

# Contribution to the Knowledge of the Genus *Paraphytoseius* Swirski and Shechter (Acarina: Phytoseiidae) in Taiwan<sup>1</sup>

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**Abstract** Four species in the genus *Paraphytoseius* are reported. *P. multidentatus* Swirski and Shechter shows variations compared to other reports. *P. cracentis* (Corpuz and Rimando) is first recorded from Taiwan. *P. chihpenensis* and *P. hualienensis* are new to science.

## INTRODUCTION

Swirski & Shechter (1961) created the genus *Paraphytoseius*, with *P. multidentatus* as type-species. Ten more species were reported thereafter. Only two *Paraphytoseius* species, *P. subtropicus* (Tseng) and *P. hyalinus* (Tseng), were recorded from Taiwan (Tseng 1972, 1973, 1976). The former was emended to *P. multidentatus* (Tseng 1983). The present authors had not collected *Paraphytoseius hyalinus*. It is very regret that the collection of Tseng's is not available for comparison.

Specimens studied in this report were examined with a Leitz diaphan optical microscope which was equipped with transmitted light interference contrast lenses. Spermatheca and spermatodactyl were examined with 100x, oil objective lense. Some measurements were measured at certain site. These are as follows:

Dorsal shield: length, D1 to D6; width, L5 to L5.

Sternal shield: width, between the base of seta II.

Genital shield: width, the widest part, near genital seta.

Ventroanal shield: width, for female, widest part of the preanal portion.

Sterno-genital shield: length, seta I to the posterior margin; width, between, the base of seta III.

All measures are in microns. The mean and range, if available, are given. Dorsal setae terminology of Swirski and Shechter (1961) is followed. The type specimens of the new species are preserved in TARI, Taiwan Agricultural Research Institute. The

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other abbreviation used in this report is NPIA, National Pingtung Institute of Agriculture.

### Genus *Paraphytoseius* Swirski and Shechter

*Paraphytoseius* Swirski and Shechter, 1961 : 113.

Type species: *Paraphytoseius multidentatus* Swirski and Shechter, 1961, by original designation.

Swirski and Shechter (1961) created the genus *Paraphytoseius*. Chant (1965) synonymised this genus under *Amblyseius*. Ehara (1967) and Tseng (1972, 1973, 1983) considered it as a subgenus of *Amblyseius*. Schicha (1987), however, based on the morphology of setae of the dorsal shield, ventral shields, spermathecae and macrosetae on leg IV, suggested that *Paraphytoseius* is a genus evolved from *Phytoseius* with the reduction of the seta L3 and a few of other modifications. Ueckerman and Loofts (1987) redefined *Paraphytoseius* to include *Platyseiella*. The present authors follow the opinion of Schicha and Corpuz-Raros.

*P. multidentatus* lack seta L8. Accordingly, Swirski and Shechter defined *Paraphytoseius* with L3 pairs of setae on dorsal shield. Schicha and Corpuz-Raros (1985) emended the number of setae on dorsal shield to be L3 or L4, because *P. cracentis* (Corpuz and Rimando) does possess L8.

Matthysse and Denmark (1981) proposed that all 11 species then described are synonymous with the type species, *P. multidentatus*. Schicha and Corpuz-Raros (1985) suggested that there were at least three species. Based on the various specimen collected, the present authors believe there are many species, not as the proposal of Matthysse and Denmark.

*P. multidentatus* and *P. chihpenensis* n. sp. do not have seta L8, and a smaller macroseta is found on genu I. While *P. cracentis* and *P. hualienensis*, which possess L8, do not have macroseta on genu I. This holds to species described by Tseng (1976) and Schicha and Corpuz-Raros (1985), except *P. seychellensis*. This author wonders if there is a relationship between the presence of macroseta on genu I and the seta L8.

An indent, U shape in general, in the median of anterior margin of sternal plate is always observed by the authors. This differs to the observations of other researchers.

