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Author(s): Edward W. Baker
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The Genus Brevipalpus (Acarina: Pseudoleptidae)

Edward W. Baker

Bureau of Entomology and Plant Quarantine,
Agricultural Research Administration, U. S. D. A., Washington, D. C.

Within the last few years several species of *Brevipalpus* have been found to be pests of cultivated plants. Although not so important as the *Tetranychidae* or spider mites, they are at times serious enough to warrant investigations of their biology and control. This paper is a review of the taxonomy of the genus. Although some of the early described species cannot yet be identified, reproductions of many of the figures and references to the early literature are given. Owing to the minute differences between some of the species, such as *donnadieui* and its close relatives, final determinations can be made only when material from type hosts and localities can be studied. For this reason certain early names, such as *obovatus,* cannot now be applied to any species in available collections, and some recently described species may prove to be synonyms of these earlier described mites.

The following review indicates the type and severity of the injury caused by these mites. Green (1900) records a species of *Brevipalpus* as causing serious damage to tea plants in Ceylon. Originally determined as *B. obovatus* Donnadieu, or very close to it, specimens received from C. H. Gadd, Ceylon, have proved to be *B. australis* (Tucker). Green states, "Apparently a very injurious pest. The branches—and whole bushes—are almost denuded of leaves, the bark shriveled and hide-bound. The terminal buds have ceased growing. In some instances the trees have been actually killed. The mites are crowded on the under surface of the leaves, and their attack results in a brownish scurfy discoloration extending along the midrib and on each side of it, the base of the leaf being particularly affected, causing its premature detachment." Bernard (1909) also discusses this species in some detail. Although still considered as a pest of tea (King 1936), it is the least numerous of the species of mites attacking that plant.

McGregor (1916) reports defoliation of privet by *Brevipalpus inornatus* (Banks) throughout Florida, South Carolina, Alabama, Mississippi and Louisiana. Blanchard (1940) states that *Brevipalpus pseudocuneatus* (Blanchard) is a carrier of a virus disease of citrus in Argentina. Jones, et al. (1941) report species of *Brevipalpus* (probably *papayensis* n. sp.) as sometimes causing serious damage to papaya fruits in Hawaii. The fruits develop gray, scaly or cracked areas, most frequently at points where they are in contact with the trunk.

Lewis (1944) found a *Brevipalpus* (described later as *B. lewisi* McGregor) scarring lemon fruit at Porterville, California. In parts of an infested grove which had received no commercial spray treatment for about ten years, more

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than twenty-five percent of the fruit was scarred, but in adjacent orchards which had been treated regularly these mites were hard to find. Lewis also states that "Injury is apparent to tender wood and fruit stems as a darkened, scarred area confined to the upper surface. Buttons are also darkened. Leaf injury, though present is of no importance."

In Valencia, Spain, Planes (1945) found an undetermined species[1] causing scarring of citrus fruits. In cases of large numbers of mites the leaves and pedicles are scarred and defoliation can occur.

Sloan (1946) gives the following description of *Brevipalpus*[2] damage to passion vines in Queensland.

"The passion fruit mite is a common, but frequently unrecognized, cause of the unthrifty appearance and premature death of passion fruit vines.

"Passion vines may be attacked at any age and even young plants show severe injury if growing conditions are unfavourable. The older leaves of the vine turn yellow prematurely. These then die and are shed. The injured surface of the canes becomes covered with a rusty-red corky layer showing small cracks. This injury persists even after the mites have been checked and gives an indication of the extent of previous infestations. Heavy attacks over a long period may cause the shedding of the greater part of the foliage, leaving many canes bare except for the terminals. Buds in the axils of affected leaves may fail to develop or produce only yellowish stunted growth. Not infrequently, the less sturdy laterals die back to the main cane. A moderate attack will bring about a serious loss of vigour, while severe attacks over a prolonged unfavourable growing period may lead to the death of the entire vine. The general picture of a mite-affected vine is that of one suffering from lack of soil moisture.

"Injury to the fruit occurs only in heavy infestation and is at first restricted to the stalk end, particularly under and around the calyx. Later, mites may be more freely distributed over the surface and water-soaked areas then disfigure the rind. These later dry out, leaving dull-grayish areas which are sometimes tinged with reddish-brown. The affected fruit may fail to develop fully.

"Usually, the mite causes little apparent damage in spring, so long as the vines are making good progress, but injury may become pronounced later in the warmer months, especially if growing conditions are such as to retard growth and if the vines are fruiting heavily. Vines that are heavily infested in the summer and early autumn make a partial recovery during winter and subsequently the growth may proceed normally until mite populations again become high during the following summer."

Mites of this genus appear to be distributed throughout the temperate regions of the world. Lawrence (1943) discussing *Tenuipalpus* s. l. which now includes *Tenuipalpus* and *Brevipalpus,* states, "It seems that indigenous species of *Tenuipalpus* are always found on indigenous host plants and will

1 Specimens sent by Mr. Planes have been determined as *Brevipalpus pseudocuneatus* (Blanchard).

2 Reported as *Tenuipalpus californicus* Banks; possibly a misidentification.

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usually be confined to a single one, while introduced species will occur on a large and mixed assembly of native and foreign plants."

The finer techniques of mounting and studying these small mites have enabled workers to begin properly to separate the species. The discovery that in the nymphal stages the setal patterns are usually strikingly distinct has made the separation and identification of species much easier. Occasionally colonies of more than one species occur, in which case care must be exercised in properly associating the nymphs with adults. This can be done by the hysterosomal setae count or by the finding of molting specimens containing adult forms. Nymphs described in this paper have been found associated with adults, and in no cases have any forms been reared. However, I feel confident that the nymphal forms have been correctly identified. Not enough larvae have been studied to evaluate their characters. Some larvae possess long posterior whiplike setae similar to those of *Tenuipalpus;* these are lost in the nymphal stage. Males likewise show specific differences.

The extent of variation within a species is not yet known, but there is an indication, in *B. inornatus* (Banks) for example, that in the nymphal stages certain of the setae, usually the small marginal ones, may occasionally vary in size. It must be borne in mind that the key to the nymphs is based upon a few individuals of each species, and further studies may find variations which are not yet known. In the adult females it was found that the rostral shield was too variable to be of much importance in specific identification.

Unless otherwise stated types are deposited in the United States National Museum.

The genus *Brevipalpus* Donnadieu 1875, family Pseudoleptidae,[3] is distinguished by its small size, its four-segmented palpus in which the second segment bears a single seta, the third a pair of setae, and the fourth three setae; its flat egg-shaped body; its reticulate skin pattern; the usually wrinkled legs with a pair of claws, pulvillus and tenent hairs; the presence of distinct hysterosomal genital plates; the shieldlike process extending out over the rostrum; a pair of simple setae on the venter of the rostrum; two pairs of lateral lenslike eyes; a distinct dorsal suture between the propodosoma and hysterosoma in the female; a distinct dorsal suture between the propodosoma and hysterosoma and another dividing the hysterosoma into two parts in the male; and in having long needle like chelicerae capable of extrusion.

The type of the genus is *Brevipalpus obovatus* Donnadieu 1875. (By designation, Vitzthum, 1942.)

Baker, 1945, recognized the validity of the genus *Brevipalpus* and separated it from *Tenuipalpus* under which it had been synonymized. He stated, "and the name *Brevipalpus* Donn., 1875, which has been synonymized with *Tenuipalpus,* should be reinstated as the generic name for the *inornatus* group of mites." It is considered that the proper name combinations were implied in this sentence so new combinations are listed in this paper.

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3 Oudemans, 1938, placed *Pseudoleptus* in synonymy with *Trichadenus* but the study of the group shows the two genera to be distinct and the name Pseudoleptidae should be used rather than Trichadenidae.

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Keys to the species in the United States National Museum are given below. Wherever possible species not examined have been included, based on characters figured by the authors. In a few cases of close similarity the species have not been separated in the key, and it is necessary to study the other sex or stages of the mite. In order to identify species correctly, it is advisable to study adults of both sexes, as well as nymphs, whenever possible.

KEY TO FEMALES

1. Tarsus II with one terminal rodlike seta 2
   Tarsus II with two terminal rodlike setae 19
2. Hysterosoma with six pairs of marginal setae 3
   Hysterosoma with seven pairs of marginal setae 7
3. Dorsal surface of body reticulate almost in entirety 4
   Dorsal surface of body not reticulate, with only a very few linear markings; markings along margin of body more common; marginal setae long, slender, serrate ..... *edwinae,* new species
4. Dorsal reticulate elements netlike, net not longer than wide 5
   Dorsal reticulate elements quite elongate with only a few cross striae ..... *mcgregori,* new species
5. Reticulations not meeting dorso-medianly on propodosoma; dorsal reticulate elements of hysterosoma wider than long 6
   Reticulations meeting dorso-medianly on propodosoma; dorsal reticulate elements of hysterosoma about as long as wide ..... *chilensis,* new species
6. Reticulate pattern on venter of hysterosoma extends anterior to posterior ventral hysterosomal setae ..... *inornatus* (Banks)
   Reticulate pattern on venter of hysterosoma not extending to the posterior ventral hysterosomal setae ..... *phoenicis* (Geijskes)
7. Rostral shield not reaching past middle of femur I; tip of rostrum reaching only to distal end of femur I; rostrum of normal size, not elongate 8
   Rostral shield reaching almost to distal end of femur I; tip of rostrum reaching almost to distal end of genu I; mouth parts greatly elongate ..... *oleae,* new species
8. Hysterosoma with lateral margins subparallel, converging posteriorly 9
   Lateral margins more or less parallel, front and rear of mite broadly rounded, extra pair of anterior lateral hysterosomal setae present 18
9. Posterior and anterior ventral hysterosomal setae short, of equal length 10
   Posterior ventral hysterosomal setae much longer than anterior pair 11
10. Reticulation covering almost all of dorsal body surface, of same pattern throughout, the elements about as long as wide; reticulate pattern not covering entire venter of mite ..... *oncidii,* new species
    Reticulate patterns not meeting dorsally on propodosoma and on hysterosoma consisting of a few more or less irregular lines; reticulate pattern covers almost entire venter of mite ..... *cuneatus* (Canestrini and Fanzago)
11. Dorsal reticulate pattern not netlike, elements much longer than wide 12
    Dorsal reticulate pattern netlike, elements about as long as wide 13
12. Reticulate pattern between genital plate and posterior ventral hysterosomal setae ..... *garmani,* new species
    No reticulate pattern between genital plate and posterior ventral hysterosomal setae ..... *lewisi* McGregor
13. Hysterosomal marginal setae short, with few serrations 14
    Hysterosomal marginal setae long, reaching about halfway to base of next seta, with many serrations ..... *cardinalis* (Banks)
14. Dorsal setae of femora I and II not as long as width of segment 15
    Dorsal setae of femora I and II as long as width of segment ..... *sayedi,* new species

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15. Reticulate pattern extending across entire anterior ventral plate 16
Reticulate pattern only on lateral margins of ventral plate; pattern connected by transverse striae .....*russulus* (Boisduval)

16. Elements of reticulate pattern of anterior ventral plate wider than long; dorsal hysterosomal reticulate elements, especially medianly, of varying sizes 17
Elements of reticulate pattern of anterior ventral plate about as wide as long; dorsal hysterosomal reticulate elements of equal size .....*essigi,* new species

17. Dorsal propodosomal reticulate elements netlike across entire surface; femora I and II without large protuberances .....*lilium,* new species
Dorsal propodosomal reticulate elements broken medianly; femora I and II with one or two prominent protuberances .....*linki,* new species

18. Posterior ventral hysterosomal setae much longer than anterior pair .....*pyri* Sayed
Posterior and anterior ventral hysterosomal setae short, of equal length .....
.....*oudemansi* (Geijskes); *geisenheyeri* (Rübsaamen)

19. With six pairs of hysterosomal marginal setae 20
With seven pairs of hysterosomal marginal setae 22

20. Palpal segment II with a strong inner basal swelling 21
Palpal segment II without strong inner basal swelling .....
.....*yothersi,* new species; *mcbridei,* new species

21. Marginal setae broadly lanceolate; pattern laterad of coxae II not reticulate but consists of a few short striae .....*papayensis,* new species
Marginal setae narrowly lanceolate; pattern laterad of coxae II truly reticulate .....
.....*pseudocuneatus* (Blanchard)

22. Dorsal reticulate pattern truly netlike 23
Dorsal pattern consists of a few longitudinal striae .....*longisetosus,* new species

23. Reticulate pattern covers entire dorsal surface of propodosoma 24
Reticulate pattern does not cover entire dorsal surface of propodosoma, meeting in center with faint irregular striae .....*californicus* (Banks); *woglumi* McGregor

24. Reticulate elements in area between anterior ventral plate and posterior ventral hysterosomal setae about as long as wide 25
Reticulate elements in above area wider than long .....
.....*australis* (Tucker); *confusus,* new species

25. Ventral reticulation between posterior and anterior ventral hysterosomal setae; reticulate elements in area laterad of coxae II longer than wide .....
.....*trinidadensis,* new species
Ventral reticulation extends only slightly anterior to the posterior ventral hysterosomal setae; reticulate elements in area laterad of coxae II about as long as wide
.....*browningi,* new species

KEY TO DEUTONYMPHS

1. With six[4] pairs of hysterosomal marginal setae 2
With seven[4] pairs of hysterosomal marginal setae 7

2. Marginal setae not of equal length 3
Marginal setae of approximately equal size and length .....*mcgregori,* new species

3. Marginal setae 2, 3 and 4 of approximately equal size, lanceolate serrate 4
Marginal setae 2, 3 and 4 not of equal size 5

4. Marginal setae 1, 5 and 6 minute, not lanceolate .....*papayensis,* new species
Marginal setae 1 and 5 not minute but smaller than others and lanceolate serrate
.....*yothersi,* new species

5. Marginal setae 2 and 3 of equal size 6
Marginal setae 1, 2, 5 and 6 minute, serrate, not lanceolate .....
.....*pseudocuneatus* (Blanchard)

[4] The marginal body setae are numbered, for convenience, from 1 to 10.

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6. Marginal setae 1, 4 and 5 equal ..... *inornatus* (Banks)
Marginal setae 1 and 4 equal, more than two times longer than seta 5, seta 6 about two times longer than 5, on citrus at times 4=5=6 or 5=6 ..... *mcbridei*, new species

7. All marginal and dorsal setae not extremely long 8
All marginal and dorsal setae extremely long, much longer than distance between setal bases ..... *salviae* McGregor

8. Marginal setae 7-10 not of equal length 9
Marginal setae 7-10 of equal size and length 14

9. Lateral marginal setae long, reaching base of next posterior setae, especially 2 and 3 10
Lateral marginal setae not long, not reaching base of next setae 11

10. Dorsal surface of body with normal nymphal striation ..... *pyri* Sayed
Dorsal posterior surface of hysterosoma and lateral margin of propodosoma with reticulate pattern ..... *cardinalis* (Banks)

11. Setae of moderate size, never long, whiplike 12
Setae 2, 3 and 8 long, whiplike; seta 10 lanceolate; other setae minute ..... *longisetosus*, new species

12. Rostrum and palpi not extremely long, of normal size 13
Rostrum and palpi extremely long, reaching past distal end of femur I; marginal seta 10 twice as long as 9 (setae 3, 4 and 8 missing, others equal in length to 9) ..... *oleae*, new species

13. Marginal setae 2, 8 and 10 quite large, lanceolate, serrate; other setae minute ..... *garmani*, new species
Marginal seta 8 large, other posterior marginal setae minute ..... *essigi*, new species
Marginal setae 8 and 10 large; other posterior marginal setae minute ..... *trinidadensis*, new species
Marginal setae 1, 2, 3, 4, 5, 7, 8 and 10 large, of equal size; seta 6 small, lanceolate; seta 9 minute, rodlike ..... *linki*, new species

14. All marginal setae (1-10) of approximately equal size and shape 15
Marginal setae (1-10) subequal 16

15. Dorsal and marginal setae of approximately same length ..... *pini*, new species
Marginal setae much larger than dorsal setae ..... *browningi*, new species

16. Setae 2 and 3 of decidedly different size and/or shape 17
Setae 2 and 3 of approximately same shape and either of same size or 3 not more than 1/3 longer than 2 19

17. Setae 3, 4, 7, 8, 9 and 10 lanceolate serrate 18
Setae 3, 7, 8, 9 and 10 decidedly rounded with spinelike serrations ..... *russulus* (Boisduval)

18. Marginal setae 1, 2, 5 and 6 minute, of equal size; setae 3, 4, 7, 8, 9 and 10 large, lanceolate, of equal size ..... *woglumi* McGregor; *lilium*, new species; *confusus*, new species
Marginal setae 1, 2, 5 and 6 shorter than others, 1 the shortest; setae 7, 8, 9 and 10 elongate, drawn out at tip ..... *oncidii*, new species

19. Marginal setae 2, 3 and 4 large and of more or less equal size; setae 1, 5 and 6 small ..... *australis* (Tucker)[5]
Marginal setae as above but seta 2 smaller than 3 ..... *lewisi* McGregor
Marginal setae as in *lewisi* but seta 4 as small as 1 and 5 ..... *californicus* (Banks)

KEY TO MALES

1. Hysterosoma with six pairs of marginal setae 2
Hysterosoma with seven pairs of marginal setae 4

[5] The specimen studied is probably a protonymph.

