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Tetranychoid mites infesting tea in Taiwan

By

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The materials on which this paper is based were collected from the tea and various plants in Taiwan from November of 1966 to January of 1968 by the author, and Mr. E. S. Lu of the Taiwan Agricultural Research Institute. After examination, the present materials have been determined to comprise the following five species, belonging to three families:

Family **Tenuipalpidae**

1. *Brevipalpus californicus* (Banks)
2. *B. obovatus* Donnadieu
3. *Tenuipalpus antipodus* Collyer

Family **Tetranychidae**

4. *Oligonychus coffeae* (Nietner)

Family **Tuckerellidae**

5. *Tuckerella pavoniformis* (Ewing)

Among the five species treated here, the *Brevipalpus obovatus* and *Oligonychus coffeae* were recently recorded from Taiwan (Hu, 1964 and Sonan, 1951); and the other three species are new to the fauna of Taiwan. The specimens are preserved in the Department of Economic Zoology, Taiwan Agricultural Research Institute.

Superfamily TETRANYCHOIDEA Baker and Pritchard 1953

Tetranychoidea Baker and Pritchard, 1953, Ann. Ent. Soc. Amer., Vol. 46, No. 2, pp. 243, 244.

Key to Families

1. Palpus with a claw on penultimate segment····························2
- Palpus without a claw··**Tenuipalpidae**
2. Hysterosoma with 30 pairs of dorsal setae, including caudal flagelliform and foliaceous setae····························**Tuckerellidae**
- Hysterosoma with 9 to 12 pairs of dorsal setae, no caudal flagelliform setae··**Tetranychidae**

(after Ehara, 1966)

Family Tenuipalpidae Sayed 1950

(=Phytoptipalpidae Ewing, 1922; Pseudoleptidae Oudemans, 1928; Trichadenidae Oudemans, 1938)

Key to genera of **Tenuipalpidae** found in Taiwan on Tea

1. Body evenly ovate or elliptical with no constriction between propodosoma and opisthosoma; palpus four-segmented···*Brevipalpus*
- Body not evenly ovate or elliptical; propodosoma broad with contricted opisthosoma; palpus one-to five-segmented·····*Tenuipalpus*

(after Cromroy, 1958)

Genus *Brevipalpus* Donnadieu

Brevipalpus Donnadieu, 1875, Rech. Serv. Hist. Tetranych., p. 116; Pritchard and Baker, 1958, Univ. Calif. Publ. Ent., 18 (3): 196; Cromroy, 1958, Jour. Agri. Univ. Puerto Rico, Vol. XLII, No. 2, p. 77; Baker and Tuttle, 1964, Agri. Exp. Sta., Univ. Ariz., Tucson, Tech. Bull. 163, p. 30; Ehara, 1966, Jour. Fac. Sci., Hokkaida Univ" Ser. VI, Zool., Vol. 16, No. 1, p. 3.

Key to species of ***Brevipalpus*** (Female)

1. Hysterosoma with six pairs of dorsolateral setae; with even reticulations on dorsolateral area of propodosoma·····*californicus*
- Hysterosoma with five pairs of dorsolateral setae; dorsum with rather even reticulations mediolaterally; with broad depression mediolaterally on hysterosoma·····*obovatus*

(1). *Brevipalpus californicus* (Banks)

(See "Tenuipalpid and tetranychid mites infesting citrus in Taiwan, and a life history study of the citrus green mite, *Schizotetranychus baltazarae* Rimando".)

(2). *Brevipalpus obovatus* Donnadieu

(See "Tenuipalpid and tetranychid mites infesting citrus in Taiwan, and a life history study of the citrus green mite, *Schizotetranychus baltazarae* Rimando".)

