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Notes on the genus *Epitrioza* of Japan, with descriptions of two new species (Homoptera : Psyllidae)*

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日本産オオトガリキジラミ属について

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トガリキジラミ類の1つであるオオトガリキジラミ属（*Epitrioza*）は，日本固有の属で，これまでにオオトガリキジラミ（*E. mizuhonica*）の1種が知られているのみであった．このほど筆者の調査により，近縁の2新種が追加された．両種は幼虫の形態においてオオトガリキジラミと明らかな差異があり，幼虫はゴールを形成しないなど，習性も異なっている．主として山地に産する種を *E. marginata*（ヤマオオトガリキジラミ—新称），主として平地・低山地に産する種を *E. yasumatsui*（サトオオトガリキジラミ—新称）として記載した．両種ともオオトガリキジラミと同時に採集されることも多いが，両種が同時に採集されることはない．両種ともオオトガリキジラミから派生した種と考えられ，山地でゴールを作らず葉裏へ進出して自由生活をするようになったタイプからヤマオオトガリキジラミが，平地でゴールを作らず葉表へ進出したタイプからサトオオトガリキジラミが分化してきたものと推定される．3種ともグミ類に寄生する．

The genus *Epitrioza* is one of the members belonging to the subfamily Triozinae and known from Japan only. It has been represented by the unique species, *E. mizuhonica* for a long time. As a result of careful examination of material two related species which are new to science are recently added to the genus. Their developmental stages are quite different from those of *mizuhonica* morphologically and biologically.

In the present paper, two new species are described and *mizuhonica* is redescribed, with description of the part of the developmental stages and available information about their biology. The type specimens and most of the type series will be deposited at the Osaka Museum of Natural History.

Before going further, I wish to express my cordial thanks to Dr. Manzo CHIJI and Mr. Isamu HIURA of the Osaka Museum of Natural History who have been a great source of encouragement and helpful in material. My thanks are also due to Dr. Keizo YASUMATSU, the former professor of the Entomological Laboratory, Kyushu University for his constant guidance during the course of study in college which the present paper is based on, and to many gentlemen who placed the material at my disposal.

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* Contributions from the Osaka Museum of Natural History, No. 222.

Genus *Epitrioza* KUWAYAMA

Epitrioza KUWAYAMA, 1910, Trans. Sapporo Nat. Hist. Soc. 3 : 55.

Type species : *Epitrioza mizuhonica* KUWAYAMA, 1910 (original designation by KUWAYAMA in 1910).

Larger species. Head small, narrower than thorax, vertical or slightly deflexed. Vertex quadrate, with posterior margin straight, longer than half as long as wide on median line, depressed discally, not pubescent. Genal cones short, nearly half as long as vertex, vertical, slightly divergent, with blunt or subacute apices, pubescent. Antenna short, slightly longer than width of head, apex with 1 long and 1 short setae.

Thorax robust, convex, not pubescent. Pronotum almost vertical, slightly narrower than head, produced laterally. Forewing transparent, long and broad, over 2.5 times as long as wide, roundingly angulate at apex, venation triozine ; Rs very long, ending more or less near apex ; M_{1+2} long and sinuate ; M_{3+4} almost straight ; both medial and cubital cells large and elongate. Hind wing about 4/5 as long as forewing, rounded apically, venation not triozine, R arising from basal vein first, M and Cu with common petiole, M without subdivision. Legs short and moderately stout, sparsely pubescent ; posterior tibia without conspicuous basal spurs, with 1 outer and 2 inner apical spurs ; proximal segment of posterior tarsi without apical spurs ; meracanthus short.

Male genitalia small ; proctiger longer than forceps, with long pubescence ; forceps long, more or less parallel-margined, simple ; subgenital plate short and high. Female genitalia large ; dorsal valve in lateral view distinctly longer than ventral valve, with sinuate dorsal margin, apical portion attenuate, apex sharply acute and often conspicuously upturned ; ventral valve short, in lateral view subtriangular, apex sharp and upturned.

As pointed out by CRAWFORD (1919), the genus *Epitrioza* KUWAYAMA is not a well-defined genus. However, any disposition is not tried in the present work as it seems to be still a distinct natural group either at generic rank or at subgeneric rank. The genus can be distinguished from the other genera of the subfamily Triozinae by combination of all of the following characters. Vertex and thorax are not pubescent. Antenna is extremely short (slightly longer than width of head). An apex of forewing is not located in the median cell as seen in *Trichochermes bicolor,* etc. Venation of hind wing is not triozine. Posterior tibia has no basal spurs, and has 1 outer and 2 inner apical spurs.

Key to the species of *Epitrioza*

1(2) Forewing with Rs ending close to apex, which is located nearly in the middle of apices of Rs and M_{1+2} or closer to apex of Rs (Fig. 1 - Mz_1 ; Fig. 2) ; male forceps slender and nearly straight, with an acute apex curved forward .... *mizuhonica* KUWAYAMA

2(1) Forewing with Rs ending far from apex, which is located conspicuously closer to apex of M_{1+2} (Fig. 1 - Mg_2, Y_4 ; Fig. 2) ; male forceps sinuate, with a blunt apex or an acute apex curved caudad.

3(4) Posterior margin of forewing with a light brown band, Rs and M_{1+2} not parallel owing to M_{1+2} ended further from wing apex (Fig. 1 - Mg_2) ; male forceps rather slender, with a blunt apex (Fig. 3 - Mg_1) ; dorsal valve of female genitalia in lateral view strongly convex in the middle, with an apical attenuate portion short and not upturned (Fig. 3 - Mg_2) ..... *marginata* sp. nov.

4(3) Posterior margin of forewing without a light brown band, Rs and M_{1+2} nearly parallel (Fig. 1 - Y_4) ; male forceps stout, with an acute apex curved caudad (Fig. 3 - Y_1) ; dorsal valve of female genitalia in lateral view weakly convex in the middle, with an apical attenuate portion long and conspicuously upturned (Fig. 3 - Y_2)..... ..... *yasumatsui* sp. nov.

Epitrioza mizuhonica KUWAYAMA, 1910

Epitrioza mizuhonica KUWAYAMA, 1910, Trans. Sapporo Nat. Hist. Soc. 3 : 56 (Sapporo, Takasago, Yamashiro, Tamagawa).

Color : General color green to light brown. Antenna light brown with 10th segment black. Forewing transparent, veins greenish, membrane sometimes slightly yellowish. Overwintered form reddish brown to dark brown. Thoracic dorsum with rather conspicuous stripes or maculations. Antenna with 1st segment brown and 10th segment black. Wing veins light brown to brown.

Structure : Head small, narrower than thorax, nearly vertical or slightly deflexed ; vertex quadrate, with posterior margin almost straight, longer than half as long as wide on median line (about 1.5 times as wide as long), with a small pit on each side of median line, without pubescence, except anterior margin with a few short hairs ; genal cones short, 1/2 as long as vertex, vertical in lateral view, slightly divergent in frontal view, sparsely pubescent, with blunt or subacute apices ; clypeus in lateral view with upper edge moderately produced forward. Antenna short, nearly 1.1 times as long as width of head ; apex with 1 long and 1 short setae, relative length of antennal segments as 3 : 4 : 10 : 4.5 : 3.5 : 4 : 4 : 4 : 3 : 3.

Thorax large, moderately convex, without pubescence ; pronotum slightly narrower than head, almost vertical, produced laterally ; praescutum convex, continuous from plane of pronotum, 5/6 as long as wide ; scutum large, convex laterally, rather flat dorsally, half as long as wide ; scutellum somewhat trapezoidal, 3/5 as long as wide, slightly convex. Forewing large, 2.6 to 2.7 times as long as wide, roundingly angulate at apex ; Rs very long, sinuate, ending close to wing apex as figured (Fig. 1 - Mz_1) ; M_{1+2} long, sinuate, ending at posterior margin near wing apex ; M_{3+4} long, nearly straight, rather parallel to M_{1+2} ; Cu_1 strongly arched ; medial cell conspicuously elongate ; cubital cell smaller than medial cell. Hind wing large, 2.7 times as long as wide, 5/7 as long as forewing, with sinuate anterior margin, with arched posterior margin, rounded apically ; venation not triozine, R coming out first, then M and Cu with common petiole, R with reduced subdivision, M without subdivision, Cu with distinct Cu_1 and Cu_2 ; C+Sc with over 10 frenulum basally (Fig. 1 - Mz_2). Legs short and moderately stout, sparsely pubescent ; posterior tibia without conspicuous basal spur, with 1 outer and 2 inner apical spurs, with comb-like bristles along apical margin ; proximal segment of posterior tarsi without apical spurs ; meracanthus short, slender, projected ventrocaudad, acute at apex. Abdomen (excl. genital segments) long and robust, almost as long as head and thorax combined, without pubescence dorsally, with short pubescence ventrally.

