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A New Estuarine and an Unrecorded Species of the Nymphulinae (Lepidoptera, Pyralidae) from Japan*

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Abstract A new nymphuline species, *Eristena argentata*, is described from Japan. The species lives in the intertidal zone near a river mouth. The immature stages and biological notes are also given. *Elophila nigrolinealis* (PRYER) is newly added to the Japanese fauna.

The genus *Eristena* WARREN, 1896, is represented by 14 nominal species from the Oriental and Australian Regions (YOSHIYASU, 1984, 1987). While examining the nymphuline specimens preserved in the Entomological Laboratory, University of Osaka Prefecture, and those of Mr. T. MANO, I found a new species of this genus from Japan, which will be described in the following lines. In June of 1987 I discovered the adults and pupae in the tidal flat of a river where fresh and salt waters are mixed. Having examined the materials, I found that they were identical with the unidentified larvae (*Cataclysta* sp.) which were already collected from the same place (FURUYA, 1980). Here I will also describe the pupae and redescribe the larvae, together with the habitat. As far as I know, this is the first nymphuline species from that kind of habitat.

Elophila nigrolinealis (PRYER) is first recorded here from Japan, based on the specimen collected in northern Kyushu by Mr. T. KAWAMURA.

As a result, 34 species belonging to 10 genera of the Nymphulinae are known from Japan.

Genus *Eristena* WARREN

Eristena WARREN, 1896, Annls. Mag. nat. Hist., (6), **17**: 149 (type species: *Eristena murinalis* WARREN, 1896). —— YOSHIYASU, 1987, Microlep. Thai., (1): 153.

The genus is characterized by having the labial palpus long and acutely upturned, the long proboscis, the male antenna thick, the forewing long and narrow with vein R_2 stalked with R_3 and R_4, and the hindwing also long with a little produced apex, the vein M_1 stalked with $Sc+R_1+Rs$ for a short distance and the vein M_2 usually anastomosed with M_3 at base, and the following genitalic characters.

Male genitalia: Tegumen rather narrow, with dorsal ridge, usually not fused

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with uncus posteriorly. Uncus long. Gnathos also long. Valva broad, with or without dorsoapical specialized setae together with some long setae marginally. Phallus long and narrow; coecum penis well developed; vesica with long spine(s) or plate of cornuti. Juxta wide.

Female genitalia: Ostium bursae usually broad. Bursal ring long or short. Corpus bursae stout, usually with a group of signa. Spermatheca without lagena. Eighth tergum short, medially membranous dorsally. Papilla analis wide or narrow. Apophyses moderate in length.

The adult of the genus is allied to *Eoophyla* SWINHOE, 1900, but distinguished from the latter in the more weakly excised termen below apex, with the vein M_2 usually stalked with M_3, and the more weakly marked marginal dots in the hindwing, and the male genitalia with the slenderer phallus having more significant cornuti, and the female genitalia lacking the lagena in the spermatheca. On the other hand, the larva is much different from those of *Eoophyla*, and resembles those of *Potamomusa* YOSHIYASU, 1985, and *Paracymoriza* WARREN, 1890: Larval body cylindrical, with singular tracheal gills; head not flat, with transformed M_3 seta on labrum; prothorax without pinaculum of L seta; 9th abdominal segment with 2 L setae and so on. However, *Eristena* is easily distinguished from the latter two genera in having fewer gills and the labrum with La3 seta transformed into a flat process.

Eristena argentata sp. nov.

[Japanese name: Ensui-mizumeiga]

(Figs. 1-5, 6A, C-F)

Male & female. Head with frons whitish, medially suffused with brown; vertex with erected and whitish scales. Maxillary palpus narrow, a little extending upwards by whitish scales. Proboscis with whitish scales basally. Labial palpus with the 3rd segment narrow. Antenna in male about 3/5 as long as forewing, with whitish base, and densely setose ventrally; that in female slenderer. Foreleg with coxa to tibia fuscous to brown on anterior surfaces, the others fulvous. Midleg with ventral surface of femur with a series of erect, fulvous scales through the length. Hindleg in male fulvous, with base of femur ventrally with thick scale-tuft blackish inside and fulvous outside; that in female also fulvous, without any special tuft. Thorax with tegula whitish fulvous except for two horizontal fuscous bands anteriorly and medially; the other portions above fulvous mixed with fuscous, beneath whitish. Abdomen above pale ochreous, beneath almost same in color but with a pair of special tufts at anterior margin of 4th segment ventrally.

