Reinstatement of the Genus *Stigmaeopsis* Banks, with Descriptions of Two New Species (Acari, Tetranychidae)

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ABSTRACT The genus *Stigmaeopsis* Banks is reinstated with characteristic morphology on distal segment of palpus. Two new species, *Stigmaeopsis saharai* n. sp. and *S. takahashii* n. sp., are collected from Hokkaido and described. Five species previously known as *celarius* species group in *Schizotetranychus* are moved to *Stigmaeopsis*. Descriptions are supported by illustrations and scanning electron micrographs.

KEY WORDS spider mite, *celarius* species group, recovery, new species, new combinations

IN THE GENUS *Schizotetranychus* (Acari: Tetranychidae), the *celarius* species group (Ehara 1999) was originally described as a single species of the genus *Stigmaeopsis* Banks. The type species, *Stigmaeopsis celarius* Banks, was collected from *Bambusae metake* (Sasscer) in Oneco, FL (Banks 1917). McGregor (1950) redescribed this species, moved it to *Schizotetranychus* Tra'gårdh, i.e., *Schizotetranychus celarius* (Banks), and deleted the genus *Stigmaeopsis*. Pritchard and Baker (1955) made a detailed redescription of this species, and Ehara (1957) also made a redescription from Japanese specimens occurring on *Sasa* sp. and *Phyllostachys reticulata* (Koch). After that, Ma and Yuan (1980) described a new species, *S. nanjingensis* Ma & Yuan on *Phyllostachys pubescens* Mazel & De Lahaie in China, which is very close to *S. celarius*. Furthermore, Saito (1990) described two new species, *S. longus* Saito on *Sasa senanensis* (Franch. & Sav.) and *S. miscanthi* Saito on *Miscanthus sinensis* Anderss., both of which had been previously known as *S. celarius* in Japan. Recently, Zhang et al. (2000b) described *S. tenuinidus* Zhang & Zhang, which is very closely related to *S. celarius*. Before the current study, the *celarius* species group consisted of five species worldwide.

A molecular phylogeny study using the 28S region of rDNA recently revealed that the *celarius* species group formed a distinct monophyletic clade in the Tetranychinae (Sakagami 2002). This information, as well as the results of morphological inspections, strongly suggests that this species group could be separated from the genus *Schizotetranychus* and considered an independent genus. We propose here the recovery of the genus *Stigmaeopsis* Banks in Tetranychidae. Then, we describe two new species and recategorize seven species of the *celarius* species group as members of this genus.

Genus Stigmaeopsis Banks (Reinstatement)

(Japanese name: Sugomori-hadani)

Type Species. *Stigmaeopsis celarius* Banks, 1917, p. 193, Figs. 9-11.

Banks (1917) description of this genus is as follows: "Basal part of mandibles united into a plate as in *Tetranychus*, and apical part long, styliform as in that genus. Legs thick throughout as in *Tenuipalpus*, but not winkled, two claws, tarsi as long as preceding point; palpi long, large and porrect, with the thumb not extending beyond the claw. Skin not reticulate, but finely striated. Spinning small dense webs under which they live."

Because the above-mentioned description is very brief and the figures were not always detailed, we have added an important new character to represent this genus. *Stigmaeopsis* is distinguished from other genera of Tetranychidae by the chaetotaxy of the distal segment of the palpus. In all species of *Stigmaeopsis*, the distal segment of the palpus has two simple setae (a and c by the symbols of Lindquist 1985), three eupathidia (ul′, ul″, and su) and one solenidion (ω) both in females and males as shown in Fig. 1. However, according to Lindquist (1985) the palptarsal "thumb" of most tetranychid species bears seven setiform structures or phaneres: three simple setae (a, b, and c), three eupathidia (ul′, ul″, and su =spinneret), and one solenidion (ω). Other than *Stigmaeopsis*, the females

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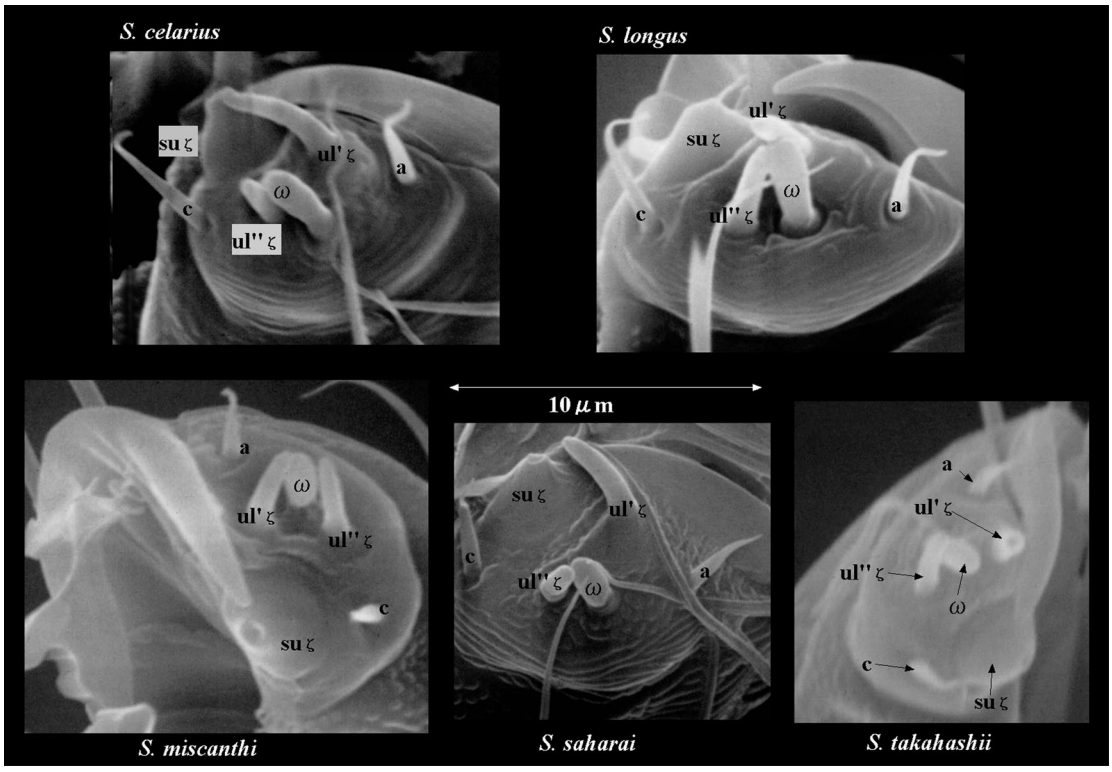


