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A REVISION OF THE SPECIES OF THE MEGASTIGMINAE OCCURRING IN JAPAN*
(HYMENOPTERA: CHALCIDOIDEA)
[TAXONOMIC STUDIES ON THE TORYMIDAE OF JAPAN, I]

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Introduction

The subfamily Megastigminae, a large group of the family Torymidae, is distinctive, being readily distinguishable from any other subfamilies by the greatly expanded stigma. It comprises entomophagous and phytophagous speceis, the former being parasitic mainly on species of Cynipidae living in galls and the latter attacking the seeds of plants. As there are a number of species of which the larvae destroy the seeds of various kinds of conifers, this subfamily is of particular importance in forestry. So far as I am aware, 13 genera of the Megastigminae have been described, most of these concentrating in the Oriental and Australian regions. Above all in the Australian region this subfamily seems to be very rich and diverse, most of the members being entomophagous. On the other hand, in the Holarctic region it is rather simple, being restricted to phytophagous species belonging to *Megastigmus* with a few exceptions.

In Japan 10 species have been described by the following authors: Ashmead (1904), Crosby (1913), Yano (1918), Hoffmeyer (1929), Hussey and Kamijo (1958), and Kamijo (1958). Since 1956 I have made systematic studies on the family Torymidae and in this paper I give the results of my study on the Japanese species of the Megastigminae, treating 16 species, of which 5 are new to science belonging to *Megastigmus* and *Macrodasyceras* (gen. nov.). Unless otherwise stated the type-specimens of the new species are deposited in the Entomological Institute, Hokkaido University, Sapporo.

In examining the material is used a binocular microscope of 120 magnifications. Measurements are taken with an ocular micrometer. The length of the ocelloccipital line is taken at minimum distance between the lateral ocellus and the occipital carina. The distance between the eyes is measured at level of the antennal toruli. The dorsal segment lying behind the petiole, the true third abdominal segment, is counted as "first tergite".

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I am also indebted to the following gentlemen for their generous loan or gift of specimens: Dr. T. Ishihara, Entomological Laboratory, Ehime University, Shikoku; Dr. A. Habu, National Institute of Agricultural Sciences, Tokyo; Mr. K. Sato, Tokyo; Dr. K. Iwata, Entomological Laboratory, Hyogo University of Agriculture, Honshu; and Dr. J. F. Perkins, British Museum (Nat. Hist.), London.

Thanks are also due to officers of the College Experiment Forest, Hokkaido University, and to those of Regional Forest Offices for the gift of conifer seeds.

Classification

Subfamily **Megastigminae**

Key to the Japanese genera

1. Marginal vein as long as or shorter than postmarginal; antennae inserted at or below middle of face; scape not extending beyond level of median ocellus; gaster of female subsessile, with first and second tergites weakly incised at apex (sometimes the third feebly so); funicle segments of male with normal hairs. . . . . *Megastigmus* Dalman.
- Marginal vein distinctly longer than postmarginal; antennae inserted much above middle of face; scape extending beyond level of median ocellus; gaster of female with petiole more or less distinct and with first to fourth tergites deeply incised at apex; funicle segments of male with sparse, outstanding hairs which are as long as the funicle segment . . . . . *Macrodasyceras*, gen. nov.

Genus ***Megastigmus*** Dalman

Megastigmus Dalman, 1820, Svensk. Vet.-Akad. Handl., 41 : 178.

Type species.—*Pteromalus bipunctatus* Swederus.

Trogocarpus Rondani, 1877, Soc. Ent. Ital. Bol., 9 : 204.

Type species.—*Torymus ballestrerii* Rondani.

Xanthosomoides Girault, 1913, Canad. Ent., 45 : 220.

Type species.—*Xanthosomoides maculatipennis* Girault.

This is the largest genus in the subfamily and up to date about a hundred species have been recorded from all the zoogeographical regions.

In the Palaearctic region there are at present five entomophagous species known to occur, of which two occur in Japan, while in the Nearctic region there are no entomophagous species. Recently, having examined some European representatives as well as the Japanese ones, I have found that these can be divided into two groups, entomophagous and phytophagous, which are readily distinguished by certain morphological characters as stated in the following key. It seems, therefore, better to treat these groups as different genera, but it is too early to do so, since further examinations of abundant other species are necessary

in order to have a definite taxonomic conclusion.

Key to the groups

1. Antennae inserted distinctly below middle of face, just above level of ventral edge of eyes (fig. 1, D); club with a large tuft of micropilosity, extending to base of club in both sexes (fig. 1, F); ovipositor with large teeth at apex (obviously visible under binocular microscope of 75 magnifications) (fig. 1, A); head and thorax more or less green with metallic reflections. . . . . Entomophagous group.
- Antennae inserted at middle of face (rarely above middle of face), and above level of ventral edge of eyes (fig. 1, E); club of female with a tuft of micropilosity extending to base of the second segment, that of male with the tuft restricted to the third segment; ovipositor with teeth reduced (hardly visible under binocular microscope of 120 magnifications) (fig. 1, B, C); body yellow to black without metallic reflections. . . . . Phytophagous group.

I. Entomophagous group

In the entomophagous species, the propodeal spiracles are separated from the hind margin of the metanotum by their own length, sometimes slightly more than their length; while in the phytophagous species, the spiracles are separated by more than 1.5 times, usually twice, their own length.

The entomophagous species known to occur in the Palaearctic region can be arranged into the following two smaller groups.

1. *Stigmatizans* group.—*stigmatizans* (F.) and *habui*, sp. nov.

This group is characterized as follows:—the first and second segments of the antennal club are strongly oblique at apex; the sensillae on the funicle segments are short and numerous; and the postmarginal vein is much longer than the marginal.

2. *Dorsalis* group.—*dorsalis* (F.), *viridescens*, sp. nov., and probably *synophri* Mayr.

This group may be distinguished from the preceding group as follows:—the first and second segments of the antennal club are not oblique at apex; the sensillae on the funicle segments are rather sparse, at most in two rows on each segment; and the postmarginal vein is as long as the marginal.

Key to the Japanese species of the entomophagous group

♀♀

1. Marginal vein much shorter than postmarginal; basal cell open below in basal half by a row of hairs on cubital vein; funicle segments with sensillae short, numerous; first and second segments of club oblique at apex; most vestiture on thoracic dorsum black; ovipositor sheath as long as or slightly shorter than body. . . . . *habui*, sp. nov.
- Marginal vein as long as postmarginal; basal cell closed below by a row of hairs on cubital vein; funicle segments with sensillae long, disposed in a single row on distal two segments; first and second segments of club not oblique at apex; vestiture on thoracic dorsum pale; ovipositor sheath shorter than thorax and gaster combined. . . . . *viridescens*, sp. nov.

1. ***Megastigmus habui***, sp. nov. (Fig. 1, A, D, F, G; Fig. 2)

Female. Length 5.0 mm. Head seen from above 1.7 to 1.9 times width of its median length, with face weakly gibbous between eyes. Vertex weakly convex, transversely rugose; postocellar line longer than ocellocular line (12 : 9.5), which is longer than ocelloccipital line

(8); occiput broadly and shallowly emarginate. Eyes separated by 1.2 times their own length. Head seen in front 1.3 times as wide as high. Lower face with pale hairs medially, with long black hairs on sides. Antennal scrobe rather deep, not attaining median ocellus. Antennae inserted just above lower margins of eyes; scape almost reaching median ocellus, slightly longer than basal two funicle segments and half of the third combined; pedicel a little shorter than first funicle segment (9 : 11). Flagellum 1.1 times as long as width of head, hardly increasing in width; first funicle segment twice as long as wide, seventh much shorter than first (6.5 : 11), a little longer than wide (5.5); club about as long as two preceding segments combined, with apices of first and second segments strongly oblique; micropilosity large, extending from apex of third segment to base of the first (fig. 1, F). Sensillae very short, numerous, about one-sixth length of first funicle segment.

Thorax about twice as long as wide, not strongly convex in lateral aspect. Pronotum 1.3 times as wide as long, parallel-sided, strongly rugose, with flange on anterior margin moderately emarginate. Mid lobe of mesoscutum very roughly sculptured (fig. 2); side lobes transversely rugose; hind margin of mesoscutum almost straight. Notaulices rather deep, moderately convergent posteriorly. Scutellum about 1.2 times as long as wide, narrowly truncate on anterior margin, coarsely and somewhat transversely rugose, with six or seven pairs of bristles; frenum longitudinally rugose. Propodeum about half as long as scutellum, 0.6 times as long as distance between inner edges of spiracles, deeply and irregularly carinate; arched transverse keel at basal one-third, interrupted at middle; median carina absent; spiracles separated by less than their own length from posterior margin of metanotum. Hairs on thoracic dorsum mostly black.

