

A New Record of *Sinomegoura citricola* (van der Goot, 1917) (Sternorhyncha: Aphididae) from Korea

한국 미기록 진딧물 *Sinomegoura citricola* (van der Goot, 1917) (Sternorhyncha: Aphididae)의 보고

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Abstract – *Sinomegoura citricola* (van der Goot, 1917) is recognized on *Citrus unshiu* Markovich (Rutaceae), *Photinia glabra* (Thunb.) Maxim (Rosaceae), and *Cinnamomum loureirii* Nees (Lauraceae) from Jeju-do, Korea. Apterous viviparous female, alate viviparous female, and an intermediate morph between the apterous female and alate female are described. This is the first record of the genus *Sinomegoura* in Korea.

Key Words – Sternorhyncha, Aphididae, *Sinomegoura citricola*, Korea, intermediate morph

초 록 – 제주도의 감귤, 육계나무, 홍가시나무에서 현재까지 국내에 알려지지 않았던 진딧물 *Sinomegoura citricola* (van der Goot, 1917)가 확인되었다. 무시형 산자충 및 유시형 산자충의 외부형태에 대해 도면과 함께 기술하고, 분포지역 및 기주식물 정보를 제공한다. 또한 유시형과 무시형의 중간형을 띠는 개체에 대해 처음으로 보고한다. *Sinomegoura* 속은 한반도에서 처음으로 기록되는 속이다.

검색어 – 매미목, 진딧물과, *Sinomegoura citricola*, 대한민국, 유/무시 중간형

Sinomegoura is a Macrosiphine genus distributed in the subtropical region, comprising 7 valid species which have been described mostly from South Eastern Asia and East Asia (Remaudière & Reamudière, 1997; Noordam, 1986). The genus is similar to *Acyrtosiphon* Mordvilko 1914, but can be distinguished by the reticulated abdominal tergum, the swollen calf-shaped siphunculi, and an elongate cauda.

Sinomegoura citricola (van der Goot, 1917) is a rather widely distributed species in the subtropical region

of Asia from India to Japan (Blackman and Eastop 2000); *Sinomegoura coffeae* Noordam 1986 and *Sinomegoura symplocois* (van der Goot, 1917) from Java (Noordam, 1986); *Sinomegoura nepalensis* Das & Raychaudhuri, 1983 and *Sinomegoura pyri* Ghosh & Raychaudhuri, 1968 from Indian Subregion (Das & Raychaudhuri, 1983; Ghosh & Raychaudhuri, 1968); *Sinomegoura rhododendri* (Takahashi, 1937) from Phillipine and India (Chakrabarti, Mandal & Raha, 1983); and *Sinomegoura photiniae* (Takahashi, 1936)

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from Japan and China respectively (Miyazaki, 1971).

Recently, we collected several samples of *S. citricola* in Jeju-do, the southernmost island of Korean Peninsula. In the present study, the apterous viviparous female and alate are described, and an intermediate morph between apterous viviparous female and alate viviparous female is reported for the first time. This is the first report for the genus *Sinomegoura* from Korea.

Abbreviations used in this paper as follows: Ant. I, II, III, IV, V, VI, antennal segment I, II, III, IV, V, and the base of Ant. VI, respectively; PT, processus terminalis; URS, ultimate rostral segment; 2HT, second segment of hind tarsus; SIPH, siphunculus; apt., apterous viviparous female; al., alate viviparous female; ny., nymph.

Materials used in this paper are deposited in the National Institute of Agricultural Science and Technology (NIAST), Suwon, Korea.

Systematic Accounts

Genus *Sinomegoura* Takahashi, 1960

Sinomegoura Takahashi, 1960: Kontyu 28: 223-229.

Type species: *Acyrtosiphon photinae* Takahashi, 1936.

Sinomegoura citricola (van der Goot, 1917)

굴수염진딧물 (신칭) (Figs. 1 & 2)

Macrosiphoniella citricola van der Goot, 1917: 34; Takahashi, 1923: 76.

Tuberosiphum camphorae Shinji, 1922: 789.

Megoura jacobsoni Mason, 1927: 88.

Megoura citricola: Takahashi, 1929: 252; Shinji, 1941: 895; Moritsu, 1948: 85.

Sinomegoura citricola: Takahashi, 1960: 228; Eastop, 1966: 476; Remaudière & Reamudière, 1997: 143.