Male genitalia (Fig. 3 - Mz_1) small, nearly 1/4 as long as the rest of abdomen ; proctiger in lateral view stout, distinctly longer than forceps, with anterior margin almost straight, with posterior margin produced caudad, with long pubescence ; forceps large, about 4/5 as long as proctiger, sparsely pubescent, in lateral view elongate, parallel-margined and bent caudad apically, then narrowed to black apex, apically produced anteriorly as a rather sharp tooth, with inner face (Fig. 3 - Mz_1-i) bearing strong retrorse setae, in dorso-caudal view, rather broad basally, arched and narrowed to acute and black-tipped apices ; aedeagus long, the second segment acute apically ; subgenital plate short and high, 1.1 times as high as long, sparsely pubescent on caudal half. Female genitalia (Fig. 3 - Mz_2) large, nearly as long as the rest of abdomen, dorsal valve distinctly longer than ventral, in lateral view with sinuate dorsal margin, with apical portion attenuate, with apex sharply acute and conspicuously upturned, sparsely pubescent near middle part with a few long bristles ; inner valve slightly shorter than dorsal valve ; ventral valve short, subtriangular, hairy apically, with dorsal margin nearly straight, with ventral margin produced slightly ventrad near middle, with apex sharp and upturned.

Length of body ♂ 2.6-3.6 mm, ♀ 2.9-4.1 mm (to tip of folded wings ♂ 4.6-5.7 mm, ♀ 4.7-6.2 mm) ; length of forewing ♂ 4.0-4.6 mm, ♀ 4.0-4.8 mm ; width of forewing ♂ 1.5-1.6 mm, ♀ 1.5-1.7 mm ; length of hind wing ♂ 2.8-3.0 mm, ♀ 3.1-3.6 mm ; width of hind wing ♂ 1.0-1.1 mm, ♀ 1.1-1.2 mm ; length of antenna ♂ 0.8-1.0 mm, ♀ 0.8-1.0 mm.

Distribution : Japan (Hokkaido, Aomori Pref., Miyagi Pref., Yamagata Pref., Tokyo

Metro., Nagano Pref., Niigata Pref., Sado Is., Yamanashi Pref., Gifu Pref., Shiga Pref., Kyoto Pref., Nara Pref., Osaka Pref., Hyogo Pref., Tokushima Pref., Kagawa Pref., Kochi Pref., Ehime Pref., Fukuoka Pref., Ooita Pref., Kumamoto Pref., Kagoshima Pref., Goto Is., Tsushima Is.).

Specimens examined : 〔HONSHU〕 1♀, Towada Lake, Aomori Pref., 13. vii. 1962, Y. Miyatake leg. 1♀ (overwintered form), Yamagata, x. 1954, H. Hasegawa leg. 2♂ 3♀, Nishigoo-mura, near Yamagata, Yamagata Pref., 2. vi. 1955, H. Hasegawa leg. 3♂ 8♀, Tsuchitaru, Yuzawa-machi, Minamiuonuma-gun, Niigata Pref., 2. vii. 1966, K. Baba leg. 32♂ 19♀ (1♀, teneral), 1 exuvia of the last instar, 13. vii. 1966, on *Elaeagnus umbellata,* Y. Miyatake leg. ; 1♀, 13. vii. 1966, H. Shima leg. ; 1♂, 14. vii. 1966, Y. Miyatake leg. ; Asagai, Yuzawa-machi, Minamiuonuma-gun, Niigata Pref. 2♂ 1♀, Kijiya ～ Shiraike (alt. 1,100 m), Itoigawa City, Niigata Pref., 18. vii. 1966, on *E. umbellata,* Y. Miyatake leg. 3♂ 1♀, Akadama-sugiike, nr Mt. Kunimi, Ryôtsu City, Sado Is., 23. vii. 1970, on *E. umbellata,* Y. Miyatake leg. 1♂, Kawamo-tôge, Akadomari-mura, Sado-gun, Sado Is., 22. vii. 1970, on *E. multiflora,* Y. Miyatake leg. 1♀ (overwintered f.), 28. v. 1941, T. Nakane leg. ; 4♂ 4♀, 22. vi. 1972, Y. Miyatake leg., gall on *E. umbellata* ; Kamiyama, Nojiri Lake, Shinano-cho, Kamiminochi-gun, Nagano Pref. 1♀, Kano, Nagano Pref., 7. viii. 1964, in *Larix* forest, K. Morimoto leg. 1♂ 1♀, Karuizawa, Nagano Pref., 7-14. vii. 1959, K. Morimoto leg. 5♂ 13♀ (mostly teneral), Minami-minowa, Kamiina-gun, Nagano Pref., on *E. umbellata,* Y. Maeta leg. 2♂ 4♀, 9. vii. 1966 ; 1♂ 1♀, 10. vii. 1966 ; Kutsukake, Karuizawa-cho, Nagano Pref., on *E. umbellata,* Y. Miyatake leg. 1♀, Sengataki, 11. vii. 1966 ; 1♀, Nagabinata, 12. vii. 1966, on *E. umbellata* ; Karuizawa-cho, Nagano Pref., Y. Miyatake leg. 2♀, Amarizawa, Yamanashi Pref., 8. iv. 1959, on *E. umbellata,* T. Saigusa leg. 1♂ (overwintered f.), Okumino, Gifu Pref., 4. v. 1967, T. Naito leg. 1♂ (overwintered f.), Mt. Ibuki (alt. 250～450 m) ; 1♀ (overw. f.), Taiheiji, Mt. Ibuki ; Ibuki-mura, Sakata-gun, Shiga Pref., 20, iv. 1969, Y. Miyatake leg. 11♂ 9♀ (2♂ on slides), 8. vi. 1967, gall on *E. umbellata* ; 3♂ 8♀, 1 exuvia, 19. vi. 1967, gall on *E. umbellata* ; 1♂ 1♀, 13. vi. 1968, on *E. umbellata* ; 3♂ 1♀, 16. vi. 1968, on *E. umbellata* ; 9♂ 5♀, 16. vi. 1968, on *E. pungens* ; 1♂ 1♀ (overwintered f.), 14. iii. 1968, on *E. umbellata* ; 1♂ 5♀ (overw. f.), 1. iv. 1968, on *E. umbellata* ; 4♂ 3♀ (overw. f.), 4. iv. 1968, on *E. umbellata* ; 1♂ (overw. f.), 17. iv. 1970, on *E. pungens* ; Hatsutani, Nose, Osaka Pref., Y. Miyatake leg. 1♀ (overw. f.), Hôzanji, Takarazuka City, Hyogo Pref., 21. iv. 1968, on *E. umbellata,* Y. Miyatake leg. 1♂, Myôken-gû, Kasugayama, Nara Pref., 9. vi. 1968, on *E. umbellata,* Y. Miyatake leg. 7♂ 6♀, 1 exuvia, Ichinoi, Kasugayama, Nara Pref., 9. vi. 1968, gall on *E. umbellata,* Y. Miyatake leg. 〔SHIKOKU〕 1♀ (overw. f.), Zinryô, Tokushima Pref., 28. ii. 1953, I. Hiura leg. 1♀ (overw. f), Zentsuji City, Kagawa Pref., 3. i. 1959, Y. Miyatake leg. 2♀, Matsuyama, Ehime Pref., 19. v. 1959, on *Elaeagnus* sp., M. Miyatake leg. 1♂ (overwintered f.), T. Naito leg. ; 1♀ (overw. f.), A. Na-