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2. Marginal setae short, not reaching to bases of next setae 3
Marginal setae long, reaching to or surpassing base of next setae (only five pairs setae shown in original figure but pattern indicates that the second pair of hysterosomal setae was not included) .....*grewiae* (Rübsaamen)

3. Margins of body subparallel; marginal setae moderately long and strongly serrate; many small dorsal reticulate elements .....*edwinae,* new species
Margins of body converging to rear as in female; marginal setae short, finely serrate; fewer larger dorsal reticulate elements .....*inornatus* (Banks)

4. Marginal setae long, those on hysterosoma reaching at least to base of next seta 5
Marginal setae short, not reaching more than half way to base of next seta except on posterior margin 7

5. Dorsal setae short 6
Dorsal setae extremely long, reaching much past bases of next setae .....
.....*salviae* McGregor

6. Dorsal body surface reticulate .....*pyri* Sayed
Dorsal body surface without reticulations .....*cardinalis* (Banks)

7. Reticulate pattern covers almost entire surface of dorsum and venter 8
Reticulate pattern only on lateral portion of dorsum, none or very little on venter
.....*pini,* new species

8. Reticulate elements netlike, about as long as broad 9
Reticulate elements, especially on propodosoma, many times longer than broad .....
.....*garmani,* new species

9. Marginal setae lanceolate, serrate 10
Marginal, and dorsal, setae clublike, serrate .....*natalensis* (Lawrence)

10. Posterior ventral elements of hysterosoma meeting at center 11
Posterior ventral elements of hysterosoma not meeting at center ....*russulus* (Boisduval)

11. Posterior and anterior ventral hysterosomal reticulate elements of about equal size 12
Anterior ventral hysterosomal elements much smaller than the posterior ventral elements .....*browningi,* new species

12. Hysterosoma constricted at suture 13
Hysterosoma not constricted at suture, form similar to that of female .....
.....*lilium,* new species

13. Hysterosoma strongly constricted at suture; lateral teeth of rostral shield simple
.....*oncidii,* new species
Hysterosoma only mildly constricted at suture; lateral teeth of rostral shield paired
.....*confusus,* new species

Brevipalpus edwinae, new species

Plate I, Figs. 1-5

Female (Figs. 1, 2 ,5).—Body broadest at or behind suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, not extending past middle of femur I; palpal segment II without inner basal swelling. Rostral shield with a pair of median lobes and two pairs of small lateral lobes. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; marginal setae narrowly lanceolate, serrate, somewhat longer than normal. Dorsal hysterosomal setae simple, not as long as marginal setae. Propodosoma without dorsal reticulation but with a few lateral striae; hysterosoma with a few lateral and dorsal striae. Venter of mite reticulate. On posterior ventral plate reticulate elements wider than long; elements on anterior plate only slightly wider than long; laterad of anterior plate and between plate and posterior ventral

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hysterosomal setae the reticulate elements as long as wide. Coxae I and II with few reticulations on outer basal portion; few short striae laterad of coxae II. Posterior ventral hysterosomal setae long, surpassing suture between propodosoma and hysterosoma. Tarsus II with a single rodlike seta. Dorsal setae of femora I and II broadly lanceolate, serrate, about half as long as width of segment. Length of body 216 μ; including rostrum 273 μ; width about 140 μ.

Male (Figs. 3, 4).—Body rather rectangular, only slightly constricted at hysterosomal suture. Rostrum of normal size, not reaching past middle of femur I; palpal segment II without inner basal swelling. Rostral shield short, with three pairs of subequal lobes, the center pair not extending past the others. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; marginal setae lanceolate, serrate, long, reaching about halfway to base of next seta. Dorsum of mite reticulate, elements small, about as long as wide; reticulate elements on posterior of hysterosoma apparently not meeting dorsally. Reticulate pattern covering posterior ventral portion of hysterosoma and between the transverse striae and posterior ventral hysterosomal setae. Venter of propodosoma with few striations. Coxae relatively smooth. Dorsal setae on femur I and II lanceolate, serrate, about as long as width of segment. Length of body 213 μ; including rostrum 260 μ; width 107 μ.

Deutonymph.—Not known.

Type host.—*Eupatorium glabratum.*

Type locality.—Km. 67, Mexico-Cuernavaca Highway, Morelos, Mexico.

Type.—U. S. National Museum No. 1812.

The type female, nine paratypes and two males were collected January 22, 1941 by E. W. Baker. The mite is named for Edwina Pages of Mexico City, Mexico.

Brevipalpus mcgregori, new species

Plate I, Figs. 6-8

Female (Figs. 6, 7).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum slightly longer than usual, extending almost to tip of femur I; palpal segment II with a small inner basal swelling. Rostral shield with a pair of long inner lobes and two pairs of small lateral lobes; central portion of shield with longitudinal striae. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; all marginal setae short, broadly lanceolate, serrate. Dorsal hysterosomal setae short, appear to be simple. Pattern of propodosoma composed of longitudinal striae; pattern of hysterosoma composed of longitudinal striae forming dorsally elongate elements. Reticulate elements of ventral plates wider than long; those in area anterior to plates less so; other elements tend to be longer than wide. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II broadly lanceolate, serrate, about half as long as width of segment. Length of body 246 μ; including rostrum 293 μ; width 166 μ.

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Male.—Not known.

Deutonymph (Fig. 8).—Dorsal striations typical. All marginal setae large, lanceolate, serrate; marginal setae 1, 2, 3, 4, 5, 6, 7 and 9 of about equal size; seta 8 slightly smaller. Dorsal hysterosomal setae small, simple.

Type host.—Lemon.

Type locality.—Santa Paula, California.

Type.—U. S. National Museum No. 1813.

The type female, seven paratypes and two nymphs were collected on lemon buds September 14, 1938 by K. E. Maxwell; four paratypes and three nymphs were collected on lemon buds September 8, 1938 by E. W. Baker.

Brevipalpus chilensis, new species
Plate I, Figs. 9, 10

Female (Figs. 9, 10).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum extending to middle of femur I; palpal segment II with sharp inner basal swelling. Rostral shield consisting of a pair of median lobes and two pairs of small lateral lobes; posterior central portion of shield with reticulate design. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; marginal setae short, lanceolate, apparently not serrate. Dorsal hysterosomal setae short and of same size. Reticulate pattern covers dorsal surface of mite, reticulate elements slightly longer than wide. Reticulate elements of ventral plates and area anterior to plates wider than long; reticulate elements laterad of plates about as long as wide. Posterior ventral hysterosomal setae reach to suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II lanceolate, serrate, about half as long as segment is wide. Length of body 267 μ; including rostrum 327 μ; width 167 μ.

Male.—Not known.

Deutonymph.—Not known.

Type host.—Lemon.

Type locality.—Chile (intercepted at New York).

Type.—U. S. National Museum No. 1814.

Described from the type female and two paratypes collected June 14, 1933 by K. W. Holloway, R. D. Kennedy, G. F. Smith and Pablo Ortiz of the Division of Foreign Plant Quarantines in New York on lemons originating in Chile. Eight other specimens were collected on *Vitis vinifera*, September 20, 1909 at Talca, Chile, Collector unknown.

BREVIPALPUS INORNATUS (Banks)
Plate II, Figs. 11-15

Tenuipalpus inornatus Banks, 1912, Proc. Ent. Soc. Wash. 14: 97, pl. 1, fig. 1.
Tenuipalpus bioculatus McGregor, 1914, Ann. Ent. Soc. Amer. 7: 354, text fig. 1, pl. XLII.
Tenuipalpus bioculatus McGregor, 1916, Jour. Econ. Ent. 9: 556, pl. XLIII, fig. 38.

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Brevipalpus inornatus (Banks), Baker, 1945, Proc. Ent. Soc. Wash. 47 (2): 33.
Brevipalpus inornatus (Banks), McGregor, 1949, Mem. South. Calif. Acad. Sci. III (2): 13-15, text fig. 4, pl. II.

Female (Figs. 11, 12).—Body broadest at suture between propodosoma and hysterosoma; propodosoma appears short in relation to its width; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, not reaching to middle of femur I; palpal segment II with sharp inner basal swelling. Rostral shield with a pair of long median lobes and two pairs of small lateral marginal lobes; posterior of shield sculptured. Propodosoma with three pairs of short, lanceolate, serrate setae; hysterosoma with six pairs of similar setae. Dorsal hysterosomal setae slightly lanceolate, perhaps serrate, and about as long as marginal setae. Elements of reticulate pattern on propodosoma slightly longer than wide, not meeting dorsally; elements of pattern on hysterosoma varying, those on dorsum wider than long and those laterad of this area longer than wide. Ventral reticulate elements small, on ventral plates and anterior to plates these elements are wider than long. Elsewhere the elements are slightly longer than wide. Posterior ventral hysterosomal setae of normal length, reaching to suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II lanceolate, serrate, almost half as long as width of segment. Length of body 246 μ; including rostrum 286 μ; width 150 μ.

Male (Figs. 13, 14).—Body broadest at propodosoma; hysterosoma with lateral margins converging posteriorly, not constricted at suture. Rostrum of normal size, reaching to middle of femur I; palpal segment II without inner basal swelling. Rostral shield with the two median lobes and two pairs of weak lateral lobes. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; marginal setae short, lanceolate, serrate; the three pairs of dorsal hysterosomal setae are short and slightly lanceolate. Elements of propodosomal reticulate pattern about as long as wide, not meeting dorsally; elements of anterior portion of hysterosoma tend to be longer than wide and do not meet dorsally; elements on posterior portion of hysterosoma tend to be longer than wide except on anterior central portion and meet dorsally. Reticulate pattern on venter of hysterosoma slightly wider than long, covering entire venter; those elements anterior to the hysterosomal suture small, about as long as wide; other elements as figured. Dorsal setae of femora I and II broadly lanceolate, serrate, about half as long as width of segment. Length of body 227 μ; including rostrum 273 μ; width 153 μ.

Deutonymph. (Fig. 15).—Dorsal striations typical. Marginal setae lanceolate, serrate; setae 1, 4, 5 and 6 of equal size, about half as long as others but this may be variable; setae 2, 3, 7, 8 and 9 of equal size; dorsal hysterosomal setae small, simple.

Type host.—Goldenrod.

Type locality.—Batesburg, South Carolina.

Type.—U. S. National Museum No. 1815.

The mite was originally described from goldenrod; the type of *bioculatus*, a synonym, was found on privet in the same locality. McGregor, 1916, records

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it on privet in Florida, South Carolina, Alabama, Mississippi, and Louisiana. Mites determined as this species have been collected on begonia, Main; Japanese honeysuckle, South Carolina; *Phoenix humilis*, Louisiana; *Gerbera* sp., Ontario, Canada; *Osbeekia?*, Maryland; Ponderosa lemon, Italy? at Brownsville, Texas; *Citharexylum quadrangularis*, Missouri. Ten females, two nymphs and two larvae were also collected in tulip bulbs originating in Japan, at Seattle, Washington; these cannot be separated at present from *inornatus*. The description of the male is based on specimens collected on honeysuckle, Batesburg, South Carolina. Specimens of what appears to be this species from citrus in Australia and Azalea in California and Oregon tend to have larger marginal setae 1, 4, 5 and 6 in the nymphal stages. A few specimens of the east coast privet forms have the tendency to vary in the same manner but not as much. An *inornatus* type nymph was found in material from tea, Ceylon sent in by C. D. Gadd. Numerous specimens of the typical east coast form were collected on potatoes in the insectary at the Citrus Experiment Station, Riverside, California, February 26, 1948 by Blair Barlett.

BREVIPALPUS PHOENICIS (Geijskes)

Plate II, Figs. 16, 17

Tenuipalpus phoenicis Geijskes, 1939, Medeleelingen van de Landbouwhoogeschool, Wageningen, Nederland, Deel 42, Ver. 4: 23, 24, fig. 8.

Until nymphal forms of *phoenicis* can be studied the exact status of the species cannot be determined since the differentiation between the adult females of *phoenicis* and *inornatus* is so poor that it is somewhat doubtful that the two can be really separated.

Type host.—Palm.

Type locality.—Netherlands. Specimens not seen.

BREVIPALPUS PEREGER Donnadieu

Plate II, Figs. 18, 19

Brevipalpus pereger Donnadieu, 1875, Recherches pour servir à l'histoire des Tetranyques. Lyon, p. 116, pl. V, fig. 49.

Type host.—*Rubus* and *Rosa* leaves.

Type locality.—France.

Oudemans, 1929, Ent. Ber. VII: 395, 396, gave a short description, without figures, of "*Brevipalpus pereger*" from an orchid, Java. This is probably a misidentification.

BREVIPALPUS PULCHER (Canestrini and Fanzago)

Plate II, Fig. 20

Tenuipalpus pulcher Canestrini and Fanzago, 1876, Academia Scientifica Veneto. Trentino Istriana. Atti 5: 134, 135.

Caligonus pulcher Canestrini and Fanzago, 1877, Ist. Veneto di Sci. Let., ed Arti. Atti 4(5): 156.

Tenuipalpus pulcher Canestrini and Fanzago, Berlese, 1887, Acari, Myr. Scorp: Ital. Prostigmata, fasc. LXXII, no. 3.

Tenuipalpus pulcher Canestrini and Fanzago, Canestrini, 1890, Prosp. Acarof. Ital. IV: 455.

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The figure given by Canestrini, 1890, indicates this to be a male; the figure by Berlese, 1887, appears to be that of a nymph.

Type host.—Hedge.

Type locality.—Trevigiano, Italy.

Brevipalpus oleae, new species

Plate III, Figs. 21-23

Female (Figs. 21, 22).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum elongate, reaching almost to distal end of genu I; palpi also elongate, segment II straight, not swollen at base. Rostral shield elongate, reaching past middle of femur I, with a pair of long median lobes and a pair of short lateral lobes. Shield with few long longitudinal striae. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae short, lanceolate, not appearing to be serrate but this may be due to the mounting. Dorsal hysterostomal setae similar to marginal setae. Reticulate pattern covers dorsum of mite, not meeting on anterior portion of propodosoma; reticulate elements in general are slightly longer than broad except between posterior pair of dorsal hysterosomal setae where they are wider than long. Reticulate elements of ventral plates wider than long; not meeting centrally anterior to plates; in general rest of ventral elements longer than wide. Posterior ventral hysterosomal setae reach to suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II lanceolate, probably serrate, shorter than half the width of the segment. Length of body 266 μ; including rostrum 346 μ; width 167 μ.

Male.—Not known.

Deutonymph (Fig. 23).—Dorsal striations typical. Rostrum, as in adult, quite elongate. Marginal seta 10 two times as long as 9; setae 3, 4 and 8 missing, other setae equal in length to 9; all marginal setae lanceolate and perhaps serrate. Dorsal hysterosomal setae short, simple.

Type host.—Olive.

Type locality.——Morocco?

Type.—U. S. National Museum No. 1816.

The type female and a larva were collected on olive cutting, February 20, 1933 by W. B. Wood; a paratype, a nymph and a larva were collected in crevices of olive bark, March 31, 1930 by W. B. Wood; the collections were made in Washington, D. C. from material originating in Morocco.

Brevipalpus oncidii, new species

Plate III, Figs. 24-30

Female (Figs. 24, 25, 29).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum reaching almost to middle of femur I; palpal segment II without inner basal swelling. Rostral shield with a pair of long median lobes and a pair of short lateral lobes, with striae and reticulation on posterior portion.

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Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs; marginal setae short, strong, lanceolate, serrate. Dorsal hysterosomal setae short, strong, but weaker than marginal setae, and perhaps slightly serrate. Reticulate patern covers dorsum of mite; reticulate elements tend to be longer than wide except on dorsal posterior portion of hysterosoma. Reticulate elements of ventral plates much wider than long; elements in other regions longer than wide; in area below coxae II reticulate elements about as long as wide. Posterior ventral hysterosomal setae short, no longer than anterior setae. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II shorter than half the width of the segment, stout, serrate. Length of body 313 μ; including rostrum 367 μ; width 193 μ.

Male (Figs. 26, 27, 30).—Body more or less typical of sex, broadest at suture between propodosoma and hysterosoma, constricted at hysterosomal suture; posterior lateral margins of hysterosoma subparallel, giving the rear of the mite a squarish appearance. Rostrum normal, not extending past middle of femur I, palpal segment II thick but not swollen at base. Rostral shield with a pair of long median lobes and a pair of small lateral lobes, punctate, with striae on center portion and a reticulate pattern on extreme posterior portion. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; propodosomal marginal setae and anterior two pairs of hysterosomal marginal setae short, stout, serrate; posterior marginal setae broader. Dorsal hysterosomal setae short, serrate, not as strong as marginal setae. Reticulate pattern covers dorsum of mite; reticulate elements tend to be slightly longer than wide except in the posterior portion of hysterosoma where they are wider than long. Ventral posterior portion of hysterosoma covered with reticulate pattern whose elements are longer than wide; anterior to transverse striations elements slightly wider than long. On propodosoma central connecting elements wider than long; elements below coxae II about as long as wide; lateral elements longer than wide. Posterior ventral hysterosomal setae of medium length, not reaching bases of anterior pair. Dorsal setae of femora I and II short, strong, serrate, about half as long as width of segment. Length of body 240 μ; including rostrum 293 μ; width 146 μ.

Deutonymph (Fig. 28).—Dorsal skin striation typical. Marginal setae 3, 4, 7, 8, 9 and 10 long, serrate; marginal setae 1, 2, 5 and 6 short, serrate, seta 1 shorter than others. Dorsal hysterosomal setae short, serrate.

Type host.—*Oncidium* sp.

Type locality.—Jarvisbrook, England.

Type.—U. S. National Museum No. 1817.

The type female, four males and a nymph were collected on *Oncidium*, originating at Jarvisbrook, England, by members of the Plant Quarantine Control Administration. No other information available. Three paratypes, two males and five nymphs were collected on *Odontoglossum* leaf originating in England at Hoboken, June 4, 1946 by J. M. R. Adams.

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Brevipalpus garmani, new species
Plate IV, Figs. 31-35

Tenuipalpus lineola (Canestrini and Fanzago), Garman, 1923, Conn. Agr. Expt. Stat. Bull. 247: 339 (misidentification).

Tenuipalpus bioculatus McGregor, Garman, 1940, Conn. Agr. Expt. Sta. Bull. 431: 71-73 (misidentification).

Female (Figs. 31, 32).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, reaching to middle of femur I; palpal segment II with inner basal swelling. Rostral shield with a pair of long median lobes and a pair of smaller lateral lobes which occasionally may be cleft. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae slightly lanceolate, serrate, those on propodosoma slightly longer than those on hysterosoma. Dorsal hysterosomal setae about same length as marginal setae, simple. Reticulate pattern on dorsum of propodosoma does not meet medianally; reticulate elements longer than wide. Pattern on hysterosoma with dorsomedian elements wider than long, irregular; the few lateral elements are longer than wide; many longitudinal striations. Reticulate pattern of ventral plates with elements wider than long; elements anterior to plates slightly wider than long; reticulate elements on coxae II about as long as wide; other ventral reticulate elements longer than wide. Posterior ventral hysterosomal setae reach to suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II lanceolate, serrate, about half as long as segment is wide. Length of body 287 μ; including rostrum 340 μ; width 187 μ.

