

BULLETIN OF THE CALIFORNIA INSECT SURVEY

VOLUME 4, NO. 1

THE ERIOPHYID MITES OF CALIFORNIA

(*Acarina: Eriophyidae*)

BY

H. B. KENNEDY

(California Department of Agriculture)

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THE ERIOPHYID MITES OF CALIFORNIA

Introduction

This Bulletin is the result of fifteen years of intermittent exploration of California for Eriophyid mites. When the work began in 1937 the principal species recognized were the relatively few economic species. This situation not only left an opportunity to discover and describe new species, it also demanded that as many new Eriophyids as possible be put in print in order to erect a taxonomic framework. As a result, this summary now presents a list of 186 species in 39 genera.

Certain common names are current for mites of this family. The most usual one is 'gall mite'. Another term is 'blister mite'. More specialized names are 'bud mite' and 'rust mite'. I am using the term 'Eriophyid mite' because the majority of the species do not cause any noticeable injury to their hosts and any name depending on a particular plant deformation, and used for all of the mites in this family, emphasizes some characteristic of but a small fraction of the whole. For example, if we call these mites 'blister mites', we are stressing the activities of *Eriophyes pyri* alone and ignoring the remainder.

Modern Eriophyid taxonomy originates from the basis laid down by the Austrian, Alfred Nalepa. He worked on these mites from 1887 to 1929, and his descriptions were the first adequate ones. All names given to these mites previous to the beginning of his work are resting on inadequate descriptions at best. If it were not for the specific hostplant relationships of the species we could probably hardly recognize any of them, since the authors inadequately described or ignored the actual mite structure. These pre-Nalepa names are mostly names without descriptions.

It has been my intention all along to build as much as possible on Nalepa's foundation. I have principally added to his generic and higher arrangements by utilizing the beak structure to create the tribe Diptilomiopini; by using the situation of the dorsal tubercles to erect new genera; and by elevating the status of extra shield and abdominal setae to subfamily significance.

We have before us a world that is but slightly explored for Eriophyids. This is not surprising, considering the microscopic size of these mites. Not many people understand how to collect Eriophyids. We have literature treating a considerable number of the species that occur in Europe, and in California. But with the possible exception of Java, other areas are essentially blank. Anyone who

would classify these mites at the present, faces the prospect of a growing number of species in the large genera, and of broad revisions to come. But I believe the average type of Eriophyid to have already been pretty well defined, since these mites are widespread, and ancient in origin.

As we now know these tiny creatures, they constitute a closed group, structurally pointing to themselves. On the outside, certain Phytotopalpids, by reduction of leg number, and elongation of the abdomen, would seem to suggest some relationship to Eriophyids. But this question needs much further study, and further exploration of the world for intermediate forms.

The Demodecids have been taxonomically associated with Eriophyids. These mites, which are animal parasites, have eight stumpy legs, which bear claws not similar to those on the Eriophyid leg.

Eriophyids average about 1/5 of a millimeter in length. Their main distinction is the presence of only four legs (I have seen nothing on these mites to suggest the fate of the other two pair of legs; perhaps some undiscovered form may give the answer to this question.) Eriophyids also have the genitalia placed proximally, just behind the coxae. The abdomen is elongate and its surface is characterized by the presence of narrow transverse rings which are typically set with small rounded or pointed bead-like structures, here called *microtubercles*.

The Eriophyid chelicerae are a pair of slender stylets which puncture the plant tissue without causing the death, or immediate death, of the effected cells. These stylets rest in a groove on the dorso-anterior side of the rostrum. The rostrum is a jointed structure with what appears to be a basal and an apical joint. The basal joint bears a seta on each side of the cheliceral groove. There is also a subapical seta in this same position on the distal joint of the rostrum. The apex of the rostrum consists of a pair of pads, apparently for the purposes of conducting saliva to the chelicerae and sucking up the plant juices. These pads bear sensory papillae on their rear edge. The main structure of the rostrum evidently represents what Snodgrass (1948) designated as the *palps* in the Tetranychidae. For further information on the anatomy of these mites see Hassan, 1928.

The subfamily and tribal arrangement which I use is based on what I consider to be certain fun-

damental characters. There are four subfamilies in the keys. They fit themselves into a circle divided into quarters. The vertical division of this circle separates the two subfamilies bearing three or four shield setae from the two having two or no shield setae. The horizontal division separates the worm-like budmites from the fusiform leaf vagrants or rustmites. This latter division depends primarily on whether or not the shield projects over the rostrum base. The projection of the shield over the rostrum base is an important character. While it is usually accompanied by the presence of broad back plates or tergites, it still carries the mite along with all other species that have this projection even when the broad back plate condition is not present. Plate B illustrates the circle arrangement of the subfamilies and lists the separation criteria.

Bud and gall mites of the genera *Eriophyes* and *Aceria* have evenly ringed, wormlike abdomens, which we can call *Eriophyiiform*. Opposed to this the broad back-plate types are *Phyllocoptiform*. All nymphs with one exception are *Eriophyiiform*. The broad back plate condition and the lack of microtubercles are structural modifications that exist only in the adult stages of part of the species, that is, in the *Phyllocoptinae* and *Sierraphytoptinae*. Some species with the shield projecting over the rostrum base and classed in these two subfamilies nevertheless have *Eriophyiiform* abdomens. One possible explanation is that the abdominal condition is a carry-over from the nymphal stage.

I have systematically disregarded almost all male *Eriophyiids* in developing the taxonomy of the California species. With the exception of the genital structures (and the males of *Anthocoptes punctidorsa* and *Phyllocoptes dimorphus*), males only differ from the females by being a little smaller. I have consistently illustrated certain female genital structures lying just under the coverflap. These are: 1. the genital opening; 2. the anterior projection which I call the *anterior genital apodeme*; 3. two posterior gland-like structures supposed to be the semenile vesicles. The apodeme appears to have a certain amount of specific significance in its structural variations. However, when the genitalia are 'appressed' to the coxae, this apodeme is shortened in ventral view and has generic significance.

The student can only examine these internal genital structures in chloral hydrate or lactic acid media by cutting the specimen before heat treating. Otherwise the internal pressures developing in the mite body invariably blow out these structures.

Eriophyiids have a simple direct development after hatching. They pass thru two nymphal instars, the second producing the adult after a resting period or 'pseudopupa'. In this resting stage the genitalia form and protrude through the body wall (nymphs have the genital setae but no exterior indication of the genital organs). Growth from the

egg to the adult takes from about ten days to two weeks.

But *Eriophyiid* life histories are not all simple. There is an explanation, gained through experimental taxonomy, for the functions of two types of females in certain species. But no experimental data are on hand to elucidate the situations in complex populations in leaf galls.

In the case of two types of females in one species, the condition is known as *deuterogyny*. *Deuterogyny*, so far as it is known, is present only in *Phyllocoptine* species on deciduous trees and shrubs. *Deuterogynous* species have, first, the primary form or *protogyne*, which is the female resembling the male, that exists only on the leaves of its hostplant. The *protogyne* and male make up the perfect form of the species.

The secondary female or *deutogyne* is the imperfect form and is specialized for hibernation (including aestivation in some cases). *Deutogynes* appear in response to leaf maturing or the coming of lower fall temperatures. They cannot reproduce in the year that they grow and must quit the leaves when fully fed, regardless of the time of year. They usually become dormant in bark crevices, but some sequester themselves around lateral buds. During the spring these *deutogynes* come out of hibernation and lay eggs on the new leaves, which eggs hatch into the perfect form of the species.

Since the *deutogyne* is an imperfect stage it is not entirely suitable for taxonomic purposes. The keys in this bulletin do not take *deutogynes* into consideration and most would run to the wrong categories. *Deutogynes* tend to resemble each other regardless of species or genus. Thus their principal taxonomic significance may be to indicate true relationship between genera and species. The account of experiments proving *deuterogyny* is in *Eriophyiid Studies XII*.

Eriophyiid mites are creatures of perennial plants since annuals do not afford a stable basis for development and colony founding. When an *Eriophyiid* kills its host (example: tomato russet mite) the relationship is unnatural. The reason back of this is that these mites are not facultative travelers and must depend on forces outside their control to reach new individuals of their host plant species.

Eriophyiid host relations are intimate and nearly always show a high degree of specificity. For that reason a host list is a valuable and necessary means for identifying mite species. Part of the mites will go from one plant species to another in one plant genus. (Example: *Aceria brachytarsus* forms purse galls on both species of black walnuts native to California, but will not go to the imported English walnut.) Some have a host range extending through related plant genera. But only the big beaked plum mite (*Diptacus gigantorhynchus*) crosses plant family lines, in California.

Most *Eriophyiids* cause no noticeable injury to their hosts. The plant deformations that a minority

of the species cause are well known. A list of types of deformations and injury is as follows:

1. leaf discoloration such as browning or silvering;
2. leaf erineum, which is the development of patches of hairs or papillae;
3. leaf pocketing, such as bead galls, purse galls;
4. leaf blisters in which the tissue becomes spongy and dies between the epidermal layers;
5. leaf folds, diagonal or longitudinal;
6. leaf edgerolling;
7. leaf stunting and leaf deformation (extending to the fruit at times);
8. woody galls around buds;
9. development of hairs on all leaves on an infested branch;
10. stunted shoots becoming a cluster of buds harboring numerous mites;
11. in one case drying of bulbs.
12. bud blasting.

Certain gall mite species of the Eriophyidae attract attention by the leaf modifications they produce. These modifications, or galls, are characteristic for the mite species making them. But certain plants, harboring gall mites, also have populations of what appear to be structurally these same mites, that do not produce galls. Examples are: the grape erineum mite and the grape bud mite; the pear leaf blister mite and the pear bud mite; and the linden gall mite, with certain linden trees that have mites of this same type which never produce leaf galls.

The collection of Eriophyids is not as difficult field work as one might suppose. A ten-power hand lens is necessary for exploration. Plant deformations and injury are the easiest to see and draw attention to the mites causing them, but the most interesting Eriophyids, taxonomically, are those which cause no noticeable alteration on their hosts. Random searching will usually disclose more mites than one might expect. To find these "gall-less" species examine buds, petiole bases, both sides of the leaves, and green stems. No Eriophyids will be found on annuals.

Wrap well infested plant parts in soft tissue, place in an envelope bearing the data, especially the name of the hostplant, and allow to dry. File for future reference, or send to a specialist. Lightly infested plant parts may not be satisfactory when handled this way, but putting the mites in alcohol or other liquid should be avoided as much as possible (except as noted below).

For the preparation and study of Eriophyids I recommend the following formulae:

A. The preparatory solution:

1. Gum arabic powder 1.0 gram
2. Resorcinol crystals 3.0 grams
3. Potassium iodide crystals 0.2 gram
4. Iodine crystals 0.2 to 0.35 gram
Grind in mortar, transfer powder to screw-cap vial
5. Lactic acid, commercial solution 10.0 cc
6. Hydrochloric acid 8 drops

Screw the cap down tightly and heat in a 45° C oven for 4 to 5 hours, or long enough to dissolve the

gum arabic. Add no glycerin or water as both have undesirable results in this mixture.

This medium clears and expands the mites by heating. It is best used as a bulk recovery fluid for simmering in a small casserole, but is also useable on a slide under a coverslip. The casserole method is mainly for finding mites preserved with dry plant parts. Pour the processed specimens in this onto glass slides and pick out the mites by using transmitted light. Needle them into the following mixture which starts the process of stain setting and resorcinol polymerization, and removes excess resorcinol.

B. Intermediate solution:

1. Table sugar (sucrose) 1.0 gram
(Or sucrose 0.5 gr., and glycerin 0.5 cc)
2. Chloral hydrate crystals 8.0 grams
3. Potassium iodide 0.2 gram
4. Iodine crystals 0.35 gram
Grind in mortar, transfer to screw-cap vial
5. Formaldehyde sol. 1/2 strength
30 drops

Screw cap down tightly and warm for several hours at 45° C.

When needling mites into this second medium be careful not to allow the resorcinol to become concentrated enough to jell, as the mites do not separate readily from this jell. The mites can be left for an indefinite period in this medium, and usually should be left in it for a few hours at least. If mites are given the solution A treatment, this second mixture would be a very satisfactory medium in which to ship them in a vial. When properly cured in B, transfer the mites to the following mixture, which is the permanent mounting medium and which attains a certain degree of firmness.

C. Final or permanent medium

1. Gum arabic powder 0.5 gram
2. Table sugar 0.5 gram
3. Chloral hydrate crystals 7.0 grams
4. Potassium iodide crystals 0.2 gram
5. Iodine crystals 0.2 to 0.35 grams
Grind in mortar, transfer to screw-cap vial
6. Formaldehyde, 1/4 to 1/2 strength
18 drops (or more)

Gum arabic will not dissolve readily in the above mixture. The best method is to put 2 grams of chloral hydrate in the original mix, heat at 45° under a tightly screwed cap until the gum is in solution, and then add the rest of the chloral hydrate. Orient the mites by pushing the coverslip. As hardening progresses it will be increasingly difficult to turn the mites.

I have experimented with giant molecule water soluble synthetic resins, but their rubbery nature, and the fact that they imbibe too much water while dissolving, makes them fundamentally unsatisfactory. Gum arabic, in spite of its faults, is a

small molecule substance and therefore dissolves in a minimum amount of water. Sugars are also based on small molecules.

Some remarks are also necessary about the keys to genera and species. In the first place poor preparations of the mites will not show the necessary characters. Use of the oil immersion lens will be necessary to examine the featherclaws and skin microtubercles. The characters separating the genera should be fairly clear in most cases. Subdorsal longitudinal furrows may give considerable trouble at times, especially on flattened species. I have relied much on shield patterns in some of the keys. Shield patterns are variable, frequently being unequal on the two sides of the same shield. So the student should study more than one specimen. But there is always the host list to use for a check.

As already stated, deutogynes will not fit into the keys. The big-beaked forms will run to the Diptilomiopini, but the others will all go to the genera *Phyllocoptes* or *Vasates*. It is possible to recognize deutogynes by the suppression or absence of the microtubercles, plus their association with the primary forms.

Much work remains to be done in correlating the California Eriophyids with the earlier described European species. This work cannot proceed rapidly at a long distance. An example of the need for correlation is the situation of a mite which I have described as *Aceria parapopuli*. This species has a hump over the caudal lobes, a structure not mentioned for *populi* Nal. of Europe. The two populations of mites form woody bud galls on poplar twigs.

Another example concerns the pear rust mite, which I have named *Epitrimerus pirifoliae*. Nalepa has described *Epitrimerus pyri* of Europe without mentioning the most striking character of *pirifoliae*, namely the prominent lateral lobes of the shield.

All specimens referred to in this paper that are in existence are in the collection of the State Department of Agriculture at Sacramento. In the case of part of the records of common species I have saved no specimens. Before 1942 I was not using the formaldehyde medium and all specimens placed on slides before then are now destroyed. Most of the specimens since then, in formaldehyde medium, are in existence, and in tolerably good condition, although many are shriveled.

This publication has been possible through the generosity of Drs. E. Gorton Linsley, R. L. Usinger, and A. E. Pritchard of the University of California Division of Entomology and Parasitology. Many people have contributed specimens and their names appear under "California records." My work on Eriophyids began in 1937 at the suggestion of D. B. Mackie, who was then Chief of the State Bureau of Entomology. I also acknowledge the encouragement of the Present Chief of the Bureau, H. M. Armitage. To Dr. A. M. Massee, of the Rothamstead Experiment Station, England, I am indebted for reprints otherwise unobtainable. To Edna Willis Gaskill, librarian of the State Department of Agriculture, I am indebted for much help in publishing all of the original descriptions of these mites.

Explanation of the Numbering System

Each genus bears a number based on its consecutive arrangement in the keys. Each species is numbered consecutively under the genus. To find a species in the key note the species number in the index. This number is also the plate number. To find a species in the Species Treatment look for the genus number and then find the species alphabetically arranged.

For example: *Aceria heterothecae* bears the number 9-24. This is the 24th species under genus #9 in the keys. In the text it occurs under *h* in genus #9, *Aceria*. The illustration is on Plate 9-24.

II. Host List

POLYPODIACEAE

- Pteris aquilina lanuginosa* (Bory), Bracken
Vagrant on the underside of the fronds
25-4. *Phyllocoptes dimorphus* K.

PINACEAE

- Abies concolor* L. & G., White fir
Needle vagrant on new growth
32-4. *Epitrimerus abietis* K.
Abies magnifica Murr., Red Fir
Needle vagrant on new growth
7-1. *Nalepella ednae* K.
Cedrus atlantica glauca Carr., Glauca cedar
Needle vagrant on new growth
25-5. *Phyllocoptes cedri* K.
Pinus jeffreyi Vasey, Jeffrey pine
Inhabitant of needle sheaths
1-1. *Trisetacus pini* (Nal.)
2-1. *Setoptus jonesi* (K.)
Pinus muricata Don., Bishop Pine
Inhabitant of needle sheaths
2-1. *Setoptus jonesi* (K.)
Pinus murrayana Balfour, Tamarac pine
Inhabitant of needle sheaths
30-2. *Platyphytopus multisternatus* K.
Pinus pinea L., Stone or umbrella pine
Inhabitant of needle sheaths
30-1. *Platyphytopus sabinianae* K.
Pinus ponderosa Dougl., Yellow pine
Inhabitant of needle sheaths
1-1. *Trisetacus pini* (Nal.)
2-1. *Setoptus jonesi* (K.)
30-1. *Platyphytopus sabinianae* K.
Pinus radiata Don., Monterey pine
Inhabitant of needle sheaths
1-1. *Trisetacus pini* (Nal.)
Pinus sabiniana Dougl., Digger pine
Inhabitant of needle sheaths
1-1. *Trisetacus pini* (Nal.)
30-1. *Platyphytopus sabinianae* K.
Pinus torreyana Parry, Torrey pine
Inhabitant of needle sheaths
1-1. *Trisetacus pini* (Nal.)
2-1. *Setoptus jonesi* (K.)
30-1. *Platyphytopus sabinianae* K.
Pinus tuberculata Gord., Knobcone pine
Inhabitant of needle sheaths
30-1. *Platyphytopus sabinianae* K.
Pseudotsuga taxifolia (Lamb.), Douglas fir
Vagrant on new growth
32-9. *Epitrimerus pseudotsugae* K.
Tsuga mertensiana (Bong.), Mountain hemlock
Vagrant on needles on new growth
7-2. *Nalepella tsugae* K.

TAXODIACEAE

- Taxodium distichum* Rich. Bald Cypress

Needle vagrant

- 32-10. *Epitrimerus taxodii* (K.)

CUPRESSACEAE

- Cupressus macnabiana* Murr., McNab Cypress
Vagrant on new growth
32-7. *Epitrimerus cupressifoliae* K.
Cupressus macrocarpa Hartw., Monterey cypress
Tip swellings on the twigs.
1-2. *Trisetacus cupressi* (K.)
Vagrant on new growth
28-1. *Cupacarus cuprifestor* K.
Cupressus sargentii Jepson, Sargent cypress
Vagrant on new vigorous tips
32-7. *Epitrimerus cupressifoliae* K.
Cupressus sempervirens L., Italian cypress
Vagrant on the tips
32-5. *Epitrimerus cupressi* (K.)
Juniperus californicus Carr., California juniper
Vagrant on vigorous tips
32-7. *Epitrimerus cupressifoliae* K.
Juniperus chinensis procumbens Endl., prostrate juniper
Killing twig tips
1-2. *Trisetacus cupressi* (K.)
Libocedrus decurrens Torr., incense cedar
Vagrant on the twigs
32-8. *Epitrimerus libocedri* (K.)

GRAMINAE

- Andropogon* sp., a coarse grass
Vagrant on the underside of the leaves
33-2. *Calepitrimerus andropogonis* K.
Elymus triticoides Buckl., a perennial grass
Inhabiting the longitudinal leaf furrows on the upper surface, possibly causing some browning
17-5. *Vasates mckenziei* K.
20-1. *Abacarus hystrix* (Nal.)

CYPERACEAE

- Carex barbarae* Dew., Sedge
Inhabitant in the leaf bases
11-14. *Eriophyes caricis* K.

PALMACEAE

- Phoenix dactylifera* L., date palm
Inhabiting the folded center leaves
6-1. *Mackiella phoenicis* K.
Trachycarpus excelsa Wendl., Windmill palm
Inhabiting the folded center leaves
22-1. *Tumescoptes trachycarpi* K.

LILIACEAE

- Allium cepa* L., Onion
Living in the bulb between the layers producing a dry condition
9-49. *Aceria tulipae* (K.)
Allium sativum L., Garlic

- Inhabitant of the bulbs
 9-49. *Aceria tulipae* (K.)
 Aloe spinosissimae Hort., Aloe
 Living at bases of leaves and causing
 large warty deformations
 9-46. *Aceria aloinis* (K.)
 Nolina parryi Wats., Nolina
 Vagrant on the outside of the younger
 leaves
 34-1. *Acamina nolinae* (K.)
 Tulipa sp. (gesneriana L. ?), Tulip
 Inhabitant of bulbs
 9-49. *Aceria tulipae* (K.)

SALICACEAE

- Populus fremontii Wats., Cottonwood
 Large pendant gall of fasciated
 outgrowths on staminate catkin
 9-45. *Aceria neoessigi* (K.)
 Woody proliferation around buds
 hindering growth
 9-12. *Aceria parapopuli* (K.)
 Salix babylonica L., Weeping willow
 In leaf axils
 25-1. *Phyllocoptes calisalicis* K.
 Salix hindsiana And., Sandbar willow
 In hairs around terminal buds
 11-2. *Eriophyes triradiatus* (Nal.)
 Salix laevigata Bebb., Red willow
 Numerous bead galls on leaves, usually
 colonial
 17-21. *Vasates laevigatae* (Hassan)
 Salix lasiolepis Benth., Pussy willow
 Leaf vagrant in leaf hairs, apparently
 causing unusual hairing of the leaves
 on a whole twig
 37-8. *Rhyncaphytoptus acilius* K.
 Salix sitchensis angustifolia Bebb., Velvet
 willow
 Leaf vagrant in the underside leaf hairs
 37-5. *Rhyncaphytoptus salicifoliae* K.

BETULACEAE

- Alnus rhombifolia Nutt., White alder
 Bead galls on the leaves with
 undersurface opening
 11-3. *Eriophyes laevis* (Nal.)
 Undersurface leaf vagrant
 39-2. *Diptacus sacramentae* (K.)
 Alnus rubra Bong.
 Bead galls
 11-3. *Eriophyes laevis* (Nal.)
 Leaf vagrant, undersurface
 13-2. *Oxypleurites marinalni* K.
 Alnus tenuifolia Nutt., Mountain alder
 Bead galls
 11-3. *Eriophyes laevis* (Nal.)
 Leaf vagrants on undersurface
 5-1. *Sierraphytoptus alnivagrans* K.
 39-2. *Diptacus sacramentae* (K.)
 Corylus avellana L., Filbert
 Bud gall known as 'Big-bud', also
 specialized nymph on undersurface
 of leaf

- 3-1. *Phytoptus avellanae* Nal.
 Undersurface leaf vagrants
 13-1. *Oxypleurites depressus* Nal.
 14-1. *Coptophylla lamimani* (K.)
 Corylus rostrata var. californica A. DC.,
 Hazel nut
 Undersurface leaf vagrants
 17-11. *Vasates tamalpais* (K.)
 39-3. *Diptacus calicoryli* (K.)

FAGACEAE

- Nothofagus menziesii, New Zealand oak
 Terminal stunting and bud clusters
 9-6. *Aceria waltheri* (K.)
 Quercus agrifolia Nee., Coast live oak
 Upper surface leaf vagrant
 23-1. *Acaricalus secundus* K.
 Undersurface erineum pockets and
 leaf deformation
 9-4. *Aceria mackiei* (K.)
 Bud clusters
 9-5. *Aceria paramackiei* (K.)
 Quercus chrysolepis Liebm., Maul oak
 Erineum on underside of the leaves
 9-4. *Aceria mackiei* (K.)
 Quercus sp. (durata J. ?), scrub oak
 Undersurface leaf vagrants
 27-1. *Acarelliptus occidentalis* K.
 37-2. *Rhyncaphytoptus megarostris* (K.)
 Quercus kelloggii Newb., California black oak
 Upper surface leaf vagrants
 15-1. *Calacarus pulviferus* K.
 23-1. *Acaricalus secundus* K.
 Undersurface leaf vagrants
 27-1. *Acarelliptus occidentalis* K.
 37-4. *Rhyncaphytoptus spinifera* K.
 Quercus lobata Nee., White or valley oak
 Uppersurface leaf vagrants
 14-3. *Coptophylla caliquerici* K.
 15-3. *Calacarus tejonis* K.
 Undersurface leaf vagrants
 26-1. *Caliphytoptus quercilobatae* K.
 37-2. *Rhyncaphytoptus megarostris* (K.)
 Quercus vaccinifolia Engelm., huckleberry oak
 Undersurface erineum pockets
 9-4. *Aceria mackiei* (K.)
 Quercus wislizenii A. DC., interior liveoak
 Undersurface erineum pockets
 9-4. *Aceria mackiei* (K.)