Fore wing: basal cell with very sparse hairs, open below in basal half; upper surface of costal cell with a row of hairs in apical half, the lower surface with irregular three rows of hairs in basal half, hairy beyond; speculum moderately developed; marginal vein much shorter than postmarginal, stigmal vein as in fig. 1, G; relative length of sm : m : p : s as 92 : 33 : 51 : 17.

Gaster about as long as thorax, not compressed; first tergite weakly and second deeply incised apically. Ovipositor sheath a little shorter than body.

Yellow to light brownish yellow with a longitudinal greenish stripe from vertex to tip of abdomen dorsally. Tip of scape, pedicel and flagellum dark brown; area from upper margin of antennal scrobe to occipital carina green medially; occiput black. Pronotum green medially; mid lobe of mesoscutum and scutellum green; propodeum medially blackish with metallic reflections. Dorsum of gaster brownish black with greenish reflections medially.

Male. Length 3.1–4.0 mm. Scape slightly less than first three funicle segments combined; pedicel about as long as first funicle segment, which is twice as long as wide, seventh half as long as first, quadrate; club longer than three preceding segments combined. Sensillae moderate in length and number. Marginal vein sometimes nearly as long as postmarginal. Gaster shorter than thorax. Hind margins of tergites not incised medially.

Holotype (♀).—Urawa, Saitama Pref., Honshu, 19. X. 1957, A. Habu. Paratypes (9♀♀, 10♂♂)—2♀♀, the same as holotype; Tokyo, 1♀, em. 8. VII. 1947, ex *Trichagalma serratae*, S. Sakagami, 3♀♀, 5♂♂, em. VIII. 1959, ex *T. serratae*, T. Nambu; Osaka, 1♀, 5♂♂, 28. VI.

1960, 2♀♀, 6. VII. 1960, K. Iwata. Some paratypes are in the collection of the National Institute of Agricultural Sciences, Tokyo.

Host.—*Trichagalma serratae* (Ashmead).

Distribution.—Japan (Honshu).

This species is closely related to *M. stigmatizans* (F.), from which it may be separated as follows:— Pedicel slightly shorter than first funicle segment; notaulices deep, moderately convergent posteriorly; scutellum rather narrowly truncate anteriorly; mesoscutum and scutellum coarsely and strongly sculptured; lower face covered with black hairs on sides; hairs on thoracic dorsum mostly black; basal cell of fore wing open below in basal half.

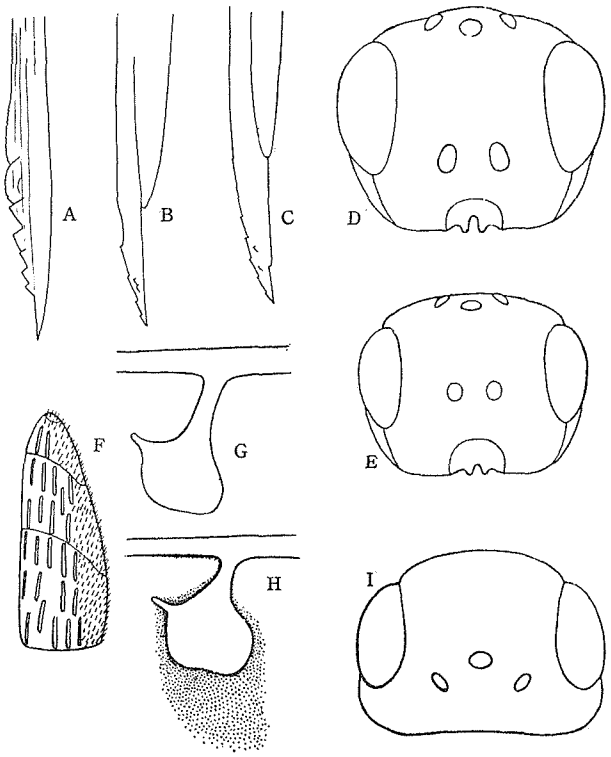

Fig. 1. A–C. Ovipositor: A, *Megastigmus habui*, sp. nov.; B, *M. borriesi* Crosby; C, *M. aculeatus* (Swederus).
D–E. Front view of head of female: D, *M. habui*, sp. nov.; E, *M. pourthiaeae*, sp. nov.
F–G. *Megastigmus habui*, sp. nov., female: F, antennal club; G, stigmal vein.
H–I. *M. viridescens*, sp. nov., female: H, stigmal vein; I, dorsal view of head.

I have had the opportunity to examine some specimens of *M. stigmatizans* (F.) which were kindly sent me by Dr. Perkins of the British Museum (Nat. Hist.). In these specimens, the notaulices are weakly convergent posteriorly, so that the mid lobe is broad posteriorly; the scutellum is broadly truncate anteriorly; sculpture of the mesoscutum and scutellum is

not coarse and strong; hairs on the lower face and the thoracic dorsum are pale. In regard to these characters, *stigmatizans* is rather similar to the species of the *dorsalis* group.

2. ***Megastigmus viridescens***, sp. nov. (Fig. 1, H, I)

Female. Length 3.3 mm. Head seen from above 1.5 times as wide as long, much wider than thorax (44 : 37), with face strongly gibbous between eyes; temples subparallel directly behind eyes (fig. 1, I). Vertex rather strongly convex, transversely rugose; postocellar line nearly twice as long as ocellocular line (12 : 6.5), which is shorter than ocelloccipital line (7.5); occiput hardly emarginate. Eyes separated by 1.26 times their own length. Head seen in front circular, a little wider than high (44 : 39); lower face with pale hairs. Antennal scrobe very deep. Antennae inserted just above lower margins of eyes; scape not reaching level of median ocellus, as long as first two funicle segments and half of the third combined; pedicel slender, about as long as first funicle segment, twice as long as wide. Flagellum 1.3 times as long as width of head, weakly increasing in width distally; first funicle segment twice as long as wide, seventh a little shorter than first, about quadrate; club short, about as long as two preceding segments combined, with first and second segments not oblique at apex; tuft of micropilosity large, extending from top to base of club. Sensillae sparse and disposed in two rows on proximal funicle segments, showing tendency to form a single row on distal segments.

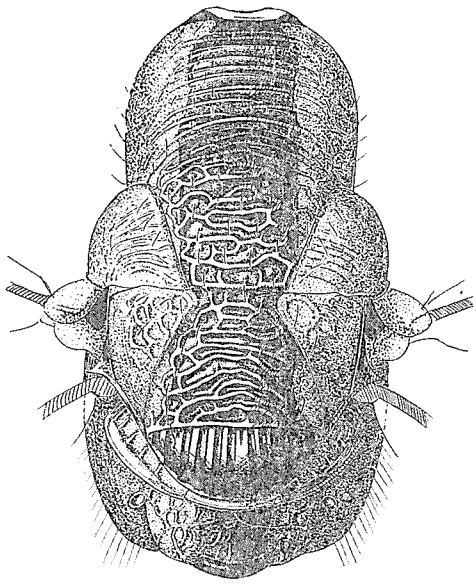

Fig. 2. Dorsal view of thorax of *Megastigmus habui*, sp. nov., female.

Thorax slender, not strongly convex in lateral aspect. Pronotum 1.3 times as wide as long, parallel-sided, transversely rugose, with anterior flange weakly emarginate. Sculpture of mid lobe of mesoscutum similar to that of *habui*, but much finer; side lobes with sparse and transverse rugae which continue onto the mid lobe; notaulices shallow, weakly convergent posteriorly, curved interiorly and obscure in front of hind margin of mesoscutum. Scutellum longer than wide (28 : 23), evenly convex, not broadly truncate on anterior margin, irregularly transversely rugose, with six pairs of bristles; frenum with longitudinal, irregular rugae. Propodeum elongate, about two-thirds length of scutellum, nearly as long as distance between inner edges of propodeal spiracles, with a transverse, arched carina anteriorly, to which other carinae extend from anterior and posterior margins; carinae behind the transverse carina irregular, especially at middle; interspaces between carinae mostly smooth, shining; median carina absent; nucha well developed; spiracles separated by nearly their own length from hind margin of metanotum.