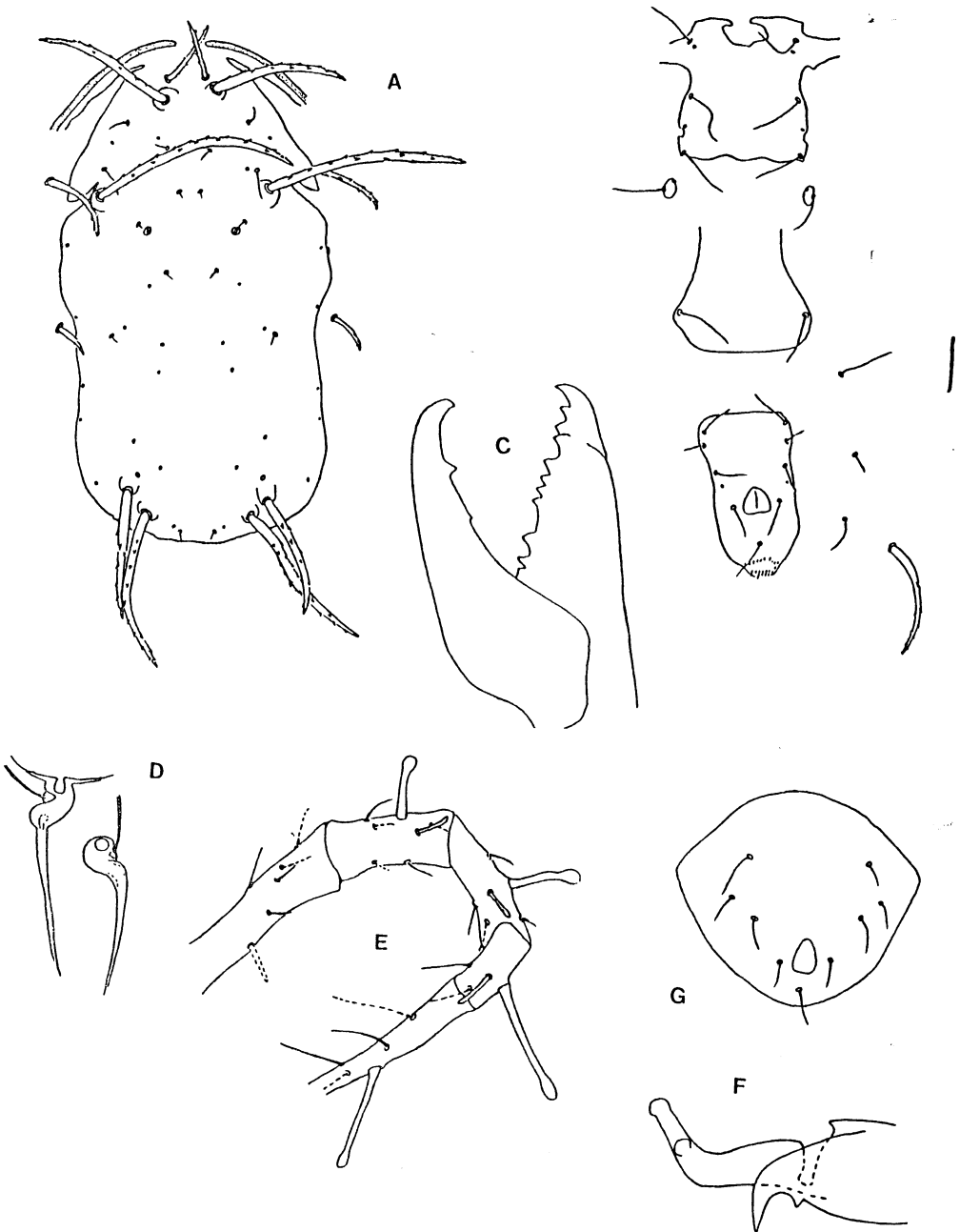
### KEY TO THE TAIWAN SPECIES OF THE GENUS *PARAPHYTOSEIUS*

#### Females

1. L8 absent, genu I with a macroseta..... 8  
L8 present, genu I without macroseta ..... 3
2. Atrium of spermatheca funnel shaped, ventroanal shield  
widest at the anal area..... *P. chihpenensis* n. sp.  
Atrium of spermatheca inclined bean shaped, ventroanal shield widest at near the preanal seta 2.....*P. multidentatus* Swirski and Shechter
3. Lateral margin of ventroanal shield straight.....*P. hyalinus* (Tseng)  
Lateral margin of ventroanal shield with a concave between preanal setae 2 and 3,

atrium of spermatheca not prominent, sternal shield with a protrusion posterior-lateral to the posterior pore..... *P. hualienensis* n. sp.  
 Preanal portion of the ventroanal shield widest at the front margin and narrowest at the pore area, atrium expanded prominently, sternal shield without a protrusion as above..... *P. cracentia* (Corpuz and Rimando)

*Paraphytoseius multidentatus* Swirski and Shechter (Figure 1)



**Figure 1.** *Paraphytoseius multidentatus* Swirski and Shechter.

A: Dorsal shield of female. B: Venter of female. C: Chelicera of female. D: Spermatheca. E: Leg IV of female. F: Spermatodactyl. G: Ventroanal shield of male.

***Paraphytoeius multidentatus* Swirski and Shechter** (Figure 1)

*Paraphytoeius multidentatus* Swirski and Shechter, 1961: 114; Matthyssse and Denmark 1981: 342; Schicha and Corpuz-Raros, 1985: 67. *Amblyseius (Paraphytoeius) subtropicus* Tseng, 1972: 1, 1976: 105, 1983: 35.