JUGLANDACEAE

- Juglans californica Wats., Southern
 California black walnut
 Leaf purse galls
 9-7. *Aceria brachytarsus* (K.)
 Inquilin in purse galls
 9-8. *Aceria amicus* (K.)
 Juglans hindsii Jepson, Northern
 California black walnut
 See J. californica
 Juglans regia L., Persian or English walnut
 Undersurface erineum patches
 9-3. *Aceria erineus* (Nal.)
 Undersurface leaf vagrant

- 13-4. *Oxypleurites juglandis* K.
- URTICACEAE
Urtica gracilis holosericea Jepson, Nettle
 Among undersurface leaf hairs
 36-1. *Quadracus urticarius* (C. & M.)
- ULMACEAE
Ulmus campestris L., Elm
 Uppersurface leaf vagrant
 19-2. *Tetra concava* (K.)
 Undersurface leaf vagrants
 17-1. *Vasates calulmi* (K.)
 37-6. *Rhyncaphytoptus ulmivagrans* K.
Ulmus pumila L., Asiatic elm
 Undersurface leaf vagrants
 16-1. *Anthocoptes punctidorsa* K.
 37-6. *Rhyncaphytoptus ulmivagrans* K.
- LORANTHACEAE
Arceuthobium campylopodium Engelm., Pine tree mistletoe
 Bud mite in the pockets holding the staminate flowers
 10-1.1 *Paraphytoptus arceuthobii* K.
- CHENOPODIACEAE
Allenrolfea occidentalis (Wats.), Iodine bush
 Bud mite between joints and in flower heads, causing slight browning of the tissue
 9-43.1 *Aceria allenrolfeae* K.
Salicornia sp., a pickleweed
 See *Allenrolfea*
- CARYOPHYLLACEAE
Dianthus sp., Carnation
 Under leaf bases, causing stunting and yellowing of the plant
 9-45.1 *Aceria paradianthi* K.
- MORACEAE
Ficus sp. (carica L.), fig
 In buds and under fruit scales
 9-27. *Aceria ficus* (Cotte)
 Under surface vagrant among leaf hairs
 37-7. *Rhyncaphytoptus ficifoliae* K.
Morus sp., mulberry
 Under bud scales or at petiole bases
 9-33. *Aceria mori* (K.)
- MAGNOLIACEAE
Magnolia fraseri Walt.
 Among hairs on flower buds
 9-44. *Aceria magnoliae* (K.)
Magnolia grandiflora L., Southern magnolia or Bull bay
 Among undersurface leaf hairs or around buds
 17-7. *Vasates magnolivora* (K.)
- BERBERIDACEAE
Berberis californica Jepson, a barberry
 Irregular sinuate leaf folds from the upper surface
 9-25.1 *Aceria caliberberis* K.
- LAURACEAE
Cinnamomum camphora N. & E., Camphor
 In basal leaf glands
 18-1. *Gammaphytoptus camphorae* K.
- Laurus nobilis* L., Grecian laurel
 In flowers and under bud scales
 8-1. *Cecidophyes malpighianus* (C. & M.)
Persea americana Mill., Avocado
 In buds and under fruit buttons
 21-1. *Tegonotus myersi* (K.)
Umbellularia californica Nutt., California laurel
 Among surface hairs on twig tips, especially on flower buds
 33-1. *Calepitrimerus umbellulariae* K.
- CRASSULACEAE
Cotyledon caespitosa Haw., Stonecrop
 At bases of leaves
 9-25. *Aceria stinsonis* (K.)
 Browning and wrinkling of leaf surfaces
 17-9. *Vasates cotyledonis* (K.)
- SAXIFRAGACEAE
Ribes nevadense Kell., Currant
 Undersurface leaf vagrant or at petiole bases
 32-1. *Epitrimerus sierribis* K.
- PLATANACEAE
Platanus racemosa Nutt., Sycamore
 Undersurface leaf vagrant
 37-1. *Rhyncaphytoptus platani* K.
Platanus sp., Hybrid shade tree
 See *P. racemosa*
- ROSACEAE
Amelanchier alnifolia Nutt., Western Service berry
 Leaf vagrant on both surfaces
 33-3. *Calepitrimerus anatis* K.
Amygdalus communis L., almond
 Leaf vagrant on both surfaces
 17-18. *Vasates cornutus* (Banks)
Amygdalus persica S. & Z., peach, also nectarine
 Leaf vagrant on both surfaces
 17-18 *Vasates cornutus* (Banks)
 Undersurface leaf vagrant
 39-1. *Diptacus gigantorhynchus* (Nal.)
Cercocarpus ledifolius Nutt., Desert mahogany
 In buds?
 4-1. *Anchiphytoptus lineatus* K.
 Upper surface leaf vagrant among the leaf hairs
 19-1. *Tetra cercocarpi* K.
Crataegus sp. (oxycantha L. ?), Hawthorne
 Undersurface leaf vagrant
 33-7. *Calepitrimerus armatus* (Nal.)
Eriobotrya japonica Lindl., loquat
 In buds
 9-30. *Aceria eriobotryae* (K.)
Photinia arbutifolia Lindl., Toyon or Christmas berry
 Among hairs in terminal buds
 11-10. *Eriophyes heteromeles* K.
Prunus andersonii Gray, desert peach
 In a baggy erineum deformation on the leaves

11-9. *Eriophyes prunandersoni* K.
In buds and under fruit buttons
11-6. *Eriophyes breechii* K.
Prunus avium L., Sweet cherry
Undersurface leaf vagrant
39-1. *Diptacus gigantorhynchus* (Nal.)
Prunus domestica L., prune
Rusting of leaves on undersurface
17-19. *Vasates fockeui* (Nal.)
Undersurface leaf vagrant
39-1. *Diptacus gigantorhynchus* (Nal.)
25-3. *Phyllocoptes abaenus* K.
Prunus emarginata Dougl., Native bitter cherry
Leaf finger galls with lower surface opening
11-4. *Eriophyes emarginatae* K.
Inquilin in finger galls
11-5. *Eriophyes savagei* K.
Prunus ilicifolia Walp., Holly-leaf cherry
Bud inhabitant
11-8. *Eriophyes ilicifolia* K.
Prunus triloba Lindl., Flowering almond
Undersurface leaf vagrant
39-1. *Diptacus gigantorhynchus* (Nal.)
Prunus sp. (Varieties of plums),
Undersurface leaf vagrants
25-3. *Phyllocoptes abaenus* K.
39-1. *Diptacus gigantorhynchus* (Nal.)
Pyrus communis L., Pear
Leaf blisters and bud blasting
11-7. *Eriophyes pyri* (Pgst.)
Rusting of leaf undersurface
32-3. *Epitrimerus pyri* (Nal.)
Pyrus malus L., apple
Leaf blisters
11-7. *Eriophyes pyri* (Pgst.), variety
Undersurface leaf vagrants causing slight rusting
17-15. *Vasates malivagrans* K.
(*schlectendali* Nal. ?)
33-4. *Calepitrimerus baileyi* K.
Rosa californica C. & S., Native rose
Among seeds and at petiole bases
25-6. *Phyllocoptes fructiphilus* K.
Rosa sp., Cultivated rose
Undersurface vagrants
25-2. *Phyllocoptes adaluis* K.
31-1. *Callyntrotus schlectendali* Nal.
Rubus parviflorus Nutt., Thimbleberry
Among hairs on underside of leaf
25-8. *Phyllocoptes gracilis* (Nal.)
Rubus thyrsanthus Focke., Himalaya blackberry
In buds and causing redberry condition
9-10. *Aceria essigi* (Hassan)
Rubus vitifolius C. & S., Native blackberry
In buds and at petiole bases
9-11. *Aceria orthomera* K.
Undersurface leaf vagrants
25-7. *Phyllocoptes calirubi* K.
38-2. *Rhynacus abronius* (K.)
39-1. *Diptacus gigantorhynchus* (Nal.)
Rubus sp., Mammoth blackberry

Redberry condition of fruit, also in buds
9-10. *Aceria essigi* (Hassan)
Rubus sp., Boysenberry
In buds and causing shoot stunting, and bud blasting
9-11. *Aceria orthomera* K.
Rubus sp. Raspberry
On underside of leaves and on fruits
25-8. *Phyllocoptes gracilis* (Nal.)
Spiraea densiflora Nutt.
Flower galls
11-15. *Eriophyes spiraeae* Nal.

LEGUMINOSAE
Cercis occidentalis Torr., Redbud
Undersurface leaf vagrants and in buds
17-6. *Vasates scotti* (K.)
Lupinus albifrons Benth.
In hairs around buds and under petiole bases
9-48. *Aceria calilupini* (K.)
Medicago sativa L., alfalfa
In leaf axils around buds
9-34. *Aceria medacaginis* (K.)
Pickeringia montana Nutt., Pea chaparral
Among surface hairs on leaves and twigs
16-2. *Anthocoptes pickeringiae* K.
Prosopis juliflora glandulosa Ckll.,
Honey mesquite
Leaf vagrants
17-2. *Vasates prosopis* (K.)
Wisteria sp.
In buds
11-13. *Eriophyes wisteriae* K.

ZYGOPHYLLACEAE
Larrea tridentata glutinosa Rydb.,
Creosote bush
Under scales (stipules ?) at base of petiole
9-47. *Aceria larreae* (K.)

RUTACEAE
Citrus limonia Osb., Lemon
In buds causing blasting or leaf deformation
9-28. *Aceria sheldoni* (Ewing)
On surfaces of leaves and fruit causing silvering or rusting
29-1. *Phyllocoptera oleivorus* (Ashm.)
Citrus sinensis Osb., Orange
See *C. limonia*
Ptelea baldwinii crenulata Jepson, Hop tree
Undersurface leaf vagrant causing leaf discoloring
32-2. *Epitrimerus pteleae* K.

BUXACEAE
Buxus sempervirens L., Boxwood
Under bud scales or in flower clusters causing partial blasting
11-16. *Eriophyes canestrinii* (Nal.)

ANACARDIACEAE
Rhus diversiloba T. & G., Poison oak
Leaf bead galls, especially on terminal leaves

- 17-22. *Vasates toxicophagus* (Ewing)
- ACERACEAE
Acer glabrum Torr., Sierra maple
 Magenta erineum on leaves, usually at tips
 9-9. *Aceria calaceris* K.
 Inquilins in magenta erineum
 17-20. *Vasates paraglabri* K.
 17-23. *Vasates glabri* K.
Acer macrophyllum Pursh, Big leaf maple
 White undersurface erineum
 Mite population very similar to that on *Acer glabrum*
Acer negundo californicum Sarg., boxelder
 Undersurface leaf vagrants
 21-5. *Tegonotus negundella* K.
 37-3. *Rhyncaphytoptus strigatus* K
- AQUIFOLIACEAE
Ilex aquifolium L., Holly
 In buds and under fruit buttons
 8-2. *Cecidophyes verilicis* (K.)
- CELASTRACEAE
Euonymus sp.
 In buds causing some deformation to tips and leaves
 11-12. *Eriophyes convolvens* (Nal.)
- HIPPOCASTANACEAE
Aesculus californicus (Spach.), Buckeye
 Vagrants on both leaf surfaces causing slight silvering
 13-7. *Oxypleurites aesculifoliae* (K.)
- RHAMNACEAE
Ceanothus cordulatus Kell., Snow brush
 Vagrants on leaves and stems
 20-2. *Abacarus acalyptus* (K.)
Ceanothus cuneatus (Hook.), Buck brush
 Leaf vagrants
 16-3. *Anthocoptes hesperus* K.
Ceanothus velutinus Dougl., tobacco brush
 Bead galls on the leaves, usually opening underneath
 9-26. *Aceria ceanothi* (K.)
Rhamnus californicus Esch., Coffee berry
 Oblique deformation along side vein, also vagrants
 21-3. *Tegonotus rhamnicola* (K.)
Rhamnus californicus tomentella B. & W.
 In terminal buds and among hairs
 10-2. *Paraphytoptus rhamniphagus* K.
 Undersurface leaf vagrants
 17-16. *Vasates rhamnivagrans* (K.)
Zizyphus sativus Gaertn., jujube
 Vagrants on leaves and green stems
 21-4. *Tegonotus zizyphagus* (K.)
- TILIACEAE
Tilia sp. (vulgaris ?), Linden
 Nail galls on leaves
 11-11. *Eriophyes tiliae* (Nal.)
- Vitis vinifera* L., grape
 Forming leaf erineum, also in buds
 11-1. *Eriophyes vitis* (Pgst.)
 Undersurface leaf vagrant causing some browning
 33-6. *Calepitrimerus vitis* (Nal.)
Vitis californicus Benth., California wild grape
 Undersurface leaf vagrant
 39-1. *Diptacus gigantorhynchus* (Nal.)
- THEACEAE
Camellia japonica L., Camellia
 In buds, causing some browning of flower bud scales
 9-1. *Aceria camelliae* K.
 Leaf vagrants causing browning and leaving debris
 15-2. *Calacarus adornatus* (K.)
 24-1. *Acaphylla steinwedini* K.
- STERCULIACEAE
Fremontia californica Torr., Flannel bush
 Among stellate hairs on leaves and twigs
 12-1. *Pareria fremontiae* K.
- TAMARICACEAE
Tamarix gallica L., Tamarisk
 On green stems and under scale-like leaves
 17-3. *Vasates immigrans* (K.)
- CACTACEAE
Opuntia sp. (occidentalis Engelm. ?), Cactus
 In flower buds, among the papillae on small pads, spine bases
 9-2. *Aceria cactorum* (K.)
- PUNICACEAE
Punica granatum L., Pomegranate
 In buds and causing leaf edgeroll often stunting growth
 9-20. *Aceria granati* (Can.)
- MYRTACEAE
Feijoa sellowiana (Berg.), Feijoa
 In hairs around buds
 9-32. *Aceria feijoeae* (K.)
- ARALIACEAE
Hedera helix L., English ivy
 In buds and at petiole bases causing deformation and stunting
 3-3. *Phytoptus hedericola* K.
 Uppersurface leaf vagrant
 23-2. *Acaricalus hederæ* (K.)
- UMBELLIFERAE
Apium graveolens L., Celery
 Browning of stalks
 17-13. *Vasates eurynotus* (Nal.)
Daucus carota L., Carrot
 Discoloration of flower heads
 9-21. *Aceria peucedani* (Nal.)
 17-13. *Vasates eurynotus* (Nal.)
- CORNACEAE
Cornus californicus C. A. Mey., Creek dogwood
 Undersurface leaf vagrants
 13-8. *Oxypleurites cornifoliae* K.
Cornus glabrata Benth.
 13-9. *Oxypleurites glabratae* K.
Cornus nuttalli Aud., Flowering dogwood
 In buds and among seeds
 3-2. *Phytoptus corniseminis* K.

ERICACEAE

- Arbutus unido* L., Strawberry tree
 Undersurface leaf vagrants
 14-2. *Coptophylla arbuti* (K.)
Arbutus menziesii Pursh., Madrone
 Undersurface leaf vagrants
 35-1. *Asetacus madronae* K.
Arctostaphylos spp., Manzanita
 Leaf vagrants
 17-8. *Vasates manzanitae* (K.)
 38-1. *Rhynacus arctostaphyli* (K.)
Rhododendron occidentale Gray, Azalea
 Undersurface leaf vagrants
 17-12. *Vasates rhododendronis* (K.)

EBENACEAE

- Diospyros kaki* L., Persimmon
 Under bud scales and fruit buttons
 9-31. *Aceria diospyri* K.

OLEACEAE

- Fraxinus dipetala* H. & A., Native ash
 Undersurface leaf vagrant
 21-2. *Tegonotus califraxini* (K.)
Fraxinus oregona Nutt., Oregon ash
 Fruit galls in the form of rough balls, 'Klunkern'
 9-19. *Aceria fraxinivorus* (Nal.)
Ligustrum ovalifolium Haask., Privet
 In buds
 9-17. *Aceria ligustri* (K.)
 On leaves and stems causing stunting and browning
 17-17. *Vasates ligustri* (K.)
Olea europa L., Olive
 Upper surface leaf vagrant
 13-3. *Oxypleurites maxwelli* K.

HYDROPHYLLACEAE

- Eriodictyon crassifolium* Benth.
 Among leaf hairs, especially on the newly forming leaves
 9-24.1. *Aceria eriodictyonis* K.

LABIATEAE

- Salvia apiana* Jepson, White sage
 In hairs on leaves and stems
 10-5. *Paraphytoptus salviacrinis* K.
Salvia leucophylla Greene, Purple sage
 Under petiole bases
 9-18. *Aceria neosalviae* (K.)

SOLANACEAE

- Lycopersicum esculentum* Mill., Tomato
 Browning and curling of the leaves, causing death to the plant
 17-14. *Vasates destructor* (K.)
Petunia sp.
 Browning of leaves and stems
 17-14. *Vasates destructor* (K.)
Physalis ixocarpa Brot.
 Browning of the leaves ?
 17-14. *Vasates destructor* (K.)
Solanum douglasii Dunal., Nightshade
 Leaf vagrant
 17-14. *Vasates destructor* (K.)
Solanum tuberosum L., potato
 Browning of leaves
 17-14. *Vasates destructor* (K.)

CAPRIFOLIACEAE

- Sambucus glauca* Nutt., Elder
 Leaf curling and rusting
 32-6. *Epitrimerus trilobus* (Nal.)
Symphoricarpos albus (L.), Snowberry
 Undersurface leaf vagrants
 17-4. *Vasates symphoricarpi* (K.)
Viburnum opulus L., Snowball
 Leaf vagrants (probably not a preferred host)
 15-2. *Calacarus adornatus* (K.)

COMPOSITAE

- Ambrosia psilostachya* DC., Western ragweed
 Bead galls on leaves
 9-22. *Aceria boycei* (K.)
 Leaf vagrants
 17-10. *Vasates ambrosiae* (K.)
Artemisia californica Less., California sagebrush
 Leaf thickenings which contain erineum pockets
 9-13. *Aceria paracalifornicus* (K.)
 Leaf and stem vagrant in the hairs
 10-6. *Paraphytoptus californicus* (Hall)
Artemisia dracunculus L.,
 Ball-like stem structure of deformed leaves, buds and shoots
 9-16. *Aceria dracunculi* (L.)
Artemisia heterophylla Nutt., Wormwood
 Vagrant among hairs on leaves and stems
 9-15. *Aceria neoartemisiae* (K.)
 10-7. *Paraphytoptus inaequalis* K.
 Erineum pockets on leaves, the erineum on the underside
 9-36. *Aceria abalis* (K.)
 Leaf vagrant, usually on the upper surface
 33-5. *Calepitrimerus cariniferus* K.
Baccharis emoryi Gray
 Vagrant, usually on the upper surface of the leaves
 13-5. *Oxypleurites baccharis* K.
Baccharis glutinosa Pers.
 Bead galls on leaves and some leaf deformation
 9-37. *Aceria baccharices* K.
Baccharis pilularis DC., Chaparral broom
 Under leaf axils around lateral buds
 9-40. *Aceria calibaccharis* (K.)
 Vagrants on upper surface of second year leaves
 13-6. *Oxypleurites acidotus* K.
Baccharis viminea DC., Mule fat
 See *B. glutinosa*
Brickellia californica T. & G.
 In buds and among seeds in flower heads
 10-1. *Paraphytoptus brickelliae* K.
Chrysanthemum sp. (morifolium Ram. ?)
 Vagrants among surface hairs or in buds and under sepals
 10-4. *Paraphytoptus chrysanthemi* K.
Chrysopsis oregana Gray
 At base of leaf axils along stems
 9-23. *Aceria chrysopsis* (K.)

- Cynara scolymus* L., Artichoke
Vagrants among hairs on undersides of
leaves and stems
9-43. *Aceria neocynarae* (K.)
- Encelia californica* Nutt.
Around buds and in surface hairs
9-14. *Aceria enceliae* (K.)
10-3. *Paraphytoptus mcgregori* K.
- Ermicameria ericoides* (Less.), False heather
In leaf axils, around buds, and in terminal
Cecidomyid galls
9-41. *Aceria spinulifera* (K.)
16-4. *Anthocoptes ericameriella* K.
- Ericameria pinifolia* (Gray)
In Cecidomyid galls
9-41. *Aceria spinulifera* (K.)
- Eriophyllum staechadifolium* Lag.
Among hairs on leaves and stems, also
in leaf axils
9-35. *Aceria langei* (K.)

- Haplopappus venetus* H. B. K.
Around lateral buds
9-42. *Aceria haplopappi* (K.)
- Heterotheca grandiflora* Nutt., Telegraph weed
At the bases of lateral leaves
9-24. *Aceria heterothecae* (K.)
- Lepidospartum squamatum* Gray
Stunted shoots with bud clusters
9-29. *Aceria lepidosparti* K.
- Pluchea sericea* Nutt., Mock willow
Among hairs on leaves and around
terminal bud
10-8. *Paraphytoptus calipluchae* (K.)
- Wyethia* sp. (mollis Gray ?),
Flower gall deforming part or all of
the flower
9-38. *Aceria beevori* K.
- Wyethia* sp.
Vagrant among the undersurface leaf hairs
9-39. *Aceria wyethiae* K.

III. Keys to California Eriophyid Mites

Key to Subfamilies

1. Three or four setiferous tubercles on shield;
subdorsal abdominal setae present or absent
..... 2.
- Two setiferous tubercles on shield, or no
shield setae; subdorsal abdominal setae
never present 3.
2. Shield with no anterior lobe over rostrum; ab-
domen wormlike, with rings similar dorso-
ventrally PHYTOPTINAE
- Shield produced over rostrum, or abdominal
tergites broader and less numerous than the
sternites, or both; fusiform species
..... SIERRAPHYTOPTINAE (p. 12)
3. Shield never with anterior lobe over rostrum;
abdomen wormlike, with rings similar above
and below, at least anteriorly; when rostrum
large the chelicerae evenly curved down ..
..... ERIOPHYINAE (p. 12)
- Usually fusiform mites with some combination
of the following characters: anterior shield
lobe over rostrum; or with tergites broader
and less numerous than sternites especially
anteriorly; or with rostrum large, tapering,
and chelicerae abruptly bent downward at
right angles. PHYLLOOPTINAE (p. 15)

Phytoptinae, Generic key

1. Three shield setae 2.
- Four shield setae 3.

2. Subdorsal abdominal setae present
..... 1. *Trisetacus* (p. 11)
- Subdorsal abdominal setae absent
..... 2. *Setoptus jonesi* (p. 20)
3. Abdominal microtubercles evenly distributed ..
..... 3. *Phytoptus* (p. 11)
- Dorsal microtubercles forming a well-spaced
pattern of longitudinal lines
..... 4. *Anchiphytoptus lineatus* (p. 21)

Species of *Trisetacus*

1. Shield with central longitudinal lines; ante-
rior shield seta short; female genital cover-
flap acute; in needle sheaths of *Pinus* spp.
..... 1-1. *pini* (Nal.) (p. 20)
- Shield with no central lines; anterior seta of
moderate length; coverflap rounded; small
terminal twig gall on Cypress
..... 1-2. *cupressi* K. (p. 20)

Species of *Phytoptus*

1. No lateral spur on tibia of first leg; big-bud
on *Corylus* ... 3-1. *avellanae* Nal. (p. 21)
- Foretibia with lateral spur. 2.
2. Shield design obsolete; in buds and around
seeds of *Cornus nuttalli*
..... 3-2. *corniseminis* K. (p. 21)
- Shield with strong design of lines; deforming
shoots of *Hedera* 3-3. *hedericola* K. (p. 21)

Sierraphytoptinae, Generic key

1. Subdorsal abdominal setae present
 5. *Sierraphytoptus alnivagrans* K. (p. 21)
 Subdorsal abdominal setae absent 2.
2. Two anterior shield setae
 6. *Mackiella phoenicis* K. (p. 22)
 One anterior shield seta 7. *Nalepella* (p. 12)

Species of *Nalepella*

1. Fore coxae spinuliferous both apically and at junction; microtubercles pointed; vagrant on *Abies magnifica* . . . 7-1. *ednae* K. (p. 22)
 Fore coxae spinuliferous only at junction; microtubercles rounded; vagrant on needles of *Tsuga mertensiana* 7-2. *tsugae* K. (p. 22)

Eriophyinae, Generic key

1. Dorsal shield setae missing
 8. *Cecidophyes* Nal. (p. 12)
 Dorsal shield setae present 2.
2. Dorsal shield setae pointing backward over abdomen from tubercles situated on rear shield margin 3.
 Dorsal shield setae pointing up, centrally, or forward, from tubercles usually distinctly ahead of rear shield margin 4.
3. Abdominal rings similar the full length of abdomen 9. *Aceria* K. (p. 12)
 Abdominal rings of even numbers dorso-ventrally immediately behind shield; at some point beyond 1/4 becoming differentiated into tergites and sternites, the tergites covering two or more sternites
 10. *Paraphytoptus* Nal. (p. 14)
4. No differentiation between tergites and sternites . . . 11. *Eriophyes* von S. (p. 14)
 Tergites on rear fourth broader and covering two sternites each
 12. *Pareria fremontiae* (p. 39)

Species of *Cecidophyes*

1. Shield lines distinct; large lateral granular area; bud mite on *Laurus*
 8-1. *malpighianus* (C. & M.) (p. 23)
 Shield lines mostly obsolete, especially the submedian lines; small lateral granular area; bud mite on *Ilex*
 8-2. *verilicis* (K.) (p. 23)

Species of *Aceria*

1. Female genital coverflap with longitudinal

striations in two ranks 2.
 Coverflap smooth, or with scoring crescentic, or longitudinal scoring uninterrupted . . 3.

2. Featherclaw 6-rayed; female genital apodeme shortened; *Camellia* bud mite
 9-1. *camelliae* K. (p. 26)
 Featherclaw 5-rayed; apodeme normal length; cactus bud mite. 9-2. *cactorum* (K.) (p. 25)

3. Featherclaw 3-rayed; oak and walnut mites. 4.
 Featherclaw 4-rayed 9.
 Featherclaw 5-rayed 25.
 Featherclaw 6-rayed 41.
 Featherclaw 7-rayed 45.

4. Genital setae on spur-like tubercles; erineum on English Walnut
 9-3. *erineus* (Nal.) (p. 27)
 Genital tubercles normal 5.

5. Genital coverflap sculptured; the oak mites 6.
 Genital coverflap smooth. 7.

6. Coverflap with fine oblique lines; erineum pockets on *Quercus agrifolia*
 9-4. *mackiei* (K.) (p. 30)
 Coverflap with lobular sculpturing; bud clusters on *Quercus agrifolia*.
 9-5. *paramackiei* (K.) (p. 32)

7. Foretibial seta absent; stunted shoots on *Nothofagus* . . 9-6. *waltheri* (K.) (p. 34)
 Foretibial seta present 8.

8. Abdominal microtubercles rounded; purse gall on leaves of *Juglans hindsii*.
 9-7. *brachytarsus* (K.) (p. 24)
 Microtubercles each bearing a spinule; inquiline in galls on *Juglans hindsii*
 9-8. *amiculus* (K.) (p. 24)

9. Tergites more numerous than sternites by lateral doubling of alternate rings; magenta erineum on *Acer glabrum*
 9-9. *calaceris* K. (p. 25)
 Rings on abdominal dorsum about same number as on sternum, doubling infrequent and erratic 10.

