

First Record of the Genus *Kaochiaoja* Tao, 1963 (Hemiptera: Aphididae) in Korea

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한국의 미기록 속 *Kaochiaoja* Tao, 1963 [노린재목: 진딧물과]에 대한 보고

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ABSTRACT: The genus *Kaochiaoja* Tao, 1963 is newly recognized in Korea based on the type species *Kaochiaoja arthroxonis* (Takahashi, 1921). Diagnosis and illustrations for apterous viviparous females are given.

Key words: Aphids, *Arthroxon* sp., Macrosiphini, New record

초록: 본 연구에서는 *Kaochiaoja arthroxonis* (Takahashi, 1921) 종을 기반으로 *Kaochiaoja* Tao, 1963 속을 국내 최초로 보고한다. 무시형 처녀생식세대의 암컷 사진 형태 정보를 제시하였다.

검색어: 진딧물, 조개풀, 수염진딧물족, 미기록종

The monospecific genus *Kaochiaoja* (Aphididae: Aphidinae) was elected by Tao (1963) based on the type species *Kaochiaoja arthroxonis* (Takahashi, 1921) from Taiwan. Subsequently, this species has been recorded in India as *Micromyzus granotiae* (Ghosh et al., 1970) and Japan as *K. pollinae* (Miyazaki, 1971). Later, both species were synonymized as *K. arthroxonis* (Eastop and Blackman, 2005; Remaudière and Remaudière, 1997). This species is associated with various host-plants belonging to the family Poaceae such as *Arthroxon* sp., *Digitaria adscendens*, *Garnotia* sp. and *Microstegium vimineum*.

In this study, the genus *Kaochiaoja* is newly reported in Korea, based on *K. arthroxonis* collected on *Arthroxon hispidius*. A diagnostic note, biometric data and illustrations are given for apterous viviparous females.

Materials and Methods

Aphid samples were collected in Korea in 2014. Samples were preserved in 90% ethanol for a month, and then mounted in Canada balsam, following the method of Blackman and Eastop (2000) and Martin's (1983) methods. Illustrations for the species were taken by a digital camera attached to the microscope (Leica 400B, Leica Microsystems, Germany) at a resolution of 600 dpi. Measurements for each specimen are taken from the digital images by using image analysis software (Active measure ver. 3.0.3 from Mitani Co. Ltd, Japan). All specimens were preserved in the College of Agriculture and Life sciences, Seoul National University Korea (CALs).

Abbreviations used for diagnosis and biometric data are: ANT I-VI, antennal segments I-VI; BASE, base of the last antennal segment; PT, processus terminalis of the last antennal segment; BD III, basal diameter of antennal segment III; Ls

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ANT III, longest setae on ANT III; HT II, second segment of hind tarsus; SIPH, siphunculus; URS, ultimate rostral segment.

Taxonomy

Genus *Kaochiaoja* Tao, 1963 조개풀수염진딧물속(신칭)

Kaochiaoja Tao, 1963: 169.

Kaochiaoja Tao, 1963: Miyazaki, 1971: 134; Eastop and Hille Ris Lambers, 1976: 232; Remaudière and Remaudière, 1997: 105; Nieto Nafria et al., 2011: 232; Joshi and Blackman, 2017. Type species: *Myzus arthroxonis* (Takahashi, 1921).

Diagnosis. This genus is morphologically very similar to *Neomyzus* Goot, 1915 by having blunted setae on head and distinct dark dorsal patches, but can be distinguished by having no secondary sensoria in apterous viviparae (Eastop and Blackman, 2005).

Remarks. Systematic position of this genus has been highly controversial. Hille Ris Lambers considered this genus as *Neomyzus* van der Goot, 1915 and Basu (1970) followed his suggestion. However, additional studies on comparing these two genera have not yet been conducted.

Kaochiaoja arthroxonis (Takahashi, 1921) 조개풀수염진딧물(신칭) (Table 1; Figs. 1, 2)

Myzus arthroxoni Takahashi, 1921: 17, 22.

Myzus arthroxoni Takahashi, 1921: Takahashi, 1923: 83.

Kaochiaoja arthroxona Tao, 1963: 169.

Aulacorthum (*Neomyzus*) *anthroxoni* Basu, 1970: 357.

Kaochiaoja arthroxonis Eastop and Hille Ris Lambers, 1976: 232, 262, 296; Remaudière and Remaudière, 1997: 105.

Macrosiphum pollinae Shinji, 1924: 364.

Micromyzus granotiae Ghosh et al., 1970: 199.

Diagnosis. Apterous viviparous female. Body oval, 1.23-1.39 mm. Head pigmented with strong spicules dorsally and ventrally, head dorsum with 6 short and blunted setae, antennal tubercle developed. Antenna 1.05-1.14 × body length, ANT I-VI imbricated, antennal setae blunted almost invisible, without secondary sensoria, PT 3.55-5.10 × BASE. Rostrum not reaching or barely reaching middle coxae, URS short with 6 pointed setae. Meso- and metanotum, abdominal tergites I-IV and

VI-VIII pigmented with reticulate pattern. SIPH 0.13-0.16mm long, broadly reticulated with distal flange. Cauda cornical shaped 0.13-0.16 mm with 6-7 pointed hairs.