Wing shape and venation: Forewing narrow with costal margin in proximal half straight and in distal half a little expanded behind apex; vein R_2 rather shortly anastomosed with R_{3+4}; M_2 a little approximated with M_3 basally; CuA_2 rather separated from CuA_1. Hindwing narrow, with costal margin weakly curved; apex

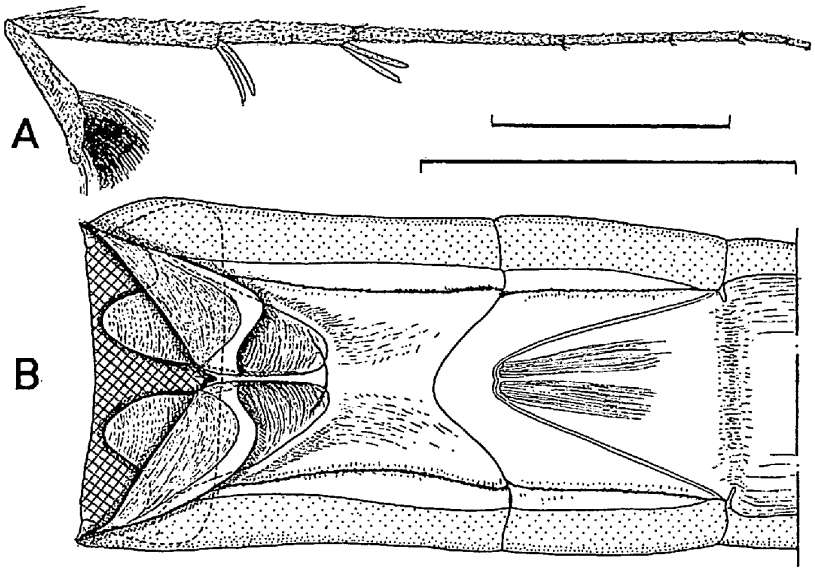

Fig. 1. Male of *Eristena argentata* sp. nov.; A, hindleg; B, anterior segments of abdomen, ventral view. Scale: 2 mm (A), 1 mm (B).

broadly rounded; termen incised below apex, and slightly undulate to tornus; vein $Sc+R_1$ long anastomosed with Rs, and short; M_2, M_3 and CuA_1 as in forewing; CuP vestigial in proximal 1/2.

Upperside of forewing: Ground color pale orange; lines fuscous and white areas partly or wholly ornamented with silvery grey scales. Area from base to AMG whitish with darker scales along veins. AML distinct from base of vein CuA_2, strongly oblique to wing base innerly, then AMG narrowed at discoidal cell. DB1 represented by a darker spot on base of vein R_1. Proximal area to DB1 whitish. WB proximally edged by ML and distally edged by narrow or obscure anterior portion of PML, wedge-shaped and whitish, usually ornamented with silvery scales posteriorly. WC arising from posterior angle of discoidal cell, and excurved to vein 1A+2A, covered with silvery grey scales, edged by distal dark brown PML which is continuous to anterior portion of PML in some specimens. SMW parallel with termen, scattered with silvery scales, and clearly edged by SML distally. MGL narrow, blackish, usually separated by veins, the portion of cell R_5 a little broader than the other portions. Cilia fulvous, with pale fuscous line at proximal 1/3.

Underside of forewing: Area from base to SMW evenly pale fuscous, excepting pale orange discocellular lunule and white wedge-shaped WB. SMW white, without silver scales. The others as in upperside except paler in color.