10. Foretibial seta missing; *Rubus* bud mites. 11.
 Foretibial seta present 12.

11. Genital coverflap with crescentic scoring; redberry mite 9-10. *essigi* (Hassan) (p. 28)
 Coverflap with longitudinal scoring; bud mite on native blackberry
 9-11. *orthomera* K. (p. 32)

12. Female genital coverflap smooth. 13.
 Coverflap scored. 14.

13. Weak shield design; caudal lobes humped above;

- woody bud galls on *Populus* 9-12. *parapopuli* (K.) (p. 32)
 Strong shield design; lobes normal; erineum
 pockets on *Artemisia californica*
 9-13. *paracalifornicus* (K.) (p. 32)
14. Genital coverflap scoring crescentic; bud mite
 on *Encelia* . . . 9-14. *enceliae* (K.) (p. 27)
 Coverflap scoring longitudinal 15.
15. Abdominal microtubercles rounded 16.
 Microtubercles distinctly pointed or each
 bearing a spinule. 21.
16. Genital setiferous tubercles larger than
 usual 17.
 These tubercles of normal size. 18.
17. Abdominal rings on dorsal rear smooth; in leaf
 hairs on leaves of *Artemisia heterophylla*. .
 9-15. *neoartemisiae* (K.) (p. 31)
 Rings completely microtuberculate; causing
 coarse shoot deformation on *Artemisia*
dracunculus . . 9-16. *dracunculi* (K.) (p. 27)
18. Central shield design obsolete except for
 short marks just ahead of rear margin;
 privet bud mite 9-17. *ligustri* (K.) (p. 30)
 Shield design clear 19.
19. Two or three strong diagonal lines across
 large lateral granular shield area; bud
 mite on *Salvia leucophylla*
 9-18. *neosalviae* (K.) (p. 31)
 Lateral granular areas homogeneous 20.
20. Median shield line ending in posterior dart-
 shaped mark; deformed fruiting bodies on
 ash, 'klunkern'
 9-19. *fraxinivorus* (Nal.) (p. 28)
 Median shield line simple; leaf edgeroller and
 shoot deformer on pomegranate
 9-20. *granati* (Can.) (p. 29)
21. Microtubercles strong and spinulate ventrally
 on abdomen, weak on dorsal half; flowers of
Umbelliferae. 9-21. *peucedani* (Can.) (p. 32)
 Abdominal microtubercles equally developed
 above and below 22.
22. A rear-pointing dart-shaped mark connected
 with the median shield line 23.
 Median line simple or broken. 24.
23. Dart-shaped mark in center of shield; micro-
 tubercles pointed; leaf bead galls on
Ambrosia. 9-22. *boycei* (K.) (p. 24)
 Dart-shaped mark at rear; microtubercles
 spinuliferous in buds and at leaf bases on
Chrysopsis . . 9-23. *chrysopsis* (K.) (p. 26)
24. Submedian shield lines forked in front of
 dorsal tubercles; microtubercle spinules of
 moderate length; bud mite on *Heterotheca* . .
 9-24. *heterothecae* (K.) (p. 29)
 Submedian shield lines forked in front of
 dorsal tubercles; microtubercle spinules
 longer; in leaf hairs on *Eriodictyon*
 9-24.1 *eriodictyonis* K. (p. 27)
 Submedian shield lines simple or broken; bud
 mite on *Cotyledon* 9-25. *stinsonis* (K.) (p. 33)
25. Abdominal microtubercles rounded 26.
 Microtubercles pointed or extended into a
 spinule 33.
26. Median shield line ending in a rear-pointing
 dart-shaped mark. 27.
 Median line simple. 29.
 Median line very faint or obsolete; on
Berberis . . 9-25.1 *caliberberis* K. (p. 26)
27. Shield design of lines of granules and short
 streaks; bead galls on leaves of *Ceanothus*
velutinus 9-26. *ceanothi* (K.) (p. 26)
 Shield design of solid lines when distinct 28.
28. Shield design always distinct with first sub-
 median line forked in front of dorsal tubercle;
 fig bud mite . 9-27. *ficus* (Cotte) (p. 28)
 Shield design usually indistinct; when dis-
 tinct the first and second submedian lines
 confluent ahead of dorsal tubercles; citrus
 bud mite . . 9-28. *sheldoni* (Ewing) (p. 33)
29. Shield lines interspersed with numerous short
 dashes; bud and shoot deformer on
Lepidospartum . 9-29. *lepidosparti* K. (p. 30)
 Shield lines with clear spaces in between for
 the most part 30.
30. Shield design of lines of granules. 31.
 Shield lines solid 32.
31. Admedian shield lines meeting behind the
 median; loquat bud mite
 9-30. *eriobotryae* (K.) (p. 27)
 Admedian lines ending on rear shield margin;
 persimmon bud mite 9-31. *diospyri* K. (p. 26)
32. Admedian shield lines very close on anterior
 half; feijoa bud mite
 9-32. *feijoeae* (K.) (p. 28)
 Admedians well spaced apart for entire length;
 mulberry bud mite . 9-33. *mori* (K.) (p. 31)
33. Abdominal microtubercles stronger below, sup-
 pressed on dorsal half: alfalfa bud mite . .
 9-34. *medicaginis* (K.) (p. 30)
 Microtubercles evenly developed on abdomen,
 above and below 34.
34. Lateral granulations extending into shield
 area in front of dorsal tubercles . . . 35.

- Granular area more restricted to side, not involving area in front of dorsal tubercles 36.
35. Granulations extending to first submedian lines; on *Eriophyllum* 9-35. *langei* (K.) (p. 29)
Granulations not extending past second submedians; on *Artemisia heterophylla* 9-36. *abalis* (K.) (p. 23)
36. Second submedian shield line with a branch crossing first submedian line in front of tubercles 37.
First and second submedians usually separate for entire length, not crossing 38.
37. Dart-shaped median mark in center of shield on median line; leaf galls on *Baccharis viminea* and *glutinosa* . 9-37. *baccharices* K. (p. 24)
Median line simple; flower galls on *Wyethia* 9-38. *beevori* K. (p. 24)
38. Dart-shaped mark near posterior end of median shield line; vagrant in hairs on *Wyethia* 9-39. *wyethiae* K. (p. 34)
Median line simple 39.
39. Microtubercles pointed; around lateral buds on twigs of *Baccharis pilularis* 9-40. *calibaccharis* (K.) (p. 25)
Each microtubercle bearing a spinule or produced point 40.
40. First submedian line strong and extending nearly to dorsal tubercle; more elongate species; on *Ericameria* 9-41. *spinulifera* (K.) (p. 33)
First submedian line weak, not clearly extending past center of shield; more robust mite on *Haplopappus* . 9-42. *haplopappi* (K.) (p. 29)
41. Abdominal microtubercles rounded 42.
Microtubercles pointed or spinuliferous. 44.
42. Third ventral seta large and spine-like; vagrant in leaf hairs on artichoke 9-43. *neocynarae* (K.) (p. 31)
Third ventral seta normal 43.
43. Median and submedian shield lines obsolete; lateral ocellar spot; on *Allenrolfea* 9-43.1 *allenrolfeae* K. (p. 23)
Median shield line with dart-shaped mark at rear, first submedian line running past second 9-44. *magnoliae* (K.) (p. 30)
Median line simple at rear, first submedian enclosed by second; causes large drooping catkin galls on *Populus* 9-45. *neoessigi* (K.) (p. 31)
44. Median shield line connected to admedians by front branches and cross lines; on carnation 9-45.1 *paradianthi* K. (p. 32)
Median line unconnected; second submedian line forked in front of dorsal tubercle; purple wart mite on aloe . 9-46. *aloinis* (K.) (p. 23)
Median line unconnected; first submedian line forked in front of tubercle; on creosote bush 9-47. *larreae* (K.) (p. 20)
45. Shield pattern a network, first submedian line joining admedian before dorsal tubercles; lupine bud mite 9-48. *calilupini* (K.) (p. 26)
First submedian line separate from admedian; bulb eriophyid . . 9-49. *tulipae* (K.) (p. 33)

Species of Paraphytoptus

- Featherclaw 6-rayed; tergites covering two sternites for 3/4 of the abdomen; in surface hairs, buds and seedheads of *Brickellia* 10-1. *brickelliae* K. (p. 34)
Featherclaw 6-rayed; tergites covering two sternites on rear 1/4 of abdomen; bud mite on pine tree mistletoe 10-1.1 *arceuthobii* K. (p. 34)
Featherclaw 5-rayed 2.
- Shield design net-like; bud mite on *Rhamnus* 10-2. *rhamniphagus* K. (p. 35)
Shield design of lines 3.
- Median line ending in a dart-shaped mark 4.
Median line simple to rear 5.
- Tergites covering two sternites each for 5/6 of abdomen length; vagrant in *Encelia* hairs 10-3. *mcgregori* K. (p. 35)
Tergites covering two sternites each on rear third only; semi-budmite on *Chrysanthemum* 10-4. *chrysanthemi* K. (p. 35)
- Lateral granular area on shield extending to first submedian line; in surface hairs on *Salvia apiana* 10-5. *salviacrinis* K. (p. 35)
Second submedian line distinct at least in part 6.
- Second submedian shield line recurved centrad behind first submedian; rear tergites with uneven serrate edges; in hairs of *Artemisia californica* 10-6. *californicus* (Hall) (p. 34)
Second submedian diverging from first or forked from first 7.
- Tergites covering at least two sternites for 1/2 abdominal length; in surface hairs on *Artemisia heterophylla* 10-7. *inaequalis* K. (p. 35)
Broader tergites occupying rear fourth of abdomen, or less; in buds and among hairs of *Pluchea* . . 10-8. *calipluchae* (K.) (p. 35)

Species of Eriophyes

- Female genitalia with longitudinal furrows in

- two ranks, the genitalia appressed to coxae and the apodeme shortened; lateral ocellar spot on shield; grape bud and erineum mite 11-1. *vitis* (Pgst.) (p. 38)
 Female genitalia normal distance from coxae, with furrows in a single rank; apodeme normal length; no ocellar spot 2.
2. Featherclaw 3-rayed; willow bud mite 11-2. *triradiatus* (Nal.) (p. 38)
 Featherclaw 4-rayed 3.
 Featherclaw 5-rayed 11.
 Featherclaw 6-rayed 12.
3. Body rings smooth, or with large ventral microtubercles which if present are usually in small numbers 4.
 Rings completely microtuberculate 5.
4. Female genital apodeme evenly rounded anteriorly; some individuals with ventral microtubercles; bead galls on alder leaves 11-3. *laevis* (Nal.) (p. 37)
 Female genital apodeme emarginate centrally and notched laterally; never with ventral tubercles; finger galls on *Prunus emarginata* 11-4. *emarginatae* K. (p. 36)
5. Microtubercles on abdomen each bearing a spinule, or ventrally in the form of triangular points 6.
 Microtubercles rounded or at most slightly pointed 7.
6. Ventral microtubercles in the form of points; shield design centrally indistinct; inquiline in *Prunus emarginata* finger galls 11-5. *savagei* K. (p. 38)
 Microtubercles evenly spinuliferous; shield design more distinct; bud mite on *Prunus andersoni* 11-6. *breechii* K. (p. 35)
7. Admedian lines confluent behind median; pear leaf blister mite 11-7. *pyri* (Pgst.) (p. 37)
 Admedians ending on rear shield margin 8.
8. Median line faint to rear or obsolete; admedians present only on rear half of shield; in buds of *Prunus ilicifolia* 11-8. *ilicifoliae* K. (p. 36)
 Median shield line distinct 9.
9. Median line broken but otherwise simple; leaf erineum on *Prunus andersoni* 11-9. *prunandersoni* K. (p. 37)
 Median line ending in a dart-shaped mark 10.
10. Submedian line meeting an inwardly diagonal line in front of tubercle; toyon bud mite 11-10. *heteromeles* K. (p. 36)
 Submedian line forked in front of tubercle; nail galls on linden leaves 11-11. *tiliae* (Pgst.) (p. 38)
11. Dorsal setae directed dorso-centrally; shield design of lines of granules; Euonymus bud mite 11-12. *convolvens* (Nal.) (p. 36)
 Dorsal setae directed antero-centrally; shield design indistinct; Wisteria bud mite 11-13. *wisteriae* K. (p. 39)
12. Dorsal setae directed dorso-centrally; lateral shield granules encroaching to admedian lines; in leaf sheaths of *Carex barbarae* 11-14. *caricis* K. (p. 36)
 Dorsal setae directed ahead and up 13.
13. Shield covered with short longitudinal streaks; admedian lines distinct; flower gall on *Spiraea densiflora* 11-15. *spiraeae* (Nal.) (p. 38)
 Shield design obsolete centrally; in buds and blasted flowers of *Buxus* 11-16. *canestrinii* (Nal.) (p. 36)

Phyllocoptinae, Key to Tribes

1. Rostrum variable in size but always with chelicerae evenly downcurved; dorsal tubercles variable in position . *Phyllocoptini*
 Rostrum large, tapering, the chelicerae abruptly bent down at right angles a short distance from base; dorsal tubercles ahead of rear margin and directing the setae (when present) up and ahead *Diptilomiopini* (p. 19)

Phyllocoptini, Key to Genera

1. Tergites moderately broad, with more or less acute and produced lateral lobes; dorsal tubercles and setae various 13. *Oxypleurites* (p. 16)
 Tergites of various widths, but curving evenly to sternites, or extremely broad 2.
2. Dorsal setae absent 3.
 Dorsal setae present 4.
3. Abdomen without ridges 14. *Coptophylla* (p. 17)
 Abdomen with three to five wax bearing ridges 15. *Calacarus* (p. 17)
4. Dorsal setae projecting directly caudad over abdomen from tubercles on rear margin 5.
 Dorsal setae nearly always arising from tubercles distinctly ahead of rear shield margin, the setae projecting centrally, up, or ahead 10.
5. Tergites very large and broad, contrasting with those over cauda 16. *Anthocoptes* (p. 17)

- Tergites not as broad and graduating evenly to the rear 6.
6. Abdomen circular or broad-elliptical in cross section, only slight subdorsal furrows if any, tergites not undulate 17. *Vasates* (p. 17)
Tergites ridged, furrowed, or undulate 7.
7. Tergites usually undulate or lobed; female genitalia appressed to coxae and apodeme shortened 18. *Gammaphytoptus camphorae* (p. 48)
Tergites forming ridges or furrows; genitalia normal distance from coxae and apodeme usual length 8.
8. Dorsum almost wholly occupied by a broad longitudinal trough, no central ridge 19. *Tetra* (p. 18)
A central dorsal ridge and subdorsal ridges 9.
9. The central ridge ending in broad dorsal trough before end of trough 20. *Abacarus* (p. 18)
Central ridge as far caudad as subdorsal ridges, all fading simultaneously 21. *Tegonotus* (p. 18)
10. Featherclaw divided 11.
Featherclaw simple 13.
11. Abdomen expanded laterally behind shield, caudal portion suddenly narrower. 22. *Tumescoptes trachycarpi* (p. 50)
Abdomen tapering evenly 12.
12. Central abdominal ridge ending before end of dorsal trough 23. *Acaricalus* (p. 18)
Central ridge tapering simultaneously with furrows and subdorsal ridges 24. *Acaphylla steinwedeni* (p. 50)
13. Abdomen circular or broad-elliptical in cross section, only slight subdorsal furrows 25. *Phyllocoptes* (p. 18)
Abdomen flattened, or with central trough or ridge 14.
14. Accessory flap over rostrum under anterior shield lobe; rear of abdomen abruptly projecting down or recurved; flattened species 15.
No accessory flap under anterior shield lobe 16.
15. Central longitudinal ridge present 26. *Caliphytoptus quercilobatae* (p. 52)
Three narrow dorsal longitudinal furrows 27. *Acarelliplus occidentalis* (p. 52)
16. Central dorsal longitudinal furrows 17.
- Flattened species, or dorsal ridges present, no central furrow 18.
17. Central furrow occupying center of broader central ridge 28. *Cupacarus cuprifestor* (p. 52)
The furrow a broad trough occupying most of dorsum with a ridge on each side 29. *Phyllocoptruta oleivorus* (p. 52)
18. Flat species with a sublateral longitudinal furrow on each side 30. *Platyphytoptus* (p. 18)
Species less flat, having central ridges or rows of spines 19.
19. Lines of wax-bearing spines on a pattern of low longitudinal ridges 31. *Callyntrotus schleictendali* (p. 53)
One central longitudinal ridge, sometimes low and not much differentiated from rest of dorsum 20.
20. The central longitudinal ridge often low, but tapering evenly with subdorsal furrows, part of species flattened 32. *Epitrimerus* (p. 18)
Central ridge sharper and usually higher, ending in a broad trough before lateral ridges; sides of abdomen often declivitous 21.
21. All ventral setae present, anterior shield lobe acute 33. *Calepitrimerus* (p. 19)
Ventral abdominal setae I and II absent; anterior shield lobe broad 34. *Acamina nolinae* (p. 57)

Species of *Oxypleurites*

1. Dorsal shield tubercles ahead of rear margin 2.
Dorsal tubercles on rear margin 3.
2. Hind patellar seta present, on cultivated *Corylus* 13-1. *depressus* Nal. (p. 40)
Hind patellar seta absent; on alder 13-2. *marinalni* K. (p. 40)
3. Dorsal depression immediately above cauda; lateral projections unequal; on olive 13-3. *maxwelli* K. (p. 40)
Dorsum curving evenly down to cauda 4.
4. Dorsal setae projecting outwards and caudad 5.
Dorsal setae projecting up and centrally 7.
5. Tergites flat; on English walnut 13-4. *juglandis* K. (p. 40)
A central longitudinal ridge 6.
6. Tergal ridge with small longitudinal furrows; southern species on *Baccharis*

- 13-5. *baccharis* K. (p. 40)
Tergal ridge with almost no sculpturing; central California; on *Baccharis*
13-6. *acidotus* K. (p. 39)
7. Central longitudinal ridge on dorsum; on *Aesculus* . . 13-7. *aesculifoliae* (K.) (p. 39)
No tergal ridge 8.
8. Shield as long as broad; montane species; on *Cornus* 13-8. *cornifoliae* K. (p. 40)
Shield shorter than broad; lowland species; on *Cornus* 13-9. *glabratae* K. (p. 40)

Species of *Coptophylla*

1. Tergites broad, each covering a number of fine sternites; on cultivated *Corylus*
14-1. *lamimani* (K.) (p. 41)
Tergites and sternites all narrow and about equal, microtuberculate 2.
2. Shield design of solid lines; on *Arbutus*
14-2. *arbuti* (K.) (p. 41)
Shield design of lines of granules; on oak
14-3. *caliquerci* K. (p. 41)

Species of *Calacarus*

1. Three wax-bearing abdominal ridges; on Kellogg oak 15-1. *pulviferus* K. (p. 42)
Five wax-bearing abdominal ridges 2.
2. Elaborate shield pattern of curved lines; on *Camellia* . . . 15-2. *adornatus* K. (p. 41)
Shield design of a simple elliptical central raised plate, the margin absent anteriorly; on Valley white oak 15-3. *tejonis* K. (p. 42)

Species of *Anthocoptes*

1. Featherclaw 2-rayed; on elm
16-1. *punctidorsa* K. (p. 42)
Featherclaw 5 or 6-rayed 2.
2. Featherclaw 6-rayed; on *Pickeringia*
16-2. *pickeringiae* K. (p. 42)
Featherclaw 5-rayed 3.
3. Tergites non-tuberculate, shield with central longitudinal hump; on *Ceanothus cuneatus*
16-3. *hesperus* K. (p. 42)
Tergites with elongate microtubercles; shield design obsolete; on *Ericameria*
16-4. *ericameriella* K. (p. 42)

Species of *Vasates*

1. Featherclaw 2-rayed; on elm

- 17-1. *calulmi* (K.) (p. 43)
Featherclaw 8-rayed 2.
- Featherclaw 7-rayed 3.
Featherclaw 6-rayed 4.
Featherclaw 5-rayed 5.
Featherclaw 4-rayed 6.

2. Shield pointed anteriorly and with design clearly visible; on mesquite
17-2. *prosopis* (K.) (p. 47)
Anterior shield lobe rounded; design obsolete; on *Tamarix* . . . 17-3. *immigrans* (K.) (p. 45)
3. Median shield line ending with a dart-shaped mark; on *Symphoricarpos*
17-4. *symphoricarpi* (K.) (p. 47)
Median shield line simple; on *Elymus*
17-5. *mckenziei* K. (p. 46)
4. Shield design net-like, tergites smooth; on *Cercis* 17-6. *scotti* (K.) (p. 47)
Shield granular, tergites with elongate microtubercles; on *magnolia*
17-7. *magnolivora* (K.) (p. 46)
5. Microtubercles spine-like; on *Manzanita*
17-8. *manzanitae* (K.) (p. 46)
Microtubercles pointed or short-spinulate, on *Cotyledon* . . 17-9. *cotyledonis* (K.) (p. 43)
Tergites lacking microtubercles; on *Ambrosia*
17-10. *ambrosiae* (K.) (p. 43)
6. Dorsal setae at least one and one half the shield length 7.
Dorsal setae at most about shield length 8.
7. Tergites microtuberculate; on native *Corylus*
17-11. *tamalpais* (K.) (p. 47)
Tergites smooth; on azalea
17-12. *rhododendronis* (K.) (p. 47)
8. Shield design obsolete; on *Umbelliferae*
17-13. *eurynotus* (Nal.) (p. 44)
Shield design distinct 9.
9. Shield strongly declivitous on front of anterior lobe; on *Solanums*
17-14. *destructor* (K.) (p. 44)
Anterior shield lobe tapering to leading edge 10.
10. Anterior shield lobe with a pair of small terminal spines 11.
Anterior shield lobe lacking terminal spines 14.
11. Shield design of lines of granules; on apple
17-15. *malivagrans* K. (p. 46)
Shield design of solid lines 12.

12. Tergites strongly microtuberculate; on *Rhamnus*
 17-16. *rhamnivagrans* (K.) (p. 47)
 Tergites smooth or nearly so 13.
13. On privet 17-17. *ligustri* (K.) (p. 45)
 On peach 17-18. *cornutus* (Banks) (p. 43)
 On plum 17-19. *fockeui* (Nal.) (p. 45)
14. Tergites and sternites about equal in number;
 on Sierra Maple .17-20. *paraglabri* K. (p. 46)
 Tergites less numerous than sternites . . 15.
15. Tergal microtubercles indistinct; bead galls
 on willow leaves 17-21. *laevigatae* (Hassan)
 (p. 45)
 Tergal microtubercles distinct 16.
16. Tergal microtubercles short, elliptical, bead
 galls on poison oak leaves
 17-22. *toxicophagus* (Ewing) (p. 47)
 Tergal microtubercles elongate; on Sierra
 Maple in magenta erineum 17-23. *glabri* K. (p. 45)

Species of Tetra

1. Featherclaw 6-rayed; vagrant on leaves of
Cercocarpus . . .19-1. *cercocarpi* K. (p. 48)
 Featherclaw 2-rayed; vagrant on elm leaves . .
 19-2. *concava* (K.) (p. 48)

Species of Abacarus

1. Featherclaw 8-rayed; submedian shield lines
 absent; on grass .20-1. *hystrix* (Nal.) (p. 48)
 Featherclaw 6-rayed; submedian shield lines
 present; on *Ceanothus* 20-2. *acalyptus* (K.) (p. 48)

Species of Tegenorus

1. Tergites narrow, microtuberculate 2.
 Tergites broader, microtubercles suppressed or
 absent 3.
2. Shield design of lines of granules; under avo-
 cado buttons . . . 21-1. *myersi* (K.) (p. 49)
 Shield design of solid lines; vagrant on ash .
 21-2. *califraxini* (K.) (p. 49)
3. Broad central tergal ridge; deforming *Rhamnus*
 leaves 21-3. *rhamnicola* (K.) (p. 49)
 Narrow central ridge 4.
4. Shield design net-like; on jujube
 21-4. *zizyphagus* (K.) (p. 49)
 Shield design obscure; on box elder
 21-5. *negundella* K. (p. 49)

Species of Acaricalus

1. Shield strongly keeled, lines of design nar-

row; on oak . . . 23-1. *segundus* K. (p. 50)
 Shield hardly keeled, lines broad; on ivy . .
 23-2. *hederae* (K.) (p. 50)

Species of Phyllocoptes

1. Featherclaw 3-rayed; on willow
 25-1. *calisalicis* K. (p. 51)
 Featherclaw 4-rayed 2.
 Featherclaw 5-rayed 3.
 Featherclaw 6-rayed; on rose
 25-2. *adalius* K. (p. 51)
2. Tergites very similar to sternites; on plum
 25-3. *abaenus* K. (p. 51)
 Tergites distinctly broader than sternites; on
 bracken 25-4. *dimorphus* K. (p. 51)
3. Female coverflap longitudinally very narrow;
 on *Cedrus* 25-5. *cedri* K. (p. 51)
 Tergal coverflap of normal shape 4.
4. Shield design a network of solid lines; in
 rose fruits . 25-6. *fructiphilus* K. (p. 51)
 Shield design of lines of granules 5.
5. Admedian lines forked to rear, the inner
 branches confluent; on *Rubus vitifolius* . .
 25-7. *calirubi* K. (p. 51)
 Admedian lines diverging to rear; on cultivat-
 ed *Rubus**. . . 25-8. *gracilis* (Nal.) (p. 52)

Species of Platyphytoptus

1. Tergites and sternites about equal in number;
 on lowland and middle altitude pines in
 needle sheaths
 30-1. *sabinianae* K. (p. 53)
 Tergites half as numerous as sternites; on
Pinus murryana at high elevations
 30-2. *multisternatus* K. (p. 53)

Species of Epitrimerus

1. Dorsal setae projecting caudo-centrally or
 centrally from tubercles diagonal with but
 touching the rear margin 2.
 Tubercles well ahead of the rear shield mar-
 gin, the setae projecting centrally . . 3.
2. Featherclaw 5-rayed; on *Ribes*
 32-1. *sierribis* K. (p. 55)
 Featherclaw 6-rayed; on *Ptelea*
 32-2. *pteleae* K. (p. 55)
3. Shield bearing prominent lateral lobes . . 4.
 Shield curving evenly into abdomen . . . 5.
4. Featherclaw 4-rayed; on pear

*and *R. parviflorus*

- 32-3. *pyri* (Nal.) (p. 55)
 Featherclaw 5-rayed; on *Abies concolor* . . .
 32-4. *abietis* K. (p. 54)
 Featherclaw 6-rayed; on *Cupressus* . . .
 32-5. *cupressi* (K.) (p. 54)
 5. Dorsal ridges with wax glands forming longitudinal bands of wax; on *Sambucus* . . .
 32-6. *trilobus* (Nal.) (p. 55)
 No definite longitudinal wax stripes formed, or no wax . . . 6.
 6. Female coverflap with diagonal furrows . 7.
 Female genital coverflap with numerous short longitudinal streaks . . . 8.
 7. Tergites much broader than sternites; on *Cupressus* . 32-7. *cupressifoliae* K. (p. 54)
 Tergites but little broader than sternites; on *Libocedrus* . 32-8. *libocedri* (K.) (p. 54)
 8. Featherclaw 4-rayed; on *Pseudotsuga* . . .
 32-9. *pseudotsugae* K. (p. 55)
 Featherclaw 10-rayed; on *Taxodium* . . .
 32-10. *taxodii* (K.) (p. 55)

Species of *Calepitrimerus*

1. Dorsal tubercles produced finger-like; featherclaw 5-rayed; in surface hairs on *Umbellularia* tips 33-1. *umbellulariae* K. (p. 57)
 Dorsal tubercles but moderately raised . . 2.
 2. Featherclaw 8-rayed; on *Andropogon* . . .
 33-2. *andropogonis* K. (p. 56)
 Featherclaw 7-rayed; on *Amelanchier* leaves . . .
 33-3. *anatis* K. (p. 56)
 Featherclaw 4-rayed . . . 3.
 3. Central dorsal ridge one half abdominal length; on apple . 33-4. *baileyi* K. (p. 56)
 Central ridge two thirds or more abdominal length . . . 4.
 4. Shield design obscure, large area of lateral granulations; on *Artemisia heterophylla* . . .
 33-5. *cariniferus* K. (p. 56)
 The admedian lines and some others distinct . . . 5.
 5. Admedian lines forking between the dorsal tubercles; on grape 33-6. *vitis* (Nal.) (p. 57)
 Admedian lines curving outward between the dorsal tubercles; on *Crataegus* . . .
 33-7. *armatus* (Nal.) (p. 56)

Diptilomiopini, Key to Genera

1. Featherclaw simple . . . 2.
 Featherclaw divided . . . 4.
 2. No dorsal setae . . .
 35. *Asetacus madronae* K. (p. 57)
 Dorsal setae present . . . 3.
 3. Broad mid-dorsal abdominal ridge, the tergites uneven in lateral view . . .