Genus *Tenuipalpus* Donnadieu

Tenuipalpus Donnadieu, 1875, Rech. Serv. Hist. Tetranych., p. 111;

Vitzthum, 1929, Tierw. Mitteleur., 3(7):49; Zacher, 1932, Zool. Anz., 97(7/8):182; Geijskes, 1939, Meded Landb. Wageningen, 42(4):20; Lawrence, 1940, Jour. Ent. Soc. S. Afr., 3:114; Sayed, 1942, Bull. Soc. Fouad 1er Ent., 26:82, 93; Lawrence, 1943, Trans. Roy. Soc. S. Afr., 30(1):47; Baker, 1945, Proc. Ent. Soc. Wash., 47(2):33; Sayed, 1946, Bull. Soc. Fouad 1er Ent., 30:99; McGregor, 1949, Mem. S. Calif. Acad. Sci., 3(2):4; Sayed, 1950, Proc. Eighth Internatl. Congress Ent., p. 1016; Pritchard and Baker, 1952, Univ. Calif. Publ. Ent., 9(1):41; Pritchard and Baker, 1958, Univ. Calif. Publ. Ent., 14(3): 235; Rimando, 1962, Univ. Phil., College Agric., Tech. Bull. 11, p. 41; Baker and Tuttle, 1964, Agric. Exp. Sta., Univ. Ariz., Tucson, Tech. Bull. 163, p. 73; Collyer, 1964, Acarologia, Tome VI, fase. 3, p. 27.

(3). *Tenuipalpus antipodus* Collyer (Figs. 1A, 1B, 1C, 1D).

Tenuipalpus antipodus Collyer, 1964, Acarologia, Tome VI, fase. 3, pp. 436–438.

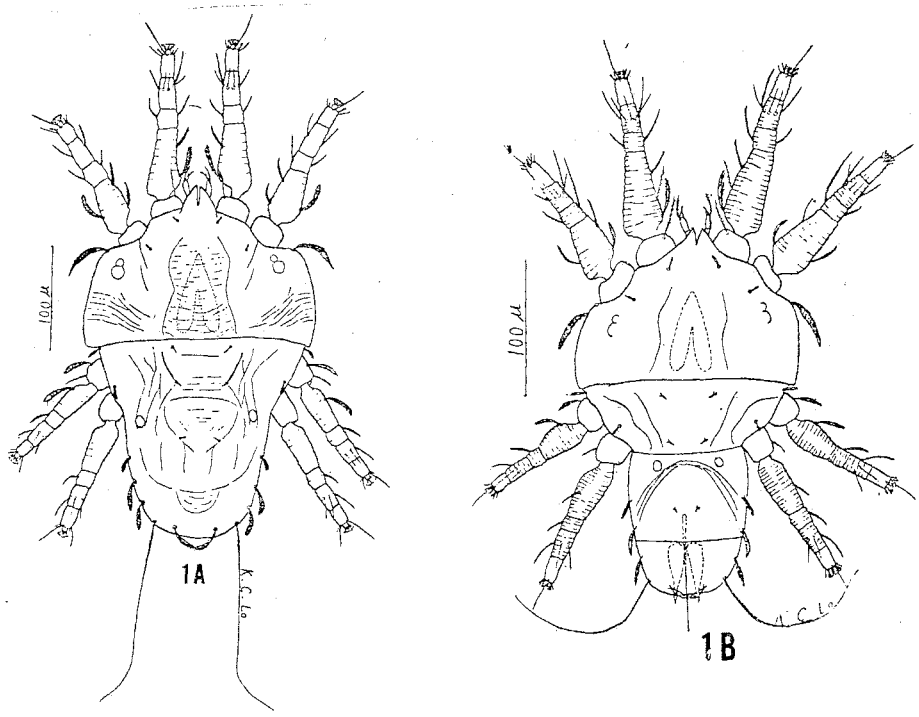

Fig. 1.—*Tenuipalpus antipodus* Collyer: 1A. Dorsum of femala; 1B, Dorsum of male