Fore wing: basal cell with a few hairs apically, almost closed below by a row of hairs

on cubital vein; upper surface of costal cell with two rows of hairs on apical half, and lower surface with irregular three rows of hairs in basal half, hairy beyond; speculum large; stigma surrounded by cloud (fig. 1, H); relative length of sm : m : p : s as 64 : 34 : 34 : 12.

Gaster subcompressed. Hind margin of first tergite rather deeply incised medially, of second shallowly so. Ovipositor sheath as long as gaster and half of thorax combined.

Head light brownish yellow: area from upper half of antennal scrobe to vertex dark green, except eye margins brownish yellow; occiput black; inner surface of scape, pedicel and flagellum dark brown. Thorax dark green with bronzy reflections on side lobes of mesoscutum, axillae and frenum; pleura blackish with greenish reflections. Legs pale brownish yellow, with hind coxae black. Gaster blackish dorsally, brownish yellow at sides.

Male.—Unknown.

Holotype (♀).—Tomakomai, Hokkaido, 23. VI. 1959, K. Kamijo.

Host.—Unknown.

Distribution.—Japan (Hokkaido).

This species may be distinguished from *M. dorsalis* (F.) by the longer and more narrowly truncate scutellum, by the narrower propodeum, by the more weakly emarginating anterior flange of the pronotum, by the coarser sculpture of the mid lobe of the mesoscutum and by having a distinct transverse carina on the propodeum.

II. **Phytophagous group**

The phytophagous species of the Palaearctic region can not be grouped on the basis of morphological features as in entomophagous species. Milliron (1949) tentatively arranged the phytophagous species occurring in North America into nine smaller groups from the standpoint of the host association. The Japanese species are referable to Milliron's groups as follows.

1. *Brevicaudis* group.—*pourthiaeae*, sp. nov.
2. *Aculeatus* group.—*aculeatus* (Swederus) and *mali* Nikolskaja.
3. *Laricis* group.—*inamurae* Yano.
4. *Strobilobius* group.—*ezomatsuanus* Hussey et Kamijo.
5. *Spermotrophus* group.—*cryptomeriae* Yano, *tsugaphilus* Kamijo, *thuyopsis* Yano and *chamaecyparidis* Kamijo.
6. *Pinus* group.—*borriesi* Crosby and *firmae*, sp. nov.

The *spermotrophus* group is very interesting, that is, it is associated with *Pseudotsuga*, *Tsuga*, *Cryptomeria*, *Thuja*, *Thujopsis* or *Chamaecyparis* which range in the area along the coast of the Pacific Ocean from eastern China and Japan to western North America.

No species belonging to the other three groups of Milliron have not yet been found in Japan.

Key to the Japanese species of the phytophagous group

♀♀

1. Ovipositor sheath shorter than gaster. . . . . 2.
- Ovipositor sheath longer than gaster. . . . . 3.
2. Mainly black; frenum longitudinally rugose; marginal vein much shorter than postmarginal;

scutellum with nine to thirteen hairs on each side . . . . . *pourthiaeae*, sp. nov.

– Mainly brownish yellow; frenum nearly smooth or feebly sculptured; marginal vein as long as postmarginal; scutellum with three pairs of pale hairs; vestiture on head and thoracic dorsum pale. . . . . *mali* Nikolskaja.

3. Frenum longitudinally sculptured; vertex somewhat depressed; thorax brownish yellow with outer surface of axillae, anterior margin of mesoscutum, and propodeum dark brown to black; basal cell closed below; marginal vein a little shorter than postmarginal; funicle segments with sensillae disposed in two rows upon each segment; ovipositor sheath as long as or longer than gaster and thorax combined. . . . . *aculeatus* (Swederus).

– Frenum nearly smooth; vertex not depressed. . . . . 4.

4. Marginal vein distinctly shorter than postmarginal; ovipositor sheath longer than body. . . . . 5.

– Marginal vein as long as postmarginal; ovipositor sheath shorter than body. . . . . 6.

5. Black; occiput shallowly emarginate. . . . . *borriesi* Crosby.

– Mainly yellowish brown; occiput deeply emarginate. . . . . *firmae*, sp. nov.

6. Dorsum of thorax mostly black; ovipositor sheath as long as or a little longer than gaster and thorax combined; basal cell of fore wing hairy, closed below by a row of hairs on cubital vein . . . . . *ezomatsuanus* Hussey et Kamijo.

– Brownish yellow; ovipositor sheath as long as or shorter than thorax and gaster combined. . . 7.

7. Thorax elongate, more than twice as long as wide; first funicle segment longer than second; occiput shallowly emarginate; basal cell of fore wing closed below by a row of hairs on cubital vein. . . . . *cryptomeriae* Yano.

– Thorax at most twice as long as wide; first funicle segment as long as second; occiput deeply emarginate; basal cell of fore wing more or less open below. . . . . 8.

8. Funicle segments with sensillae short and disposed in two rows upon each segment; basal cell of fore wing open below basally; scutellum nearly as wide as long, with four or five bristles on each side. . . . . *tsugaphilus* Kamijo.

– Funicle segments with sensillae disposed in a single row upon each segment; basal cell of fore wing broadly open below; scutellum a little longer than wide, with three pairs of bristles. . . 9.

9. Thorax strongly convex in lateral aspect; ovipositor sheath shorter than gaster and thorax combined; fore wing with speculum moderate in size, open below; basal cell hairy apically. . . . . *thuyopsis* Yano.

– Thorax weakly convex in lateral aspect; ovipositor sheath slightly shorter than gaster and thorax combined; fore wing with speculum large and closed below; basal cell with only one or two hairs apically. . . . . *chamaecyparidis* Kamijo.

♂♂

1. Dorsum of pronotum and mesonotum black in greater part. . . . . 2.

– Dorsum of pronotum and mesonotum yellow to brownish yellow in greater part. . . . . 4.

2. Frenum longitudinally rugose; scutellum with about twelve hairs on each side; postocellar line distinctly shorter than ocellocular line. . . . . *pourthiaeae*, sp. nov.

– Frenum smooth; scutellum with about five hairs on each side; postocellar line longer than ocellocular line. . . . . 3.

3. Thorax elongate, much more than twice as long as wide; scutellum 1.5 times as long as wide; scape as long as first two funicle segments combined; gaster longer than thorax. . . . . *firmae*, sp. nov.

– Thorax about twice as long as wide; scutellum a little longer than wide; scape longer than first two funicle segments combined; gaster shorter than thorax. . . *ezomatsuanus* Hussey et Kamijo.

4. Upper face with pale hairs; most of vestiture on thoracic dorsum pale; pronotum with black, triangle pattern anteriorly. . . . . *mali* Nikolskaja.
- Upper face with black hairs; most of vestiture on thoracic dorsum black; pronotum without such pattern anteriorly. . . . . 5.
5. Frenum longitudinally sculptured; vertex depressed; thorax brownish yellow, with outer surface of axillae, anterior margin of mesoscutum, and propodeum dark brown to black. . . . . *aculeatus* (Swederus).
- Frenum smooth; vertex convex; thorax entirely brownish yellow or orange (in *cryptomeriae* propodeum blackish in greater part). . . . . 6.
6. Thorax, especially propodeum, elongate, 2.3 to 2.6 times as long as wide, pronotum distinctly narrowed to base; inner surface of scape with black hairs throughout; occiput shallowly emarginate; propodeum blackish in greater part. . . . . *cryptomeriae* Yano.
- Thorax less elongate; inner surface of scape with black hairs on apical half; occiput deeply emarginate; propodeum brownish yellow. . . . . 7.
7. Thorax strongly convex in lateral aspect; scutellum with four or five pairs of bristles; basal cell of fore wing hairy in apical half, closed below by a row of hairs on cubital vein. . . . . *tsugaphilus* Kamijo.
- Thorax weakly convex in lateral aspect; scutellum with three pairs of bristles; basal cell of fore wing with a few hairs apically, open below in basal half. . . . . *chamaecyparidis* Kamijo.

3. ***Megastigmus pourthiaeae***, sp. nov. (Fig. 1, E; Fig. 3, A)

Female. Length 2.0–3.2 mm. Head seen from above nearly twice as wide as long, with face weakly gibbous between eyes; temples rounded off behind eyes. Vertex moderately convex, transversely rugose; postocellar line distinctly shorter than ocellocular line (8 : 10), which is longer than ocelloccipital line (7.5); occiput slightly emarginate. Eyes separated by 1.5 times their own length. Lower face with dense, pale hairs. Antennae inserted at middle of face; scape reaching median ocellus, as long as first two funicle segments and one-third of the third combined; pedicel shorter than first funicle segment (6 : 8). Flagellum 1.2 times as long as width of head, not increasing in width; first funicle segment twice as long as wide, seventh a little shorter than first, about 1.5 times as long as wide; club as long as two preceding segments combined; apices of first and second segments weakly oblique; tuft of micropilosity extending to base of second segment. Sensillae short and numerous, disposed in two rows upon basal funicle segments.