**FEMALE**

**DORSUM:** Dorsal shield smooth, with notch on margin lateral to L5, 274 (255—293) long, 104 (100—108) wide. It bears 13 pairs of setae, five dorsal, two median, four pro-lateral, two postlateral. Setae D1 (37, 34—41), M2 (72, 64—80), L1 (83, 76—92), L5 (122, 111—136), and L9 (97, 89—107) are long, thick and serrated. Setae D5, L3, L6, L7, and L8 are absent. All other setae are smooth and short or minute. One pair of large pores is mesad to M1. Fourteen pairs of pores in addition to those pores around L4 and M2 were as figured. Setae S1 (47, 41—55) and S2 (24, 22—27) are thick and serrated also, set on interscutal membrane. Peritremes extend forward to D1 (Fig. 1A).

**VENTER:** Sternal shield 76 (74—79) long, 64 (63—67) wide, bears 3 pairs of setae; and 2 pairs of pores, one posterior to seta I, the other anterior to seta III. Metasternal shield bears 1 pair of setae and 1 pair of pores on the anterior margin. Genital shield 85 (79—92) wide, bears 1 pair of setae. Ventroanal shield 100 (95—108) long, 55 (54—57) wide, bears 3 pairs of preanal setae, one pair of paraanal setae, and one postanal seta. A pair of pores was posterior to preanal seta III. The cuticle surround ventroanal shield bears 4 pairs of setae, with the fourth pair thick and serrated, 66 (60—71) long. The metapodal shield is slender, 36 long (Fig. 1B).

**CHELICERA:** The fixed digit with 9 teeth. The movable digit with 2 teeth (Fig. 1C).

**SPERMATHECA:** Cervix disc-shaped. Atrium shape varies while view from different angle (Fig. 1D).

**LEGS:** Genu I (1), genu II (1), femur IV (1), genu IV (2), tibia IV (2), basitarsus IV (2), and distitarsus IV (1) bear spatulate and/or knobbed macrosetae (Fig. 1E).

**MALE**

**DORSUM:** Dorsal shield smooth, without notch on margin lateral to L5, 220 (209—231) long (D1-D6), 93 (90—96) wide (L5-L5). The chaetotaxy resembles female's, with S1 and S2 on dorsal shield. Setae length are D1 23 (14—26), M2 46 (43—48), L1 58 (49—64), L5 83 (72—95), L9 57 (52—61), S1 32 (28—35), and S2 14 (14—15). Peritremes extend forward to between L1 and L2.

**VENTER:** Sternogenital shield is smooth, 106 (101—111) long (from the first pair of setae to the end), 63 (60—65) wide (between the base of the third pair of setae), bears 5 pairs of setae. The last pair of setae may not on the shield. Ventroanal shield 95 (87—109) long, 99 (95—108) wide, bears 3 pairs of preanal setae, one pair of paraanal setae, and one postanal seta. The caudolateral seta thick and serrated, 16 (14—20) long (Fig. 1F).