Female. Fig. 1A. - Body, including rostrum, 330 μ long, and greatest width 225μ; reddish yellow in color; palpus three-segmented, second segment with a long serrate seta, and the third with a terminal sensory rod. First dorsal propodosomals minute; third on small projection, elongate lanceolate, elbowed, and longer than half of the distance between its base and the posterior margin of the propodosoma. Humeral setae small; three pairs of dorsocentral hysterosomal setae very small; four pairs of dorsolateral hysterosomals lanceolate, one pair of flagellate setae very long, about 2/3 of the body length. Gnathosoma with a pair of setae ventrally. Ventrally one pair each of anterior and posterior medio-ventral metapodosomals. Genu I and II each with two setae, genu III and IV each with one seta; tibia I and II each with five setae, tibia III and IV each with three setae.

Male. Fig. 1B. - Body, including rostrum, 268 μ long, and greatest width, 168 μ; otherwise is similar to the female.

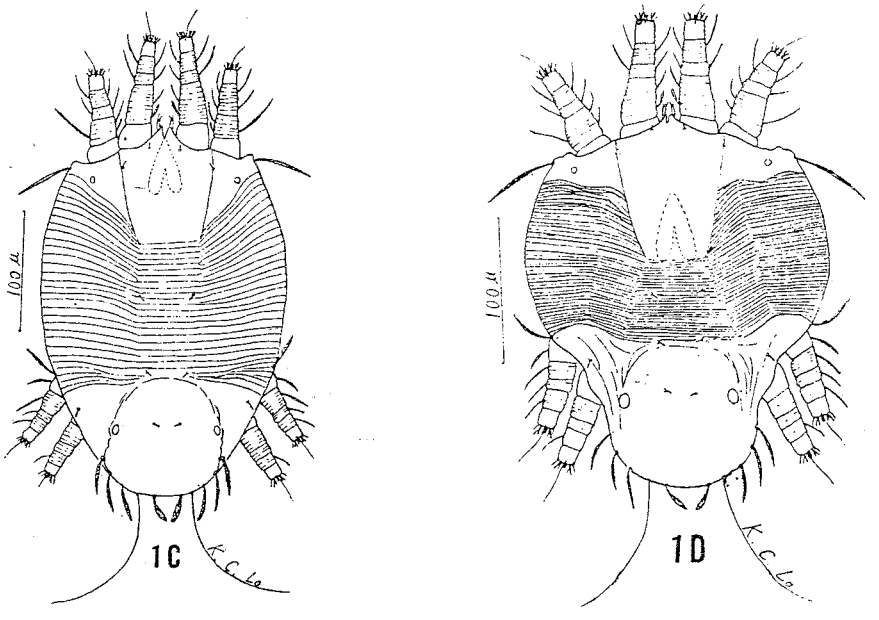

Fig. 1.- *T.antipodus* Collyer: 1C, Dorsum of female nymph: 1D, Dorsum of male nymph.

Nymph. Figs. 1C, 1D. - The female nymph (Fig. 1C) is different to the

male nymph (Fig. 1D), in generally, they are similar to the adult.

The numbers of this species are reddish yellow in color, and the flattened orange eggs. These characters are different from the Collyer's described specimens, it may be related to the different host plants and different weather.

According to Collyer's recorded, *T. antipodus* occurs from the North Island of New Zealand, on a number of bush plants including *Coprosma* spp., *Melicytus ramiflorus*, and *Nothopanax* sp.

Specimens have been collected in Taiwan as follows: 4♀♀, 4♂♂ and 5 nymphs, Taipei, 25-IV-1967 (E. S. Lu), on *Thea sinensis* L.; 4♀♀, Taipei, 22-VI-1967 (K. C. Lo), on *Thea sinensis* L.; 12♀♀ and 2♂♂, Taipei, 23-VI-1967 (E. S. Lu), on *Thea sinensis* L.