Thorax rather strongly convex in lateral aspect. Pronotum nearly 1.4 times as wide as long, transversely impressed at posterior one-third, coarsely and irregularly rugose, with flange on anterior margin moderately emarginate. Mid lobe of mesoscutum strongly rugose, with dense, long hairs; the side lobes finely rugulose; notaulices deep. Scutellum nearly 1.3 times as long as wide, strongly convex, narrowed anteriorly, transversely rugulose, with nine to thirteen hairs on each side; median furrow extending from anterior margin of scutellum to frenal furrow; frenum longitudinally rugose. Metanotum long, slightly more than half of median length of frenum, with median piece crescent-shaped. Propodeum about two-thirds of scutellum, three times as long as metanotum, impressed posteriorly; carination on propodeum strong and very irregular, usually a pair of oblique, strong carinae extending from the anterior margin just outside of median carina, which is restricted to the anterior half,

sometimes absent. Propodeal spiracles separated from hind margin of metanotum by about 1.4 times their length.

Fore wing: basal cell hairy, closed below by a row of hairs on cubital vein; upper surface of costal cell with a row of hairs in distal half, which becomes triple distally, the lower surface with irregular three rows of hairs in basal half, hairy beyond; speculum small; marginal vein distinctly shorter than postmarginal; relative length of sm : m : p : s as 78 : 35 : 48 : 18; stigma elongate (fig. 3, A).

Gaster compressed. Hind margin of first tergite feebly incised medially. Ovipositor sheath about half as long as gaster.

Head yellowish brown: antennal scrobe, temples posteriorly, vertex and occiput black, except posterior and upper eye margins yellowish brown; inner surface of scape, pedicel and flagellum dark brown. Thorax and gaster black: posterior half of pronotum dorsally and tegulae yellowish brown. Legs brownish yellow: fore and middle coxae basally and hind coxae entirely black; hind femora darker in greater part.

Male. Length 2.8–3.7 mm. Scape as long as first and second funicle segments combined; pedicel much shorter than first funicle segment (6 : 9.5); flagellum 1.3 times as long as width of head; anellus as long as wide; club distinctly longer than two preceding segments combined, with a tuft of micropilosity on third segment; stigma more stout than that of female.

Black: face, clypeus, mandibles, genae and anterior area of temples yellowish brown, with upper area of clypeus and tips of mandibles black; inner surface of scape, pedicel and flagellum fuscous. Fore and middle femora, basal and apical areas of hind femora, tibiae and tarsi brownish yellow.

Holotype (♀).—Yamabe, Hokkaido, 30. VI. 1960, ex seed of *Pourthiaea villosa*, K. Kamijo. Paratypes (39 ♀♀, 71 ♂♂).—12 ♀♀, 61 ♂♂, the same as holotype; Yamabe, Hokkaido, 26 ♀♀, 10 ♂♂, VI. 1961, ex *P. villosa*, K. Kamijo; Amagisan, Shizuoka Pref., Honshu, 1 ♀, 31. V. 1959, K. Kamijo.

Host.—*Pourthiaea villosa* (Thunb.) Decne.

Distribution.— Japan (Hokkaido; Honshu).

This species comes near to *M. brevicaudis* Ratzeburg, from which it may be distinguished by the postocellar line which is distinctly shorter than the ocellocular line, by the shorter scape and pedicel, and by having much more hairs on the scutellum. It may be distinguished from *M. ameranchieris* Cushman by the shorter ovipositor sheath, by the longitudinally sculptured frenum, by the shorter postocellar line and by the shorter pedicel.

4. ***Megastigmus mali*** Nikolskaja

Megastigmus mali Nikolskaja, 1952, Opred. Faune SSSR (Chalcidoidea), 44 : 106.

Specimens examined.—Honshu: Iwate Pref., 1 ♀, 1. VI, Ogasawara; unlocalized, probably Honshu, 2♀♀, em. 19. IV. 1951, ex seeds of *Malus* sp. USSR: Tshitinsk region, East Siberia, 1 ♀, 1 ♂ (paratypes of *mali*), em. 25. III. 1940, ex seeds of *Malus pallasiana*, I. Shposhnikov.

Hosts.—*Malus pallasiana* Fuz.; *Malus* sp.

Distribution.—Japan (Honshu); East Siberia.

Through the kindness of Dr. Nikolskaja I have had the opportunity to examine two

paratypes of this species. In the Japanese specimens the ovipositor sheath is distinctly shorter than the gaster (about 35 : 45), whereas it is as long as the gaster in the paratype. And yet I have come to the conclusion that the Japanese form should be identified with *mali* Nikolskaja.

5. ***Megastigmus aculeatus*** (Swederus) (Fig. 1, C)

Pteromalus aculeatus Swederus, 1795, Svensk. Vet.-Akad. Handl., 16 : 221.
Megastigmus aculeatus var. *nigroflavus* Hoffmeyer, 1931, Ent. Meddel., 16 : 324.

Specimens examined.—Hokkaido : Sapporo, 22♀♀, 8♂♂, em. 4.–13. IV. 1957, 3♀♀, 3♂♂, em. 5.–26. IV. 1958, 2♀♀, 2♂♂, 4. VII. 1956, ex *Rosa multiflora*, K. Kamijo; Ishikari, 15♀♀, 28♂♂, em. 14. IV.–5. V. 1958, ex *R. rugosa*, K. Kamijo ; Esashi, 3♀♀, 9. VII. 1958, K. Kamijo. Honshu : Iwate Pref., 1♀, 6. VII, Ogasawara ; Nagano, 18♀♀, em. 18.–19. V. 1958, ex *R. multiflora*, K. Kamijo.

Hosts.—*Rosa multiflora* Thunberg ; *R. rugosa* Thunberg.

Distribution.—Japan (Hokkaido ; Honshu); Europe ; Iran ; Africa ; China.

This species occurs in North America along the Atlantic seaboard; however, according to Milliron (1949), it was probably introduced into this area.

6. ***Megastigmus ezomatsuanus*** Hussey et Kamijo

Megastigmus ezomatsuanus Hussey et Kamijo, 1958, Ins. Mats., 21 : 115.

Specimens examined.—Hokkaido : Toikambetsu, Teshio Prov., 26♀♀, 31♂♂ (holotype (♀), allotype (♂) and paratypes), em. 17.–27. V. 1956, Ashoro, 3♂♂ (paratypes), em. 21. V. 1956, ex *Picea Glehnii*, K. Kamijo ; Toikambetsu, 11♀♀, 7♂♂ (paratypes), em. 17.–23. V. 1956, ex *P. jezoensis*, K. Kamijo.

Hosts.—*Picea Glehnii* Masters ; *P. jezoensis* Carrière.

Distribution.—Japan (Hokkaido).

7. ***Megastigmus borriesi*** Crosby (Fig. 1, B)

Megastigmus borriesi Crosby, 1913, Ann. Ent. Soc. Amer., 6 : 169.

On the basis of the specimens examined the following redescription will be given.

Female. Length 2.4–3.7 mm. Head seen from above about 1.7 times as wide as long, with face moderately gibbous between eyes ; temples subparallel directly behind eyes and about half as long as eye ; occiput weakly emarginate. Postocellar line distinctly longer than ocellocular line, about 10 : 7, which is about as long as ocelloccipital line. Eyes separated by 1.4 times their own length. Head seen in front 1.3 times as wide as high ; vertex moderately convex, transversely aciculate ; genae rather strongly narrowed to mouth. Antennal scrobe wide and shallow. Antennae inserted at middle of face, scape almost reaching median ocellus, usually as long as first two funicle segments and half of the third combined, sometimes as long as first three funicle segments combined ; pedicel as long as and wider than first funicle segment. Flagellum about 1.2 times as long as width of head, very gradually increasing in width distally ; anellus slightly longer than wide ; first funicle segment twice or less as long as wide, seventh nearly as long as first, slightly longer than wide ; club a little longer than two preceding segments combined, apices of first and second segments

not oblique; tuft of micropilosity extending to base of second segment. Sensillae sparse on basal funicle segments, disposed in two rows upon each funicle segment.

