

MITES OF THE FAMILIES TETRANYCHIDAE
AND TENUIPALPIDAE ASSOCIATED WITH CITRUS
IN SOUTH EAST ASIA

BY

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During 1961-62 while studying plant feeding mites at the U. S. Department of Agriculture, Washington, D. C., the opportunity arose to examine a series of mites of the families Tetranychidae and Tenuipalpidae which were collected in south east Asia by C. A. FLESCNER of the Citrus Experiment Station, Riverside, California. These were collected on citrus in India, Burma, Nepal, Thailand and Hong Kong, the areas visited being shown on the map in fig. 1. Sixteen species were collected of which three are new and two possibly new. Descriptions of these are included. Very little is known of the mites of this area, and distribution and host records are given for all species, new locality records occurring in many cases.

TETRANYCHIDAE

Eutetranychus orientalis (Klein).

Anychus orientalis [Zacher] KLEIN, 1936, *Bul. Agric. Res. Sta. Rehovoth* 21 : 3.

Eutetranychus orientalis (Klein) : BAKER and PRITCHARD, 1960, *Hilgardia* 29 : 11 : 464.

Four males, six females, three nymphs, on lemon, Bangalore, India, 22-I-59 ; three males, four females, two nymphs, Pathankot, Punjab, India, 6-V-59 ; two males Darjeeling Rd., Assam, India, 13-III-59 ; twenty six males, twenty six females, one nymph, Nagpur, India, 12-II-59 ; twenty three males, forty four females, three nymphs, New Delhi, India, 9-IV-59 ; thirteen males, thirteen females, nine nymphs, Attari, Punjab, India, 1-V-59 ; three males, one female, Petchboon, Thailand, 29-VI-59.

Previous recordings are from Cyprus, Iran, Afghanistan, the Sudan, South Africa, India and Formosa. Hosts other than citrus are squash, frangipani, croton, *Euphorbia* and *Glyceridea*.

Eutetranychus africanus (Tucker).

Anychus africanus TUCKER, 1926, *Union So. Afr. Dept. Agric. Div. Ent. Mem.* 5 : 5.
Eutetranychus africanus (Tucker); BAKER and PRITCHARD, 1960, *Hilgardia* 29 : II : 464.

Eleven males, twenty three females, six nymphs, Goalpara, Assam, India, 14-III-59; six males, twelve females, Kalimpong, India, 27-V-59; six males, ten females, on orange, near Mercara, Mysore, India, 1-II-59; one male, five females, fourteen nymphs, Lashio, Burma, 12-VI-59; two females, Darjeeling Rd., Assam, India, 13-III-59; one female, Dawki, Assam, India, 21-II-59.

Previous recordings are from Durban, Natal, on oranges, lemons, frangipani, and from Mauritius on peach, loquat and citrus.

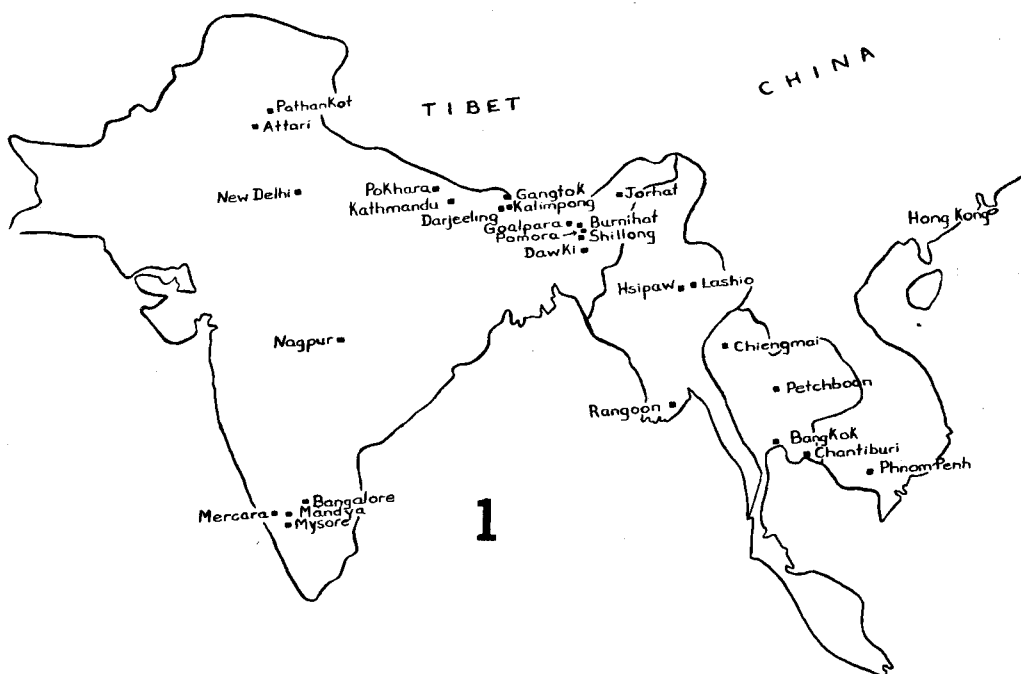


FIG. 1. — Map of south east Asia, showing the localities at which the mites were collected.

Panonychus citri (McGregor).