36. *Quadracus urticarius* (C. & M.) (p. 57)
 At most only slight subdorsal furrows; no broad central ridge, tergites even in side view . . . 37. *Rhyncaphytoptus* K. (p. 19)

4. Dorsal setae missing . 38. *Rhynacus* K. (p. 19)
 Dorsal setae present . 39. *Diptacus* K. (p. 19)

Species of *Rhyncaphytoptus*

1. Fore tibia shorter than tarsus . . . 2.
 Fore tibia as long or longer than tarsus . 3.
 2. Dorsal tubercles fingerlike; on sycamore . . .
 37-1. *platani* K. (p. 58)
 Dorsal tubercles only moderately produced; on oak . . . 37-2. *megarostris* (K.) (p. 58)
 3. Tergites quite similar to sternites in form and number; coverflap with longitudinal scoring; on boxelder . . .
 37-3. *strigatus* K. (p. 59)
 Tergites fewer and broader than sternites . 4.
 4. Microtubercles strongly spinelike; on Kellogg oak . . . 37-4. *spinifera* K. (p. 59)
 Microtubercles at most but moderately spinelike . . . 5.
 5. Tergites smooth, covering 2 or 3 sternites; on high mountain willow . . .
 37-5. *salicifoliae* K. (p. 58)
 Tergites bearing small spines, at least laterally, each covering 4 to 5 sternites for most of body length . . . 6.
 6. Featherclaw 5-rayed; on elm . . .
 37-6. *ulmivagrans* K. (p. 59)
 Featherclaw 6-rayed; on fig . . .
 37-7. *ficifoliae* K. (p. 58)
 Featherclaw 9-rayed; on lowland willow . . .
 37-8. *acilius* K. (p. 58)

Species of *Rhynacus*

1. Tergites broader than and distinctly less numerous than sternites; on manzanita . . .
 38-1. *arctostaphyli* (K.) (p. 60)
 Tergites and sternites about same number and structure; on *Rubus* . . .
 38-2. *abronius* (K.) (p. 59)

Species of *Diptacus*

1. Dorsal tubercles slightly produced, the setae short; anterior shield lobe short; design on shield net-like; on plum, peach, blackberry, grape and other hosts . . .
 39-1. *gigantorhynchus* (Nal.) (p. 60)
 Dorsal tubercles finger-like; anterior shield lobe produced well over rostrum . . . 2.
 2. Median shield line 3/4 as long as shield; on alder . . . 39-2. *sacramentae* (K.) (p. 60)
 Median line indistinct; on native *Corylus* . . .
 39-3. *calicoryli* (K.) (p. 60)

IV. Discussion of Species

PHYTOPTINAE

Genus 1. *Trisetacus* Keifer, 1952

Bul. Cal. Dept. Agr. V. 41, p. 32, 1952
Type of genus: *Trisetacus pini* (Nal.)

Trisetacus cupressi (K.) (1-2) Plate 1-2

Phytoptus cupressi Keifer, BCDA V. 33, p. 19, 1944
Type locality: San Francisco
Type host: *Cupressus macrocarpa* Hartw., Monterey cypress
Additional host: *Juniperus chinensis procumbens* Endl., prostrate juniper
Common name: Cypress tip mite
Relation to host: On Monterey cypress the mite forms small galls on the tips of the twigs. What appears to be the same mite kills the tips on prostrate juniper.

California records:

ALAMEDA CO.: Berkeley, X-1-1941, Juniper (M. R. Bell)
ORANGE CO.: Santa Ana, VI-10-1942 (Dudley)
SAN FRANCISCO CO.: San Francisco, VIII-28-1943 (HHK)

Trisetacus pini (Nal.) (1-1) Plate 1-1

Phytoptus pini Nalepa. Ab. Akad. Wiss. math-nat. Wien. V 96, p. 133, 1887
Eriophyes pini (Nal.) Keifer, BCDA V. 27, p. 182, 1938
Type locality: Austria
Type host: *Pinus sylvestris* L.
Additional hosts: *Pinus* spp.
Common name: Pine bud mite (approved)
Relation to host: In California the mites inhabit the needle sheaths and have occasionally been found to cause yellowing of the needles. In Europe on the type host this species produces twig enlargements.
Discussion: This mite is widely distributed, apparently by natural means. It occurs on any pine in California that has an adequate needle

sheath. Certain varieties have been named for this mite but the writer is unable to comment on their status at the present writing. In California the species of the genus *Pinus* that have the mite are: *jeffreyi* Vasey, Jeffrey pine; *ponderosa* Dougl., Yellow pine; *radiata* Don, Monterey pine; *sabiniana* Dougl., Digger pine; *torreyana* Parry, Torrey pine. This list will undoubtedly be enlarged.

California records:

AMADOR CO.: Lumber Yard Station, VIII-17-1947 (HHK)
EL DORADO CO.: Fallen Leaf Lake, IX-10-1947 (HHK)
CONTRA COSTA CO.: Mt. Diablo, IX-20-1951 (HHK)
LOS ANGELES CO.: Charleston Flats, IX-12-1944 (L. E. Myers)
MENDOCINO CO.: Albion, III-2-1939 (J. B. Steinweden)
RIVERSIDE CO.: Idylwild, X-9-1939 (HHK)
SAN DIEGO CO.: Torrey Pines, IX-7-1937 (M. L. Jones)
SAN LUIS OBISPO CO.: Cambria, IX-6-1940 (HHK)
SACRAMENTO CO.: Sacramento, IX-1937 (HHK)

Genus 2. *Setoptus* Keifer, 1944

BCDA V. 33, p. 19, 1944
Type of genus: *Setoptus jonesi* (K.)

Setoptus jonesi (K.) (2-1) Plate 2-1

Platyphytoptus jonesi Keifer, BCDA V. 27, p. 189, 1938
Type locality: Torrey Pines
Type host: *Pinus torreyana* Parry
Additional hosts: *Pinus jeffreyi* Vasey; *P. muricata* Don; *P. ponderosa* Dougl.
Common name: Torrey pine sheath mite
Relation to host: The mites inhabit the needle sheaths with no apparent damage to their hosts.
Discussion: This is the largest Eriophyid in California. It is widely distributed although search has failed to indicate that it inhabits Monterey pine in its three mainland stands:

Cambria, Monterey and Ano Nuevo Point. It occurs north and south of these localities, however.

California records:

AMADOR CO.: Lumber Yard Station, VIII-17-1947 (HHK)
EL DORADO CO.: Twin Bridges, IX-9-1945 (HHK)
MARIN CO.: Inverness, VII-1939 (HHK)
SAN DIEGO CO.: Torrey Pines, IX-7-1937 (M. L. Jones)

Genus 3. *Phytoptus* Dujardin, 1851

Ann. Sci. nat. ser. 3, V. 15, p. 166, 1851

Type of genus: *Phytoptus avellanae* Nal., Keifer, BCDA v. 27, p. 301, 1938

Phytoptus avellanae Nal. (3-1)

Plate 3-1

Phytoptus avellanae Nalepa, Sb. Akad. Wiss. math-nat. Wien, V. 98, p. 126, 1889

Type locality: Austria

Type host: *Corylus avellana* L., Filbert

Common name: Filbert bud mite (approved)

Relation to host: The mites overwinter in the terminal buds and change them into an enlarged structure which is a gall and is known as "big bud". During the summer the nymphs apparently exist in two forms. The one resembling the adult is found in the buds. The one on the underside of the leaves is of a form which could not be expected for this type of mite since this nymph resembles Oxypleurites mites.

Discussion: The mite is widely distributed on its host, and occurs on what is probably a native *Corylus* in the Eastern United States. Vallot in 1836 named this mite *Acarus pseudogallarum*: Mem. Ac. Dijon p. 189.

California records:

BUTTE CO.: Paradise V-16-1939 (A. E. Davey)

Phytoptus corniseminis K. (3-2)

Plate 3-2

Phytoptus corniseminis Keifer, BCDA v. 28, p. 144, 1939

Type locality: Riverton, El Dorado Co.

Type host: *Cornus nuttalli* Aud., flowering dogwood

Common name: Dogwood budmite

Relation to host: The mites overwinter in the terminal buds. In the spring they move to the flowers and then live through the summer mainly between the seeds in the persistent seed heads.

No damage would seem to result from the activities of the mite.

California records:

EL DORADO CO.: Riverton, VIII-24-1938 (HHK)

Phytoptus hedericola K. (3-3)

Plate 3-3

Phytoptus hedericola Keifer, BCDA v. 32, p. 212, 1943

Type locality: San Mateo

Type host: *Hedera helix* L., English Ivy

Common name: Ivy budmite

Relation to host: The mites inhabit the buds and cause stunting of the leaves. On dwarf potted ivy this mite produces severe stunting of the shoots.

California records:

LOS ANGELES CO.: Montebello, IX-15-1942

(V. E. Williams)

SAN MATEO CO.: San Mateo, XII-26-1942 (HHK)

Genus 4. *Anchiphytoptus* Keifer, 1952

BCDA v. 41, p. 31, 1952

Type of genus: *Anchiphytoptus lineatus* K.

Anchiphytoptus lineatus K. (4-1)

Plate 4-1

Anchiphytoptus lineatus Keifer, BCDA v. 41, p. 31, 1952

Type locality: Rocky Camp, Hat Creek

Type host: *Cercocarpus ledifolius* Nutt., Mountain mahogany

Relation to host: This species is presumably a budmite. It was recovered from dry sections of the host plant while the writer was studying the leaf vagrant, *T. cercocarpi*, on this host.

California records:

SHASTA CO.: Rocky Camp, Hat Creek. VIII-10-1948 (HHK)

SIERRAPHYTOPTINAE

Genus 5. *Sierraphytoptus* Keifer, 1939

BCDA v. 28, p. 151, 1939

Type of genus: *Sierraphytoptus alnivagrans* K.

Sierraphytoptus alnivagrans K. (5-1)

Plate 5-1

Sierraphytoptus alnivagrans Keifer, BCDA V. 28,
p. 152, 1939

Type locality: Cisco district

Type host: *Alnus tenuifolia* Nutt., alder

Relation to host: The mites are undersurface
vagrants

California records:

PLACER CO.: Cisco district, IX-13-1938 (HHK)

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951
(HHK)

Genus 6. *Mackiella* Keifer, 1939

BCDA V. 28, p. 147, 1939

Type of genus: *Mackiella phoenicis* K.

Mackiella phoenicis K. (6-1)

Plate 6-1

Mackiella phoenicis Keifer, BCDA V. 28, p. 147,
1939

Type locality: Indio

Type host: *Phoenix dactylifera* L., date palm

Common name: Date palm budmite

Relation to host: The mites live between the sur-
faces of the folded fronds as they rise out of
the bud. No apparent damage has ever been
noted.

Discussion: This mite is without doubt of Old
World origin, but apparently no one has ever
searched for it on date palm in its native
habitat. To collect the mite the collector
must cut away the numerous sharp spines to get
to the folded leaves.

California records:

RIVERSIDE CO.: Indio, X-10-1938 (HHK)

SOLANO CO.: Winters district (Wolfskill
Ranch), V-3-1945 (HHK)

Genus 7. *Nalepella* Keifer, 1944

BCDA V. 33, p. 21, 1944

Type of genus: *Nalepella tricerus* (Borner), Abr.
Biol. Abt. Land-Forst. Kaiserl. Ges. Berlin, V.
5. p. 140, 1906; Keifer, BCDA V. 33, p. 21,
1944

Discussion: This genus was erected to accommodate
mites allied to *Sierraphytoptus* that have three

shield setae but no subdorsal abdominal setae.
The writer has not seen the type of the genus,
but the published figure seems informative. In
1905 Banks established the genus *Cecidobia* for
the species *salicicola*, a mite he stated was
from willow galls. Banks described this mite as
having a frontal shield seta (like *Nalepella*?),
but the dorsal setae are depicted as pointing
backwards, unlike *Nalepella*. Prof. T. D. A.
Cockerell supplied the original material to
Banks, and in 1944 he sent the writer additional
willow galls from the same location, on request.
The mites in these galls proved to be a species
of *Vasates*, perhaps the same as the mite Banks
described except for the frontal seta. Banks may
have mistaken uplifted chelicerae for a frontal
seta. At any rate, *Cecidobia* remains unexplained.

Nalepella ednae K. (7-1)

Plate 7-1

Nalepella ednae Keifer, BCDA V. 40, p. 93, 1951

Type locality: Twin Bridges

Type host: *Abies magnifica* Murr., red fir

Relation to host: The mites are needle vagrants on
the current season's growth, becoming more nu-
merous in late summer.

California records:

EL DORADO CO.: Twin Bridges, IX-1-1946 (HHK);
Fallen Leaf Lake, IX-11-1947

Nalepella tsugae K. (7-2)

Plate 7-2

Nalepella tsugae Keifer, BCDA V. 40, p. 94, 1951

Type locality: Lassen National Park, 8000 feet
elevation.

Type host: *Tsuga mertensiana* Bong., Mountain
hemlock

Relation to host: The mites are vagrants on the new
growth.

California record:

SHASTA CO.: Lassen National Park, VIII-22-1949
(HHK)

ERIOPHYINAE

Genus 8. *Cecidophyes Nalepa*, 1889

Sb. Akad. Wiss. math-nat. Wien, V. 98, p. 31, 1889

Type of genus: *Cecidophyes galii* (Karpelles) Nal.:
Keifer, BCDA V. 27, p. 302, 1938

Discussion: The writer has not seen the type of the genus and has no information on it except through Nalepa's publications. Nalepa used the genus for short, stocky mites, and then discarded it when this viewpoint became untenable. The lack of dorsal setae did not impress him as anything more than a specific character.

Cecidophyes malpighianus (C. & M.) (8-1)

Plate 8-1

Phytoptus malpighianus Canestrini and Massalongo.

Bul. Soc. Veneto-Trent. V. 5, p. 127, 1893;

Eriophyes m. Keifer, BCDA V. 28, p. 334, 1939

Type locality: Italy

Type host: *Laurus nobilis* L., Grecian laurel

Common name: Laurel budmite

Relation to host: The mites inhabit the buds and opening flowers. In the latter position they may cause blasting of the flower parts, or deformation. Infestations would seem to remain localized on the infested laurels, however.

Discussion: The original description does not precisely match our Sacramento specimens. There seems to be a complex of this type of mite in the Mediterranean region, laurel leaves from Israel bearing erineum having a very similar mite on them.

California record:

SACRAMENTO CO.: Sacramento, IV-6-1939 (HHK)

Cecidophyes verilicis (K.) (8-2)

Plate 8-2

Eriophyes verilicis Keifer, BCDA V. 28, p. 418, 1939

Type locality: Sacramento

Type host: *Ilex aquifolium* L., holly

Relation to host: The mites live in the buds and under the fruit buttons.

California records:

ALAMEDA CO.: Berkeley, III-15-1939

(G. B. Laing)

SACRAMENTO CO.: Sacramento, VI-21-1939 (HHK)

Genus 9. *Aceria* Keifer, 1944

Bul. Cal. Dept. Agr. V. 33, p. 22, 1944

Type of Genus: *Aceria tulipae* K., BCDA V. 27, p. 185, 1938

Discussion: This genus accommodates worm-like mites

with the dorsal setae projecting directly backwards from tubercles on the rear margin of the shield. The long axis of these dorsal tubercles is transverse to the direction of inclination. In *Aceria* this axis is transverse to the body length. In some genera the dorsal tubercles are situated near the rear shield margin but have their long axis parallel to the body length, directing the dorsal setae up and centrally.

Aceria abalis (K.) (9-36)

Plate 9-36

Eriophyes abalis Keifer, BCDA V. 29, p. 25, 1940

Type locality: Sacramento

Type host: *Artemisia heterophylla* Nutt., wormwood

Relation to host: The mites cause erineum pockets on the undersides of the leaves. These pockets bulge out on the upper surface. The extra growth of hair makes the pockets white below.

Discussion: This mite is undoubtedly close to *Aceria artemisiae* (Can.) of Europe.

California record:

SACRAMENTO CO.: Sacramento, X-19-1939 (HHK)

Aceria allenrolfeae K. (9-43.1)

Plate 9-43.1

Aceria allenrolfeae Keifer, BCDA V. 41, p. 67, 1952

Type locality: Wheeler Ridge area of Kern County

Type host: *Allenrolfea occidentalis* (Wats.), Iodine bush

Additional host: *Salicornia* sp., pickleweed

Relation to host: The mites live in the crevices between the joints, and in the flower heads. In these locations they usually produce a slight browning and shriveling of the tissue.

California records:

KERN CO.: Wheeler Ridge district, XI-18-1951 (HHK)

SAN DIEGO CO.: Oceanside, X-2-1951, (HHK)

Aceria aloinis (K.) (9-46)

Plate 9-46

Eriophyes aloinis Keifer, BCDA V. 30, p. 205, 1941

Type locality: North Hollywood

Type host: *Aloe spinosissima*, aloe

Additional host: *Haworthia* sp.

Common name: Aloe wart mite.

Relation to host: On aloe the mite produces a large mass of disfiguring warts on the inner base of the leaves. The minute purple mites live in the crevices formed by the warts. The wart mass is entirely out of proportion to the size of the causative organism.

California records:

LOS ANGELES CO.: Burbank, IV-13-1944; Glendale, IV-15-1942 (L. E. Myers); Los Angeles, XII-12-1940 (V. E. Williams); North Hollywood, XI-18-1940 (VEW); Redondo Beach, II-25-1942; Van Nuys, IV-24-1944
 SAN DIEGO CO.: Pacific Beach, XII-9-1940 (T. Aller); San Diego, IX-16-1944 (D. F. Palmer)
 SANTA BARBARA CO.: Santa Barbara, VII-24-1941 (W. S. Cummings)

Aceria amicus (K.) (9-8)
 Plate 9-8

Eriophyes amicus Keifer, BCDA V. 29, p. 23, 1940
 Type locality: Wheeler Canyon
 Type host: *Juglans californica* Wats., Southern black walnut
 Additional host: *Juglans hindsii* Jepson, northern black walnut
 Relation to host: The mites are inquillines in the leaf galls caused by *Aceria brachytarsus* (K.)

California records:

VENTURA CO.: Wheeler Canyon, Santa Paula, X-4-1939 (Cyril Gammon)
 YOLO CO.: Davis, X-10-1939 (HHK)

Aceria baccharices K. (9-37)
 Plate 9-37

Aceria baccharices Keifer, BCDA V. 34, p. 139, 1945
 Type locality: Chico
 Type host: *Baccharis viminea* DC., mule fat, the northern plant
 Additional host: *Baccharis glutinosa* Pers., the southern plant
 Common name: Baccharis gallmite
 Relation to host: The mites produce bead galls on the leaves with the opening on the under surface. At times these galls are numerous enough to deform the leaves.
 Discussion: The type host is the long-leaf type

of *Baccharis* which is common to dry washes in northern California. The other host is the same sort of thing but confined to the south.

California records:

BUTTE CO.: Chico, XI-23-1944 (R. G. White)
 KERN CO.: Bakersfield, I-14-1946 (B. L. Fox)
 LOS ANGELES CO.: Glendale, VIII-12-1941 (V. E. Williams)
 RIVERSIDE CO.: Riverside, 1938 (K. E. Maxwell)
 SAN MATEO CO.: Belmont, V-31-1947
 VENTURA CO.: Santa Paula, VIII-8-1930 (E. L. Smith)

Aceria beevori K. (9-38)
 Plate 9-38

Aceria beevori Keifer, BCDA V. 40, p. 96, 1951
 Type locality: Sierra City district
 Type host: *Wyethia* sp. possibly *mollis*
 Relation to host: The mite produces galls in the flower heads of its host, which galls may at times involve the entire head.

California records:

SHASTA CO.: Rocky Camp, Hat Creek, VIII-10-1948 (HHK)
 SIERRA CO.: Sierra City district, VII-18-1948 (G. A. Beever)

Aceria boycei (K.) (9-22)
 Plate 9-22

Eriophyes boycei Keifer, BCDA V. 32, p. 213, 1943
 Type locality: Fillmore
 Type host: *Ambrosia psilostachya* DC., western ragweed
 Relation to host: The mites form numerous bead galls on the terminal leaves.
 Discussion: This mite does not occur on the same host in northern California.

California record:

VENTURA CO.: Fillmore, VIII-8-1940 (A. M. Boyce)

Aceria brachytarsus (K.) (9-7)
 Plate 9-7

Eriophyes brevitarisus Keifer, BCDA V. 28, p. 224, 1939
Eriophyes brachytarsus Keifer, BCDA V. 28, p. 328, 1939

Type locality: Sacramento
 Type host: *Juglans hindsii* Jepson, northern black walnut

Additional host: *Juglans californica* Wats., southern black walnut

Common name: Black walnut purse-gall mite

Relation to host: The mites produce moderate-sized purse galls on the leaves with the opening on the under surface. The galls may be quite numerous on the leaflets, especially on lower portions of the trees.

Discussion: When first formed these galls, which are rather large considering the size of the mite, are nearly empty, with only the stem-mother present. As the season advances the galls become filled with reddish mites until they are tightly packed in. Hassan, 1928, treated this species under the name *tristriatus* Nal. *Aceria tristriatus* is an European species which is said to have an elongate tarsus. Our California form does not have such a structure. In addition, the European mite should be examined for the presence or absence of elongate genital tubercles.

California records:

ALAMEDA CO.: Pleasanton, VI-29-1949

FRESNO CO.: Fresno, IV-20-1940

KINGS CO.: Hanford, V-9-1938

LOS ANGELES CO.: San Dimas, X-13-1938

(V. E. Williams)

NEVADA CO.: Nevada City, VII-26-1940 (HHK)

SACRAMENTO CO.: Sacramento, XII-19-1938 (HHK)

SAN BENITO CO.: Panoche Valley, V-15-1947

SAN DIEGO CO.: La Mesa, VI-25-1942 (Tower)

SANTA CLARA CO.: San Jose, VI-6-1942

(A. T. McClay)

SHASTA CO.: Redding, VII-8-1946

SOLANO CO.: Rio Vista, VI-24-1941

VENTURA CO.: Wheeler Canyon, Santa Paula,

X-4-1939 (C. Gammon)

YOLO CO.: Woodland, VII-27-1939

(J. B. Steinweden)

Aceria cactorum (K.) (9-2)

Plate 9-2

Eriophyes cactorum Keifer, BCDA V. 27, p. 185, 1938

Type locality: Santa Paula

Type host: *Opuntia* sp. (*occidentalis* Engelm.), cactus

Relation to host: The mites are most easily found in developing flowers. They also occur around new pads.