Thorax twice as long as wide, rather weakly convex in lateral view. Pronotum 1.5 times as wide as long, with sparse rugulae; anterior flange sharp, moderately emarginate. Mid lobe of mesoscutum transversely shingled, usually with longitudinal striae on posterior area. Notaulices deep. Scutellum 1.2 times as long as wide, finely shingled, with five or six hairs on each side; frenum smooth and shining. Propodeum slightly shorter than half of scutellum, irregularly reticulately sculptured, usually with two transverse carinae at middle, to which longitudinal carinae extend from the posterior margin of the propodeum; median carina sharp on anterior half, irregularly branched posteriorly; spiracles separated by nearly two times their own length from hind margin of metanotum.

Fore wing: basal cell with hairs apically, open below in basal half; lower surface of costal cell with a row of hairs from base to middle, with numerous hairs beyond, the upper surface with two rows of hairs apically; speculum moderately developed along basal vein and parastigma on upper surface, almost reduced on lower surface; marginal vein shorter than postmarginal, relative length of sm : m : p : s as 68 : 33 : 38 : 14; stigma usually elongate oval.

Gaster strongly compressed. Hind margins of first and second tergites rather deeply incised medially, of the third feebly incised. Ovipositor sheath longer than body (not as long as gaster as in the original description).

Black: face below, clypeus, and ventral area of gaster dark brown; antennae brownish black; legs dark brown to yellowish brown, with coxae black and hind femora darker in greater part.

Male.—Unknown.

Specimens examined.—Hokkaido: Otoineppu, Teshio Prov., 63 ♀♀, em. 14. VI. 1956, ex *Abies sachalinensis*, K. Kamijo. Honshu: Aomori Pref., 1 ♀, em. 1. VI. 1957, 6 ♀♀, 1954, ex *A. Mariesii*, K. Kamijo; Kusatsu, Gumma Pref., 1 ♀, em. 8. V. 1959, ex *A. Veitchii*, K. Kamijo. Shikoku: Ehime Pref., 1 ♀, em. V. 1957, ex *A. sikokiana*, K. Kamijo. Saghalien: Horo, 2 ♀♀, 1939, ex *A. sachalinensis*, K. Tamanuki.

Hosts.—*Abies sachalinensis* (Fr. Schmidt) Masters; *A. Mariesii* Masters; *A. Veitchii* Lindley; *A. sikokiana* Nakai.

Distribution.—Japan (Hokkaido; Honshu; Shikoku); Saghalien.

Crosby describes *borriesi* from two females taken in northern Honshu. The type-specimens are deposited in the U. S. National Museum. Dr. Burks kindly compared specimens sent by me with the types and informed me as follows:— "Your identification of *borriesi* Crosby is correct. Crosby's type specimen is distorted, but the length of the ovipositor is the same as in your specimen, or very close to it".

This species seems to resemble *M. suspectus* Borries, from which it may be distinguished by the longer pedicel, the first funicle segment which is as long as the seventh, and the shape of the stigma. It is also allied to *M. atedius* Walker and *M. bornmülleriana* Hussey, but may be separated from *atedius* by the longer pedicel and by having a median carina on the propodeum. From *bornmülleriana*, it may be distinguished by the perfectly smooth

frenum.

The appearance of the male seems to be extremely few as in *suspectus* Borries. Numerous female specimens have been taken during this work, while none of the male have yet been found.

8. ***Megastigmus firmae***, sp. nov. (Fig. 3, B, D)

Female. Length 3.8 mm. Head seen from above 1.7 times as wide as long, with face strongly convex between eyes; temples rounded off behind eyes. Vertex convex, weakly rugulose; postocellar line 1.5 times as long as ocellocular line, which is about as long as ocelloccipital line; occiput broadly and deeply emarginate (fig. 3, D). Eyes separated by 1.4 times their own length. Head seen in front about 1.2 times as wide as long; lower face with long, black hairs at sides, with paler hairs at middle. Antennal scrobe moderate in depth. Antennae inserted at middle of face; scape reaching median ocellus, as long as basal two funicle segments and half of the third combined, bearing rather long, dense, black hairs on inner surface; pedicel nearly as long as first funicle segment. Flagellum 1.3 times as long as width of head, not increasing in width; anellus slightly wider than long; first funicle segment nearly twice as long as wide, seventh nearly as long as first; club as long as two preceding segments combined, tuft of micropilosity extending to base of the second segment. Sensillae disposed in two rows upon each funicle segment.

Thorax more than twice as long as wide (92 : 42), not strongly convex in lateral aspect. Pronotum 1.3 times as wide as long, with sides rounded; its dorsum transversely rugulose, medially with oblique rugulae at sides, smooth along posterior margin. Mid lobe of mesoscutum aciculate, at certain angles appearing shingled, longitudinally rugulose in posterior area. Notaulices shallow. Scutellum 1.3 times as long as wide, narrowly truncate on anterior margin, finely shingled, with five or six pairs of bristles; frenum smooth. Propodeum half as long as scutellum, with lateral area elevated medially, irregularly and finely reticulate; median carina branched at middle; spiracles separated by about 1.5 times their own length from hind margin of metanotum.

Fore wing: basal cell open below in basal half, with sparse hairs apically; upper surface of costal cell with a row of hairs in apical half, the lower surface with a single row in basal half, densely hairy beyond; speculum of moderate size, more reduced on lower surface; relative length of sm : m : p : s as 65 : 36 : 43 : 13; stigmal vein as in fig. 3, B.

Gaster strongly compressed. Ovipositor sheath much longer than body (1.2 : 1).

Yellowish brown: head becoming darker above; pedicel dark brown; flagellum blackish; dorsum of pronotum brownish black; dorsum of mesonotum darker than pronotum, with inner surfaces of side lobes of mesoscutum, axillae and scutellum slightly lighter; propodeum black; mesopleura medially, metapleura and hind coxae dark brown. Gaster dark brown above, brown below.

Male. Length 3.0 mm. Scape a little longer than first two funicle segments combined; pedicel slightly shorter than first funicle segment (5 : 6); flagellum 1.4 times as long as width of head; club as long as scape, as long as two preceding segments combined, with a tuft of micropilosity on third segment.

Thorax more elongate, 2.3 times as long as wide. Pronotum nearly as long as wide, with anterior dorsal flange weakly emarginate. Mid lobe of mesoscutum shingled, without longitudinal rugulae posteriorly. Scutellum nearly 1.5 times as long as wide. Propodeum evenly elevated, irregularly and coarsely reticulate.

Fore wing: basal cell almost closed below, relative length of sm : m : p : s as 51 : 25 : 25 : 10.5. Gaster much longer than thorax, compressed.

Holotype (♀).—Tomioka, Fukushima Pref., Honshu, em. 29. V. 1957, ex *Abies firma*, K. Kamijo. Paratypes (1♀, 2♂♂).—Honshu: 1 ♂, the same as holotype. Kyushu: Sunoura, Miyazaki Pref., 1 ♀, 1 ♂, em. VI. 1957, ex *A. firma*, K. Kamijo.

Host.—*Abies firma* Siebold et Zuccarini.

Distribution.—Japan (Honshu; Kyushu).

The coloration of the female seems to be variable. The present female specimen from Kyushu is much lighter in colour:—brownish black area on vertex smaller than that of holotype; flagellum brownish black; thorax light brownish yellow, with posterior margin of pronotum, anterior and outer areas of mesoscutum, outer surface of axillae, and anterior area of propodeum darker. Legs entirely light brownish yellow. Colour of gaster as in holotype.

This species seems to be closely allied to *M. specularis* Walley and *M. lasiocarpae* Crosby. It differs from *specularis* in the longer ocelloccipital line, the smooth frenum, and the lighter thorax; and from *lasiocarpae* in the longer ovipositor sheath, the lighter thorax and the first funicle segment which is as long as the second.

9. ***Megastigmus cryptomeriae*** Yano (Fig. 3, E)

Megastigmus cryptomeriae Yano, 1918, Rept. Forest Exp., Forestry Bur. (Tokyo), 17 : 45; Yano, 1918, Insect World, 22 : 373; Hoffmeyer, 1929, Ent. Meddel., 16 : 326.

This species was originally described by Yano from specimens reared from the seeds of *Cryptomeria japonica*. Unfortunately, the type-specimens were destroyed by fire. On the basis of the present specimens reared from the same host, the redescription will be given below.

