

## Soil inhabiting Acaridae and Histiostomidae (Acari : Astigmata) from Korea

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### 한국 토양서식성 가루응애과 및 별가루응애과 (응애 아강 : 무기문응애 목)의 분류학적 연구

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#### ABSTRACT

Astigmatid mites collected from forest and pasture soil in Korea during the period of June, 1997 to July, 1998 were examined, and seven species were identified as follows.

1. *Tyrophagus putrescentiae* (Schrank, 1781)
2. *T. longior* (Grevais, 1844)
3. *T. similis* Volgin, 1949
4. *Rhizoglyphus robini* Claparede, 1869
5. *Suidasia nesbitti* Hughes, 1948
6. *Histiostoma feronarium* (Dufour, 1839)
7. *H. sapromyzorum* (Dufour, 1839)

Of them, *T. longior*, *T. similis*, *H. feronarium* and *H. sapromyzorum* are newly added to Korean fauna.

**Key words** : Taxonomy, Acaridae, Histiostomidae, soil, Korea

#### INTRODUCTION

Astigmatid mites have been recorded from a variety of stored produce, living plants and human habitats in Korea. Since Kim (1923) reported eggs of mites from human feces, Chu *et al.* (1964) observed eggs and adults of *Tyrophagus* species from human feces too. Later Chu *et al.* (1967) reported 3 species of acarid mites from dusts of

schools, houses and stores. And Kim and Song (1968) reported 5 species of acarid mites from stored foods. On the other hand, Kang and Chu (1975) investigated house dust mites from Seoul, and Cho and Huh (1977) reported *Dermatophagoides* spp. as allergen. Subsequently, Ree *et al.* (1997) studied on the fauna and distribution of house dust mites in Korea. Ree and Lee (1997) and Ree *et al.* (1997) reared house dust mites.

Recently, Choi (1988) studied on ecology of

*Rhizoglyphus robini*, but agricultural regards on acaroid mites are meager in this country. Furthermore, free living astigmatid mites in soil have not been investigated yet.

This study was carried out to understand the Korean fauna of free living astigmatid mites in soil and their abundance. As a result, seven species are identified, of them *Tyrophagus putrescentiae* are the most abundant, and other six mites are less comparatively.

## MATERIAL and METHOD

Mites were collected from June, 1997 to July, 1998. They were isolated from soil through Tullgren funnels and preserved in 75 % alcohol. The specimens were cleared by treating with 50% lactic acid at 60 C and mounted in PVA medium.

Collection localities in this study are as Fig. 1.

1, Kyunggi-do Ansan (경기도 안산). 2, Chungbuk Baikwoon-myun Chadogul (충북 백운면 차도굴). 3, Chungbuk Mt. Sogrisan (충북 속리산). 4, Chungnam Mt. Kyeryongsan (충남 계룡산). 5, Chonbuk Woongpo (전북 옹포). 6, Chonbuk Byonsan Sukmoondong (전북 변산 석문동). 7, Chonbuk Chonju (전북 전주). 8, Chonbuk Chinan Poonghyul (전북 진안 풍혈). 9, Chonbuk Muju Mt. Chogsangsan (전북 무주 적상산). 10, Kyongnam Chinju (경남 진주). 11, Chonnam Odongdo Is. (전남 오동도). 12, Chonnam Bosung (전남 보성). 13, Kwangju city (광주시). 14, Chonnam Naju (전남 나주). 15, Chonnam Yongkwang Mt. Geumjungsan (전남 영광 금정산). 16, Chonnam Goheung (전남 고흥). 17, Chonnam Haenam Mt. Daedoosan (전남 해남 대둔산). 18, Chonnam Haenam Mihwangsa (전남 해남 미황사). 19, Chonnam Chindo Sanggyesa (전남 진도 쌍계사). 20, Chonnam Bogildo Is. (전남 보길도). 21, Chejudo Jungmoon (제주도 중문). \*(Numbers are same as Fig. 1)

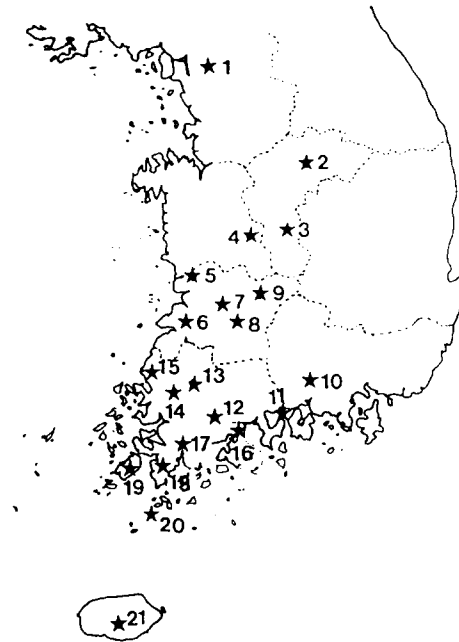


Fig 1. Collection localities of soil inhabiting astigmatid mites in Korea.

