

Two New Species of Spider Mites Occurring in Japan (Acari, Tetranychidae)¹

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ABSTRACT

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Two new spider mites were described and illustrated from Honshu: *Panonychus osmanthi* sp. nov. from *Osmanthus fragrans* Lour. var. *aurantiacus* Makino in Ryugasaki, Ibaraki Pref., and *Tetranychus pueraricola* sp. nov. from *Pueraria lobata* (Willd.) Ohwi in Hitachi-Ohta, Ibaraki Pref. Specimens of *P. osmanthi* from Fukuoka Pref., Kyushu, were also examined. *P. osmanthi* is a sibling species of *P. citri* (McGregor), while *T. pueraricola* is a sibling species of *T. urticae* Koch.

Key words: Japan, new species, *Panonychus osmanthi*, sibling species, Tetranychidae, *Tetranychus pueraricola*

INTRODUCTION

Five species of the spider mite genus *Panonychus* Yokoyama, including *P. citri* (McGregor) and its sibling species *P. mori* Yokoyama, were previously recognized to occur in Japan (Ehara and Gotoh, 1990, 1992, 1993). Very recently, populations of "*P. citri*" from *Osmanthus*, were clarified to be reproductively isolated from those of *citri* on citrus by Kitashima and Gotoh (1995). On close examination, it has just been confirmed that specimens of the former show a few morphological differences from those of the latter, true *citri*. Based on the specimens from *Osmanthus*, a new *Panonychus* species is described below.

On the other hand, ten species of *Tetranychus* Dufour have hitherto been recorded from Japan (cf. Ehara and Masaki, 1989; Ehara and Gotoh, 1989; Ehara, 1995). In the present paper, a sibling species of *T. urticae* Koch, recently reported as the DR form of *urticae* (Gotoh and Tokioka, 1996), is also described as new. This new species overwinters as diapausing females, and has red summer females, differing from the green form of *T. urticae*. The new mite is reproductively incompatible with the latter, and with the

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red form of *urticae* [formerly *T. cinnabarinus* (Boisduval)] (Gotoh and Tokioka, 1996).

The setal nomenclature follows that of Ehara and Tho (1988). The measurements are given in micrometers. The type series of the new species are deposited in the Department of Biology, Faculty of Education, Tottori University, Tottori.

***Panonychus osmanthi* sp. nov.**

(Japanese name: Mokusei-hadani)

(Figs. 1-8, 12-23)