Female. Length 1.8–3.0 mm. Head seen from above 1.5 times as wide as long, with face strongly gibbous between eyes; temples nearly half as long as eye, rounded off behind eyes (fig. 3, E). Vertex convex, finely and transversely sculptured; ocellocular line shorter than postocellar line (about 5 : 8), slightly shorter than or as long as ocelloccipital line; occipital carina sharp; occiput shallowly emarginate. Eyes 1.4 times as long as wide, separated by 1.2 times their own length. Head seen in front circular, a little wider than high; lower face clothed with black hairs. Antennal scrobe shallow. Antennae inserted at middle of face; scape almost reaching median ocellus, as long as basal two funicle segments and two-thirds of the third combined, with black hairs on inner surface throughout; pedicel nearly as long as first funicle segment. Flagellum 1.3 times as long as width of head, slightly increasing in width distally; anellus nearly as long as wide; first funicle segment usually more than twice as long as wide, longer than second, seventh slightly shorter than first, about 1.3 times as long as wide; club a little longer than two preceding segments combined, with a tuft of micropilosity extending to base of its second segment. Sensillae short and sparse, disposed

in one or two rows upon each funicle segment.

Thorax elongate, slightly more than twice as long as wide, weakly convex in lateral aspect. Pronotum 1.1 to 1.3 times as wide as long, parallel-sided, sparsely rugulose, with anterior dorsal margin very weakly emarginate. Mid lobe of mesoscutum transversely shingled anteriorly, rugulose posteriorly, with four or five black bristles along notaulicix and a pair of ones posteriorly. Notaulices rather shallow. Scutellum convex, 1.3 to 1.4 times as long as wide, finely shingled, with four or five pairs of black bristles; frenum nearly smooth. Propodeum a little longer than half length of scutellum, about 14 : 22, a little shorter than distance between inner edges of spiracles (14 : 17), with branched longitudinal carinae between anterior margin and an arched transverse carina, behind which the middle area is rather finely reticulate; posterior area with carinae extending from posterior margin, interspaces smooth; median carina variable, sometimes branched or indistinct; spiracles very small, separated by more than twice their own length from hind margin of metanotum; spiracular sulci deep.

Fore wing: basal cell hairy in apical half, almost closed below by a row of hairs on cubital vein, upper surface of costal cell with a row of hairs apically, lower surface with a row of sparse hairs in basal half, hairy beyond; speculum almost reduced; relative length of sm : m : p : s as 52 : 29 : 29 : 11.

Gaster strongly compressed, about as long as thorax. Ovipositor sheath as long as gaster and thorax combined.

Brownish yellow: scape apically and pedicel basally darker; flagellum, occiput, propodeum in greater part, and mesolcus dark brown. Tergites with an indistinct, dark band basally. Ovipositor sheath black. In lighter specimens, propodeum entirely brownish yellow.

Male. Length 2.0–3.0 mm. Scape as long as first two funicle segments and half of the third combined; pedicel usually shorter than first funicle segment; flagellum 1.5 times as long as width of head; first funicle segment about twice as long as wide; club usually nearly as long as three preceding segments combined; the third segment long, with a tuft of micropilosity.

Thorax much slender, 2.3 to 2.6 times as long as wide. Pronotum distinctly narrowed to base. Propodeum nearly two-thirds of scutellum, nearly as long as distance between inner edges of spiracles, weakly produced beyond insertions of hind coxae.

Ocelli partially surrounded by brownish black patches. First tergite black above; second to fifth tergites with a broad, dark band.

Specimens examined.—Hokkaido: Kikonai, Oshima Prov., 30 ♀♀, 20 ♂♂, em. 9. V. 1961, ex *Cryptomeria japonica*, K. Kamijo. Honshu: Yamagata Pref., 11 ♀♀, 8 ♂♂, em. 5. V. 1948, ex *C. japonica*, K. Sato; Takada, Niigata Pref., 8 ♀♀, 4 ♂♂, em. 7. V. 1912, ex *C. japonica*, S. Matsumura; Kamikoma, Kyoto, 8 ♀♀, 9 ♂♂, em. 4. IV. 1955, ex *C. japonica*, T. Inoue; Tokyo, 3 ♀♀, 24. V. 1956, A. Habu. Kyushu: Hikosan, Fukuoka Pref., 8 ♀♀, 11 ♂♂, 20. V. 1959, K. Kamijo.

Host.—*Cryptomeria japonica* D. Don.

Distribution.—Japan (Hokkaido; Honshu; Kyushu).

This species is related to *M. spermotrophus* Wachtl, from which it may be separated

by the much slender body, by having fewer bristles on the scutellum, by having black hairs on the lower face and by the carination of the propodeum. It is also closely related to *tsugaphilus* Kamijo, *thuyopsis* Yano and *chamaecyparidis* Kamijo, but may be distinguished from those species by the characters given in the preceding key.

10. ***Megastigmus thuyopsis*** Yano (Fig. 3, C)

Megastigmus thuyopsis Yano, 1918, Rept. Forest Exp., Forestry Bur. (Tokyo), 17 : 46; Yano, 1918, Insect World, 22 : 374.

The type-specimens of this species were destroyed by fire. The following redescription is based upon a female sepcimen reared from the same host as the type.

Female. Length 2.0 mm. Head seen from above 1.7 times as wide as long, with face strongly gibbous between eyes; temples roundly narrowed behind eyes. Vertex convex, transversely and feebly aciculate; occiput deeply emarginate; postocellar line 1.7 times as long as ocellocular line, which is about as long as ocelloccipital line. Eyes separated by 1.3 times their own length. Head seen in front 1.2 times as wide as high; lower face with black hairs. Antennal scrobe shallow. Antennae inserted at middle of face; scape as long as first three funicle segments combined, its inner surface with black hairs on apical two-thirds; pedicel much wider and a little longer than first funicle segment; flagellum 1.3 times as long as width of head, very slightly increasing in width distally; anellus wider than long; first funicle segment 1.5 times as long as wide; seventh equal to first in length. Sensillae rather long, disposed in a single row upon each funicle segment.

Thorax about twice as long as wide, rather strongly convex in lateral aspect. Pronotum finely rugulose; flange on anterior dorsal margin hardly emarginate. Mid lobe of mesoscutum transversely and feebly aciculate, at certain angles appearing shingled, with three pairs of lack bbristles posteriorly. Notaulices deep. Scutellum 1.3 times as long as wide, finely and reticulately sculptured, with three pairs of black bristles; frenum longitudinally and feebly sculptured medially, nearly smooth at sides. Propodeum slightly longer than half length of scutellum, impressed medially, reticulate-punctate behind transverse carina, to which weak carinae extend from the anterior margin; median carina visible posteriorly. Propodeal spiracles small, separated by two times their own length from posterior margin of metanotum.

Fore wing: basal cell with several hairs apically, open below in basal half; lower surface of costal cell without hairs in basal half, hairy in apical half, upper surface with a row of hairs apically; speculum moderately developed; relative length of sm : m : p : s as 38 : 21 : 21 : 8; stigmal vein as in fig. 3, C.

Gaster subcompressed. Ovipositor sheath distinctly shorter than gaster and half of thorax combined.

Brownish yellow: inner surface of scape, pedicel and flagellum dark brown; ocelli partially surrounded by brownish black patches; propodeum slightly darker basally; first to fourth tergites with a broad, dark band posteriorly. Ovipositor sheeth black.

Male.—Unknown.

Specimens examined.—Aomori Pref., Honshu, 1 ♀, em. 15. IV. 1957, ex *Thujopsis dolabrata*, K. Kamijo.

Host.—*Thujopsis dolabrata* Siebold et Zuccarini.

Distribution.—Japan (Honshu).

This species is closely related to *chamaecyparidis* Kamijo and *tsugaphilus* Kamijo. It may be distinguished from *chamaecyparidis* by the shorter ovipositor sheath, by the basal cell having much more hairs, by the shape of the stigmal vein, and by the pedicel which is longer than first funicle segment; from *tsugaphilus*, by the shorter ovipositor sheath, by the shape of the stigmal vein, by the speculum which is open below and by the less robust thorax.

11. ***Megastigmus tsugaphilus*** Kamijo

Megastigmus tsugaphilus Kamijo, 1958, Ins. Mats., 22 : 32.

Specimens examined.—Holotype (♀), allotype (♂) and paratypes (11 ♀♀, 5 ♂♂), Kochi Pref., Shikoku, em. 9. V.–20. VI. 1957, ex *Tsuga Sieboldii*, K. Kamijo.

Host.—*Tsuga Sieboldii* Carrière.

Distribution.—Japan (Shikoku).

12. ***Megastigmus chamaecyparidis*** Kamijo

Megastigmus chamaecyparidis Kamijo, 1958, Ins. Mats., 22 : 31.