Description: Apterous viviparous female (Fig. 1).

Colour (in life): reddish brown or brown. Ant. I-II black; Ant. III-V pale except distal end of each segment black; Ant. VI black. Legs pale brown on coxae, trochanter, basal half of femur and distal apex of tibia; otherwise black. Siphunculi pale at base, dark brown on distal 2/3. Cauda black. *Colour (in macerated specimens)*: Head pale brown, thorax and abdomen pale except tergite VIII with dark transverse band.

Antennae dark brown on Ant. I-II, distal 1/5 of Ant. III, distal 1/2 of Ant. IV and Ant. V, and whole Ant. VI; otherwise pale or pale brown. Ultimate rostral segment dark brown. Legs pale brown except distal 1/3 of femur, distal end of tibia, and tarsus dark brown. Siphunculi and genital plate brown. Cauda dark brown.

Morphology. Body spindle-shaped, 2.85-3.25 mm long. **Head**: smooth with 4 pairs of dorsal hairs, 2 pairs posteriorly and 2 pairs anteriorly close to vertex. Antennal tubercle developed moderately, spinulated on ventral surface, bearing 3 hairs on both sides. Frons with a pair of hairs. Longest hair on dorsum as long as basal width of Ant. III. Antennae long, 0.96-1.11 x as long as body length: Ant. I and Ant. II partly granulated with 6-10 and 3-4 hairs respectively; Ant. III smooth with 0-3 secondary rhinaria on basal 1/4, ca. 26 short hairs, longest hairs 1/3 x as long as basal width of segment; Ant. IV and Ant. V weakly imbricated, primary rhinarium on Ant. V ciliated, small, longest diameter 1/2 x as long as middle width of segment; Ant. VI strongly imbricated, PT 2.63-2.96 x as long as base of Ant. VI. Rostrum attaining hind coxae; clypeus with 4 hairs and mandibular laminae with 3-4 hairs on each side; ultimate rostral segment wedge-shaped, 1.24-1.50 x as long as second segment of hind tarsus, 1.35-1.59 x as long as Ant. VI base, bearing 2 pairs of secondary hairs. **Thorax**: reticulated dorsally with a pair of spinal hairs and a marginal hair on each side. Hind coxae spinulated with 9 hairs; trochanter smooth with 3 hairs; femur smooth, but weakly spinulated distally with short hairs, longest one 1/4 x as long as basal width of segment; tibia smooth with longest hair shorter (3/4x) than middle width of segment; first tarsal chaetotaxy 3:3:3; second segment of hind tarsus imbricated with 2 dorsal and 4-5 ventral hairs. **Abdomen**: reticulated dorsally with 8-13 hairs on tergite III including marginal ones, 5-9 on tergite VI between siphunculi and 4-6 on tergite VIII; longest hairs on tergite III 1/5 x as long as basal width of hind femur. Siphunculi cylindrical, widest at base; smooth on basal 1/3, sparsely spinulated on distal 2/3, as long as or slightly shorter (0.86-1.00x) than cauda. Cauda elongated, pointed apically with 14-16 hairs. Genital plate with 2-3 median long hairs and 13-18 short hairs on posterior margin.

Alate viviparous female (Fig. 2, A-E). *Colour (in macerated specimens)*. Head and thorax dark brown.



Fig. 1. Apterous viviparous female *Sinomegoura citricola* (van der Goot). A, apterous female; B, ultimate rostral segment (URS); C, head (focused on dorsal surface); D, hind tarsus; E, abdominal tergite (reticulation); F, antennal segment IV; G, antennal segment V; H, antennal segment III; I, antennal segment VI; J, hind tibia and tarsus; K, siphunculus (SIPH); L, cauda.



Fig. 2. Alate viviparous female (A-E) and an intermediate morph (F-H) between apterous viviparous female and alate viviparous female of *Sinomegoura citricola* (van der Goot). A, Alate viviparous female; B, hind wing; C, antennal segment III; D, siphunculus; E, cauda; F, intermediate morph; G, antennal segment III; H, underdeveloped wing trace.

