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The Genus *Helcystogramma* (Lepidoptera, Gelechiidae) of Japan

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Abstract The Japanese species of the genus *Helcystogramma* are revised. One new species, *H. fuscomarginatum,* and two known species, *H. triannulella macroscopum* (MEYRICK) and *H. arotraeum* (MEYRICK), are described or redescribed, with illustrations of moths, wing venation and genitalia.

Key words: Gelechiidae; Dichomeridinae; *Helcystogramma;* new species; Japan.

The genus *Helcystogramma* ZELLER, 1877 is belonging to the subfamily Dichomeridinae, containing at least 75 species and the genus is distributed throughout the world, excluding New Zealand and Hawaii (HODGES, 1986).

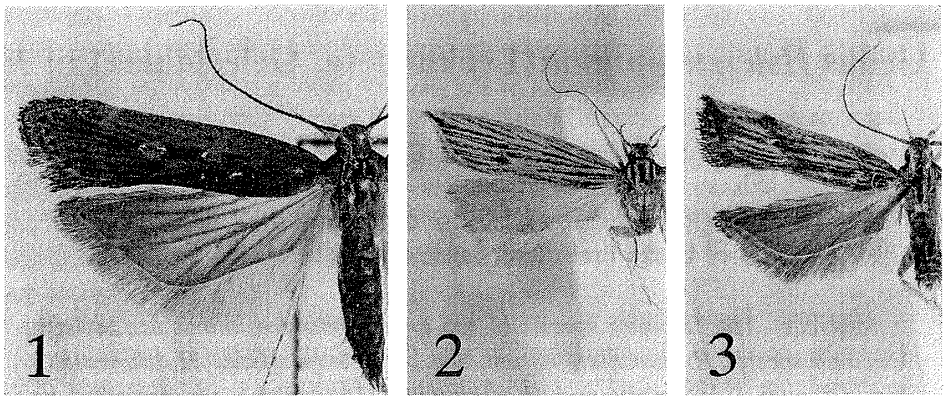
Three Japanese species, *H. triannulella macroscopum* (MEYRICK), *H. arotraeum* (MEYRICK) and *H. fuscomarginatum* sp. nov., are dealt with in this paper. A character is added to the generic definition given by HODGES (1986) based on the structure of the eighth abdominal tergite of the genus and allies.

Holotype and most of the materials used in this work are preserved in the collection of Entomological Laboratory, University of Osaka Prefecture. The following abbreviations are used for collections:
HU: Laboratory of Systematic Entomology, Hokkaido University, Sapporo.
OMNH: Osaka Museum of Natural History, Osaka.
UOP: Entomological Laboratory, University of Osaka Prefecture, Sakai.

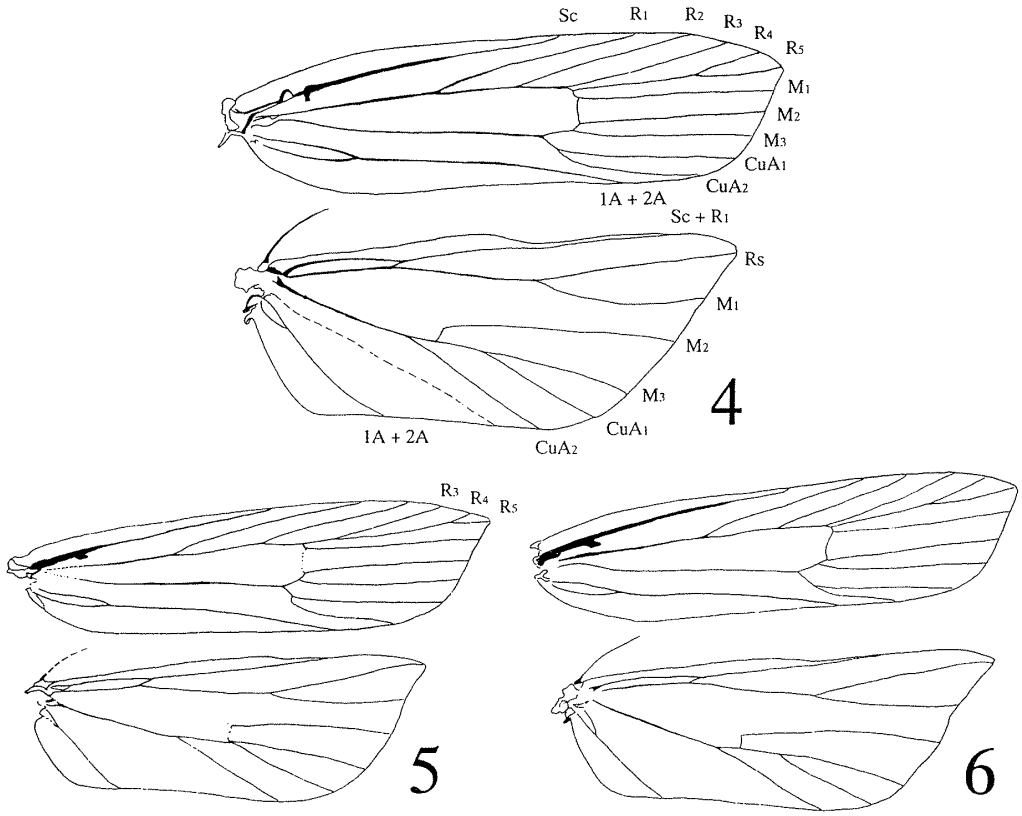
Before going further, I wish to express my cordial thanks to Prof. T. YASUDA, Assoc. Prof. S. MORIUTI, Dr. M. ISHII and Dr. T. HIROWATAI (UOP) for their encouragement, continuous direction and kind advice. I am indebted to the following entomologists for the gift or loan of the materials: Prof. T. KUNMATA and Mr. Y. SAKAMAKI (HU), Mr. I. KANAZAWA (OMNH), Dr. F. KOMAI of Osaka University of Arts, Dr. Y. NASU of the Osaka Plant Protection Office, Dr. Y. S. BAE (UOP), Mr. T. KADOHARA of Kankyo Kagaku , Mr. T. MARO of Aichi Pref. and Dr. K. YASUDA of Japan International Research Center for Agricultural Sciences. I am especially obliged to Dr. K. T. PARK for his helpful suggestions.