## SYSTEMATIC ACCOUNTS

Family Acaridae Ewing and Nesbitt, 1942 가루응애과  
Genus *Tyrophagus* Oudemans, 1924 가루응애속 (신칭)

### *Tyrophagus putrescentiae* (Schrank, 1781)

긴털가루응애

*Acarus putrescentiae* Schrank, 1781, pp. 1-513.

*Tyrophagus putrescentiae*: Hughes, 1977, pp. 51~57; Cho and Huh, 1977, pp. 133~137; Lee and Choi, 1980, pp. 120~121.

*Tyrophagus dimidiatus*: Chu et al., 1964, pp. 62~68; Kim and Song, 1968, pp. 37~40; Kang and Chu, 1975, pp. 59~67.

**Material examined** : 2♀♀, Chejudo Jungmoon, 31 Dec. 1997; 16♀♀, 7♂♂, Chonnam Bogildo Is., 28 Jun. 1998; 1 Protonymph, Kwangju city, 24 Jul. 1998; 1♀, Chonbuk Byonsan Sukmoondong, 16 Jul. 1997; 1♂, Kyunggi Ansan Sadong, 28 May 1998; 1♀, Chungbuk Baikwoon Chadogul, 23 Jan. 1998; 1♀, Chonnam Haenam Mt. Daedoon, 14 Apr. 1998; 4♀♀, 2♂♂,

Chonnam Goheung, 15 Jun. 1998: 55 ♀♀, 24 ♂♂, Chonnam Bosung, 31 Dec. 1997 & 27 Feb. 1998: 3 ♀♀, Chonnam Naju, 16 Jul. 1997: 1 ♂, Chonnam Yongkwang Mt. Geumjungsan: 2 ♀♀, 2 ♂♂, 16 Jul. 1997, Chonnam Haenam Mihwangsa

**Female.** Body length 450–505 μm. Rostral seta longer than the tip of chelicera. Inner propodosomal seta (i=17.5 μm) longer than outer propodosomal seta (o=10 μm). Inner humeral seta (d1) 5–7.5 μm, first lumbar seta (d2) 8–8.7 μm, third lumbar seta (d3) 30–32.5 μm, second lumbar seta (la) 15–17.5 μm. The anal opening near the posterior end of the body. Length of the tarsus I 10–11.5 μm, tibia I 2.5–3.8 μm, genu I 3.3–4 μm in length. Chaetotaxy of tarsus I as Fig. 2A. Macrosense seta of tarsus I (omega 1) 1.8–2 μm (Fig. 2B). Macrosense seta of tarsus II (omega 2) 1.5–1.8 μm long. With two anal setae, of which postanal bristle (a2) longer than paraanal bristle (a1).

**Male.** Body length 360–450 μm. Tarsus IV 7.5–9.5 μm, tibia IV 2.5–3 μm, genu IV 3.3–4 μm in

length. Two suckers on tarsus IV equidistant from the base and apex of the segment (Fig. 2C). The lateral sclerites supporting the aedeagus turned outwards. Aedeagus including lateral sclerites 3.7–5 μm long (Fig. 2D). Tip of aedeagus relatively short and doubly bent into S-shape (Fig. 2E).

**Distribution:** Cosmopolitan.

***Tyrophagus longior* (Gervais, 1844)**

긴가루응애 (신칭)

*Tyroglyphus longior* Gervais, 1844, pp. 1–256.

*Tyrophagus longior*: Hughes, 1977, pp. 57–59.

**Material examined:** 1 Deutonymph, 3 ♂♂, Chonbuk Woongpo, 10 Nov. 1997: 3 ♀♀, 1 ♂, Chonbuk Chinan Poonghyul, 12 Nov. 1997.

**Female:** Body length 480 to 520 μm. The supracoxal seta not thickened towards the base, with short lateral barbs of about equal length. Tarsus I 7.5–8.0 μm, tibia I 2.5–2.7 μm, genu I 3–3.3 μm (Fig. 3A). On tarsus I, omega 1 1.7–2.3 μm and gradually tapers towards its distal end (Fig. 3B). Omega 2 of tarsus II 1.5–2 μm in length.