California record:

VENTURA CO.: Santa Paula, VII-28-1937 (HHK)

Aceria calaceris K. (9-9)

Plate 9-9

Aceria calaceris Keifer, BCDA V. 41, p. 33, 1952

Type locality: Fallen Leaf Lake

Type host: *Acer glabrum* Torr., Sierra maple

Relation to host: The mite is found in and presumably causes the magenta-colored erineum on the tips of the leaves of its host. This erineum is composed of hollow capitate hairs, containing magenta-colored fluid.

Discussion: White erineum on the leaves of big-leaf maple, *Acer macrophyllum*, proves to have the same complex of mites as this magenta erineum, although the precise relationships have not been determined. (Two other mites found in this magenta erineum are listed under the names *Vasates glabri* and *V. paraglabri*.) Banks in 1907 gave the catalog name *ryderi* to a mite which was the subject of a short article in 1879 by J. A. Ryder. This name was then the one available for maple erineum mites in North America and Essig (1926) used it for white erineum mites on California maple. Leonard (1928) uses this name for maple mites in New York State. However, Hodgkiss (1930) after a careful study of New York maple mites concludes that there is no way to apply the name. The writer, on examining Ryder's original article finds that while Ryder states the mite he saw to be a *Phytoptus*, he has omitted any mention of a locality, or the color of the erineum inhabited by the mites, or the precise species of maple infested. The conclusion here presented is that the name *ryderi* is useless.

California records:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951 (HHK)

Aceria calibaccharis (K.) (9-40)

Plate 9-40

Eriophyes calibaccharis Keifer, BCDA V. 28, p. 331, 1939

Type locality: Stanford Campus

Type host: *Baccharis pilularis* DC., chaparral broom

Relation to host: The mites occur along lateral buds on the stem below the terminal area where there is too much viscosity.

California record:

SANTA CLARA CO.: Palo Alto, IV-15-1939 (HHK)

Aceria caliberberis K. (9-25.1)

Plate 9-25.1

Aceria caliberberis Keifer, BCDA v. 41, p. 66, 1952

Type locality: Garnet Peak

Type host: *Berberis californica* Jepson, barberry

Relation to host: Working from the upper leaf surface the mites cause irregular longitudinal sinuate folds, anywhere from the edge to the midrib. The mites develop in the fold.

California record:

SAN DIEGO CO.: Garnet Peak, XI-22-1951

(C. E. Norland)

SISKIYOU CO.: Hornbrook, VII-7-1939

(E. A. Breech)

Aceria calilupini K. (9-48)

Plate 9-48

Aceria calilupini Keifer, BCDA v. 35, p. 39, 1946

Type locality: Table Mountain, Oroville

Type host: *Lupinus albifrons* Benth., white lupine.

Relation to host: The mites are abundant in hairs around the buds.

California record:

BUTTE CO.: Oroville district, VI-11-1944,

(HHK)

Aceria camelliae K. (9-1)

Plate 9-1

Aceria camelliae Keifer, BCDA v. 34, p. 137, 1945

Type locality: Santa Maria

Type host: *Camellia japonica* L.

Common name: Camellia budmite

Relation to host: The mites inhabit the buds, especially the flower buds. In some cases the result of the mites' activities may be flower drop, although various varieties of camellias may show different susceptibilities.

Discussion: This species is of interest since it combines 'appressed' genitalia and the shortened apodeme with the presence of dorsal setae. Usually this combination is characterized by the absence of dorsal setae. *Aceria camelliae* also lacks the foretibial seta.

California records:

ALAMEDA CO.: Berkeley, IV-12-1941

(E. O. Essig)

ORANGE CO.: Santa Ana, X-20-1941

(W. W. Cadwallader)

SACRAMENTO CO.: Sacramento, XII-4-1947 (HHK)

SAN DIEGO CO.: San Diego, I-20-1944

(S. V. Weimer)

SAN LUIS OBISPO CO.: Santa Maria, III-8-1945

(M. R. Bell)

SANTA BARBARA CO.: Santa Barbara, I-13-1943

(J. B. Steinweden)

SANTA CRUZ CO.: Santa Cruz, I-25-1946

(W. J. Cordua)

VENTURA CO.: Santa Paula, III-14-1946

(J. L. Schall)

Aceria ceanothi (K.) (9-26)

Plate 9-26

Eriophyes ceanothi Keifer, BCDA v. 28, p. 330, 1939

Type locality: Crater Lake, Oregon

Type host: *Ceanothus velutinus* Dougl., Tobacco brush

Relation to host: The mites form small bead galls on the upper surface of the large leaves.

California records:

EL DORADO CO.: Fallen Leaf Lake, VII-28-1938 (HHK)

PLACER CO.: Donner Lake, 1938, (Iris Savage)

Aceria chrysopsis (K.) (9-23)

Plate 9-23

Eriophyes chrysopsis Keifer, BCDA v. 29, p. 26, 1940

Type locality: Putah Canyon, Winters district

Type host: *Chrysopsis oregana* Gray

Relation to host: The mites are found under the bases of the leaf axils along the stems.

California record:

YOLO CO.: Winters district, Putah Canyon, XI-7-1939 (HHK)

Aceria diospyri K. (9-31)

Plate 9-31

Aceria diospyri Keifer, BCDA v. 33, p. 23, 1944

Type locality: Garden Grove

Type host: *Diospyros kaki* L., oriental persimmon

Common name: Persimmon budmite

Relation to host: The mites live under the fruit buttons and in the buds. Their activity causes browning under the buttons and perhaps fruit drop.

California records:

LOS ANGELES CO.: Downey, IX-19-1944
(V. E. Williams)
ORANGE CO.: Garden Grove, X-13-1943
(E. A. Dudley; San Juan Capistrano,
X-8-1943 (Bumgardner))

Aceria dracunculi (K.) (9-16)
Plate 9-16

Eriophyes dracunculi Keifer, BCDA V. 28. p. 333,
1939
Type locality: Big Bear Lake district
Type host: *Artemisia dracunculus* L.
Relation to host: The mites produce a mass of buds
and deformed leaves on the stems.

California record:

SAN BERNARDINO CO.: Big Bear Lake district,
X-12-1938 (HHK)

Aceria enceliae (K.) (9-14)
Plate 9-14

Eriophyes enceliae Keifer, BCDA V. 28, p. 226,
1939
Type locality: Santa Paula
Type host: *Encelia californica* Nutt.
Relation to host: The mites live among the hairs
around the buds.

California records:

RIVERSIDE CO.: Riverside, III-3-1942
(E. A. McGregor)
VENTURA CO.: Santa Paula, X-31-1938
(K. E. Maxwell)

Aceria erineus (Nal.) (9-3)
Plate 9-3

Phytoptus tristriatus erineus Nalepa, Anz. Akad.
Wiss. math-nat. Wien, V. 28, p. 162, 1891
Type locality: Austria?
Type host: *Juglans regia* L., Persian or English
walnut
Common name: Walnut blister mite (approved)
Relation to host: The mites produce rather large
felted masses of thick hair on the under sides
of the leaves, these masses visible above as
convex areas. Numerous mites develop in this
hair, or erineum. The mites overwinter in the
buds.
Discussion: Several Juglandaceous mites, of which
erineus is one of two in California, have an

unusual structure, namely produced genital tu-
bercles. Typical *tristriatus* should be inves-
tigated for this character. The other Califor-
nia mite with produced genital tubercles was
found too late for inclusion here. See Bul.
Cal. Dept. Agr. V. 51, p. 148, 1952.

California records:

ALAMEDA CO.: Newark, X-26-1943 (Byers)
BUTTE CO.: Chico, VI-2-1934 (E. E. Fix)
GLENN CO.: Willows, IX-19-1942
(P. V. Harrigan)
LOS ANGELES CO.: Whittier, V-19-1938
(V. E. Williams)
MERCED CO.: Los Banos, XI-4-1946
(R. H. Milbourn)
RIVERSIDE CO.: Hemet, VI-25-1942
(S. F. Bailey)
SACRAMENTO CO.: Sacramento, V-5-1934
(G. L. Stout)
SAN JOAQUIN CO.: Lodi, VIII-8-1941
(P. F. Wright)
SANTA BARBARA CO.: Goleta, V-2-1947
SOLANO CO.: Vallejo, V-11-1941
(Edna W. Gaskill)
YUBA CO.: Hallwood, IV-8-1933, (H. K. Plank)

Aceria eriobotryae (K.) (9-30)
Plate 9-30

Eriophyes eriobotryae Keifer, BCDA V. 27, p. 188
1938
Type locality: Sacramento
Type host: *Eriobotrya japonica* Lindl., loquat
Relation to host: The mites live among the hairs
around the buds.

California record:

SACRAMENTO CO.: Sacramento, XII-15-1937 (HHK)

Aceria eriodictyonis K. (9-24.1)
Plate 9-24.1

Aceria eriodictyonis Keifer, BCDA V. 41, p. 67,
1952
Type locality: Castaic
Type host: *Eriodictyon crassifolium* Benth., Thick-
leaf Yerba Santa
Relation to host: The mites occur among the hairs
on the small leaves emerging from the bud.
These hairs are quite sticky and it is remark-
able that a creature so frail as an Eriophyid
could exist in this habitat. Perhaps the body
spinules help the mite to keep free from the
natural adhesive present.

Discussion: The actual range of this mite in Southern California remains to be determined. The writer spent several days (October 1951) examining Eriodictyons from San Diego County, north to the type locality, but was not aware of the precise location of the mites on their host until the very last and northernmost locality visited. In 1939 the writer noted a single specimen of this mite on the underside of a mature *crassifolium* leaf in the Pasadena district. The extra long spinules on the body are perhaps the most distinctive feature of the mite.

California record:

LOS ANGELES CO.: Castaic, X-4-1951
(L. E. Myers and H.H.K.); Pasadena
district, IX-1939 (HHK)

Aceria essigi (Hassan) (9-10)
Plate 9-10

Eriophyes essigi Hassan, UC Publ. in Ent. V. 4,
p. 380, 1928

Type locality: Berkeley

Type host: *Rubus thyrsanthus* Focke, Himalaya
blackberry

Additional host: *Rubus* sp., Mammoth blackberry

Common name: Redberry mite (approved)

Relation to host: The mites live in the buds and in the fruits. In the latter location their feeding activities delay the ripening of part or all of the drupelets, providing a habitation for the mites. This is the "redberry" effect.

Discussion: In BCDA V. 30, p. 205, 1941, the writer characterized this species as lacking the foretibial seta and as having crescentic scoring on the genital coverflap. Recently a mite has appeared as a pest on Boysenberry that has longitudinal scoring on the coverflap, but is otherwise similar to *essigi*. This second species is listed as *Aceria orthomera*. Our records of *essigi* are therefore somewhat confused at the present.

California records:

ALAMEDA CO.: Berkeley, VII-10-1940 (HHK)
BUTTE CO.: Paradise, VII-2-1940 (HHK)
LOS ANGELES CO.: West Los Angeles, IX-27-1946
PLACER CO.: Auburn, VII-2-1941 (Odel Wilson)
SACRAMENTO CO.: Sacramento, VIII-9-1951 (HHK)

Aceria feijoae (K.) (9-32)
Plate 9-32

Eriophyes feijoae Keifer, BCDA V. 28, p. 484, 1939

Type locality: Sacramento

Type host: *Feijoa sellowiana*, feijoa

Common name: Feijoa budmite

Relation to host: The mites live in the hairs around the buds. Some feijoas show fasciation, but this mite has not been implicated with this difficulty. On the type shrub in Sacramento no injury has occurred since the discovery of the mite on it.

California records:

LOS ANGELES CO.: Huntington Park, I-23-1940
(M. B. Sheldon)

ORANGE CO.: Santa Ana, VIII-13-1943 (Walden)

RIVERSIDE CO.: Riverside, III-12-1943
(A. M. Boyce)

SACRAMENTO CO.: Sacramento, VIII-2-1939 (HHK)

SAN DIEGO CO.: Chula Vista, X-16-1939
(W. Binney)

Aceria ficus (Cotte) (9-27)

Eriophyes ficus Cotte, Bul. Soc. Path. Veget.
V. 7, p. 26, 1920

Eriophyes fici Essig and Smith, BCDA V. 11, p. 63,
1922

Type locality: France

Type host: *Ficus* sp., black (?) fig

Common name: Fig mite (approved)

Relation to host: The mites are usually found under the scales at the fruit opening. They also infest the buds and at times are numerous enough to damage small trees. E. W. Baker first proposed the above synonymy.

California records:

FRESNO CO.: Fresno, XI-1947

MERCED CO.: Bear Creek Ranch, VIII-31-1944
(E. M. Stafford)

SAN BERNARDINO CO.: Colton, X-1949 (HHK)

SAN JOAQUIN CO.: Stockton, X-25-1943
(Anderson)

SANTA CLARA CO.: San Jose, VII-11-1941
(L. R. Cody)

TULARE CO.: Orisi, III-14-1934 (Butler)

Aceria fraxinivorus (Nal.) (9-19)

Eriophyes fraxinivorus Nal. Anz. Akad. Wiss. math-
nat. Wien, V. 46, p. 117, 1909

Eriophyes fraxiniflora Felt, Mem. 8, N. Y. State
Mus. V. 2, p. 633, 1906 (07?)

Eriophyes fraxini (Karp.) Nal., Das Tierreich, 4th
Issue, Acarina, p. 33, 1898

Type locality: Austria

* BCDA V.28, p. 266, 1939

Type host: *Fraxinus excelsior* L. ash
 California host: *Fraxinus oregona* Nutt., Oregon ash
 Common name: Ash gall mite
 Relation to host: The mites cause the formation of rough hanging balls in the fruiting bodies. Nalepa's term for these is 'klunkern.' The species evidently ranges around the northern hemisphere.
 Discussion: The only tree that the writer has seen infested in California was a tree in Capitol Park, labelled *Fraxinus oregona*, which has recently been removed. The above indicated synonymy probably does not entirely settle the question, as *fraxini* and *fraxiniflora* are essentially nude names. Perhaps Nalepa validated *fraxini* in his 1898 publication.

California record:
 SACRAMENTO CO.: Sacramento, X-3-1944 (HHK)

Aceria granati (C. & M.) (9-20)
 Plate 9-20

Phytoptus granati Canestrini and Massalongo, Atti Soc. Veneto-Trent. ser. 2, V. 1, p. 465, 1894
 Type locality: Italy
 Type host: *Punica granatum* L., pomegranate
 Common name: Pomegranate leafroll mite
 Relation to host: The mite rolls the leaves in tight rolls from the edges. The leaves on a whole shoot may be so badly damaged as to fail to expand, producing a leafless appearance on the twig.

California records:
 ALAMEDA CO.: Niles, X-9-1941 (M. R. Bell)
 CONTRA COSTA CO.: Danville, VIII-16-1946
 LOS ANGELES CO.: U. C. L. A. Campus, X-24-1938 (R. H. Smith)
 SACRAMENTO CO.: North Sacramento, IV-22-1941 (J. B. Steinweden)
 TEHAMA CO.: Red Bluff, VII-9-1946

Aceria haplopappi (K.) (9-42)
 Plate 9-42

Eriophyes haplopappi Keifer, BCDA V. 28, p. 331, 1939
 Type locality: Harbor City
 Type host: *Haplopappus venetus* HBK., an Asteraceous Composite
 Relation to host: The mites inhabit the area on the plant of least vidity and can be found in

the leaf bases on the lower part of the season's current growth.

California record:
 LOS ANGELES CO.: Harbor City, IV-6-1939 (L. E. Myers)

Aceria heterothecae (K.) (9-24)
 Plate 9-24

Eriophyes heterothecae Keifer, BCDA V. 28, p. 330, 1939
 Type locality: El Monte
 Type host: *Heterotheca grandiflora* Nutt., telegraph weed
 Relation to host: The mites inhabit the leaf bases and the surface hairs on leaves and stems.

California record:
 LOS ANGELES CO.: El Monte, IV-25-1939 (V. E. Williams)

Aceria langei (K.) (9-35)
 Plate 9-35

Eriophyes langei Keifer, BCDA V. 28, p. 417, 1939.
 Type locality: Half Moon Bay
 Type host: *Eriophyllum staechadifolium* Lag.
 Relation to host: The mites inhabit the leaf axils and the hairs on the leaves and stems.
 Discussion: This species might nearly as well be placed in the next genus, *Paraphytoptus*, and perhaps further study will indicate the advisability of doing that.

California record:
 SAN MATEO CO.: Half Moon Bay, V-15-1939 (W. H. Lange)

Aceria larreae (K.) (9-47)
 Plate 9-47

Eriophyes larreae Keifer, BCDA V. 29, p. 26, 1940
 Type locality: Whitewater
 Type host: *Larrea tridentata glutinosa* Rydb., Creosote bush
 Relation to host: The mites live under the brown scales at the petiole bases.
 Discussion: This plant is extremely viscid and it is remarkable that it could harbor an Eriophyid. The mites have picked about the only non-sticky place on new growth in which to exist.

California record:

RIVERSIDE CO.: Whitewater, IX-16-1939 (HHK)

Aceria lepidosparti K. (9-29)

Plate 9-29

Aceria lepidosparti Keifer, BCDA V. 40, p. 95, 1951

Type locality: Devore district

Type host: *Lepidospartum squamatum* Gray

Relation to host: The mites produce bud clusters on the stems, stunting the growth at that point.

California records:

LOS ANGELES CO.: Val Verde, X-4-1951
(L. E. Myers & HHK)

SAN BERNARDINO CO.: Devore district, VI-28-1946 (J. B. Steinweden & HHK)

Aceria ligustri (K.) (9-17)

Plate 9-17

Eriophyes ligustri Keifer, BCDA V. 32, p. 213, 1943

Type locality: Sacramento

Type host: *Ligustrum ovalifolium* Hassk., privet

Common name: Privet bud mite

Relation to host: The mites inhabit the buds.

California record:

SACRAMENTO CO.: Sacramento, VII-1943 (HHK)

Aceria mackiei (K.) (9-4)

Plate 9-4

Eriophyes mackiei Keifer, BCDA V. 27, p. 302, 1938

Type locality: Sacramento

Type host: *Quercus agrifolia* Nee., Coast liveoak, a park tree

Additional hosts: *Quercus chrysolepis* Liebm. Maul oak; *Quercus wislizenii* A. DC., interior liveoak; *Quercus vaccinifolia* Engelm., huckleberry oak; probably others.

Common name: Coast liveoak erineum mite

Relation to host: The mites form erineum pockets on the undersides of the leaves that bulge out onto the upper surface. These pockets are usually only on leaves on the lower shady side of the tree. Badly infested leaves are somewhat deformed. The mites overwinter in these erineum pockets, at least on live oak, although they may be found in the buds.

Discussion: The relation this mite bears to the *Aceria ilicis* complex in Europe has not been determined, but it is undoubtedly a close relative.

California records:

ALAMEDA CO.: Piedmont, VIII-26-1943

(G. B. Laing)

AMADOR CO.: Silver Lake, IX-14-1941

(D. B. Mackie)

BUTTE CO.: Oroville, V-20-1950 (F. R. Platt)

CONTRA COSTA CO.: Martinez, V-17-1940

(V. G. Stevens)

FRESNO CO.: Coalinga, II-6-1949

LOS ANGELES CO.: Los Angeles, IX-10-1938

(R. H. Smith)

SACRAMENTO CO.: Sacramento, VI-10-1938 (HHK)

TULARE CO.: Visalia, VIII-1939 (F. T. Scott)

Aceria magnoliae (K.) (9-44)

Plate 9-44

Eriophyes magnoliae Keifer, BCDA V. 28, p. 335, 1939

Type locality: Sacramento

Type host: *Magnolia fraseri* Walt., a park tree

Relation to host: The mites inhabit the buds and may be found in the hair around the flower buds.

Discussion: The native home of this mite is presumably the native home of its host. At this writing the trees are still standing.

California record:

SACRAMENTO CO.: Sacramento, III-2-1939 (HHK)

Aceria medicaginis (K.) (9-34)

Plate 9-34

Eriophyes medicaginis Keifer, BCDA V. 30, p. 206, 1941

Type locality: Sacramento

Type host: *Medicago sativa* L., alfalfa

Common name: Alfalfa bud mite

Relation to host: The mites inhabit the leaf axils.

No damage has been observed on alfalfa in California, but elsewhere these mites have been suspected of causing a peculiar flower deformation.

California records:

LASSEN CO.: Honey Lake, X-10-1945

(L. F. Wheeler)

LOS ANGELES CO.: Los Angeles, X-14-1943

(V. E. Williams)

SACRAMENTO CO.: Sacramento, II-20-1940 (HHK)

Aceria mori (K.) (9-33)

Plate 9-33

Eriophyes mori Keifer, BCDA V. 28, p. 485, 1939

Type locality: Sacramento, VIII-14-1939 (HHK)

Type host: *Morus* sp., a white mulberry with moderately small leaves

Relation to host: The mites inhabit the buds and petiole bases. Deformed fruit from Oroville may be due to the work of this mite.

California records:

BUTTE CO.: Oroville, V-7-1939SACRAMENTO CO.: Sacramento, VIII-14-1939 (HHK)*Aceria neoartemisiae* (K.) (9-15)

Plate 9-15

Eriophyes neoartemisiae Keifer, BCDA V. 27, p. 302, 1938

Type locality: Sacramento

Type host: *Artemisia heterophylla* Nutt., wormwood

Relation to host: The mites live in the hairs on the underside of the leaves and on the stems. They do not appear to cause any definite damage.

California records:

LOS ANGELES CO.: Big Tajunga Canyon, X-4-1951 (HHK)SACRAMENTO CO.: Sacramento, VI-20-1938 (HHK)*Aceria neocynarae* (K.) (9-43)

Plate 9-43

Eriophyes neocynarae Keifer, BCDA V. 28, p. 334, 1939

Type locality: Colma

Type host: *Cynara scolymus* L., artichoke (in a plantation)

Common name: Artichoke leaf-hair mite

Relation to host: The mites live on the underside of the leaves in the hairs.

Discussion: The large third ventral seta is most unusual.

California records:

SAN MATEO CO.: Colma, II-12-1939 (HHK)SANTA CRUZ CO.: Davenport, V-19-1939 (W. H. Lange)*Aceria neoessigi* (K.) (9-45)

Plate 9-45

Eriophyes neoessigi Keifer, BCDA V. 29, p. 22, 1940

Type locality: Jensen, Utah

Type host: *Populus* sp.Additional hosts: *Populus fremontii* Wats., cottonwood; *Populus tremuloides* Michx., aspen.

Relation to host: The mites form large pendant catkin galls. These are deformations of the male catkins after the pollen is liberated. As observed at Sacramento, the gall consists of masses of twisted fasciated outgrowths from each anther base. Some of these growths resemble deformed leaves. The mites live in the curled edges of these deformations.

Discussion: The galls of the type series are considerably different from those in the Sacramento Valley, but are still catkin modifications. Only male cottonwood trees harbor the mite. This species of *Aceria* is probably similar to the European *varius* (Nal.)

California record:

SACRAMENTO CO.: Sacramento, VI-8-1943 (HHK)*Aceria neosalviae* (K.) (9-18)

Plate 9-18

Eriophyes neosalviae Keifer, BCDA V. 27, p. 187, 1938

Type locality: Santa Paula

Type host: *Salvia leucophylla* Greene, purple sage

Relation to host: The mites live between the petiole bases and the stems.

California record:

VENTURA CO.: Santa Paula, VII-28-1937 (HHK)*Aceria orthomera* K. (9-11)*Aceria orthomera* Keifer, BCDA V. 40, p. 94, 1951

Type locality: Sacramento

Type host: *Rubus vitifolius* C&S., native blackberry or dewberryAdditional host: *Rubus* sp., Boysenberry

Common name: Boysenberry budmite

Relation to host: The mites inhabit the buds along the shoots of native blackberry. This host has not been examined for damage. However, on boysenberry the mite has called attention to itself by stunting the shoots. It causes the growth of warty patches on the inside of the bud scales, and if the bud has been entirely penetrated by the mite the scales and tissue become rigid and somewhat twisted. This bud condition is in effect the formation of a gall. The mite also causes warty outgrowths at the bases of drupelets in the berries.

Discussion: *Aceria orthomera* and *essigi* are separable from nearly all other mites in this genus in California by lacking the foretibial seta.

California records:

ALAMEDA CO.: Albany, VIII-8-1951 (HHK)
 FRESNO CO.: Fresno district, IV-19-1951
 (R. A. Break)
 ORANGE CO.: Costa Mesa, VII-14-1944
 (P. H. Andres)
 PLACER CO.: Lincoln, III-1-1940
 (S. Lockwood)
 SACRAMENTO CO.: Sacramento, VII-16-1951 (HHK)
 SANTA BARBARA CO.: Santa Barbara, VIII-4-1942

Aceria paracalifornica (K.) (9-13)
 Plate 9-13

Eriophyes paracalifornicus Keifer, BCDA V. 28,
 p. 332, 1939

Type locality: Berkeley

Type host: *Artemisia californica* Less., California
 sagebrush

Relation to host: The mites produce wooly erineum
 in swollen pockets in the slender leaves.

California records:

ALAMEDA CO.: Berkeley, V-3-1939 (HHK)
 LOS ANGELES CO.: Westwood, IV-16-1939
 (N. Stahler)

Aceria paradianthi K. (9-45.1)
 Plate 9-45.1

Aceria paradianthi Keifer, BCDA V. 41, p. 65,
 1952

Type locality: Goleta

Type host: *Dianthus* sp., carnation

Relation to host: The mites live between the leaf
 bases and stem, causing some basal sprouting,
 stunting, and yellowing. The overall damage is
 evidently not very serious.

California records:

LOS ANGELES CO.: Burbank, III-25-1952
 (L. E. Myers)
San Fernando, III-18-1952
 (R. M. Hawthorne)
San Gabriel, III-20-1952
 (V. Daniels)
Sierra Madre, III-24-1952
 (V. Daniels)
Van Nuys, III-24-1952
 (L. E. Myers)

ORANGE CO.: Costa Mesa, III-21-1952

(D. H. Byers)

SANTA BARBARA CO.: Goleta, II-25-1952

(R. J. Reid)

Aceria paramackiei (K.) (9-5)
 Plate 9-5

Eriophyes paramackiei Keifer, BCDA V. 30, p. 204,
 1941

Type locality: Sacramento

Type host: *Quercus agrifolia* Nee, Coast liveoak

Relation to host: The mites cause the formation
 of bud clusters. The activity of the mite in-
 creases and wanes over a period of years.