Materials examined. 15 apterous viviparous females, Mt. Chilgapsan, Cheongyang-gun, Chungcheongnam-do, South

Table 1. Biometric data of *Kaochiaoja arthroxonia* in Korea

Characters	Body part	Apterae (n=15)
Length (mm)	Body length	1.30 (1.23-1.39)
	Whole Antennae	1.43 (1.36-1.46)
	ANT I	0.07 (0.07-0.08)
	ANT II	0.06 (0.05-0.06)
	ANT III	0.32 (0.31-0.33)
	ANT IV	0.23 (0.22-0.24)
	ANT V	0.19 (0.18-0.20)
	BASE	0.11 (0.10-0.11)
	PT	0.47 (0.39-0.51)
	URS	0.06 (0.05-0.06)
	Hind femur	0.40 (0.37-0.43)
	Hind tibiae	0.73 (0.70-0.76)
	HT II	0.07 (0.07-0.07)
	SIPH	0.29 (0.25-0.32)
	Cauda	0.14 (0.13-0.16)
No. of setae on	Ls ANT III	0.01 (0.01-0.01)
	ANT I	5 (4-6)
	ANT II	3 (2-3)
	ANT III	6 (5-7)
	URS	6 (6-6)
	Cauda	7 (6-7)
No. of rhinaria on	ANT III	0
	ANT IV	0
Ratio (times)	Whole Antenna / body	1.10 (1.05-1.14)
	PT / BASE	4.46 (3.55-5.10)
	PT / ANT III	1.44 (1.18-1.59)
	URS / HT II	0.80 (0.71-0.86)
	URS / BASE	0.54 (0.45-0.60)
	SIPH / body length	0.22 (0.20-0.24)
	SIPH / ANT III	0.90 (0.76-1.03)
	SIPH / hind femur	0.72 (0.68-0.79)
	SIPH / cauda	2.01 (1.67-2.29)
	Cauda / width of cauda	1.95 (1.75-2.14)
	Ls ANT III / BD III	0.05 (0.05-0.05)

Abbreviations are explained in materials and methods.

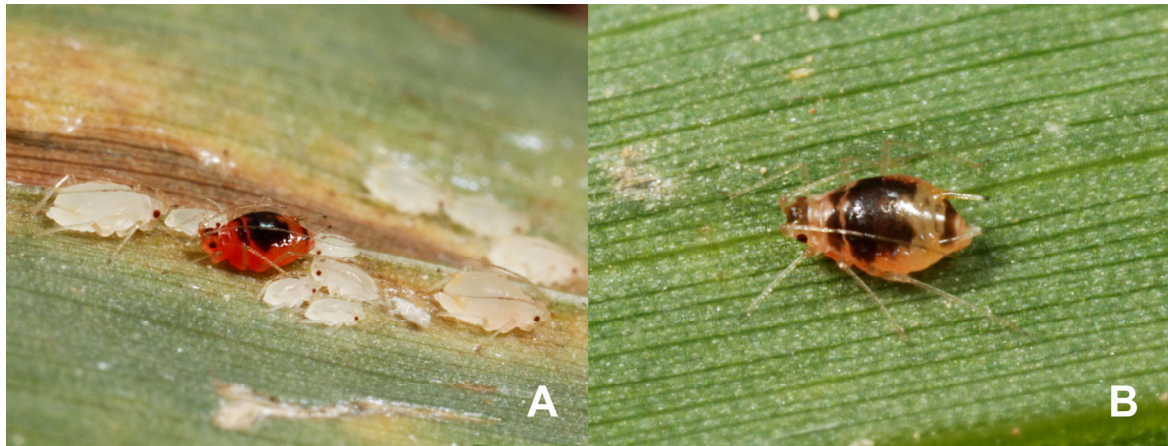


Fig. 1. *Kaochiaja arthroxonis* (A-B) in life. A, colony of *K. arthroxonis*; B, salmon pink colored apterous viviparous female of *K. arthroxonis*.