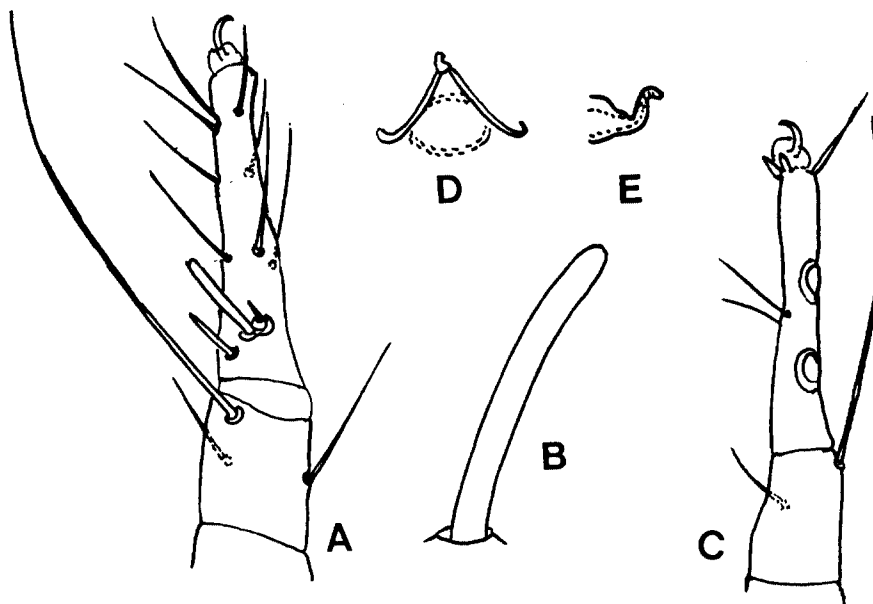


Fig 2. *Tyrophagus putrescentiae*(Schränk, 1781): A. Leg I of female: B, Omega 1 on tarsus I: C, Leg IV of male: D, Aedeagus. E, Tip of aedeagus.

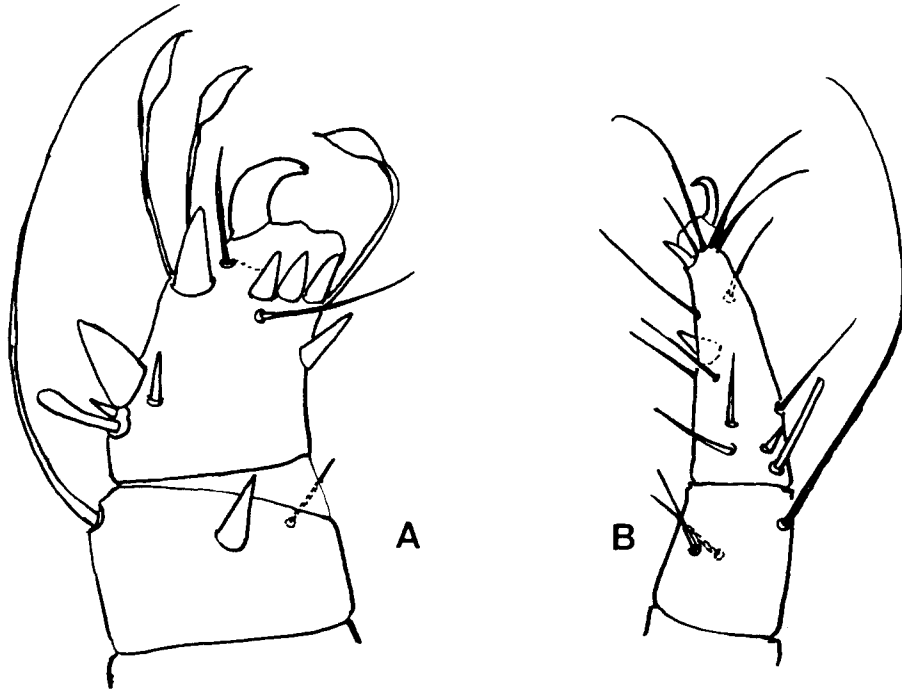


Fig 5. A, Female leg I of *Rhzoglyphus robini* Claparedes, 1869; B, Female leg I of *Suidasia nesbitti* Hughes, 1948.

propodosomal seta ( $7-10\mu\text{m}$ ). With the exception of humeral seta ( $65-70\mu\text{m}$ ) and marginal seta ( $170-200\mu\text{m}$ ), all the setae of the hysterosoma short, about the same length as internal propodosomal seta. Setae d1 to d4 almost in linear series with one another. The anal opening at the posterior margin of the body surrounded by three pairs of anal setae. Omega 1 ( $0.6-1\mu\text{m}$ ) on tarsus I slender and curved (Fig. 5B).