Genus *Helcystogramma* ZELLER, 1877

Ceratophora HEINEMANN, 1870, Schmett. Dtl. Schweiz, (2) **2** (1): 325 (nom. praeocc.). Type-



Figs. 1–3. Adults. —— 1, *Helcystogramma triannulella macroscopum* (MEYRICK), ♂; 2, *Helcystogramma arotraeum* (MEYRICK), ♂; 3, *Helcystogramma fuscomarginatum* sp. n., ♂, Holotype.



Figs. 4–6. Wing venations. —— 4, *Helcystogramma triannulella macroscopum* (MEYRICK), ♂; 5, *Helcystogramma arotraeum* (MEYRICK), ♂; 6, *Helcystogramma fuscomarginatum* sp. n., ♂.

species: *Recurvaria rufescens* HAWORTH, 1828, designated by WALSINGHAM (1911), Biologia cent.-am., Zool., Lepid.-Heterocera, **4**: 84. *Ceratophora* HEINEMANN, 1870 isajunior homonym of *Ceratophora* GRAY, [1832–35] (Reptilia).

Helcystogramma ZELLER, 1877, Horae Soc. Ent. Ross., **13**: 369. Type species: [*Gelechia hibisci*

STAINTON, 1859=] *Gelechia* (*Helcystogramma*) *obseratella* ZELLER, 1877, designation by MEYRICK, 1910, Ent. Mon. Mag., **46**: 282.

Teuchophanes MEYRICK, 1914, Trans. ent. Soc. Lond., **1914**: 274. Type species: [*Dichomeris luminosa* BUSCK, 1914=] *Teuchophanes leucopleura* MEYRICK, 1914, monotypy.

Psamathoscopa MEYRICK, 1937, Exot. Microlepidopt., **5**: 96. Type species: *Onebara simplex* WALSINGHAM, 1900, monotypy.

The genus *Helcystogramma* is assigned to the subfamily Dichomeridinae, which is considered a monophyletic group by the sharing two synapomorphies, *i. e.,* the presence of the secondary bursa in the female genitalia and the shape of the abdominal support structure on the second sternite (SATTLER, 1979; HODGES, 1986).

The following diagnoses of the genus acceptably include those given by HODGES (1986): eighth abdominal tergite well sclerotized, the anterior margin being strongly concave; gnathos long and strongly sclerotized, hook-shaped; valva with lobe on base of saccular region; vinculum with paired sclerotized lobes arising from lateral arms, the apices being swollen and the inner margin being heart-shaped; saccal region slightly acute; aedeagus with basal half inflated, oval and weakly sclerotized; dorsal wall of antrum sclerotized with a pair of triangular plates, set with many minute spines; ductus seminalis arising from right posterior of corpus bursae; corpus bursae with slightly sclerotized portion at junction of ductus seminalis.