Upperside of hindwing: Base white. SBL faintly marked near base and accompanying pale orange AMG. DB1 in discoidal cell continuous to ML, oblique innerly. PML also broad, almost parallel with DB1+ML. Discocellular lunule absent, so white WB continuous to WC. SMW interrupted at cell M_1, ornamented with silvery scales on white scales, and distally edged by sinuous SML. SMW not clearly edged proximally. ML blackish, separated by each vein of which the

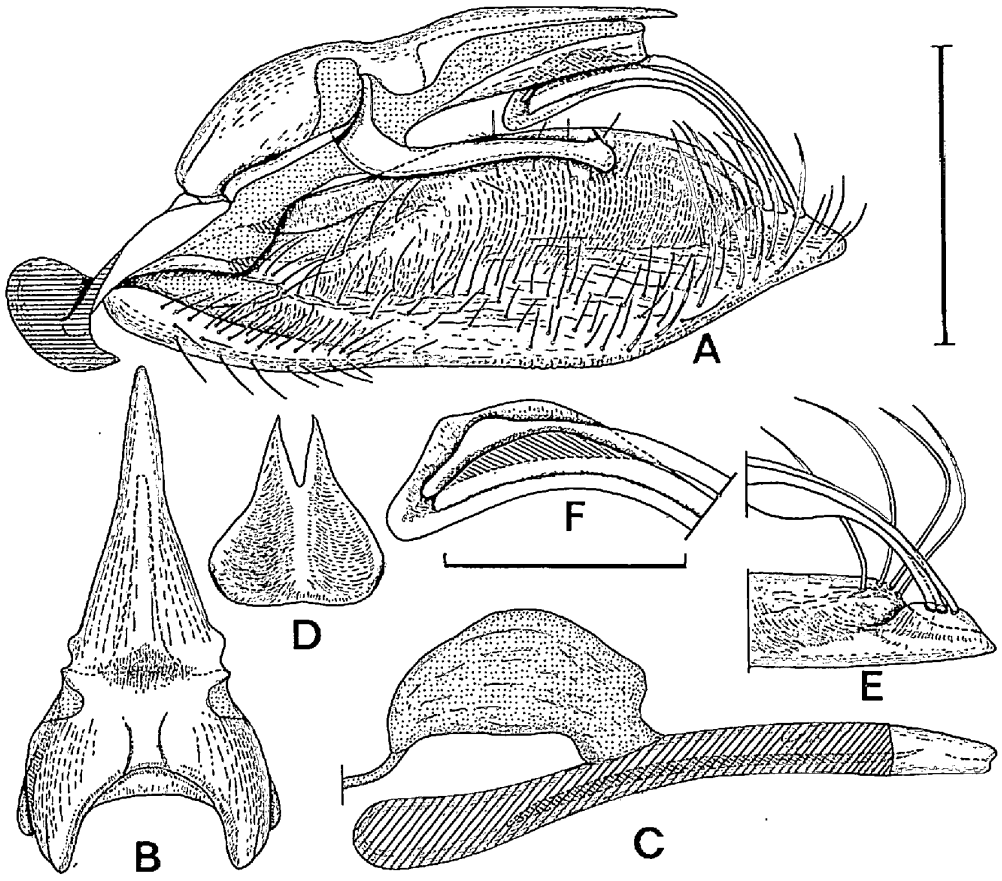

Fig. 2. Male genitalia of *Eristena argentata* sp. nov.; A, lateral view; B, tegumen & uncus, dorsal view; C, phallus; D, juxta; E, valval apex, dorsal view; F, apical portion of valval specialized setae. Scale: 0.5 mm except F (0.2 mm).

portions between veins M_2 and CuA_2 are represented as rather distinct spots. Cilia as in forewing.

Underside of hindwing: Almost as in upperside except paler in color.

Male genitalia: Tegumen wider than long, fused with uncus posteriorly, with a pair of curved, longitudinal ridges dorsally. Fenestrulae rather broad laterally. Vinculum narrower than the other species of *Eristena*, almost as long as height of tegumen. Saccus large, rounded in lateral view. Uncus long triangular in dorsal view, with subbase a little expanded laterally, and without setae. Gnathos long, with one apical spine dorsally. Valva long, narrowed to apex where some long setae are arising ventrally, and with 3 specialized setae of which proximal 2 setae are fused incompletely with each other. Phallus slightly curved; coecum penis well developed, about 2/5 as long as whole length of phallus; vesica with a long (about 2/3 of the whole length of phallus) plate of cornutus and a small, weakly sclerotized plate. Juxta wide at base and narrowed to apex which is convex in V shape.