#### Distribution

England, Portugal, Finland, Belgium, Italy, Crete, N. America, N. Africa, S. Africa and West Indies. Japan, China, Korea.

Family Histiotomidae Hughes, 1977 빨가루응애과

Genus *Histiotoma* Kramer, 1876

빨가루응애속 (신칭)

*Histiotoma feroniarum* (Dufour, 1839)

빨가루응애 (신칭)

*Hypopus feroniarum* Dufour, 1839, pp. 274-281.

*Histiotoma feroniarum*: Hughes, 1977, pp. 215-221.

**Material examined:** 9♀♀, 1 Larva, 3 Hypopi, Kyongnam Chinju, 15 Sep. 1997; 1 Hypopus, 8 Jun. 1998, Chonbuk Muju Chogsangsan.

**Female:** Body length  $480-680\mu\text{m}$ . The idiosoma whitish in colour due to large quantities of guanin in the form of a chalky deposit. Each chelicera with the elongated movable digit (Fig. 6A, B). The tip of movable digit  $1\mu\text{m}$  long and whip shaped. With a transverse groove between the propodosoma and the hysterosoma. The posterior margin of the body slightly concaved inwards. On the ventral surface, with the two pairs of chitinous circular rings, the anterior pair ( $4\times 2.4\mu\text{m}$ ) lying between coxae II and III, the posterior rings ( $6\times 4-5\mu\text{m}$ ) nearer together and lying at the same level as coxae IV (Fig. 6A). All the setae of the idiosoma short and posterior marginal setae  $1.4\mu\text{m}$ . With two pairs of genital setae arised in

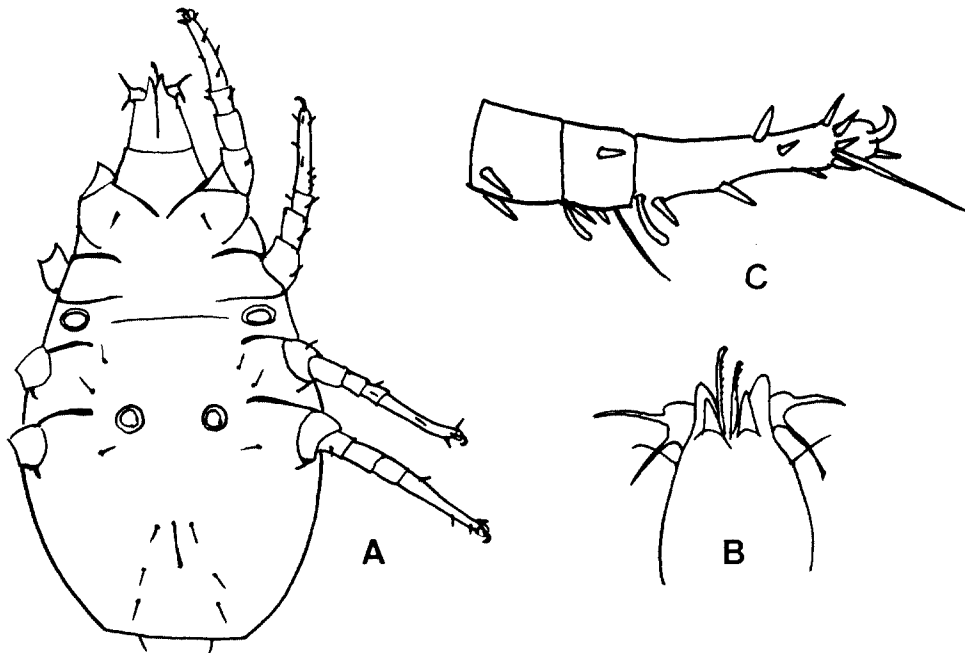


Fig 6. *Histiostoma feronarium* (Dufour, 1839): A, Ventral surface of female: B, Gnathosoma of female: C. Leg I of female.