**CHELICERA:** The fixed digit with 7 teeth. The movable digit with 1 teeth.

**SPERMATODACTYL:** As Fig. 1G.

**LEGS:** The number of spatulate and/or knobbed macrosetae are genu I (1), genu

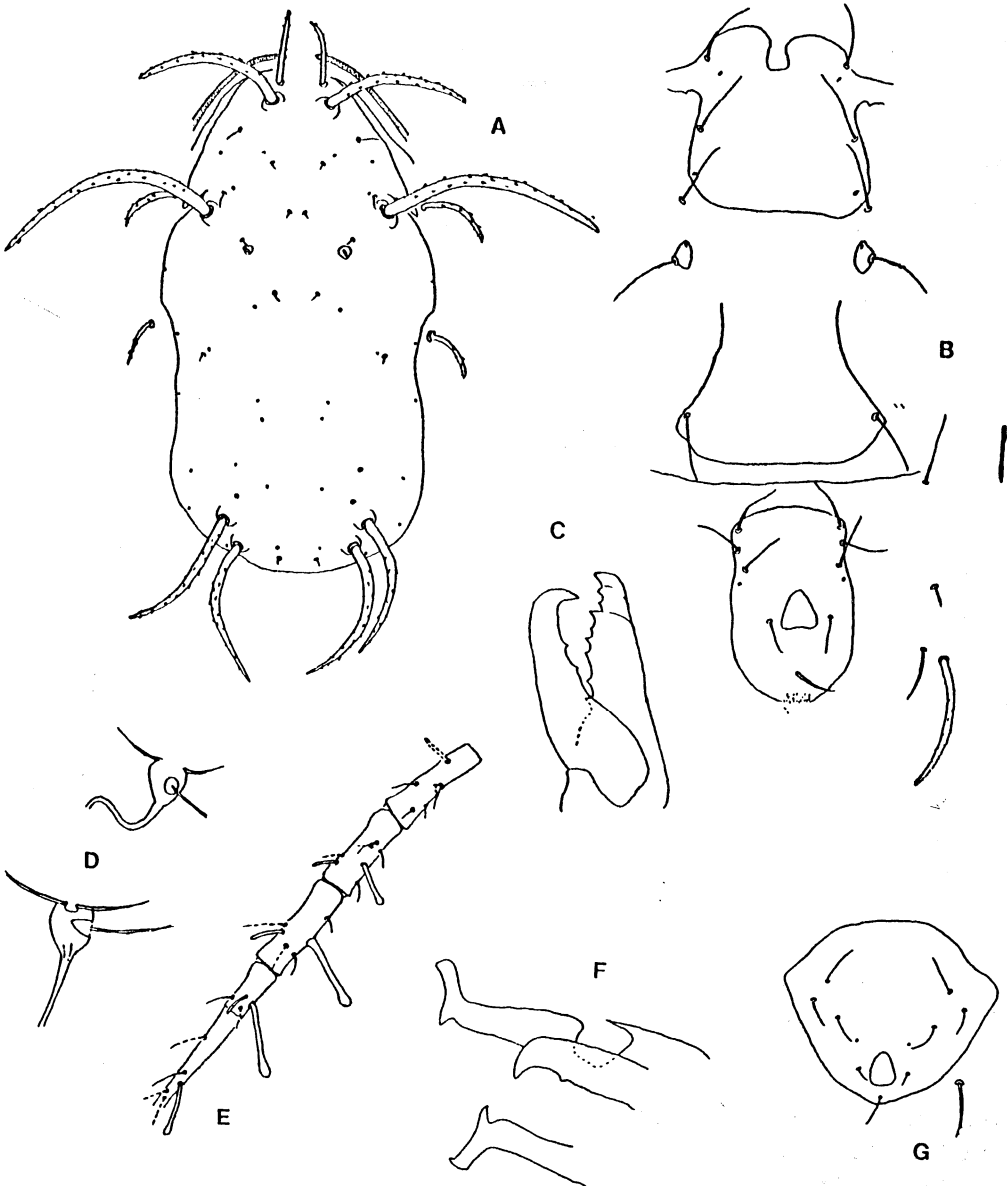
II (1), femur IV (1), genu IV (2), tibia IV (2), basitarsus IV (2), and distitarsus IV (1).

SPECIMENS EXAMINED: TARI, 2.xi.1987, on jujube leaves, C. C. Ho. Taitung, Lutaotao, 1.v.1987, on *Pueraria montana* (Lour.) Merr., C. C. Ho. Nantou, Tunpu, 18.x. 1985, on a Leguminosae plant, C. C. Ho.

**REMARKS**

Specimens described in this paper resemble the *P. seychellensis* Schicha and Corpuz-Raros (1985) in the number of teeth on fixed digit of chelicera, the 3rd pair of ventro-

*Paraphytoseius chihpeneensis* n. sp. (Figure 2)



**Figure 2.** *Paraphytoseius chihpeneensis* n. sp.

A: Dorsal shield of female. B: Venter of female. C: Chelicera of female. D: Spermatheca. E: Leg IV of female. F: Spermatodactyl. G: Ventroanal shield of male.

lateral setae are not serrated; resemble *P. multidentatus* in the number of macrosetae, the figure of sternal plate. The spermatheca of *P. multidentatus* and *P. seychellensis* differs distinctly in their report (Fig. 6 and Fig. 24 of Schicha and Corpuz-Raros). Two types of spermatheca (Fig. 1D) were in the specimens collected by the present authors. However, after careful observations, the senior author considers the observed different shape of spermatheca is due to the pose of spermatheca that settled when making specimens. As the teeth number tends to have variation among specimens, therefore, based on the number of macrosetae on leg IV, these specimens are identified as *P. multidentatus*.

*Paraphytoseius chihpenensis* n. sp. (Figure 2)

**FEMALE**

**DORSUM:** Dorsal shield smooth, with notch on margin lateral to L5, 267 (260—278) long, 103 (101—105) wide. It bears 13 pairs of setae, five dorsal, two median, four pro-lateral, two postlateral. Setae D1 (37, 35—41), M2 (79, 74—84), L1 (92, 88—97), L5 (131, 127—133), and L9 (102, 92—108) are long, thick and serrated. Setae D5, L3, L6, L7, and L8 are absent. All other setae are smooth and short or minute. One pair of large pores is mesad to M1. Fifteen pairs of additional pores were figured. Setae S1 (47, 42—51) and S2 (35, 32—40) are thick and serrated also, set on interscutal membrane. Peritremes extend beyond D1 (Fig. 2A).