As regards the eighth abdominal tergite, MORIUTI (1982) illustrated that of *H. triannulella macroscopum.* The well–sclerotized tergite is recognized in all Japanese *Helcystogramma,* many *Dichomeris* and *Brachmia dimidiella* [DENIS & SCHIFFERMÜLLER]. Japanese *Dichomeris* species that I have been able to examine have the tergite with more or less concave anterior margin, however, some species of *Dichomeris* have weakly sclerotized tergite and in *B. dimidiella,* the anterior margin is straight. So I consider the well-sclerotized tergite with the concave anterior margin to be one of the possible apomorphies of *Helcystogramma.*

Key to Japanese Species of *Helcystogramma*

External characters

1. Forewing veins streaked with pale fuscous; length of forewing 7 mm or less (Figs. 2, 3) 2
— Forewing veins not streaked; length of forewing 7 mm or more (Fig. 1) ..... *triannulella macroscopum* (MEYRICK)
2. Forewing termen margined with fuscous (Fig. 3) ..... *fuscomarginatum* sp. nov.
— Forewing termen not margined (Fig. 2) ..... *arotraeum* (MEYRICK)

Male genitalia

1. Appendix appendicular well developed and strongly sclerotized; aedeagus with a large strongly sclerotized process on left side at middle (Fig. 9) ..... *fuscomarginatum* sp. nov.
— Appendix appendicular moderate; aedeagus without such a process (Figs. 7, 8) 2
2. Valva constricted at middle; uncus with posterior margin rounded (Fig. 8) ..... *arotraeum* (MAYRICK)
— Valva not constricted; uncus with posterior margin slightly angled at middle (Fig. 7) ..... *triannulella macroscopum* (MEYRICK)

Female genitalia

1. Ductus bursae with strongly sclerotized portion (Fig. 9) ..... *fuscomarginatum* sp. nov.
— Ductus bursae without strongly sclerotized portion (Figs. 7, 8) 2
2. Corpus bursae with many minute spines (Fig. 8) ..... *arotraeum* (MEYRICK)
— Corpus bursae with no spines (Fig. 7) ..... *triannulella macroscopum* (MEYRICK)

Helcystogramma triannulella macroscopum (MEYRICK, 1932)

(Figs. 1, 4, 7)

Anacampsis triannulella HERRICH-SCHÄFFER, 1854, Schmett. Eur., **5**: 201, fig. 458.
Gelechia triannulella: RÖSSLER, 1863, Wein. Ent. Mon., **7**: 131.
Ceratophora triannulella: HEINEMANN, 1870, Schmett. Deutshl., **2**, 1: 320.
Brachmia triannulella: MEYRICK, Gen. Ins., **184**: 248.; GERASIMOV, 1930, D. Ent. Z. Iris, **44**: 135, fig. 3.; MATSUMURA, 1931, 6000 Illust. Insects Japan-Empire: 1082, fig. 2201.; GAEDE, 1937, Lep. Cat., **79**: 545.; KUROKO, 1962, Kontyu, **30**: 159.; SAITO, 1969, Early Stages Japan. Moths Col., **2**: 111, pl. 54, fig. 214.
Brachmia macroscopa MEYRICK, 1932, Exot. Microl., **4**: 206.; GAEDE, 1937, Lep. Cat., **79**: 541.; ISSIKI, 1950, Icon. Ins. Japon., **1**: 463, fig. 1253.; INOUE, 1954, Check List Lep. Japan, **1**: 72.; OKANO, 1959, Icon. Ins. Japon. Col. Nat., **1**: 271, pl. 180, fig. 5.; ISSIKI, 1959, Illust. Ins. Larvae Japan: 170, fig. 1253.; CLARKE, 1969: 366, pl. 182, fig. 1.; ISSIKI, 1971, Icon. Het. Japon. Col. Nat. Revised New edit.: 39, pl. 5, fig. 162.
Brachmia triannulella macroscopa: MORIUTI, 1982: 287, pl. 13, fig. 46, pl. 243, fig. 8, pl. 259, fig. 1.
Helcystogramma trianulella [!]: HODGES, 1986: 123.
Helcystogramma macroscopum: HODGES, 1986: 123.

Forewing length: 7.4–9.0 mm.