kanishi leg. ; Kochi City, Kochi Pref., 1. iv. 1963. 1♂, Matsuo (alt. 100 m), Ashizuri Pen., Tosashimizu C., Kochi Pref., 22. xi. 1976, Y. Miyatake leg. 〔KYUSHU〕 18♂ 16♀ (overw. f., 1♂ 1♀ on slides), 22. iii. 1958, on *E. multiflora* ; 1♀ (overw. f.), 23. iii. 1958, on *Neolitsea sericea* ; Tsuda, nr Kokura, Fukuoka Pref., Y. Miyatake leg. 6♂ 3♀ (overw. f.), 16. ii. 1958, on *E. glauca* ; 1♂ (overw. f.), 16. ii. 1958, on *Cryptomeria japonica* ; 1♂ (overw. f.), 16. ii. 1958, on *Trachelospermum asiaticum* ; 1♀ (overw. f.), 16. ii. 1958, on *Ilex crenata* ; 5♂ 2♀ (overw. f.), 16. ii. 1958, on *E. pungens* ; 2♂ 3♀ (overw. f.), 1. iv. 1959, on *E. umbellata* ; 18♂ 18♀ (4♂ 4♀ on slides, overw. f.), 5. iv. 1958, on *E. multiflora* ; 1♂ (overw. f.), 31. v. 1959, on *E. umbellata* ; 1♂ (overw. f.), 9. iv. 1960, on *E. umbellata* ; Mt. Wakasugi, nr Fukuoka, Fukuoka Pref., Y. Miyatake leg. 2♂ 3♀ (overw. f.), Mt. Wakasugi, nr Fukuoka, Fukuoka Pref., 8. v. 1963, A. Nakanishi leg. 3♂ 3♀, 1 exuvia, 25. v. 1958, on *E. multiflora* ; 4♀, 2 exuviae, 31. v. 1958 ; 1♂ (overw. f.), 13. iii. 1969, on *E. umbellata* ; Mt. Tachibana, Fukuoka City, Y. Miyatake leg. 1♂, Mt. Kanayama, nr Fukuoka, Fukuoka Pref., 15. vi. 1958, on *E. umbellata,* Y. Miyatake leg. 1♂ (overw. f.), Mizunashi, nr Fukuoka City, 6. iii. 1960, on *E. umbellata,* Y. Miyatake leg. 1♀, 13. vii. 1959 ; 8♂ 12♀ (1♂ 1♀ on slides), 2 nymphs of the 5 th instar, 19. vi. 1962, galls on *E. umbellata* ; Mt. Homan,Fukuoka Pref., Y. Miyatake leg. 1♀ (overw. f.), Innaki, nr Fukuoka City, 1. ii. 1959, on *E. pungens,* Y. Miyatake leg. 7♂ 6♀, 28. vi. 1958 ; 2♂ 1♀, 15-17. vii. 1958 ; 4♂ 5♀, 14. vi. 1959 ; 1♂ 2♀ (overw. f.), 3. v. 1962 ; Mt. Hikosan, Fukuoka Pref., Y. Miyatake leg. 2 ♂ 5 ♀ (overw. f.), Mt. Kujuh, Ooita Pref., 9. iv. 1959, Y. Miyatake leg. 1♂ 3♀ (overw. f.), Makiguchi, Ooita Pref., 21. iii. 1958, on *Elaeagnus* sp., Y. Miyatake leg. 1♂ 5♀ (overw. f.), Kugino, Aso National Park, Kumamoto Pref., 28. iii. 1960, on *E. umbellata,* Y. Miyatake leg. 1♀, 23. v. 1952 ; 1♀, 24. v. 1952 ; Magome ～ Hezuka, Sata, Osumi, Kagoshima Pref., H. Hasegawa leg. 1♂, Otojuku, Fukue City, Fukue Is., Goto Islands, Nagasaki Pref., 28. v. 1968, Y. Shibata leg. 6♂ 3♀ (1♂ on slide), Upper Ikawa River, Kishuku-cho, Fukue I., Goto Is., Nagasaki Pref., on *Elaeagnus* sp., 7. vi. 1969, I. Hiura leg. 1♂ 3♀, Izuhara ～ Sasutôge, Tsushima Is., 7. vi. 1941, T. Shirôzu leg. 21♂ 8 ♀, many nymphs, Mt. Ariake (alt. 300 m), Izuhara-cho, Tsushima Is., 13. vi. 1975, galls on *E. glabra,* Y. Miyatake leg. 1 ex. (teneral), many nymphs, Top, Mt. Ariake, 9. vi. 1975, galls on *E. umbellata,* Y. Miyatake leg. 10♂ 10♀, Agami-guchi ～ Uchiyama, Izuhara-cho, Tsushima Is., 10. vi. 1975, on *E. umbellata,* Y. Miyatake leg. 28♂ 25♀, galls on *E. umbellata* ; many vacant galls on *E. macrophylla* ; Ohfunakoshi ～ Tsunagakezaki, Mizushima-cho, Tsushima Is., 12. vi. 1975, Y. Miyatake leg.

Host plants : "Akigumi"— *Elaeagnus umbellata* Thunb. 〔Elaeagnaceae〕. "Natsugumi"— *E. multiflora* Thunb. 〔Elaeagnaceae〕. "Nawashiro - gumi"— *E. pungens* Thunb. 〔Elaeagnaceae〕. "Ohba - gumi (Maruba - gumi)" — *E. macrophylla* Thunb. 〔Elaeagnaceae〕. "Tsurugumi" — *E. glabra* Thunb. 〔Elaeagnaceae〕.

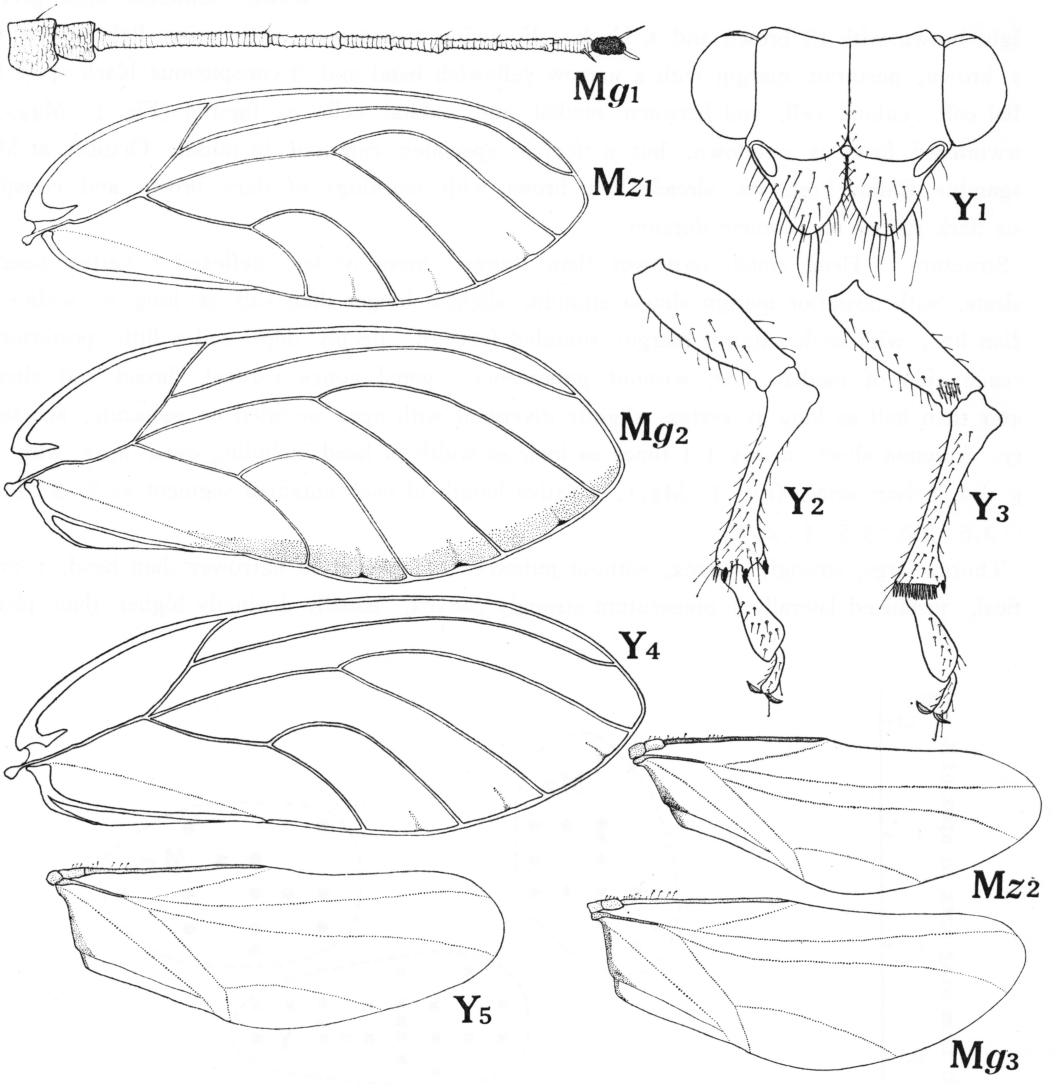

Fig. 1. Mz, *Epitrioza mizuhonica* KUWAYAMA (1, Forewing, ♀, Hatsutani ; 2, Hind wing, ♀, Hatsutani). Mg, *E. marginata* sp. nov. (1, Antenna, ♂, Mt. Kujuh ; 2, Forewing, ♀, Kutsukake ; 3, Hind wing, ♀, Kutsukake). Y, *E. yasumatsui* sp. nov. (1, Head, frontal view, ♀, Tennô ; 2, Posterior tibia, inner side, ♀, Sasayama ; 3, Posterior tibia, outer side, ♀, Sasayama ; 4, Forewing, ♀, Mt. Kongo ; 5, Hind wing, ♀ , Hatsutani).

Epitrioza marginata sp. nov.

Color : General color light green or greenish brown to light brown. Antenna light green to light brown with IX brown and X black. Forewing transparent, with veins light green to light brown, posterior margin with a narrow yellowish band and 3 conspicuous black spots in medial cell, cubital cell, and between medial and cubital cells as figured (Fig. 1 - Mg_2). Overwintered form is unknown, but a female specimen captured in middle October at Mt. Saragamine, Ehime Pref. was already light brown with markings of dark brown and conspicuous dark stripes on thoracic dorsum.

Structure : Head small, narrower than thorax, more or less deflexed ; vertex nearly quadrate, with posterior margin almost straight, slightly longer than half as long as wide on median line, with each anterior margin rounded forward, deeply depressed a little posteriorly on each side of median line, without pubescence ; genal cones vertical, broad and short, shorter than half as long as vertex, slightly divergent with apex rounded or subacute, sparsely hairy. Antenna short, nearly 1.1 times as long as width of head including eyes, apex with 1 long and 1 short setae (Fig. 1 - Mg_1), relative length of each antennal segment as 2 : 3 : 10 : 4.5 : 3.5 : 3.5 : 3.5 : 4 : 2 : 3.