Fig. 1. Photographs of distal segments of palpus of seven species in *Stigmaeopsis* by scanning electron microscope. The symbols in figures according to Lindquist (1985).

of all species so far referred to bear the same morphs, although males of several species lack su. Namely, the simple seta b in Lindquist (1985) is absent in *Stigmaeopsis.* This genus is similar to *Schizotetranychus* Tra'gårdh and *Yezonychus* Ehara (Ehara 1978) in having bifid empodial claws, but whereas the former has five setiform structures excepting the spinneret, the latter two have six. Another peculiarity that characterizes *Stigmaeopsis* concerns the positions of the dorsocentral hysterosomal setae (c). Two lines connecting the bases of the C1 and C4 pairs form a V-shape in *Stigmaeopsis,* whereas these are more or less parallel in other Tetranychini species.

Remarks. All species of this genus make dense woven nests on the leaf surface and live aggregatively, even though the nest size varies among species (Saito and Takahashi 1980).

Stigmaeopsis celarius Banks (Recovery)
(Figs. 1–9, Tables 1 and 2)

(Japanese name: Take-sugomori-hadani)

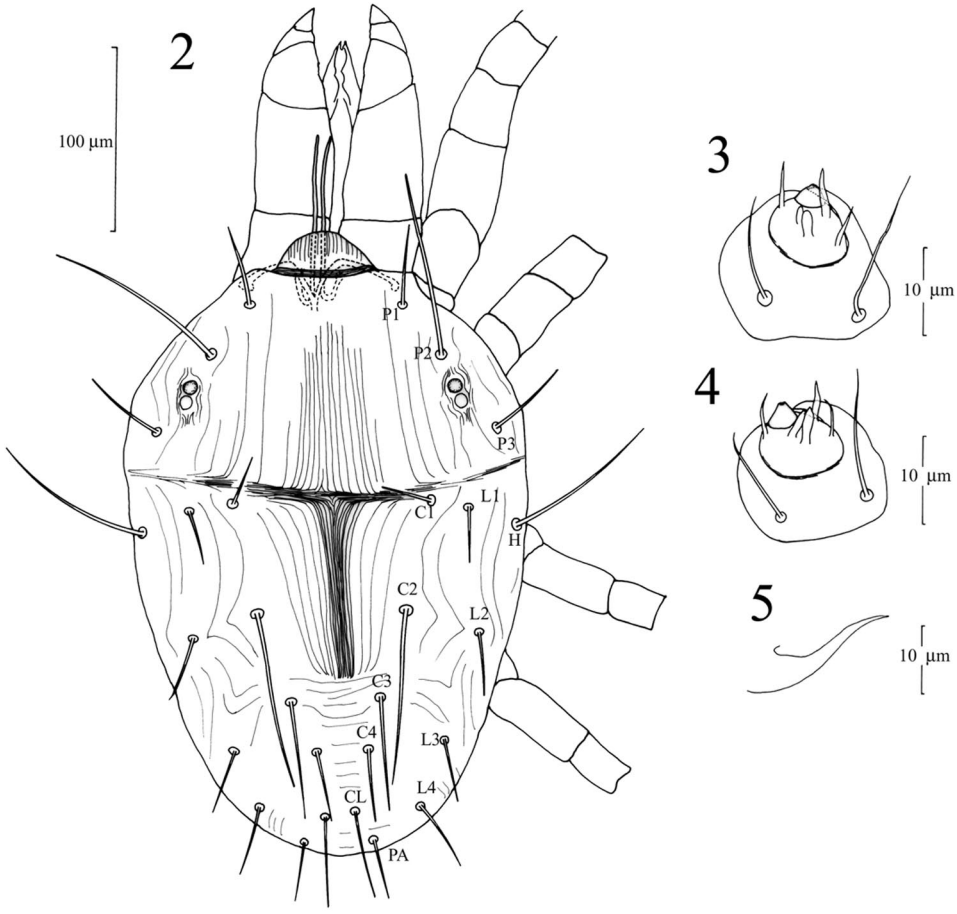
Stigmaeopsis celarius Banks, 1917, p. 196, pl. 15, Figs. 9 and 11.

Schizotetranychus celarius (Banks) McGregor 1950, p. 308, pl. 19; Pritchard and Baker 1955, p. 249, Figs. 205–207.

Female. Body flattened. Strawy to greenish yellow with small blackish green spots. Body size is 417–498 μm (from tip of rostrum to end of hysterosoma). Idiosoma with dorsal setae slender. Propodosoma well demarcated from hysterosoma. Second dorsal propodosomal setae (P2) three-fourths as long as the distance between their bases (Table 1). Bases of all dorsocentral hysterosomal setae (C1-C4) approximately in a straight line. Second dorsocentral hysterosomal setae (C2) exceed bases of fourth (C4), but do not reach base of fifth ones (CL). Lengths of dorsal setae and distances between their bases listed in Table 1. Genital flap and area anterior to flap transversely striate. Distal segment of palpus having two simple setae, three eupathidia (including one spinneret), and one solenidion. Spinneret (terminal sensillum) on distal segment of palpus conical in shape and two-thirds as long as wide. Numbers of setae and solenidia on distal segment of palpus presented in Figs. 1 and 7 and those of leg segments in Table 2.

Male. Body size is 285–317 μm. Lengths of dorsal setae and distances between their bases as in Table 1. Aedeagus broadly curved dorsally. Number of setae and solenidia on distal segment of palpus and leg segments presented in Table 2.

Materials Examined. Paratype four females and one male, Florida, on *Bambusae metake* (Sasscer) and California on bamboo plants, 20 July 1949 (A. E. Pritchard); reference specimens: 13 females and 12 males, Kishiwada, Osaka, Japan on *P. pubescens,* 12 August (Y. Saito).



Figs. 2–5. *Stigmaeopsis celarius* Banks. (2) Dorsum of female. (3) Distal segment of palpus of female. (4) Distal segment of palpus of male. (5) Aedeagus.

Japanese specimens at least two females and two males examined in this study will be deposited at the Smithsonian National Museum of Natural History where the holotype and paratypes are already deposited.

Host and Distribution. Japan (Honshu), United States, parasitic on *Phyllostachys* spp.