Family Tetranychidae Donnadieu 1857

(=Tétranychidés Donnadieu, 1857; Tetranychidae Murray, 1877; Tetranychini Canestrini and Fanzago, 1878; Tetranychina Berlese, 1886)

Genus *Oligonychus* Berlese

Oligonychus Berlese, 1886, Acari Dann. Piante Coltiv., p. 24; Canestrini, 1889, Atti Reale Ist. Veneto Sci. Let. Arti (ser. 6), 7:532, 534; Banks, 1917, Ent. News, 28:197; Hirst, 1920, Proc. Zool. Soc. Lond., 1920:58; Ewing, 1921, Proc. U. S. Natl. Mus., 59(2394):659; Pritchard and Baker, 1955, Pacif. Coast Ent. Soc. Mem. ser. Vol. 2, p. 270; Cromroy, 1958, Jour. Agric. Univ. Puerto Rico, Vol. XLII, No. 2, p. 55; Rimando, 1962, Univ. Phil., Coll. Agric., Tech. Bull. 11, p. 19; Reeves, 1963, Corn. Univ. Agric. Exp. Sta., Mem. 380, p. 51; Ehara, 1966, Jour. Fac. Sci., Hakkaido Univ., Ser. VI, Zool., Vol. 16, No. 1, p. 10.

Paratetranychus Zacher, 1913, Mitt. Kais. biol. Anst. Land-. Först., 14:39; Trägårdh, 1915, Zts. angew. Ent., 2:162; McGregor, 1919, Proc. U. S. Natl. Mus., 56 (2303):665; Geijskes, 1939, Meded. Landb. Wageningen, 42(4):33; Garman, 1940, Bul. Conn. Agri. Exp. Sta., 43:75; McGregor, 1950, Amer. Midl. Nat., 44:329; Baker and Pritchard, 1953, Hilgardia, 22(7):209.

Panonychus Yokoyama, 1929, Nippon Sangyô Gaichû Zensho (Tokyo),

p. 531.

Tacebia Yokoyama, 1929, Nippon Sangyô Gaichû Zensho (Tokyo), p. 536.

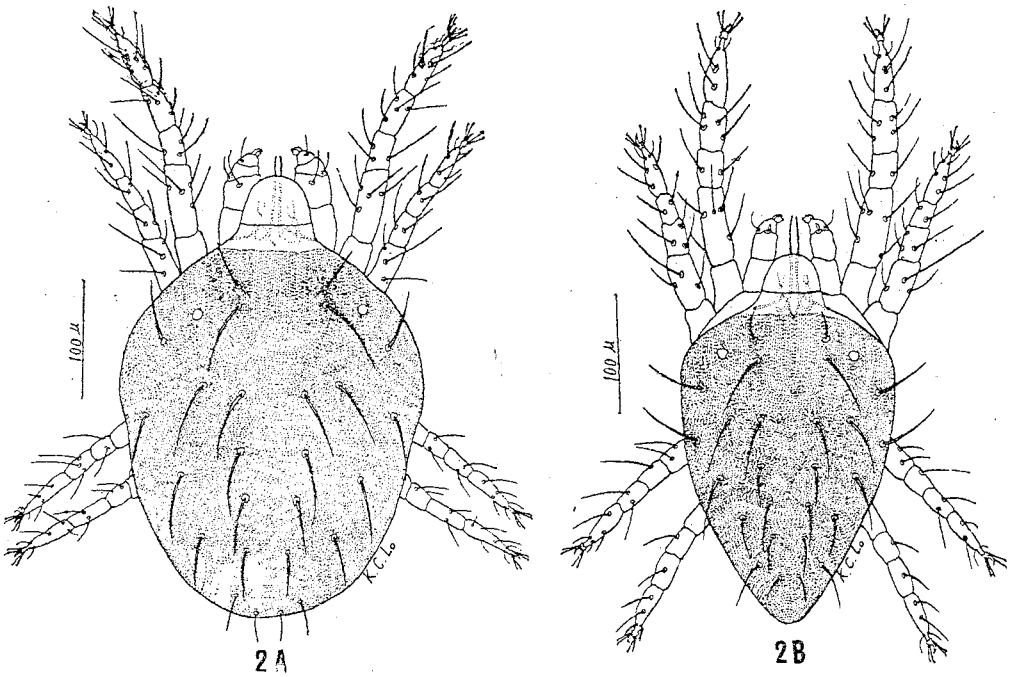

Fig. 2.–*Oligonychus coffeae* (Nietner): 2A, Dorsum of female; 2B, Dorsum of male.