Thorax large, strongly convex, without pubescence ; pronotum narrower than head, nearly vertical, produced laterally ; praescutum strongly convex, usually distinctly higher than plane

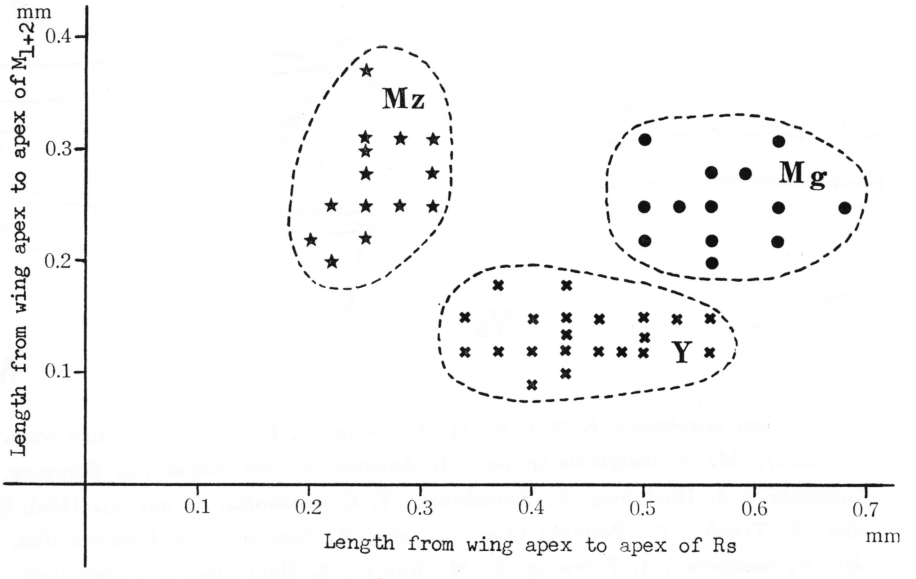

Fig. 2. Ratio of length from wing apex to apex of Rs to length from wing apex to apex of M_{1+2}. Mz, *Epitrioza mizuhonica* KUWAYAMA (15♂ 15♀) ; Mg, *E. marginata* sp. nov. (15♂ 15♀) ; Y, *E. yasumatsui* sp. nov. (16♂ 17♀).

of pronotum, slightly shorter than wide ; scutum large, convex laterally and rather flat dorsally, half as long as wide ; scutellum somewhat trapezoidal, 2/3 as long as wide, convex. Forewing large, 2.4 to 2.6 times as long as wide, roundingly angulate at apex ; Rs very long, arched, ended far from wing apex as figured (Fig. 1-Mg_2) ; M_{1+2} quite long, sinuate, closer to wing apex ; M_{3+4} long, slightly sinuate ; Cu_1 strongly arched ; medial cell remarkably elongate, much larger than cubital cell ; cubital cell elongate and high, somewhat parallelogrammic. Hind wing long and wide, 2.5 to 2.6 times as long as wide, 0.7 times as long as forewing, with sinuate anterior margin, with arched posterior margin, rounded apically, with venation not triozine (Fig. 1 - Mg_3). Legs short, moderately stout, sparsely pubescent ; posterior tibia produced more or less outward, but without distinct basal spur, with 1 outer and 2 inner apical spurs, with comb-like bristles along apical margin ; proximal segment of posterior tarsi without apical spurs ; meracanthus short, slender, projected ventro-caudad, acute at apex. Abdomen (excl. genital segments) long and robust, nearly as long as thorax, without pubescence dorsally, with short pubescence ventrally.

Male genitalia (Fig. 3 - Mg_1) small, 1/3 as long as the rest of abdomen ; proctiger in lateral view stout, longer than forceps, with posterior margin produced caudad, with long hairs apically and posteriorly ; forceps large, rather slender, sinuate and parallel - margined, conspicuously bent caudad at basal one-thirds, with blunt apex, with inner face (Fig. 3 - Mg_1 - i) bearing many retrorse setae as figured ; subgenital plate large and rather flat, distinctly longer than high, sparsely pubescent in caudal half.

Female genitalia (Fig. 3 - Mg_2) moderate in size, nearly half as long as the rest of abdomen ; dorsal valve longer than ventral, in lateral view dorsal margin prominently produced dorsad behind anal pore ring, with apical attenuate portion rather short, with apex sharply acute and scarcely upturned, with long hairs near middle part ; ventral valve rather small, hairy, in lateral view ventral margin prominently produced ventrad near middle, with apical portion attenuate, with apex sharp and slightly upturned.

Length of body ♂ 3.0 - 3.6 mm, ♀ 3.0 - 4.1 mm (to tip of folded wings ♂ 5.3 - 5.7 mm, ♀ 5.6 - 6.3 mm) ; length of forewing ♂ 4.3 - 4.8 mm, ♀ 4.8 - 5.1 mm ; width of forewing ♂ 1.6 - 1.9 mm, ♀ 1.8 - 2.0 mm ; length of hind wing ♂ 3.0 - 3.4 mm, ♀ 3.1 - 3.6 mm ; width of hind wing ♂ 1.1 - 1.3mm, ♀ 1.3 mm ; length of antenna ♂ 0.9 - 1.0mm, ♀ 0.9 - 1.0 mm.

Holotype (♂) : Kutsukake, Karuizawa - cho, Nagano Pref., 10. vii. 1966, on *Elaeagnus umbellata,* Y. Miyatake leg.

Paratopotypes : 3♂ 5♀, 9 - 10. vii. 1966, on *E. umbellata,* Y. Miyatake leg. ; 1♀, 9. vii. 1966, M. Honda leg. ; Kutsukake, Karuizawa-cho, Nagano Pref. 1♂ 1♀, foot of Mt. Asama, Karuizawa-cho, Kitasaku-gun, Nagano Pref., 10. vii. 1966, sweeping, Y. Miyatake leg. 1♀, Karuizawa, Nagano Pref., 7-14. vii. 1959, K. Morimoto leg.

Paratypes : 1♂ 3♀, Yumoto, Nikko, Tochigi Pref., 9. vii. 1961, on *E. multiflora,*

K. Morimoto leg. 1♀, 17. vi. 1964, in *Fagus* forest, I. Hiura leg. ; 2♂, 15. vi. 1967, on *E. umbellata,* Y. Miyatake leg. ; Mt. Kongo, Osaka Pref. 3♂ (teneral), nymphs & exuviae, Onbara Lake, Kamisaibara-cho, Tomata-gun, Okayama Pref., 5. vi. 1973, on *E. umbellata,* Y. Miyatake leg. 17♂ 10♀ (1♂ 1♀ on slides), Matsuyama City, Ehime Pref., 19. v. 1959, on *Elaeagnus* sp., M. Miyatake leg. 1♂ 3♀, Mt. Saragamine (near top, alt. 1,250 m), 3. vii. 1968, Y. Miyatake leg. ; 1♀, Mt. Saragamine (top, alt. 1,270 m), 15. x. 1973, O. Tominaga leg. ; on *E. umbellata,* Onsen-gun, Ehime Pref. 9♂ 5♀ (1♂ 1♀ on slides), Mt. Kujuh, Ooita Pref., 19. vii. 1958, Y. Miyatake leg.

Distribution : Japan (Tochigi Pref., Nagano Pref., Osaka Pref., Okayama Pref., Ehime Pref., Ooita Pref.).

Host plants : "Akigumi" — *Elaeagnus umbellata* Thunb. [Elaeagnaceae]. "Natsugumi" — *E. multiflora* Thunb. [Elaeagnaceae].

Differs from *Epitrioza mizuhonica* in being larger usually, in having forewing with Rs ending far from wing apex and M_{1+2} ending rather close to wing apex (both Rs and M_{1+2} ending close to wing apex in *mizuhonica*), male forceps more sinuate and parallel-margined with a blunt apex, and dorsal valve of female genitalia in lateral view strongly convex with an apical attenuate portion short and not upturned.

The specific name, *marginata* is based upon the character of a narrow and yellowish marginal band running along posterior margin of forewing.

Epitrioza yasumatsui sp. nov.

Color : General color light green or greenish brown to light brown. Antenna light green to light brown with IX brown and X black. Forewing transparent, with veins light green to light brown, without maculation. Overwintered form much darker, mostly reddish to dark brown. Thoracic dorsum with conspicuous stripes. Antenna with 1st and 9th segments brown and 10th segment black. Wing veins brown. Abdomen dark brown to black, with maculae of reddish brown.

Structure : Head (Fig. 1 - Y_1) small, slightly narrower than thorax, slightly deflexed ; vertex nearly quadrate, with posterior margin almost straight, longer than half as long as wide on median line, with each anterior margin produced forward, depressed a little posteriorly on each side of median line, without pubescence ; genal cones nearly vertical, short and broad, 2/3 as long as vertex, slightly divergent, with apex rounded or subacute, sparsely hairy. Antenna short, nearly 1.1 times as long as width of head including eyes, apex with 1 long and 1 short setae, relative length of each antennal segment as 3 : 3 : 12 : 5 : 4 : 4 : 4 : 4 : 3 : 3.

