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The Genus *Pochazia* Amyot and Serville (Hemiptera: Ricaniidae) from Korea, with a Newly Recorded Species

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ABSTRACT

Two species of the genus *Pochazia*, *P. albomaculata* and *P. shantungensis*, are redescribed and illustrated from Korea. Among them, the exotic species *P. shantungensis*, assumed to be invaded from China recently, is known for the first time in Korea. A sudden outbreak of the latter is observed in the western part of Korean peninsula which is injurious to various fruit plants, many other trees and wild herbs. Hitherto unknown male genitalic characters of the two species are given and keys to genera of the Ricaniidae and species of *Pochazia* from Korea are provided.

Key words: Auchenorrhyncha, fulgoromorpha, planthopper, taxonomy

INTRODUCTION

The planthopper genus *Pochazia* Amyot and Serville, 1843 has hitherto been represented by 46 recognized species (Bourgoin, 2011) distributed widely in the Afrotropical, East Palaearctic and Oriental regions (Distant, 1906; Fletcher, 1999). Most species of this genus are of little economic importance; however, a few are occasional pests in agriculture and forestry. *P. shantungensis* was recorded as an important economic pest of various fruit plants such as apple, persimmon, peach and roadside trees mainly in Zhejiang province, China (Chou and Lu, 1977; Chou *et al.*, 1985; Shen *et al.*, 2007).

In Korea, *P. albomaculata* was firstly recorded from Cheju-do province in 1990 (Kwon and Huh, 2001). After then, recent outbreak of the exotic species, *P. shantungensis*, has been observed sporadically in the western part of Korean peninsula (Chungcheongnam-do, Jeollabuk-do, Jeollanam-do and Gyeonggi-do provinces) since 2009, infesting various fruit plants such as apple, persimmon, peach, chestnut, five flavor berry, blueberry, raspberry, ginkgo and many other roadside trees along with wild herbs (Im *et al.*, 2011; Choe *et al.*, 2011; Jo *et al.*, 2011) and infestation trends are spreading out to other localities day by day. Nevertheless, nobody confirmed the identification of species level until now, mainly due to the unavailability of the male genitalic characters of externally resembled species. Even though the external body colorations of above two species are nearly same, they can be easily distinguished from each other by body size and male genitalic structures.

MATERIALS AND METHODS

The morphological terminology followed by Chen and He (2010). Dried specimens were used for the description and illustration. External and internal morphology were observed under a

stereoscopic microscope (Olympus SZH12) and characters were measured with an ocular micrometer. The photographs of external and internal morphological structures have been taken by Canon EOS 500D Camera with MPE 65 mm lens and DIXI Digital Camera (JUJAK 5.5/DIXI3000), respectively. Illustrations were imported into Adobe Photoshop CS3 for labeling and plate composition.

Specimens examined in the present study are deposited in the collection of the School of Applied Bio-sciences, Kyungpook National University, Daegu, Republic of Korea.

SYSTEMATICS

Key to genera of Ricaniidae from Korea

- 1. Veins R1 and R2 of forewings arising from the same point on the basal cell or very close to it (Fig. 1c, d)..... 2
- Veins R1 and R2 of forewings arising from long or cooperatively short common stalk on basal cell (Fig. 1a, b)..... 3
- 2. Forewing large, with apical angle prominent, apical margin longer than claval suture (Fig. 1d) *Pochazia* Amyot et Serville
- Forewing not large, with apical angle broadly rounded, apical margin nearly as long as claval suture (Fig. 1c) *Ricania* Germar
- 3. Forewings with sparse longitudinal veins, veins R1 and R2 arising from long common stalk on basal cell (Fig. 1a) *Euricania* Melichar
- Forewings with dense longitudinal veins, veins R1 and R2 arising from short common stalk on basal cell (Fig. 1b) *Orosanga* Fennah

Genus *Pochazia* Amyot and Serville, 1843

Type species: *Flata fasciata* (Fabricius, 1803) [Africa], designated by Kirkaldy (1903).