Tetranychus citri MCGREGOR, 1916, *Ann. Ent. Soc. Amer.* 9 : 28.
Metatetranychus citri (McGregor); PRITCHARD and BAKER, 1955, *Pac. Coast Ent. Soc. Mem.* 2 : 133.
Panonychus citri (McGregor); EHARA, 1956, *Jour. Fac. Sci. Hokkaido, Univ.* Ser. VI, Zool. 12 : 4 : 499.

Six males, six females, three nymphs, Hong Kong, 11-VII-59; one male, ten females, on mandarin, Shillong, Assam, India, 10-III-59; seven males, four females,

Shillong, Assam, India, 22-III-59 ; five females, three nymphs, Kathmandu, Nepal, 15-V-59 ; one female, Kalimpong, India, 27-V-59 ; one female, Pomora, Assam, India, 20-II-59.

Previous records are from China, Mexico, Japan, Central America, the Middle East, Florida, Cuba, Bermuda, California, Argentina, New Zealand, South Africa. It is a pest of citrus and broad-leaved evergreen ornamentals.

***Panonychus elongatus* n. sp.**

(Figs. 2-8).

This species is very similar to *Panonychus citri* (McGregor), 1956, being distinguished by the longer and more slender aedeagus. Unfortunately, no females were available for examination.

Male. — Length of body 173 μ . Terminal sensillum of palpus about twice as long as broad. Peritreme ending as a simple bulb. Aedeagus as figured ; long, slender and tapering. Tarsus I with three tactile and three sensory setae proximal to duplex setae ; tibia I with seven tactile and four sensory setae. Tarsus II with three tactile and one sensory setae proximal to duplex seta ; tibia II with five tactile setae. Tarsus III with nine tactile and one sensory setae ; tibia III with five tactile setae. Tarsus and tibia IV similar to III.

Holotype. — Male, U. S. National Museum No. 2846, on citrus, Lashio, Burma, 12-VI-59.

Also in the same collection were four nymphs.

Eotetranychus kankitus Ehara.

Eotetranychus kankitus EHARA, 1955, *Annotationes Zoologicae Japonenses* 28 : 3 : 178.

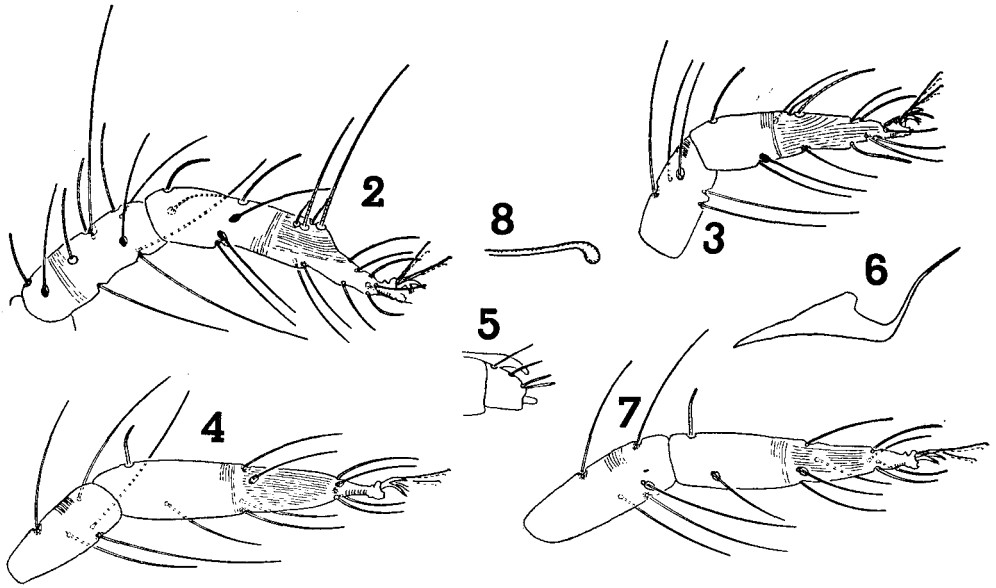
Seventeen males, twenty three females, four nymphs, Pomora, Assam, India, 20-II-59 ; eight males, ten females, one nymph, Kathmandu, Nepal, 15-V-59 ; six males, fourteen females, five nymphs, on mandarin, Shillong, Assam, India, 10-II-59.

This species was described from citrus, taken on the Island of Osaki-shimajima in the central part of the Inland Sea, Japan.

***Eotetranychus pamela* n. sp.**

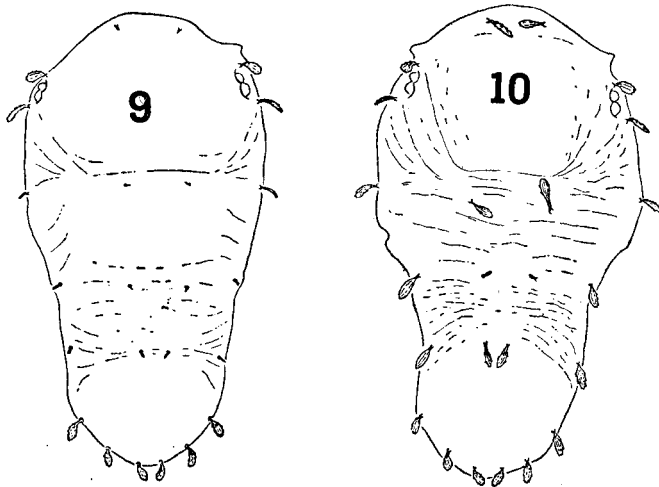
(Figs. 11-25).