Thorax large and robust, strongly convex, without pubescence ; pronotum slightly narrower than head, almost vertical, produced laterally, praescutum strongly convex, usually distinctly

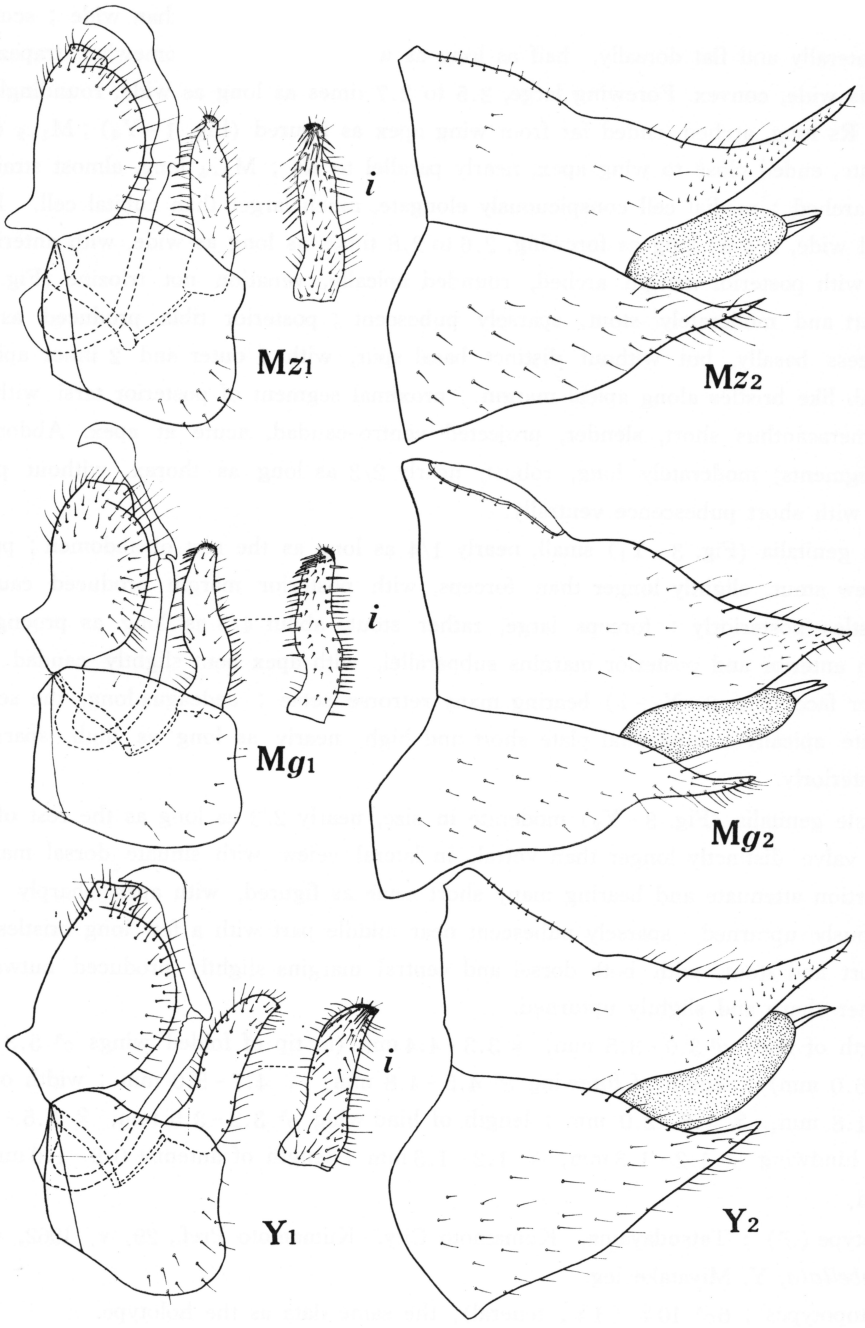

Fig. 3. Genitalias of *Epitrioza* spp. Mz, *E. mizuhonica* KUWAYAMA (1, Male, Tsuda ; 2, Female, Tsuda). Mg, *E. marginata* sp. nov. (1, Male, Mt. Kujuh ; 2, Female, Mt. Kujuh) ; Y, *E. yasumatsui* sp. nov. (1, Male, Sasayama ; 2, Female, Sasayama). (i ; inner face of male forceps).

higher than plane of pronotum, nearly as long as or slightly shorter than wide ; scutum large, convex laterally and flat dorsally, half as long as wide ; scutellum somewhat trapezoidal, 2/3 as long as wide, convex. Forewing large, 2.5 to 2.7 times as long as wide, roundingly angulate at apex ; Rs long, arched, ended far from wing apex as figured (Fig. 1 - Y_4) ; M_{1+2} quite long, not sinuate, ended close to wing apex, nearly parallel to Rs ; M_{3+4} long, almost straight ; Cu_1 strongly arched ; medial cell conspicuously elongate, much larger than cubital cell. Hind wing large and wide, 3/4 as long as forewing, 2.6 to 2.8 times as long as wide, with anterior margin sinuate, with posterior margin arched, rounded apically, venation not triozine (Fig. 1 - Y_5). Legs short and moderately stout, sparsely pubescent ; posterior tibia produced as a knob-like process basally, but without distinct basal spur, with 1 outer and 2 inner apical spurs, with comb-like bristles along apical margin ; proximal segment of posterior tarsi without apical spurs ; meracanthus short, slender, projected ventro-caudad, acute at apex. Abdomen (excl. genital segments) moderately long, robust, nearly 2/3 as long as thorax, without pubescence dorsally, with short pubescence ventrally.

Male genitalia (Fig. 3 - Y_1) small, nearly 1/4 as long as the rest of abdomen ; proctiger in lateral view stout, slightly longer than forceps, with posterior margin produced caudad, with long bristles posteriorly ; forceps large, rather stout, about 4/5 as long as proctiger, hairy, with both anterior and posterior margins subparallel, with apex bent slightly caudad and acute, with inner face (Fig. 3 - Y_1 - i) bearing many retrorse setae ; aedeagus long, the second segment acute apically ; subgenital plate short and high, nearly as long as high, sparsely pubescent posteriorly.

Female genitalia (Fig. 3 - Y_2) moderate in size, nearly 2/3 as long as the rest of abdomen ; dorsal valve distinctly longer than vntral, in lateral veiew with sinuate dorsal margin, with apical portion attenuate and bearing many short setae as figured, with apex sharply acute and conspicuously upturned, sparsely pubescent near middle part with a few long bristles ; ventral valve short and stout, with both dorsal and ventral margins slightly produced outwards, with apex rather sharp and slightly upturned.

Length of body ♂ 3.0 - 3.5 mm, ♀ 3.3 - 4.4 mm (to tip of folded wings ♂ 5.3 - 5.8 mm, ♀ 5.2 - 6.0 mm) ; length of forewing ♂ 4.5 - 4.8 mm, ♀ 4.7 - 5.0 mm ; width of forewing ♂ 1.6 - 1.8 mm, ♀ 1.8 - 2.0 mm ; length of hind wing ♂ 3.2 - 3.5 mm, ♀ 3.5 - 3.6 mm ; width of hindwing ♂ 1.2 - 1.3 mm, ♀ 1.2 - 1.3 mm ; length of antenna 0.9 - 1.0 mm, ♀ 0.9 - 1.0 mm.

Holotype (♂) : Tatsudayama, Kumamoto City, Kumamoto Pref., 29. v. 1962, on *Elaeagnus umbellata,* Y. Miyatake leg.

Paratopotypes ; 6♂ 10♀ (1♀, teneral), the same data as the holotype.

Paratypes ; 3♀, Sasaguchi-hama, Nakajyo-machi, Kitakanbara-gun, Niigata Pref., 7. vii. 1966, K. Baba leg. 1♂, Kanemata, Myokokogen-cho, Nakakubiki-gun, Niigata Pref., 23. vi. 1972, on *E. umbellata,* Y. Miyatake leg. 2♂ 2♀ (teneral), nymphs, Kamiyama, Nojiri Lake,