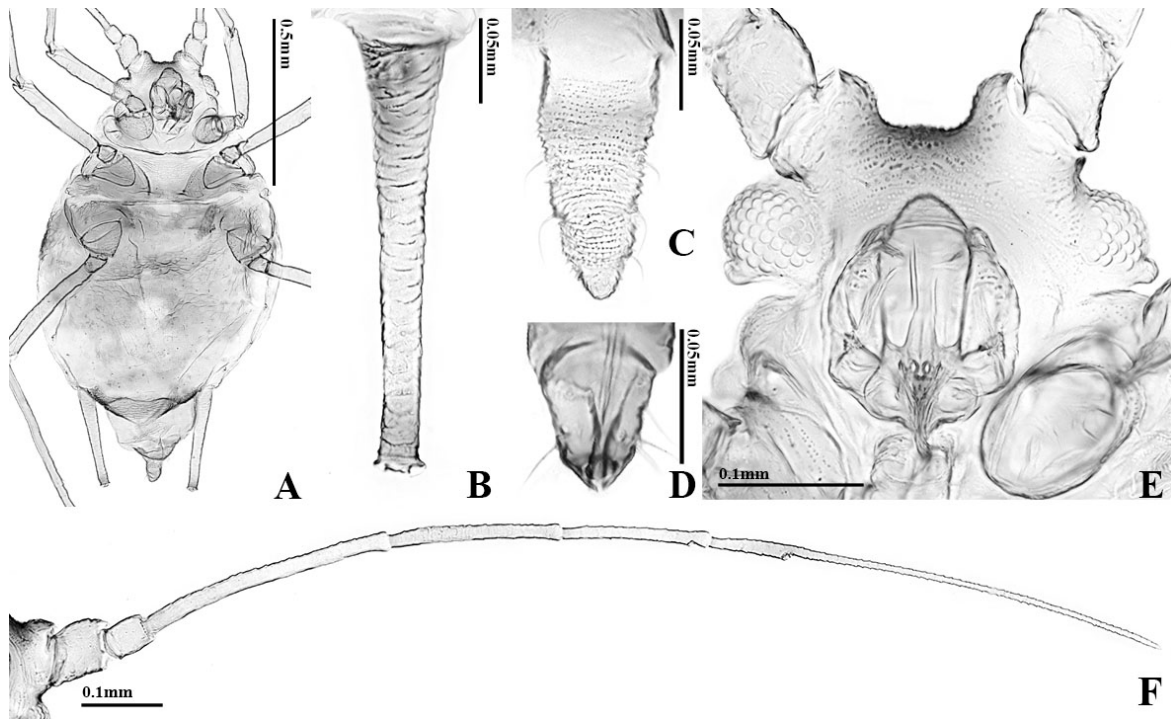


Fig. 2. Apterous viviparous female of *K. arthroxonis*. A, body; B, SIPH; C, cauda; D, URS; E, head; F, Antenna.

Korea, Hyoseok Lee leg., on *Arthroxon hispidius* (Poaceae), 26.vii.2014, no. 140726HS-2.

Host plant. Poacea: *Arthroxon hispidius* (Korea), *Digitaria adscendens* (Japan), *Garnotia* sp. (India) and *Microstegium vimineum* (Japan).

Distribution. Korea, Japan, Taiwan and India.

Remarks. This species is new to Korea. Currently, this species is only collected in Mt. Chilgapsan in Korea. According to Miyazaki (1971), body color is variable in life (salmon pink

to reddish brown with shine). Korean specimens also exhibit variable body color (Fig. 1). The only other congeneric species, *K. sikkimensis* Joshi and Blackman, 2017, has entirely shining black body (Joshi and Blackman, 2017).

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Literature Cited

- Basu, A.N., 1970. Further records of new and little known aphids (Homoptera) from West Bengal, India. *Orient. Insects* 3, 355-371.
- Blackman, R.L., Eastop, V.F., 2000. *Aphids on the world's crops. An Identification and Information guide*, 2nd eds. John Wiley and Sons, London, 1460 pp.
- Eastop, V.F., Blackman, R.L., 2005. Some new synonym in Aphididae (Hemiptera: Sternorrhyncha). *Zootaxa* 1089, 1-36.
- Eastop, V.F., Hille Ris Lambers, D., 1976. *Survey of the World's Aphids*. W. Junk, The Hague, 573 pp.
- Ghosh, A.K., Ghosh, M.R., Raychaudhuri, D.N., 1970. Studies on the aphids (Homoptera: Aphididae) from Eastern India. *Orient. Insects* 4, 193-203.
- Joshi, S., Blackman, R.L., 2017. A new bamboo-feeding species of *Kaochiaoja* Tao (Hemiptera: Aphididae) from India. *Zootaxa* 4363(4), 569-575.
- Miyazaki, M., 1971. A revision of the tribe Macrosiphini of Japan (Homoptera: Aphididae, Aphidinae). *Insecta Matsumurana* 34, 1-247.
- Nieto Nafria, J.M., Favret, C., Akimoto, S., Barbagallo, S., Chakrabarti, S., Mier Durante, M.P., Miller, G.L., Qiao, G., Sano, M., Pérez Hidalgo, N., Stekolshchikov, A.V., Wegierek, P., 2011. Register of genus-group taxa of Aphidoidea, in: Nieto Nafria, J.M., Favret, C. (Eds.), *Registers of Family-Group and Genus-Group Taxa of Aphidoidea (Hemiptera Sternorrhyncha)*. Universidad de León, León, pp. 81-404.
- Remaudière, G., Remaudière, M., 1997. *Catalogue of the World's Aphididae*. INRA, Paris, pp. 473.
- Shinji, O., 1924. New aphid species from Morioka. *Dobuts. Zasshi (Zoological Magazine)* 36, 343-373.
- Takahashi, R., 1921. *Aphididae of Formosa 1*. Rep. Gov. Res. Inst. Formosa. 20, 1-97.
- Takahashi, R., 1923. *Aphididae of Formosa 2*. Rep. Gov. Res. Inst. Formosa. 4, 1-173.
- Tao, C.C., 1963. Revision of Chinese Macrosiphinae. *Plant Protect. Bull.* 5, 162-205.