This species bears some resemblance to *Eotetranychus kankitus* Ehara, and *E. spanius* Rimando, but can be distinguished by the shape of the aedeagus which is rather short, the distal portion declivate, directed posteriorly and bluntly pointed.



Panonychus elongatus n. sp.

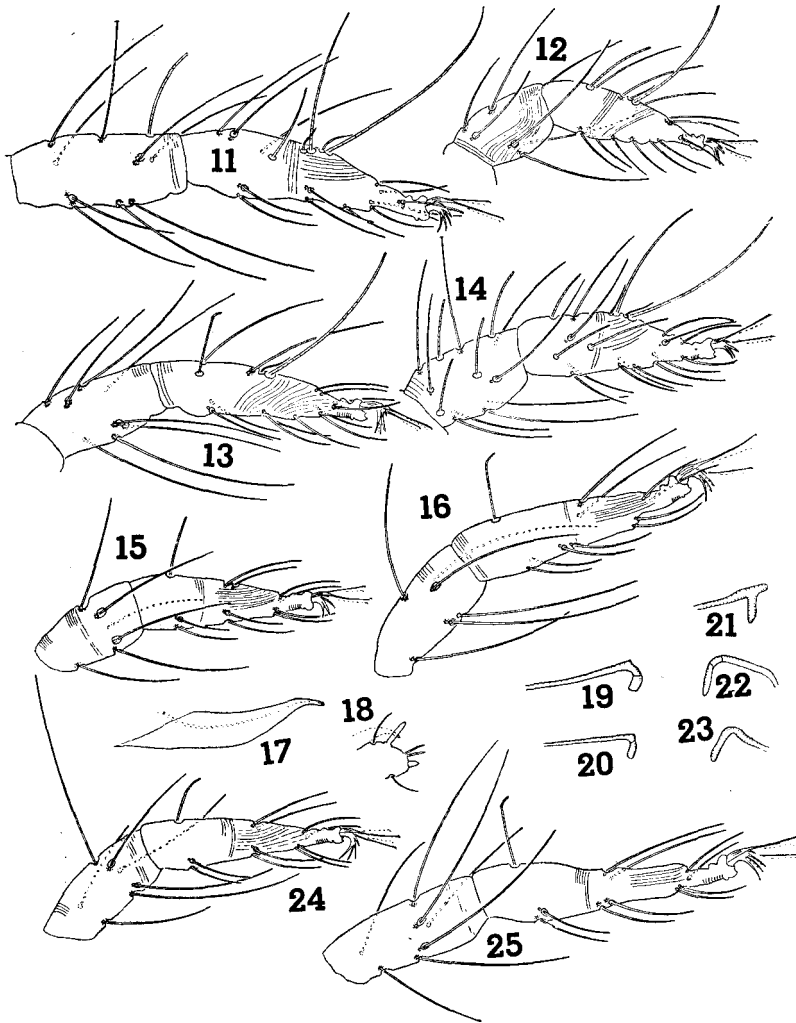
FIG. 2. Tarsus and tibia I of male. — FIG. 3. Tarsus and tibia II of male. — FIG. 4. Tarsus and tibia III of male. — FIG. 5. Terminal segment of palpus of male. — FIG. 6. Aedeagus. — FIG. 7. Tarsus and tibia IV of male. — FIG. 8. Peritreme of male.



Brevipalpus phoenicis (Geijskes).

FIG. 9. Dorsal body view of a normal nymph (from Lashio). — FIG. 10. Dorsal body view of an abnormal nymph (from Nagpur) showing enlarged body setae.

Female. — Length of body 385 μ ; greatest width of body 258 μ . Terminal sensillum of palpus large, about twice as long as broad. Terminal portion of peritreme as figured; almost bent at a right angle. Dorsal body setae long and tapering, longer than the longitudinal intervals between them. Dorsal striae transverse between the third pair of dorsocentral hysterosomals. Striations on genital flap similar to those of *Eotetranychus sexmaculatus* (Riley); anterior to



Eotetranychus pamelae n. sp.

FIG. 11. Tarsus and tibia I of female. — FIG. 12. Tarsus and tibia II of male. — FIG. 13. Tarsus and tibia II of female. — FIG. 14. Tarsus and tibia I of male. — FIG. 15. Tarsus and tibia III of male. — FIG. 16. Tarsus and tibia III of female. — FIG. 17. Aedeagus. — FIG. 18. Terminal segment of palpus of male. — FIGS. 19, 20. Peritreme of female. — FIGS. 21, 22, 23. Peritreme of male. — FIG. 24. Tarsus and tibia IV of male. — FIG. 25. Tarsus and tibia IV of female.

genital flap, and on flap itself, striations are longitudinal; on posterior portion of flap striations become transverse. Tarsus I with fourteen tactile and one sensory setae as well as the two duplex setae (tarsus I of one specimen with thirteen tactile, two sensory and two duplex setae); tibia I with nine tactile and one sensory setae. Tarsus II with thirteen tactile and one sensory setae as well as the duplex seta (in one instance twelve tactile and one sensory setae present, one member of the paired proximal ventral setae being absent); tibia II with eight tactile setae. Tarsus III with ten tactile and one sensory setae; tibia III with six tactile setae. Tarsus IV with ten tactile and one sensory setae; tibia IV with seven tactile setae. Empodial spur prominent on all legs.