Remarks. Ehara (1957) observed Japanese specimens from *Sasa* sp. and *Phyllostachys reticulata* Koch and identified them as *Schizotetranychus celarius* (Banks). However, from comparisons of the lengths of dorsal setae between other species of *Stigmaeopsis* collected in Japan and the United States, the species described by Ehara (1957) is now considered to be different from the type species and should be reported as a separate new species (Table 2; see below). Although the number of setae on the distal segments observed in this report differed from Fig. 207 of Pritchard and Baker (1955), as first pointed out by Ehara (1957), we could not find any apparent discrepancies between the specimens out on loan from the Smithsonian National Museum of Natural History, Washington, DC (specimens #2013780), and Japanese specimens by optical microscope (Table 2). Further inspection of the U.S. species by scanning electron microscopy is thought to be necessary to reach a final conclusion, but we judged that the species described here is *Stigmaeopsis celarius* Banks.

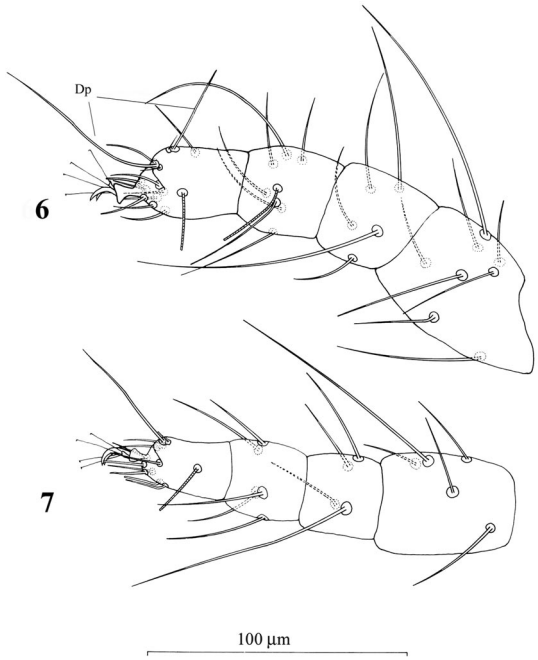
Stigmaeopsis longus (Saito) n. comb.
(Fig. 1; Table 2)

(Japanese name: Kenaga-sugomori-hadani)

Schizotetranychus celarius (Banks), B-strain, Saito 1979, p. 82; Saito and Ueno 1979, p. 445.

Schizotetranychus celarius (Banks), long seta form, Saito and Takahashi 1980, p. 62; Saito and Takahashi 1982, p. 69; Saito 1983, p. 377; Saito 1985, p. 253; Saito 1986a, p. 47; Saito 1986b, p. 377; Saito 1987, p. 57; Saito 1990b, p. 45.

Schizotetranychus longus Saito 1990a, p. 389, Figs. 11–20; Saito 1990c, p. 263; Saito and Osakabe 1992, p. 427; Ehara and Saito 1993, p. 82, Figs. 44A–F; Saito et al. 1993, p. 593; Osakabe et al. 1993, p. 757; Saito 1995a, p. 55; Sakagami et al. 1997, p. 524; Mori et al.



Figs. 6–7. *Stigmaeopsis celarius* Banks. (6) Femur, genu, tarsus, and tibia I of female. (7) Femur, genu, tarsus, and tibia II of female.

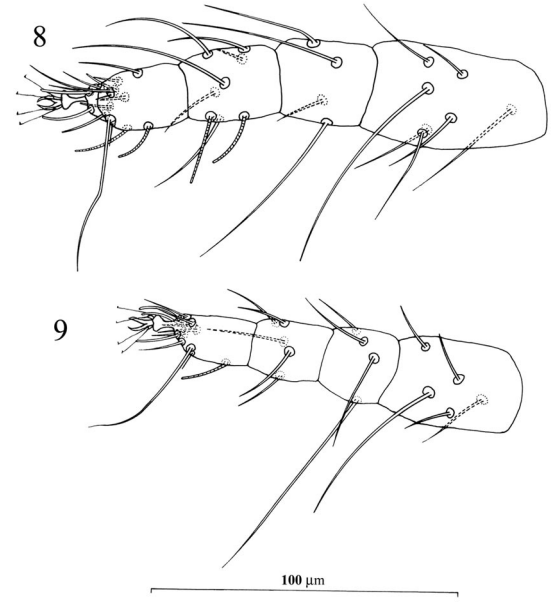


Fig. 8–9. *Stigmaeopsis celarius* Banks. (8) Femur, Genu, Tarsus, and Tibia I of male. (9) Femur, genu, tarsus, and tibia II of male.

1999, p. 411; Chittenden and Saito 2001 p. 56; Lin et al. 2002, p. 85.

Number of setae on distal segment presented in Fig. 1 and those on leg segments in Table 2.

Host and Distribution. Japan (Hokkaido, Honshu, Shikoku and Kyushu), parasitic on *Sasa senanensis* (Franc. & Sav.), *S. kurilensis* (Rupr.) and *Sasa* spp.

Stigmaeopsis miscanthi (Saito) n. comb.
(Fig. 1; Table 2)

(Japanese name: Susuki-sugomori-hadani)

Schizotetranychus miscanthi Saito 1990a, p. 389, Figs. 11–20; Saito 1990c, p. 263; Saito 1990d, p. 37; Saito and Osakabe 1992, p. 427; Ehara and Saito 1993, p. 80, Figs. 43A–E; Saito et al. 1993. p. 593; Osakabe et al. 1993, p. 757; Saito 1994, p. 15; Saito 1995a, p. 471; Saito 1995b, p. 55; Saito 1997, p. 448; Sakagami et al. 1997, p. 524; Saito and Sahara 1999, p. 25; Saito 2000, p. 351; Saito et al. 2000a, p. 79; Saito et al. 2000b, p. 668; Sato et al. 2000a, p. 605; Sato et al. 2000b, p. 611; Saito et al. 2002, p. 645; Sato et al., 2003.

Numbers of setae on distal segment of palpus presented in Fig. 1 and those on leg segments in Table 2.