Male (Figs. 33, 34).—Body broadest at propodosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, reaching to middle of femur I; palpal segment II without inner basal swelling. Rostral shield with two pairs of rounded lobes as figured; posterior of shield with few striations. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae lanceolate, serrate; the pair anterior to the eyes appear to be longer than others; the posterior pair more broadly lanceolate. The dorsal hysterosomal setae about as long as the marginal setae and appear to be simple. Propodosoma with a dorsal skin pattern of more or less subparallel striations, occasionally with cross striations; hysterosoma with reticulate pattern in which the elements are longer than wide. Reticulate pattern on venter of hysterosoma with elements slightly wider than long. Base of coxae II and area laterad of coxae II with reticulate elements longer than wide. Dorsal setae of femora I and II broadly lanceolate, serrate, longer than one half the width of the segment. Length of body 233 μ; including rostrum 287 μ; width 146 μ.

Deutonymph (Fig. 35).—Dorsal striations typical, without reticulate pattern. Marginal setae 1, 3, 4, 5, 6, 7 and 9 minute, simple; setae 2, 8 and 10 large, lanceolate, serrate, 8 and 10 perhaps longer than 2. Dorsal hysterosomal setae minute, simple.

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Type host.—Elder.
Type locality.—Hamden, Connecticut.
Type.—U. S. National Museum No. 1818.

Described from the type female, twenty-two paratype females, three males and eleven nymphs. These were collected on elder leaves by Philip Garman at Hamden, Connecticut, September 21 and 25, 1922 and at Cheshire, Connecticut, September 3, 1939. Paratypes will be deposited at the Agricultural Experiment Station, New Haven, Connecticut.

Garman (1940) lists the hosts as elderberry, *Sambucus,* and Joe-pye-weed (*Eupatorium*). He states "The damage to the host appears as a sort of reddening of the foliage."

BREVIPALPUS CUNEATUS (Canestrini and Fanzago)

Plate IV, Figs. 36, 37

Caligonus cuneatus Canestrini and Fanzago, 1876, Atti Soc. Veneto-Trentina Sci. Naturali, 5: 136.
Caligonus cuneatus Canestrini and Fanzago, 1877, Ist. Veneto di Sci. Let., ed Arti. Atti 4(5): 157.
Tenuipalpus cuneatus (Canestrini and Fanzago), Berlese, 1887, Acari, Myr. Scorp. Ital., fasc. 35, no. 1.
Tenuipalpus cuneatus (Canestrini and Fanzago), Geijkes, 1939, Mededeelingen van de Landbouwhoogeschool, Wageningen, Nederland, Deel 42, ver. 4: 26.

Female (Figs. 36, 37).—Mounted specimens broad, egglike, broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum not reaching past middle of femur I; palpal segment II without inner basal swelling. Rostral shield appears as figured, with a median pair of lobes of medium length and a pair of small lateral lobes; posterior of shield reticulate. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae short, lanceolate, serrate, the 7th and 8th and 9th and 10th marginal setae are paired. Dorsal hysterosomal setae short, lanceolate, apparently not serrate. Dorsal reticulate pattern somewhat irregular; on propodosoma lateral elements longer than wide and on the anterior portion where the pattern meets dorsally the elements are wider than long; on posterior portion of propodosoma the reticulate pattern does not appear to meet dorsally. On hysterosoma the reticulate pattern is more indefinite; on the dorsal surface the elements are broken and are wider than long; on the lateral margins just outside the dorsal setae the few reticulate elements are longer than wide. Entire venter covered with reticulate patern; reticulate elements of posterior ventral plate much wider than long; reticulate elements of anterior plate slightly wider than long; other reticulate elements except those on posterior center of propodosoma tend to be longer than wide. Posterior ventral hysterosomal setae short, no longer than the anterior setae. Tarsus II with a long rodlike sensory seta. Dorsal setae of femora I and II short, lanceolate serrate, about half as long as the width of the segment. Length of body 267 μ; including rostrum 325 μ; width 200 μ.

Male.—Not known.

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Deutonymph.—Not known.

Type host.—Leaves of hedge.

Type locality.—Italy.

The above redescription was made from two females deposited in the U. S. National Museum, collected in Portici, Italy and from the Berlese collection. These were identified by Berlese as this species.

BREVIPALPUS LEWISI McGregor

Plate IV, Figs. 38, 39, Plate V, Fig. 40

Tenuipalpus sp., Lewis, 1944, Calif. Citrograph 29 (4): 87.

Brevipalpus lewisi McGregor, 1949, Mem. So. Calif. Acad. Sci. 3 (2): 17-19, text fig. 6, pl. IV.

Female (Figs. 38, 39).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Mouth parts of normal size, not extending past middle of femur I; palpal segment II with slight inner basal swelling. Rostral shield with a pair of long median lobes, and a pair of large but smaller lateral lobes which are notched in some specimens. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae short, slightly lanceolate, serrate. The three pairs of dorsal hysterosomal setae slightly lanceolate, and possibly faintly serrate. Reticulate pattern on propodosoma not meeting dorsally, elements much longer than wide. Elements of reticulate pattern on hysterosoma also much longer than wide. Reticulate elements on ventral shields much wider than long; anterior to shields reticulate pattern faint towards center, possibly not meeting; rest of reticulate pattern with elements longer than wide. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II lanceolate, serrate, about half as long as width of segment. Length of body 246 μ; including rostrum 280 μ; width 153 μ.

Male.—Not known.

Deutonymph (Fig. 40).—Dorsal striations typical. Marginal setae 1, 5, and 6 short, lanceolate, serrate, 1 probably smaller than others; marginal setae 2, 3, 4, 7, 8, 9 and 10 large, lanceolate serrate, 2 and 4 of equal size and appear to be slightly smaller than 3, 7, 8, 9 and 10 which are of equal size. Dorsal hysterosomal setae short and simple.

Type host.—Lemons.

Type locality.—Porterville, California.

Type.—U. S. National Museum No. 1527.

The type specimens were collected by H. C. Lewis December 11, 1942. Redescribed from types.

BREVIPALPUS CARDINALIS (Banks)

Plate V, Figs. 41-45

Tenuipalpis cardinalis Banks, 1912, Proc. Ent. Soc. Wash. XIV: 96, 97, pl. I, fig. 8.

Brevipalpus cardinalis (Banks), McGregor, 1949, Mem. South. Calif. Acad. Sci. III (2): 15-17, text. fig. 5, pl. III.

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Female (Figs. 41, 42).—Body broadest at or slightly behind suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum long, reaching to or past distal end of femur I; palpal segment II without inner basal swelling. Rostral shield with two long median lobes and a pair of small simple lateral lobes as figured; posterior portion of shield with some sculpturing. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all setae long, stout, and strongly serrate. The three pairs of dorsal hysterosomal setae strongly serrate, almost as long as marginal setae. Propodosoma covered with reticulate pattern, the elements of which, in general, are about as long as wide. The dorsal hysterosomal reticulate pattern varies greatly as figured. Posterior ventral plate with reticulate pattern in which the elements are wider than long; anterior plate and region anterior to plate with pattern in which the elements are much wider than long. Reticulate elements laterad of ventral plates perhaps slightly longer than wide; other reticulate elements longer than wide. Coxae I and II and venter of propodosoma with few transverse striations; region laterad of coxae II appears free of any pattern. Posterior ventral hysterosomal setae reaching past suture between propodosoma and hysterosoma; anterior ventral hysterosomal setae almost as long as posterior pair. A single rodlike sensory seta on tarsus II. Dorsal setae of femora I and II strongly serrate, about as long as length of segment. Length of body 246 μ; including rostrum 280 μ; width 146 μ.

Male (Figs. 44, 45).—Body broadest at posterior margin of propodosoma; narrowing gradually to rear, no constriction at either suture. Rostrum of normal size, reaching only to middle of femur I; palpal segment II without inner basal swelling. Rostral shield short, with two median lobes and a pair of weak lateral lobes. Marginal setae as in female, long, strongly serrate; three pairs of setae on propodosoma and seven pairs on hysterosoma. Dorsal hysterosomal setae much shorter and smaller than marginal setae, serrate. Dorsal surface of body smooth and covered with many small tubercles; with eight pairs of pores as figured. Venter of mite appears to be smooth except for the striae behind coxae IV. Dorsal setae of femora I and II serrate, about as long as segment. Length of body 217 μ; including rostrum 233 μ; width 113 μ.

Deutonymph (Fig. 43).—The striate pattern is present but there is also a reticulate pattern on the propodosoma and posterior portion of the hysterosoma; that on the propodosoma does not meet dorsally while the hysterosomal pattern covers the entire posterior central portion of the mite. Marginal setae 1 to 7 long, serrate, 1, 5, 6 and 7 appear slightly longer than 2, 3 and 4; marginal setae 8, 9 and 10 short, broadly lanceolate, serrate, seta 8 shorter than 9 and 10.

Type host.—Ash.

Type locality.—Phoenix, Arizona.

Redescribed from specimens collected on ash at Bakersfield, California, September 11, 1944 by C. S. Morlan. Location of type not known.

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Brevipalpus essigi, new species
Plate V, Figs. 46-48

Female (Figs. 46, 47).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum longer than usual, reaching to distal end of femur I; palpal segment II without inner basal swelling. Rostral shield with two long median lobes and three pairs of small lateral lobes; with very few longitudinal markings. Propodosoma with three pairs of serrate marginal setae, the anterior pair the strongest. Hysterosoma with seven pairs of slightly serrate setae, all slightly shorter than the posterior pair on the propodosoma. Dorsal hysterosomal setae about as long as marginal setae but finer and probably not serrate. Reticulate pattern covers dorsal surface of mite; in general the reticulate elements on the propodosoma are about as long as wide, and those on the hysterosoma are slightly longer than wide. Reticulate pattern on posterior ventral plate with elements which are much wider than long; those on the anterior plate are about as wide as long. The reticulate elements of rest of venter, except those laterad of coxae II which are longer than wide, about as long as wide. Posterior ventral hysterosomal setae almost reaching suture between propodosoma and hysterosoma. Tarsus II with one rodlike sensory seta. Dorsal seta on femora I and II strongly serrate, reaching end of segment, that on femur I the larger. Length of body 280 μ; including rostrum 340 μ; width 166 μ.

Male.—Not known.

Deutonymph (Fig. 48).—Dorsal striations typical, as figured. Setae 1, 3 and 8 large, 1 being the largest, and 3 and 8 smaller; 2 and 4 smaller than 3 and of about equal size; 5, 6, 7, 9 and 10 of about same size, smaller than others; all setae serrate. Dorsal hysterosomal setae of equal size, simple, about as long as marginal setae 6 and 7.

Type host.—*Acuba* sp.

Type locality.—Berkeley, California.

Type.—U. S. National Museum No. 1819.

The type female and one paratype were collected on *Acuba* sp., Berkeley, California, January 28, 1938 by E. W. Baker. Two paratypes and five nymphs were collected on a vine, *Ficus* sp., at Berkeley, California, March 9, 1938 by E. W. Baker.

Brevipalpus sayedi, new species
Plate VI, Figs. 49, 50

Female (Figs. 49, 50).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging slightly posteriorly. Rostrum slightly longer than normal, reaching to distal end of femur I; palpal segment II long, without inner basal swelling. Rostral shield simple, with only a pair of median lobes; posterior of shield strongly sculptured. Propodosoma with three pairs of long simple marginal setae, the anterior pair the longest. Hysterosoma with seven pairs of shorter, simple setae; if these marginal setae are serrate they are only slightly so and cannot be seen in the prepara-

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tions. Dorsal hysterosomal setae simple, short. Dorsal reticulate pattern as figured; reticulate elements varying in length and width; reticulate pattern not well defined on anterior central portion of propodosoma; on hysterosoma reticulate pattern as figured. On venter of mite pattern tends to be of transverse striations on all portions except laterad of ventral plates and coxae II where the reticulate elements are longer than wide. Posterior ventral hysterosomal setae of normal length, reaching past suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory setae. Dorsal setae on femora I and II broadly lanceolate, serrate, longer than width of segment and reaching past distal tip of segment. Length of body 200 μ; including rostrum 240 μ; width 120 μ.

Male.—Not known.

Deutonymph—Not known.

Type host.—Hickory.

Type locality.—Monticello, Florida.

Type.—U. S. National Museum No. 1820.

The type female and five paratypes were collected on hickory, December 8, ----?, by J. B. Gill. Thirteen paratypes were collected on hickory bud, Gainesville, Florida, February 18, 1914 by ..... Scammell. Many overwintering females were collected on hickory buds at Beltsville, Maryland, April 10, 1947 by E. W. Baker.

BREVIPALPUS RUSSULUS (Boisduval)

Plate VI, Figs. 51-55

Acarus russulus Boisduval ,1866, Essai Entom. horticole, pp. 89, 90.
Tenuipalpus cactorum Oudemans, 1929, Ent. Ber. 7 (168): 483-484.
Brevipalpus russulus (Boisduval), Oudemans, 1938, Tyd. Ent. LXXXI, Verslag LXXIII.
Tenuipalpus cactorum Oudemans, Geijskes, 1939, Mededeelingen van de Landbouwhoogeschool Wageningen, Nederland, Deel 42, ver. 4: 24, 25, fig. 9.
Tenuipalpus russulus (Boisduval), Cooreman, 1947, Bull. & Annals Soc. Ent. Belgique, 83: 43.

Female (Figs. 51, 52).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Mouth parts of normal size, rostrum reaching slightly past middle of femur I; palpal segment II without inner basal swelling. Rostral shield with two long median lobes and two pairs of small lateral lobes. Propodosomal with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae not lanceolate but spinelike with few serrations. The three pairs of dorsal hysterosomal setae are of equal length, appear simple, and are about as long as the marginal setae. The reticulate pattern covers dorsum on the propodosoma; the elements, are, in general, longer than wide; on the hysterosoma the elements are perhaps longer than wide except between the dorsal setae where they are wider than long. The reticulate pattern on posterior ventral plate consists of elements wider than long; on the anterior plate the lateral elements are small, about as long as wide, while the central elements appear to be much wider than long. Likewise, the reticulate elements anterior to the ventral plates are wider than long and extend anterior to the posterior ventral hysterosomal

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setae. Laterad of the ventral plates the reticulate elements are longer than wide; laterad of coxae II reticulate elements about as long as wide. Coxae I with few transverse striae; coxae II with reticulate pattern on basal outer portion. Posterior ventral hysterosomal setae almost reach suture between propodosoma and hysterosoma. Tarsus II with a single terminal rodlike sensory seta of medium length. Dorsal setae on femora I and II spinelike, with few serrations, about half as long as segment is wide. Length of body 280 μ; including rostrum 327 μ; width 173 μ.

Male (Figs. 53, 54).—Broadest at suture between propodosoma and hysterosoma; constricted at hysterosomal suture; posterior of hysterosoma rounded. Rostrum reaching to middle of femur I; palpus without inner basal swelling. Rostral shield with two pairs of lobes of about equal length. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all setae lanceolate, serrate, those on propodosoma only slightly so while those on posterior of hysterosoma much more so. Dorsal reticulate pattern covering most of propodosoma and hysterosoma, the reticulate elements as a whole, perhaps longer than wide. Reticulate pattern on posterior venter of mite with elements longer than wide, not meeting in center. Few striations and reticulations on coxae I and II; reticulate elements laterad of coxae II slightly longer than wide. Dorsal setae of femora I and II slender, serrate, about half as long as segment is wide. Length of body 227 μ; including rostrum 267 μ; width 127 μ.

Deutonymph (Fig. 55).—Dorsal skin pattern normal as figured. Marginal setae 3, 7, 8, 9 and 10 of equal size, broadly squamiform with long serrations; marginal setae 1, 2, 4, 5 and 6 of equal size, small with few serrations, setae 1, 2 and 4 with lateral serrations and setae 5 and 6 merely split at tip. Dorsal hysterosomal setae of same size as the small marginal setae, the first two pairs are similar to marginal setae 1, 2 and 4 and the posterior pair is similar to marginal setae 5 and 6.

Type host.—Cactus.

Type locality.—Germany.

The female and nymph were redescribed and figured from material collected on *Lobivia rebutioides* from Peru, collected at Washington, D. C., June 23, 1936 by J. M. R. Adams. The male was redescribed from material collected on "cactus plants" from Germany at Washington, D. C., July 25, 1936 by H. Y. Gouldman. Material was also collected on *Echinocactus lafaldensis* from Argentina at Washington, D. C., November 23, 1936 by W. B. Woods. Geijskes (1939) lists it as feeding on cacti and succulents in Holland.

Brevipalpus lilium, new species

Plate VI, Figs. 56, 57; Plate VII, Figs. 58-60

Female (Figs. 56, 57).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, reaching slightly past middle of femur. Palpal segment II with perhaps a slight inner basal swelling. Rostral shield with a pair

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of long median lobes and a pair of short lateral lobes which may at times be slightly notched. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae short, narrowly lanceolate, serrate. Dorsal hysterosomal setae about same as marginal setae but do not appear to be serrate. Reticulate pattern covers propodosoma; reticulate elements longer than wide; elements of reticulate pattern on hysterosoma longer than wide except on dorsoposterior portion where they are wider than long. Elements of reticulate pattern on ventral plates much wider than long; those anterior to ventral plates slightly wider than long. Elsewhere reticulate elements longer than wide. Posterior ventral hysterosomal setae of normal length, reaching to suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II lanceolate, serrate, slightly longer than half the width of the segment. Length of body 286 μ; including rostrum 350 μ; width 200 μ.