Kashiwabara, Shinano-cho, Kamiminochi-gun, Nagano Pref., 22. vi. 1972, on *E. umbellata,* Y. Miyatake leg. 4♂ 5♀ (overwintered form), Amarizawa, Yamanashi Pref., 8. iv. 1959, on *E. umbellata,* T. Saigusa leg. 1♂ (overw. f.), Sagami-hakusan, Kanagawa Pref., 6. iv. 1951, M. Takahashi leg. 1♀, Tennô, Nose-cho, Osaka Pref., 16. xii. 1970, sweeping (*Cryptomeria japonica*), Y. Miyatake leg. 4♂ 11♀ (1♂ 6♀, teneral), 8. vi. 1967 ; 3♂ 4♀, nymphs, 19. vi. 1967 ; 2♂ 3♀ (overw. f.) 1. iv. 1968 ; Hatsutani, Nose, Osaka Pref., on *E. umbellata.* 2♂ 2♀ (overw. f.), Ichinotorii - Yoshikawa, Nose, Hyogo Pref. ~ Osaka Pref., 19. iv. 1968, on *E. umbellata,* Y. Miyatake leg. 1♀ (overw. f.), 1. v. 1968 ; 2♂ 3♀ (overw. f.), 29. iv. 1969 ; Mt. Kongo, Osaka Pref., on *E. umbellata,* 1♀, Kurondo-ike, Katano C., Osaka Pref., 11. iv. 1969, on *E. umbellata,* Y. Miyatake leg. 9♂ 9♀ (overw. f., 1♂ 2♀ on slides), Sasayama, Tanba, Hyogo Pref., 20. iv. 1963, T. Naito leg. 2♂ 1♀ (overw. f.), Tsurugamine, Zentsuji C., Kagawa Pref., 3. i. 1959, Y. Miyatake leg. 1♂ 1♀ (overw. f.), Kochi City, 1. iv. 1963, T. Naito leg. 1♀, Mt. Kuroson, Tsudai-mura, Hata-gun, Kochi Pref., 16. vii. 1953, T. Edashige leg. 1♂, Kashima Is., Hôjyo C., Ehime Pref., 7. vii. 1968, on *E. umbellata,* Y. Miyatake leg. 3♂ 1♀ (overw. f.), Tsuda, nr Kokura, Fukuoka Pref., 22. iii. 1958, on *E. multiflora,* Y. Miyatake leg. 1♂, on *E. multiflora,* 31. v. 1958 ; 1♂, on *E. umbellata,* 4. vi. 1958 ; 4♂ (overw. f.), on *E. umbellata,* 18. ii. 1959 ; 1♂ 3♀, on *E. umbellata,* 1. vi. 1959 ; Mt. Tachibana, Fukuoka City, Y. Miyatake leg. 1♂ 2♀ (overw. f.), on *E. umbellata,* 5. iv. 1958, Y. Miyatake leg. ; 1♀ (overw. f.), on *E. umbellata,* 1. iv. 1959, Y. Miyatake leg. ; 2♂ 1♀ (overw. f.), 8. v. 1963, A. Nakanishi leg. ; Mt. Wakasugi, nr Fukuoka City. 1♀, Mt. Hôman, Fukuoka Pref., 13. vii. 1959, Y. Miyatake leg. 1♀, Innaki, Fukuoka Pref., 19. vi. 1957, M. Sonda leg. 2♂ (teneral) 1♀, Mt. Kanayama, Fukuoka Pref., 15. vi. 1958, on *E. umbellata,* Y. Miyatake leg. 2♂ 3♀ (overw. f.), Kugino, Aso Nat. Park, Kumamoto Pref., 28. iii. 1960, on *E. umbellata,* Y. Miyatake leg. 1♂ 2♀ (overw. f.), Makiguchi, Ooita Pref., 21. iii. 1958, on *E. umbellata,* Y. Miyatake leg. 1♂ 1♀, Uearata, Kagoshima City, 4. vi. 1966, on *E. umbellata,* Y. Miyatake leg. 1♀ (overw. f.), Nagasakibana, Satsuma Pen., Kagoshima Pref., 29. iii. 1957, M. Sonda leg. 1♀ (overw. f.), Cape Sata, Kagoshima Pref., 16. iv. 1963, A. Kato leg. 14♂ 14♀, Torii, Upper Ikawa River, Kishuku-cho, Fukue Is., Goto Islands, Nagasaki Pref., 7. vi. 1969, on *Elaeagnus* sp., I. Hiura leg. 15♂ 20♀ (2♂ 7♀ teneral, 1♂ 1♀ on slides), Ohfunakoshi, Mizushima-cho, Tsushima Is., 12. vi. 1975, on *E. umbellata,* Y. Miyatake leg.

Distribution : Japan (Niigata Pref., Yamanashi Pref., Nagano Pref., Kanagawa Pref., Osaka Pref., Hyogo Pref., Kagawa Pref., Kochi Pref., Ehime Pref., Fukuoka Pref., Kumamoto Pref., Ooita Pref., Kagoshima Pref., Goto Is., Tsushima Is.).

Host plants : "Akigumi" — *Elaeagnus umbellata* Thunb. 〔Elaeagnaceae〕. "Natsugumi"— *E. multiflora* Thunb. 〔Elaeagnaceae〕.

Differs from *Epitrioza mizuhonica* in being usually larger, in having forewing with Rs ending far from wing apex and M_{1+2} ending very close to wing apex, stouter male forceps

with an acute apex curved caudad, and dorsal valve of female genitalia with attenuate apical portion shorter. Differs from *E. marginata* in wanting of yellowish marginal band of forewing which runs along posterior margin, and in having forewing with both Rs and M_{1+2} being parallel to each other and ending closer to wing apex (Fig. 1-Y_4), male forceps with an acute apex curved caudad, and dorsal valve of female genitalia with attenuate apical portion much longer and distinctly upturned.

The specific name is dedicated to Prof. Keizo Yasumatsu, the former professor of the Entomological Laboratory, Faculty of Agriculture, Kyushu University, who gave me guidance in the course of taxonomical and biological study upon which the present paper is based.

Fifth instar nymph

Generally the fifth (last) instar nymph of *Epitrioza* is rather typical triozine form and flat. Antennae are short and 3-segmented, with 2 apical setae. Wing pads are developed and distinctly divided into forewing and hind wing. Legs are moderately stout and capable of walking, with the proximal segment of tarsi which is not yet segmented from tibia making a tibio-tarsus. Entire margin is closely set with a continuous series of sectasetae, which are rather long on head and abdomen and rather short on wing pads. Anal opening is set rather close to the apex of abdomen on ventral side and surrounded with a large circum-anal pore ring.

As for the fifth instar concerned, three species are rather easily distinguished in size, shape, color, and many structures as shown in Table 1 and Fig. 4. As earlier stages are not yet completely clarified, description of those stages will be given in the further report. Wax secretion from marginal sectasetae is remarkable in *mizuhonica* and *marginata,* and weak in *yasumatsui.*

General biology

Three species of *Epitrioza* have similar life history generally. They have only one generation per year. Adults begin to appear from late in May to middle of June, and pass the whole summer and winter in the adult stage sometimes on the host tree in case of being evergreen, or more frequently on the different evergreen tree rather than the host plant. Copulation does not occur before migration, nor during aestivation and hibernation.

From the end of winter to the beginning of spring, namely from the latter part of February to the middle of March, overwintered adults return to the host plant one by one and make a mass of considerable number of males and females. They start to copulate for the first time since their emergence. Form of copulating appears to be "keeping side by side" style usually.

Females start to lay eggs from the end of February or the beginning of March, continuously till the beginning of April. It seems that the start of ovipositing is earlier in the

lowland and later in the mountainous region. As shown in Fig. 5, each egg is laid on underside of closed or opened leaves amongst stellate scales, one by one in most of cases (Fig. 5-2) or in two together (Fig. 5-3) sometimes. One female appears to lay a little more than 50 eggs according to the dissecting data. The period of incubation is not clear, butthe first instar may begin to hatch from early in March to the beginning of April. Subsequent stages are not completely clarified. Anyway, nymphs come to matured by the middle or the end of May. There seems to be five nymphal instars distinguishable by body size and the shape of wing pads as in another triozine psyllids.

In *Ep. mizuhonica,* soon after feeding starts on under surface, infested part of leaf becomes a fold gall (Fig. 6-1～3) or a roll gall (Fig.6-4～5). Usually several nymphs are living in one gall together, and settle inside throughout their nymphal stages without moving out. When development is complete the fifth instar nymph leaves a gall and settles down in an exposed

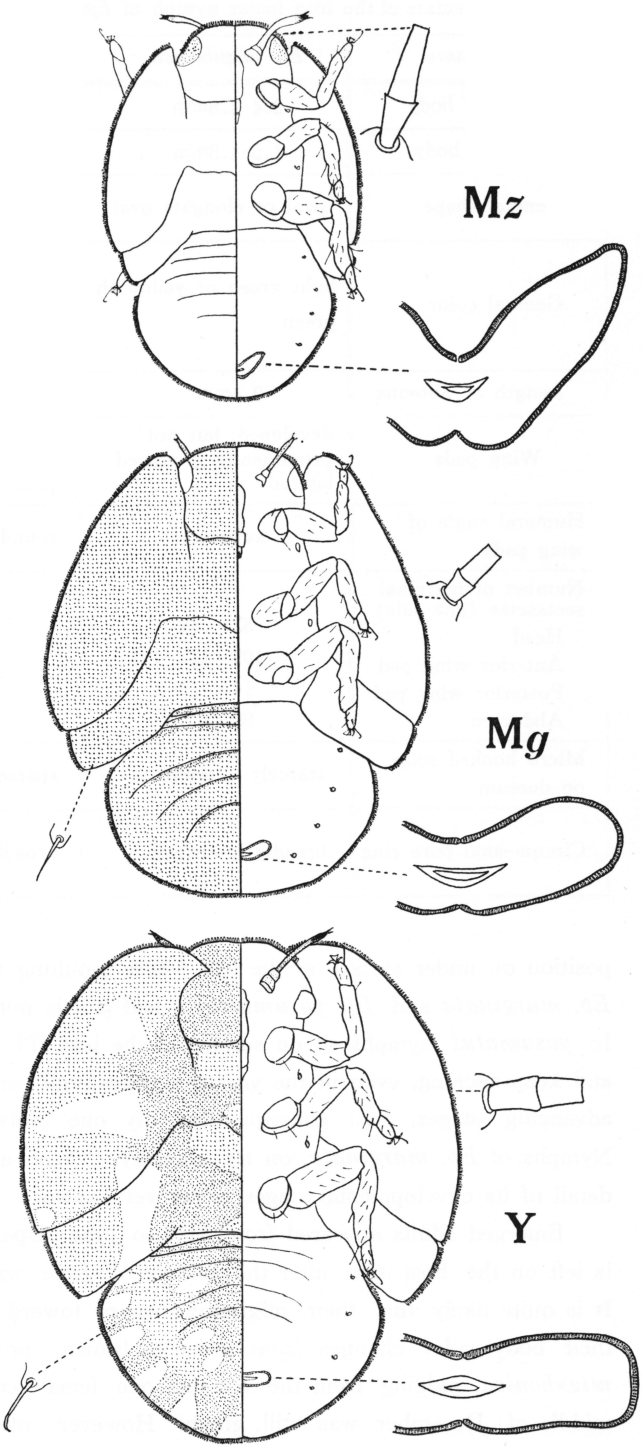

Fig. 4. The fifth instars of *Epitrioza* spp. Mz, *Epitrioza mizuhonica*, Mt. Homan ; Mg, *E. marginata*, Onbara ; Y, *E. yasumatsui*, Teragaike. (×20)

Table 1. Characters of the fifth instar nymph of *Epitrioza mizuhonica*, *E. marginata* and *E. yasumatsui*.