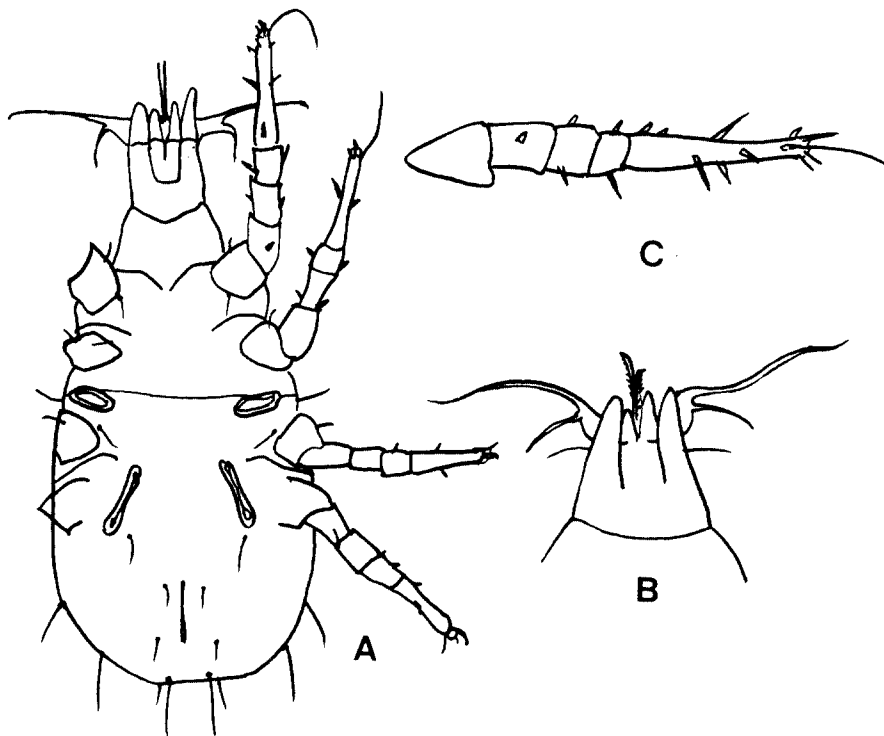


Fig 7. *Histiostoma sapromyzorum* (Dufour, 1839): A, Ventral surface of female: B, Gnathosoma of female: C. Leg I of female.

front of and behind the posterior chitinous rings. Four pairs of setae on either side of and behind the anus. The setae of leg thickened to form spines, one (ba) lying immediately in front of omega 1 (Fig. 6C). Tarsus I 9–10.4 $\mu$ m, tibia I 3.2–3.6 $\mu$ m, genu I 3.6–4 $\mu$ m in length.

#### Distribution

England, Holland, France, Italy, Germany, U.S.A., Australia, New Zealand, Japan, China, Korea.

#### *Histiostoma sapromyzarum* (Dufour, 1839)

긴빨가루응애 (신칭)

*Hypopus sapromyzarum* Dufour, 1839; pp. 274–281.

*Histiostoma sapromyzarum*: Hughes, 1977, pp. 221–222; Li and Fan, 1997, p. 248.

**Material examined:** 3♀♀, 25 Nov. 1997, Chonbuk Chinan Poonghyul; 2♀♀, Chungbuk Sogrisan, 25 Jul. 1997.

**Female:** Body length 440–500 $\mu$ m and smaller than former species (Fig. 7A). Movable digit of chelicera with long whiplike tip which 4.6–5 $\mu$ m in length (Fig. 7B). On the ventral surface of the body, with the two pairs of chitinous rings. Posterior rings elongated and constricted in the middle (Fig. 7A). Anterior rings 3–4x1.4–2.4 $\mu$ m, posterior ones 5.6–6x0.4–0.8 $\mu$ m in length. Posterior marginal setae 4 $\mu$ m. The legs more slender than in *H feroniarum*. The chaetotaxy of leg I (Fig. 7C) similar to *H feroniarum*. Tarsus I 9 $\mu$ m, tibia I 2–2.4 $\mu$ m, genu I 2.8–3 $\mu$ m in length.

#### Distribution

England, Germany, Holland, France, Italy, Brazil, Bolivia, Philippines, Australia, China, Korea.

## 적 요

1997년 6월부터 1998년 7월 사이에 남한의 삼립 및 초지 토양에서 채집된 무기문응애류를 조사한 결과 다음과 같이 7종이 동정되었다.

1. *Tyrophagus putrescentiae* (Schrank, 1781)

2. *T. longior* (Grevais, 1844)

3. *T. similis* Volgin, 1949

4. *Rhizoglyphus robini* Claparede, 1869

5. *Suidasia nesbitti* Hughes, 1948

6. *Histiostoma feronarium* (Dufour, 1839)

7. *H. sapromyzae* (Dufour, 1839)

그 중, *T. longior*, *T. similis*, *H. feronarium*, *H. sapromyzae*의 4종은 한국 미기록종이다.

검색어: 분류, 가루응애과, 빨가루응애과, 토양, 한국

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