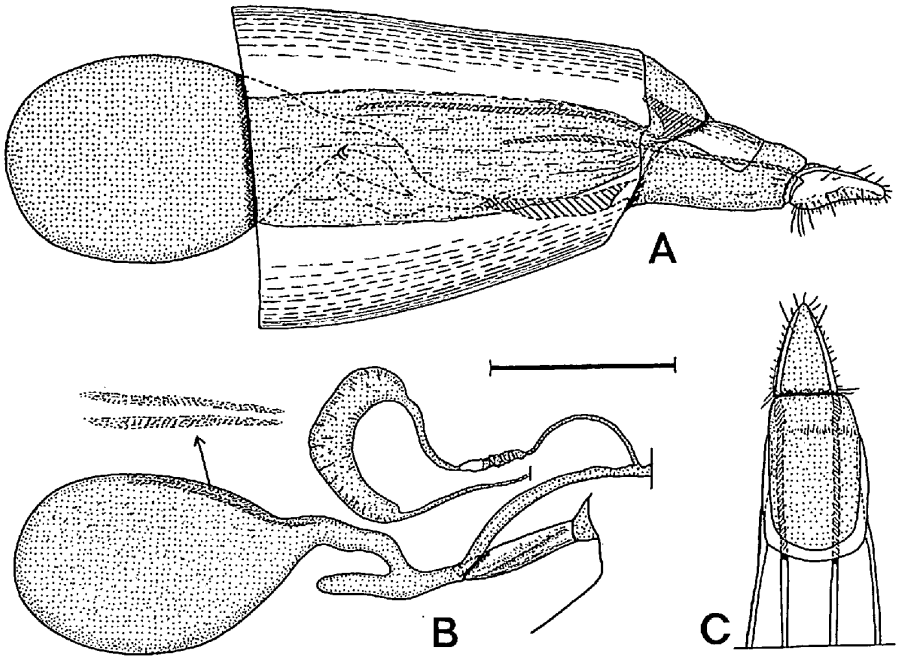

Fig. 3. Female genitalia of *Eristena argentata* sp. nov.; A, lateral view; B, corpus bursae and spermatheca; C, 8th to 10th abdominal segments, dorsal view. Scale: 0.5 mm.

Female genitalia: Ostium bursae rather narrow. Ductus bursae very short. Bursal ring well developed, about 1/3 as long as 7th tergum. Corpus bursae short, bifurcated at base, the larger one elliptical in shape, with a pair of row of signa. Spermatheca rather large. Eighth tergum short, U in shape dorsally; apophysis anterioris long, about 0.9 as long as 7th sternum. Papilla analis rather small, pointed at apex; apophysis posterioris almost as long as the anterioris.

Size of forewing: ♂, 6.9–7.4 mm; ♀, 5.1–7.1 mm.

Holotype: Male, Shinmura, Amami-Oshima, Amami Iss., 28. iv. 1960 (A. MUTUURA), preserved in the Ent. Lab., University of Osaka Prefecture (UOP). Paratypes: 1 ♂, same data as holotype (UOP); 1 ♂, Nishinakama, Amami-Oshima Is., 12. iv. 1976 (H. MAKIHARA); 1 ♂, Yatomi-chô, Kaifu-gun, Aichi Pref., 26. v. 1986 (T. MANO) & 1 ♀, 16. vi. 1986 (T. MANO) & 11 ♀, 13. ix. 1986 (T. MANO, S. FUNAKOSHI, T. TANABE, Y. YOSHIYASU); 4 ♂ 2 ♀, Nagahama, Ehime Pref., 25–26. vi. 1987 (Y. YOSHIYASU); 1 ♂, same locality, 27. vi. 1987 em. (Y. YOSHIYASU).

Mature larva. Body length 10 mm. Body cylindrical and creamy white, with short and unbranched tracheal gills on mesothorax to 9th abdominal segments except 5th abdominal segment, and each gill shorter than the length of each segment; setae rather short and slightly curved.