**VENTER:** Sternal shield 75 (69—79) long, 64 (60—68) wide, bears 3 pairs of setae, with the third pair of seta set on membrane, and 2 pairs of pores, one after seta I, the other before seta III. Metasternal shield bears 1 pair of setae, and a pair of pores on the anterior margin. Genital shield 85 (79—92) wide, bears 1 pair of setae. Ventrolanal shield 84 (79—88) long, 52 (49—54) wide, bears 3 pairs of preanal setae, one pair of paraanal setae, and one postanal seta. A pair of pores are posterior and slightly lateral to preanal setae III. Four pairs of setae were borne on the cuticle surround ventroanal shield, with the 3rd one more than twice as long as the 2nd pair, and the 4th pair thick and serrated, 76 (71—87) long. The metapodal shield is slender, 31 long (Fig. 2B).

**CHELICERA:** The fixed digit with 7—8 teeth. The movable digit with 2—3 teeth (Fig. 2C)

**SPERMATHECA:** Cervix disc-shaped. Atrium as figured (Fig. 2D).

**LEGS:** Genu I (1), genu II (1), femur IV (1), genu IV (2), tibia IV (2), basitarsus IV (2), and distitarsus IV (1) bear spatulate and/or knobbed macrosetae (Fig. 2E).

**MALE**

**DORSUM:** Dorsal shield smooth, without notch on margin lateral to L5, 221 long, 94 wide. The chaetotaxy resembles female's, with S1 and S2 on dorsal shield. Setae length are D1 27, M2 42, L1 60, L5 92, L9 58, S1 34, and S2 16. Peritremes extend forward to between D1 and D2, and is more close to D2.

**VENTER:** Sternogenital shield is smooth, 106 long, 64 wide; bears 5 pairs of setae, the 5th pair of setae was on membrane, and 3 pair of pores. Ventroanal shield 82 long, 95 wide, bears 3 pairs of preanal setae, one pair of paraanal setae, and one postanal

seta. A pair of pores locate in a position posterior and inner to preanal seta III. The caudolateral seta thick and serrated, 22 long (Fig. 2F).

CHELICERA: The fixed digit with 7—8 teeth. The movable digit with 1 teeth.

SPERMATODACTYL: As Fig. 2G.

LEGS: The number of spatulate and/or knobbed macrosetae are genu I (1), genu II (1), femur IV (1), genu IV (2), tibia IV (2), basitarsus IV (2), and distitarsus IV (1).

Holotype: ♀ Taitung, Chihpen, 23.iii.1988, on *Macaranga tanarius* (L.) Muell-Arg. leaves, C. C. Ho. Paratypes: 9♀ and 1 ♂, data same as for holotype. 2♀, Kaohsiung, Liukuei, 3.vii.1985, on *Urena lobata* L., C. C. Ho.

### REMARKS

This species differs to *P. multidentatus* in the shape of spermatheca and ventroanal shield. The ventroanal shield is widest at the anal area. The macroseta of femur IV is slightly longer. It resembles more to *Amblyseius* (*Paraphytoseius*) *urumanus* Ehara described by Ehara (1967), but all the setae measured were longer than *A. (P.) urumanus*.

*Paraphytoseius cracentis* (Corpus and Rimando) (Figure 3)

*Ptenoseius cracentis* Corpuz and Rimando, 1966 : 115.

*Paraphytoseius cracentis*: Schicha and Corpuz-Raros, 1985 : 69.