Table 1. Biometric data of *Sinomegoura citricola* (van der Goot) from Jeju-do, Korea

Part	Apterous vivipara (n=8)			Alate vivipara (n=4)			
	Min.	Max.	Avr.	Min.	Max.	Avr.	
Length of (in mm)	body length (L)	2.85	3.25	3.07	2.35	2.55	2.45
	whole antennae (A)	3.00	3.38	3.16	3.10	3.20	3.14
	antennal segment I (Ant. I)	0.16	0.18	0.17	0.15	0.16	0.16
	antennal segment II (Ant. II)	0.11	0.13	0.12	0.11	0.12	0.11
	antennal segment III (Ant. III)	0.74	0.88	0.80	0.70	0.74	0.73
	antennal segment IV (Ant. IV)	0.63	0.69	0.65	0.63	0.67	0.65
	antennal segment V (Ant. V)	0.57	0.68	0.62	0.62	0.66	0.64
	antennal segment VI base (Ant. VIb)	0.22	0.25	0.24	0.23	0.25	0.24
	processus terminalis (PT)	0.63	0.71	0.67	0.70	0.75	0.74
	ultimate rostral segment (URS)	0.16	0.19	0.17	0.17	0.17	0.17
	hind tibia	0.12	0.14	0.13	0.11	0.12	0.11
	hind femur	1.00	1.05	1.03	1.70	1.88	1.79
	hind tarsus II (2HT)	0.12	0.14	0.13	0.93	1.00	0.96
	Siphunculi (S)	0.48	0.54	0.51	0.42	0.43	0.42
	Cauda (C)	0.51	0.60	0.56	0.37	0.40	0.39
Ratio	A/L	0.96	1.11	1.03	1.23	1.33	1.28
	URS/2HT	1.24	1.50	1.38	1.48	1.55	1.51
	URS/Ant. VIb	1.35	1.59	1.47	1.36	1.48	1.40
	PT/Ant. VIb	2.63	2.96	2.82	2.91	3.26	3.03
	S/C	0.86	1.00	0.91	1.05	1.16	1.10
No. of hairs on	Ant. I	6	10	7.88	7	9	7.75
	Ant. II	3	4	3.88	4	4	4.00
	ML	3	4	3.13	3	3	3.00
	URS	4	4	4.00	4	4	4.00
	tergite III	8	13	11.00	11	12	11.50
	tergite VI between SIPH	5	9	7.00	7	8	7.50
	tergite VIII	4	6	4.75	4	4	4.00
cauda	14	16	15.25	14	16	15.00	
No. of rhinaria on	Ant. III	0	3	2.13	20	23	21.00
	Ant. IV	—	—	—	0	2	0.50

Abdomen with marginal pigmented sclerites on each segment. Wings pale, transparent except costal vein and stigma dark brown. Morphology. Body 2.35~2.55 mm long. Antennae much longer (1.23~1.33x) than body length; Ant. III with 20~23 secondary rhinaria distributed throughout segment in a line; Ant. IV with 0-2 secondary rhinaria. Abdomen with lateral tubercles on tergite I~IV. Otherwise like apterous female.

Intermediate morph between alate viviparous female and apterous female (Fig. 2, F-H). One sample on *Photinia glabra* retain the intermediate characteristics between apterous viviparous female and alate viviparous female. General shape is apparently apterous viviparous female, but Ant. III has 18~20 secondary rhinaria distributed throughout the segment and thorax has the trace of wing development which can be seen only in the last nymph of alate morph (Fig. 2, H). This form seems not to be the underdevelopment or malformation of alate viviparous female, but the intermediate form which was misled in postnatal development or

erroneously programmed in embryo genesis.

Specimens examined: Six apterous viviparous females and an intermediate morph between apterous viviparous female and alate viviparous female, and 3 nymphs, Shinheung-ri, Namwon-eup, Namjeju-gun, Jeju-do, Korea, 10.vi.1998, on *Photinia glabra* (Thunb.) Maxim (Rosaceae), leg. S. H. Lee; 3 alate viviparous female and 3 nymphs, Yeon-dong, Jeju-si, Jeju-do, Korea, 24.v.2000, coll.# 000523-JY37 on *Cinnamomum loureirii* Nees (Lauraceae), leg. J. Y. Choi; 1 alate viviparous female, Gueom-ri, Aewol-myeon, Bukjeju-gun, Jeju-do, 9.vi.1998, on commercial cucumber, *Cucumis sativus* L. (Cucurbitaceae) (probably accidental visit, not a true host), leg. S. H. Lee; 2 apterous viviparous females, Citrus Experiment Station, Namwon-eup, Namjeju, Jeju-do, 4.v.1998, on *Citrus unshiu* Markovich (Rutaceae), leg. D. H. Kim.