Head fuscous; face and orbit above eye whitish-ocherous. Antenna fuscous. Labial palpus with second segment fuscous outwardly, scattered with

whitish-ocherous and whitish-ocherous inwardly, irrorated with fuscous; third segment fuscous except at whitish-ocherous apex. Thorax and tegula dark fuscous. Legs ocherous, strongly irrorated with fuscous. Forewing elongate; R_3 not stalked with R_{4+5}; fuscous; dorsal half from base to end of cell dark fuscous; veins obscurely marked with dark fuscous; first discal stigma oval, ocherous, situated at two-fifths, distally edged with white scales; second discal stigma oval, ocherous, at three-fifths, edged anteriorly and posteriorly with whitish scales; plical stigma beneath the first, forming a blackish longitudinal bar; several blackish dots along termen including apex; cilia fuscous with whitish basal and apical lines. Hindwing pale brownish-gray; veins suffused with pale fuscous; cilia pale fuscous, tipped with white; extreme base buff. Abdomen fuscous, scattered with ocherous.

Male genitalia: Eighth abdominal tergite cordate. Uncus with about one-fourth length of valva, narrowest at anterior one-fourth, widest at posterior one-fourth; posterior margin slightly angled at middle. Tegumen broad, with anterior margin considerably concave. Valva moderate, with length about five times as large as width. Vinculum with acute apical lobe. Aedeagus hook-shaped at apex.

Female genitalia: Apophysis posterioris about four times as long as apophysis anterioris. Anterior margin of eighth abdominal tergite broadly concave. Ductus bursae with a pair of slightly sclerotized plates at posterior angles. Corpus bursae oblong; signum situated at anterior one-seventh, forming a suboval plate, armed with spinules; accessory bursa arising nearly from signum, about four-sevenths times the length of corpus bursae.

Material examined. Honshu: 1♂, Gozaisho, Mie Pref., 21. X. 1966, T. KUMATA, HU.; 1♀, Takatsuki, Osaka Pref., 5. III. 1948, S. ITO, UOP.; 1♂, Ikeda, Osaka Pref., 9. III. 1948, S. ITO, UOP.; 1♂, same locality, 13. IV. 1951, A. MUTUURA, UOP.; 1♀, Sonenji, Osaka Pref., 19. V. 1993, T. UEDA, UOP.; 1♂, Matsubara City, Osaka Pref., 7. IV. 1981, E. NISHIDA, UOP.; 7♂, 1♀, Univ. Osaka Pref., Osaka Pref., emerged 26–31. VII. 1991, T. UEDA, UOP.; 1♀, Sakai, Osaka Pref., 12. V. 1955, K. YANO, UOP.; 1♀, same locality, 23. V. 1979, Y. NASU, UOP.; 6♂, 3♀, Yamatetyô, Osaka Pref., 3. VII. 1978–1. VIII. 1978, S. MORIUTI, UOP.; 1♂, 1♀, Tondabayashi City, Osaka Pref., emerged 10–17. VII. 1991, S. MORIUTI, UOP.; 1♀, Yashiro, Hyogo Pref., 30. VII. 1991, T. UEDA, UOP. Kyushu: 1♂, Kounominato, Fukuoka Pref., 3–4. VIII. 1991, T. HIROWATARI, UOP.; 1♀, Onoaida, Yakushima Is., Kagoshima Pref., 19. IX. 1978, S. MORIUTI, UOP.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu, Ryukyus), Taiwan, Korea, China, India.

Host plants. Ipomoea batatas L. and *Calystegia* spp. (Convolvulaceae).