Table 1. Measurements of dorsal setae and distances micrometers between their bases in *Stigmaeopsis celarius*

Setae	Male					Female				
	Length	SD	Distance	SD	Length/ distance	Length	SD	Distance	SD	Length/ distance
P1	29.3 (30.0)	3.1	64.2 (70.0)	3.1	0.45 (0.43)	40.1 (44.4)	3.3 (2.4)	84.2 (83.4)	4.5 (0.7)	0.48 (0.53)
P2	62.0 (69.2)	3.0	92.1 (106.1)	3.6	0.67 (0.65)	95.6 (98.9)	2.7 (3.3)	129.1 (135.3)	4.5 (1.7)	0.74 (0.73)
P3	35.2 (38.4)	2.7	143.5 (154.9)	5.1	0.25 (0.25)	47.8 (51.6)	2.6 (2.3)	192.0 (201.4)	8.3 (0.5)	0.25 (0.26)
H	48.9 (58.4)	2.1	168.7 (188.2)	12.3	0.29 (0.31)	87.2 (72.5)[a]	4.8 (–)	210.9 (237.2)	35.6 (31.5)	0.41 (0.31)
C1	24.4 (27.0)	2.1	91.6 (107.9)	4.9	0.27 (0.25)	33.5 (33.3)	4.2 (1.1)	124.7 (141.8)	31.4 (23.0)	0.27 (0.23)
C2	55.5 (63.8)	3.3	64.5 (75.0)	3.0	0.86 (0.85)	86.8 (75.9)[a]	5.7 (4.9)	84.8 (94.9)	4.7 (2.8)	1.02 (0.80)
C3	33.6 (36.7)	2.1	35.8 (45.1)	2.8	0.94 (0.81)	58.9 (53.4)	4.0 (4.9)	48.9 (52.0)	4.6 (7.8)	1.20 (1.03)
C4	28.2 (31.3)	2.6	17.7 (18.7)	2.4	1.59 (1.67)	40.1 (44.1)	4.6 (–)	27.9 (28.4)	2.3 (8.6)	1.44 (1.55)
CL	30.3 (37.4)	2.2	20.3 (23.4)	2.9	1.49 (1.60)	51.5 (53.3)	3.6 (6.2)	24.6 (27.9)	3.1 (3.4)	2.09 (1.91)
L1	26.9 (27.2)	2.8	131.3 (140.0)	8.7	0.20 (0.19)	31.0 (33.9)	2.6 (1.9)	163.6 (180.8)	10.8 (19.6)	0.19 (0.19)
L2	28.4 (31.2)	3.3	125.6 (139.4)	6.8	0.23 (0.23)	32.8 (36.4)	2.5 (2.1)	162.2 (181.7)	8.1 (17.1)	0.20 (0.20)
L3	28.6 (27.9)	2.3	92.2 (106.2)	5.5	0.31 (0.27)	34.6 (36.4)	3.0 (–)	125.6 (144.1)	10.0 (21.0)	0.28 (0.25)
L4	31.7 (38.2)	2.9	59.5 (61.9)	3.9	0.53 (0.62)	44.6 (38.4)	3.0 (–)	91.3 (108.6)	6.5 (6.8)	0.49 (0.35)
PA	21.6 (23.0)	3.4	29.7 (33.0)	4.5	0.73 (0.70)	36.8 (–)	1.5 (–)	38.9 (40.7)	4.0 (1.4)	0.95

In parentheses, measurements of U.S. specimens are shown. Ten to 12 were measured for Japanese specimens (both male and female), but only one to three females and one male were measurable for U.S. specimens.

[a] Tips of setae might be broken.

Table 2. Numbers of setae on leg segments of seven species in *Stigmaeopsis*

Species	Female										Male									
	Leg I			Leg II			Leg III		Leg IV		Leg I			Leg II			Leg III		Leg IV	
S. celarius																				
Femora	8			5			3		3		7			5			3		3	
Genua	5			4			3		2		4[a]			4			3		2(3)	
Tibiae	7	1		5			5		5		6[a]	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	2	2	9	1	1	8	1	8	1
S. celarius U.S.																				
Femora	8			5			3		3		7			5			3		3	
Genua	5			4			3		2		5[a]			4			3		3	
Tibiae	7	1		5			5		5		7[a]	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	2	2	9	1	1	8	1	8	1
S. longus																				
Femora	8			5			3		3		9			5			3		3	
Genua	5			4			3		2		5			4			3		2	
Tibiae	7	1		5			5		5		7	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	2	2	9	1	1	8	1	8	1
S. miscanthi																				
Femora	8			5			3		3		9			5			3		3	
Genua	5			4			3		2		5			4			3		2	
Tibiae	7	1(2)		5			5		5		7	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	−10	1	2	9	1	1	8	1	8	1
S. nanjingensis																				
Femora	9			5			3		3		9			5			3		3	
Genua	5			4			3		3		5			4			3		3	
Tibiae	7	1		5			5		5		7	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	1	2	9	1	1	8	1	8	1
S. tenuinidus																				
Femora	8			5			3		3		9			5			3		3	
Genua	5			4			3		3		5			4			3		3	
Tibiae	7	1		5			5		5		7	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	2	2	9	1	1	8	1	8	1
S. saharai																				
Femora	8			5			3		3		8			5			3		3	
Genua	5			4			3		3(2)		4			4			3		3	
Tibiae	7	1		5			5		5		7	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	2	2	9	1	1	8	1	8	1
S. takahashii																				
Femora	8(9)			5			3		3		9			5			3		3	
Genua	5			4			3		3(2)		5			4			3		3	
Tibiae	7	1		5			5		5		7	2		5			5		5	
Tarsi	10	1	2	9	1	1	8	1	8	1	10	1	2	9	1	1	8	1	8	1

From the left column for each leg, tactile (normal) setae + euphathidia, solenidia, and pairs of duplex setae (normal seta and solenidion). The last column of legs III and IV are omitted as these legs never have duplex setae. Number in parentheses means variation.

[a] Discrepancy between Japan and U.S. specimens. Underlined characters vary among species. *S. nanjingensis* and *S. tenuinidus* from Zhang and Zhang (2000) *S. longus* and *S. miscanthi* from Saito (1990c).

Host and Distribution. Japan (Honsu, Shikoku, Kyusu, Okinawa), Korea (Pusan), China (Fuzhou), parasitic on *Miscanthus sinensis* and *M.* spp.

Remarks. This species is the only species in *Stigmaeopsis* that inhabits plants other than bamboo. Recently, we noticed that there are two forms showing different male-to-male aggression behaviors (HG and LW forms, Saito and Sahara 1999). Although these forms can be distinguished by the proportions of male leg I (Saito 1995) and the reproductive isolation observed between them (Sato et al. 2000a,b), we have not yet identified any distinct characters that makes it possible to separate them into two species.