Discussion: The type host is a park tree which is
 still standing. At the time the species was
 described the tree had many living bud clus-
 ters. Since then but few have persisted, the
 old ones having died and dropped off.

California records:

ORANGE CO.: Brea, X-16-1941 (P. A. Miller)
 SACRAMENTO CO.: Sacramento, III-4-1941 (HHK)

Aceria parapopuli (K.) (9-12)
 Plate 9-12

Eriophyes parapopuli Keifer, BCDA V. 29, p. 22,
 1940

Type locality: Ennis, Montana

Type host: *Populus* sp., known as Canadian poplar

Common name: Poplar bud-gall mite

Relation to host: The mite causes woody galls to
 develop around the buds, stunting growth.

Discussion: In Montana where the growing season is
 short the action of the mite is a deterrent to
 the growth of poplars. In California the spe-
 cies attacks *Populus* spp. on the east side of
 the Sierra Nevada mountains, but has not proven
 to be serious.

California records:

ALPINE CO.: Markleeville district, IX-9-1945
 (HHK)
 FRESNO CO.: A high mountain locality, VI-15-
 1950 (on aspen)
 KERN CO.: Keene, X-17-1950 (C. S. Morley)
 LOS ANGELES CO.: Lancaster, VIII-18-1942
 MODOC CO.: Adin, II-21-1941

Aceria peucedani (Can.) (9-21)
 Plate 9-21

Phytoptus peucedani Canestrini, Atti Soc. Veneto-

Trent. V. 12, p. 378, 1891

Type locality: Italy

Type host: *Peucedanum venetum* Koch

Common name: Carrot bud mite

Relation to host: What is presumably this species attacks carrots in California causing discoloration of the flower heads and possibly some injury to the developing seeds. In Europe this mite is credited with living on a number of Umbelliferous hosts.

California record:

SOLANO CO.: Rio Vista, VII-26-1944 (Byers)

Aceria sheldoni (Ewing) (9-28)

Plate 9-28

Eriophyes sheldoni Ewing, Proc. Ent. Soc. Wash, V. 29, p. 193, 1937

Type locality: Santa Paula

Type host: *Citrus limonia* Osb., lemon

Additional host: *Citrus sinensis* Osb., orange

Common name: Citrus bud mite (approved)

Relation to host: This mite partially damages citrus buds and causes deformation of leaves and fruit.

Discussion: In California it remains in the citrus areas along the coast of southern California, never coming far inland and never invading the citrus areas of the central valleys. California is apparently the only section in the United States where the mite occurs. Elsewhere it infests citrus in the Hawaiian Islands, Java, probably Australia, South Africa and Sicily.

California records:

LOS ANGELES CO.: Whittier, XI-19-1937

(L. E. Myers); San Fernando, VII-23-1941

ORANGE CO.: Costa Mesa, XI-19-1937

(J. R. La Follette)

RIVERSIDE CO.: Fresno Canyon, I-29-1942

(R. T. Lewis)

SAN BERNARDINO CO.: Ontario, VII-10-1946

SAN DIEGO CO.: Escondido, IX-4-1937

(Brunton); Chula Vista, IX-27-1941

(H. Crell)

SANTA BARBARA CO.: Goleta, X-18-1937

(W. S. Cummings)

VENTURA CO.: Bardsdale, XI-2-1937

(E. L. Smith)

Aceria spinulifera (K.) (9-41)

Plate 9-41

Eriophyes spinulifera Keifer, BCDA v. 27, p. 187, 1938

Type locality: Puente

Type host: *Ericameria pinifolia* Gray

(*Artemisia californica* cited in error)

Relation to host: The mites lurk around the lateral buds or in the outer layers of terminal Cecidomyid galls.

California records:

LOS ANGELES CO.: Puente, XII-14-1937

(L. E. Myers)

RIVERSIDE CO.: Perris, VI-28-1946 (HHK)

SAN FRANCISCO CO.: San Francisco, IX-11-1951 (HHK)

Aceria stinsonis (K.) (9-25)

Plate 9-25

Eriophyes stinsonis Keifer, BCDA v. 28, p. 485, 1939

Type locality: Stinson Beach

Type host: *Cotyledon caespitosa* Haw., stone crop

Relation to host: The mites live at the leaf bases.

California record:

MARIN CO.: Stinson Beach, VII-3-1939 (HHK)

Aceria tulipae (K.) (9-49)

Plate 9-49

Eriophyes tulipae Keifer, BCDA v. 27, p. 185, 1938

Type locality: Sacramento

Type host: *Tulipa* sp.

Additional hosts: *Allium cepa* L., onion; *Allium sativa* L., garlic

Common name: Dry-bulb mite

Relation to host: This mite infests certain liliaceous bulbs, living between the layers.

The principal damage it does is to induce drying. In this manner it ruins stored garlic and onions.

Discussion: The mite has a wide range, being found in North America and Europe. It is most often taken in garlic imported from Mexico. Further study of this interesting mite may show other hosts. For example, it has been taken over-running foxtail, although the mites in this case were apparently looking for transportation, having come from some host at that point.

California records:

SACRAMENTO CO.: Sacramento, X-4-1937

(W. B. Carter)

SANTA CLARA CO.: Gilroy, VIII-17-1948

Aceria waltheri (K.) (9-6)

Plate 9-6

Eriophyes waltheri Keifer, BCDA V. 28, p. 417, 1939

Type locality: San Francisco

Type host: *Nothofagus menziesii*, *Nothofagus*

Relation to host: The mites cause a witches broom to develop on terminal twigs, the individuals living under the bud scales.

Discussion: This mite is one of the four kinds in California lacking the foretibial seta. It undoubtedly came to the west Coast from the native home of its host, New Zealand. It is nevertheless closely related to such oak species as *mackiei* and *paramackiei* which are native to California.

California record:

SAN FRANCISCO CO.: San Francisco, VI-13-1939 (E. Walther)

Aceria wyethiae K. (9-39)

Plate 9-39

Aceria wyethiae Keifer, BCDA V. 40, p. 95-1951

Type locality: Fallen Leaf Lake

Type host: *Wyethia* sp.

Relation to host: The mites are vagrants among the hairs on the under side of the leaves.

California record:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951 (HHK)

Genus 10. *Paraphytoptus* Nalepa, 1896

Anz. Akad. Wiss. math-nat. Wien, V. 33, p. 55, 1896

Type of genus: *P. paradoxus* Nal., Keifer BCDA V. 27, p. 304, 1938

Discussion: In the opinion of the writer, this genus, in spite of the caudal resemblance to Phyllocoptine mites, belongs very close to *Aceria*. The anterior sections of the body are identical in both genera. *Paraphytoptus* species typically have a semi-open surface life among plant hairs. This would seem to account for the broader rear back plates, which would serve as protection, while the anterior end is buried in the hairs. However, *arceuthobii* is at variance with this theory since it lives as a bud mite on a hairless host. The only species of *Paraphytoptus* which is suspected of damaging its host is the chrysanthemum semi-bud mite.

Paraphytoptus arceuthobii K. (10-1.1)

Plate 10-1.1

Paraphytoptus arceuthobii Keifer, BCDA V. 41, p. 68, 1952

Type locality: Fallen Leaf Lake

Type host: *Arceuthobium campylopodium* Engelm., pine tree mistletoe

Relation to host: The mites live in the cups under the staminate flowers. No damage to the host is apparent.

Discussion: In the case of the type locality, the host was growing on Jeffrey pine. At Mt. Diablo (listed below) the host grows on digger pine. This mite functions as a bud mite, the host lacking hairs.

California records:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951 (HHK)

CONTRA COSTA CO.: Mt. Diablo, IX-20-1951 (HHK)

Paraphytoptus brickelliae K. (10-1)

Plate 10-1

Paraphytoptus brickelliae Keifer, BCDA V. 29, p. 27, 1940

Type locality: Putah Canyon, Winters district

Type host: *Brickellia californica* T&G., a Composite

Relation to host: The mites live around the terminal buds and later around the seeds in the heads.

California record:

YOLO CO.: Putah Canyon, Winters district, XI-7-1939 (HHK)

Paraphytoptus californicus (Hall) (10-6)

Plate 10-6

Eriophyes californicus Hall, Pomona Jr. Ent. V. 2, p. 280, 1910

Paraphytoptus californicus (Hall) Keifer, BCDA V. 28, p. 335, 1939

Type locality: Pomona district

Type host: *Artemisia californica* Less., California sagebrush

Relation to host: The mites live among the surface hairs on the leaves and stems.

Discussion: Hall's original description is not definitive, but his figure suggests the genus *Paraphytoptus* by its outline.

California records:

LOS ANGELES CO.: Pomona district, 1910 (H. V. M. Hall)

ALAMEDA CO.: Berkeley, V-3-1939 (HHK)

Paraphytoptus caliplucheae (K.) (10-8)

Plate 10-8

Eriophyes caliplucheae Keifer, BCDA V. 29, p. 26.
1940

Type locality: Castaic

Type host: *Pluchea sericea* Nutt., Mock willow

Relation to host: The mites live among the heavy
hairing around the terminals.

California record:

LOS ANGELES CO.: Castaic, IX-17-1939 (HHK)

Paraphytoptus chrysanthemi K. (10-4)

Plate 10-4

Paraphytoptus chrysanthemi Keifer, BCDA V. 29,
p. 27, 1940

Type locality: Hanford

Type host: *Chrysanthemum*

Common name: *Chrysanthemum* semi-bud mite

Relation to host: The mites live among the hairs
on the leaves and stems. They also live around
the buds and under the sepals. In the latter
location they may cause flower damage. Plants
with less hair discourage the development of
the mites.

California records:

KINGS CO.: Hanford, IX-29-1939 (L. O. Haupt)

LOS ANGELES CO.: Pacoima, X-6-1948

(L. E. Myers)

ORANGE CO.: Orange, X-1-1951

(Byers and Keifer)

SACRAMENTO CO.: Sacramento, X-8-1951 (HHK)

Paraphytoptus inaequalis K. (10-7)

Plate 10-7

Paraphytoptus inaequalis Keifer, BCDA V. 27, p.
304, 1938

Type locality: Sacramento, VI-20-1938 (HHK)

Type host: *Artemisia heterophylla* Nutt., worm-
wood

Relation to host: The mites live among the hairs
on the underside of the leaves and along the
stems.

California records:

BUTTE CO.: Honcut, VIII-3-1941 (HHK)

SACRAMENTO CO.: Sacramento, VI-20-1938 (HHK)

Paraphytoptus mcgregori K. (10-3)

Plate 10-3

Paraphytoptus mcgregori Keifer, BCDA V. 28, p.
228, 1939

Type locality: Santa Paula

Type host: *Encelia californica* Nutt.

Relation to host: The mites live among the hairs
around the buds.

California records:

RIVERSIDE CO.: Highgrove, III-3-1942

(E. A. McGregor)

VENTURA CO.: Santa Paula, X-31-1938

(K. E. Maxwell)

Paraphytoptus rhamniphagus K. (10-2)

Plate 10-2

Paraphytoptus rhamniphagus Keifer, BCDA V. 35,
p. 40, 1946

Type locality: Clarksville district

Type host: *Rhamnus californicus tomentella* B&W

Relation to host: The mites live in the hairs
around the terminal buds.

California record:

EL DORADO CO.: Clarksville district, VIII-1-
1944 (HHK)

Paraphytoptus salviacrinis K. (10-5)

Plate 10-5

Paraphytoptus salviacrinis Keifer, BCDA V. 28,
p. 145, 1939

Type locality: Riverside

Type host: *Salvia apiana* Jepson, White sage

Relation to host: The mites inhabit the hair on the
leaves and stems

California record:

RIVERSIDE CO.: Riverside, X-11-1938 (HHK)

Genus 11. *Eriophyes* von Siebold, 1850

Jahresber. Schles. Ges. V. 28, p. 89, 1850

Type of genus: *Eriophyes vitis* (Pgst.) Keifer,
BCDA V. 27, p. 301, 1938

Discussion: This genus differs from *Aceria* by the
inclination of the dorsal tubercles which di-
rects the dorsal setae up and ahead, or central-
ly. These tubercles are usually set a little
ahead of the rear shield margin.

Eriophyes breechii K. (11-6)

Plate 11-6

Eriophyes breechii Keifer, BCDA V. 28, p. 416,
1939

Type locality: Coleville
 Type host: *Prunus andersoni* Gray, desert peach
 Relation to host: The mites live under the fruit buttons and presumably in the buds. The fact that the fruits remain on the shrub for considerable periods helps the development of the mite in that location.

California record:
 MONO CO.: Coleville, VI-13-1939
 (E. A. Breech)

Eriophyes canestrinii (Nal.) (11-16)

Phytoptus canestrinii Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 27, p. 212, 1890
 Type locality: Austria
 Type host: *Buxus sempervirens* L., boxwood
 Common name: Boxwood bud mite
 Relation to host: The mites live under the bud scales. They may cause leaf deformation and flower blasting.

California records:
 SACRAMENTO CO.: Sacramento, I-23-1952 (HHK)
 SAN MATEO CO.: Redwood City, III-16-1950
 (Edwards)

Eriophyes caricis K. (11-14)
 Plate 11-14

Eriophyes caricis Keifer, BCDA V. 33, p. 22, 1944
 Type locality: Sacramento
 Type host: *Carex barbarae* Dew., sedge
 Relation to host: The mites live down in the bases of the leaves which are wrapped around the stem and where the tissue is turning from yellow to green.
 Discussion: While this is the only North American locality on record, Roivainen (1951) reports it from Sweden and Finland on *Carex ericetorum* L., and *C. panicea* L.

California record:
 SACRAMENTO CO.: Sacramento, IX-19-1943 (HHK)

Eriophyes convolvens (Nal.) (11-12)
 Plate 11-12

Cecidophyes convolvens Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 26, p. 162, 1889
 Type locality: Austria
 Type host: *Euonymus europaea* L.

Common name; *Euonymus* budmite
 Relation to host: The mites attack the terminal buds, deforming and stunting the leaves.

California record:
 VENTURA CO.: Ventura, X-27-1937

Eriophyes emarginatae K. (11-4)
 Plate 11-4

Eriophyes emarginatae Keifer, BCDA V. 28, p. 144, 1939

Type locality: Tragedy Springs district
 Type host: *Prunus emarginata* (Dougl.), bitter cherry

Common name: Bitter cherry gall mite
 Relation to host: The mites form finger-like galls on the upper surfaces of the leaves with the gall opening onto the lower surface.
 Discussion: European mites which are probably correlated with this species are *padi* Nal., and *similis* Nal. These differ from *emarginatae* in having dorsal shield lines. *Eriophyes padi* lacks accessory setae, whereas *emarginatae* has them.

California records:
 AMADOR CO.: Tragedy Springs district, IX-18-1938 (D. B. Mackie)
 EL DORADO CO.: Fallen Leaf Lake, IX-1-1947 (HHK)

Eriophyes heteromeles K. (11-10)
 Plate 11-10

Eriophyes heteromeles Keifer, BCDA V. 28, p. 226, 1939

Type locality: Sacramento
 Type host: *Photinia arbutifolia* Lindl., Toyon or Christmas berry
 Relation to host: The mites live around the terminal buds

California record:
 SACRAMENTO CO.: Sacramento, I-24-1939 (HHK)

Eriophyes ilicifoliae K. (11-8)
 Plate 11-8

Eriophyes ilicifoliae Keifer, BCDA V. 30, p. 204, 1941

Type locality: Rockville
 Type host: *Prunus ilicifolia* Walp., holly-leaf cherry
 Relation to host: The mites were collected in a sparse population in the terminal buds.

Discussion: A mite which produces galls on the leaves of Chamise, *Adenostoma fasciculatum* H. & A., seems to be indistinguishable from this mite. The cherry shrubs from which the mites came grow in the vicinity of a hilltop of chamise. This *Adenostoma* remains to be investigated for the presence of leaf galls. However, *Adenostoma* growing across the Sacramento Valley near Shingle Springs in El Dorado County, is heavily infested with the gallmite. Mites from these Shingle Springs shrubs are exceedingly similar to those from the holly-leaf cherry. It is possible that this cherry is but a casual host of the mite and that *Adenostoma* may be the primary host.

California record:

SOLANO CO.: Rockville, IX-17-1940 (HHK)

Eriophyes laevis (Nal.) (11-3)

Plate 11-3

Phytoptus laevis Nalepa, Sb. Akad. Wiss. math-nat. Wien, V. 98, p. 132, 1889

Eriophyes laevis (Nal.), Das Tierreich, 4th Issue: Acarina, p. 7, Berlin, 1898

Eriophyes rhombifoliae Hassan (?), UC Publ. in Ent. V. 4, p. 381, 1928

Eriophyes marinalni Keifer, BCDA V.28, p. 223, 1939

Type locality: Austria

Type host: *Alnus glutinosa* Gert. alder

California hosts: *Alnus rubra* Bong., *Alnus tenuifolia* Nutt.

Common name: Alder gall mite

Relation to host: The mites form bead galls on the leaves. This gall in Europe originally received the name: *Cephaloneon pustulatum* Bremi

Discussion: The Marin County form has ventral microtubercles more consistently than the Sierran form. Otherwise the body rings are smooth. No attempt has been made to correlate these California mites with Nalepa's varieties. Hassan's characterization of "*rhombifoliae*" suggests a species of *Aceria*; otherwise it might be supposed that he figured a second stage nymph of *laevis*. This species (*laevis*), with *emarginatae*, constitutes a distinct group in the genus.

California records:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951 (HHK)

MARIN CO.: Stinson Beach, VIII-13-1938 (HHK)

Eriophyes prunandersoni K. (11-9)

Plate 11-9

Eriophyes prunandersoni Keifer, BCDA V. 28, p. 416, 1939

Type locality: Coleville

Type host: *Prunus andersoni* Gray, desert peach

Relation to host: The mites cause a baggy depression in the leaves in which erineum develops.

California record:

MONO CO.: Coleville, VI-13-1939 (E. A. Breech)

Eriophyes pyri (Pgst.) (11-7)

Plate 11-7

Phytoptus (?) *pyri* Pagenstecher, Verh. Ver. Heidelb. V. 1, p. 48, 1857

Type locality: Germany

Type host: *Pyrus communis* L., pear

Additional hosts: see discussion

Common name: Pear leaf blister mite (approved)

Relation to host: The mites typically form 'blisters' in the leaves. These blisters open on the under surface and consist of an area of dead and shrunken tissue. The mites feed on the periphery of this dead tissue. The so-called 'pear budmite' is structurally the same as the blister mite, but does not make the blisters. These mites overwinter in the terminal buds and when numerous enough will blacken and destroy the tender developing bud parts in the spring.

Discussion: Nalepa (see references) has given this type of mite a series of varietal names to designate the host from which each 'variety' originated. The writer is leaving this problem to a later date for explanation and application to California mites of the *pyri* complex. Nalepa records these mites form Pomaceous trees and shrubs of the following genera: *Amelanchier*, *Cotoneaster*, *Crataegus*, *Cydonia*, *Sorbus*, and *Pyrus*. Apple in California also has blister mites but, as a rule, is not so badly attacked as pear. Apple trees with leaf blisters may be growing near pears that have no blisters, and vice versa. The following California records are exemplary of range, rather than being exhaustive.

California records:

LAKE CO.: Big Valley, X-30-1941 (M. R. Bell)

LASSEN CO.: Susanville, V-14-1936 (Taylor)

LOS ANGELES CO.: Los Angeles, V-1934 (G. R. Gorton)

NAPA CO.: Napa, III-24-1931

ORANGE CO.: Rancho Santa Fe, III-29-1939 (C. E. Norland)

PLACER CO.: Auburn, X-12-1942 (F. Clark)
 SACRAMENTO CO.: Sacramento, V-21-1946
 SAN DIEGO CO.: Julian, V-11-1935 (S. B. Osborn)
 SUTTER CO.: Riego, X-26-1940 (HHK)
 VENTURA CO.: Ojai, XI-22-1943 (R. Young)
 YUBA CO.: Marysville, III-12-1930 (A. C. Browne)

Eriophyes savagei K. (11-5)

Plate 11-5

Eriophyes savagei Keifer, BCDA V. 28, p. 145, 1939
 Type locality: Maiden's Grave
 Type host: *Prunus emarginata* (Dougl.), bitter cherry
 Relation to host: The mites are inquilines in the galls of *Eriophyes emarginatae*

California record:

EL DORADO CO.: Maiden's Grave, IX-5-1938 (Iris Savage)

Eriophyes spiraeae (Nal.) (11-15)

Phytoptus spiraeae Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 30, p. 105, 1893
 Type locality: Austria (?)
 Type host: *Spiraea crenifolia* Meyer
 California host: *Spiraea densiflora* Nutt.
 Common name: *Spiraea* flower gall mite
 Relation to host: The mites produce galls in the flower heads.
 Discussion: This mite would appear to have a holarctic distribution by natural means.

California records:

EL DORADO CO.: Twin Bridges, VIII-2-1945 (HHK)
 PLUMAS CO.: Buck's Lake, VII-28-1946 (HHK)

Eriophyes tiliae (Pgst.) (11-11)

Plate 11-11

Phytoptus (?) *tiliae* Pagenstecher, Verh. Ver. Heidelb. V. 1, p. 46, 1857
Eriophyes tiliae typicus (Pgst.) Nalepa, Verh. Ges. Wien, V. 70, p. 52, 1920
 Type locality: Germany
 Type host: *Tilia platyphyllo* Scop., linden
 Common name: Linden gall mite
 Relation to host: The mites produce elongate rather pointed upper surface leaf galls, known as 'nail' galls. Some trees with mites

of this type in the buds never have these galls, however.

Discussion: This mite does not attack American lindens as far as the writer knows. The native American linden mite is *Phytoptus abnormis* Garman. It is allied to *P. avellanae*, even to lacking the lateral foretibial spur. As far as the writer knows *abnormis* has not come to California.

California records:

ALAMEDA CO.: Berkeley, VIII-24-1932 (E. O. Essig); Oakland, VII-12-1950 (Sibray)
 SANTA CLARA CO.: Palo Alto, 1944 (R. H. Smith); San Jose, X-20-1946 (T. J. Moniz)

Eriophyes triradiatus (Nal.) (11-2)

Plate 11-2

Phytoptus triradiatus Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 29, p. 128, 1892
 Type locality: Austria
 Type host: *Salix alba* L., willow
 California host: *Salix hindsiana* Benth., sandbar willow
 Relation to host: The mites live in the hairs around the terminal buds.
 Discussion: The mite is evidently holarctic in distribution, having gained this range by natural means.

California record:

SACRAMENTO CO.: Sacramento, VIII-17-1939 (HHK)

Eriophyes vitis (Pgst.) (11-1)

Plate 11-1

Phytoptus (?) *vitis* Pagenstecher, Verh. Ver. Heidelb. V. 1, p. 48, 1857
Eriophyes vitis (Pgst.) Keifer, BCDA V. 33, p. 21, 1944
 Type locality: Germany
 Type host: *Vitis vinifera* L., grape
 Common name: Grape erineum mite (approved)
 Relation to host: The typical form makes erineum on the under sides of the leaves (*Phyllerium vitis* Fries). Not all grape varieties are susceptible, since it is a common observation that two different grape varieties may have their branches intertwined, and that one will consistently have erineum, while the other never has it. A bud form of this mite never makes erineum on any vine, confining its activities entirely to the buds.

Discussion: This mite is widely distributed on its host. The writer knows of no infestations on American grapes.

California records:

AMADOR CO.: Ione, VI-15-1939 (R. J. Corbin)
 BUTTE CO.: Oroville, VII-23-1938 (J. B. Steinweden)
 FRESNO CO.: Fresno, VIII-21-1942 (F. P. Roullard)
 KERN CO.: Bakersfield, IV-9-1943 (Grimm)
 LOS ANGELES CO.: Huntington Park, VI-25-1936 (V. E. Williams)
 MADERA CO.: Madera, VIII-21-1942 (L. M. Smith)
 MERCED CO.: Snelling, IV-24-1940 (C. H. Kinsley)
 NEVADA CO.: Nevada City, VII-26-1940
 ORANGE CO.: Atwood, VI-3-1942 (K. Sloop)
 PLACER CO.: Auburn, VII-17-1935 (F. Clark)
 SACRAMENTO CO.: Sacramento, V-22-1946
 SAN BERNARDINO CO.: Ontario, VII-11-1941 (C. R. Tower)
 SAN DIEGO CO.: Borego, IX-20-1950 (Barnes)
 SANTA CLARA CO.: Almaden, VIII-10-1944 (HHK)
 SANTA CRUZ CO.: Vine Hill, VIII-10-1944 (HHK)
 SHASTA CO.: Redding, V-9-1949
 SONOMA CO.: Healdsburg, V-18-1943 (L.M. Smith)
 TULARE CO.: Orosi, VIII-9-1940 (J. B. Steinweden)
 YOLO CO.: Davis, VIII-21-1941 (G. L. Stout)

Eriophyes wisteriae K. (11-13)

Plate 11-13

Eriophyes wisteriae Keifer, BCDA V. 28, p. 329, 1939

Type locality: Balboa

Type host: *Wisteria* sp.

Relation to host: The mites live under the bud scales.

California record:

SAN DIEGO CO.: Balboa, III-28-1939 (C. Gammon)

Genus 12. *Pareria* Keifer, 1952

Bul. Cal. Dept. Agr. V. 41, p. 32, 1952

Type of genus: *Pareria fremontiae* Keifer, BCDA V. 41, p. 32, 1952

Discussion: This genus bears the same relation to *Eriophyes* that *Paraphytoptus* bears to *Aceria*.

Pareria fremontiae K. (12-1)

Plate 12-1

Pareria fremontiae Keifer, BCDA V. 41, p. 32, 1952

Type locality: Phelan district

Type host: *Fremontia californica* Torr., Flannel bush

Relation to host: The mites live around and under the stellate hairs on the under sides of the leaves and along the stems.

