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Four species of the phytoseiid mites from Cheju Island in Korea (Acari, Phytoseiidae)

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ABSTRACT *Amblyseius* (*Amblyseius*) *barkeri*, *A.* (*A.*) *womersleyi*, *A.* (*A.*) *eharai*, and *Phytoseius* (*Pennaseius*) *hongkongensis* are recorded from the Cheju Island for the first time. *A.* (*A.*) *barkeri* and *P.* (*P.*) *hongkongensis*, previously unrecorded in Korea, are redescribed based on specimens from this island. The subgenus *Pennaseius* is recorded for the first time in this country.

KEY WORDS Acari, *Amblyseius* (*Amblyseius*) *barkeri*, *A.* (*A.*) *eharai*, *A.* (*A.*) *womersleyi*, Cheju Is., Korea, New locality species, Phytoseiidae, *Phytoseius* (*Pennaseius*) *hongkongensis*

초 록 제주도산 이리응애 4종인 *Amblyseius* (*Amblyseius*) *barkeri*, *A.* (*A.*) *womersleyi*, *A.* (*A.*) *eharai*와 *Phytoseius* (*Pennaseius*) *hongkongensis*를 보고한다. 그 중에서 한국미기록종인 *Amblyseius* (*Amblyseius*) *barkeri*(나팔이리응애)와 *Phytoseius* (*Pennaseius*) *hongkongensis*(홍콩이리응애)를 재기재하였다. *Pennaseius*아속은 한국에서 처음으로 보고된다.

검색어 긴꼬리이리응애, 긴털이리응애, 나팔이리응애, 제주도, 이리응애과, 응애아강, 한국미기록종, 홍콩이리응애

INTRODUCTION

Phytoseiid mites are predators of plant feeding mites. Therefore, many phytoseiids are used as biological control agents in a number of agricultural ecosystem. Up to the present, 36 species of phytoseiid mites have been recorded in Korea. But, the phytoseiids are little known from Cheju Island. In this paper, 4 species of the phytoseiid mites are recorded from this island for the first time; *Amblyseius* (*Amblyseius*) *barkeri*, *A.* (*A.*) *womersleyi*, *A.* (*A.*) *eharai*, and *Phytoseius* (*Pennaseius*) *hongkongensis*. Among them, 2 newly recorded Korean species, *A.* (*A.*) *barkeri* and *P.* (*P.*) *hongkongensis* are redescribed based on specimens from Cheju Island. The subgenus *Pennaseius* belonging to the genus *Phytoseius* is recorded for the first time in Korea. The genus *Phytoseius* has 2 subgenera, *Phytoseius* Ribaga, 1904 and *Pennaseius* Pritchard et Baker, 1962. The females of the subgenus *Pennaseius* are characterized by seta R1 present on the interscutal membrane, whereas those of the subgenus *Phytoseius* are characterized by seta R1 absent.

MATERIALS AND METHODS

The materials were collected with leaves of 6 plant species in the Cheju Island from 1994 to 1995. The specimens were kept in 70% alcohol and mounted on slides with Down's (1943) PVA solution. The setal nomenclature was based on that of Rowell *et al.* (1978). All measurements are given in micrometers.

DESCRIPTION

Amblyseius (*Amblyseius*) *barkeri* (Hughes) 나팔이리응애 (신칭)

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(Figs. 1-6)

Neoseiulus barkeri, Hughes, 1948, p. 141, Figs. 200-206; Ragusa and Athias-Henriot, 1983, p. 659, Fig. 8.

Typhlodromus (*Neoseiulus*) *barkeri*: Nesbitt, 1951, p. 35, pl. 12, Figs. 31, 33; Ehara, 1966, p. 18.

Typhlodromus (*Typhlodromus*) *barkeri*: Chant, 1959, p. 61, Figs. 72, 73.

Amblyseius barkeri: 124-126; Athias-Henriot, 1966, p. 215, Figs. 24, 32, 129; Tuovinen, 1993, p. 107, Fig. 25.

Amblyseius (*Amblyseius*) *barkeri*: Ehara, 1972, p. 147, Figs. 42-48; Ehara, Okada and Kato, 1994, p. 124.