Key to the species of genus *Pochazia* from Korea

- 1. Body size relatively small; forewing with a triangular-shaped white spot on costal margin at about two-thirds from base (Fig. 2a); dorsocaudal portion of pygofer produced caudad in a process; aedeagus as in Fig. 2g-j *P. albomaculata* (Uhler)
- Body size relatively large; forewing with an elliptical-shaped white spot on costal margin at about two-thirds from base (Fig. 3a); dorsocaudal portion of pygofer not produced caudad in a process; aedeagus as in Fig. 3g-j *P. shantungensis* (Chou and Lu, 1977)

Pochazia albomaculata (Uhler, 1896) (Fig. 2a-l)

Ricania albomaculata (Uhler, 1896): [Japan]

***Pochazia albomaculata*:** Matsumura (1905), Kwon and Huh (1995) and Kwon and Huh (2001).

Redescription: Body length male (N = 03): 6.0-6.5 mm (from vertex to tip of genitalia), 10.5-11.0 mm (from vertex to tip of forewings). General color brown to dark brown. Vertex (Fig. 2b), frons, clypeus, rostrum (Fig. 2c) and eyes brown. Ocelli yellowish brown. Pronotum and mesonotum

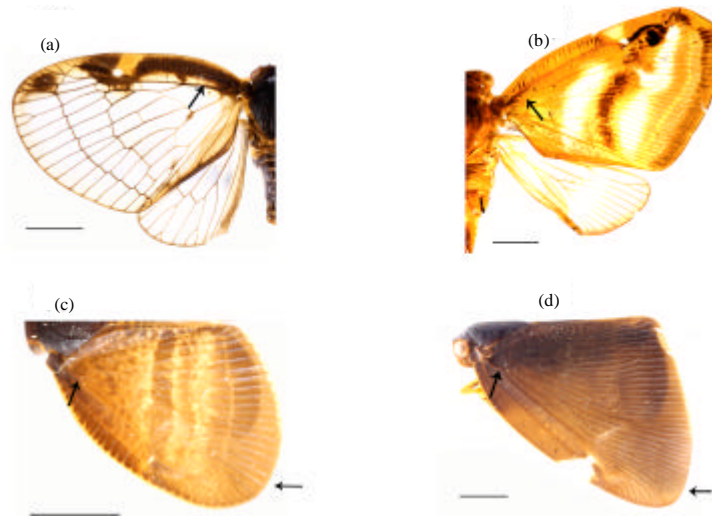


Fig. 1(a-d): Forewings of other genera of Ricaniidae from Korea. (a) *Euricania clara* (Kato, 1932) (b) *Orosanga japonica* (Melichar, 1898), (c) *Ricania taeniata* (Stal, 1870) and (d) *Pochazia albomaculata* (Uhler, 1896), Scale bar (a-d) 2.0 mm

(Fig. 2b) black. Thorax dark brown ventrally. Forewing (Fig. 2a, b) brown to dark brown with a triangular white spot on costal margin at about two-thirds from base. Hind wing brown. Legs brown. Abdomen brown except posterior margin of each segment, yellowish brown. Genital segment dark brown.

Head (including compound eyes) as wide as pronotum. Vertex in dorsal view broadly rectangular, wider than long in middle line (8.4:1), apical margin distinctly carinate, posterior margin concave, lateral carinae slightly elevated, disk slightly depressed. Frons wider at widest part than long in middle line (1.5:1), longer than clypeus (1.6:1), disc tricarinate, with sublateral carinae shorter than central carina, depressed subapically. Clypeus triangular, with central carina. Rostrum nearly reaching between hind coxae, with apical segment shorter than basal segment. Antennae short, second adenomere subglobose, flagellum originated from apical point. Lateral ocelli adjacent to eyes and lateral margin of frons.

Pronotum narrow, collar-shaped, anterior margin convex, longer than vertex in middle line (2:1), central carina prominent. Mesonotum large, with three carinae: central carina straight, lateral carinae inwardly and anteriorly curved, converging closely together on anterior margin, each bifurcating outwardly near middle in a straight longitudinal carina to anterior border. Forewings large, more or less triangular with dense longitudinal veins, apical angle prominent and longer than claval suture (1.1:1.0), triangular white spot on costal margin surpassing the vein Sc. Wing venation as in Fig. 2a. Hind tibia with two lateral spines and six apical teeth.