Specimens examined.—Holotype (♀), Otaki, Nagano Pref., Honshu, em. 23. V. 1957, ex *Chamaecyparis obtusa*, K. Kamijo; allotype (♂), Honshu (exact locality and date are unknown), ex *C. obtusa*. Paratypes.—6 ♀♀, the same as holotype; 8 ♀♀, 12 ♂♂, the same as allotype.

Host.—*Chamaecyparis obtusa* Endlicher.

Distribution.— Japan (Honshu).

Species of *Megastigmus* unknown to the writer

13. ***Megastigmus inamurae*** Yano

Megastigmus inamurae Yano, 1918, Rept. Forest Exp., Forestry Bur. (Tokyo), 17 : 47; Yano, 1918, Insect World, 22 : 347.

I have not seen any representatives of this species.

Host.—*Larix leptolepis* Gordon; *L. Gmelinii* Gordon.

Distribution.—Japan (Honshu).

14. ***Megastigmus koebelei*** Ashmead

Megastigmus koebelei Ashmead, 1904, Jour. N. Y. Ent. Soc., 12 : 146.

This species was originally described from a single female specimen taken from Atami, Honshu (Type No. 7150, U.S.N.M.), but according to Dr. Burks, the type is lost. The original description is too inadequate to recognize this species.

Host.—Unknown.

Distribution.—Japan (Honshu).

Macrodasyceras, gen. nov.

Anterior margin of clypeus deeply incised medially, with two teeth; mandibles with three teeth (fig. 3, G); occiput sharply margined. Antennal scrobe fully reaching median ocellus; antennae inserted at mid-height of eyes and extremely above middle of face (fig. 3.

K, L); scape slender, extending beyond level of vertex, flagellum filiform; in male, pedicel much shorter than first funicle segment, funicle bearing sparse, outstanding hairs which are as long as the funicle segment.

Thorax about twice as long as wide; pronotum and mesoscutum transversely rugulose or rugose; scutellum roundly truncate on anterior margin, with frenal furrow distinct; spiracles oval, separated from hind margin of metanotum by their own length; prosternum without a median groove; prepectus with an oblique carina. Fore wing with marginal vein obviously longer than postmarginal; in male, upper surface of costal cell with a complete row of hairs.

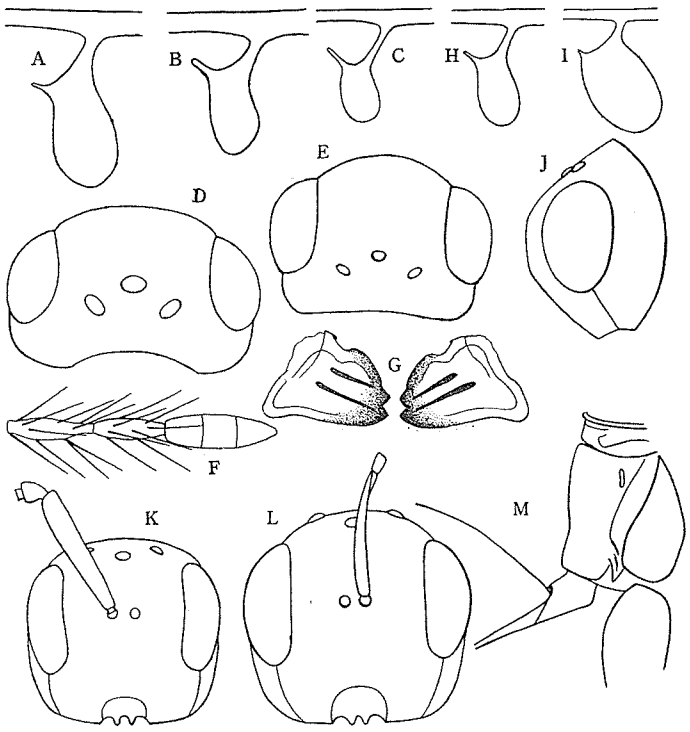

Fig. 3. A–C. Stigmal vein of female: A, *Megastigmus pourthiaeae*, sp. nov.; B, *M. firmae*, sp. nov.; C, *M. thuyopsis* Yano.
D–E. Dorsal view of head of female: D, *M. firmae*, sp. nov.; E, *M. cryptomeriae* Yano.
F–M. *Macrodasyceras japonicum* (Ashmead). F, antennae of male; G, mandibles of female; H–I, stigmal vein of female (H) and male (I); J, lateral view of head of male; K–L, front view of head of male (K) and female (L); M, lateral view of abdominal petiole of female.

Abdomen of female with petiolar segment more or less distinct, and with hind margins of first to fourth tergites deeply incised medially. Ovipositor at apex with small teeth as in phytophagous species of *Megastigmus*.

Type species.—*Megastigmus japonicus* Ashmead.

This new genus may be distinguished from *Megastigmus* Dalman by the characters given

in the key. The male antennae of the new genus are similar to those of *Pulvilligera* Strand (1911) which, according to a personal information of Mr. Riek, should be synonymous with the genus *Bootania* Dalla Torre (1897). He kindly examined some representatives of the new genus and informed me that *Macrodasyceras* differs from *Bootania* markedly in wing-venation apart from other characters.

Key to the species

♀♀

1. Ovipositor sheath shorter than gaster; abdominal petiole distinct, about as long as wide; stigma not surrounded by cloud. . . . . *japonicum* (Ashmead).
- Ovipositor sheath nearly as long as thorax and gaster combined; abdominal petiole shorter, much wider than long; stigma surrounded by faint cloud below. . . . . *hirsutum*, sp. nov.

1. ***Macrodasyceras japonicum*** (Ashmead) (Fig. 3, F, G, H, I, J, K, L, M)

Megastigmus japonicus Ashmead, 1904, Jour. N. Y. Ent. Soc., 12 : 146.

On the basis of the specimens examined this species will be redescribed below.

Female. Length 2.2–3.6 mm. Head seen from above about 1.7 times as wide as long, as wide as thorax, with face not strongly gibbous between eyes; temples rather sharply narrowed behind eyes, slightly shorter than half of eye. Vertex convex, rugulose; occipital carina sharp, attaining top of vertex; occiput narrowly and deeply emarginate; ocellocular line much shorter than postocellar line (6 : 10). Eyes about 1.3 times as long as wide, separated by 1.1 times their own length. Malar space half as long as eye. Head seen in front elongate, nearly as long as wide, about 37 : 40, with genae less narrowed towards mouth, angled ventrally; lower face large, with very sparse, short, pale hairs, and with two black bristles on each side below; upper face with a row of three black bristles on each side. Distance between centers of antennal toruli short, slightly less than one-fourth distance between eyes. Antennal scrobe moderate in depth, fully attaining median ocellus. Scape extending by one-third its length beyond level of median ocellus, nearly as long as first three funicle segments combined, its inner surface with two rows of black hairs from base to apex; pedicel usually slightly shorter than first funicle segment, nearly twice as long as wide. Flagellum 1.4 times as long as width of head, not increasing in width; anellus much wider than long; first funicle segment about twice as long as wide, seventh a little shorter than first; club about as long as two preceding segments combined; apices of first and second segments not oblique, with a rather large tuft of micropilosity extending to base of the second segment.

Thorax slightly more than twice as long as wide, weakly convex in lateral aspect. Pronotum 1.2 times as wide as long, parallel-sided in posterior two-thirds, transversely impressed medially and posteriorly, with rather sparse rugae; anterior dorsal flange hardly emarginate. Mesoscutum as long as pronotum, transversely rugulose; mid lobe with three or four black bristles along notaulicix, which is shallow. Scutellum about 1.2 times as long as wide, flattened above, narrowed anteriorly and roundly truncate on anterior margin, irregularly and weakly rugulose, with three pairs of bristles; frenum obliquely rugulose. Propodeum about two-thirds of scutellum, 0.8 times as long as distance between inner edges

of propodeal spiracles, with longitudinal carinae anteriorly and posteriorly; arched transverse carinae at anterior one-third, behind which reticulation is dense and irregular, sometimes it is absent and the carinae from the posterior margin extend to the transverse carinae; median carina visible anteriorly; spiracular sulci shallow. Legs: outer surface of middle and hind tibiae with sparse, long, pale hairs.

Fore wing: basal cell with a few hairs apically, open below in basal two-thirds; upper surface of costal cell with a row of hairs apically, lower surface without hairs in basal half, very sparsely hairy beyond; speculum moderately developed; relative length of sm : m : p : s as 69 : 33 : 25 : 13.