Male (Figs. 58, 59).—Broadest at suture between propodosoma and hysterosoma; body narrowing to rear, not constricted at hysterosomal suture. Rostrum of normal size, not extending past middle of femur; palpal segment II without inner basal swelling. Rostral shield not distinctly visible, possibly as figured. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of setae; marginal setae of medium length, slightly lanceolate, serrate. Dorsal hysterosomal setae perhaps slightly lanceolate, not serrate. Reticulate pattern covers dorsum of mite; reticulate elements slightly longer than wide on propodosoma and distinctly so on hysterosoma. On venter of hysterosoma reticulate elements tend to be wider than long in center and longer than wide on lateral margins. Venter of propodosoma with many transverse striae as figured. Dorsal setae of femora I and II slightly lanceolate, serrate, not as long as width of segment. Length of body 213 μ; including rostrum 246 μ; width 133 μ.

Deutonymph (Fig. 60).—Dorsal skin pattern typical. Marginal setae 1, 2, 5 and 6 small, serrate, 2 perhaps slightly longer than the others; marginal setae 3, 4, 7, 8, 9 and 10 large, lanceolate, serrate. Dorsal hysterosomal setae short and simple.

Type host.—*Lilium regale*.

Type locality.—Mabton, Washington.

Type.—U. S. National Museum no. 1821.

The type female, thirty-two paratypes, one male and two nymphs were collected by F. P. McWhorter, September 26, 1938.

Brevipalpus linki, new species
Plate XIV, Figs. 125-127

Female (Figs. 125, 126).—Body broadest just behind suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly, but not strongly. Rostrum of normal size, not extending past middle of femur I; palpal segment II without inner basal swelling and with somewhat broader seta than normal. Rostral shield with a pair of long median

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lobes and a pair of lateral lobes, both pairs may or may not be slightly notched. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae short, broadly lanceolate, serrate. Dorsal hysterosomal setae small, slightly lanceolate. Reticulate elements of propodosoma about as long as wide except dorsally where the pattern is very irregular; reticulate elements of hysterosoma irregular, tending to be wider than long dorsally. Reticulate elements of ventral plates slightly wider than long; other ventral elements tend to be slightly longer than wide. Posterior ventral hysterosomal setae not reaching to suture between propodosoma and hysterosoma. Tarsus II with a single rodlike sensory seta. Dorsal setae of femora I and II short, broadly lanceolate; femur I with two prominent basal protuberances; femur II with one prominent protuberance. Length of body 226 μ; including rostrum 280 μ; width 167 μ.

Male.—Not known.

Deutonymph (Fig. 127).—Dorsal striations typical. Most marginal setae large, lanceolate, serrate; setae 1, 2, 3, 4, 5, 7, 8 and 10 large, lanceolate, serrate, of equal size; marginal setae 6 short, less than one-third as long as others, lanceolate, serrate; marginal seta 9 minute, rodlike. Dorsal hysterosomal setae short, simple.

Type host.—Live oak, on leaf.

Type locality.—Orlando, Florida.

Type.—U. S. National Museum No. 1822.

The type female, two paratype females and four nymphs were collected on live oak leaf at Orlando, Florida, January 30, 1948 by O. D. Link for whom the mite is named.

BREVIPALPUS OUDEMANSI (Geijskes)
Plate VII, Figs. 61, 62

Tenuipalpus oudemansi Geijskes, 1939, Mededeelingen van de Landbouwhoogeschool, Deel 42, ver. 4: 25, 26, fig. 7.

Figures 7, 8 and 9 of Geijskes should read as follows and not as printed in his paper: Fig. 7, *oudemansi;* Fig. 8, *phoenicis;* Fig. 9, *cactorum*.

Type host.—Apple.

Type locality.—Holland.

BREVIPALPUS PYRI Sayed
Plate VII, Figs. 63-66; Plate VIII, Fig. 67

Tenuipalpus oudemansi Geijskes, Sayed, 1942, Bull. Soc. Fouad 1er Ent. XXVI: 94-96, pls. I, II (misidentification).

Brevipalpus pyri Sayed, 1946, Bull. Soc. Fouad 1er Ent. XXX: 100, 102, 103.

Female (Figs. 63, 64).—Body rounded anteriorly and posteriorly; lateral margins almost parallel, as in *oudemansi* and *geisenheyeri*. Rostrum normal, not reaching much past middle of femur I; palpal segment II without inner basal swelling. Rostral shield simple, with a pair of median lobes only; shield covered with scalloplike reticulations. The three pairs of propodosomal marginal setae are long, serrate, the first pair longer than others; hysterosoma with seven pairs of marginal setae, about half as long as posterior pair of propodo-

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somal setae; there is an extra pair of such setae a short distance in from the first pair of hysterosomal marginal setae. The three pairs of dorsal hysterosomal setae simple, about as long as the marginal setae. Reticulate pattern covers entire dorsum, elements about as long as wide except on dorsocentral portion of hysterosoma where they are wider and long. Reticulate elements of ventral plates slightly wider than long; those anterior and laterad of plates about as long as wide. Venter of propodosoma with few transverse striations. Posterior ventral hysterosomal setae extend to suture between propodosoma and hysterosoma. Tarsus II with a single, long, slender rodlike sensory seta. Dorsal setae of femora I and II slightly lanceolate, serrate, longer than half the width of the segment. Length of body 280 μ; including rostrum 313 μ; width 173 μ.

Male (Figs. 65, 67).—Not seen, figures after Sayed, 1942.

Deutonymph (Fig. 66).—Dorsal striations simple, typical. Most marginal setae are missing on the only available specimen. However, marginal setae 2, 3 and 6 are large, long, serrate; marginal seta 7 short, apparently lanceolate and possibly serrate. Dorsal hysterosomal setae shorter than marginal set 7 and simple.

Type host.—Apples, pears, plums, apricots and others.

Type locality.—Egypt.

Mites in the U. S. National Museum have been collected as follows: on cherry buds, originating in Italy, New York, April 6, 1933 by Ralph Shemin, F. O. Dodd, et al.; on Sorbus apple leaf originating in Italy, at New York, January 18, 1932 by J. R. Garret and O. G. Fitzgerald; on apple scion, originating in Italy, at Washington, D. C., February 27, 1930 by H. Y. Gouldman; on apple originating in England, April 7, 1913 (no other data); or. *Malus* sp. originating in Algeria, at Washington, D. C., March 6 and 7, 1932 by L. L. Spessard and W. B. Wood; on walnut bark originating in Sicily, at Washington, D. C. (no other data); on Cotoneaster originating at Taunton, England at San Francisco, April 10, 1945 by R. L. Howard; and on *Salix discolor* originating in Denmark, at New York, April 5, 1946 by E. A. Prentiss.

Brevipalpus donnadieui (Oudemans), new combination

Plate VIII, Figs. 68-70

Tenuipalpus glaber Donnadieu, 1875, Recherches pour servir à l'histoire des Tetranyques, Lyon, pp. 114-115, pl. IV, figs. 31-42.

Tetranychus lineola Canestrini and Fanzago, 1876, Academia Scientifica Veneto. Trentino Istriana Atti 5, fasc. 1, p. 105.

Caligonus lineola Canestrini and Fanzago, 1877, Ist. Veneto di Sci. Let., ed Arti. Atti 4(5): 153, 154, pl. V, fig. 2.

Caligonus glaber Donnadieu, 1877, Ibid., 4(5): 154.

Tenuipalpus lineola Canestrini and Fanzago, Canestrini, 1890, Prosp. Acarof. Ital. IV: 453, 454.

Tenuipalpus lineola Canestrini and Fanzago, Berlese, 1893, Acari, Myr. Scorp. Ital. Prostigmata, p. 56.

Flexipalpus donnadieui Oudemans, 1938, Tijd. v. Ent. 81, verslag LXXIII.

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Tenuipalpus glaber Donnadieu, Geijskes, 1939, Mededeelingen van de Landbouwhoogeschool, Nederland, Deel 42, ver. 4: 26.

Canestrini, in 1890, placed the species *cuneatus* into synonymy with *lineola;* Berlese, 1893, placed *lineola* into synonymy with *glaber* and figured *cuneatus* as a distinct species. The figure of *lineola* as given by Canestrini in 1890 indicates that Berlese is correct. Oudemans (1938) states that Donnadieu identified his *glaber* with *Trombidium glabrum* Dugés which is actually a *Caligonus*, thus leaving Donnadieu's species without a name. Oudemans proposed the name *Flexipalpus donnadieui* for this species. *Flexipalpus* Scheuten, 1857 was believed by Oudemans to be identical with *Tenuipalpus* Donnadieu, but from the examination of the original figures illustrating the genus I am convinced that it is an eriophyid.

Type host.—*Rubus fructiosus* and *Rosa canina.*

Type locality.—France.

Geijskes, 1939, lists *Rubus fructicosus, R. idaeus,* and *Rosa rubiginosa* as hosts.

BREVIPALPUS GEISENHEYERI (Rübsaamen)

Plate VIII, Figs. 71, 72

Tenuipalpus geisenheyeri Rübsaamen, 1910, Zs, Wiss. Insektenbiol. 6: 127-189, fig. 2.

Type host.—*Cornus sanguinea* L.

Type locality.—Germany.

BREVIPALPUS OBOVATUS Donnadieu

Plate VIII, Figs. 73-75

Brevipalpus obovatus Donnadieu, 1875, Recherches pour servir à l'histoire des Tetranyques. Lyons. P. 116, pl. V. figs. 43-52.

The figures and description are not detailed enough to recognize the species.

Type host.—*Phytolacca* and *Primula veris.*

Type locality.—France.

BREVIPALPUS SPINOSUS (Donnadieu)

Plate IX, Figs. 76-77

Tenuipalpus spinosus Donnadieu, 1875, Recherches pour servir à l'histoire des Tetranyques. Lyon, p. 114, pl. III, figs. 20-30.

Type host.—*Viburnum tinus.*

Type locality.—France.

Brevipalpus yothersi, new species

Plate IX, Figs. 78-80

Female (Figs. 78, 79).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, extending slightly past middle of femur; palpal segment II without inner basal swelling. Rostral shield with a pair of long median lobes and a pair of lateral lobes, striate on posterior portion. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae of medium length, lanceolate, serrate. Dorsal hysterosomal setae slightly lanceolate, shorter than marginal setae. Reticulate elements longer

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than wide except on posterior dorsum of hysterosoma where they are wider than long; reticulate elements do not meet dorsally on propodosoma. Reticulate elements of ventral plates wider than long; elements anterior to ventral plates about as wide as long; other ventral elements tend to be longer than wide. Posterior ventral hysterosomal setae of normal length, reaching slightly past suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II broadly lanceolate, serrate, about half as long as segment is wide. Length of body 233 μ; including rostrum 280 μ; width 146 μ.

Male.—Not known.

Deutonymph (Fig. 80).—Dorsal striations typical. Marginal setae 1, 5 lanceolate, serrate, somewhat smaller than 2; marginal setae 2, 3, 4, 6, 7, 8 and 9 larger, lanceolate, serrate, of about equal size. Marginal seta 5 lanceolate, serrate, minute. Dorsal hysterosomal setae short, apparently serrate.

Type host.—Privet.

Type locality.—Orlando, Florida.

Type.—U. S. National Museum No. 1823.

The type female, twenty-nine paratypes and twenty-two nymphs were collected on privet by M. A. Yothers (collection date not known). Other specimens were also collected on privet, Orlando, Florida, November 2, 1913 by M. A. Yothers.

Brevipalpus mcbridei, new species
Plate IX, Figs. 81-83

Female (Figs. 81, 82).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, reaching almost to middle of femur I; palpal segment II with a very slight inner basal swelling. Rostral shield with a pair of long median lobes and apparently only one pair of small lateral lobes; central portion of shield with longitudinal striae. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; all marginal setae short, lanceolate, serrate. Dorsal hysterosomal setae short, lanceolate and apparently serrate. Reticulate pattern of propodosoma not meeting dorsally, composed of a few lateral elements which are longer than wide; pattern on hysterosoma consists of a few striae forming a dorsal pattern whose elements are wider than long. Elements of reticulate pattern on ventral plates and area anterior to plates wider than long; other reticulate elements tend to be longer than wide. Posterior ventral hysterosomal setae of normal length, reaching to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II strong, reaching almost to tip of segment, lanceolate, serrate. Length of body 226 μ; including rostrum 280 μ; width 146 μ.

Male.—Not known.

Deutonymph (Fig. 83).—Dorsal striations typical. Marginal setae 1 and 4 small, of equal size, lanceolate serrate, about half as long as 2 and 3; setae 2, 3, 7, 8 and 9 large, lanceolate, serrate, of about equal size; seta 5 tiny, lan-

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ceolate, serrate, about half as large as 6; seta 6 about half as large as 7 and slightly smaller than 4. Dorsal hysterosomal setae short, apparently serrate.

Type host.—English walnut.

Type locality.—Orlando, Florida.

Type.—U. S. National Museum No. 1824.

The type female, three paratypes and three nymphs were collected November 26, 1926 by O. C. McBride. Several hundred specimens were collected on citrus leaves at Orlando, Florida, July 14, 1948 by R. L. Miller. The nymphs showed some variation in setal pattern from those described from walnut in, at times, having setae 4, 5 and 6 small and of equal size. In a communication from Dr. Miller he states "this mite was from a nursery of Temple orange trees where it has been very abundant. The damage has been so severe enough on the leaves and some of the twigs so that the leaves have fallen off. The continued feeding of the mites causes a white corky layer to form on the surface of the leaf or green branch. A peculiar habit of this mite is that the eggs are deposited very abundantly around White Flies or Scale and the mites feed in these spots. This sometimes causes a yellow spot to develop that shows through on the top of the leaf. The mites are almost entirely on the under surface. It occurs on grapefruit and sour oranges in the same nursery."

Brevipalpus papayensis, new species
Plate X, Figs. 84-86

Tenuipalpus bioculatus McGregor, Jones, W. W. et al., 1941, Bul. Hawaii Agric. Exp. Sta. No. 87, p. 46 (misidentification).

Female (Figs. 84, 85).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, not reaching much past middle of femur I; palpal segment II with a sharp inner basal swelling. Rostral shield with a pair of long median lobes and a pair of small lateral lobes; shield with few central and posterior striae. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; marginal setae short, broadly lanceolate, serrate. Dorsal hysterosomal setae short, lanceolate and possibly serrate. Dorsal reticulate pattern varies from the normal in that on the propodosoma there are only a few longitudinal striae, not meeting dorsally; on the hysterosoma the striae form a reticulate pattern behind the posterior dorsal setae in which the elements are wider than long. Reticulate elements on ventral plates and area anterior to plates wider than long; laterad of plates elements longer than wide. Lateral areas of propodosoma with short longitudinal striae. Posterior ventral hysterosomal setae of normal length, reaching to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II short, lanceolate, serrate, about half as long as width of segment. Length of body 250 μ; including rostrum 270 μ; width 167 μ.

Male.—Not known.

Deutonymph (Fig. 86).—Dorsal striations typical. Marginal setae 1, 5

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and 6 small, serrate; marginal setae 2, 3, 4, 7, 8 and 9 large, lanceolate, serrate. Dorsal hysterosomal setae small, simple.

Type host.—Papaya.

Type locality.—Kailua, Oahu, Hawaii.

Type.—U. S. National Museum No. 1825.

The type female, twenty-eight paratypes and fifteen nymphs were collected March 26, 1941 by W. C. Look. Six females and a nymph of what appears to be this species were collected on camphor leaf, U. S. Botanic Garden, Washington, D. C., March 15, 1924; a female collected on lemon fruit, Santiago de Las Vegas, Cuba, May 25, 1917 closely resembles the type specimens and may be this species.

BREVIPALPUS PSEUDOCUNEATUS (Blanchard)
Plate X, Figs. 87-89

Tenuipalpus pseudocuneatus Blanchard, (1939) 1940, Revista de la Facultad de Agronomia de la Plata (tercera época) XXIV: 11-14.

Female (Figs. 87, 88).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, not reaching much past middle of femur I; palpal segment II with a sharp inner basal swelling. Rostral shield with a pair of long median lobes and a pair of small, apparently bifurcate lateral lobes; central portion of shield with few striae. Propodosoma with three pairs of marginal setae; hysterosoma with six pairs of marginal setae; all marginal setae short, broadly lanceolate, serrate. Dorsal hysterosomal setae not as long as marginal setae; hysterosoma with six pairs of marginal setae; all marginal setae short, broadly lanceolate, serrate. Dorsal hysterosomal setae not as long as marginal setae, slightly lanceolate, apparently simple. On propodosoma reticulate pattern covers dorsum but is rather vague in center; laterally the reticulate elements are longer than wide. On hysterosoma lateral elements are longer than wide and central elements are much wider than long. Reticulate elements of ventral plates and area anterior to ventral plates wider than long. Other elements tend to be longer than wide. Posterior ventral hysterosomal setae almost reach to suture between propodosoma and hysterosoma. Tarsus setae almost reach to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II short, about half as long as width of segment, broadly lanceolate, serrate. Length of body 246 μ; including rostrum 294 μ; width 153 μ.

Male.—Not known.

Deutonymph (Fig. 89).—Dorsal striations typical. Marginal setae 1, 2, 5 and 6 small, serrate, of equal size. Marginal setae 3, 4, 7, 8 and 9 large, lanceolate, serrate, of about equal size, although 4 may be slightly smaller than others. Dorsal hysterosomal setae short, apparently simple.

Type host.—Citrus.

Type localities.—Provinces of Entre Rios, Corrientes and Santa Fé, Argentina.

The above re-descriptions were made from specimens collected on oranges

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and lemons at Estacion Experimental Agricola, Tucuman, Province of Tucuman, Argentina, November 27, 1916 by E. W. Rust.

Brevipalpus longisetosus, new species
Plate X, Figs. 90-92

Female (Figs. 90, 91).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum short, not reaching past middle of femur I; palpal segment II with small inner basal swelling. Rostral shield with two long median lobes and two pairs of lateral lobes. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae lanceolate, serrate, those on propodosoma larger than those on hysterosoma. Dorsal hysterosomal setae lanceolate, serrate, about as long as marginal setae but narrower. Dorsal skin pattern composed of various longitudinal striations. Reticulate pattern on ventral plates and area directly anterior to plates composed of elements wider than long; other hysterosomal reticulate elements longer than wide. Reticulate pattern of coxae II with elements which are about as long as wide; laterad of coxae II the reticulate elements are longer than wide. Posterior ventral hysterosomal setae reaching to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II broadly lanceolate, serrate, about half as long as width of segment. Length of body 213 μ; including rostrum 247 μ; width 140 μ.