Host plants. Korea: *Photinia glabra*, *Cinnamomum loureirii*, and *Citrus unshiu* (new host records). **Japan** (after Miyazaki, 1971): *Acronychia pedunculata* Miq.,

Buxus liukiensis Makino, *Cinnamomum* spp. (*camphora* T. Nees & Eberm., *japonicum* Sieb. ex Nakai, *zeylanicum* Blume), *Eugenia densiflora* DC., *Eurya japonica* Thunb., *Ficus obscura* Blume, *Lagerstroemia indica* L., *Lasianthus* sp., *Litsea* sp., *Murraya exotica* L., *Musa basjoo* Siebold, *Pieris ovalifolia* D. Don, *Trachycarpus fortunei* H. Wendl., *Viburnum odoratissimum* Ker-Gawl. **China** (after Tao, 1968): *Bauhinia variegata* L., *Bridelia ovata* Decne., *Camellia japonica* L., *Canarium album* Raeusch. **Java** (after Noordam, 1986): *Annona muricata* L., *Antidesma bunius* (L.), *Bixa orellana* L., *Cinnamomum (burmanni)* Nees ex Bl., *multiflorum* Wight, *verum* J.S. Presl, *Citrus aurantium* L., *Dendrophthoe pentandra* (L.), *Ixora* sp., *Litsea amara* Bl., *Michelia montana* Bl., *Murraya koenigii* (L.), *Persea americana* Mill., *Piper aduncum* L., *Psidium guajava* L., *Ravensana aromatica* Gmel., *Scurrula* sp., *S. philippensis* (Cham. & Schlecht.), *Syzygium pycnanthum* Merr. & Perry. **Sumatra** (after Mason, 1927): *Gardenia florida* L. **Australia** (after Eastop, 1966): *Mangifera indica* L., *Sargocephalus bartlingii* (DC.) Miq.

Biology: The aphids were found on the lower sides of new leaves, on developing shoots, and on flowers (*Cinnamomum*) or flower stems (*Persea*) (Noordam, 1986). Small colonies were found on new leaves and stems of *Photinia glabra* (Thunb.), *Cinnamomum loureirii* Nees, and *Citrus unshiu* Markovich in Jeju-do, Korea.

Distribution: Korea (Jeju-do), Japan, China, Taiwan, India, Nepal, Philippines, Singapore, Indonesia (Java,

Sumatra), New Guinea, Australia.

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Literature Cited

- Blackman, R.L. and V.F. Eastop. 2000. Aphids on the world's crops. An identification and information guide. Second Edition. 466 pp. The Natural History Museum, London.
- Chakrabarti, S., A.K. Mandal and S. Raha. 1983. Rhododendron infesting aphids (Homoptera: Aphididae) of the Himalayas. Zool. J. Linnean Society. 78: 349~362.
- Das, B.C. and D.N. Raychaudhuri. 1983. Aphids (Homoptera: Aphididae) of Nepal. Rec. Zool. Survey India occ. Paper No. 51: 79 pp.
- Eastop, V.F. 1966. A taxonomic study of Australian Aphidoidea (Homoptera). Australian J. Zool. 14: 399~592.
- Ghosh, A.K. and D.N. Raychaudhuri. 1968. New aphids from Northeast India (Homoptera). Ann. Entomol. Soc. Am. 61: 752~755.
- Mason, P.W. 1927. Fauna Sumatrensis. Suppl. Ent. 15: 86~90.
- Miyazaki, M. 1971. A revision of the tribe Macrosiphini of Japan (Homoptera: Aphididae, Aphidinae). Insecta Matsumurana. 34(1): 1~247.
- Noordam, D. 1986. Aphids of Java. Part II: *Sinomegoura* Takahashi, 1960 (Homoptera: Aphididae) with a new species from *Coffea*. Zoologische Mededelingen. 60: 39~61.
- Remaudière, G. and M. Remaudière. 1997. Catalogue of the world's Aphididae. Homoptera Aphidoidea. 473 pp. Institut National de la Recherche Agronomique.
- Tao, C.C. 1963. Revision of Chinese Macrosiphinae (Aphidae, Homoptera). Plant Protect. Bull. Taiwan 5: 162~205.

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