Male. — Length of body 269 μ . Terminal sensillum of palpus longer than broad, gradually narrowing from base to apex and rather sharply pointed. Terminal portion of peritreme somewhat variable, but usually sharply bent at an angle of about ninety degrees. Aedeagus as figured; short, directed posteriorly and ending bluntly. Tarsus I with thirteen tactile, three sensory setae and two duplex setae; tibia I with nine tactile and four sensory setae. Tarsus II with thirteen tactile, one sensory and one duplex setae; tibia II with seven tactile setae. Tarsus III with ten tactile and one sensory setae; tibia III with six tactile setae. Tarsus IV with ten tactile and one sensory setae; tibia IV normally with seven tactile setae although in one instance only six tactile setae present.

Holotype. — Male, U. S. National Museum, No. 2845, on citrus, Darjeeling Rd., Assam, India, 13-III-59.

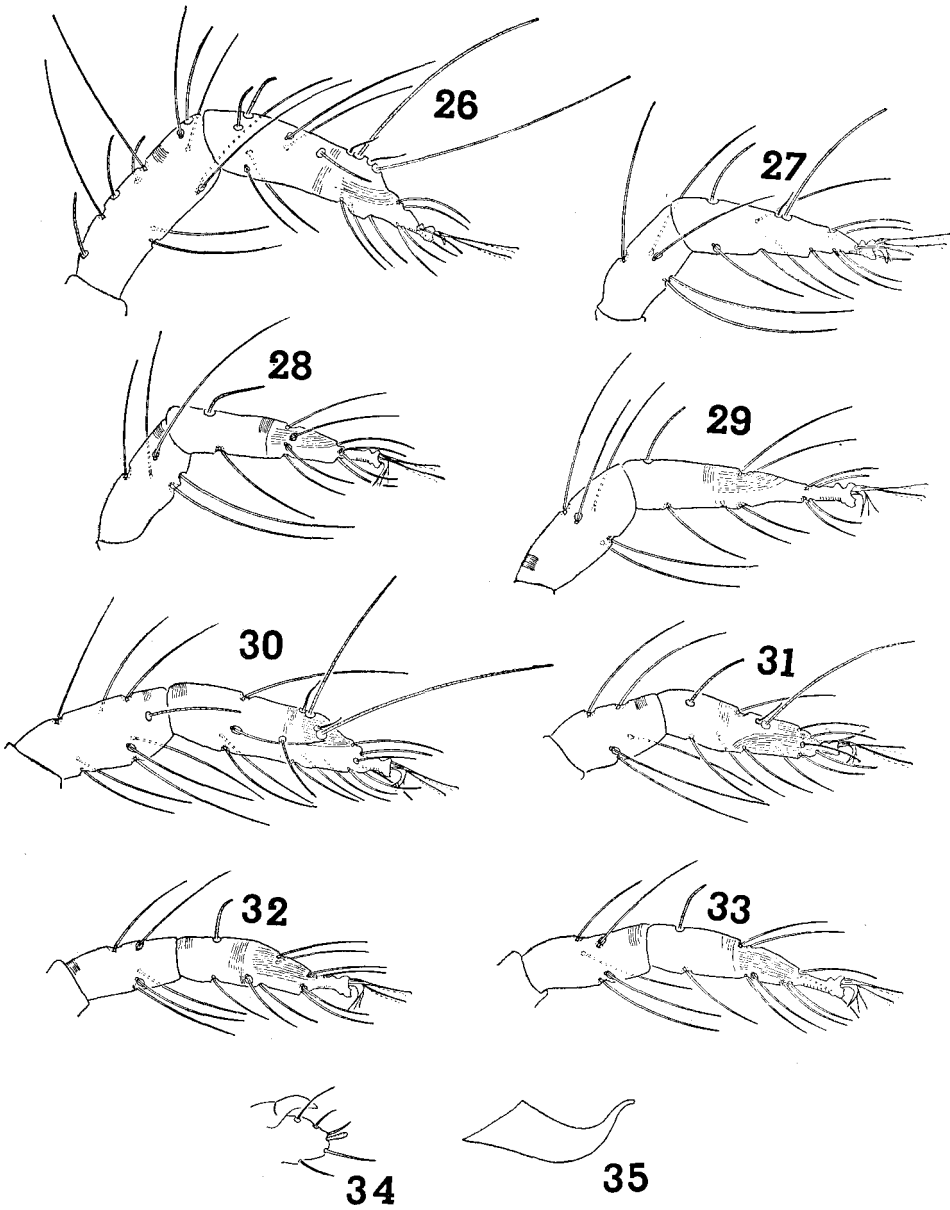
Paratypes. — Two males, six females, one nymph, with above data.

Eotetranychus ? cendañai Rimando.

(Figs. 26-35).