Male.—Not known.

Deutonymph (Fig. 92).—Dorsal striations typical of the genus. Marginal setae 1, 4, 5, 6, 7 and 9 simple and quite minute; setae 2, 3 and 8 very long, whiplike; seta 10 large, lanceolate, serrate.

Type host.—"Undetermined plant."

Type locality.—Yauco, Puerto Rico.

Type.—U. S. National Museum No. 1826.

The type female, five paratypes and seven nymphs were collected November 23, 1935 by L. C. Fife.

BREVIPALPUS CALIFORNICUS (Banks)
Plate XI, Figs. 93-95

Tenuipalpus californicus Banks, 1904, Jour. N. Y. Ent. Soc. 12: 55, pl. 2, fig. 2.
Tenuipalpus californicus Banks, 1907, Proc. U. S. N. Mus. 32: 599.
Brevipalpus californicus (Banks), McGregor, 1949, Mem. South. Calif. Acad. Sci. III (2): 11-13, text fig. 3, pl. I.

Female (Figs. 93, 94).—Body broadest at or just anterior to suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, extending to middle of femur I; palpal segment II with inner basal swelling. Rostral shield with two long median lobes and two pairs of short lateral lobes as figured. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all

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marginal setae short, lanceolate, serrate. Dorsal hysterosomal setae appear simple, about as long as marginal setae. Reticulate pattern on propodosoma with lateral elements slightly longer than wide, reticulation not meeting dorsally, but with few irregular lines as figured; hysterosoma with same pattern. Reticulate pattern of both ventral plates and area anterior to plates with elements which are wider than long; other ventral reticulate elements longer than wide. Coxae I and II with few transverse striations. Posterior ventral hysterosomal setae almost reaches suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae on femora I and II lanceolate, serrate, about half as long as segment is wide, that on femur I appears to be slightly longer and wider than on femur II. Length of body 240 μ; including rostrum 287 μ; width 156 μ.

Male.—Not known.

Deutonymph (Fig. 95).—Dorsal striations typical, as figured. Marginal setae subequal; setae 7 to 10 largest, lanceolate, serrate, of equal size; setae 1, 2, 4, 5 and 6 small, short, lanceolate, serrate; seta 3 about twice as large as 1, lanceolate, serrate.

Type host.—Orange peel.

Type locality.—Redlands, California.

Type.—U. S. National Museum No. 1827.

Redescribed from type material in the U. S. National Museum. Also examined were specimens collected on lemons, Corona, California, August 7, 1914, by ..... Foster; on orange, Redlands, California, August 15, 1903 by A. S. Pearse; on lemon fruits, East Redlands, California, January 5, 1944 by H. Lewis and E. A. McGregor; in lemon bud, Santa Paula, California, December 10, 1938 by W. E. Buckner. Specimens appearing to be this species were collected by R. P. Wilbur July 11, 1935 at Nogales, Arizona, on geraniums originating in Mexico.

BREVIPALPUS WOGLUMI McGregor

Plate XI, Figs. 96-98

Brevipalpus woglumi McGregor, 1949, Mem. So. Calif. Sci. 3 (2): 19-21, text. fig. 7, Pl. V.

Female (Figs. 96, 97).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal length, extending slightly past middle of femur I; palpal segment II with a slight inner basal swelling. Rostral shield with a pair of long median lobes and a pair of small lateral lobes; posterior and central portion of shield with few markings. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae short, slightly lanceolate, serrate. Dorsal hysterosomal setae short, slightly lanceolate, probably serrate. Reticulate pattern covers dorsum of mite, reticulate elements of propodosoma longer than wide, not definite in center; lateral elements on hysterosoma longer than wide; dorsal elements wider than long. Reticulate elements of ventral plates and area anterior to plates wider than

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long; rest of ventral elements tend to be longer than wide. Posterior ventral hysterosomal setae of normal length, reaching to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II lanceolate, serrate, about half as long as segment is wide. Length of body 233 μ; including rostrum 273 μ; width 140 μ.

Male.—Not known.

Deutonymph (Fig. 98).—Dorsal striations appear typical. Marginal setae 3, 4, 7, 8, 9 and 10 large, broadly lanceolate, serrate, of about equal size. Marginal setae 1 and 2 serrate, short; setae 5 and 6 serrate, smaller than 1 and 2. Dorsal hysterosomal setae short.

Type host.—Lemons.

Type locality.—West Hillsdale, Spring Valley, San Diego, California.

Type.—U. S. National Museum No. 1528.

Nine females and four nymphs, designated as type material, were collected October 27, 1944 by R. S. Woglum.

BREVIPALPUS AUSTRALIS (Tucker)

Plate XI, Figs. 99-103

Tenuipalpus obovatus of authors, *nec* Donnadieu (on tea in Ceylon).
Tenuipalpus australis Tucker, 1926, Union So. Africa Dept. Agr. Div. Ent. Mem. 5: 3, 4, pls. I, II.
Tenuipalpus vitis Womersley, 1940, Trans. Roy. Soc. South Austral. 64 (2): 241, 242, fig. 3; 1941, 65 (1): 42 (treated as synonym of *australis*).
Tenuipalpus australis Tucker, Womersley, 1941, Trans. Roy. Soc. South Austral. 65 (1): 42.
Tenuipalpus phoenicis Geijskes, Womersley, 1940. Ibid., 64 (2): 234.
Tenuipalpus californicus Banks, Womersley, 1940. Ibid., 64 (2): 239.
Tenuipalpus californicus Banks, Womersley, 1941. Ibid., 65 (1): 42, fig. c.
Tenuipalpus australis Tucker, Lawrence, 1943, Trans. Roy. Soc. South Africa, XXX (1): 39, 40.

Female (Figs. 99, 100, 102, 103).—Body broadest at propodosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, not reaching past middle of femur I; palpal segment II without inner basal swelling. Rostral shield with two long inner lobes and two pairs of small lateral lobes which may or may not vary as figured. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae short, slightly lanceolate with few serrations. The three pairs of dorsal hysterosomal setae short, of equal size. Propodosoma covered with a reticulate pattern in which the elements are about as long as wide; hysterosoma covered with a reticulate pattern in which the marginal elements are longer than wide, while in the region between the dorsal setae the pattern is quite irregular, not forming complete cells as elsewhere. Reticulate pattern of ventral plates consists of elements which are wider than long. Reticulate elements anterior to ventral plate wider than long. Elsewhere ventral reticulate elements tend to be longer than wide. Coxae I and II with transverse striae. Posterior ventral hysterosomal setae reaching to suture between propodosoma and hysterosoma. Tarsus II with two short rodlike sensory setae (fig. 102). Dorsal setae of femora I and II short, lanceolate, serrate, about half as long as seg-

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ment is wide. Length of body 240 μ; including rostrum 286 μ; width 147 μ.

Male.—Not known.

Deutonymph (Fig. 101).—Dorsal skin pattern of normal striations as figured. Marginal setae 2, 3, 4, 7, 8, 9 and 10 of medium size, lanceolate, serrate, of approximately equal size; setae 1, 5 and 6 not half as large as others, lanceolate, serrate, of approximately equal size; dorsal hysterosomal setae short, apparently simple.

Type host.—Citrus fruits.

Type locality.—South Africa and Southern Rhodesia.

The above redescription was made from two females and a nymph collected on oranges at Womberal, N. S. W., Australia, April 20 and 30, 1931 by "T. MC.". Also examined and determined to be this species are specimens collected on orange, South Africa, October 28, 1926, by J. C. Faure; on grapefruit originating in Algeria and intercepted at Baltimore, Maryland, March 16, 1943 by L. L. Spessard; on gardenia leaf originating in Mexico and intercepted at Brownsville, Texas, December 14, 1945, by R. E. Burnett.

Specimens of *Brevipalpus* from tea in Ceylon sent in by C. D. Gadd who stated that they were the mites which were known as *Tenuipalpus obovatus* Donnadieu in that area appear to be *B. australis* (Tucker). The adult females appear to be identical; the protonymphs are similar although there is a tendency for seta 1 to be larger in the tea form; no deutonymphs of the citrus form were available for study but in those from tea seta 1 is much larger than setae 5 and 6 but still smaller than 2.

Brevipalpus confusus, new species
Plate XII, Figs. 104-108

Female (Figs. 104, 105).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma margins converging to broadly rounded rear. Rostrum of normal size, not reaching past middle of femur I; palpal segment II without inner basal swelling. Rostral shield with three pairs of lobes, the inner pair only slightly longer than the others. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae, short, slightly lanceolate, with few serrations. The three pairs of dorsal hysterosomal setae short, of equal size, slightly lanceolate. Propodosoma covered with a reticulate pattern in which the elements tend to be slightly longer than wide; hysterosoma covered with a reticulate pattern in which the elements tend to be longer than wide. Reticulate elements of ventral plates wider than long; elements anterior to ventral plate wider than long; other elements tend to be longer than wide or of about equal dimensions. Coxae I and II with few transverse striae. Posterior ventral hysterosomal setae almost reach suture between propodosoma and hysterosoma. Tarsus II with two short rodlike sensory setae. Dorsal setae of femora I and II lanceolate, serrate, about half as long as width of segment. Length of body 253 μ; including rostrum 280 μ; width 153 μ.

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Male (Figs. 107, 108).—Broadest at propodosoma; hysterosomal margins converging to rear, not, or only slightly constricted at hysterosomal suture. Rostrum reaching to middle of femur I; palpal segment II without inner basal swelling. Rostral shield with three pairs of lobes, the inner pair slightly longer than the other two. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae lanceolate, serrate; dorsal hysterosoma setae short, slightly lanceolate. Dorsal reticulate pattern covering propodosoma and hysterosoma; reticulate elements on propodosoma and anterior portion of hysterosoma as a whole about as long as wide while those on posterior portion of hysterosoma longer than wide. Reticulate pattern on posterior venter of mite with elements about as long as wide; elements behind posterior ventral hysterosoma setae wider than long; other elements tend to be longer than wide. Dorsal setae of femora I and II lanceolate, serrate, about as long as width of segment. Length of body 233 μ; including rostrum 286 μ; width 140 μ.

Deutonymph (Fig. 106).—Dorsal skin pattern normal, as figured. Marginal setae 3, 4, 7, 8, 9 and 10 large of equal size, lanceolate, serrate; setae 1 and 2 short, lanceolate, serrate; setae 5 and 6 smaller than 1 and 2 and lanceolate; dorsal hysterosomal setae similar to marginal setae 5 and 6.

Type host.—Orchids.

Type locality.—College Park, Maryland.

Type.—U. S. National Museum No. 1828.

Described from the type female, seventy-nine paratype females, two males and four nymphs collected on orchids, University of Maryland Greenhouse, College Park, Maryland by E. Haviland March 28, 1947.

Brevipalpus trinidadensis, new species

Plate XII, Figs. 109-111

Female (Figs. 109, 110).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum of normal size, not reaching past middle of femur I; palpal segment II with slight inner basal swelling. Rostral shield simple, with a pair of long median lobes and a pair of small lateral lobes; shield sculptured on posterior portion. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae short, slightly lanceolate and appear to be without serrations. Dorsal hysterosomal setae short, simple. Reticulate pattern covers entire dorsum of propodosoma; reticulate elements perhaps slightly longer than wide. Elements of reticulate pattern on hysterosoma longer than wide except on posterior dorsal portion where they are wider than long. Reticulate elements of ventral plates wider than long; reticulate elements just anterior to plates slightly wider than long; other ventral reticulate elements longer than wide. Posterior ventral hysterosomal setae of normal length, reaching to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae of femora I and II lanceolate, serrate, about half as long as the width of the segment. Length of body 213

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μ; including rostrum 267 μ; width 133 μ.

Male.—Not known.

Deutonymph (Fig. 111).—Dorsal striate pattern typical. Marginal setae 1, 2, 3, 4, 8 and 10 lanceolate, serrate, 1 only slightly so and smaller than others; 2, 3, and 4 slightly larger than 1 but about half the size of 8 and 10; marginal setae 5, 6 and 7 and dorsal hysterosomal setae short, simple and of about same size. This is probably a protonymph rather than a deutonymph.

Type host.—Lantana.

Type locality.—St. Augustine, Trinidad.

Type.—U. S. National Museum No. 1829.

The type female, two paratypes and one nymph were collected May 28, 1937 by R. G. Fennah.

BREVIPALPUS GREWIAE (Rübsaamen)

Plate XII, Fig. 112

Pediculoides grewiae Rübsaamen, 1899, Ent. Nachr. 25 (16): 255-257, figs. 2, 3.
Tenuipalpus grewiae (Rübsaamen), Oudemans, 1938, Tijds. v. Ent. 81, Verslag LXXIII, LXXIX.

The form described is that of a male.

Type host.—*Grewia microcus* L., in galls.

Type locality.—India.

Brevipalpus browningi, new species

Plate XIII, Figs. 113-116

Tenuipalpus obovatus Donnadieu, Sayed, 1942, Bull. Soc. Fouad Ier Ent. XXVI: 97, 98, pls. VI, VII; 1946, idem. XXX: 103, (misidentification).

Female (Figs. 113-114).—Body broadest at suture between propodosoma and hysterosoma; hysterosoma with lateral margins converging posteriorly. Rostrum not reaching past middle of femur I; palpal segment II with a small inner basal swelling. Rostral shield with two long median lobes and two pairs of small lateral lobes. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; marginal setae small, lanceolate, serrate. Dorsal hysterosomal setae small, about as long as marginal setae. Reticulate pattern covers dorsal surface of body; on propodosoma the reticulate elements are, in general, slightly longer than wide; on the hysterosoma the lateral elements are longer than wide and dorsally they lengthen considerably. Posterior ventral plate reticulate elements much wider than long; anterior plate and area anterior to it with elements slightly wider than long; coxae I and II with a few transverse striae; reticulate elements laterad of coxae II and laterad of ventral plates slightly longer than wide. Posterior ventral hysterosomal setae reach to suture between propodosoma and hysterosoma. Tarsus II with two rodlike sensory setae. Dorsal setae on femora I and II lanceolate, serrate, about half as long as width of segment. Length of body 246 μ; including rostrum 286 μ; width 148 μ.

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Male (Fig. 116).—Not seen, figure from Sayed 1942.

Deutonymph (Fig. 115).—Dorsal skin striations typical. Marginal setae 1, 3, 4, 7, 8, 9 and 10 long, lanceolate, serrate, of about equal size; seta 2 slightly shorter than 1 and 3; setae 5 and 6 about a third shorter than 7 to 10, 6 being slightly shorter than 5. Anterior pair of dorsal hysterosomal setae appears larger than others, slightly serrate; other two pairs appear to be simple.

Type host.—Citrus.

Type locality.—Gaza, Palestine.

Type.—British Museum; seven paratypes in the British Museum and four paratypes in the U. S. National Museum. (U. S. National Museum No. 1830). The type female and eleven paratypes collected on citrus branches and leaves, Beit-Hanum (Gaza), Palestine, April 2, 1946 by P. Jolles and were received for study from E. Browning of the British Museum. Males, females and nymphs collected in Egypt on Citrus, guava, plums and apricots were kindly sent to the U. S. National Museum by Dr. Taher Sayed; a single nymph was collected on grapefruit, originating in Palestine, at New York by R. W. Woodbury, January 5, 1936.

Brevipalpus pini, new species

Plate XIII, Figs. 117-119

Female.—Not known.

Male (Figs. 117, 118).—Body broadest at propodosoma; constricted at hysterosomal suture behind coxae IV. Rostrum of normal size, extending to middle or only slightly beyond middle of femur I; palpal segment II broad, narrowing basally. Rostral shield short, median lobes no longer than lateral lobes; the shape of the lobes is variable but is more or less as figured. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs; all marginal setae of medium length, lanceolate, serrate. Dorsal hysterosomal setae serrate, the anterior and posterior pairs longer than the middle pair. Dorsal reticulate pattern as figured, not meeting dorsally, elements longer than wide on propodosoma and posterior portion of hysterosoma, variable on anterior portion of hysterosoma. Venter of mite with only a few striae as figured. Dorsal setae of femora I and II lanceolate, serrate, about half as long as the width of the segment. Length of body about 246 μ; including rostrum and genital apparatus 307 μ; width 150 μ.

Deutonymph (Fig. 119).—Dorsal striations typical. Marginal setae short, small, of about equal length; all setae except seta 6 lanceolate, serrate; seta 6 lanceolate, smooth. Anterior pair of dorsal hysterosomal setae about as long as marginal setae, lanceolate, serrate; the two posterior pairs of setae appear to be slightly lanceolate and smooth as in marginal seta 6.

Type host.—Monterey Pine.

Type habitat.—Glendale, California.

Type.—U. S. National Museum No. 1831.

The male type, one male paratype and a nymph were collected by V. E. Williams in April, 1932.

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BREVIPALPUS NATALENSIS (Lawrence)
Plate XIV, Figs. 120, 121

Tenuipalpus natalensis Lawrence, 1943, Trans. Royal Soc. South Africa XXX (1): 45-47, fig. 6.

Lawrence figures only the male. The dorsal reticulations are not shown but he states: "The body, especially in its anterior two-thirds, entirely covered with a network sculpture consisting of small, more or less quadriform segments; this sculpture absent on the narrow transverse band in the region of the constriction posterior to leg IV."

Type host.—*Halleria lucida* L.

Type locality.—Karkloof, near Pietermaritzburg, South Africa.

BREVIPALPUS SALVIAE McGregor
Plate XIV, Figs. 122-124

Brevipalpus salviae McGregor, 1949, Mem. So. Calif. Sci. 3 (2): 21-23, Pl. VI.

Female.—The only female available for study was one within the last nymphal skin, and the characters of the venter were indistinct. The following characters could be seen. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all marginal setae long, large, serrate. Dorsal hysterosomal setae large, serrate, probably not as long as marginal setae. Entire dorsum covered with a reticulate pattern whose elements tend to be longer than wide. Tarsus II with one rodlike sensory seta.