Head: Width about 1.2 mm; wider than long, dark brown, with broad pale brown area in lateral portion. Seta P1 very long, about 4 times as long as dorsolateral P2; A2 short, just ventral to longer A1; A3 very long, not situated on a line between A1 and A2 as in *Potamomusa* and *Paracymoriza*; L1 short; O1 very

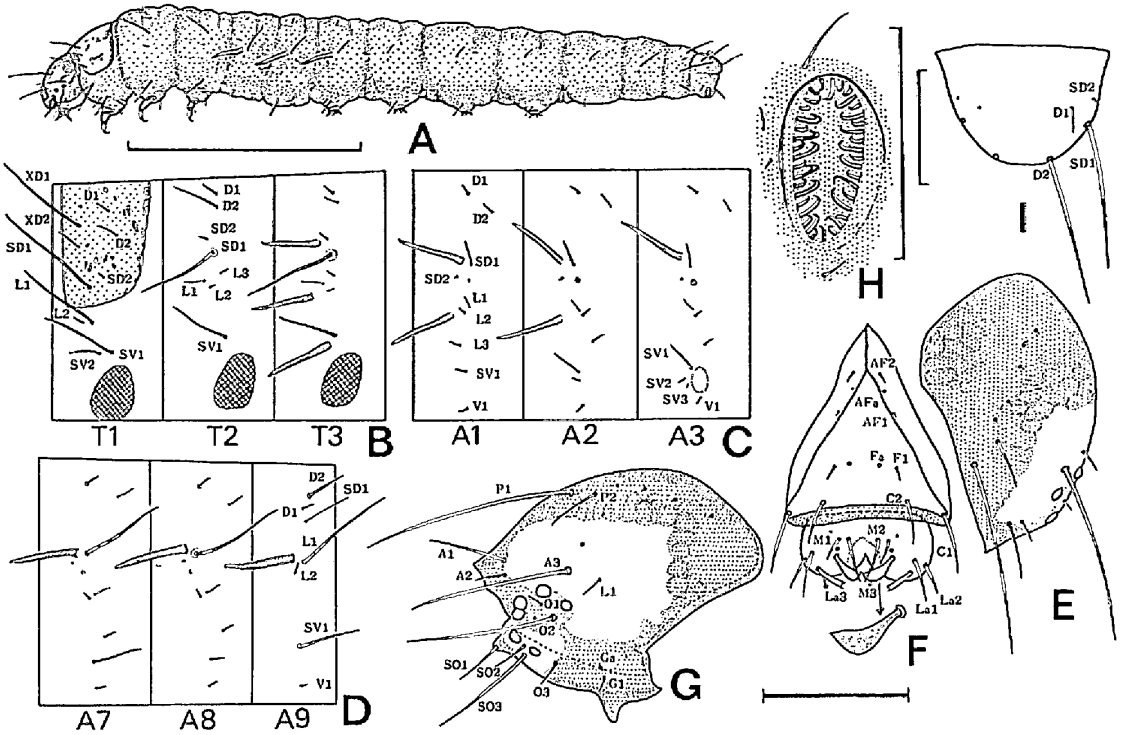

Fig. 4. Larva of *Eristena argentata* sp. nov.; A, mid-instar larva; B, chaetotaxy, pro- to metathorax; C, same, 1st to 3rd abdominal segments; D, same, 7th to 9th abdominal segments; E, head, frontal view; F, same, frons, adfrons and labrum; G, same, lateral view; H, crochets of proleg; I, 10th abdominal segment, dorsal view. Head is figured based on larval exuvia. Scale: 3 mm (A), 0.5 mm (E–I).

short; O2 long; O3 situated anteriorly to an extending line O1 and O2; SO3 long, just ventral to shorter SO2; F1 lateral to Fa; AF setae very short. Ocelli 6 in number; ocelli III and IV attached to each other. Labrum dark brown, with setae M3 and La3 transformed into flat fan-shaped processes, of which M3 is wider than La3 and broadened medially. Mandible rectangular, with 5 teeth; inner teeth undeveloped; anterior seta from posteroventral angle much longer than the posterior one.

Thorax: Prothorax with the shield well developed, pale brown, with several darker spots, especially along the posterior margin; seta XD1 long, about 4 times as long as shorter XD2; D2 short, almost ventral to D1; SD1 long and SD2 very short; SD1 and SV1 long; spiracle reduced; leg with coxae of both sides attached at midventral line. Mesothorax with seta SD2 longer than the others; L1 slender but longer than the other L setae; SV1 long; leg with coxae of both sides not attached to each other. Metathorax with the chaetotaxy as in mesothorax except D2 becoming shorter and slenderer; gills emitting at SD, L and SV setal regions.

Abdomen: Almost as in thorax in width and color. First to 8th segments (A1–A8) with setae D2 and L1 slender; SD2 minute; A3–A6 with SV3 very short, just anterior to crochets of proleg; A1 and A8 with SV1 shorter than the others.