(4). *Oligonychus coffeae* (Nietner) (Figs. 2A, 2B)

Acarus coffeae Nietner, 1861, Observ. Enem. coffee tree Ceylon; Nietner and Green, 1880, Coffee Tree Enemies, pp. 19, 20.

Tetranychus bicculatus Wood-Mason, 1884, Rep. Tea-Mites Tea-Bug Assam, p. 1.

Paratetranychus bioculatus, Baker and Pritchard, 1953, Hilgardia, 22(7):213.

Oligonychus merwei Tucker, 1926, Ent. Mem. Dept. Agric. Pretoria, 5:6.

Oligonychus coffeae Pritchard and Baker, 1955, Pacif. Coast Ent. Soc. Mem. Ser., Vol. 2, p. 315; Rimando, 1962, Univ. Phil., Coll. Agric., Tech. Bull. 11, p. 21.

The female bears seven tactile and one sensory setae on tibia I and three tectile and one sensory setae proximal to the duplex setae on tarsus I. The distal portion of the aedeagus of male bends to

right angle to the shaft and it gradually narrows to a slender distal end. The tip is truncate. Specimens collected from Taiwan, the bend portion of the aedeagus appears typical structure.

This species has long been known as an important pest of the tea in India and Ceylon. The host plants recorded for this spider mite are: Tea, *Parthenocissus quinquefolia*, *Quisqualis indica*, camellia, and *Melaleuca* sp. However, the specimens have been collected in Taiwan as following: 6♀♀ and 1♂, Taipei 13-IV-1967 (E. S. La), on *Acacia confusa* Merr.; 2♂♂ and 2 nymphs, Taipei, 13-IV-1967 (E. S. Lu), on *Nerium indicum* Mill.; 10♀♀ and 8♂♂, Taipei, 3-V-1967 (E. S. Lu), on *Camellia* sp.; 9♀♀ and 1♂, Taipei, 4-V-1967 (K. C. Lo), on *Camellia* sp.; 5♀♀ and 2♂♂, Taipei, 4-V-1967 (K. C. Lo), on *Acacia confusa* Merr.; 9♀♀ and 7♂♂, Taipei, 9-V-1967 (E. S. Lu), on *Camellia* sp.; 6♀♀ and 6♂♂, Taipei, 16-VI-1967 (E. S. Lu), on *Camellia* sp.; many ♀♀ and ♂♂, Taipei, 27-VI-1967 (E. S. Lu), on *Grevillea robusta* A. Cunn.; 9♀♀ and 5♂♂, Taipei, 27-VI-1967 (E. S. Lu), on *Psidium cattleianum* Sarine; 2♀♀ and 1♂, Shihlin, 29-VI-1967 (E. S. Lu), on *Camellia* sp.; many ♀♀ and 3♂♂, Wulai, 30-VI-1967 (E. S. Lu), on *Thea sinensis* L.; 4♀♀ and 1♂, Taichung, 8-XII-1967 (K. C. Lo), on *Vitis Vinifera* L.; many ♀♀ and ♂♂, Taichung, 8-XII-1967 (K. C. Lo), on *Grevillea robusta* A. Cunn.; many ♀♀ and ♂♂, Taipei, 20-XII-1967 (K. C. Lo), on *Camellia* sp.

Family Tuckerellidae Baker and Pritchard 1953

Tuckerellidae Baker and Pritchard, 1953, Ann. Ent. Soc. Amer., Vol. 46, No. 2, pp. 250, 251; Ehara, 1966, Jour. Fac. Sci., Hokkaido Univ., Ser. VI, Zool., Vol. 16, No. 1, p. 5.