Remarks. This species is well known as a pest of sweet potato, and has

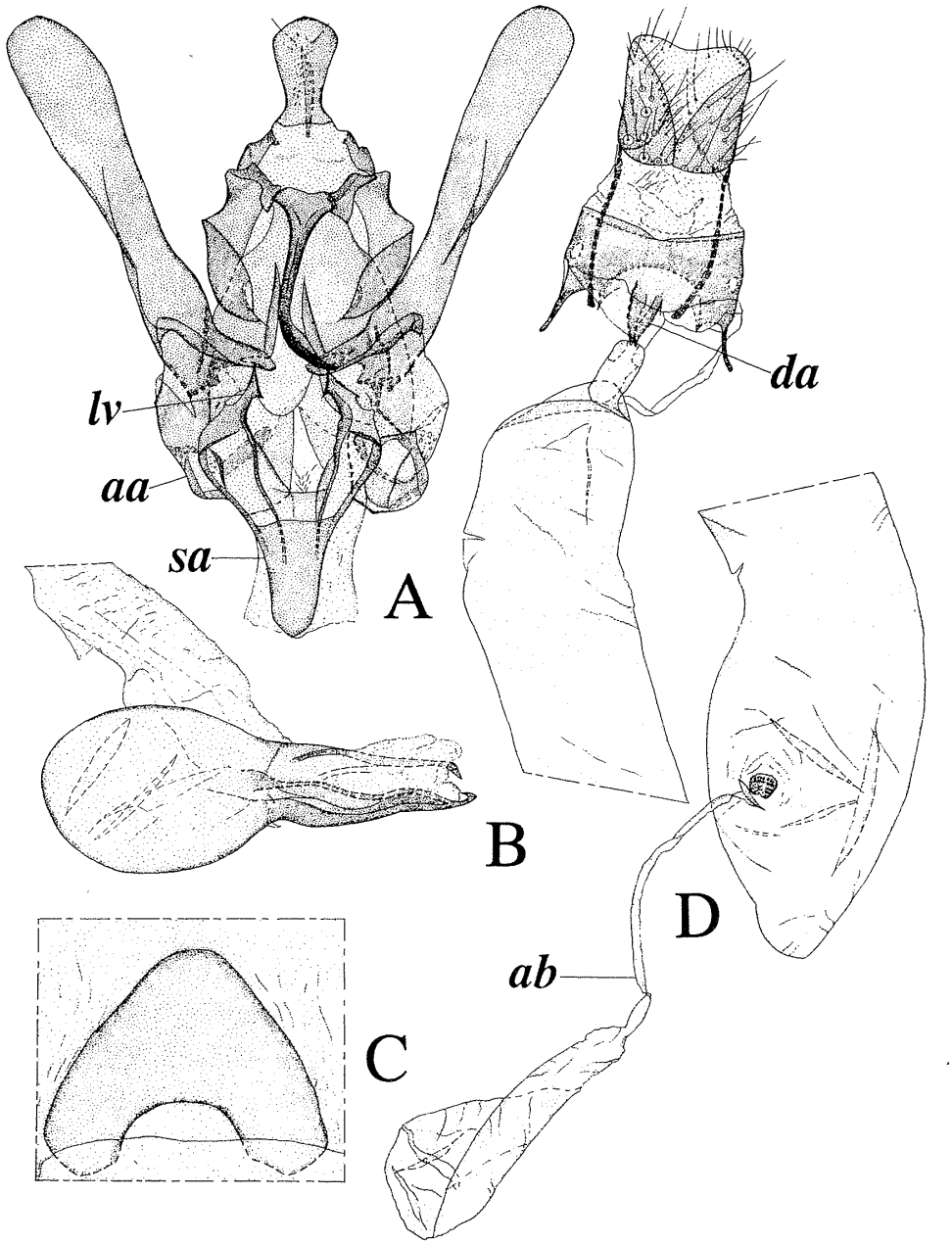


Fig. 7. *Helcystogramma triannulella macroscopum* (MEYRICK)—— A, Male genitalia; B, aedeagus; C, eighth tergite; D, female genitalia.
aa: appendix appendicular, ab: accessory bursa, da: dorsal wall of antrum, lv: lobe of vinculum, sa: saccal region.

hitherto appeared in the Japanese literature as *Brachmia macroscopa* MEYRICK or *B. triannulella macroscopa* MEYRICK. In the above literature citations, references to only taxonomic works are included. The larvae feed on the leaves and sometimes give an economical damage.

This species is at a glance separable from any other Japanese species by the

predominantly fuscous in color. It is most closely related to *H. convolvuli* (WALSINGHAM, 1908). In the external character, both species are very similar to each other, but easily distinguished by the male genitalia. In *H. convolvuli,* the appendix appendicular is well developed and the tuft of appendix appendicular strongly adherent (HODGES, 1986), while in *H. triannulella macroscopum,* the appendix appendicular is moderate.

Helcystogramma arotraeum (MEYRICK, 1894)

(Figs. 2, 5, 8)

Cladodes arotraea MEYRICK, 1894, Trans. Ent. Soc. Lond. **1894**: 15.

Brachmia arotraea: MEYRICK, 1925, Gen. Ins., **184**: 248.; GAEDE, 1937, Lep. Cat., **79**: 534.; ISSIKI, 1950, Icon. Ins. Japon., **1**: 463, fig. 1252.; INOUE, 1954, Check List Lep. Japan, **1**: 72.; OKANO, 1959, Icon. Ins. Japon. Col. Nat., **1**: 271, pl. 180, fig. 4.; CLARKE, 1969: 354, pl. 176, fig. 2.; ISSIKI, 1971, Icon. Het. Japon. Col. Nat. Revised New edit.: 40, pl. 5, fig. 163.; MORIUTI, 1982: 287, pl. 13, fig. 45.

Helcystogramma arotraeum: HODGES, 1986: 122.

Forewing length: 5.0–6.2mm.