Male genitalia. Anal segment (Fig. 2k, l) moderately small, almost oval in dorsal view, longer than wide at middle (1.5:1), lateral margin convex, apical margin at middle slightly concave, anal styles short, set in middle; in lateral view, lateral margin convex, wide at middle, narrow apically. Aedeagus (Fig. 2g-j) shaft curved, with two pairs of sclerotized and one pair of thread-like membranous processes; symmetrical in both left and right lateral view, lateral process long, sclerotized, directed cephalad, dorsal process short, sclerotized, directed dorsad, lateral process longer than dorsal process (2:1), membranous process arises apically, dorsad. Phallobase slightly

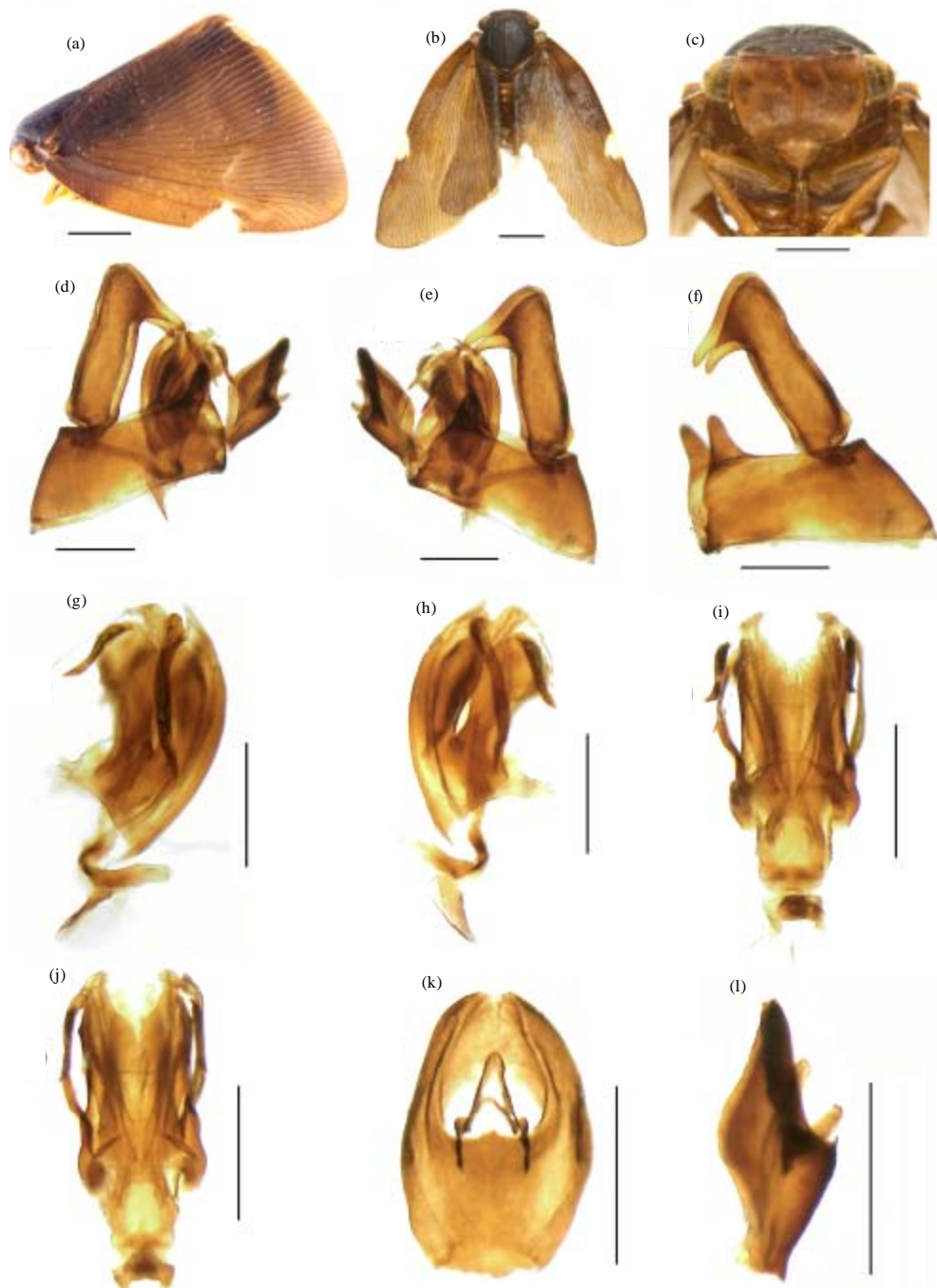


Fig. 2(a-l): *Pochazia albomaculata* (Uhler, 1896). (a) Habitus (male, lateral view), (b) Habitus (male, dorsal view), (c) Frons, (d) Male genital block (right lateral view), (e) Male genital block (left lateral view), (f) Male genital styles and pygofer (left lateral view), (g) Aedeagus (left lateral view), (h) Aedeagus (right lateral view), (i) Aedeagus (dorsal view), (j) Aedeagus (ventral view), (k) Anal segment (dorsal view) and (l) Anal segment (lateral view). Scale bar (a-b) 2.0 mm, (c) 1.0 mm, (d-l) 0.5 mm

constricted medially. Genital styles (Fig. 2f) symmetrical, large and slender, with a long apical process, in profile longer than wide (3.6:1). Pygofer (Fig. 2f), in lateral view, sclerotized with dorsal and anterior margin, at dorsocaudal portion produced caudad in a process, directed caudad.

Materials examined: One male, Sogwipo, Jeju-do, Korea, 9.X.1990, YJ Kwon; 2 males, Tonnaeko, Jeju-do, Korea, 26.VIII.1994, same collector.

Host plant: Unknown.

Distribution: Korea (Jeju-do), Japan (Honshu, Kyushu, Shikoku, Ryukyu).