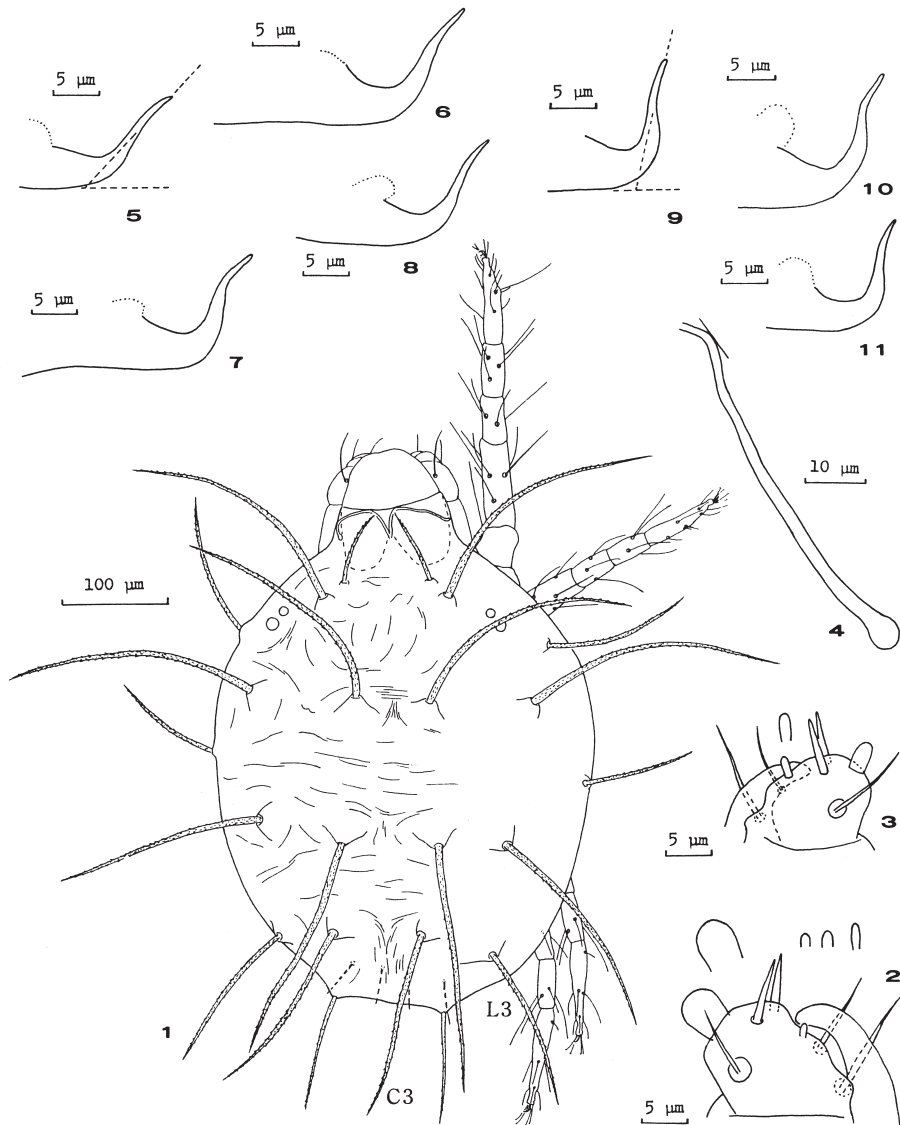
Female. Body, including rostrum, 442 long, 308 wide, rotund, velvety red in colour. Dorsal setae of idiosoma arising from strong tubercles, pubescent, much longer than distance between their bases; lengths of setae as shown in Table 1. Hysterosoma with longitudinal striae between each pair of dorsocentral setae. Peritremes straight distally, ending in a dilated termination which is subcircular, or elongate and subparallel-sided (Figs. 16-23; cf. Figs. 24-35). Pregenital and genital area with longitudinal striae on anterior part, and with transverse striae on posterior part. Palpus with spinneret slightly spatulate, approximately as long as broad; dorsal sensillum usually much longer than wide, often tiny. The number of setae and solenidia (in parentheses) on leg segments: femora 8-6-3-1, genua 5-5-3-3, tibiae 7(1)-5-5-5, tarsi 12(1)+2 dupl.-11(1)+1 dupl.-9(1)-9(1). Tarsus I with 3 tactile setae and 1 solenidion proximal to proximal set of duplex setae; proximal duplex set with distal member (solenidion) about twice as long as proximal member (tactile seta). Tarsus II with 2 tactile setae and 1 solenidion proximal to duplex setae, and with 1 tactile seta near duplex setae; distal member of duplex set approximately twice as long as proximal member.

Male. Body, including rostrum, 398 long, 211 wide. Lengths of setae as presented in Table 1. Aedeagus with shaft strongly bent dorsad to form a slender, tapering, sigmoid distal part which is about 1.5 times as long as dorsal margin of shaft; the axis of distal part forming at an angle of ca. 47°-ca. 63° with ventral margin of shaft. The number of setae and solenidia (in parentheses) on leg segments: femora 8-6-3-1, genua 5-5-3-3, tibiae 7 (4)-5-5-5, tarsi 12(3)+2 dupl.-11(1)+1 dupl.-9(1)-9(1). Tarsus I with 3 tactile setae and 3 solenidia proximal to proximal set of duplex setae; proximal duplex set with distal member approximately twice as long as proximal member. Tarsus II with 2 tactile aetae and 1 solenidion proximal to duplex setae, and with 1 tactile seta near duplex setae; distal member of duplex set approximately twice as long as, or slightly longer than the length of proximal member.

Type series. Holotype: ♂, 6-I-1995 (T. Gotoh), reared in Laboratory of Appl. Entomol. & Zool., Ibaraki Univ. (host in laboratory: *Osmanthus fragrans* Loureiro var. *aurantiacus* Makino), originally collected at Ryugasaki, Ibaraki Pref., Honshu, 6-VI-1993 (T. Gotoh), on *Osmanthus fragrans* var. *aurantiacus*. Paratypes: 19 ♂ ♂ & 26 ♀ ♀, with the above data.