Stigmaeopsis nanjingensis (Ma & Yuan) n. comb.
(Table 2)

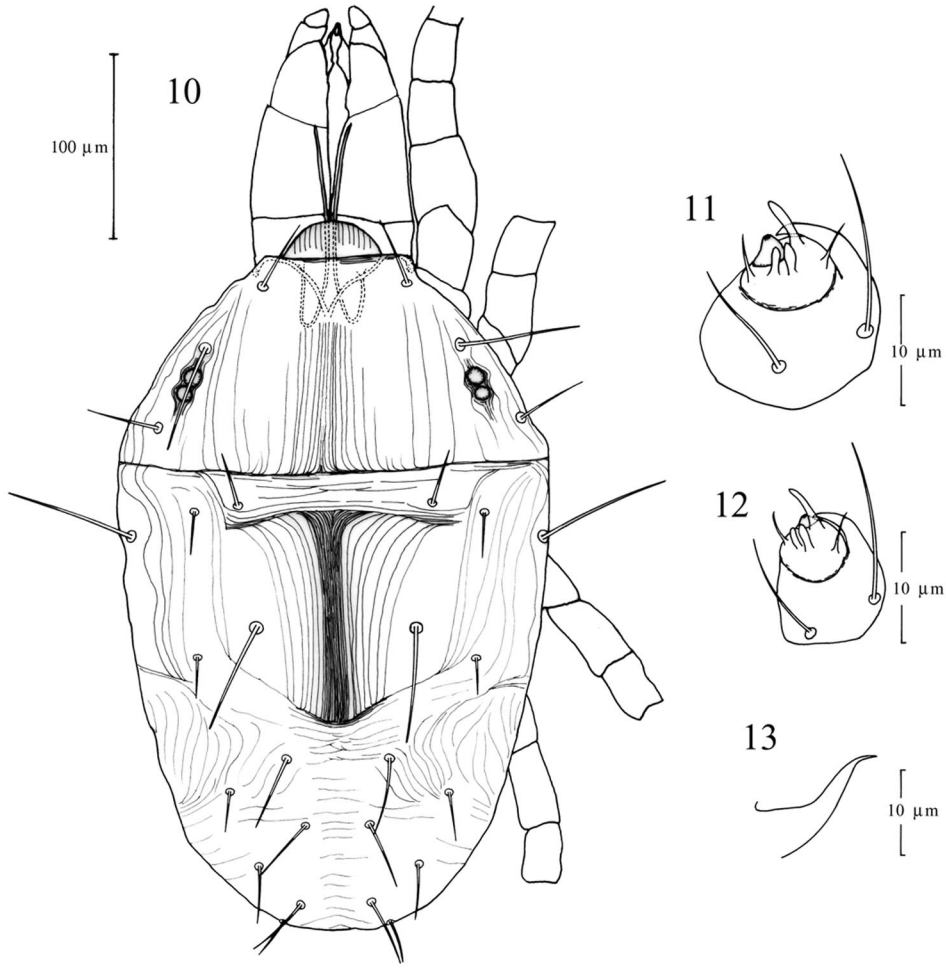
(Japanese name: Nankin-sugomori-hadani)

Schizotetranychus nanjingensis Ma and Yuan 1980, p. 42, Fs. 1 and 2; Ma et al.

1984, p. 125, Figs. 8–37a–c; Yu and Shi 1991, p. 61; Shi et al. 1992, p. 27; Yu et al. 1993, p. 29; Zhang et al. 1997a, p. 13; Zhang et al. 1997b, p. 13, Fig. 2a–c; Zhang et al. 1998, p. 61; Zhang et al. 1999a, p. 22; Zhang et al. 1999b, p. 63; Zhang et al. 1999c, p. 75; Lin et al. 2000, p. 84; Zhang et al. 2000a, p. 227; Zhang et al. 2000b, p. 19; Zhang et al. 2000c, p. 63; Zhang et al. 2001b, p. 383; Zhang et al. 2003.

Numbers of setae on leg segments presented in Table 2.

Host and Distribution. China (Fuzhou, Ninghua, Qingliu, Jiangle, Changting, Zhangping, Guangze, Youxi, Pingnan, Fuzhou, Minhou, Minqing, Luoyuan, Yongchun, Anxi, Datian, Jianou, Shaowu, Wuyishan, Jianyang, Pucheng, Shounin, Zhounin, Fuan, Nanping, Shunchang, Yongan, Sanming, Longyan, Liancheng,



Figs. 10–13. *Stigmaeopsis saharai* n. sp. (10) Dorsum of female. (11) Distal segment of palpus of female. (12) Distal segment of palpus of male. (13) Aedeagus.

Shanghang, Yongding, Zhejiang, Yuhang, Jiangxi, Lushan, Jiangsu, Nanjing, Henan, Jigonshan, Baiyunshan), parasitic on *P. pubescens*, *P. praecox* Chu & Chao, and *P. vivax* McClure.

Remarks. This species and *S. longus* have very long P2 and C2 setae. C2 setae exceed the distances between their bases and the bases of L4. *S. nanjingensis* differs from *S. longus* in the arrangement of dorsocentral setae; in the former the bases of C3 are located very laterally and never on the line joining the bases of C2 and C4, but in the latter, the bases of C3 are almost in a straight line joining the bases of C2 and C4.

Stigmaeopsis tenuinidus (Zhang & Zhang) n. comb.
(Table 2)

(Japanese name: Moso-sugomori-hadani)

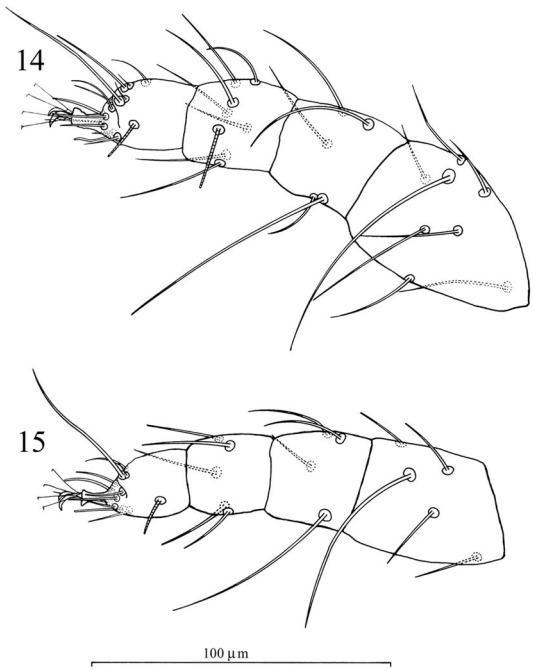
Schizotetranychus tenuinidus Zhang et al. 2000b, p. 25, Figs. 1–6; Zhang et al., 2001a, p. 13.