Discussion: The exact location of this collection is south of Phelan in the canyon through which the highway leaves the Mojave Desert.

California record:

SAN BERNARDINO CO.: Phelan district, IX-30-1951

PHYLLOCOPTINAE

Phyllocoptini

Genus 13. *Oxypleurites* Nalepa, 1891

Denk. Akad. Wiss. math-nat. Wien, V. 58, p. 868, 1891

Type of genus: *Oxypleurites heptacanthus* (Nal.), Keifer, BCDA V. 27, p. 312, 1938

Oxypleurites acidotus K. (13-6)

Plate 13-6

Oxypleurites acidotus Keifer, BCDA V. 28, p. 493, 1939

Type locality: San Francisco

Type host: *Baccharis pilularis* DC., chaparral broom

Relation to host: The mites are vagrants on older less viscid leaves. They prefer the upper surface.

California record:

SAN FRANCISCO CO.: San Francisco, VIII-20-1939 (HHK)

Oxypleurites aesculifoliae (K.) (13-7)

Plate 13-7

Phyllocoptes aesculifoliae Keifer, BCDA V. 27, 307, 1938 (deutogyne)

Oxypleurites neocarinatus Keifer, BCDA V. 28, p. 11, 1939 (protogyne)

Type locality: Novato

Type host: *Aesculus californicus* (Spach), buckeye
 Common name: Buckeye rust mite

Relation to host: The mites live on both leaf surfaces: They cause some rusting of the leaves.

Discussion: Deutogynes appear a relatively short time after the mites start multiplying on the new leaves. This is probably an adaptation due to the early and irregular shedding of leaves by the host. While the following records do not show it, the species probably occurs in California throughout much of the range of its host.

California records:

MARIN CO.: Novato, VI-25-1938 (HHK)

SACRAMENTO CO.: Sacramento, V-10-1941 (HHK)

Oxypleurites baccharis K. (13-5)

Plate 13-5

Oxypleurites baccharis Keifer, BCDA V. 28, p. 237 1939

Type locality: Riverside

Type host: *Baccharis emoryi* Gray

Relation to host: The mite is a leaf vagrant, usually on the upper surface.

California record:

RIVERSIDE CO.: Riverside, X-11-1938 (HHK)

Oxypleurites cornifoliae K. (13-8)

Plate 13-8

Oxypleurites cornifoliae Keifer, BCDA V. 28, p. 235, 1939

Type locality: Baxter's district

Type host: *Cornus californicus* C. A., dogwood

Relation to host: The mites are vagrants on the under sides of the leaves.

California record:

PLACER CO.: Baxter's, IX-20-1938 (HHK)

Oxypleurites depressus Nal. (13-1)

Plate 13-1

Oxypleurites depressus Nalepa, Anz. Akad. Wiss.

Math-nat. Wien, V. 31, p. 38, 1894

Type locality: Austria

Type host: *Corylus avellanae* L., Filbert

Relation to host: The mites are vagrants on the under sides of the leaves. No damage has been apparent here in California.

California record:

BUTTE CO.: Paradise, VI-7-1939 (HHK)

Oxypleurites glabratae K. (13-9)

Plate 13-9

Oxypleurites glabratae Keifer, BCDA V. 29, p. 32, 1940

Type locality: Winters district

Type host: *Cornus glabrata* Benth.

Relation to host: The mites occur on both leaf surfaces and evidently cause considerable browning of the leaves. The immature forms are covered with white wax, which is left in characteristic white streaks on the leaves upon molting.

California record:

YOLO CO.: Winters, in Putah Canyon, IX-4-1939 (HHK)

Oxypleurites juglandis K. (13-4)

Plate 13-4

Oxypleurites juglandis Keifer, BCDA V. 40, p. 97, 1951

Type locality: San Jose

Type host: *Juglans regia* L., English walnut

Common name: Walnut rust mite

Relation to host: The mites are vagrants on the under sides of the leaves.

California record:

SANTA CLARA CO.: San Jose district, VII-29-1947 (W. H. Hart)

Oxypleurites marinalni K. (13-2)

Plate 13-2

Oxypleurites marinalni Keifer, BCDA V. 28, p. 237, 1939

Type locality: Stinson Beach

Type host: *Alnus rubra* Bong., red alder

Relation to host: The mites are harmless leaf vagrants on the under surfaces. They nestle themselves in the angles formed by the veins.

California record:

MARIN CO.: Stinson Beach, VIII-13-1938 (HHK)

Oxypleurites maxwelli K. (13-3)

Plate 13-3

Oxypleurites maxwelli Keifer, BCDA V. 28, p. 152, 1939

Type locality: Sacramento

Type host: *Olea europa* L. Olive

Common name: Olive leaf mite

Relation to host: The mites live on the upper surface of the leaves. They cause no apparent damage even when present in large numbers.

Discussion: The dorsal depression on the rear of the mite, coupled with uneven side processes,

makes this species very distinct. The origin of this mite is presumably the Mediterranean region, but examination of badly mite-damaged olive twigs from Israel has failed to disclose the presence of *maxwelli* there.

California records:

BUTTE CO.: Palermo, VI-7-1939 (HHK)
 SACRAMENTO CO.: Sacramento, IX-21-1938 (HHK)
 SANTA BARBARA CO.: Montecito, V-10-1949
 VENTURA CO.: Santa Paula, VIII-1938 (K. E. Maxwell)
 YOLO CO.: Winters district, V-3-1945 (HHK)

Genus 14. *Coptophylla* Keifer, 1944

BCDA V. 33, p. 26, 1944

Type of genus: *Coptophylla lamimani* (K.), BCDA

Coptophylla arbuti (K.) (14-2)

Plate 14-2

Phyllocoptes arbuti Keifer, BCDA V. 28, p. 489, 1939

Type locality: Berkeley

Type host: *Arbutus unido* L., Strawberry tree

Relation to host: The mites occur on the under sides of the leaves and due to pulverulent wax leave considerable debris.

California record:

ALAMEDA CO.: Berkeley, VII-25-1939 (HHK)

Coptophylla caliquerci K. (14-3)

Plate 14-3

Coptophylla caliquerci Keifer, BCDA V. 33, p. 26, 1944

Type locality: Sacramento

Type host: *Quercus lobata* Nee, Valley white oak

Relation to host: The mites are upper surface leaf vagrants.

California record:

SACRAMENTO CO.: Sacramento (Capitol Park), IX-9-1943 (HHK)

Coptophylla lamimani (K.) (14-1)

Plate 14-1

Phyllocoptes lamimani Keifer, BCDA V. 28, p. 419, 1939

Type locality: Paradise

Type host: *Corylus avellanae* L. Filbert

Relation to host: The mites are found on the under sides of the leaves, almost entirely along the veins.

Discussion: This species is very distinct from the previous two species. The original home of *lamimani* remains unknown.

California record:

BUTTE CO.: Paradise, V-16-1939 (HHK);
Palermo, VI-7-1939 (HHK)

Genus 15. *Calacarus* Keifer, 1940

Bul. Cal. Dept. Agr. V. 29, p. 163, 1940

Type of Genus: *Calacarus pulviferus* K.

Calacarus adornatus (K.) (15-2)

Plate 15-2

Epitrimerus adornatus Keifer, BCDA V. 29, p. 32, 1940

Type locality: Sacramento (Capitol Park)

Type host: *Viburnum opulus* L., snowball

Additional host: *Camellia japonica* L.

Common name: Purple camellia mite

Relation to host: The mites are vagrants on both leaf surfaces. In the case of camellia the mites cause some browning of the surfaces, but also leave considerable debris in the form of waxy shed skins and carcasses.

Discussion: The occurrence of the mite on *Viburnum* was probably due to population pressure, since the species is far more characteristic of camellia.

California records:

ALAMEDA CO.: Oakland, X-31-1942 (G. B. Laing)

BUTTE CO.: Chico, II-18-1942 (R. Swett)

FRESNO CO.: Fresno, XI-14-1947

LOS ANGELES CO.: Altadena, I-7-1943 (V. E. Williams)

PLACER CO.: Loomis, XII-9-1943
 (J. B. Steinweden)

RIVERSIDE CO.: Riverside, X-19-1942 (Ehmann)

SACRAMENTO CO.: Sacramento, X-2-1939 (HHK)

SAN DIEGO CO.: San Diego, VI-22-1944
 (D. F. Palmer)

SAN JOAQUIN CO.: Lodi, III-12-1943
 (J. B. Steinweden)

SANTA CLARA CO.: Campbell, IV-15-1948

SANTA CRUZ CO.: Watsonville, XI-14-1944
 (M. R. Bell)

TULARE CO.: Visalia, I-19-1944
(J. B. Steinweden)

Calacarus pulviferus K. (15-1)
Plate 15-1

Calacarus pulviferus Keifer, BCDA V. 29, p. 163, 1940
Type locality: Grass Valley district
Type host: *Quercus kelloggii* Newb., black oak
Relation to host: The mites are upper surface leaf vagrants.

California record:

NEVADA CO.: Grass Valley district, VII-26
1940 (HHK)

Calacarus tejonis K. (15-3)
Plate 15-3

Calacarus tejonis Keifer, BCDA V. 41, p. 35, 1952
Type locality: Fort Tejon
Type host: *Quercus lobata* Nee
Relation to host: The mites are upper surface leaf vagrants.
Discussion: In accordance with the other two members of the genus the body fluids are purple. The white wax stripes along the back make all of these *Calacarus* species striking in appearance.

California record:

KERN CO.: Fort Tejon, XI-20-1951 (HHK)

Genus 16. *Anthocoptes Nalepa*, 1892

Anz. Akad. Wiss. math-nat. Wien, V. 29, p. 16, 1892
Type of genus: *Anthocoptes loricatus* (Nal.), Keifer, BCDA V. 27, p. 312, 1938

Anthocoptes ericameriella K. (16-4)
Plate 16-4

Anthocoptes ericameriella Keifer, BCDA V. 27, p. 313, 1938
Type locality: San Francisco
Type host: *Ericameria ericoides* (Less.), mock heather
Relation to host: The mites are vagrants among the small tufts of leaves. They also live in the outer layers of terminal Cecidomyid galls.

California record:

SAN FRANCISCO CO.: San Francisco, V-23-1938
(HHK)

Anthocoptes hesperus K. (16-3)
Plate 16-3

Anthocoptes hesperus Keifer, BCDA V. 30, p. 206, 1941
Type locality: South Laguna
Type host: *Ceanothus cuneatus* Hook., buckbrush
Relation to host: The mites are leaf vagrants, chiefly on the under surface.

California records:

ORANGE CO.: South Laguna, IX-4-1940 (HHK)
SANTA CRUZ CO.: Mt. Herman, VIII-18-1941
(HHK) 1944

Anthocoptes pickeringiae K. (16-2)
Plate 16-2

Anthocoptes pickeringiae Keifer, BCDA V. 41, p. 36, 1952
Type locality: Occidental
Type host: *Pickeringia montana* Nutt., Pea chaparral
Relation to host: The mites live on the leaves and green twigs in the fine pile on all these surfaces.

California record:

SONOMA CO.: Occidental, IX-6-1951 (HHK)

Anthocoptes punctidorsa K. (16-1)
Plate 16-1

Anthocoptes punctidorsa Keifer, BCDA V. 32, p. 216, 1943
Type locality: Sacramento
Type host: *Ulmus pumila* L.
Relation to host: The mites are leaf vagrants, chiefly on the under surface.
Discussion: There seems to be a certain amount of sexual dimorphism in this case, with the female more like a species of *Vasates*, while the male has the characters of *Anthocoptes*.

California record:

SACRAMENTO CO.: Sacramento, VI-7-1943 (HHK)

Genus 17. *Vasates* Shimer, 1869

Tr. Amer. Ent. Soc. V. 2, p. 319, 1869

Type of genus: *Vasates quadripedes* Shimer; Keifer, BCDA V. 33, p. 25, 1944

Discussion: Unlike the majority of the species structurally referable to this genus, the type, *quadripedes*, is a gall-former on maple leaves.

Vasates advens (K.)

Phyllocoptes advens Keifer, BCDA V. 27, p. 192, 1938

Type locality: Pomona Heights

Type host: *Citrus limonia* Osb., lemon

Discussion: This mite appeared on lemon under the fruit buttons during the survey for Citrus bud mite. It is now apparent that the mite as described is a deutogyne. The characters of the protogyne are unknown as is the true host. Until the type area is explored nothing further can be done with this name.

California record:

LOS ANGELES CO.: Pomona Heights, XII-13-1937
(K. L. Wolff)

Vasates ambrosiae (K.) (17-10)

Plate 17-10

Phyllocoptes ambrosiae Keifer, BCDA V. 32, p. 214, 1943

Type locality: Fillmore

Type host: *Ambrosia psilostachya* DC., western ragweed

Relation to host: The mites are leaf vagrants. They were found after leaves that bore galls of *Aceria boycei* had been brought back to the laboratory.

California record:

VENTURA CO.: Fillmore, VIII-8-1940
(A. M. Boyce)

Vasates calulmi (K.) (17-1)

Plate 17-1

Phyllocoptes calulmi Keifer, BCDA V. 29, p. 113, 1940

Type locality: San Mateo

Type host: *Ulmus (campestris ?)*, a street tree

Relation to host: The mites are vagrants on the under sides of the young terminal leaves. The 2-rayed featherclaw is unusual.

California record:

SAN MATEO CO.: San Mateo, VI-18- 1939 (HHK)

Vasates cornutus (Banks) (17-18)

Plate 17-18, 17-18d

Phyllocoptes cornutus Banks, Proc. Ento. Soc.

Wash. V. 7, p. 141, 1905

Type locality: Washington D. C.

Type host: *Amygdalus persica* S. & Z., peach

Common name: Peach silver mite (approved)

Relation to host: The mites are free living on the leaf surfaces. This is the well-known peach silver mite, which produces a silvery sheen on older peach leaves. Less well known is the effect this mite has on immature and young leaves. In this latter case the mites may cause a mottling of yellow dots on the leaf, or roll the leaf longitudinally. Peach trees with glandless leaves suffer most from this longitudinal rolling.

Discussion: the name *paracornutus*, proposed by the writer for mites of this type on almond (BCDA V. 32, p. 214, 1943), is nothing more than *cornutus*.

The writer is not acquainted with Banks' species *amygdalina*, said to occur on *Prunus davidiana* in Southern California.

The peach silver mite probably occurs nearly everywhere in California that peaches are grown. The mite also occurs on nectarine.

California records:

ALAMEDA CO.: Hayward, X-8-1941

(L. R. Jeppson)

BUTTE CO.: Chico, U. S. P. I. G., X-28-1949

(H. T. Osborn)

KERN CO.: Wasco, XII-2-1940 (G. L. Smith)

MADERA CO.: Madera district, V-19-1937

(N. Overgaard)

MERCED CO.: Merced, VI-18-1943 (Jilbert)

ORANGE CO.: Atwood, IX-23-43 (E. A. Dudley)

SACRAMENTO CO.: Sacramento, IX-30-1940 (HHK)

SAN JOAQUIN CO.: Stockton, V-1-1944

(C. H. Swanson)

SANTA CLARA CO.: Stanford University, X-1949

(L. A. Thompson)

STANISLAUS CO.: Salida, III-17-1949

TULARE CO.: Visalia, I-7-1942 (S. F. Bailey)

YOLO CO.: Winters, V-3-1943 (HHK)

YUBA CO.: Marysville district, VII-16, 1946

(H. A. Crane)

Vasates cotyledonis (K.) (17-9)

Plate 17-9

Phyllocoptes cotyledonis Keifer, BCDA V. 28, p. 487, 1939

Type locality: Stinson Beach

Type host: *Cotyledon caespitosa* Haw., stonecrop
 Relation to host: The mites severely brown and wrinkle the leaf surfaces, and cause uneven white surface pulverulence.

California record:

MARIN CO.: Stinson Beach, VII-3-1939 (HHK)

Vasates destructor (K.) (17-14)

Plate 17-14

Phyllocoptes destructor Keifer, BCDA V. 29, p. 160, 1940

Type locality: Modesto

Type host: *Lycopersicum esculentum* Mill., tomato

Additional hosts: *Solanum douglasii* Dunal, nightshade; *Solanum tuberosum*, potato; Petunia;

Solanum sp., a vine; *Physalis* prob. *ixocarpa* Brot.; *Datura* sp.

Common name: Tomato russet mite (approved)

Relation to host: The mites are free living on the green surfaces of their host. Potato and petunia show some discoloration of the leaves but the plants continue to live. In the case of tomato the attack of this mite is fatal to any susceptible plant (one or more varieties seem immune). Since Eriophyids need perennial hosts and cannot afford to kill their hosts, the relation of this mite to tomato is unnatural. The persistence and speed with which this mite reappears every year in newly planted tomato fields, indicates the ease with which it disseminates itself. The mite overwinters on perennial hosts such as petunia and nightshades.

Discussion: The shield pattern and declivitous front shield lobe are distinctive for the species.

California records:

ALAMEDA CO.: Irvington, IX-15-1941
 (G. B. Laing)

BUTTE CO.: Oroville, X-3-1942 (HHK)

CALAVERAS CO.: San Andreas, VII-15-1942
 (H. L. Leonard)

IMPERIAL CO.: Niland, IV-18-1944

KERN CO.: Shafter, VI-16-1942 (S. F. Bailey)

LOS ANGELES CO.: Bellflower, VIII-14-1942
 (V. E. Williams)

MERCED CO.: Merced, VII-17-1942
 (C. H. Kinsley)

MONTEREY CO.: Salinas, IX-30-1942
 (H. A. Hunt)

NAPA CO.: Napa, VIII-14-1943 (Butler)

ORANGE CO.: San Juan Capistrano, X-27-1948

PLACER CO.: Thermolands, IX-26-1941
 (Fred Clark)

RIVERSIDE CO.: Corona, VIII-4-1943 (Platt)

SACRAMENTO CO.: Elkhorn district, XI-7-1941
 (S. F. Bailey)

SAN BENITO CO.: Hollister, IX-30-1942,
 (H. A. Hunt)

SAN BERNARDINO CO.: Loma Linda, I-25-1943

SAN DIEGO CO.: Jamul, XII-22-1942 (F. Thorne)

SAN JOAQUIN CO.: Tracy, VIII-13-1941
 (H. W. Graves)

SAN LUIS OBISPO CO.: San Luis Obispo, IX-16-1942 (R. M. Drake)

SAN MATEO CO.: San Carlos, V-21-1943
 (Campbell)

SANTA BARBARA CO.: Goleta, VIII-20-1942
 (W. Cummings)

SANTA CLARA CO.: Almaden, VIII-5-1942
 (L. R. Cody)

SANTA CRUZ CO.: Watsonville, VIII-24-1946

SHASTA CO.: French Gulch, VII-26-1950
 (B. F. Stroup)

STANISLAUS CO.: Modesto, V-16-1940
 (S. F. Bailey)

SUTTER CO.: Verona, IX-2-1942

TULARE CO.: Visalia, X-11-1942

VENTURA CO.: Camarillo, IX-16-1942
 (C. J. Barrett)

YOLO CO.: Elkhorn district, IX-3-1940
 (S. F. Bailey)

YUBA CO.: Marysville, VII-11-1944
 (A. W. Worledge)

Vasates eurynotus (Nal.) (17-13)

Plate 17-13

Phyllocoptes eurynotus Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 31, p. 38, 1894

Type locality: Austria

Type host: *Torilis infesta* Koch.

California hosts: *Apium graveolens* L., celery;
Daucus carota L., carrot

Common name: Celery rust mite

Relation to host: The mites are free living on the green surfaces. On celery some surface browning evidently results from the activity of the mites. On carrot the mites are associated in part with the flower heads, where in company with *Aceria peucedani*, they cause discoloration of the heads.

California records:

FRESNO CO.: Fresno, X-25-1941 (S. F. Bailey)

LOS ANGELES CO.: San Pedro, IX-28-1944
 (H. T. Osborn)

ORANGE CO.: Stanton, IX-16-1949

SAN JOAQUIN CO.: Terminous, XI-4-1940
 (P. F. Wright)

SOLANO CO.: Rio Vista, VII-26-1944, Dixon,
VIII-2-1944 (D. H. Byers)
YUBA CO.: Marysville, X-12-1944 (Morehead)

Vasates fockeui (Nal. & Trt.) (17-19)

Phyllocoptes fockeui Nalepa and Trouessart,
Naturaliste, V. 13, p. 26, 1891
Phyllocoptes fockeui N&T, Das Tierreich, p. 52,
1898

Type locality: Austria
Type host: probably *Prunus domestica* L., prune
Additional hosts: *Prunus cerasus* L., cherry; *P.*
mahaleb L.

Common name: Plum nursery mite

Discussion: The occurrence of this mite in California is still problematical, partly because the writer knows of no distinguishing features between it and *cornutus*. Plums and cherries in areas north of California are regularly infested with what is called *fockeui*, but these trees in California do not usually have these mites. Where peach trees grow near plums and cherry trees the former may be heavily infested with silver mite without the latter becoming infested. The records listed below are tentative and indicate that plums and cherries have this type of mite in the areas indicated. The mite causes the leaves to turn brown after the manner of rust mites.

California records:

NAPA CO.: Napa, VIII-3-1944 (H. T. Osborn)
SACRAMENTO CO.: Elk Grove, III-31-1949

Vasates glabri K. (17-23)

Plate 17-23

Vasates glabri Keifer, BCDA V. 41, p. 33, 1952
Type locality: Fallen Leaf Lake
Type host: *Acer glabrum* Torr., Sierra maple
Relation to host: The mites are inquiline in the
magenta erineum.

California record:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951
(HHK)

Vasates immigrans (K.) (17-3)

Plate 17-3

Phyllocoptes immigrans Keifer, BCDA V. 29, p. 29,
1940

Type locality: Sacramento

Type host: *Tamarix gallica* L., tamarisk

Relation to host: The mites are to be found under the scale-like leaves, but when abundant wander along the twigs in the open. The type tree, which was in Capitol Park, has now been removed.

California record:

SACRAMENTO CO.: Sacramento, IX-11-1939 (HHK)

Vasates laevigatae (Hassan) (17-21)

Plate 17-21

Phyllocoptes laevigatae Hassan, U. C. Publ. Ent.
V. 4, p. 379, 1928

Type locality: Agnew

Type host: *Salix laevigatae* Bebb., red willow

Relation to host: The mites form bead galls on the leaves. These galls are usually colonial in distribution, one limb on a tree having many and other parts of the tree free.

Discussion: This mite evidently attacks other species of willow in California, but has not been thoroughly investigated. In respect to gall formation *laevigatae* resembles the type species of the genus *Vasates*. This gall mite is probably deutergynous.

California records:

FRESNO CO.: Fresno, VIII-20-1942
(R. H. Smith)

ORANGE CO.: Atwood, X-1-1943 (E. A. Dudley)

SACRAMENTO CO.: Sacramento, VIII-18-1937
(HHK)

SANTA CLARA CO.: Agnew, 1928 (Hassan)

Vasates ligustri (K.) (17-17)

Plate 17-17

Phyllocoptes ligustri Keifer, BCDA V. 27, p. 190,
1938

Type locality: Pasadena

Type host: *Ligustrum ovalifolium* Haask., privet

Common name: Privet rustmite

Relation to host: These mites remain on the leaves and green stems throughout the year. In the spring they multiply vigorously on the new leaves and often cause noticeable browning and curling of the new leaves.

Discussion: While the investigation of the structural characters separating this species from *cornutus* are not complete as yet, the habits of the two species are quite dissimilar in certain respects. The privet mite, unlike the silver

mite, has no deutogynes. The privet mite starts to multiply earlier in the spring, is depressed by the warm summer weather, and revives its population again in the fall.

California records:

LOS ANGELES CO.: Pasadena, III-4-1938
(C. Gammon)
NEVADA CO.: Nevada City, VI-8-1948
ORANGE CO.: Orange, XI-14-1938 (T. Gallion)
SACRAMENTO CO.: Sacramento, IV-25-1939 (HHK)
SAN DIEGO CO.: San Diego, III-25-1940
(J. W. Dixon)
SAN FRANCISCO CO.: San Francisco, VIII-1-1939
(HHK)
SANTA CLARA CO.: Palo Alto, V-1-1947
SANTA CRUZ CO.: Watsonville, IV-10-1950
(Huston)
SOLANO CO.: Fairfield, III-27-1950 (Goodman)
YOLO CO.: Davis, V-30-1942 (S. F. Bailey)

Vasates magnolivora (K.) (17-7)

Plate 17-7

Phyllocoptes magnolivora Keifer, BCDA V. 28, p. 486, 1939

Type locality: San Jose

Type host: *Magnolia grandiflora* L., bull bay

Relation to host: The mites live in the natural hair on the under sides of the leaves. They are also found around the flower buds but no damage has been attributed to them.

Discussion: Roivainen (1951) reports this mite on a house-grown magnolia in Finland. The native home of the host is presumably the origin of the mite.

California record:

SANTA CLARA CO.: San Jose, VIII-25-1939 (HHK)

Vasates malivagrans K. (17-15)

Plate 17-15

Vasates malivagrans Keifer, BCDA V. 35, p. 41, 1946; as *Vasates schlectendali* (Nal.) Keifer, Jr. Ec. Ent. V. 39, p. 567, 1946

Type locality: Vine Hill, Santa Cruz County

Type host: *Pyrus malus* L., apple

Common name: (if *schlectendali*) Apple rust mite (approved)

Relation to host: The mites live on the under sides of the leaves.

Discussion: The writer is uncertain whether to call this mite the species named, or *schlectendali*. The description and figures

which Nalepa (1890) gives for *schlectendali* do not fit the Santa Cruz County specimens. (The same thing can be said for specimens received from other parts of the United States.) Until authentic European material of *schlectendali* is available this problem will remain unsettled. The mite (*malivagrans*) is presumably deuterogynous.