This species appears to be identical with *E. cendañai* Rimando (1962) but differs in that the neck of the aedeagus appears shorter and the distal portion blunter. However, this may be a variation, and as both species occur on citrus and are widespread in their respective areas, it seems that until a more critical study is achieved, the south east Asian species is best named *E. ? cendañai* Rimando. The description is as follows :

Female. — Length of body 300 μ ; greatest width of body 208 μ . Terminal sensillum of palpus about one and a half to two times as long as broad. Terminal portion of peritreme straight distally and ending as a simple bulb. Dorsal body setae slender and tapering. Dorsocentral hysterosomal setae about as long as the longitudinal intervals between them. Dorsal striae longitudinal between third pair of dorsocentral hysterosomals. Striae on, and anterior to genital flap as in *Eotetranychus willamettei* (McGregor). Tarsus I with thirteen tactile, one sensory and two duplex setae; tibia I with eight tactile and one sensory setae.



Eotetranychus? cendanai Rimando.

FIG. 26. Tarsus and tibia I of male. — FIG. 27. Tarsus and tibia II of male. — FIG. 28. Tarsus and tibia III of male. — FIG. 29. Tarsus and tibia IV of male. — FIG. 30. Tarsus and tibia I of female. — FIG. 31. Tarsus and tibia II of female. — FIG. 32. Tarsus and tibia III of female. — FIG. 33. Tarsus and tibia IV of female. — FIG. 34. Terminal segment of palpus of male. — FIG. 35. Aedeagus.

Tarsus II with eleven tactile, one sensory, and one duplex setae, although occasional specimens have ten or twelve tactile setae; tibia II with five tactile setae, an occasional specimen having six tactile setae; tarsus III with nine tactile and one sensory setae; tibia III with five tactile setae. Tarsus IV with nine tactile and one sensory setae; tibia IV with five tactile setae.

Male. — Length of body 300 μ . Terminal portion of peritreme straight distally and ending as a simple bulb. Terminal sensillum of palpus absent. Aedeagus as figured; bent dorsad to form a slender posteriorly directed distal portion. Tarsus I normally with thirteen tactile, three sensory and two duplex setae, although occasionally thirteen tactile and two sensory setae, or twelve tactile and three sensory setae present; tibia I with eight tactile and four sensory setae, although an occasional specimen with seven tactile and four sensory setae. Tarsus II with eleven tactile, one sensory and one duplex setae; tibia II with five tactile setae. Tarsus III with nine tactile and one sensory setae; tibia III with five tactile setae. Tarsus and tibia IV similar to III.

Six males, twelve females, two nymphs, Bangkok, Thailand, 24-VI-59; four males, nine females, Chantiburi, Thailand, 29-VI-59; three males, Chiangmai, Thailand, 3-VII-59.

I have since, recorded this species on citrus at Phnom Penh, Cambodia, collected by C. L. ORREN on May 10th, 1961 (one male).

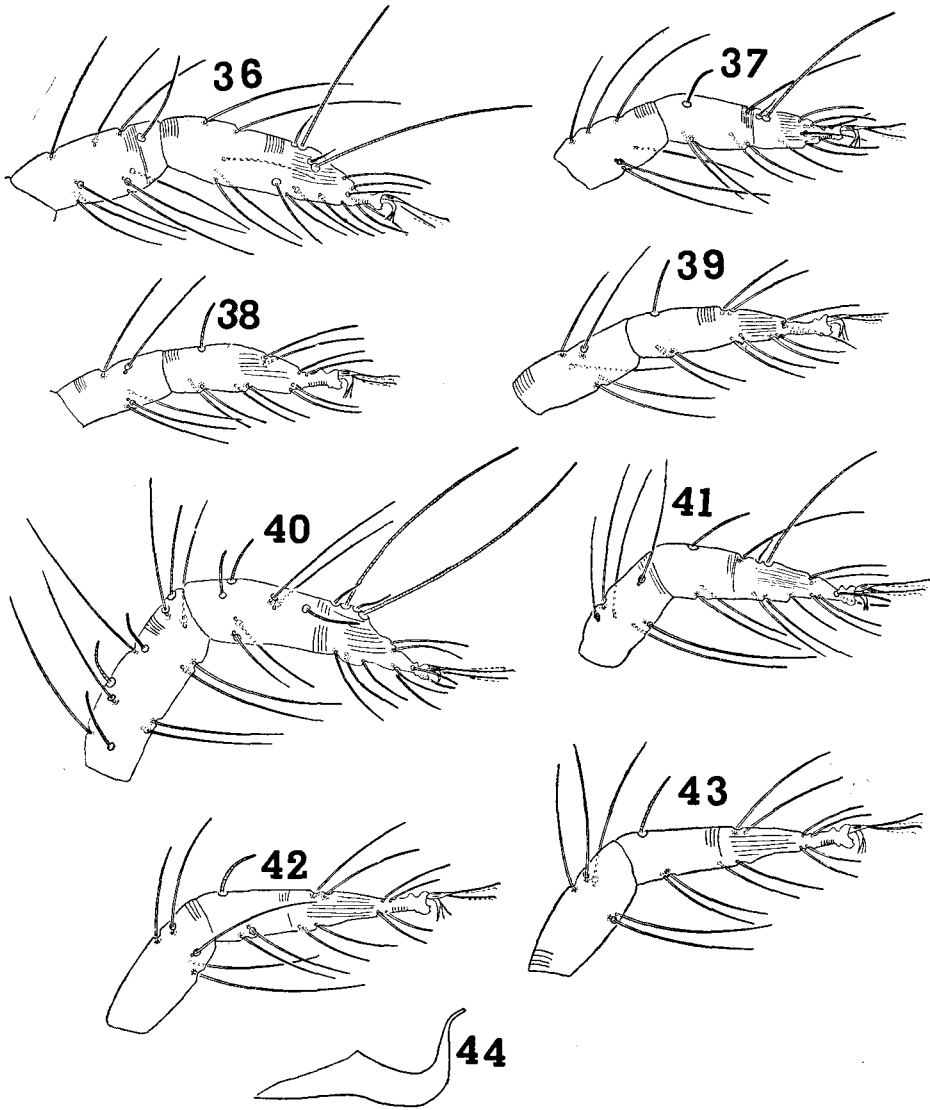
***Eotetranychus mandensis* n. sp.**

(Figs. 36-44).