Characters	*Ep. mizuhonica*	*Ep. marginata*	*Ep. yasumatsui*
Length of body	2.4-2.8mm	2.9-3.1mm	3.2-3.5mm
Width of body	1.5-1.8mm	2.3-2.6mm	2.7-3.1mm
General shape	oval or elongate oval	reverse-pentagonal or subcircular	circular
General color	light green or yellowish green	light brown	brown to dark brown, with irregular markings of white or light brown dorsally
Length of antenna	0.4mm	0.5mm	0.5-0.6mm
Wing pads	developed, but not prominently produced laterad	prominently produced laterad, especially posteriorly	whole part prominently produced laterad
Humeral angle of wing pads	subacute	roundingly angulate	distinctly acute and bent inwards
Number of marginal sectasetae (one side)			
Head	33 - 38	37 - 41	23 - 28
Anterior wing pad	109 - 123	156 - 162	161 - 181
Posterior wing pad	14 - 19	26 - 28	24 - 33
Abdomen	95 - 105	118 - 121	106 - 113
Micro hooked setae on dorsum	scarcely present	sparsely present	densely present
Circum-anal pore ring	broadly V-shaped	broadly ⌣-shaped	rather rectangular, with sides not produced cephalad

position on under surface of the leaf where moulting to the adult stage occurs (Pl. 10-7). In *Ep. marginata* and *Ep. yasumatsui* a leaf gall is not at all formed by infestation of nymphs. In *yasumatui* nymphs sit on surface of the leaf (Pl. 10-9) usually (scarcely on undersurface) and keep sucking, even in the younger stages, and can move freely. They tend to scatter with advancing stages, and consequently only one individual is left per leaf in the fifth instar. Nymphs of *Ep. marginata,* on the contrary, live on undersurface of the leaf usually. However, detail of its developmental stages is not yet known.

Emerged adults appeared from May to June disperse rather quickly and no more individual is left on the host tree after the middle of June with some exceptions as mentioned above. It is quite likely that their migration occurs toward the higher altitude. During hibernation their body color changes from green to brown, probably in late winter or early spring in *mizuhonica,* judging from the fact that one female collected at Nose-cho, Osaka Pref. in the middle of December was still green. However, one female of *marginata* collected at Mt.

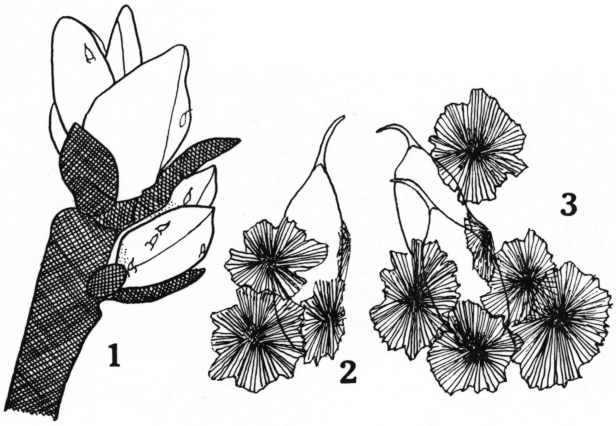

Fig. 5. Eggs of *Epitrioza mizuhonica* KUWAYAMA. 1, Eggs laid undersurface of young leave of *Elaeagnus umbellata*; 2, One egg covered with stellate scales; 3, Two eggs laid together amongst stellate scales.

Saragamine (alt. 1,270m), Ehime Pref. the middle of October was already light brown. It may depend on the environment of hibernation.

Consideration

Among three species of *Epitrioza, mizuhonica* is the most widely distributed one in Japan (Fig. 7) and common from the lowland to the high mountain. The other species, *yasumatsui* and *marginata* are not known from Hokkaido and the northern Honshu (Fig. 7). The former is common in the lowland or the coastal environments and the latter is restricted to the mountainous environments. Considering from inhabiting preference, *mizuhonica* should be the species which is adapted to both the warm temperate and the temperate zones. And, *yasumatsui* is the species of the warm temperate zone and *marginata* is the species of the

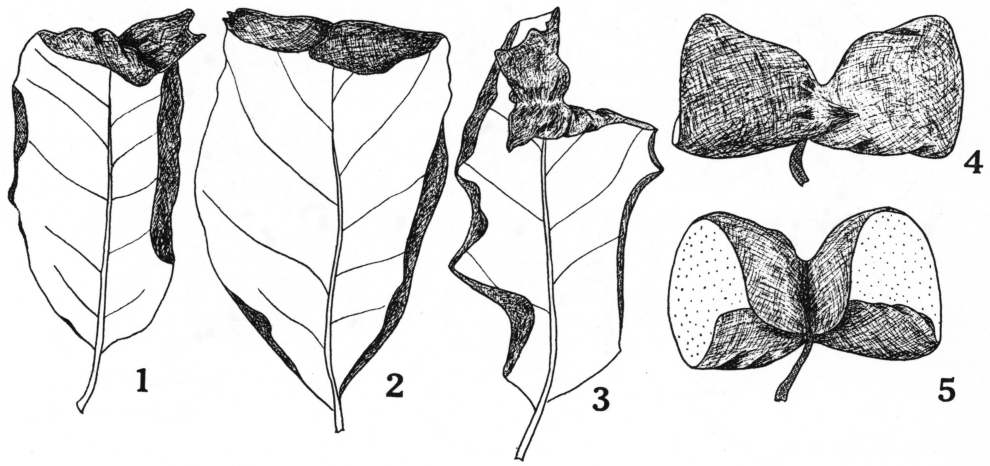

Fig. 6. Various types of galls formed by nymphs of *Epitrioza mizuhonica* KUWAYAMA. 1~3, Leaf fold galls on *Elaeagnus umbellata*; 4~5, Leaf roll gall on *E. pungens*.