Head whitish-ocherous; crown with a pale fuscous median line. Antenna whitish-ocherous, alternated with pale fuscous; scape whitish-ocherous, overlaid with fuscous above. Labial palpus with second segment whitish-ocherous, suffused with pale fuscous distally; third segment whitish-ocherous with a fuscous median streak on outer and inner surface. Thorax whitish-ocherous with three fuscous stripes; tegula pale fuscous. Legs whitish-ocherous. Forewing elongate; R_3 arising from basal one-fifth of R_{4+5}; whitish-ocherous, all veins streaked with pale fuscous; stigmata blackish, margined with white; first discal at basal two-fifths, second discal at three-fifths, and plical stigma nearly beneath the first; cilia whitish-ocherous, with pale fuscous basal and apical shades, cut by a blackish dash at apex. Hindwing whitish-gray, scattered with pale ocherous; cilia pale ocherous. Abdomen shining brownish-gray.

Male genitalia: Eighth abdominal tergite cordate, slightly constricted at anterior three-fourths. Uncus about one-thirds length of valva, narrowest at about anterior one-fourth; posterior margin rounded. Tegumen broad; anterior margin considerably concave. Valva narrowest at middle, with length about seven times as large as width. Vinculum with lobe acute apically. Aedeagus with apex hooked.

Female genitalia: Apophysis posterioris about four times as long as apophysis anterioris. Dorsal wall of antrum narrow. Corpus bursae oblong, with many minute spines; signum absent; accessory bursa arising from before anterior end of corpus bursae, nearly equal to corpus bursae in length.

Material examined. Honshu: 1♀, Kokubu, Siga Pref., 23. VIII. 1992, T.

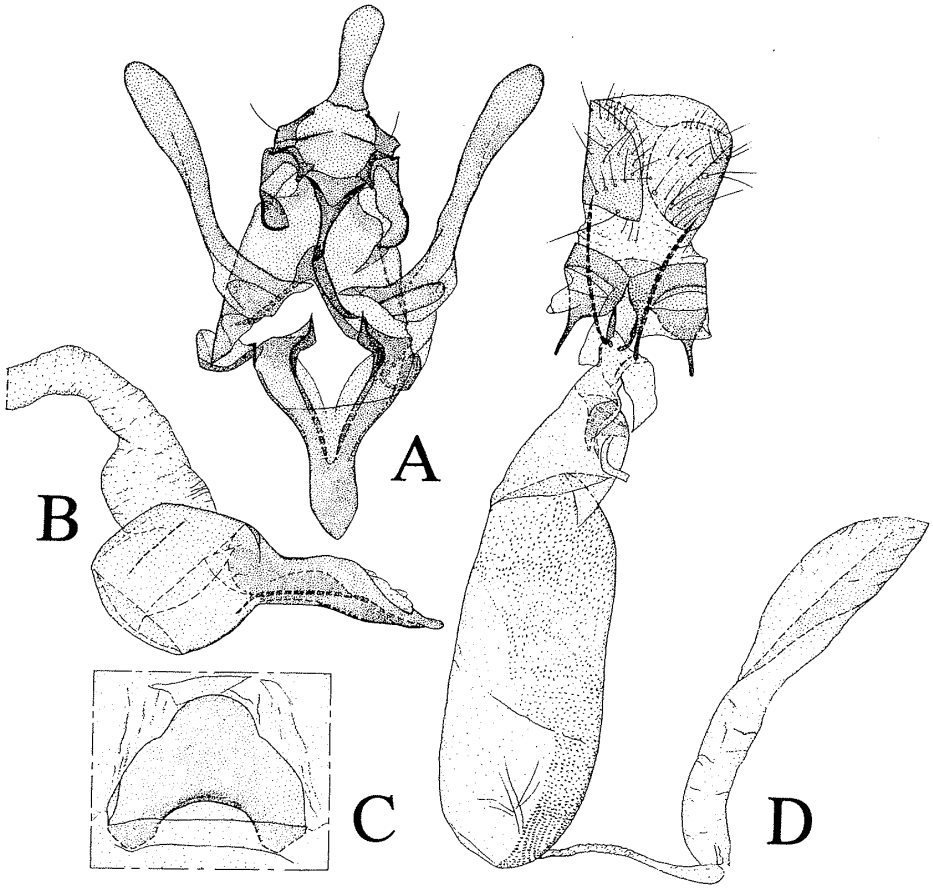


Fig. 8. *Helcystogramma arotraeum* (MEYRICK) —— A, Male genitalia; B, aedeagus; C, eighth tergite; D, female genitalia.