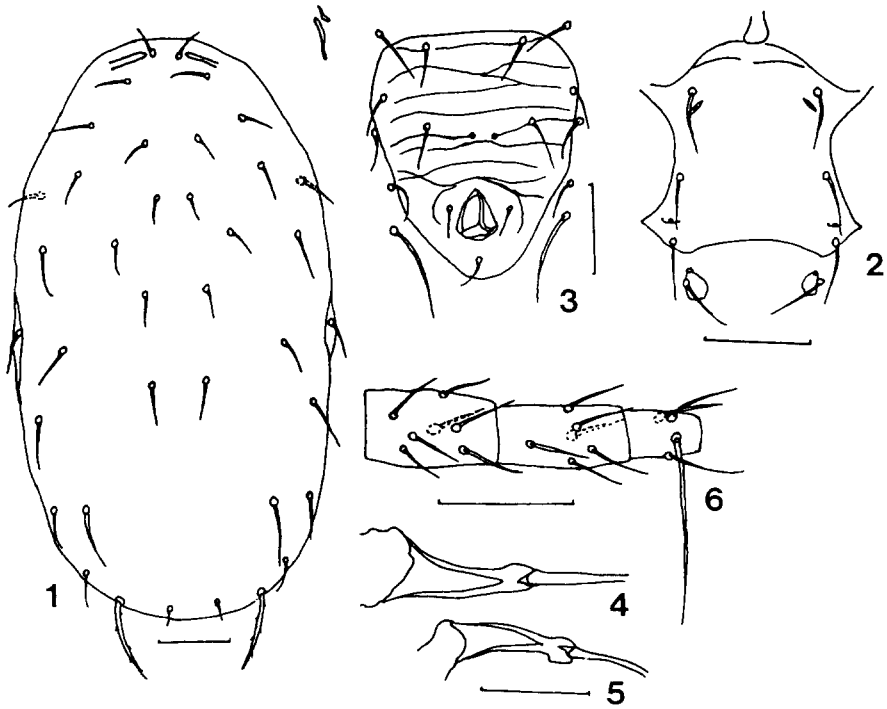
Female. Dorsal shield smooth; 347 long, 199 wide. Setae on dorsal shield: Z5 the longest, barbs; Z4 longer than s4; remaining setae much shorter, smooth. Sternal shield with posterior margin concave, with 3 pairs of setae; metasternal platelets longer than wide. Ventrianal shield much longer than wide, wider than genital shield; 3 pairs of preanal satae; a pair of crescentric pores almost between and slightly behind setae JV2. Setae JV5 smooth. Two pairs of slender metapodal platelets. Spermatheca as figured (Figs. 4-5). Peritreme not extending to seta j1; peritrematal shield fused anteriorly with dorsal shield. Chaetotaxic formula; genu II, 2-2/0, 2/0-1, genu III, 1-2/1, 2/0-1. Basitarsus IV with 1 macroseta. Lengths of setae (n = 2): j1 17.7, j3 25.2, j4 19.3, j5 18.5, j6 19.3, J2 24.8, J5 15.1, z2 24.8, z4 24.4, z5 17.2, Z1 27.3, Z4 39.9, Z5 55.9, s4 32.4, S2 30.3, S4 28.2, S5 21.0, r3 25.6, R1 22.3, JV5 50.0, macrosetae on basitarsus IV 65.1.

Male. Not known

Material examined. One ♀, Samyangdong, Chejushi, Cheju Is., 4-IX-1995, on *Cucumis sativus* L. (K. S. Lee leg.); 1 ♀, Yusuwonri, Hanlim, Cheju Is., 5-IX-1995, on *Cucumis sativus* L. (K. S. Lee leg.).

Distribution. Korea, Africa, China, England, Europe, Israel, Japan, Turkey, Ukraine.

Remark. According to Mr. Lee's observation, *A.* (*A.*) *barkeri* feeds on thrips on *Cucumis sativus* L. This



Figs. 1-6. *Amblyseius* (*Amblyseius*) *barkeri* (♀). 1, Dorsum of idiosoma; 2, Sternal shield; 3, Ventrianal shield; 4-5, Spermatheca; 6, Genu, tibia and basitarsus of leg IV. (Scales: 1,2,3,6=50 μm; 4,5=20 μm).

species is found usually indoors in Japan. (Ehara, 1972). *A.* (*A.*) *barkeri* has a haploid number of 4 and a diploid number of 8 chromosomes, and is arrhenotokous (Wysoki, 1973).

Amblyseius (*Amblyseius*) *eharai* Amitai et Swirski
긴꼬리이리응애

Amblyseius eharai Amitai et Swirski, 1981, p. 60, Figs. 1-3, 6-8, 12-13; Ryu, 1996, p. 60.

Amblyseius (*Amblyseius*) *eharai*: Ryu, 1993, 101, Figs. 35-44.

Amblyseius deleoni (*nec* Muma et Denmark): Lee and Ryu, 1989, p. 216, Fig. 1A-H.

This species is recorded for the first time from Cheju Island.