This species is very similar to *Eotetranychus* ? *cendañai* Rimando. It differs in the aedeagus being longer and more tapering, and also in the number of tactile setae on tarsi III and IV. In *E. mandensis* ten tactile and one sensory setae are present on tarsi III and IV, compared with nine tactile and one sensory setae in *E. ? cendañai*. Differences occur in the number of tactile setae present on other leg segments of the two species but variations occur, making these characters unreliable.

Female. — Length of body 269 μ ; greatest width of body 204 μ . Terminal sensillum of palpus large, about twice as long as broad. Terminal portion of peritreme straight distally and ending as a simple bulb. Dorsal body setae slender and tapering; dorsocentral hysterosomal setae about as long or longer than the longitudinal intervals between them. Dorsal striae longitudinal between the third pair of dorsocentral hysterosomals. Striae on, and anterior to genital flap transverse as in *Eotetranychus willamettei* (McGregor). Tarsus I with thirteen or fourteen tactile and one sensory setae as well as the duplex setae; tibia I with nine tactile and one sensory setae. Tarsus II with twelve tactile, one sensory and one duplex setae; tibia II normally with six tactile setae, although an occa-

sional specimen has five tactile setae. Tarsus III with ten tactile and one sensory setae (one specimen had eleven tactile and no sensory setae); tibia III with five tactile setae. Tarsus IV with ten tactile and one sensory setae; tibia IV with five tactile setae.



Eotetranychus mandensis n. sp.

FIG. 36. Tarsus and tibia I of female. — FIG. 37. Tarsus and tibia II of female. — FIG. 38. Tarsus and tibia III of female. — FIG. 39. Tarsus and tibia IV of female. — FIG. 40. Tarsus and tibia I of male. — FIG. 41. Tarsus and tibia II of male. — FIG. 42. Tarsus and tibia III of male. — FIG. 43. Tarsus and tibia IV of male. — FIG. 44. Aedeagus.

Male. — Length of body 205 μ . Terminal portion of peritreme straight distally and ending as a simple bulb. Terminal sensillum of palpus absent. Aedeagus as figured; long, slender and tapering with distal portion directed posteriorly. Tarsus I with thirteen tactile and three sensory setae as well as the two duplex setae; tibia I with nine tactile and four sensory setae. Tarsus II with twelve tactile, one sensory and one duplex setae; tibia II with six tactile setae. Tarsus III with ten tactile and one sensory setae on one leg and eleven tactile and one sensory setae on the other leg; tibia III with five tactile setae. Tarsus IV with ten tactile and one sensory setae; tibia IV with five tactile setae.

Holotype. — Male, U. S. National Museum No. 2844, on citrus, Mandya, Mysore, India, 24-I-59.

Paratypes. — Twenty one females, three nymphs, on citrus, Mandya, Mysore, India, 24-I-59.