### FEMALE

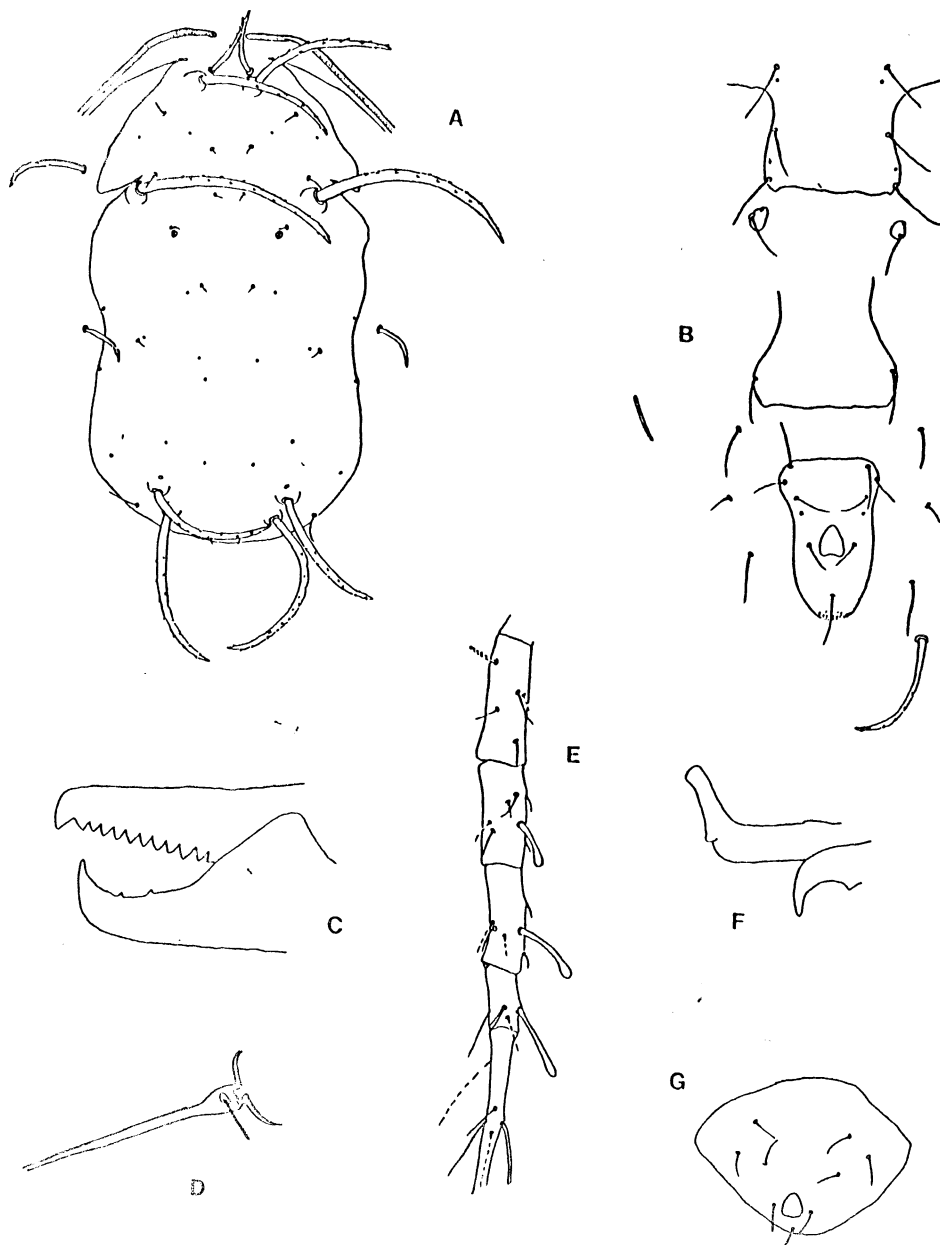
DORSUM: Dorsal shield smooth, with notch on margin lateral to L5, 264 (251—279) long, 95 (92—96) wide. It bears 14 pairs of setae, five dorsal, two median, four pro-lateral, three postlateral. Setae D1 (33, 32—34), M2 (77, 70—83), L1 (92, 87—99), L5 (125, 120—132), and L9 (110, 99—119) are long, thick and serrated. Setae D5, L3, L6, and L7 are absent. All other setae are smooth and short or minute. One pair of large pores is mesad to M1. Setae S1 (47, 43—53) and S2 (30, 27—36) are thick and serrated also, set on interscutal membrane. Peritremes extend forward to D1 (Fig. 3A).

VENTER: Sternal shield 78 (74—84) long, 67 (64—69) wide, bears 3 pairs of setae and 2 pairs of pores, one posterior to sternal seta I, one anterior to sternal seta III. Metasternal shield bear 1 pair of setae and one pair of pores. Genital shield 86 (78—90) wide, bears 1 pair of setae. Ventroanal shield 97 (95—105) long, 58 (51—64) wide, bears 3 pairs of preanal setae, one pair of paraanal setae, one postanal seta and one pair of pores posterio to preanal seta III. The opisthogastric cuticle bears 4 pairs of setae, with the fourth pair (caudolateral in position) thick and serrated, 75 (71—84) in length. The metapodal shield is slender, 31 (24—36) long (Fig. 3B).

CHELICERA: The fixed digit with 11 teeth. The movable digit with 3 teeth (Fig. 3C).

SPERMATHECA: Cervix disc-shaped. Atrium as figured (Fig. 3D).

LEGS: Each of genu II, femur IV, genu IV, tibia IV, basitarsus IV, and distitarsus IV bear one spatulate or knobbed macrosetae (Fig. 3E).



**Figure 3.** *Paraphytoseius cracentis* (Corpuz and Rimando)

A: Dorsal shield of female. B: Venter of female. C: Chelicera of female. D: Spermatchcca.  
E: Leg IV of female. F: Spermotodactyl. G: Ventroanal shield of male.

### MALE

**DORSUM:** Dorsal shield smooth, without notch on margin lateral to L5, 216 (214–219) long, 86 (85–87) wide. The chaetotaxy resembles female's, with S1 and S2 on dorsal shield. Setae length are D1 25 (24–26), M2 49 (48–49), L1 66 (63–70), L5 89 (80–97), L9 55 (48–61), S1 31 (28–33), and S2 16 (15–17). Peritremes extend forward to

between L1 and L2.