Male (Figs. 122, 123).—Body not constricted at hysterosomal suture. Rostrum long, extending past tip of femur I. Rostral shield with a pair of long median lobes and a pair of short lateral lobes; central portion of shield striate and posterior portion reticulate. Propodosoma with three pairs of marginal setae; hysterosoma with seven pairs of marginal setae; all but posterior pair of setae quite long, serrate. Dorsal hysterosomal setae as long as marginal setae, serrate. Reticulate pattern covers most of dorsum of mite; elements on propodosoma tend to be slightly longer than wide; those on anterior portion of hysterosoma wider than long; those on posterior portion of hysterosoma much longer than wide. Posterior venter of hysterosoma covered with reticulate pattern in which the elements are longer than wide. Rest of venter apparently without striae or reticulate pattern. Dorsal setae of femora I and II longer than segment is wide, strongly serrate. Length of body 190μ; including rostrum 267 μ; width 120 μ.

Deutonymph (Fig. 124).—Dorsal skin pattern not seen since this description is based on a specimen within which the adult female has formed. All marginal setae strongly serrate, quite long, 9 and 10 not as long as others. Dorsal hysterosomal setae as long as marginal setae, serrate.

Type host.—Salvia sp.

Type locality.—Santa Paula, California.

Type.—U. S. National Museum No. 1529.

The above redescription is based on type material collected July 27, 1937 by "Citrus Experiment Station workers."

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EXPLANATION OF PLATES

PLATE *I.*—*Brevipalpus edwinae,* new species, Figs. 1-5.—1, dorsal view of female; 2, ventral view of female; 3, dorsal view of male; 4, ventral view of male; 5, tarsus II of female.

Brevipalpus mcgregori, new species, Figs. 6-8.—6, dorsal view of female; 7, ventral view of female; 8, dorsal view of nymph.

Brevipalpus chilensis, new species, Figs. 9-10.—9, dorsal view of female; 10, ventral view of female.

PLATE II.—*Brevipalpus inornatus* (Banks), Figs. 11-15.—11, dorsal view of female; 12, ventral view of female; 13, dorsal view of male; 14, ventral view of male; 15, dorsal view of nymph.

Brevipalpus phoenicis (Geijskes) (after Geijskes 1939), Figs. 16-17.—16, ventral view of female; 17, dorsal view of female.

Brevipalpus pereger Donnadieu (after Donnadieu 1875), Figs. 18-19.—18, leg. I; 19, setae.

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Brevipalpus pulcher (Canestrini & Fanzago) (after Canestrini 1890), Fig. 20.—ventral view of male.

PLATE III.—*Brevipalpus oleae,* new species, Figs. 21-23.—21, dorsal view of female; 22, ventral view of female; 23, dorsal view of nymph.

Brevipalpus oncidii, new species, Figs. 24-30.—24, dorsal view of female; 25, ventral view of female; 26, ventral view of male; 27, dorsal view of male; 28, dorsal view of nymph; 29, marginal seta, female; 30, marginal setae, male.

PLATE IV.—*Brevipalpus garmani,* new species, Figs. 31-35.—31, dorsal view of female; 32, ventral view of female; 33, ventral view of male; 34, dorsal view of male; 35, dorsal view of nymph.

Brevipalpus cuneatus (Canestrini & Fanzago), Figs. 36-37.—36, dorsal view of female; 37, ventral view of female.

Brevipalpus lewisi McGregor, Figs. 38-39.—38, dorsal view of female; 39, ventral view of female.

PLATE V.—*Brevipalpus lewisi* McGregor, Fig. 40.—dorsal view of nymph.

Brevipalpus cardinalis (Banks), Figs. 41-45.—41, dorsal view of female; 42, ventral view of female; 43, dorsal view of nymph; 44, dorsal view of male; 45, ventral view of male.

Brevipalpus essigi, new species, Figs. 46-48.—46, dorsal view of female; 47, ventral view of female; 48, dorsal view of nymph.

PLATE VI.—*Brevipalpus sayedi,* new species, Figs. 49-50.—49, dorsal view of female; 50, ventral view of female.

Brevipalpus russulus (Boisduval), Figs. 51-55.—51, dorsal view of female; 52, ventral view of female; 53, dorsal view of male; 54, ventral view of male; 55, dorsal view of nymph.

Brevipalpus lilium, new species, Figs. 56-57.—56, ventral view of female; 57, dorsal view of female.

PLATE VII.—*Brevipalpus lilium,* new species, Figs. 58-60.—58, dorsal view of male; 59, ventral view of male; 60, dorsal view of nymph.

Brevipalpus oudemansi (Geijskes) (after Geijskes 1939), Figs. 61-62.—61, dorsal view of female; 62, ventral view of female.

Brevipalpus pyri Sayed, Figs. 63-66.—63, dorsal view of female; 64, ventral view of female; 65, dorsal view of male (after Sayed 1942); 66, dorsal view of nymph, some setae missing.

PLATE VIII.—*Brevipalpus pyri* Sayed, Fig. 67.—ventral view of male (after Sayed 1942).

Brevipalpus donnadieui (Oudemans), Figs. 68-70.—68, genital plate region, female (after Canestrini 1890); 69, ventral view of female (after Donnadieu 1875); 70, dorsal view of female (after Donnadieu 1875).

Brevipalpus geisenheyeri (Rübsaamen) (after Rübsaamen 1910), Figs. 71-72.—71, dorsal view of female; 72, ventral view of female.

Brevipalpus obovatus Donnadieu (after Donnadieu 1875), Figs. 73-75.—73, dorsal view of male; 74, dorsal view of male; 75, larva.

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PLATE IX.—*Brevipalpus spinosus* (Donnadieu) (after Donnadieu 1875), Figs. 76-77. —76, view showing setae and some internal organs; 77, dorsal view of female.

Brevipalpus yothersi, new species, Figs. 78-80.—78, dorsal view of female; 79, ventral view of female; 80, dorsal view of nymph.

Brevipalpus mcbridei, new species, Figs. 81-83.—81, dorsal view of female; 82, ventral view of female; 83, dorsal view of nymph.

PLATE X.—*Brevipalpus papayensis,* new species, Figs. 84-86.—84, dorsal view of female; 85, ventral view of female; 86, dorsal view of nymph.

Brevipalpus pseudocuneatus (Blanchard), Figs. 87-89.—87, dorsal view of female; 88, ventral view of female; 89, dorsal view of nymph.

Brevipalpus longisetosus, new species, Figs. 90-92.—90, dorsal view of female; 91, ventral view of female; 92, dorsal view of nymph.

PLATE XI.—*Brevipalpus californicus* (Banks), Figs. 93-95.—93, dorsal view of female; 94, ventral view of female; 95, dorsal view of nymph.

Brevipalpus woglumi McGregor, Figs. 96-98.—96, dorsal view of female; 97, ventral view of female; 98, dorsal view of nymph.

Brevipalpus australis (Tucker), Figs. 99-103.—99, dorsal view of female; 100, ventral view of female; 101, dorsal view of nymph; 102, Tarsus II of female; 103, tarsal claw.

PLATE XII.—*Brevipalpus confusus,* new species, Figs. 104-108.—104, dorsal view of female; 105, ventral view of female; 106, dorsal view of nymph; 107, dorsal view of male; 108, ventral view of male.

Brevipalpus trinidadensis, new species, Figs. 109-111.—109, dorsal view of female; 110, ventral view of female; 111, dorsal view of nymph.

Brevipalpus grewiae (Rübsaamen) (after Rübsaamen 1899), Fig. 112.—dorsal view of male.

PLATE XIII.—*Brevipalpus browningi,* new species, Figs. 113-116.—113, dorsal view of female; 114, ventral view of female; 115, dorsal view of nymph; 116, ventral view of male (after Sayed 1942).

Brevipalpus pini, new species, Figs. 117-119.—117, ventral view of male; 118, dorsal view of male; 119, dorsal view of nymph.

PLATE XIV.—*Brevipalpus natalensis* (Lawrence) (after Lawrence 1943), Figs. 120-121.—120, dorsal view of male; 121, ventral view of male.

Brevipalpus salviae McGregor, Figs. 122-124.—122, dorsal view of male; 123, ventral view of male; 124, dorsal view of nymph.

Brevipalpus linki, new species, Figs. 125-127.—125, dorsal view of female; 126, ventral view of female; 127, dorsal view of nymph.

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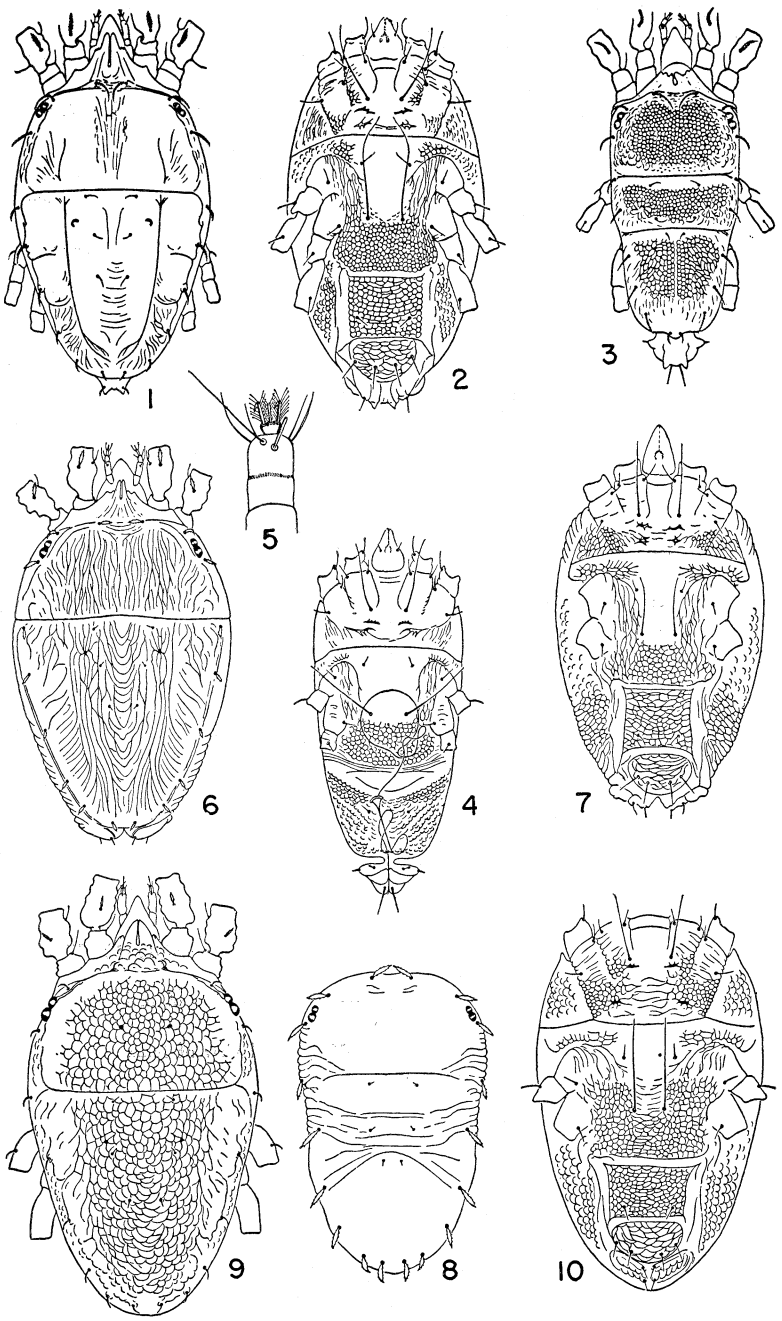

PLATE I

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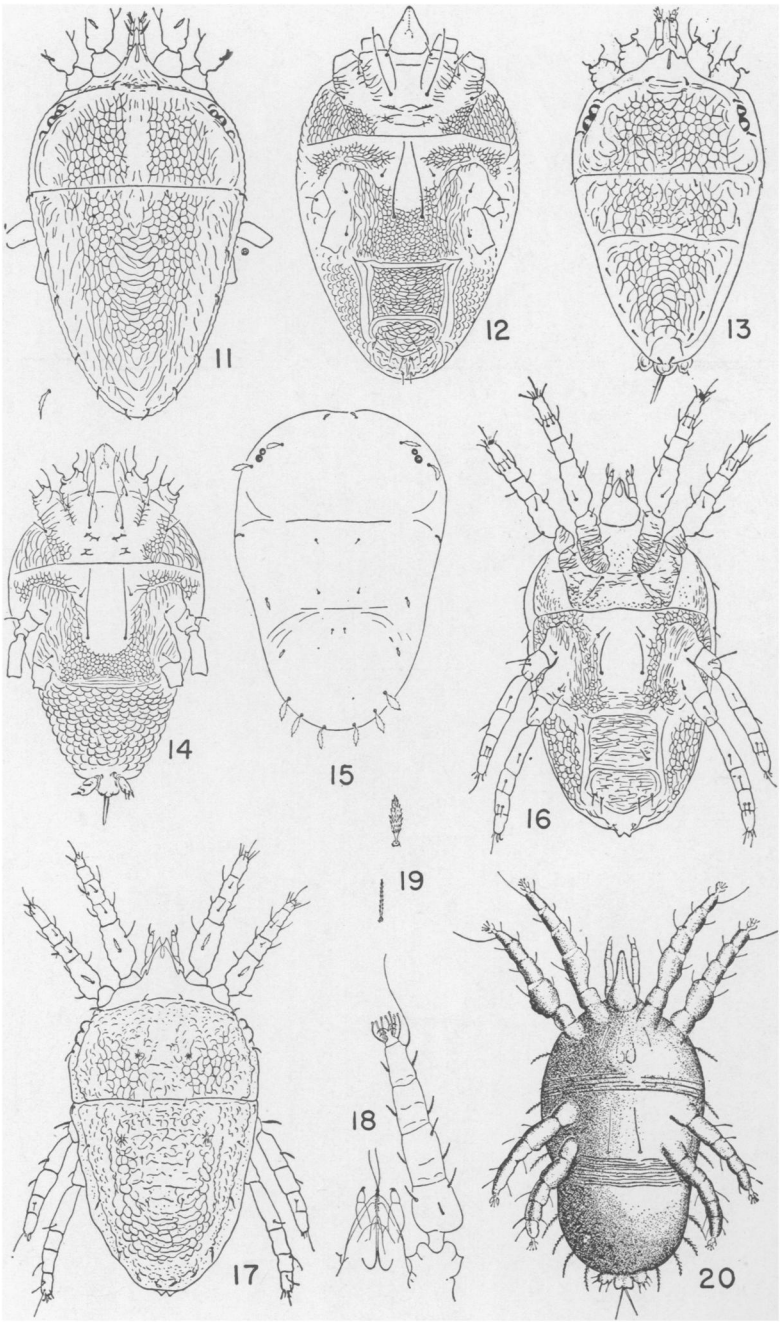

PLATE II

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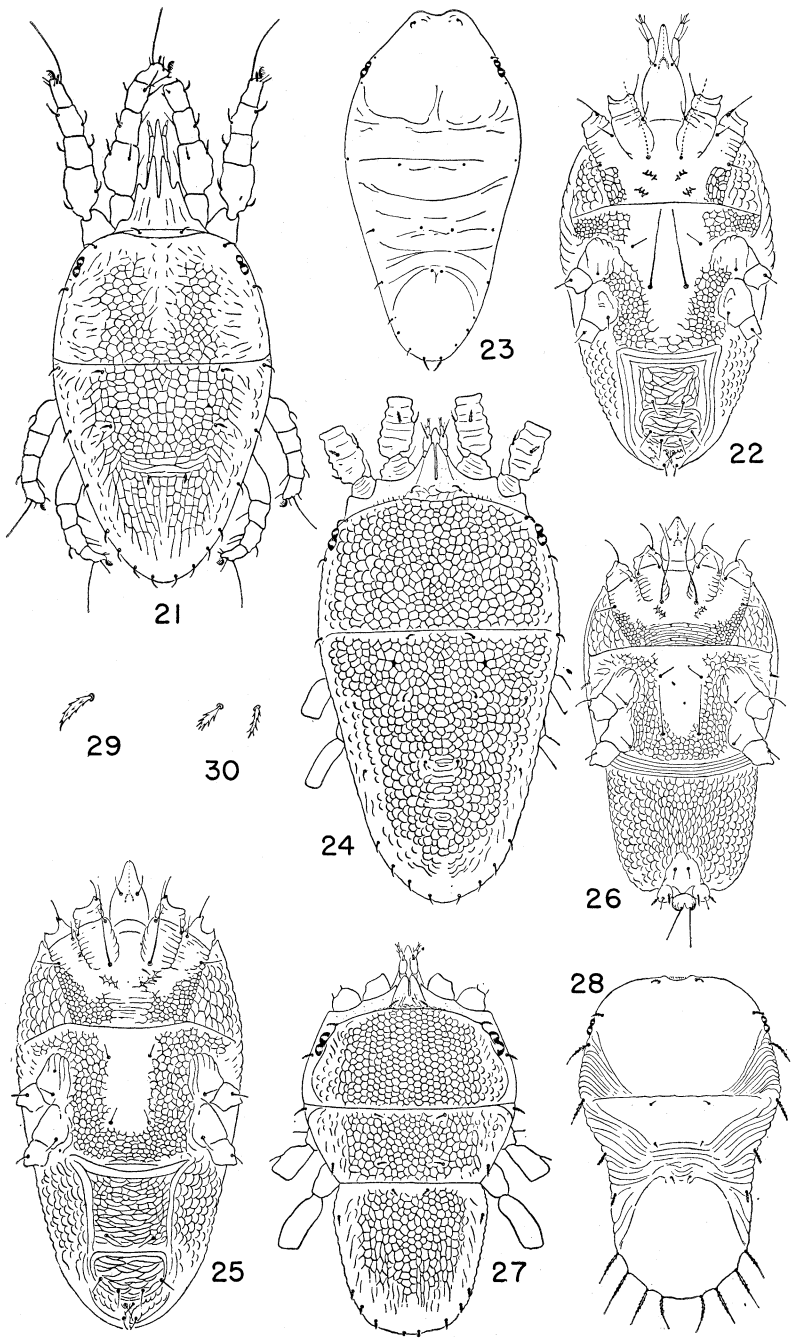