Ninth segment (A9) with SD1 slender; L1 very long; L2 anteroventral to L1. Anal shield not clearly marked, with long setae of D2 and SD1 along posterior margin. Prolegs developed, with crochets arranged in circle, biordinal, 31–34 in number. Anal proleg with transversely arranged, biordinal crochets, 12–13 in total number. Spiracles on 2nd to 4th segments well developed, although those of younger larva undeveloped as in the other segments. Numbers of SV setae and gills of mature larva are as in the following table.

Segment	A1	A2	A3–A6	A7	A8	A9
No. of SV setae	1	2	3	1	1	1
No. of gills	2	2	1	1	1	1

Pupa. Length 7.5–17.5 mm, width 2.1 mm.

Head with frons a little produced at lateral sides, with seta F3 stout; vertex with setae P1 and P2 short. Maxillary palpus clearly recognized. Maxilla long, extending to wing tips in female; in male the apex concealed by foreleg. Antenna in male long, reaching wing apex; that in female a little shorter than that in male. Foreleg reaching a little before wing apex, in male those of both sides attached to each other at midventral line. Mid- and hind legs very long, far beyond wing apex. Abdomen moderate in width, with spiracles on 2nd to 4th segments large, the others vestigial; 8th segment a little expanded laterally; 10th segment with anal shield not

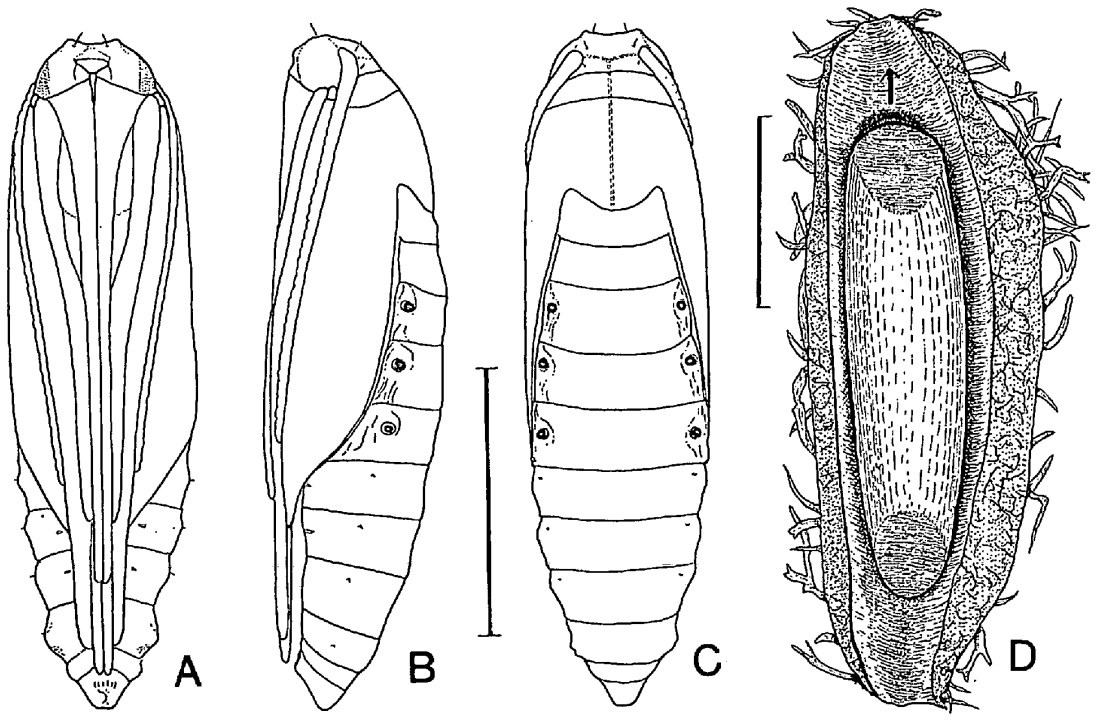

Fig. 5. Pupa of *Eristena argentata* sp. nov.; A, female, ventral view; B, same, lateral view; C, same, dorsal view; D, pupal cocoon. Scale: 3 mm (A–C), 5 mm (D).