VENTER: Sternogenital shield is smooth, 115 (113—117) long, 69 (68—70) wide, bears 5 pairs of setae. The last pair of setae may not on the shield. Ventroanal shield 95 (89—101) long, 110 (109—112) wide, bears 3 pairs of preanal setae, one pair of par-aanal setae, one postanal seta and one pair of pores posterior and inner to preanal seta III. The caudolateral seta thick and serrated, 20 (18—20) long (Fig. 3F).

CHELICERA: The fixed digit with 8 teeth. The movable digit with 1 teeth.

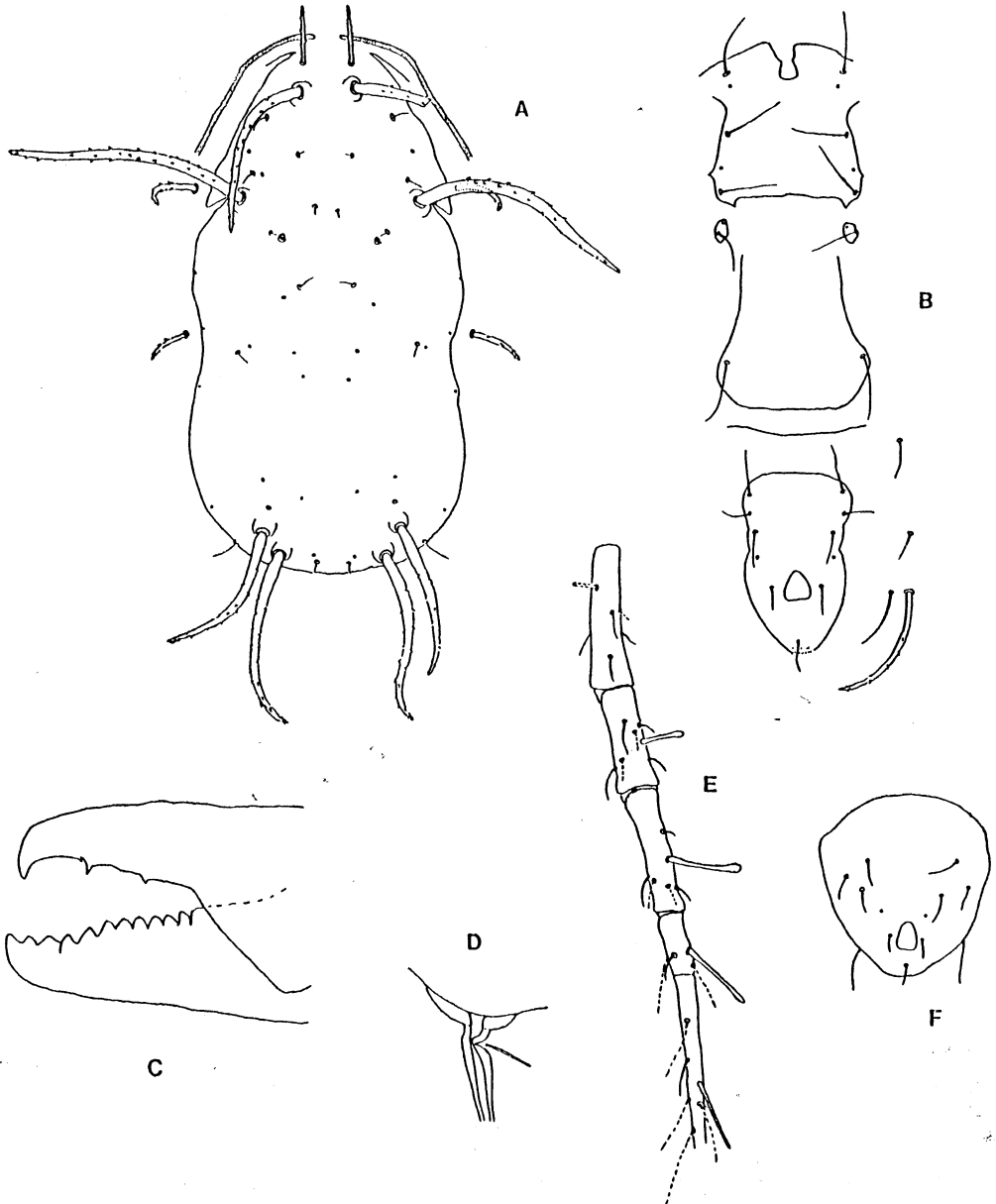


Figure 4. *Paraphytoseius hualienensis* n. sp.

A: Dorsal shield of female. B: Venter of female. C: Chelicera of female. D: Spermatacheca. E: Leg IV of female. F: Spermatoactyl. G: Ventroanal Shield of male.