Gaster distinctly petiolate (fig. 3, M); petiole slightly longer than metanotum, nearly as long as wide. Gaster a little shorter than thorax, usually not compressed. Ovipositor sheath two-thirds to three-fourths length of gaster.

Light brownish yellow to brownish yellow: pedicel and flagellum usually darker; ocelli partially surrounded by brownish black patches; mesolcus brownish black; dorsum of gaster with two broad, dark bands.

Male. Length 2.5–3.3 mm. Head in dorsal view with face strongly gibbous between eyes, and with upper face gently declivous anteriorly. Scape as long as distance between eyes, extending by about half its length beyond level of median ocellus; pedicel much shorter than first funicle segment, nearly as wide as long; funicle segments equal in length, with sparse, long hairs which are as long as the funicle segment (fig. 3, F); club shorter than or as long as two preceding segments combined, with normal hairs.

Fore wing: basal cell with sparse hairs, closed below by a row of hairs on cubital vein; upper surface of costal cell with a row of hairs from base to apex, the lower surface anteriorly with irregular three rows of hairs in basal half, hairy beyond; stigmal vein as in fig. 3, I.

Middle tibia 1.6 to 1.8 times as long as the tarsus, with two rows of black hairs on outer surface; hind tibia on outer surface with sparse, outstanding hairs which are as long as maximum width of the tibia. Gaster subsessile.

Pale yellow: antennal scrobe, area around ocelli, and flagellum brownish black; anterior margin of mid lobe of mesoscutum, prosternum, prepectus, meso- and metapleura, propodeum, fore coxae and gaster black; middle and hind coxae darker.

Specimens examined.—Honshu: Osaka, 16 ♀♀, 5 ♂♂, em. 11. XII. 1960, ex seeds of *Ilex shinensis*, K. Kamijo; Hiroshima, 1 ♀, 23. XI, 1953, 29 ♀♀, 18. XII. 1954, 3 ♀♀, 28. III. 1955, T. Ishihara; unlocalized, probably Honshu, 1 ♂, em. 28. X., 2 ♀♀, em. 7. XI. 1956, ex seeds of *Ilex serrata*, J. F. Schoen. Shikoku: Matsuyama, Ehime Pref., 1 ♀, 20,. XI. 1954, 3 ♀♀, 8. I. 1955, M. Miyatake, 2 ♀♀, 17. XII. 1952, T. Yano.

Host.—*Ilex serrata* Thunberg; *I. shinensis* Sims.

Distribution.—Japan (Honshu; Shikoku).

It should be noted that all the specimens examined are collected in winter.

2. ***Macrodasyceras hirsutum***, sp. nov.

Female. Length 3.4–4.4 mm. Head seen from above 1.8 times as wide as long, slightly

wider than thorax, with face moderately gibbous between eyes. Vertex weakly convex, transversely rugulose; occipital carina less sharp, almost attaining top of vertex; occiput deeply emarginate; ocellocular line two-thirds length of postocellar line, as long as ocelloccipital line. Eyes separated by 1.2 times their own length. Malar space about half as long as eye. Head seen in front 1.2 times as wide as high, with genae rather strongly narrowed towards mouth in a curved line. Vestiture on face like that of *japonicum* (Ashmead), but upper face with a row of four or five bristles on each side. Distance between centers of antennal toruli slightly less than one-fourth distance between eyes. Antennal scrobe of moderate depth, fully attaining median ocellus. Scape slender, curved, as long as first two funicle segments and half of the third combined, with black hairs on inner surface throughout; pedicel much shorter than first funicle segment, about twice as long as wide. Flagellum 1.5 times as long as width of head, not increasing in width; anellus wider than long; first funicle segment twice as long as wide, seventh slightly shorter than first; club nearly as long as two preceding segments combined, with a tuft of micropilosity extending to base of the second segment. Sensillae long and numerous, irregularly disposed in two rows upon each funicle segment.

Thorax 2.1 times as long as wide, weakly convex in lateral aspect. Pronotum 1.3 times as wide as long, sparsely and transversely rugose, with anterior dorsal flange hardly emarginate. Mid lobe of mesoscutum as long as pronotum, sculptured as in pronotum, with four black bristles along notaulicix, which is shallow; the side lobes rugulose. Scutellum a little longer than wide (32 : 28), truncately rounded on anterior margin, flattened above, shingled anteriorly, irregularly rugulose medially, with three pairs of bristles; frenal furrow sinuate, frenum longitudinally rugulose. Propodeum two-thirds length of scutellum, as long as two-thirds distance between inner edges of propodeal spiracles; sculpture of propodeum like that of *japonicum*, but median carina complete though weak and branched anteriorly, and transverse carina weaker. Legs: outer surface of mid tibia with two rows of black hairs, of hind tibia with sparse, pale hairs which are twice as long as width of the tibia in dorsal view.

Fore wing: vestiture like that of *japonicum*; stigma surrounded by faint cloud below.

Gaster slightly longer than thorax; petiole short, three times as wide as long. Ovipositor sheath nearly as long as gaster and thorax combined.

Brownish yellow: pedicel, flagellum, metanotum at sides, and propodeum medially dark brown; dorsum of gaster dark brown in greater part.

Male.—Unknown.

Holotype (♀).—Abiko, Chiba Pref., Honshu, 1929, T. Oguma. Paratype (1 ♀).—The same as holotype.

Host.—Unknown.

Distribution.—Japan (Honshu).

This species is very closely related to *japonicum* (Ashmead), from which it may be distinguished by the longer ovipositor sheath, and by the shorter abdominal petiole.

Host List

I. Phytophagous species

Host	Parasite
Abies firma Sieb. et Zucc.	*Megastigmus firmae*, sp. nov.
Abies Mariesii Masters	*Megastigmus borriesi* Crosby.
Abies sachalinensis Masters	*Megastigmus borriesi* Crosby.
Abies sikokiana Nakai	*Megastigmus borriesi* Crosby.
Abies Veitchii Lindl.	*Megastigmus borriesi* Crosby.
Chamaecyparis obtusa Endl.	*Megastigmus chamaecyparidis* Kamijo.
Cryptomeria japonica D. Don	*Megastigmus cryptomeriae* Yano.
Ilex serrata Thunb.	*Macrodasyceras japonicum* (Ashmead).
Ilex shinensis Sims.	*Macrodasyceras japonicum* (Ashmead).
Larix leptolepis Gordon	*Megastigmus inamurae* Yano.
Malus pallasiana Fuz.	*Megastigmus mali* Nikolskaja.
Malus sp.	*Megastigmus mali* Nikolskaja.
Picea Glehnii Masters	*Megastigmus ezomatsuanus* Hussey et Kamijo.
Picea jezoensis Carr.	*Megastigmus ezomatsuanus* Hussey et Kamijo.
Pourthiaea villosa Decne.	*Megastigmus pourthiaeae*, sp. nov.
Rosa multiflora Thunb.	*Megastigmus aculeatus* (Swederus).
Rosa rugosa Thunb.	*Megastigmus aculeatus* (Swederus).
Thujopsis dolabrata Sieb. et Zucc.	*Megastigmus thuyopsis* Yano.
Tsuga Sieboldii Carr.	*Megastigmus tsugaphilus* Kamijo.

II. Entomophagous species

Host	Parasite
Trichagalma serratae (Ashmead)	*Megastigmus habui*, sp nov.

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BOOK REVIEW

EARLY STAGES OF JAPANESE BUTTERFLIES IN COLOUR. By Takashi Shirozu & Akira Hara. Vol. I, iv+142 pages, 60 colour plates, 1960, & Vol. II, 139 pages, 60 colour plates, 1962. Hoikusha Co., Ltd., 1 Chome, Uehon-machi, Higashi-ku, Osaka, Japan. Price of each volume $ 12.50.

This is an epoch-making publication on the butterflies of Japan, comparing favourably with the publication of Frohawk's work, The Complete Book of British Butterflies. It consists of two volumes, covering one hundred and ninety-seven forms of butterflies of Japan and Okinawa. In these volumes are given nearly all members of the butterflies distributed in Japan, excluding only four species which have not yet been observed completely. On the one hundred and twenty coloured plates are clearly shown the egg, larva, pupa and adult of each species, with snap-shot photographs for life. Each species is explained under a series of heads: Distribution, Food-plants, Egg, Larva, Pupa and Life-history.

This work will be very useful to entomologists and lovers of nature who are so interested in butterflies. Although the publication is stated in Japanese, the elegant illustrations in colour are amply sufficient to satisfy foreign readers who do not know Japanese.

C. WATANABE