The family Tuckerellidae is easily distinguished from other tetranychoid mites by the dorsal chaetotaxy of the body. Known species have fan-like dorsal propodosomals and hysterosomals. There are also five or six pairs of flagellate setae caudally. The dorsal integument of the body is reticulate.

Palpus is five segments, long and slender, terminal bears one or two sensory rods and three or four tactile setae. A slender, curved claw is present on fourth segment.

Tarsi I and II each bears one or two distal sensory rods as in the Tenuipalpidae.

The female bears no genital plate nor ventral plate. On each side of the folds of the vulva bear three pairs of setae, and anterior to the folds of the oviduct are the two pairs of ventral setae. The male is unknown. The family Tuckerellidae includes only a single genus.

Genus *Tuckerella* Womersley

Tuckerella Womersley, 1940, Trans. Roy. Soc. S. Austr., 64:244; Type of genus: *Tenuipalpus ornatus* Tucker; Ehara, 1966, Jour. Fac. Sci., Hokkaido Univ., Ser. VI, Zool., Vol. 16, No. 1, p. 5.

The members of the *Tuckerella* are usually found on the twigs of the host plants. Occassionally, they may be found feeding on the leave stalks or leaves. There is only one species present in the Taiwan.

(5). *Tuckerella pavoniformis* (Ewing) (Figs. 3A, 3B)

Eupalopsis pavoniformis Ewing, 1922, Proc. Ent. Soc. Wash., 24:106.

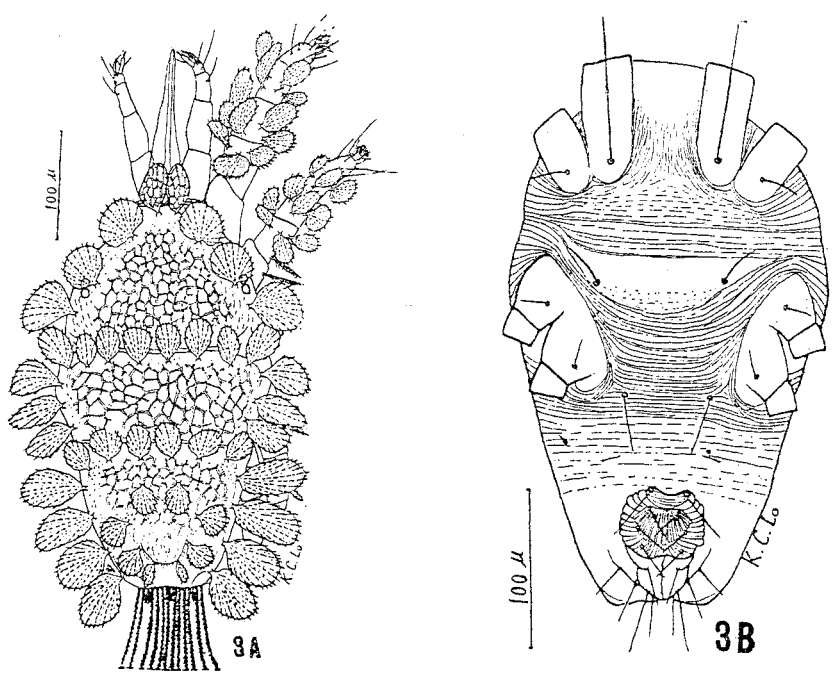

Fig. 3. *Tuckerella pavoniformis* (Ewing): 3A, Dorsum of female; 3B, Venter of female.

Type: Female, Hawaii, on *Hibiscus* (California Quarantine); in the

U. S. National Museum.

Tuckerella ornata Womersley, 1940, Trans. Roy. Ent. Soc. S. Austr., 64:244. (Misidentification)

Tuckerella pavoniformis McGregor, 1950, Amer. Midl. Nat., 44:368; Baker and Pritchard, 1953, Ann. Ent. Soc. Amer., 46:253; Ehara, 1966, Jour. Fac. Sci., Hokkaido Univ., Ser. VI, Zool., Vol. 16, No. 1, pp. 5-7.