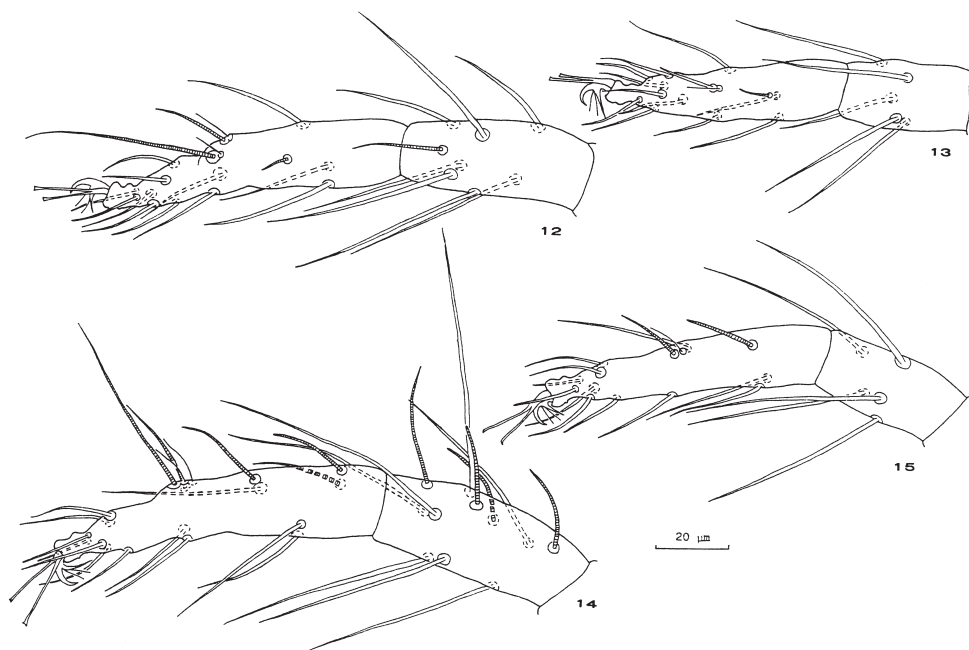
In addition to the type series, many female specimens from Kurume, Fukuoka Pref., Kyushu, on *Osmanthus fragrans* Lour., were examined.

Remarks. *Panonychus osmanthi* sp. nov. and *P. citri* (McGregor) are undoubtedly regarded as sibling species. The female of *P. osmanthi* is very close to that of *P. citri*, but



Figs. 1-8. *Panonychus osmanthi* sp. nov. 1: Dorsum of female. 2: Distal segment of palpus of female, showing variation of spinneret and dorsal sensillum. 3: Distal segment of palpus of male, with another dorsal sensillum. 4: Peritreme of female. 5-8: Aedeagi. Figs. 9-11. Aedeagi of *P. citri*.

is distinguished from the latter by having the 3rd dorsolateral hysterosomal setae (L3) noticeably shorter than the 3rd dorsocentral hysterosomals (C3). In the female of *P. citri* the 3rd dorsolateral hysterosomal setae are slightly shorter than, or as long as the 3rd dorsocentral hysterosomals. In addition to the data in Table 1, the L3 setae of *P. osmanthi* of female from Kurume, Fukuoka Pref., measure $140.6 \pm 1.3 \mu\text{m}$ ($n=20$), and its



Figs. 12-15. *Panonychus osmanthi* sp. nov. 12: Tarsus and tibia I of female. 13: Tarsus and tibia II of female. 14: Tarsus and tibia I of male. 15: Tarsus and tibia II of male.

Table 1. Setal length^a and body length (in μm) of *Panonychus osmanthi* sp. nov. and *P. citri*

