


Fig. 35. *Pagaronia maculiceps* sp. nov., ♀, taken at Mt. Mitsu-tōge (1,350 m) on June 23, 1988. Photo by M. Hayashi.



Figs. 36-41. *Pagaronia maculiceps* sp. nov., ♂ genitalia (36-40) and ♀ 7th sternum (41). 36, Pygofer in lateral view; 37, left genital plate; 38, aedeagus in lateral view; 39-40, apex of aedeagus in ventral (39) and apical (40) views. Scales, 0.5 mm (41), 0.3 mm (36), 0.2 mm (37, 38) and 0.1 mm (39, 40).

Head moderately and roundly swollen anteriorly, and the width between eyes ca. 1.5 \times as wide as the median length; pronotum sinuate at anterolateral corner, and widely emarginate at posterior margin; ♀ 7th abdominal sternum nearly quadrate, ca. 1.6 \times as wide as long, with caudal margin slightly bigibbous.

Mule genitalia. Pygofer oblong, with slight excavation on ventral margin ; genital plate slender, ca. 3.3 x as long as wide, tapering behind middle and with attenuate tip ; aedeagus gently curved near middle, protuberant at ventral base, bearing a pair of apical recurved projections protruding backward and a pair of small tubercles.

Body length : ♂, 9.2-10.2 mm (mean 9.6 mm) ; ♀, 9.8-10.9 mm (mean 10.2 mm).

Holotype : ♂, Mt. Mitsu-tôge (1,260-1,380 m), Misaka Mts., Yamanashi Pref., Honshu, Japan, 12. VI. 1987, M. Hayashi leg.

Paratypes : 8♂♂10♀♀, same data as holotype ; 7♂♂ 799, same locality and collector, 23. VI. 1988 ; 9♂♂ 599, same locality and collector, 25. VI. 1988.

The holotype is deposited in the National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

DISTRIBUTION. Japan (Central Honshu : Mt. Mitsu-tôge).

This species is probably allied to *P. omani* Anufriev, originally described from the Oku-Musashi Mts. of Saitama Prefecture. *Puguroniu maculiceps* occurs in a narrow area of the Misaka Mts. (Mt. Mitsu-tôge) north of Mt. Fuji, found on various grasses, especially on *Petasites japonicus* Maxim. (Compositae), *Reynoutria sachalinensis* Nakai (Polygonaceae), etc., at peripheries of deciduous broadleaved forests (Fig. 35).

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