***Pochazia shantungensis*:** Chou and Lu (1977) (Fig. 3a-n)

Ricania shantungensis Chou and Lu (1977) [China]; Chou *et al.* (1985), Shen *et al.* (2007)

Pochazia shantungensis: Bourgoin (2011): FLOW database [<http://flow.snv.jussieu.fr/cgi-bin/entomosite.pl>].

Description: Body length male (N = 10): 7.8-8.2 mm (from vertex to tip of genitalia), 13.0-13.5 mm (from vertex to tip of forewings); female (N = 10): 8.5-9.0 mm (from vertex to tip of genitalia), 15.5-16.5 mm (from vertex to tip of forewings). General color dark brown to black. Vertex (Fig. 3b), frons, clypeus, rostrum (Fig. 3c) and eyes brown to dark brown. Ocelli brown. Pronotum (Fig. 3b) and mesonotum (Fig. 3b) black. Thorax black ventrally. Forewing (Fig. 3d) dark brown to black with an elliptical-shaped white spot on costal margin at about two-thirds from base. Hind wing dark brown. Legs brown. Abdomen dark brown except posterior margin of each segment, yellow. Genital segment dark brown to black.

Head (including compound eyes) as wide as pronotum. Vertex in dorsal view broadly rectangular, wider than long in middle line (13:1), apical margin distinctly carinate, posterior margin concave, lateral carinae slightly elevated, disk slightly depressed. Frons wider at widest part than long in middle line (1.48:1), longer than clypeus (1.3:1), disc tricarinate, with sublateral carinae shorter than central carina, depressed subapically. Clypeus triangular, with central carina. Rostrum nearly reaching between hind coxae, with apical segment shorter than basal segment. Antennae short, second adenomere subglobose with granules, flagellum originated from apical point. Lateral ocelli adjacent to eyes and lateral margin of frons.