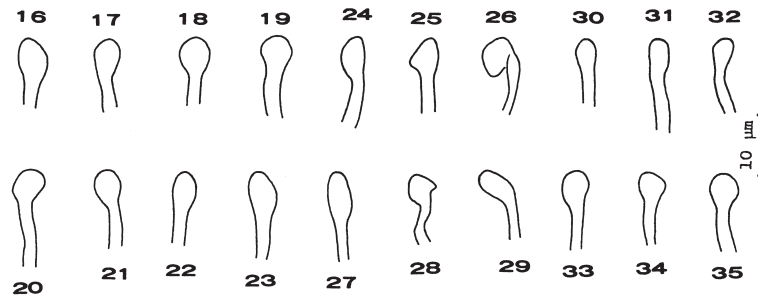
	<i>P. osmanthi</i> sp. nov. ^b		<i>P. citri</i> (1) ^c		<i>P. citri</i> (2) ^d	
	Female	Male	Female	Male	Female	Male
P 1	66.6 $\pm$ 0.7	60.0 $\pm$ 1.7	76.9 $\pm$ 1.7	64.8 $\pm$ 2.2	70.7 $\pm$ 0.9	57.6 $\pm$ 1.8
P 2	230.5 $\pm$ 2.2	159.5 $\pm$ 3.4	213.7 $\pm$ 1.9	153.1 $\pm$ 3.8	204.4 $\pm$ 2.7	137.1 $\pm$ 4.4
P 3	128.0 $\pm$ 1.5	111.2 $\pm$ 2.2	138.9 $\pm$ 1.1	110.1 $\pm$ 2.6	131.4 $\pm$ 2.2	100.7 $\pm$ 3.2
H	104.6 $\pm$ 1.0	96.7 $\pm$ 2.9	121.0 $\pm$ 1.6	96.2 $\pm$ 1.8	110.2 $\pm$ 2.1	87.4 $\pm$ 3.5
C 1	212.4 $\pm$ 2.1	145.4 $\pm$ 3.1	201.3 $\pm$ 2.5	151.1 $\pm$ 2.6	196.4 $\pm$ 3.0	128.6 $\pm$ 4.1
C 2	214.6 $\pm$ 1.9	147.0 $\pm$ 3.1	204.1 $\pm$ 2.0	153.4 $\pm$ 1.8	201.3 $\pm$ 3.3	128.6 $\pm$ 3.8
C 3	171.6 $\pm$ 1.5	60.1 $\pm$ 2.1	179.5 $\pm$ 2.2	73.6 $\pm$ 2.5	174.2 $\pm$ 2.3	63.0 $\pm$ 2.4
C 4	100.1 $\pm$ 1.0	35.9 $\pm$ 1.1	125.3 $\pm$ 1.7	40.4 $\pm$ 1.2	114.6 $\pm$ 2.3	36.9 $\pm$ 1.3
L 1	230.4 $\pm$ 2.3	161.2 $\pm$ 2.3	219.6 $\pm$ 2.5	164.6 $\pm$ 3.5	211.6 $\pm$ 3.1	151.2 $\pm$ 2.8
L 2	196.4 $\pm$ 1.8	146.1 $\pm$ 2.8	199.0 $\pm$ 2.0	151.2 $\pm$ 2.7	188.4 $\pm$ 3.2	137.2 $\pm$ 4.0
L 3	139.0 $\pm$ 1.9	95.6 $\pm$ 2.3	167.9 $\pm$ 2.0	104.6 $\pm$ 2.4	153.0 $\pm$ 2.8	92.5 $\pm$ 2.8
L 4	38.4 $\pm$ 0.7	23.1 $\pm$ 0.8	44.2 $\pm$ 1.2	26.5 $\pm$ 0.9	36.7 $\pm$ 0.7	21.1 $\pm$ 0.8
CL	33.9 $\pm$ 0.4	21.0 $\pm$ 0.7	39.1 $\pm$ 0.8	22.1 $\pm$ 0.5	31.5 $\pm$ 0.9	18.8 $\pm$ 0.6
B.L.	442	398	514	400	448	372

^a n=20, mean $\pm$ S.E.

^b From Ryugasaki, Ibaraki Pref. (*Osmanthus fragrans* var. *aurantiacus*).

^c From Akitsu, Hiroshima Pref. (citrus).

^d From Kuchinotsu, Nagasaki Pref. (citrus).



Figs. 16-35. Distal termination of peritremes of female. 16-23: *Panonychus osmanthi* sp. nov. 24-29: *P. citri* (from Akitsu). 30-35: *P. citri* (from Kuchinotsu).

C3 setae are $167.3 \pm 0.9 \mu\text{m}$. Moreover, *P. osmanthi* is characterized in that the aedeagus turns upward distally at a smaller angle to the ventral margin of the shaft than in *P. citri* (*citri*: ca. 67° -ca. 78° ; Figs. 5-11). In addition, it was recently reported that *P. osmanthi* was reproductively isolated from *P. citri* (Kitashima and Gotoh, 1995), and that esterase zymogram clearly differed between *P. osmanthi* and *P. citri* (Osakabe and Komazaki, 1996).