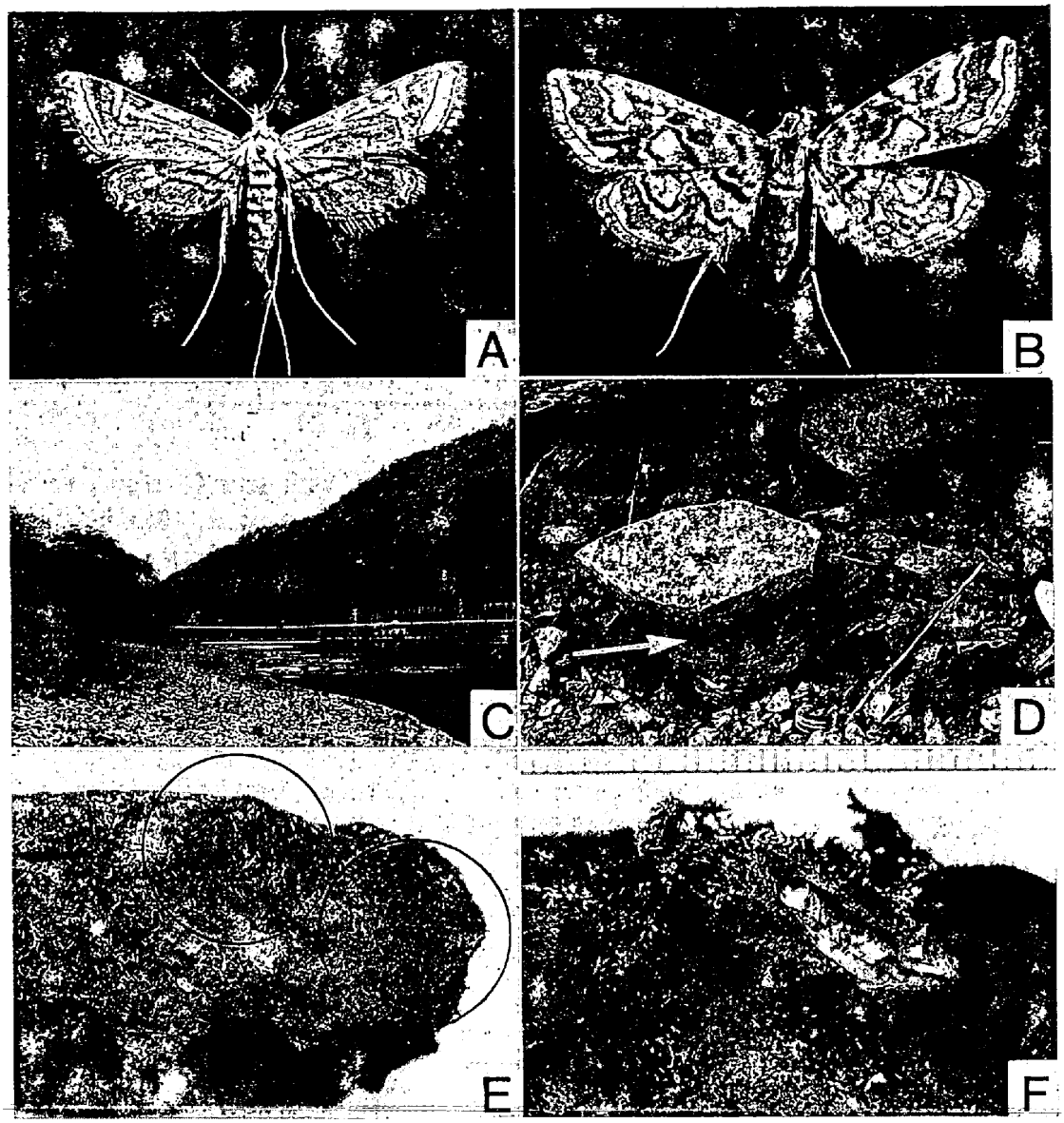

Fig. 6. —— A. *Eristena argentata* sp. nov. (♀) (Aichi Pref.) —— B. *Elophila nigrolinealis* (PRYER) (♀) (Fukuoka Pref.). —— C–F. *Eristena argentata* sp. nov.; C, habitat, Hijikawa River, 3.5 km from the river mouth; D, a rock near the riverside where pupal cocoons were discovered; E, pupal cocoons on a rock, indicated by circles, dorsal view; F, removed pupal cocoon, ventral view.

clearly formed, and with setae D2 and SD1 stout and long.