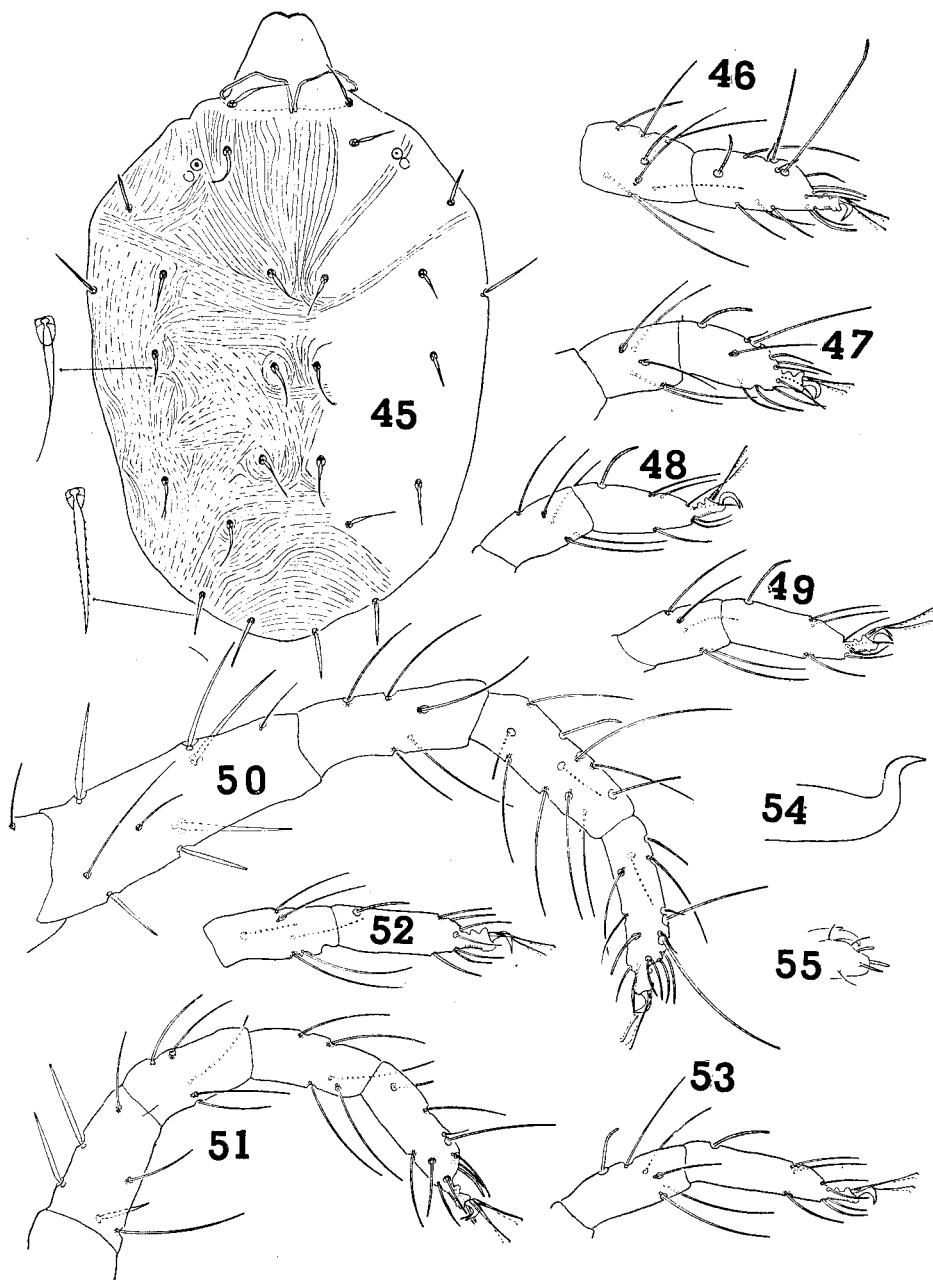
Schizotetranychus ? baltazari Rimando.

(Figs. 45-55).

I have not seen type slides of *S. baltazari* Rimando (1962) and comparison of the species has been by the description and drawings of RIMANDO. *S. ?baltazari* Rimando differs in that the neck of the aedeagus is shorter and the knob slightly larger. The palpal claw of the male has a small but distinct pointed projection a short distance from the tip. RIMANDO makes no mention of this latter character. Until a more critical study is achieved the south east Asian species is best named *S. ?baltazari* Rimando. The description is as follows :

Female. — Length of body 308 μ ; greatest width of body 219 μ . Terminal sensillum of palpus large, about twice as long as broad. Anterior margin of stylophore slightly notched. Peritreme hooked. Dorsal body setae as illustrated; two types present; those which are broadest at the basal third and taper rapidly, and those which are longer, stiffer, with a more even taper; the lateral propodosomal, humeral, outer sacral, and clunal setae are of this latter type. Dorsal striae longitudinal between third pair of dorsocentral hysterosomal setae. Tarsus I with ten tactile, one sensory and two duplex setae (on tarsus I of one specimen only nine tactile setae were present); tibia I with seven tactile and one sensory setae. Tarsus II with nine tactile, one sensory and one duplex setae; tibia II with five tactile setae. Tarsus III with seven tactile and one sensory setae; tibia III with five tactile setae. Tarsus and tibia IV similar to III.

Male. — Length of body 261 μ . Terminal sensillum of palpus absent. Peritreme hooked. Aedeagus as figured; dorsal surface of knob gently rounded, pointed posteriorly, rounded anteriorly; axis of knob forming an angle with axis of shaft. Tarsus I with ten tactile, two sensory and two duplex setae; tibia I with seven tactile and four sensory setae. Femur I with nine tactile setae, six



Schizotetranychus? baltazari Rimando.

FIG. 45. Dorsal body view of female. — FIG. 46. Tarsus and tibia I of female. — FIG. 47. Tarsus and tibia II of female. — FIG. 48. Tarsus and tibia III of female. — FIG. 49. Tarsus and tibia IV of female. — FIG. 50. Leg I of male. — FIG. 51. Leg II of male. — FIG. 52. Leg III of male. — FIG. 53. Leg IV of male. — FIG. 54. Aedeagus. — FIG. 55. Terminal segment of palpus of male.

of these being strong and thick, almost spine-like in appearance. Tarsus II with nine tactile, one sensory and one duplex setae; tibia II with five tactile setae. Femur II with six tactile setae, three of these being spine-like (on femur II of one specimen only five tactile setae were present, two of these being spine-like). Tarsus III with seven tactile and one sensory setae; tibia III with five tactile and one sensory setae. Tarsus and tibia IV similar to III.

Nineteen males, twenty nine females, twelve nymphs, Hsipaw, Burma, 14-VI-59; two males, eight females, five nymphs, Hong Kong, 11-VII-59; one female, Goalpara, Assam, India, 14-III-59; two females, on orange, near Mercara, Mysore, India, 1-II-59.

Oligonychus biharensis (Hirst).

Paratetranychus biharensis HIRST, 1925, *Proc. Zool. Soc. Lond.*, 69.