UEDA, UOP.; 1♂, Nishinomiya, Hyogo Pref., 12. IX. 1949, S. ISSIKI, UOP.; 1 ♀, Kitatani, Mie Pref., 12. IX. 1991, T. MANO, UOP. Ryukyus: 1♀, Yona, Okinawa Hontô, 14. IV. 1981, S. HASHIMOTO, UOP.; 1♀, Sêfautaki, Okinawa Hontô, 24. III. 1980, I. KANAZAWA, OMNH. Extra-limital material: Thailand: 1♂, 2♀, Fang, Chiang Mai, 29-31. X. 1985, S. MORIUTI, T. SAITO & Y. ARITA, UOP.; 6♂, 5♀, same locality, 13–16. IX. 1987, S. MORIUTI, T. SAITO, Y. ARITA & Y. YOSHIYASU, UOP.

Distribution. Japan (Honshu, Ryukyus), Taiwan, Java, Myanmar, Thailand, India, Sri Lanka.

Host plants. Zizania latifolia TURCZ., *Oryza sativa* POIR. (Poaceae).

Remarks. This species is superficially similar to *H. hystricella* (BRAUM, 1921) from North America. Judging from the figure of female genitalia of *hystricella* given by HODGES (1986), *hystricella* has the much broader eighth abdominal sternite, so it is easy to distinguish the two species. According to HODGES (1986), the origin of accessory bursa in *arotraeum* is situated at the middle of corpus bursae, but, so far as I have examined, in the Japanese and

Thai specimens the origin of accessory bursa is placed at the anterior end of corpus bursae. The stalking of R_3 and R_{4+5} is characteristic of this species.

Helcystogramma fuscomarginatum sp. nov.

(Figs. 3, 6, 9)

Forewing length: 5.8–6.6 mm.

Head yellowish-ocherous scales, with tips of individual scales pale fuscous producing an irrorate effect; eyes covered with tufts of scales. Antenna ocherous, spotted with pale fuscous above. Labial palpus with second segment yellowish-ocherous, scattered with pale fuscous; third segment yellowish-ocherous, heavily irrorated with fuscous. Thorax yellowish-ocherous with three fuscous stripes; tegula yellowish-ocherous, with basal half suffused with fuscous. Legs whitish-ocherous; foreleg with a fuscous streak; midleg with a fuscous streak on tibia and tarsus. Forewing elongate; R_3 not stalked with R_{4+5}; yellowish-ocherous; all veins streaked with pale fuscous; a few minute blackish costal dots on distal two-thirds; stigmata blackish; first discal small, situated at about two-fifths, and edged above by whitish scales; in some specimens the stigma absent; second large, edged posterior by whitish scales, at three-fifths; plical before middle, forming a short streak; termen broadly fuscous, the extreme edge being blackish; cilia fuscous, with yellowish-ocherous base and whitish-ocherous median shade. Hindwing pale brownish-gray; cilia pale brownish-gray, with a buff basal and a broad pale grayish median lines. Abdomen shining brownish-gray above, and whitish-ocherous, irrorated with fuscous beneath.

Male genitalia: Eighth abdominal tergite nearly cordate; anterior margin with strongly sclerotized band; posterior margin rounded; anterior one-fourth laterally with weakly sclerotized portion. Uncus about one-fourth length of valva, narrowest at middle, widest at posterior one-fifth; posterior margin rounded. Tegumen relatively narrow, with anterior margin deeply concave. Valva nearly parallel-sided, with length about five times as long as width. Appendix appendicular large, strongly sclerotized. Vinculum with lobe obtuse at apex. Aedeagus with a large, strongly sclerotized median process on left side and a small dorsal spine at apical one-fifth.

Female genitalia: Apophysis posterioris twice as long as apophysis anterioris. Anterior margin of eighth abdominal tergite concave. Dorsal wall of antrum broad. Ductus bursae broad, with dorsal side sclerotized except for median and lateral portions. Corpus bursae oval, with a narrow sclerite at anterior three-fourths. Accessory bursa arising from anterior two-thirds of corpus bursae, about twice as long as corpus bursae.