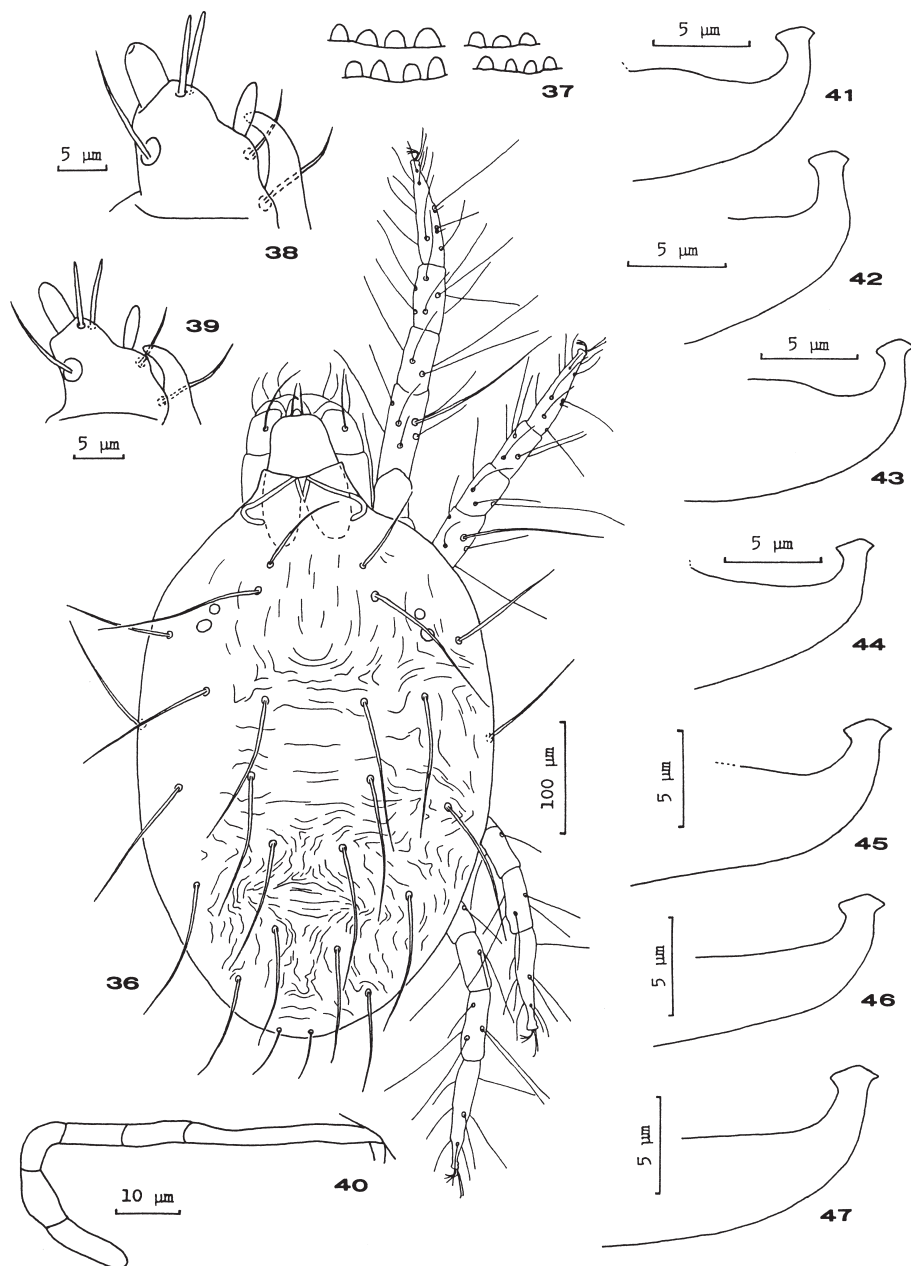
***Tetranychus pueraricola* sp. nov.**

(Japanese name: Nami-hadani-modoki)

(Figs. 36-44, 48-51)