Specimens examined. Five ♀♀, Sogwipo, Cheju Is., 10-VIII-1994, on *Orixa japonica* Thunb. (M. O. Ryu leg.); 3 ♀♀, Kujwa, Cheju Is., 10-VIII-1994. on *Mallotus japonicus* Muell.-Arg. (M. O. Ryu leg.).

Distribution. Korea, China, Japan, Taiwan.

Amblyseius (*Amblyseius*) *womersleyi* Schicha
긴털이리응애

Amblyseius womersleyi Schicha, 1975, p. 101, Figs. 1-9; Ryu, 1996, p. 58, Figs. 1-4.

Amblyseius longispinosus (*nec* Evans): Lee and Ryu, 1989, p. 219, Fig. 3A-G; Ryu and Ehara, 1990, p. 148, Fig. 13.

Amblyseius (*Amblyseius*) *longispinosus* (*nec* Evans): Ryu, 1993, p. 95, Figs. 3-10.

This species is recorded for the first time from Cheju Island.

Specimens examined. One ♀, Chungmun, Cheju Is., 10-VIII-1994, on *Ficus carica* L. (M. O. Ryu leg.); 1 ♀, Samyangdong, Chejushi, Cheju Is., 4-IX-1995, on *Solanum tuberosum* L. (K. S. Lee leg.).

Distribution. Korea, Australia, China, Japan, Taiwan

Phytoseius (*Pennaseius*) *hongkongensis* Swirski et Shechter
홍콩이리응애 (신칭)

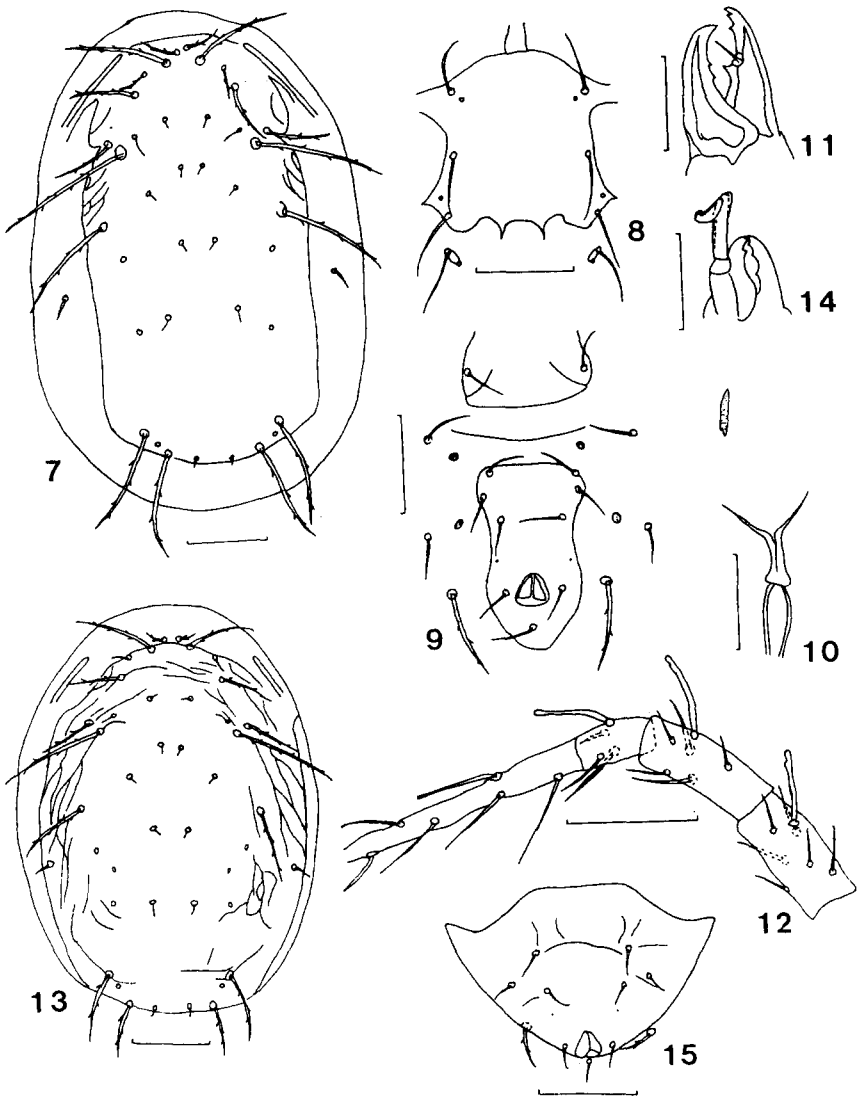
(Figs. 7-15)

Phytoseius (*Phytoseius*) *honkongkensis* Swirski et Shechter, 1961, p. 99, Figs. 1-5; Amitai and Swirski, 1966, p. 19, Fig. 2; Denmark, 1966, p. 44. Fig. 17.