Pronotum narrow, collar-shaped, anterior margin convex, longer than vertex in middle line (3:1), central carina prominent. Mesonotum large, with three carinae: central carina straight, lateral carinae inwardly and anteriorly curved, converging closely together on anterior margin, each bifurcating outwardly near middle in a straight longitudinal carina to anterior border. Forewings large, more or less triangular with dense longitudinal veins, apical angle prominent and longer than claval suture (1.12:1.0), elliptical-shaped white spot on costal margin surpassing the vein Sc. Wing venation as in (Fig. 3d). Hind tibia with two lateral spines and six apical teeth.

Male genitalia. Anal segment (Fig. 3m-n) moderately small, almost oval in dorsal view, longer than wide at middle (1.49:1), lateral and apical margin convex, anal styles short, set in middle; in lateral view, lateral margin convex. Aedeagus (Fig. 3g-j) shaft gently curved, with three pairs of sclerotized processes; symmetrical in both left and right lateral view, apical process long, curved near apex, subapical process short, straight, wide at base, both directed dorsad, ventral process moderately long, curve towards dorsad. Phallobase strongly constricted medially, dilated base.

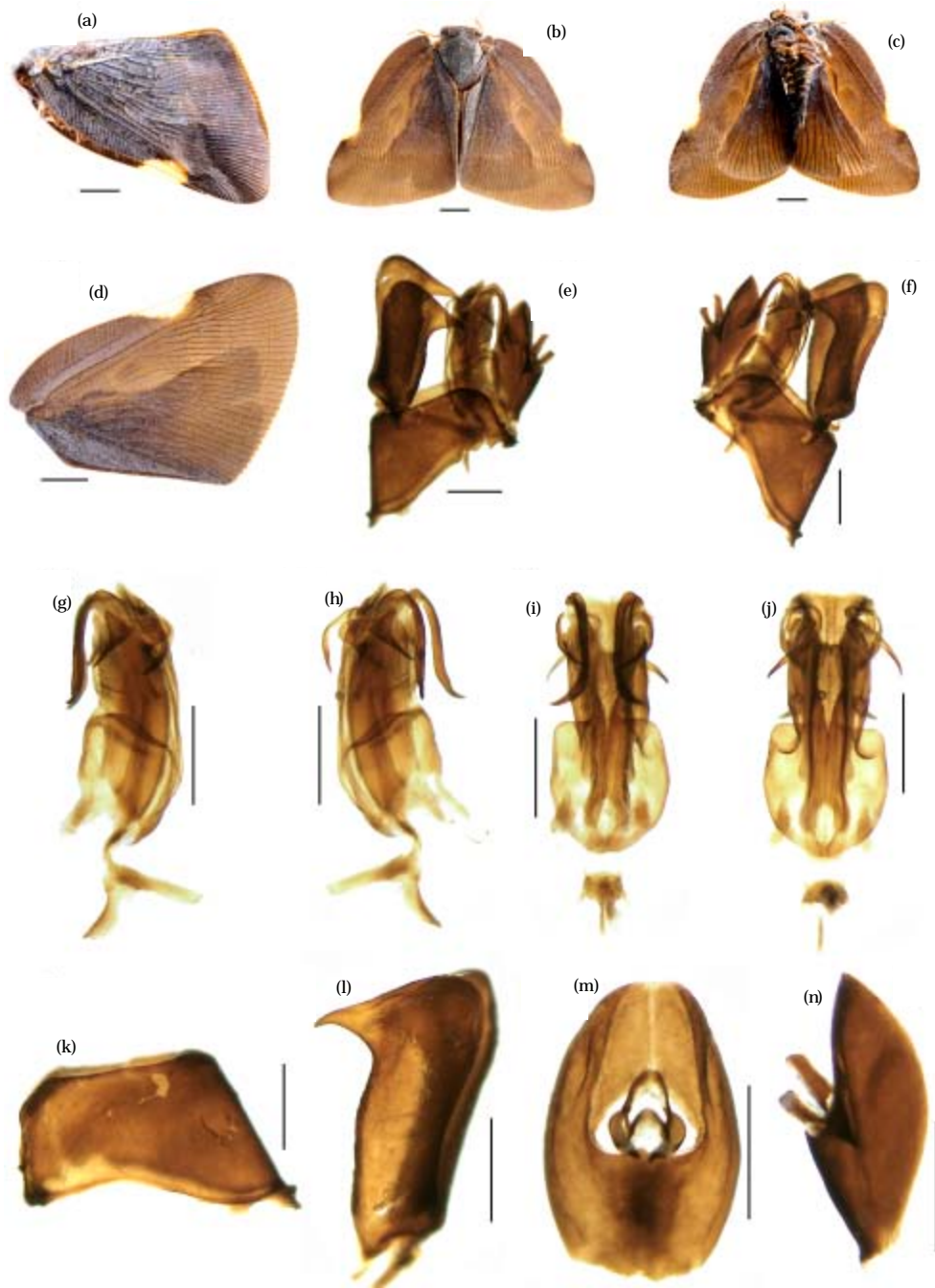


Fig. 3(a-n): *Pochazia shantungensis* (Chou and Lu, 1977). (a) Habitus (male, lateral view), (b) Habitus (male, dorsal view), (c) Habitus (male, ventral), (d) Forewing, (e) Male genital block (right lateral view), (f) Male genital block (left lateral view), (g) Aedeagus (left lateral view), (h) Aedeagus (right lateral view), (i) Aedeagus (dorsal view), (j) Aedeagus (ventral view), (k) Pygofer (lateral view), (l) Genital styles (lateral view), (m) Anal segment (dorsal view) and (n) Anal segment (lateral view). Scale bar (a-d) 2.0 mm, (e-n) 0.5 mm



Fig. 4: Nymph of *Pochazia shantungensis* (Chou and Lu, 1977) (lateral view)

Genital styles (Fig. 3l) symmetrical, large and slender, with a long apical process, in profile longer than wide (3.7:1). Pygofer (Fig. 3k), in lateral view, sclerotized with dorsal and anterior margin, at dorsocaudal portion without process.

Materials examined: 10 males and 10 females, Sinpung-myeon, Gongju-shi, Chungcheongnam-do province, Korea, 20.X.2011, YN Youn.