Female. Body, including rostrum, 526 long, 324 wide, red in colour. Dorsal setae on idiosoma slender, pubescent, much longer than distance between consecutive setae; lengths of setae (mean $\pm$ S.E., $n=10$): P 1 80.5 ± 1.4 , P 2 138.1 ± 1.9 , P 3 103.0 ± 1.1 , H 112.7 ± 1.6 , C 1 132.1 ± 1.5 , C 2 126.0 ± 1.0 , C 3 122.0 ± 1.8 , C 4 108.6 ± 1.2 , L 1 126.3 ± 1.4 , L 2 124.6 ± 1.2 , L 3 118.8 ± 1.4 , L 4 96.3 ± 0.8 , CL 43.7 ± 0.7 . Hysterosoma with longitudinal striae between pair of setae C 3 and between pair of C 4, forming a diamond-shaped figure between these setae; dorsal hysterosomal striae with lobes nipple-shaped, mostly as tall as, or taller than broad, sometimes broader than tall. Peritremes strongly hooked distally. Pregenital area with longitudinal striae, the striae broken medially, solid laterally; genital flap with transverse striae. Palpus with spinneret approximately twice as long as broad; dorsal sensillum fusiform, slightly shorter than spinneret. The number of setae and solenidia (in parentheses) on leg segments: femora 10-6-4-4, genua 5-5-4-4, tibiae 9(1)-7-6-7, tarsi 13(1)+2 dupl.-13(1)+1 dupl.-9(1)-10(1). Tarsus I with 4 tactile setae proximal to proximal set of duplex setae, with 1 solenidium at or near the level of the proximal duplex set; tarsus II with 3 tactile setae and 1 solenidium proximal to duplex setae, and with 1 tactile seta near duplex setae. Tarsi III and IV each with solenidium proximal, somewhat shorter than distances to bases of mediobasal tactile setae. Each empodium consisting of 3 pairs of hairs, with 1 pair of short, barely discernible proximobasal filaments, without mediobasal spurs.

Male. Body, including rostrum, 379 long, 177 wide. Lengths of setae ($n=10$): P 1 54.6 ± 0.9 , P 2 90.9 ± 1.4 , P 3 65.3 ± 1.1 , H 75.4 ± 1.2 , C 1 82.8 ± 0.7 , C 2 81.4 ± 1.3 , C 3 76.8 ± 1.2 , C 4

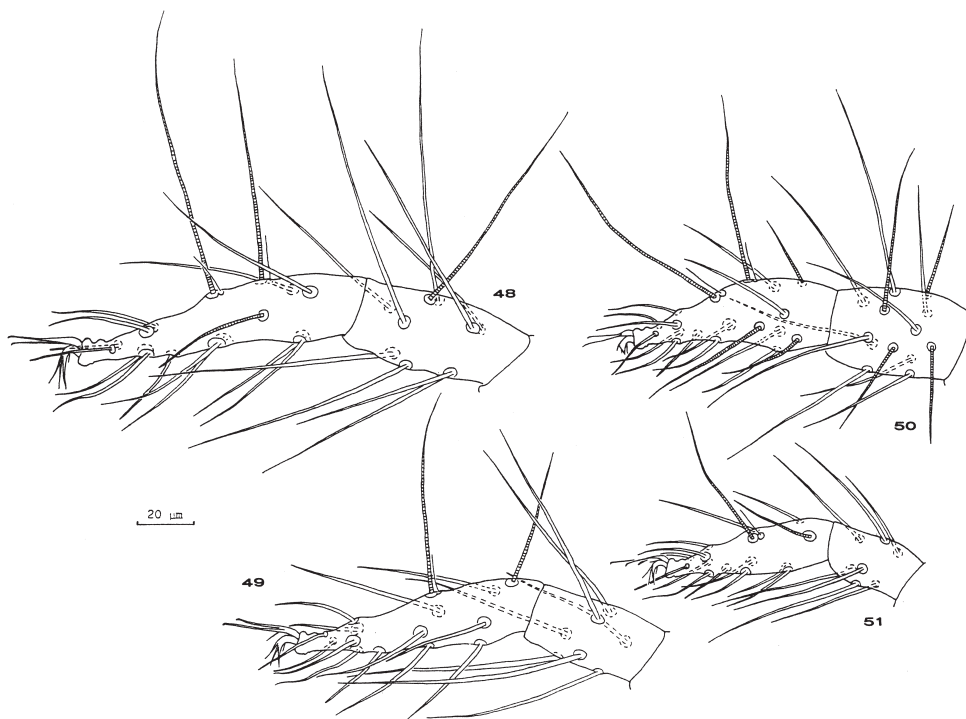


Figs. 36-44. *Tetranychus pueraricola* sp. nov. 36: Dorsum of female. 37: Lobes on dorsal hysterosomal striae of female (schematic). 38: Distal segment of palpus of female. 39: Distal segment of palpus of male. 40: Peritreme of female. 41-44: Aedeagi. Figs. 45-47. Aedeagi of *T. urticae*.