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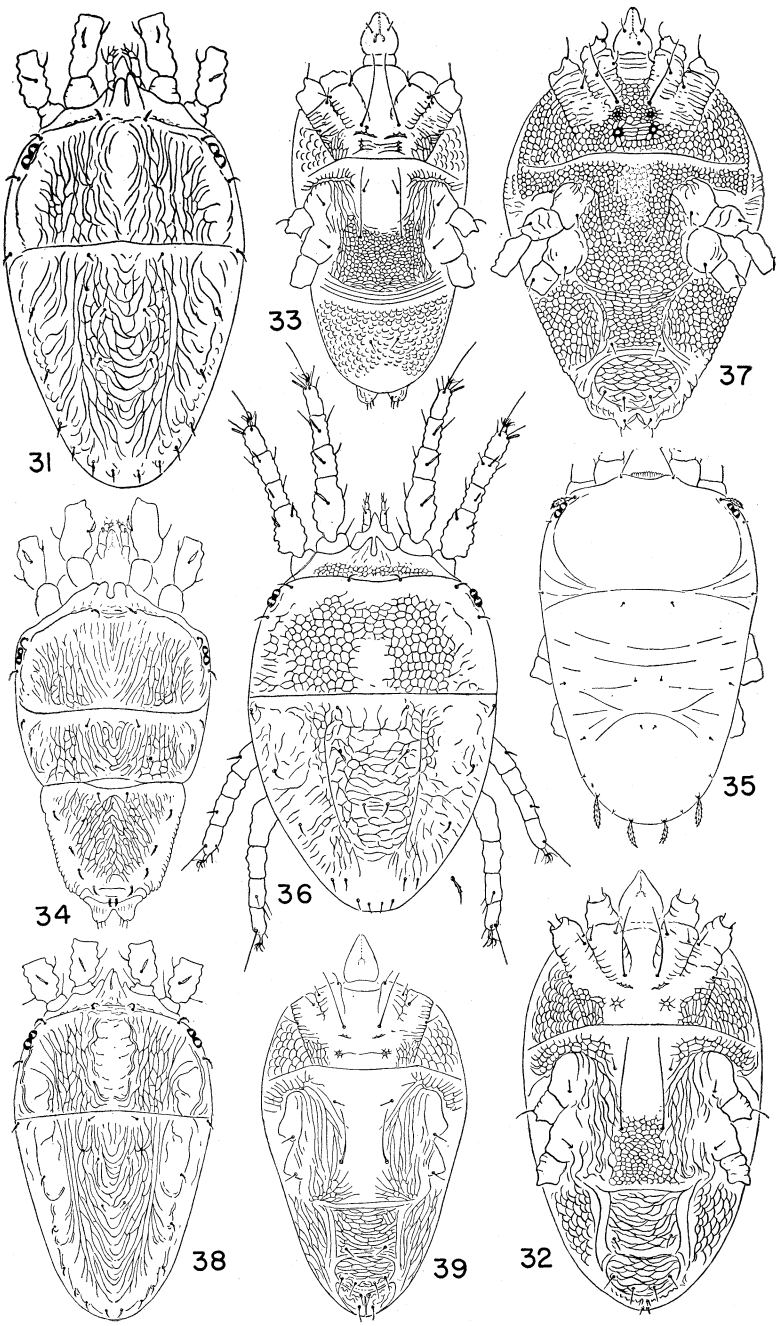

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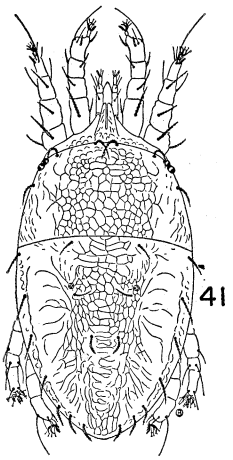

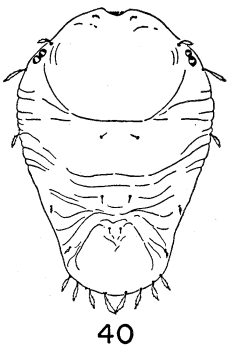

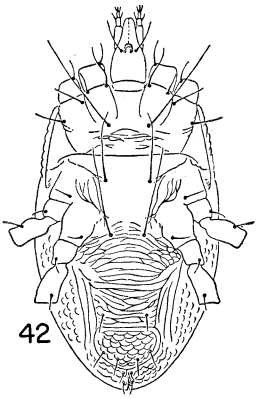

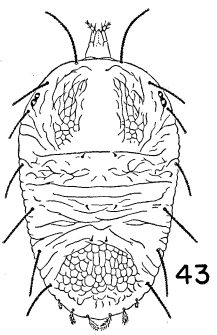

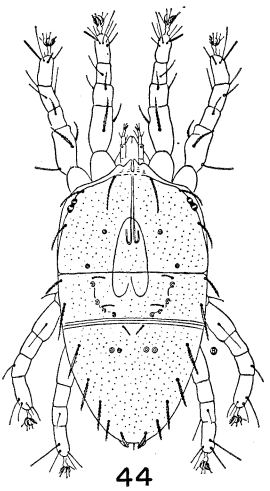

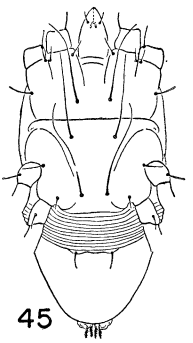

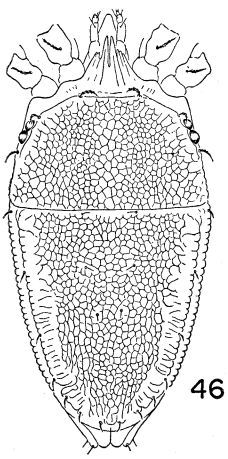

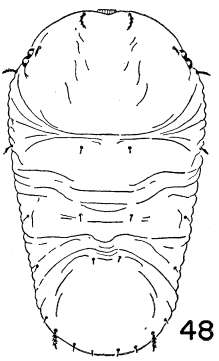

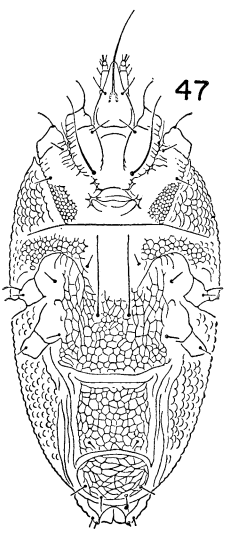

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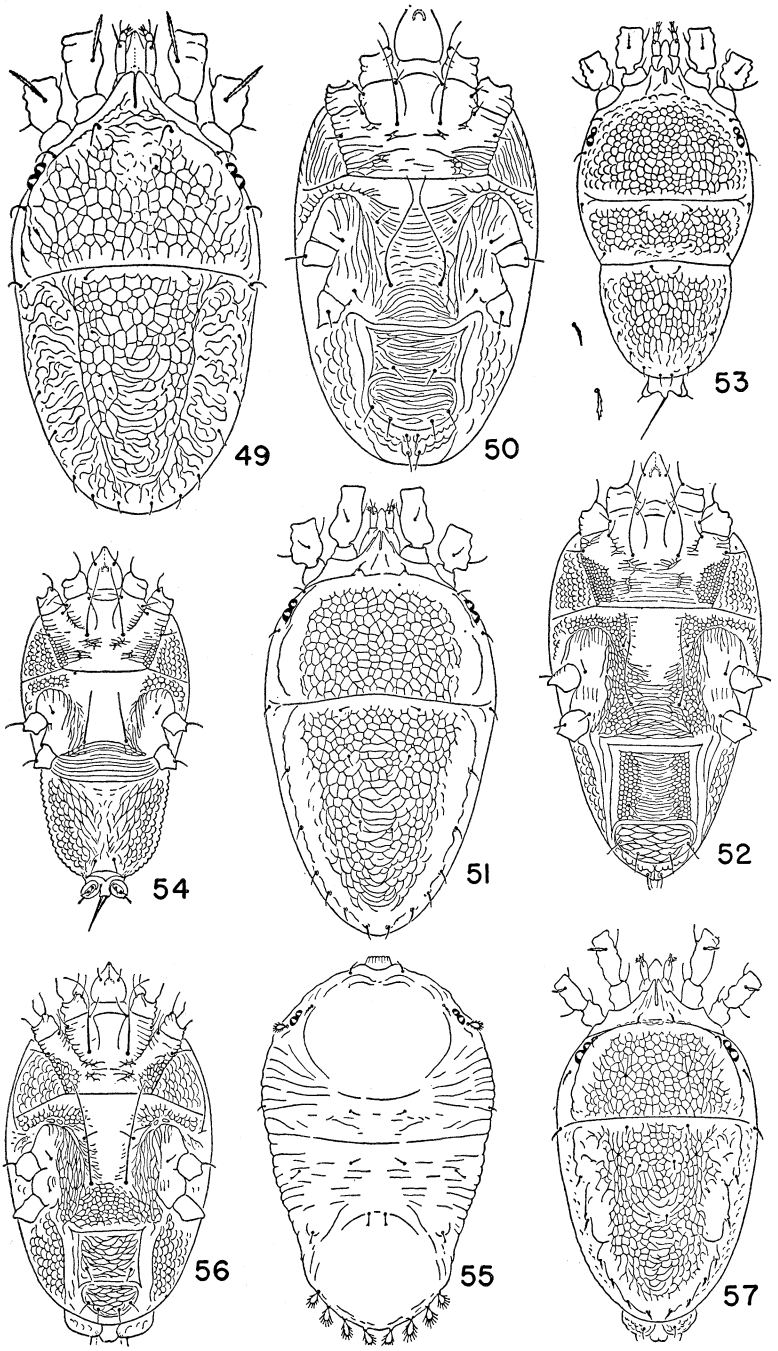

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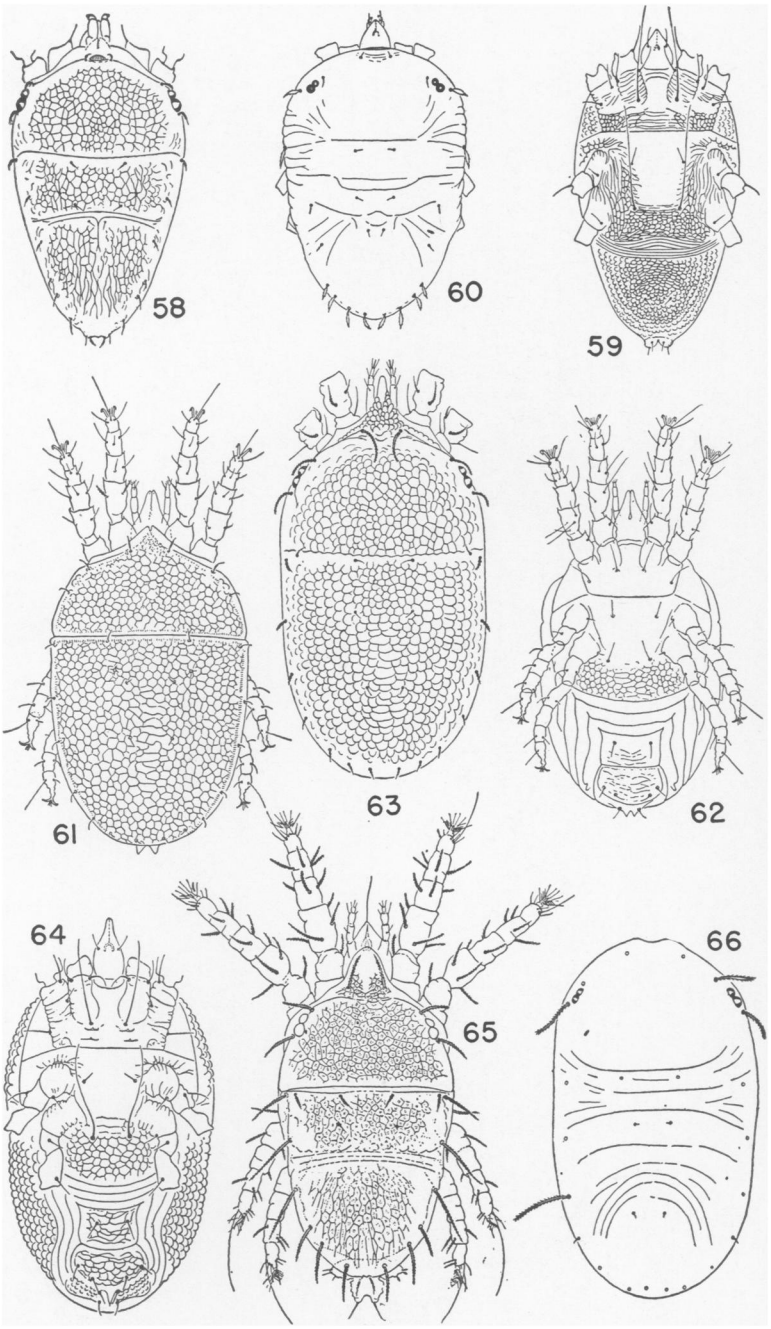

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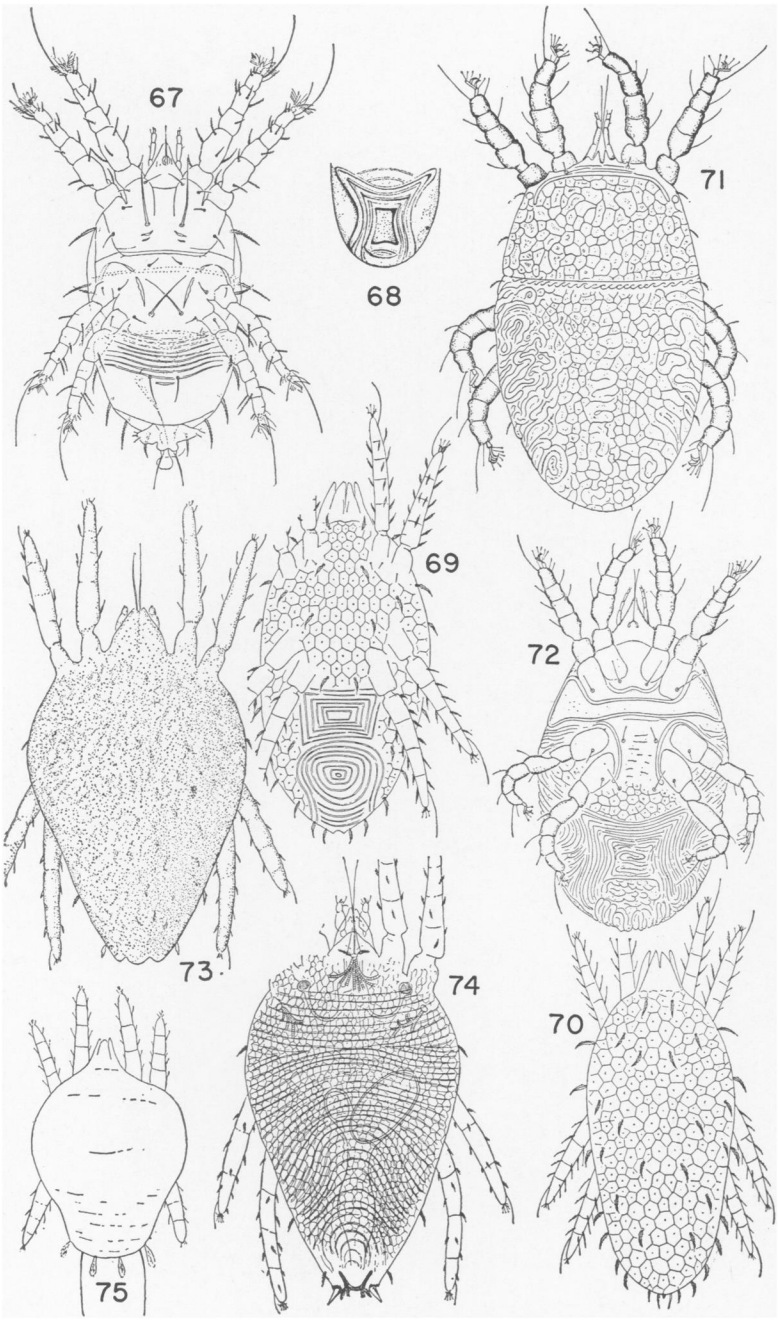