Female. Fig. 3A. - Body including rostrum, 435-475μ long, and greatest width 190-205μ. Dorsum of idiosoma reticulate; propodosoma with four pairs of fan-like setae, the first pair with reticulate structure; metapodosoma with seven pairs of fan-like setae; opisthosoma with eleven pairs of fan-like setae; last four setae with outer pair larger than inner pair; caudum with six pairs of whiplike serrate setae (each about same length of the body), and two pairs of small, foliaceous setae. Venter with striations mostly transverse (Fig. 3B). Rostrum very long and narrow. Distal segment of palpus with a slender sensory rod and four setae. Tarsus I with a long distal and a short proximal sensory rods dorsally; tarsus II with a short sensory rod dorsodistally. Legs I-III with palmate dorsal setae on femur, genu and tibia; Leg IV with palmate setae on genu and tibia.

Tuckerella pavoniformis has been known from Hawaii, California, Florida, Georgian S. S. R., Mauritius and Okinawa on a wide variety of plants. The specimems collected from Taiwan are: 2 ♀♀ and 4 nymphs, Taipei, 19-XII-1967 (K. C. Lo), on leave stalks of *Thea sinensis* L.; 11 ♀♀ and 6 nymphs, Taipei, 5-I-1968 (K. C. Lo), on twigs of *Thea sinensis* L.

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中 文 摘 要

臺灣爲害茶樹之蠕類

—羅 幹 成—

本專題研究起自民國五十五年十一月止於五十七年一月，爲期一年有餘，遍及臺灣各地，對茶樹蠕類調查已獲初步之結果。至目前止，爲害茶樹之蠕類計有三科五種，卽：

1. Family **Tenuipalpidae** (擬葉蠕科)
   (1). *Brevipalpus californicus* (Banks)
   (2). *Brevipalpus obovatus* Donnadieu
   (3) *Tenuipalpus antipodus* Collyer
2. Family **Tetranychidae** (葉蠕科)
   (4). *Oligonychus coffeae* (Nietner)
3. Family **Tuckerellidae** (枝蠕科)
   (5). *Tuckerella pavoniformis* (Ewing)

以上五種，除 *B. obobatus* 及 *O. coffeae* 在臺灣已有前人之記載而外，其他三種皆爲首次發現於臺灣爲害茶樹之種類。

在擬葉蠕科中，*B. californicus* 與 *B. obovatus* 常同時出現於茶園爲害較老之葉片下表，體呈紅褐色，體成長卵圓形，田間甚難鑑別，但製片在顯微鏡下觀察發現前者腹背兩側具有六對刺毛，而後者僅具五對，故甚易區別。然而 *T. antipodus* 亦偶出現與前二者相阼發生，但個體較大，體色較淺，體形較短寬，體側具大形羽狀刺毛，田間察觀不難區別之。

在葉蠕科中僅發現一種 *O. coffeae*，出現爲害茶葉之上表，體呈深赤色，體形橢圓，羣棲之葉片上常佈以細網加以保護，爲茶樹蠕類中爲害最烈者。

枝蠕科亦僅發現一種 *Tuckerella pavoniformis*，爲害茶樹之枝幹，體呈深赤色，體成長橢圓形，體背部及腹部皆着生大形扇狀之刺毛，體末端另着生一排鞭狀長刺毛六對，及棒狀刺毛兩對。棲息於茶樹枝幹之裂隙間，偶亦出現於葉柄部及葉片之下表爲害，故甚易被忽視之。據筆者去年十二月至今年一月於臺北附近之調查，茶樹枝幹裂隙間出現其棲羣密度相當高，值得重視。

本研究爲接受「中華民國中山學術文化基金董事會獎」助之專題研究「臺灣植食性紅蜘蛛之調查及其分類」之一部份；又本研究中之若干標本皆爲盧義聲先生採集所提供謹此一併致謝。