57.9±1.0, L 1 81.5±2.1, L 2 80.2±0.6, L 3 80.8±1.5, L 4 48.7±1.6, CL 23.1±0.9. Aedeagus upturned distally; terminal knob 2.1 long, much longer than the width of neck, approximately 1/4 to 1/3 as long as dorsal margin of shaft, the axis of knob subparallel with dorsal margin of shaft; anterior projection of knob slightly larger than the posterior projection. Palpus with spinneret more than twice as long as broad; dorsal sensillum fusiform, subequal to spinneret in length. The number of setae and solenidia (in parentheses) on leg segments: femora 10-6-4-4, genua 5-5-4-4, tibiae 9(4)-7-6-7, tarsi 13(3)+2 dupl.-13(1)+1 dupl.-9(1)-10(1). Tarsus I with 4 tactile setae and 2 solenidia proximal to proximal set of duplex setae, with 1 solenidion at or near the level of the proximal duplex set; tarsus II with 3 tactile setae and 1 solenidion proximal to duplex setae, with 1 tactile seta near duplex setae. Empodium I with 1 pair of claw-like, dentate divisions and a strong mediodorsal spur; empodia II-IV each composed of 3 pairs of hairs and an obvious mediodorsal spur.

Type series. Holotype: ♂, 20-IX-1995 (T. Gotoh), reared in Lab. of Appl. Entomol. & Zool., Ibaraki Univ. (host in laboratory: *Phaseolus vulgaris* L.), originally collected at Hitachi-Ohta, Ibaraki Pref., 23-X-1993 (T. Gotoh), on *Pueraria lobata* (Willdenow) Ohwi. Paratypes: 6 ♂ & 14 ♀, with the above data; 6 ♂ & 10 ♀, 19-XII-1994 (T. Gotoh), other data the same as for holotype.

Remarks. *Tetranychus pueraricola* sp. nov. is closely allied to *T. urticae* Koch, and is



Figs. 48-51. *Tetranychus pueraricola* sp. nov. 48: Tarsus and tibia I of female. 49: Tarsus and tibia II of female. 50: Tarsus and tibia I of male. 51: Tarsus and tibia II of male.

considered as a sibling species of the latter. The summer female of *T. pueraricola* is red in colour, in contrast with that of the green form of *T. urticae*. The aedeagus of *T. pueraricola* differs from those of the green and red forms of *T. urticae* in that the terminal knob is around $2.1\mu\text{m}$ in length instead of $2.5\text{--}2.6\mu\text{m}$ (Figs. 41–47). The terminal knobs of the two species are very similar in shape. The lobes on the dorsal hysterosomal striae of female are generally nipple-shaped rather than semicircular. *T. pueraricola* is ecologically characterized in the brownish feeding scars on the host leaves. Incidentally, *T. pueraricola* is reproductively incompatible with the green and red forms of *T. urticae* (Gotoh and Tokioka, 1996). Furthermore, this new species is distinct from all other known members of the *urticae* complex in the shape and size of the aedeagus.

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摘 要

ハダニ科の2新種の記載 江原昭三(鳥取市浜坂2丁目15-7)・後藤哲雄(茨城大学農学部 応用動物昆虫学研究室)

Panonychus osmanthi Ehara et Gotoh, sp. nov. (モクセイハダニ, 新称)と *Tetranychus pueraricola* Ehara et Gotoh, sp. nov. (ナミハダニモドキ, 新称)を記載した。*P. osmanthi*は、ミカンハダニ *P. citri* (McGregor)の同胞種であるが、雌の第3背側後体毛が第3背中後体毛よりも顕著に短く(ミカンハダニでは、前者が後者よりやや短いか、または後者とはほぼ同長)、挿入器はミカンハダニよりも弱い角度で背方に曲がる。本種はモクセイに寄生し、模式産地は茨城県竜ヶ崎市(キンモクセイ)である。福岡県久留米市産の標本も検し得た。ナミハダニ *T. urticae* Kochの同胞種である *T. pueraricola*(休眠性)は、夏型雌がナミハダニの黄緑型と異なって赤色であるほか、挿入器の末端の拡張部の径がナミハダニよりもやや短くて約 $2.1\mu\text{m}$ である(ナミハダニではこの径は $2.5\text{--}2.6\mu\text{m}$)。この種の模式産地は茨城県常陸太田市で、寄主はクズである。

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