SPERMATODACTYL: as Fig. 3G.

LEGS: The number of spatulate and/or knobbed macrosetae are similar to the female.

SPICIMENS EXAMINED: Nantou, Chungliiao, 25.ix.1985, on *Phyllanthus yeticulatus* Poir., *Thunbergia alata*, *Urena lobata* L., C. C. Ho. Nantou, Tungpu, 18. xi. 1985, on *Ampelopsis brevipedunculata* Trant., *Ilex pubescens* Hook, C. C. Ho. NPIA, 1.xii.1985, on *Centrosema pubescens* Benth, H. H. Wu. Hualien, Yuli, 2.iv.1987, on *Solanum melongena* L., S. E. Lee. Nantou, Huisuenlincharng, 5.iv.1987, on *Mallotus japonicus* (Thumb.) Muell-Arg., C.C.Ho.

*Paraphytoseius hualienensis* sp. n. (Figure 4)

### FEMALE

DORSUM: Dorsal shield smooth, with notch on margin lateral to L5, 276 (269, 282) long, 101 (100, 101) wide. It bears 14 pairs of setae, five dorsal, two median, four pro-lateral, three postlateral. Setae D1 (32; 31, 33), M2 (78; 69, 87), L1 (84; 81, 89), L5 (131; 125, 136), and L9 (101, 93—108) are long, thick and serrated. Setae D5, L3, L6, and L7 are absent. All other setae are smooth and short or minute. One pair of large pores is mesad to M1. Thirteen smaller pores were also observed. Setae S1 (40; 39, 41) and S2 (29; 27, 32) are thick and serrated also, set on interscutal membrane. Peritremes extend forward over D1 (Fig. 4A).

VENTER: Sternal shield 79 (76, 82) long, 65 (63, 68) wide, bears 3 pairs of setae and 2 pairs of pores, one posterior to sternal seta I, one anterior to sternal seta III. The lateral margin of sternal shield possess a small protrusion near the posterior pores. Metasternal shield bears 1 pair of setae and one pair of pores. Genital shield 82 (76, 89) wide, bears 1 pair of setae. Ventroanal shield 82 (73, 90) long, 60 (58, 61) wide, bears 3 pairs of preanal setae, one pair of paraanal setae, one postanal seta and one pair of preanal pores; widest at, approximetly, the line of first pair of preanal setae, and the lateral margin varied to the other species. The opisthogastric cuticle bears 4 pairs of setae, with the fourth pair (caudolateral in position) thick and serrated, 67 (63, 70) in length (Fig. 4B)

CHELICERA: The fixed digit with 11 teeth. The movable digit with 3 teeth (Fig. 4C).

SPERMATHECA: As Fig. 4D.

LEGS: Each of genu II, femur IV, genu IV, tibia IV, basitarsus IV, and distitarsus IV bear one spatulate or knobbed macrosetae (Fig. 4E).

### MALE

DORSUM: Dorsal shield smooth, without notch on margin lateral to L5, 239 long, 95 wide. The chaetotaxy resembles female's, with S1 and S2 on dorsal shield. Setae length are D1 25, M2 51, L1 66, L5 92, L9 59, S1 30, S2 12. Peritremes extend forward to between L1 and L2.

VENTER: Sternogenital shield is smooth, 114 long, 67 wide, bears 5 pairs of setae.

Ventroanal shield 128 long, 101 wide, bears 3 pairs of preanal setae, one pair of paraanal setae, one postanal seta, and one pair of preanal pores. The caudolateral seta thick and serrated, 25 long (Fig. 4F).

**CHELICERA:** The fixed digit with 9 teeth. The movable digit with 1 tooth.

**LEGS:** The number of spatulate and/or knobbed macrosetae similar to the female.

Holotype: ♀, Hualien, Cranehill, 22.iii.1988, on *Melastoma candidum* D. Don. leaves, C. C. Ho. Paratypes: 1 ♀ and 1 ♂, data same as for holotype.

### REMARKS

This species possesses a prominent pair of L8, differs to *P. cracentis* in the shape of ventroanal shield and spermatheca. Although one male was caught, chelicerae of the specimen overlapped to each other and to pedipalpus. Therefore, make the description of spermatodactyl not possible.

### ACKNOWLEDGEMENTS

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臺灣 *Paraphytoseius* Swirski and Shechter 屬捕植蟎  
(Acarina: Phytoseiidae) 之新知<sup>1</sup>

何 琦 琛 羅 幹 成<sup>2</sup>

摘 要

本文描述 4 種臺灣之 *Paraphytoseiu* 屬之捕植蟎，其中，*P. multidentatus* Swirski and Shechter 之標本與其它學者之報告顯示有個體差異存在。 *P. cracentis* 為新記錄種，*P. chihpenensis* 及 *P. hualienensis* 為兩新種。

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