Phytoseius (*Pennaseius*) *honkongkensis*: Ehara, 1966, p. 25; Ehara and Lee, 1971, p. 70, Figs. 32-37; Ehara, 1972, p. 169, Fig. 81; Ehara, Okada and Kato, 1994, p. 145.

Female. Dorsal shield lightly reticulated laterally; 272 long, 144 wide; 3 pairs of conspicuous solenostomes. Setae on dorsal shield: j1, j3, z2, z3, Z4, Z5, s4, s6 and r3 serrate; the remainning setae shorter, smooth; s4 the longest; j3 as long as Z4 and Z5, slightly shorter than s6; z3 as long as r3, longer than j1; R1 on interscutal membrane, smooth. Sternal shield with posterior margin with indentation, with 3 pairs of setae; metasternal platelets longer than wide. Ventrianal shield much longer than wide, with lateral margins strongly concave, slightly narrower than genital shield; 3 pairs of preanal setae; a pair of small preanal pores caudal to posterior pair of preanals (JV2). Seta JV5 stout, serrate. A pair of slender metapodal platelets. Spermatheca as figured (Fig. 10). Fixed digit of chelicera with 3 teeth, with pilus dentilis; movable digit with 2 teeth. Peritreme not extending to seta j1; peritrematal shield fused anteriorly with dorsal shield. Chaetotatic formula; genu II 2-2/0, 2/0-1, genu III 1-2/0, 2/0-1. Leg IV with 4 macrosetae, genu, tibia, basitarsus and telotarsus; apex of genual and tibial macroseta with a lateral notch. Lengths of setae (n=10, Mean±S.E.): j1 28.4±0.4, j3 64.6±0.7, j4 6.0±0.1, j5 6.2±0.1, j6 6.9±0.2, J2 9.6±0.3, J5 7.4±0.2, z2 18.2±0.4, z3 44.8±0.7, z4 12.8±0.9, z5 6.0±0.1, Z4 67.7±0.9, Z5 68.8±0.8, s4 88.5±0.9, s6 75.2±0.7, r3 42.6±0.6, R1 16.2±0.4, JV5 49.0±0.6, macrosetae on leg IV: genu 25.6±0.3, tibia 29.4±0.5, baistarsus 28.4±0.3, telotarsus 30.8±0.5.

Male. Dorsal shield reticulated laterally; 223 long, 132 wide; at least 4 pairs of small pores. Seta R1 dorsal shield. Peritreme extending to seta z2 level. Ventrianal shield not fused with peritrematal shield, 3 pairs of preanal setae; a pair of small preanal pores. Fixed di-



Figs. 7-15. *Phytoseius* (*Pennaseius*) *hongkongensis* 7, Dorsum of idiosoma (♀); 8, Sternal shield (♀); 9, Posterior of ventral surface (♀); 10, Spermatheca; 11, Chelicera (♀); 12, Tarsus, tibia and genu of leg IV (♀); 13, Dorsum of idiosoma (♂); 14, Chelicera (♂); 15, Ventrianal shield (♂). (Scales: 7,8,9,12,13,15=50 μm; 10,11,14=20 μm).

git of chelicera with 3 teeth, the movable digit unidentate; spermatodactyl as figured (Fig. 14). Leg IV with 4 macrosetae, genu, tibia, basitarsus and telotarsus; apex of genual and tibial macroseta with a lateral notch. Lengths of setae (n = 1): j1 20.2, j3 48.7, j4 5.9, j5 5.9, j6 6.7, J2 9.2, J5 6.7, z2 14.3, z3 34.4, z4 9.2, z5 5.0, Z4 43.7, Z5 35.3, s4 61.3, s6 46.2, r3 31.9, R1 12.6, JV5 21.0, macrosetae on leg IV: genu 18.5, tibia 21.0, baistarsus 26.9, telotarsus 27.7.

Specimens examined. Ten ♀♀ & 1 ♂, Sogwipo, Cheju Is., 10-VIII-1994, on *Broussonetia papyrifera* (L.) Vent. (M. O. Ryu leg.).

Distribution. Korea, China, Japan, Madagascar, Papua New Guinea, Taiwan, Thailand.

Remark. Korean specimens of the female of *P.* (*P.*) *hongkongensis* slightly differ from Hong Kong specimens of that (Ehara and Lee, 1971) in having macroseta of genu IV as long as that of basitarsus IV and terotarsus IV,

and seta s6 slightly longer than Z5. This species generally inhabit the subtropical and the tropical zone.

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