Pupal case. Cocoon length 11–12 mm; width 2.5–3 mm. The case is made of seaweeds and muddy soil particles. Inside the case the semidorm-like runway is formed by silk under the seaweeds and the elliptical cocoon is attached to the dorsal wall of it. The cocoon has rather flat and a little darker, circle caps on both sides of which the anterior one has a wide slit for emergence, indicated as an arrow

in Fig. 5 D.

Specimens examined. One mature larva (without head) and one mid-instar larva, Nagahama, Ehime Pref., 25. xii. 1977 (Y. FURUYA); 3 pupae, same locality, 25. vi. 1987 (Y. YOSHIYASU), with 15 pupal cocoons including larval exuviae.

Host. Undetermined. Probably some marine algae on rocks where the larvae and the pupal cocoons were found.

Biological notes. FURUYA (1980) discovered the larvae on small and submerged rocks (under 20 cm in diameter), on which seaweeds were developed, in the Hijikawa River of Ehime Prefecture, Shikoku. The collecting site is situated about 3 km removed from the sea. The sea water is rising up to 7 to 9 km from the river mouth at high tide, and the collecting site is under the influence of sea water, making seaweeds grow. At the same time she also collected estuarine tipulid larvae (FURUYA, 1983). In 1987, I fortunately collected the adults and pupae of the nymphuline, with pupal cocoons in the same place. The pupae were found on unsubmerged rocks at low tide. They made rather thick pupal cocoons with seaweeds on the rocks (Figs. 5 & 6). Most of them were, however, empty cocoons after emergence, and no larva was collected at that time. The adults were found under tree leaves growing along the river. The specimens from Honshu were also collected at a reclaimed land in Aichi Prefecture. The place is surrounded by narrow streams where the reed thrives with some other species of water plants.

The detailed biology of this species is unavailable now. Judging from the collecting data of the larvae and the adults, however, the new species is probably bivoltine, and the adults will fly from May to June and also in September. The species seems to overwinter in mature larval stage.

Distribution. Japan (Honshu, Shikoku, Amami Iss.).

Remarks. The new species is rather similar to *Eristena fulva* YOSHIYASU, 1987, and *E. pumila* YOSHIYASU, 1987, of Thailand in the wing marking, but is easily separated from them by having the hindwing vein M_2 separated from M_3, the male genitalia with slenderer valva furnishing with the special setae and the female genitalia with longer bursal ring and without signa.

Genus *Elophila* HÜBNER

Elophila HÜBNER, 1822, Syst.-alph. Verz., **1822**: 54 (type species: *Phalaena nymphaealis* [DENIS et SCHIEFFERMÜLLER, 1775]). —— YOSHIYASU, 1985, Sci. Rept. Kyoto pref. Univ., Agr., **37**: 16.

The definition of this genus is referred to SPEIDEL (1984) and YOSHIYASU (1985).

Elophila nigrolinealis (PRYER)

[Japanese name: Nise-madara-mizumeiga]

(Fig. 6B)

Nymphula nigrolinealis PRYER, 1877, Cist. Ent., **2**: 233, pl. 4, fig. 6 (type loc.: Chekiang, China)

(*nec Nymphula nigrolinealis*: INOUE, 1954).
Elophila nigrolinealis: SPEIDEL, 1984, Neue ent. Nachr., 12: 62.

This species belongs to the subgenus *Munroessa* LANGE, 1956, and has a similar wing marking to *Elophila separatalis* (LEECH, 1889).

Size of forewing: ♀, 8.6 mm.

Material examined. 1 ♀, Orio, Yahata, Fukuoka Pref. (T. KAWAMURA) (Kawamura Collection). Lectotype (♀) in Brit. Mus. (Nat. Hist.) (genitalia slide No. 11553).

Distribution. Japan (Kyushu); China. New to Japan.

Remarks. This species is very close to *Elophila separatalis* (LEECH), but is separable from the latter as follows: Ground color a little paler and rather clearly edged by fuscous; hindwing with a darker AMG; male genitalia with broader uncus; female genitalia with an area of signa wider, almost extending to apical portion of corpus bursae.

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