Material examined. Holotype: ♂, Japan: Kyushu, Kagoshima Pref.,

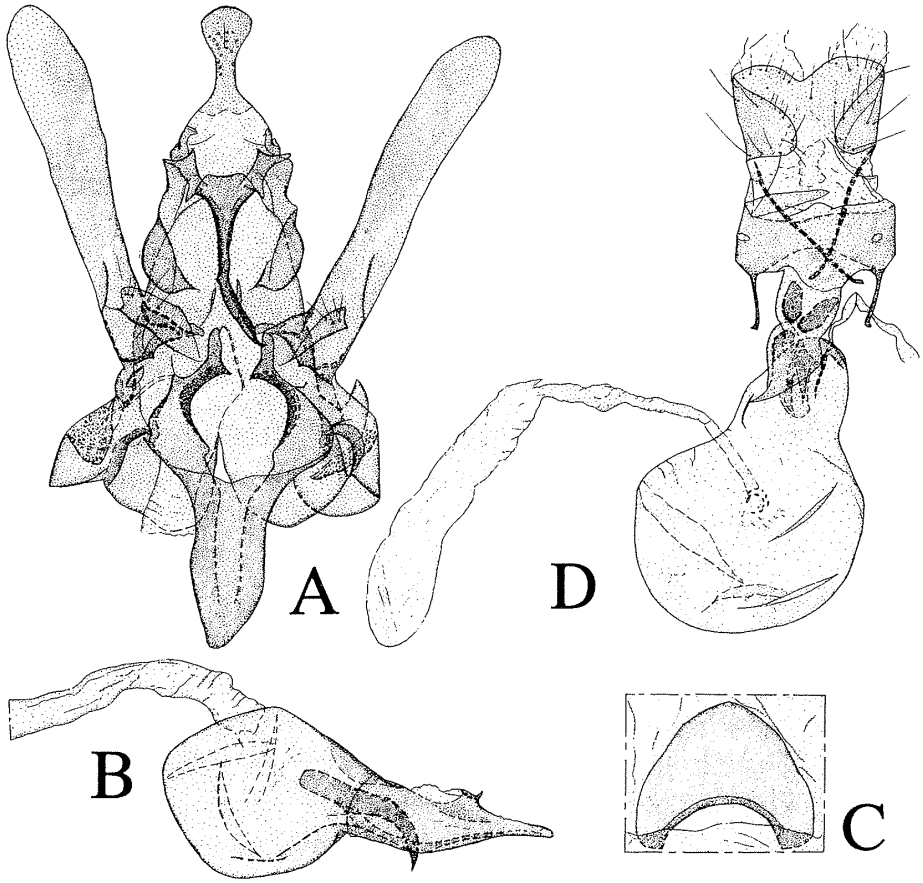


Fig. 9. *Helcystogramma fuscomarginatum* sp. n.—— A, Male genitalia; B, aedeagus; C, eighth tergite; D, female genitalia.

Yakushima Is., Onoaida, 9. IX. 1979, Y. NASU, UOP. Paratypes: Honshu: 1♀, Tauchi Kibiu, Aichi Pref., 11. V. 1991, T. MANO, UOP.; 3♂, Yase, Kyoto Pref., 9. IV. 1953, A. MUTUURA, UOP.; 1♀, Minoo, Osaka Pref., 10. V. 1989, K. YASUDA, UOP.; 1♂, 1♀, Ushitaki, Osaka Pref., 9. VII. 1993, T. KADOHARA, UOP. Kyushu: 1♀, Kojyaku, Fukuoka Pref., 14. VIII. 1965, T. KAWAMURA, UOP.; 1♀, same locality, 21. VIII. 1965, T. KAWAMURA, UOP.; 1♂, Hetsuka, Kagoshima Pref., 21. XI. 1979, I. KANAZAWA, OMNH.; 1♀, Nisinoomote, Tanegashima Is., Kagoshima Pref., 1. VII. 1965, T. KUMATA, HU.; 1♂, Nakama, Yakushima Is., Kagoshima Pref., 21. IX. 1978, S. MORIUTI, UOP.; 1♀, Onoaida, Yakushima Is., Kagoshima Pref., 19. IX. 1978, S. MORIUTI, UOP.; 1♂, 2♀, same locality, 4. IX. 1979, K. YASUDA, UOP.; 1♀, same locality, 9. IX. 1979, K. YASUDA, UOP.; 1♂, same locality, same date, Y. NASU, UOP.

Distribution. Japan (Honshu, Kyushu).

Host plant. Oplismenus undulatifolius (ARDUINO) ROEMER et SCHULTES (Poaceae).

Remarks. This species is superficially similar to *H. contrubatum* (MEYRICK, 1933) occurring in Africa, but differs from it in the female genitalia with dorsal side of the ductus bursae sclerotized instead of membrane.

Probably it is nearest to *H. lochistis* (MEYRICK, 1911) from India and Sri Lanka. Judging from the figures of lectotype of *lochistis* given by CLARKE (1969), the male genitalia of the two species are very similar to each other, but *lochistis* lacks a strongly sclerotized process at the middle of aedeagus. In the external character, they can be easily distinguished.

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