Host and Distribution. China (Fuzhou, Shounin, Jianou, Shaowu, and Yongan), parasitic on *P. pubescens.*

Stigmaeopsis saharai Saito & Mori n. sp.
(Figs. 1 and 10–17, Tables 2 and 3)

(Japanese name: Hime-sugomori-hadani)

Female. Body flattened, strawy to greenish yellow with small blackish green spots. Body size is 472–498 µm. Idiosoma with dorsal setae slender. Propodosoma well demarcated from hysterosoma. Second dorsal propodosomal setae (P2) one-half as long as distance between their bases (Table 3). Bases of all dorsocentral hysterosomal setae (C1–C4) placed approximately in a straight line. Second dorsocentral hysterosomal setae (C2) never reach bases of C3. Lengths of dorsal setae and distances between their bases listed in Table 3. Genital flap and anterior to flap transversely striate. Distal segment of palpus having two simple



Figs. 14–15. *Stigmaeopsis saharai* n. sp. (14) Femur, genu, tarsus, and tibia I of female. (15) Femur, genu, tarsus, and tibia II of female.

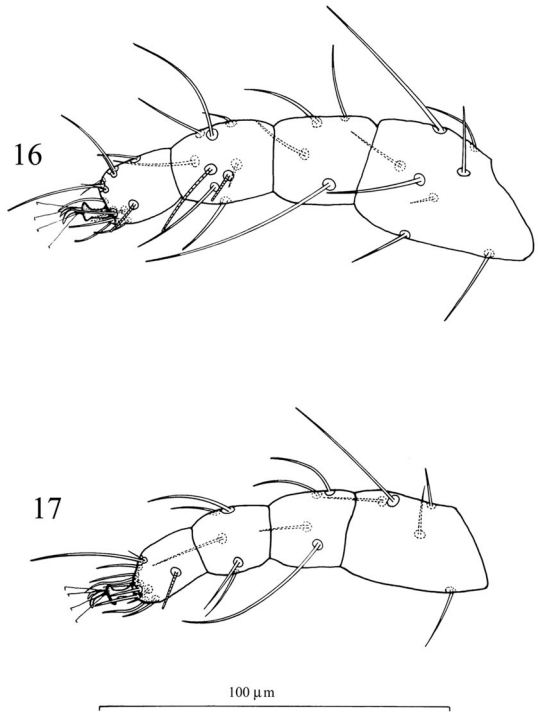


Fig. 16–17. *Stigmaeopsis saharai* n. sp. (16) Femur, genu, tarsus, and tibia I of male. (17) Femur, genu, tarsus, and tibia II of male.

setae and three eupathidia (including one spinneret) and one solenidion. Spinneret (terminal sensillum) on distal segment of palpus conical in shape and about one-half to two-thirds as long as wide. Numbers of setae on distal segment of palpus presented in Figs. 1 and 11 and those on leg segments in Table 2.

Male. Body size is 330–332 µm. Lengths of dorsal setae and distances between their bases as in Table 3. Aedeagus broadly curved dorsally. Numbers of setae and solenidia on distal segment of palpus presented in Figs. 1 and 12 and those on leg segments in Table 2.

Type Series. Holotype male and allotype female, Niseko, Hokkaido on *Sasa kurilensis* (Rupr.), 8 September, 2000 (A. R. Chittenden). Paratypes same as Holotype, three males, five females.

Host and Distribution. Japan (Hokkaido), parasitic on *S. senanensis* (Franc. & Sav.), *S. kurilensis*, and *Sasa* spp.

Remarks. This species resembles *S. celarius* but is distinguished from the latter in the lengths of P2 and C2 setae. *S. saharai* is named in honor of Dr. Ken Sahara, assistant professor of Hokkaido University, who kindly assisted with our molecular phylogenetic study on Tetranychidae.

Stigmaeopsis takahashii Saito & Mori n. sp.
(Figs. 1 and 18–25, Tables 2 and 4)

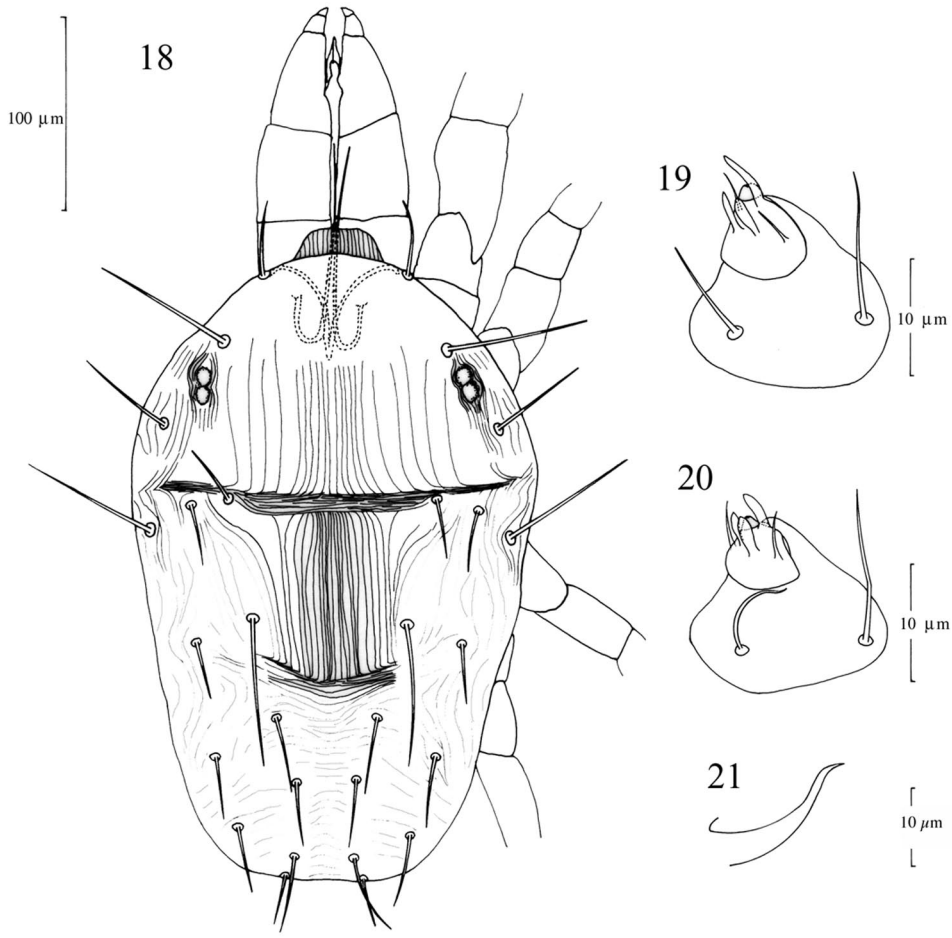
(Japanese name: Sasa-sugomori-hadani)