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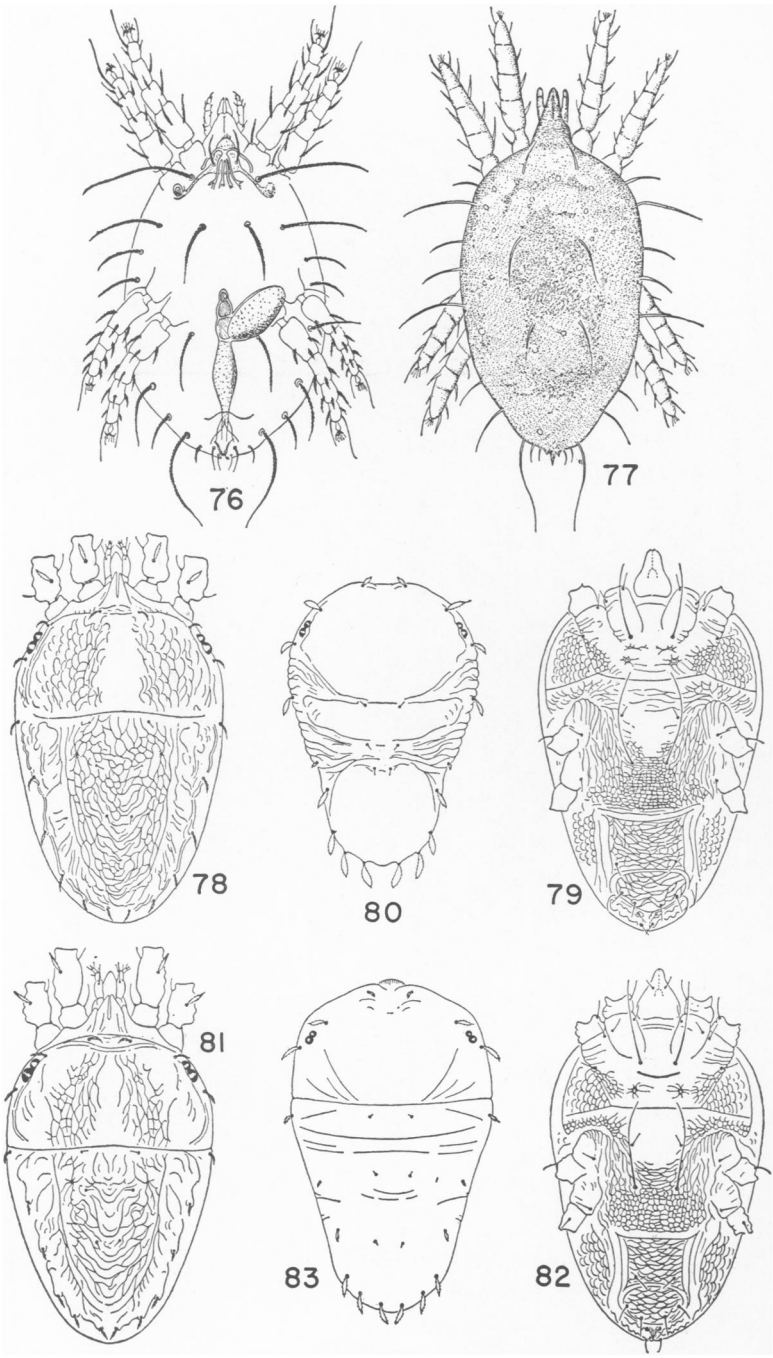

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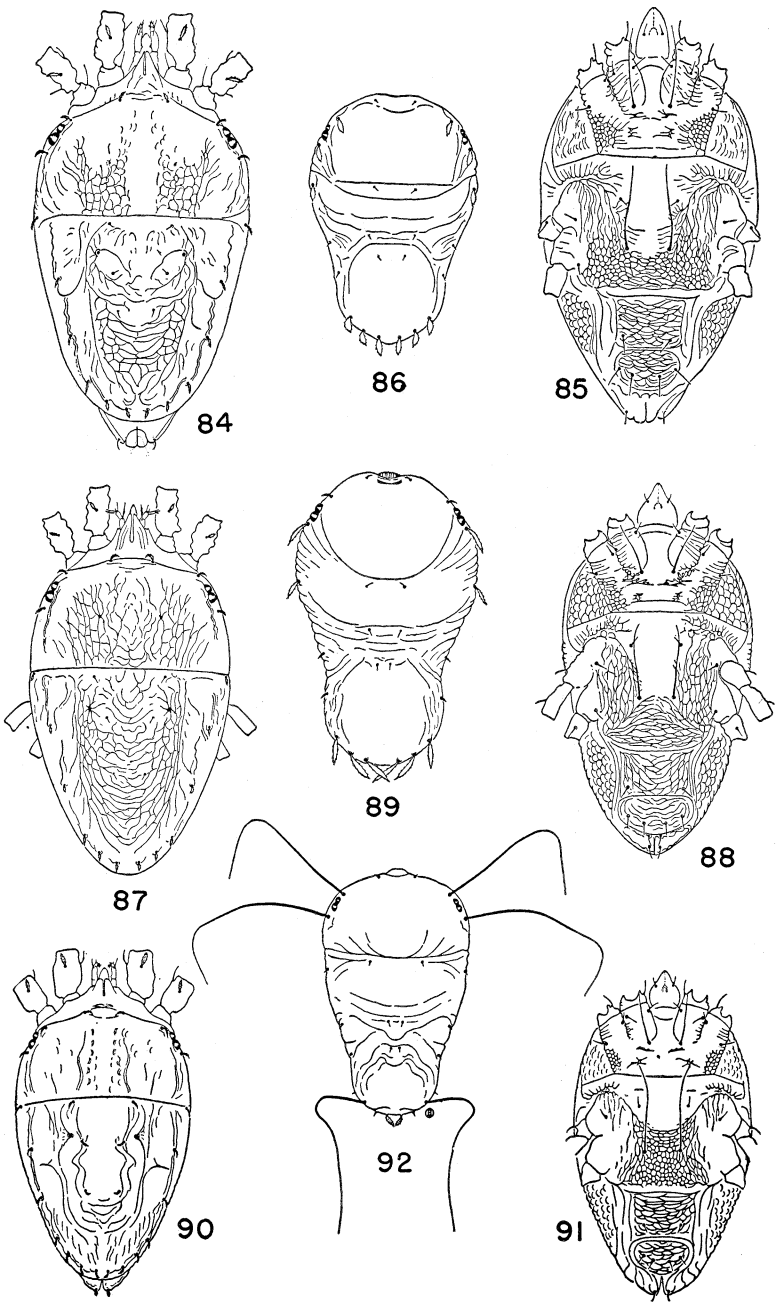

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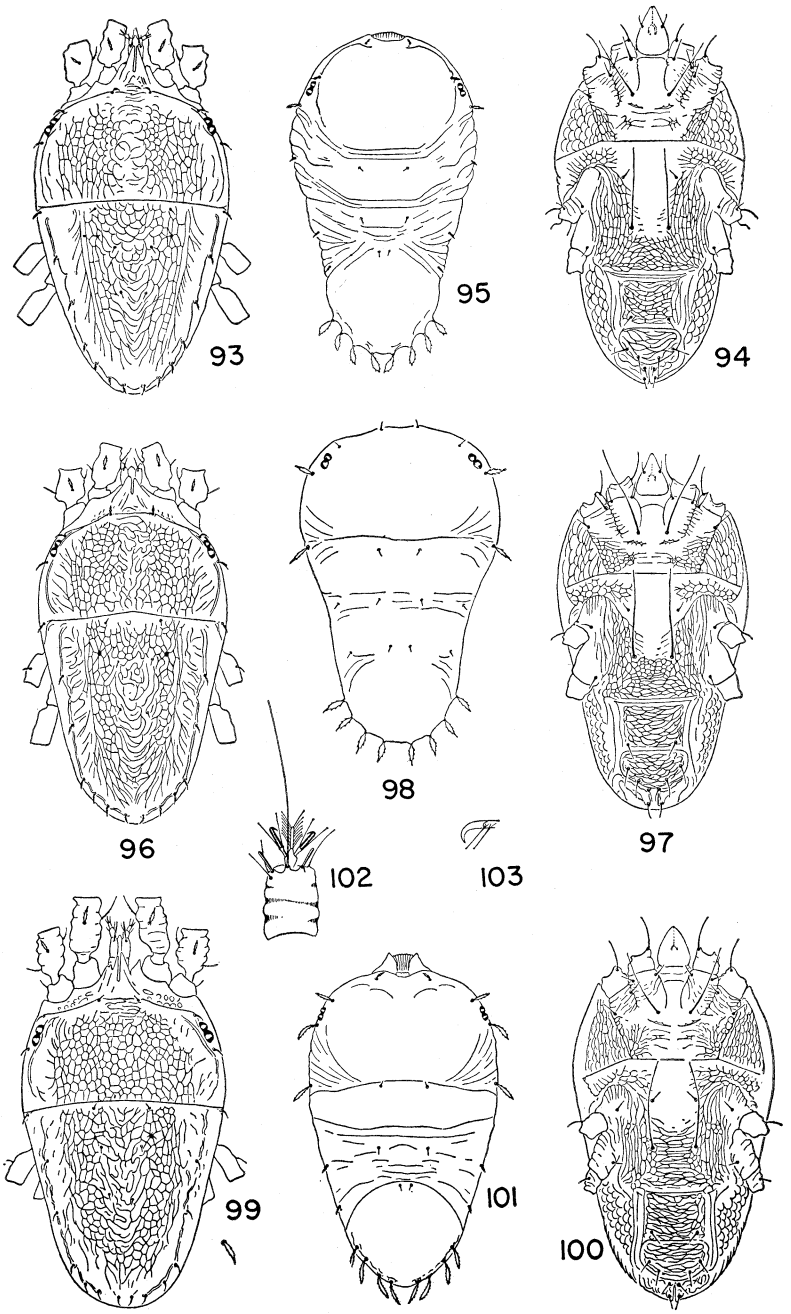

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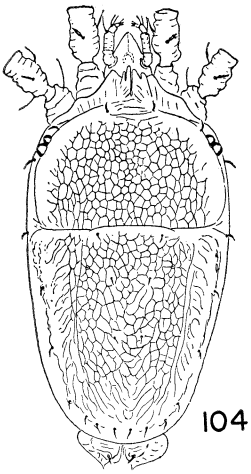

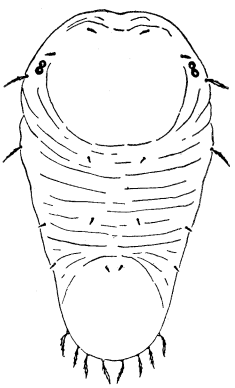

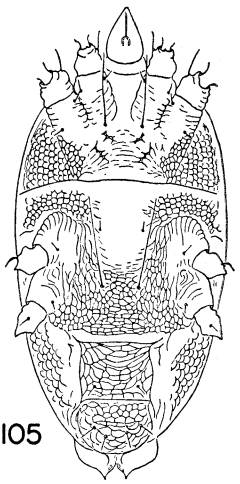

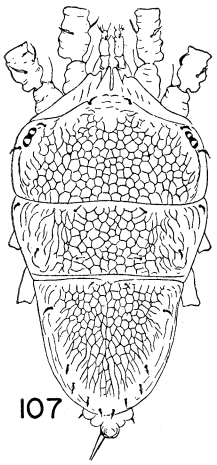

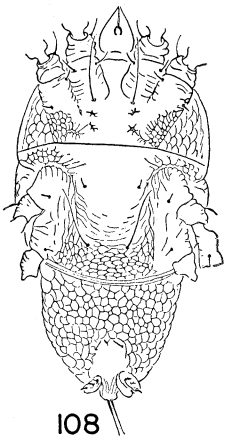

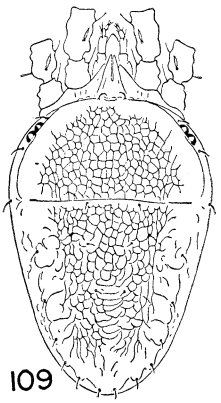

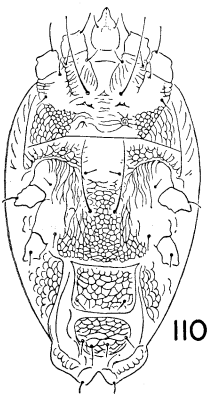

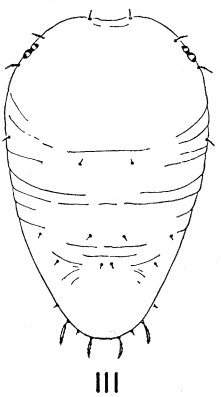

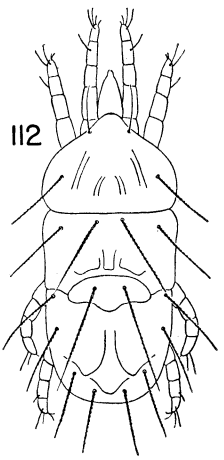

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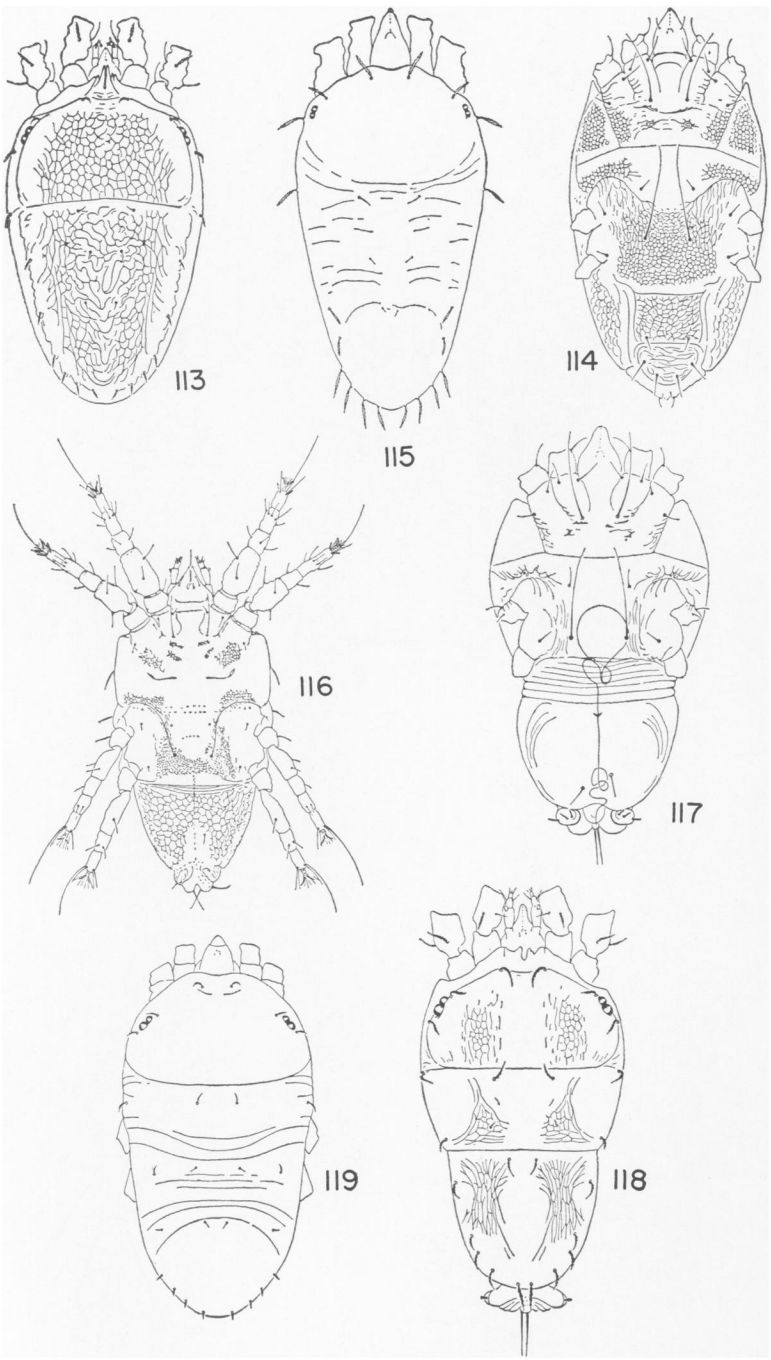

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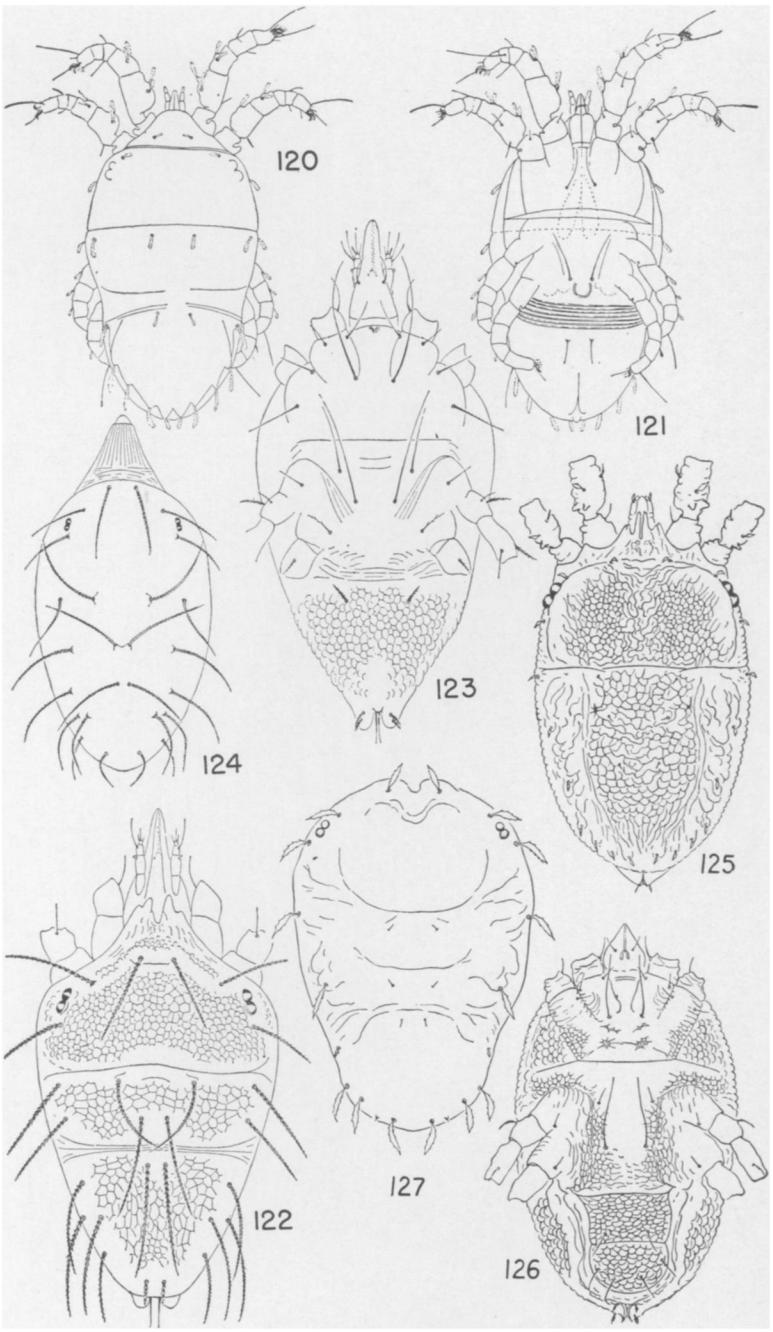

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