Oligonychus biharensis (Hirst); PRITCHARD and BAKER, 1955, *Pac. Coast Ent. Soc. Mem.* 2 : 364.

One male, four females, one nymph, Petchboon, Thailand, 29-VI-59.

Previous records are from India, Mauritius, Hawaii and Antigua. The hosts include rose, loquat, mango, litchi, cotoneaster, camphor and *Euphorbia longana*.

Tetranychus fijiensis Hirst.

Tetranychus fijiensis HIRST, 1924, *Ann. Mag. Nat. Hist.* (ser. 9), 14 : 523.

Tetranychus fijiensis Hirst; PRITCHARD and BAKER, 1955, *Pac. Coast Ent. Soc. Mem.* 2 : 382.

Two males, thirteen females, on orange, near Mercara, Mysore, India, 1-II-59; nine females, Chantiburi, Thailand, 27-VI-59; one male, three females, one nymph, Chiangmai, Thailand, 3-VII-59; two males, four nymphs, Burnihat, Assam, India, 25-II-59.

Previous records are from Fiji, on coconut; Nakuoro Island, Micronesia, on *Cyrtosperma chamissonis*, and Likiep Island, Micronesia, on coconut.

Tetranychus neocaledonicus André.

Tetranychus neocaledonicus ANDRÉ, 1933, *Bul. Mus. Natl. Hist. Nat.* (sér. 2) 5 : 302.

Tetranychus cucurbitae RAHMAN and PUNJAB, 1940, *Proc. Indian Acad. Sci* (ser. B), 11 : 179.

Tetranychus cucurbitae Rahman and Punjab; PRITCHARD and BAKER, 1955, *Pac. Coast Ent. Soc. Mem.* 2 : 419.

Tetranychus neocaledonicus André; BAKER and PRITCHARD, 1960, *Hilgardia* 29 : 11 : 546.

Two males, four nymphs, Kalimpong, India, 27-V-59; sixteen males, twenty females, nine nymphs, on lemon, Bangalore, India, 22-I-59.

Previous records are from India, Fiji, Hawaii, Venezuela, the south eastern United States, Puerto Rico, the Bahamas, Mauritius and Africa. At least sixty different kinds of plants are known as hosts.

Tetranychus cinnabarinus (Boisduval).

Acarus cinnabarinus BOISDUVAL, 1867, *Ent. Hort.*, p. 88.

Tetranychus cinnabarinus (Boisduval); BOUDREAUX, 1955, *Ann. Ent. Soc. Amer.* 49 : 46.

Six males, twenty two females, five nymphs, on mandarin, Shillong, Assam, India, 10-III-59.

Previous recordings are from Africa, the Middle East, Japan, Hawaii, Argentina, Europe and the United States.

TENUIPALPIDAE

Brevipalpus phoenicis (Geijskes).

(Figs. 9-10).

Tenuipalpus phoenicis GEIJSKES, 1939, *Meded. Landbouwh. Wageningen*, 42 : 4 : 230.

Brevipalpus phoenicis (Geijskes); PRITCHARD and BAKER, 1958, *Univ. Calif. Publ. Ent.*, 14 : 3 : 233.

This species was found to be abundant throughout the south east Asia area. The localities at which it was collected are Chiengmai and Petchboon in Thailand; Lashio, Hsipaw and Rangoon in Burma; Gangtok in Sikkim; Burnihat, Pomora, Goalpara, Kalimpong, New Delhi and Nagpur in India.

PRITCHARD and BAKER (1952) showed that there was some variation in certain structural characters of *B. phoenicis*. This is borne out in the present study. Adult females show variation in the pattern on the propodosoma, which varies from reticulation in almost the whole of the dorsolateral areas to almost a complete lack of reticulation. Variation is shown in the size and shape of the dorsal body setae of the nymph. In many cases the humeral, first propodosomal, and first and second dorsolateral setae are as large as the other setae. The first and third pairs of dorsocentral hysterosomal setae are sometimes large and ovate; some specimens have only one seta of the pair enlarged.

Brevipalpus californicus (Banks).

Tenuipalpus californicus BANKS, 1904, *Jour. N. Y. Ent. Soc.*, 12 : 55.

Brevipalpus californicus (Banks); PRITCHARD and BAKER, 1958, *Univ. Calif. Publ. Ent.*, 14 : 3 : 216.

This species was taken at Bangkok in Thailand, Dawki in India, and Pokhara in Nepal.

B. californicus was also found in association with *B. phoenicis* at the following localities: Mercara, Mandya, Darjeeling Rd., and Jorhat, all of which are in India.

Brevipalpus obovatus Donnadieu.

Brevipalpus obovatus DONNADIEU, 1875, *Rech. Serv. Hist. Tetranych.*, p. 116.
Brevipalpus obovatus Donnadieu; PRITCHARD and BAKER, 1958, *Univ. Calif. Publ. Ent.*,
14 : 3 : 231.

There was one record of this species. Six females, one nymph, Kathmandu, Nepal (in association with *B. californicus*). Six females, one nymph at Kathmandu, Nepal, 15th May 1959.

The above three species have previously been recorded from most parts of the world. They occur on a wide variety of hosts.

ACKNOWLEDGEMENTS

My thanks are due to Dr. E. W. BAKER for suggesting this work and placing the collection at my disposal.

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