Schizotetranychus celarius (Banks), Ehara 1957; p. 18, Figs. 13–24; Saito and Takahashi 1980, p. 62; Wang 1981, p. 56, Figs. 40 and 41; Ehara and Saito 1993, p. 78, Fig. 42A–C; Wang et al. 2000, p. 202, Fig. 256; Chittenden and Saito 2001, p. 56.

Schizotetranychus celarius (Banks), medium seta (M) form, Saito and Takahashi 1982, p. 69; Saito, 1983, p. 377; Saito 1995a, p. 55, 78, Fig. 42; Sakagami et al. 1997, p. 524.

Female. Body flattened, strawy to greenish yellow with small blackish green spots. Body size is 433–500 µm. Idiosoma with dorsal setae slender. Propodosoma well demarcated from hysterosoma. Second dorsal propodosomal setae (P2) less than two-thirds the distance between their bases. Bases of all dorsocentral hysterosomal setae (C1–C4) placed approximately on a straight line. Second dorsocentral hysterosomal setae (C2) exceed bases of C3 but never reach those of C4. Lengths of dorsal setae and distances between their bases listed in Table 4. Genital flap and anterior to flap transversely striate. Distal segment of palpus having two simple setae and three eupathidia (including one spinneret) and one solenidion. Spinneret on distal segment of palpus conical in shape and about one-half as long as wide. Numbers of setae on distal segment of palpus presented in Figs. 1 and 19 and those on leg segments in Table 2.

Male. Body size is 315–344 µm. Lengths of dorsal setae and distances between their bases presented in Table 4. Aedeagus broadly curved dorsally. Numbers



Figs. 18–21. *Stigmaeopsis takahashii* n. sp. (18) Dorsum of female. (19) Distal segment of palpus of female. (20) Distal segment of palpus of male. (21) Aedeagus.

of setae on distal segment of palpus presented in Figs. 1 and 20 and those on leg segments in Table 2.

Type Series. Holotype male and allotype female, Sapporo, Hokkaido, 21 August 1999 (Y. Sato) on *S. senanensis.* Paratypes same as holotype, three males, three females (Y. Sato); same location but 15 July, 1998 (K. Mori), three males and four females.

Host and Distribution. Japan (Hokkaido), parasitic on *S. senanensis*, *S. kurilensis*, and *Sasa* spp.

Remarks. This species is very similar to *S. celarius* and *S. saharai* but can be distinguished by the length of second dorsocentral hysterosomal setae (C2). In *S. takahashii*, C2 exceeds the base of C3 but never reaches that of C4. In *S. celarius*, C2 exceeds the base of C4 but never reaches CL. However, in *S. saharai*, C2 never exceeds the base of C3. *S. takahashii* is named in honor of Dr. Ken-ichi Takahashi, Hokkaido Institute of Public Health, who first discovered variation in nest size between species in *Stigmaeopsis* (the *celarius* species group).

Key to the species of *Stigmaeopsis*

1. Length of setae C2 shorter than distance between bases of C2 and C3 . . . . . *S. saharai*
   – Length of setae C2 longer than distance between bases of C2 and C3 2
2. Length of setae C3 shorter than distance between C3 and L4 . . . . . *S. takahashii*
   – Length of setae C3 longer than distance between bases of C3 and L4 3
3. Length of setae C2 shorter than distance between bases of C2 and C4 . . . . . *S. tenuinidus*
   – Length of setae C2 longer than distance between bases of C2 and C4 4
4. Length of setae C2 shorter than distance between bases of C2 and L4 . . . . . *S. celarius*
   – Length of setae C2 longer than distance between bases of C2 and L4 5
5. Distance between bases of C1 pair, between those of C2 pair and between those of C3 pair almost the same . . . . . *S. nanjingensis*

Table 3. Measurements of dorsal setae and distances micrometers between their bases in *S. saharai* n sp.

Setae	Male					Female				
	Length	SD	Distance	SD	Length/distance	Length	SD	Distance	SD	Length/distance
P1	24.8	4.7	62.3	2.7	0.40	32.6	2.8	79.2	2.5	0.41
P2	40.7	2.0	97.4	4.1	0.42	61.0	3.6	128.5	3.3	0.48
P3	26.6	2.7	150.4	8.0	0.18	39.3	2.5	196.5	9.9	0.20
H	40.4	4.7	173.6	15.5	0.23	70.4	5.1	230.4	23.0	0.31
C1	24.2	2.1	84.6	4.6	0.29	27.9	3.2	104.9	8.0	0.27
C2	42.0	1.6	61.7	4.1	0.68	60.0	3.1	82.8	4.6	0.72
C3	32.1	2.2	39.4	4.2	0.81	44.6	3.6	49.5	4.2	0.90
C4	27.1	2.2	23.3	2.5	1.16	35.5	2.4	34.5	2.6	1.03
CL	24.1	2.3	22.1	2.6	1.09	39.4	2.5	33.6	4.0	1.18
L1	21.9	1.5	129.0	8.4	0.17	27.4	3.5	159.0	11.0	0.17
L2	22.4	2.6	114.9	7.2	0.19	25.1	2.1	148.7	6.9	0.17
L3	21.9	1.7	88.5	7.9	0.25	27.2	3.0	120.7	9.0	0.23
L4	25.2	2.3	56.0	4.1	0.45	33.2	4.0	81.0	5.2	0.41
PA	20.9	2.5	35.9	4.1	0.58	28.9	1.8	49.9	4.7	0.58

Ten to 12 specimens were measured.