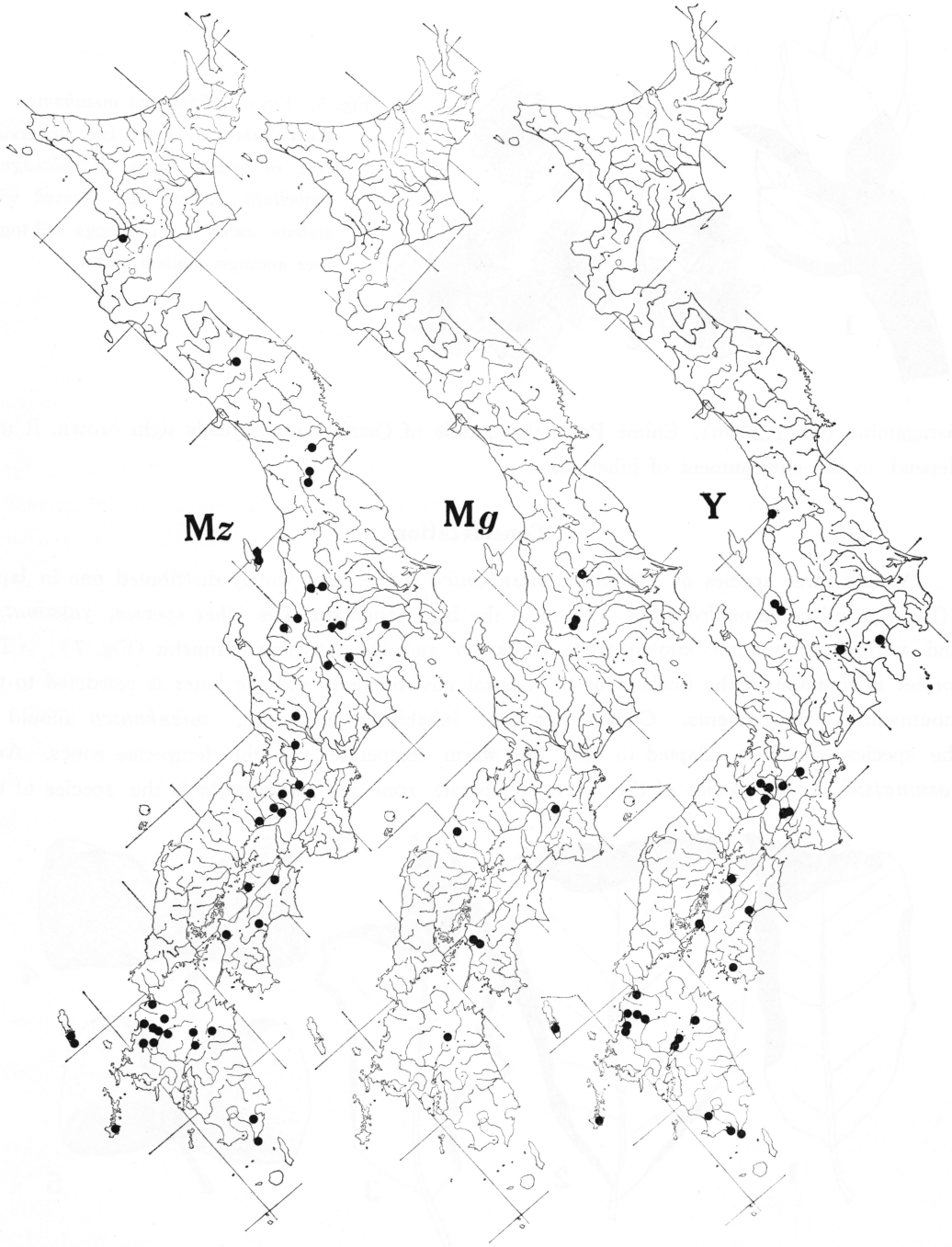

Fig. 7. Collecting localities of *Epitrioza mizuhonica* (Mz), *E. marginata* (Mg) and *E. yasumatsui* (Y).

temperate zone. As a consequence, *mizuhonica* and *yasumatsui* or *mizuhonica* and *marginata* are found from the same locality, even on the same host tree, but *yasumatsui* and *marginata* have never been found at the same place.

From the zoogeographical viewpoint, the genus *Epitrioza* represented by three related species is endemic to Japan so far. The close relatives are not yet known from the continental part of E. Asia. Threfore, it is possibly considered that speciation of three species of *Epitrioza* occured in Japan from the present knowledge. It is still difficult to tell what species they are derived from, but it is merely certain that among the known psyllids they are more or less related to *Trioza elaeagni* and *T. magnisetosa* known from Europe in genital charcters, especially of female, and the host association. With further informations this matter should be discussed again, however.

Among three species of *Epitrioza,* they are quite similar to each other both in morphological characters and biologically. In the life form of the developmental stage, a gall making species, *mizuhonica* is rather basemental or typical in the triozine psyllid, and free-living species, *yasumatsui* and *marginata* are more advanced. In the venational characters of forewing, *mizuhonica* and *marginata* are rather similar in general sense, and *yasumatsui* is more or less different. In genital characters of male, *mizuhonica* and *marginata* are basementally similar, especially in shape of forceps, and *yasumatsui* is rather modified. In genital characters of female, *mizuhonica* and *yasumatsui* resemble in shape of the attenuate apical portion of dorsal valve, and *marginata* is quite different. In the form or characters of the fifth instar, *mizuhonica* is typical of the group and *yasumatsui* is most advanced, and *marginata* is intermediate. In conclusion, it appears that both *marginata* and *yasumatsui* were derived from *mizuhonica* respectively. The form which were free from gall living in *mizuhonica* and advanced into free living on the surface of leaf in the lowland seemed to become *yasumatsui,* and such form of *mizuhonica* which advanced into free living on undersurface of leaf in temperate zone or up the mountain seemed to become *marginata.*

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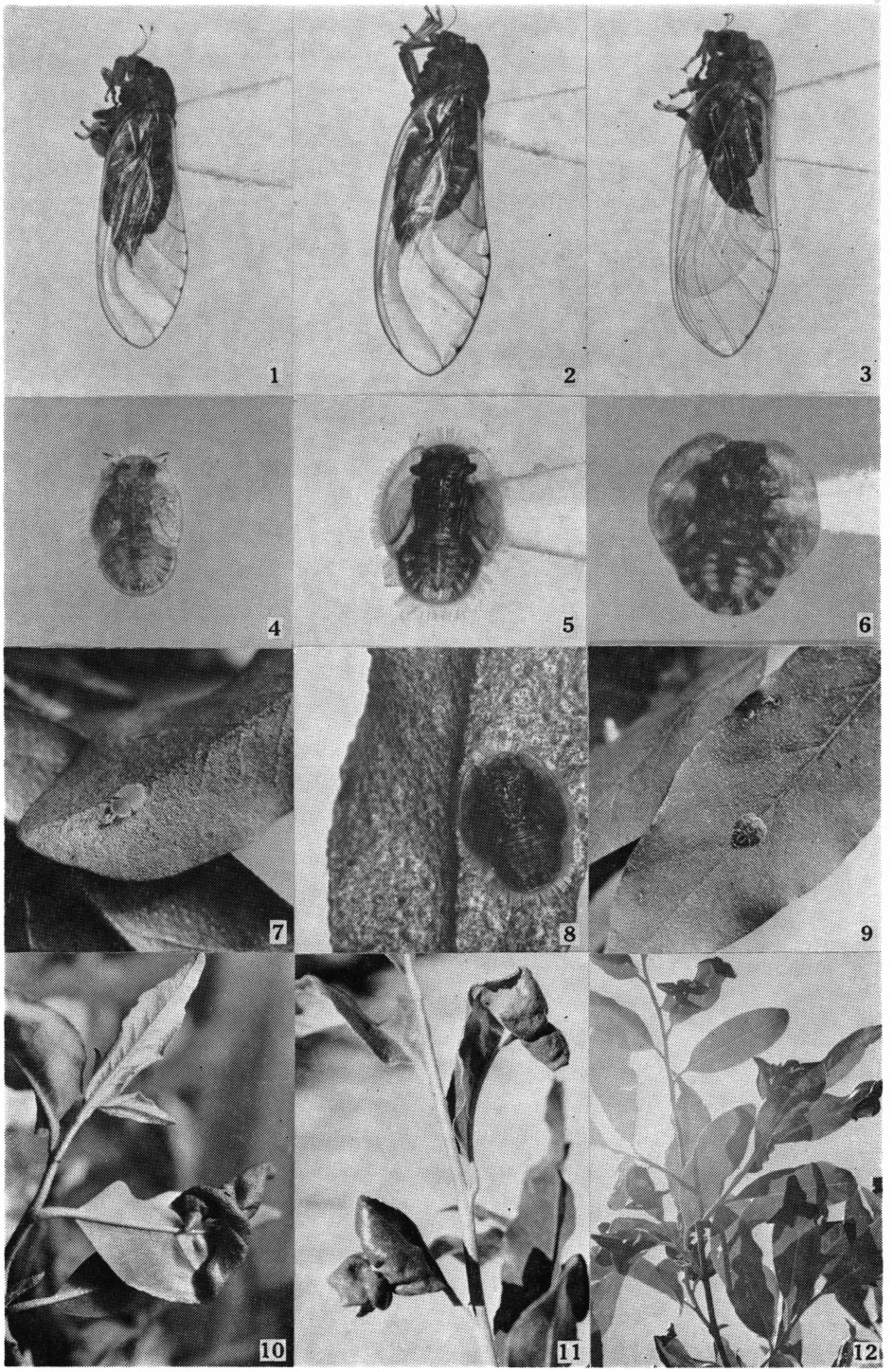
Explanation of Plate 10

1. *Epitrioza mizuhonica* KUWAYAMA, ♀. Ohfunakoshi, Mizushima-cho, Tsushima Is., 12. vi. 1975, gall on *Elaeagnus umbellata.* ×8.2
2. *Ep. marginata* sp. nov., ♀. Kutsukake, Karuizawa-cho, Nagano Pref., 9. vii. 1966, on *El. umbellata.* ×8.2
3. *Ep. yasumatsui* sp. nov., ♀. Ohfunakoshi, Mizushima-cho, Tsushima Is., 12. vi. 1975, on *El. umbellata.* ×8.2
4. Fifth instar of *Ep. mizuhonica.* Hatsutani, Nose, Osaka Pref., 16.vi.1968,on *El. pungens.* ×7.5
5. Fifth instar of *Ep. marginata.* Onbara Lake, Kamisaibara-cho, Tomata-gun, Okayama Pref., 5. vi. 1973, on *El. umbellata.* ×7.3
6. Fifth instar of *Ep. yasumatsui.* Tatsudayama, Kumamoto City, 29. v. 1962, on *El. umbellata.* ×7.5
7. Fifth instar of *Ep. mizuhonica* crawled out from gall for emergence. Funasaka, Yamaguchi-cho, Nishinomiya City, Hyogo Pref., 5. vi. 1972, on *El. umbellata.* ×2.1
8. Fifth instar of *Ep. marginata* on the under surface of a leaf. Onbara Lake, Okayama Pref., 5. vi. 1973, on *El. umbellata.* ×7.3
9. Fifth instar of *Ep. yasumatsui* on the surface of a leaf. Funasaka, Nishinomiya City, 5. vi. 1972, on *El. umbellata.* ×1.5
10. Gall of *Ep. mizuhonica* on *El. umbellata.* Funasaka, Nishinomiya City, 5. vi. 1972.

11-12. Galls of *Ep. mizuhonica* on *El. umbellata.* Hatsutani, Nose, Osaka Pref., 8. vi. 1967.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