Host plant: Persimmon (*Diospyros kaki*), apple (*Malus domestica*), peach (*Prunus persica*) chestnut (*Castanea crenata*), five flavor berry (*Schisandra chinensis*), blueberry (*Vaccinium corymbosum*), Korean black raspberry (*Rubus coreanus*), ginkgo tree (*Ginkgo biloba*) etc., all observed by Jo and Youn.

Distribution: Korea (new record: central and south), China (Shantung, Zhejiang).

Remarks: This species was firstly identified based on the forewing pattern of a single female specimen in the original description (Chou and Lu, 1977). The external characters along with forewing pattern of Korean specimen have been compared with those of the holotype deposited in the collection of Northwestern A and F University, China and confirmed as the same species.

Description of male genitalic structures is provided for the first time in this paper. This species differs from the latter in: aedeagus with three pairs of sclerotized processes, dorsal and ventral processes moderately long, lateral one short; phallobase strongly constricted medially (in the latter, aedeagus with two pairs of sclerotized and one pair of thread-like membranous processes, dorsal process long, membranous; two lateral processes, one short and another long, both sclerotized, ventral process absent, phallobase slightly constricted medially). It may be separated from its other congeners by the shape and size of processes of aedeagus.

The abundance and infestation of this species on various fruit plants and roadside trees was reported from Zhejiang province mentioning with life spans, two generations per year in China (Shen *et al.*, 2007). In Korea, still research is going on about life span of this species but so far informed one generation (May-August) per year has been observed (Jo *et al.*, 2011) (Fig. 4).

Sudden outbreak of this species has been monitored sporadically throughout western part of Korean peninsula since 2009, being injurious to various fruit plants and trees. It is presumed that this exotic species may be introduced from China recently, as in the case of previously introduced lanternfly, *L. delicatula*. Therefore, further intensive investigations are needed for clarifying its bionomics and management strategies.

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