– Distance between bases of C1 pair longer than that between bases of C2 pair, and distance between bases of C2 pair longer than that between bases of C3 pair 6

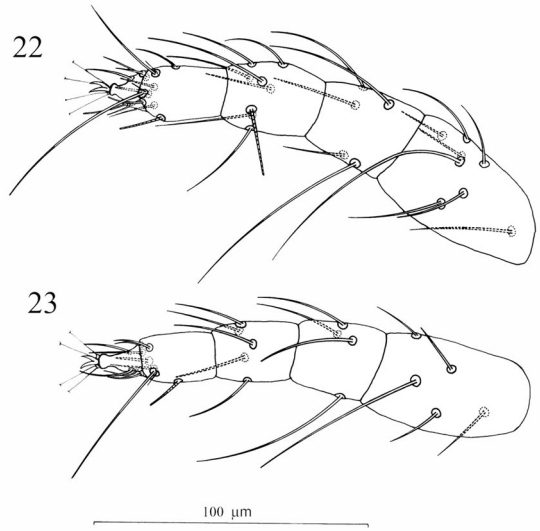
6. Distance between bases of P2 pair longer than (or similar to) that between bases of C1 . . . . . *S. longus*

– Distance between bases of P2 pair shorter than that between bases of C1 . . . . . *S. miscanthi*

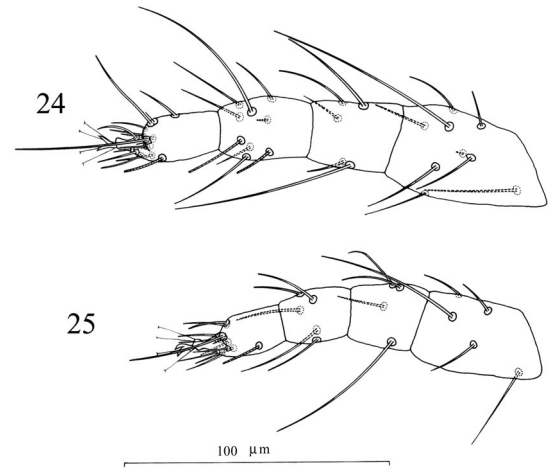
Discussion

The genus *Stigmaeopsis* contains seven species. These species are characterized by their web-nesting habit, known as WN-c life type (Saito 1983). Through behavioral observations, it is known that adults of *S. longus*, *S. nanjingensis*, *S. miscanthi*, and *S. celarius* show strong counterattack behavior against predatory mites. Furthermore, they construct large united nests including at least two adult generations. Therefore, they are considered to be social species (Saito, 1986a,b, 1990c; K.M. and Y.S., unpublished data). The other three species make relatively small nests in which a female deposits 10–15 eggs. Females of *S. saharai* and *S. takahashii* usually attend their offspring (eggs) for a short period (≈1 wk) and show weak defensive behavior against predatory mites, so that these have subsociality (Saito 1995a; K.M. and Y.S., unpublished data).

Another special trait common to this mite genus is their defecation behavior. Saito (1995a) reported that *S. celarius*, *S. longus*, and *S. miscanthi* deposit their fecal piles at certain places inside or outside their nests even if many individuals live together. *S. saharai*, *S. takahashii*, *S. nanjingensis*, and *S. tenuinidus* also tend to deposit feces on one or two places in or outside nests (Y.S. data, unpublished). Sato et al. (2003) observed that the defecation behavior of *S. miscanthi* is con-



Figs. 22–23. *Stigmaeopsis takahashii* n. sp. (22) Femur, genu, tarsus, and tibia I of female. (23) Femur, genu, tarsus, and tibia II of female.



Figs. 24–25. *Stigmaeopsis takahashii* n. sp. (24) Femur, genu, tarsus, and tibia I ofmale. (25) Femur, genu, tarsus, and tibia II of male.

Table 4. Measurements of dorsal setae and distances micrometers between their bases in *S. takahashii* n. sp

Setae	Male					Female				
	Length	SD	Distance	SD	Length/distance	Length	SD	Distance	SD	Length/distance
P1	29.9	2.2	59.7	1.6	0.50	37.0	3.2	79.5	2.3	0.47
P2	55.9	1.8	91.6	1.8	0.61	77.4	2.1	124.8	3.0	0.62
P2	33.6	1.4	138.5	8.8	0.24	50.3	4.2	189.9	5.5	0.27
H	50.5	3.7	158.8	12.1	0.32	79.5	3.5	204.4	13.0	0.39
C1	26.5	1.2	86.8	2.9	0.31	31.3	1.8	111.8	4.2	0.28
C2	52.1	1.5	59.2	1.0	0.88	70.6	5.6	86.7	2.9	0.81
C3	34.5	2.3	36.7	1.4	0.94	43.7	2.0	54.2	2.1	0.81
C4	28.7	1.7	19.1	1.7	1.50	33.4	2.7	32.2	1.4	1.04
CL	26.4	3.0	18.6	1.6	1.42	41.3	3.5	31.1	1.4	1.33
L1	27.9	1.8	131.2	2.5	0.21	30.8	1.5	163.9	5.7	0.19
L2	26.9	1.9	112.2	1.2	0.24	30.8	1.0	148.8	4.8	0.21
L3	25.5	1.5	83.3	1.8	0.31	31.5	1.4	115.8	7.0	0.27
L4	26.4	3.1	53.9	2.9	0.49	36.9	2.5	89.9	4.6	0.41
PA	19.5	1.0	31.4	1.2	0.62	27.1	1.6	39.4	2.4	0.69

Ten to 12 specimens were measured.

trolled by chemical cues from feces. Whether the other *Stigmaeopsis* species also use such cues to fix their deposition sites is interesting from the view of social evolution.

From several morphological peculiarities, we now expect that several species that are shown in Pritchard and Baker (1955) also belong to *Stigmaeopsis.* However, because the information on the setal arrangements of their distal segments is insufficient, any final decision must be deferred.

However, there are several *Schizotetranychus* species in Southeast Asia that show web-nesting habits similar to *Stigmaeopsis* on *Bambusa* spp. (Ehara and Thow 1988). The chaetotaxy of their dorsal and distal segments however suggest that these are not species belonging to *Stigmaeopsis.* Whether this resemblance in life type is the result of convergence or phylogenic constraints is another important question in future taxonomic and phylogenic studies.

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