California records:

MONTEREY CO.: Salinas, V-22-1944
(W. H. Lange)
SANTA CRUZ CO.: Vine Hill, VIII-10-1944 (HHK)

Vasates manzanitae (K.) (17-8)

Plate 17-8

Phyllocoptes manzanitae Keifer, BCDA V. 29, p. 160, 1940

Type locality: Magalia

Type host: *Arctostaphylos* sp., manzanita

Relation to host: The mites are free-living on both leaf surfaces. There are many species of manzanita in California and this mite probably occurs on a number of them.

California records:

BUTTE CO.: Magalia, VII-2-1940 (HHK)
SONOMA CO.: Occidental, IX-6-1951 (HHK)

Vasates mckenziei K. (17-5)

Plate 17-5

Vasates mckenziei Keifer, BCDA V. 33, p. 26, 1944

Type locality: Sacramento

Type host: *Elymus triticoides* Buckl., a perennial grass

Relation to host: The mites live in the longitudinal furrows on the upper leaf surface. The relationship this mite bears to *dubius* Nal. remains to be determined.

California records:

SACRAMENTO CO.: Sacramento, X-3-1943
(H. L. McKenzie)
YOLO CO.: Winters, VII-4-1944 (HHK)

Vasates paraglabri K. (17-20)

Plate 17-20

Vasates paraglabri Keifer, BCDA V. 41, p. 34, 1951

Type locality: Fallen Leaf Lake

Type host: *Acer glabrum* Torr., Sierra maple

Relation to host: This mite is another in the complex found in the magenta erineum on the host leaves.

Discussion: The relation this mite bears to *glabri* remains to be determined by experiment, but the structures seem different enough to justify the conclusion that this is not a case of deuterygyny.

California record:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951 (HHK)

Vasates prosopis (K.) (17-2)
Plate 17-2

Phyllocoptes prosopis Keifer, BCDA V. 29, p. 29, 1940

Type locality: Whitewater

Type host: *Prosopis juliflora glandulosa* Ckll., honey mesquite

Relation to host: The mites are free living on the leaves.

California record:

RIVERSIDE CO.: Whitewater, IX-16-1939 (HHK)

Vasates rhamnivagrans (K.) (17-16)
Plate 17-16

Phyllocoptes rhamnivagrans Keifer, BCDA V. 28, p. 419, 1939

Type locality: Aukum

Type host: *Rhamnus californicus tomentella* B&W

Relation to host: The mites are under surface leaf vagrants among the hairs. This mite does not occur on the glabrous variety of this host.

California record:

EL DORADO CO.: Aukum, VI-4-1939 (HHK)

SONOMA CO.: Occidental, IX-6-1951 (HHK)

Vasates rhododendronis (K.) (17-12)
Plate 17-12

Phyllocoptes rhododendronis Keifer, BCDA V. 29, p. 162, 1940

Type locality: Paradise

Type host: *Rhododendron occidentale* Cy-Ar., azalea

Relation to host: The mites are under surface leaf vagrants. The immature stages are covered with pulverulent wax.

California records:

BUTTE CO.: Paradise, VII-2-1940 (HHK)

NAPA CO.: Pope Valley, X-28-1951 (HHK)

Vasates scotti (K.) (17-6)
Plate 17-6

Phyllocoptes scotti Keifer, BCDA V. 29, p. 28, 1940

Type locality: Winters

Type host: *Cercis occidentalis* Torr., redbud

Relation to host: The mites are leaf vagrants, spending the winter in the flower buds.

California records:

SHASTA CO.: Rocky Camp, Hat Creek, VIII-10-1948 (HHK)

TULARE CO.: Sequoia National Park, X-31-1939 (F. T. Scott)

YOLO CO.: Putah Canyon, Winters district, XI-7-1939 (HHK)

Vasates symphoricarpi (K.) (17-4)
Plate 17-4

Phyllocoptes symphoricarpi Keifer, BCDA V. 28, p. 487, 1939

Type locality: Aukum

Type host: *Symphoricarpos albus* L., snowberry

Relation to host: The mites live on the under sides of the leaves.

California record:

EL DORADO CO.: Aukum, VI-4-1939 (HHK)

Vasates tamalpais (K.) (17-11)
Plate 17-11

Phyllocoptes tamalpais Keifer, BCDA V. 28, p. 486, 1939

Type locality: Mt. Tamalpais

Type host: *Corylus rostrata californica* A., hazelnut

Relation to host: The mites are vagrants on both leaf surfaces, favoring the under side. The long dorsal setae are somewhat distinctive.

California records:

MARIN CO.: Mt. Tamalpais, VII-3-1939 (HHK)

SONOMA CO.: Camp Meeker, IX-6-1951 (HHK)

Vasates toxicophagus (Ewing) (17-22)
Plate 17-22

Phyllocoptes toxicophagus Ewing, Proc. Iowa Acad.

Sci., V. 24, p. 323, 1917; Keifer, BCDA V. 27, p. 191, 1938

Type locality: Western Oregon

Type host: *Rhus diversiloba* T&G., poison oak

Common name: Poison oak leaf-gall mite

Relation to host: The mites form bead galls on the leaves. In some cases the terminal leaves are deformed by the mass of galls.

Discussion: The mite is widespread in California, but only one definite locality is available at this writing.

California record:

VENTURA CO.: Santa Paula, VII-29-1937
(S. Lockwood)

Genus 18. *Gammaphytoptus* Keifer, 1939

Bul. Cal. Dept. Agr. V. 28, p. 148, 1939

Type of genus: *Gammaphytoptus camphorae* K.

Gammaphytoptus camphorae K. (18-1)

Plate 18-1

Gammaphytoptus camphorae Keifer, BCDA V. 28, p. 148, 1939

Type locality: Sacramento

Type host: *Cinnamomum camphora* N&E., camphor tree

Relation to host: This species seems to be basically a leaf vagrant type that has taken up residence in the natural leaf glands that open on the under surface. These glands are in the angles formed by the large veins with the midrib near the leaf base.

Discussion: This mite is polymorphic, only the extreme form being shown in the figure. There are many individuals in each leaf gland population that have a nearly Eriophyiform abdomen. As in *Aceria camelliae* and *Eriophyes vitis*, this mite combines the appressed genitalia and shortened apodeme with the presence of dorsal setae. In the genera *Cecidophyes* and *Coptophylla*, both of which have this type of genitalia, the dorsal setae are missing. Undoubtedly the native home of camphor is where the mite originated.

California records:

BUTTE CO.: Oroville, VII-23-1938

(J. B. Steinweden)

LOS ANGELES CO.: Pasadena, VII-6-1938

(C. Gammon)

SACRAMENTO CO.: Sacramento, IX-29-1938 (HHK)

Genus 19. *Tetra* Keifer, 1944

Bul. Cal. Dept. Agr. V. 33, p. 27, 1944

Type of genus: *Tetra concava* (K.)

Tetra cercocarpi K. (19-1)

Plate 19-1

Tetra cercocarpi Keifer, BCDA V. 41, p. 68, 1952

Type locality: Rocky Camp, Hat Creek

Type host: *Cercocarpus ledifolius* Nutt., Desert mountain mahogany

Relation to host: The mites are vagrants among the leaf hairs on the upper leaf surface.

California record:

SHASTA CO.: Rocky Camp, Hat Creek, VIII-10-1948 (HHK)

Tetra concava (K.) (19-2)

Plate 19-2

Phyllocoptruta concava Keifer, BCDA V. 28, p. 489, 1939

Type locality: Sacramento

Type host: *Ulmus (campestris ?)*, elm

Relation to host: The mites are free living on the leaves, principally on the upper surfaces.

California record:

SACRAMENTO CO.: Sacramento, VI-27-1939 (HHK)

Genus 20. *Abacarus* Keifer, 1944

Bul. Cal. Dept. Agr. V. 33, p. 28, 1944

Type of genus: *Abacarus acalyptus* (K.)

Abacarus acalyptus (K.) (20-2)

Plate 20-2

Calepitrimerus acalyptus Keifer, BCDA V. 28, p. 490, 1939

Type locality: Baxter's

Type host: *Ceanothus cordulatus* Kell.

Relation to host: The mites live free on the leaves and green parts of the twigs.

California record:

PLACER CO.: Baxter's, VI-14-1939 (HHK)

Abacarus hystris (Nal.) (20-1)

Plate 20-1

Callyntrotus hystris Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 33, p. 110, 1896.

Abacarus hystrix (Nal.) Keifer, BCDA V. 33, p. 28, 1944
Phytocoptes hystrix (Nal.) Roivainen, Acta Ent. Fen. #8, p. 54, 1951
 Type locality: Austria
 Type host: *Agropyrum repens* Pal., a grass
 California host: *Elymus triticoides* Buckl.; also *Elymus* sp.
 Common name: Grain rust mite (approved)
 Relation to host: The mites live in the furrows on the upper leaf surface, in the case of *Elymus* spp. No cases of damage have ever occurred in California as far as is known.

California records:

SACRAMENTO CO.: Sacramento, IX-19-1943 (HHK)
 VENTURA CO.: Fillmore, VIII-30-1940 (HHK)

Genus 21. *Tegonotus Nalepa*, 1890

Anz. Akad. Wiss. math-nat. Wien, V. 27, p. 213, 1890
 Type of genus: *Tegonotus fastigatus* Nal.; Keifer, BCDA V. 28, p. 153, 1939
Thamnacus Keifer, BCDA V. 33, p. 27, 1944; type: *rhamnicola* K.
 Discussion: Nalepa characterized this genus as composed of mites with "roof-like" backs. It is here characterized as containing mites with an anterior shield lobe, dorsal setae projecting caudad, and the abdomen with a middorsal ridge that tapers to the cauda.

Tegonotus califraxini (K.) (21-2)
Plate 21-2

Epitrimerus califraxini Keifer, BCDA V. 27, p. 308, 1938
 Type locality: Placerville district
 Type host: *Fraxinus dipetala* H&A., foothill ash
 Additional host: *Fraxinus velutina* Torr., Arizona ash
 Relation to host: The mites are free-living on the under surfaces of the leaves.

California records:

KERN CO.: Bakersfield, V-1939
 SACRAMENTO CO.: Sacramento, VI-16-1939 (HHK)
 PLACER CO.: Webber Creek, Placerville district, V-30-1938 (HHK)
 YOLO CO.: Davis, V-6-1942 (R. L. Usinger)

Tegonotus myersi (K.) (21-1)
Plate 21-1

Epitrimerus myersi Keifer, BCDA V. 28, p. 150, 1939

Type locality: Puente
 Type host: *Persea americana* Mill., avocado
 Common name: Avocado bud mite
 Relation to host: The mites live in the avocado buds and under the fruit buttons. They cause some discoloration of the surface.

California records:

LOS ANGELES CO.: Puente, X-17-1938 (L. E. Myers)
 ORANGE CO.: Fullerton, X-24-1938 (R. J. Bumgardner)
 SAN DIEGO CO.: Vista, X-26, 1943 (J. R. La Follette)
 SANTA BARBARA CO.: Carpinteria, VII-14-1944 (M. Cravens)

Tegonotus negundella K. (21-5)
Plate 21-5

Tegonotus negundella Keifer, BCDA V. 28, p. 235, 1939
 Type locality: Davis
 Type host: *Acer negundo californicum* Sarg., box-elder
 Relation to host: The mites live on the under sides of the leaves.

California records:

ORANGE CO.: Santa Ana, VIII-18-1948
 SACRAMENTO CO.: North Sacramento, VI-27-1942 (E. Gammon)
 YOLO CO.: Davis, IX-24-1938 (HHK)

Tegonotus rhamnicola (K.) (21-3)
Plate 21-3

Phyllocoptes rhamnicola Keifer, BCDA V. 27, p. 307, 1938
Thamnacus rhamnicola (K.), BCDA V. 33, p. 27, 1944
 Type locality: Camp Rogers
 Type host: *Rhamnus californicus* Esch., coffee berry, smooth leaf type.
 Relation to host: The mites first cause an oblique folding of the leaf between two veins, later becoming more or less free living as the fold opens due to leaf expansion.

California record:

PLUMAS CO.: Camp Rogers, Belden district, VI-12-1938 (HHK)

Tegonotus zizyphagus (K.) (21-4)
Plate 21-4

Epitrimerus zizyphagus Keifer, BCDA V. 28, p. 420, 1939

Type locality: Oroville
 Type host: *Zizyphus sativa* Gaertn., jujube
 Relation to host: The mites are free living on the green stems and leaves.

California records:

BUTTE CO.: Oroville, VI-7-1939 (HHK)

YUBA CO.: Marysville, IX-16-1946

Genus 22. *Tumescoptes* Keifer, 1939

Bul. Cal. Dept. Agr. V. 28, p. 336, 1939
 Type of genus: *Tumescoptes trachycarpi* K.

Tumescoptes trachycarpi K. (22-1)
 Plate 22-1

Tumescoptes trachycarpi Keifer, BCDA V. 28, p. 337, 1939

Type locality: Woodland

Type host: *Trachycarpus excelsa* Wendl., windmill palm

Relation to host: This remarkable mite is found in the new folded leaves coming out of the bud.

Discussion: The palm from which the specimens originated was taken in quarantine from San Francisco. At the present time no precise locality is known in California where this mite exists. Both this species and *Mackiella phoenicis*, on date palm, are peculiar types, and may give a glimpse of some of the strange Eriophyids to come when further exploration is done for Eriophyids on palms.

Genus 23. *Acaricalus* Keifer, 1940

Bul. Cal. Dept. Agr. V. 29, p. 164, 1940
 Type of genus: *Acaricalus secundus* Keifer

Acaricalus hederæ (K.) (23-2)
 Plate 23-2

Calepitrimerus hederæ Keifer, BCDA V. 28, p. 490, 1939

Type locality: San Francisco

Type host: *Hedera helix* L., ivy

Relation to host: The mites are free-living on the upper sides of the leaves.

California record:

SAN FRANCISCO CO.: San Francisco, VIII-19-1939 (HHK)

Acaricalus secundus K. (23-1)
 Plate 23-1

Acaricalus secundus Keifer, BCDA V. 29, p. 164, 1940

Type locality: Grass Valley district

Type host: *Quercus kelloggii* Newb., black oak

Additional host: *Quercus agrifolia* Nee, coast live oak

Relation to host: The mites are free-living on the upper leaf surfaces.

California records:

NEVADA CO.: Grass Valley district, VII-20-1940 (HHK)

SAN MATEO CO.: La Honda district, VIII-20-1940 (HHK)

SONOMA CO.: Occidental, IX-3-1951 (HHK)

Genus 24. *Acaphylla* Keifer, 1943

Bul. Cal. Dept. Agr. V. 32, p. 214, 1943
 Type of genus: *Acaphylla steinwedeni* K.

Acaphylla steinwedeni K. (24-1)
 Plate 24-1

Acaphylla steinwedeni Keifer, BCDA V. 32, p. 215, 1943

Type locality: Sacramento

Type host: *Camellia japonica* L.

Common name: Yellow camellia rust mite

Relation to host: This species, which is free-living, occurs on the leaves associated with *Calacarus adornatus* (K.). While this mite does not leave as much debris on the leaves as *adornatus*, it may actually be more important as a rust mite.

California records:

ALAMEDA CO.: San Leandro, VII-27-1944 (J. B. Steinweden)

LOS ANGELES CO.: Glendale, IX-14-1942 (L. E. Myers)

MARIN CO.: Larkspur, III-8-1944 (J. B. Steinweden)

NEVADA CO.: Grass Valley, VII-26-1940 (HHK)

SACRAMENTO CO.: Sacramento, IV-7-1943 (J. B. Steinweden)

SAN JOAQUIN CO.: Lodi, III-12-1943 (J. B. Steinweden)

Genus 25. *Phylloptes Nalepa*, 1889

Sitzb. Akad. Wiss. math-nat. Wien, V. 98, p. 116, 1889

Type of genus: *Phylloptes carpini* Nal.; Keifer, BCDA V. 27, p. 191, 1938

Phylloptes abaenus K. (25-3)

Plate 25-3

Phylloptes abaenus Keifer, BCDA V. 29, p. 30, 1940

Type locality: San Mateo

Type host: *Prunus* sp., possibly Santa Rosa plum

Relation to host: These white mites are vagrants on the under sides of the leaves.

California records:

SACRAMENTO CO.: Sacramento, IX-20-1944 (HHK)

SAN MATEO CO.: San Mateo, X-21-1939 (HHK)

SANTA CLARA CO.: Stanford Campus, X-1939 (L. A. Thompson)

Phylloptes adalius K. (25-2)

Plate 25-2

Phylloptes adalius Keifer, BCDA V. 28, p. 487, 1939

Type locality: Berkeley

Type host: *Rosa* sp., cultivated rose

Relation to host: The mites are under surface leaf vagrants. In addition to the following record, there is an undated one from San Francisco.

California record:

ALAMEDA CO.: Berkeley, VII-25-1939 (HHK)

Phylloptes calirubi K. (25-7)

Plate 25-7

Phylloptes calirubi Keifer, BCDA V. 27, p. 306, 1938

Type locality: Clarksburg

Type host: *Rubus vitifolius* C. & S., native blackberry or dewberry

Relation to host: The mites are free-living on the under sides of the leaves among the leaf hairs.

California record:

YOLO CO.: Clarksburg district, VII-3-1938 (HHK)

Phylloptes calisalicis K. (25-1)

Plate 25-1

Phylloptes calisalicis Keifer, BCDA V. 33, p. 25, 1944

Type locality: Sacramento

Type host: *Salix babylonica* L., weeping willow, and *Salix* spp.

Relation to host: The mites live behind the buds and at the petiole bases, causing some shriveling of the tissue.

California record:

SACRAMENTO CO.: Sacramento, X-22-1943 (HHK)

Phylloptes cedri K. (25-5)

Plate 25-5

Phylloptes cedri Keifer, BCDA V. 45, p. 41, 1946

Type locality: Sacramento

Type host: *Cedrus atlantica glauca* Carr., glaucous cedar

Relation to host: The mites are vagrants on the needles. They become most abundant on fresh growth.

California record:

SACRAMENTO CO.: Sacramento, V-25-1944 (HHK)

Phylloptes dimorphus K. (25-4)

Plate 25-4

Phylloptes dimorphus Keifer, BCDA V. 29, p. 31, 1940

Type locality: Arrowhead Lake district

Type host: *Pteris aquilina lanuginosa* Borey, bracken

Relation to host: The mites are free-living on the under sides of the fronds.

Discussion: The males are smaller and of a darker color than the females. This should be a most instructive species to study.

California records:

EL DORADO CO.: Twin Bridges, IX-13-1947 (HHK)

SAN BERNARDINO CO.: Arrowhead Lake district, IX-16-1939 (HHK)

Phylloptes fructiphilus K. (25-6)

Plate 25-6

Phylloptes fructiphilus Keifer, BCDA V. 29, p. 30, 1940

Type locality: Clarksburg

Type host: *Rosa californica* C. & S.

Relation to host: The mites live around the petiole bases, but also have the unusual habit of living inside the fruit around the seeds.

California records:

BUTTE CO.: Wyandotte, XI-6-1942 (HHK)

YOLO CO.: Clarksburg district, XI-15-1939
(M. L. Jones)

Phyllocoptes gracilis (Nal.) (25-8)
Plate 25-8

Cecidophyes gracilis Nalepa, Anz. Akad. Wiss.
math-nat. Wien, V. 27, p. 2, 1890

Eriophyes gracilis (Nal.), Marcellia V. 20, p.
, 1923

Phyllocoptes parviflori Keifer, BCDA V. 28, p.
146, 1939

Type locality: Austria

Type host: *Rubus idaeus* L., raspberry

California host: *Rubus parviflorus* Nutt., thimble-
berry

Common name: Blackberry leaf mite (approved)

Relation to host: The mites live on the undersides
of the leaves among the hairs, and also on the
fruits. In the latter place they cause prema-
ture ripening and drying of the berries.

Discussion: The mite is northern in distribution
and on the Pacific coast it does most of the
berry damage in Washington. This species has
been confused with *Aceria essigi*, the redberry
mite, but that mite lives under cover. With the
exception of the collection given below, the
California records are uncertain.

California record:

MARIN CO.: Stinson Beach, VIII-13-1938 (HHK)

Genus 26. *Caliphytoptus* Keifer, 1938

Bul. Cal. Dept. Agr. V. 27, p. 311, 1938

Type of genus: *Caliphytoptus quercilobatae* Keifer

Caliphytoptus quercilobatae K. (26-1)
Plate 26-1

Caliphytoptus quercilobatae Keifer, BCDA V. 27, p.
311, 1938

Type locality: Ojai

Type host: *Quercus lobata* Nee, White oak

Relation to host: The mites live among the hairs
on the under sides of the leaves. They nestle
against the veins and apparently remain in one
position for long periods of time.

California record:

VENTURA CO.: Ojai, V-31-1938 (R. Young)

Genus 27. *Acarelliptus* Keifer, 1940

Bul. Cal. Dept. Agr. V. 29, p. 166, 1940

Type of genus: *Acarelliptus cocciformis* K.

Acarelliptus occidentalis K. (27-1)
Plate 27-1

Acarelliptus occidentalis Keifer, BCDA V. 40, p.
98, 1951

Type locality: Grass Valley district

Type host: *Quercus kelloggii* Newb., black oak

Additional host: *Quercus durata* Jepson, scrub oak

Relation to host: These peculiar mites are flat
and elliptical in dorsal view. They curl the
caudal portion of their abdomen under and re-
main motionless on the under sides of the
leaves after the manner of scale insect
crawlers, which they resemble in shape in a
miniature way.

California records:

NAPA CO.: Pope Valley, X-28-1951 (HHK)

NEVADA CO.: Grass Valley district, IX-1-1942
(HHK)

SONOMA CO.: Occidental, IX-3-1951 (HHK)

Genus 28. *Cupacarus* Keifer, 1943

Bul. Cal. Dept. Agr. V. 32, p. 215, 1943

Type of genus: *Cupacarus cuprifestor* K.

Cupacarus cuprifestor K. (28-1)
Plate 28-1

Cupacarus cuprifestor Keifer, BCDA V. 32, p. 215,
1943

Type locality: San Francisco

Type host: *Cupressus macrocarpa* Hartw., Monterey
cypress

Relation to host: The mites are free-living around
the bract-like leaves on the green twigs.

California records:

MONTEREY CO.: Carmel, VIII-1942 (HHK)

SAN FRANCISCO CO.: San Francisco, XII-28-1942
(HHK)

Genus 29. *Phyllocopturta* Keifer, 1938

Bul. Cal. Dept. Agri. V. 27, p. 193, 1938

Type of genus: *Phyllocopturta oleivorus* (Ashm.)

Phyllocoptruta oleivorus (Ashm) (29-1)

Plate 29-1

Typhlodromus oliivorus Ashmead, Can Ent. V. 11, p. 160, 1879

Type locality: Florida

Type host: *Citrus sinensis* (Osborne), orange

Additional host: *Citrus limonia* (Osborne), lemon

Common name: Citrus rust mite (approved)

Relation to host: This mite infests orange (*Citrus sinensis*), lemon (*Citrus limonia*) and probably other members of the genus *Citrus*.

Discussion: The mite is widespread and probably occurs in nearly every citrus growing area in the world that is near enough to ocean influence. In California the mite shows a southern coastal distribution from Santa Barbara to San Diego Counties. It does not go inland to any degree and is never found on citrus in the Sacramento or San Joaquin Valleys. In Southern California its occurrence in damaging numbers is sporadic north of Orange County.

California records:

IMPERIAL CO.: Brawley, XII-27-1938

(H. C. Liebert) (Nursery stock)

LOS ANGELES CO.: Glendora, XII-20-1937

(L. E. Myers)

ORANGE CO.: Lemon Heights, XI-4-1948

SAN DIEGO CO.: Chula Vista, XII-26-1939

(J. O. Brodeur)

SANTA BARBARA CO.: Montecito, X-20-1949

(W. S. Cummings)

VENTURA CO.: County Hospital, I-13-1949

Genus 30. *Platyphytoptus* Keifer, 1938

Bul. Cal. Dept. Agr. V. 27, p. 188, 1938

Type of genus: *Platyphytoptus sabinianae* K.

Platyphytoptus multisternatus K. (30-2)

Plate 30-2

Platyphytoptus multisternatus Keifer, BCDA V. 28, p. 146, 1939

Type locality: Phillips

Type host: *Pinus murrayana* Balfour, lodgepole pine

Discussion: These high mountain mites live in the needle sheaths.

California record:

EL DORADO CO.: Phillips near Camp Sacramento, VIII-24-1938 (HHK)

Platyphytoptus sabinianae K. (30-1)

Plate 30-1

Platyphytoptus sabinianae Keifer, BCDA V. 27, p. 188, 1938

Type locality: Oroville (Palermo)

Type host: *Pinus sabiniana* Dougl., digger pine

Additional hosts: *Pinus* spp., including *ponderosa* Dougl.; *radiata* Don; *pinex* L., *torreyana* Parry; *tuberculata* Gord.; and probably others

Relation to host: This mite is usually found in the needle sheaths in company with *Trisetacus pini*, but at times it apparently comes out and becomes free-living on the needles for a period.

Discussion: This is a peculiar mite which is abundantly distinct from any other species now known. It apparently can live on nearly any pine which has the right kind of needle sheath. The genus *Platyphytoptus* appears to have its nearest ally in *Epitrimerus*.

California records:

AMADOR CO.: Lumber Yard Station, VIII-17-1947

(HHK)

BUTTE CO.: Palermo, I-23-1938 (HHK)

RIVERSIDE CO.: Idylwild, X-9-1938 (HHK)

SACRAMENTO CO.: Sacramento, X-7-1937 (HHK)

Genus 31. *Callyntrotus* Nal., 1894

Anz. Akad. Wiss. math-nat. Wien, V. 31, p. 71, 1894

Type of genus: *Callyntrotus schlectendali* Nal.; Keifer, BCDA V. 28, p. 234, 1939

Callyntrotus schlectendali Nal. (31-1)

Plate 31-1

Callyntrotus schlectendali Nalepa, Anz. Akad.

Wiss. math-nat. Wien, V. 31, p. 71, 1894

Type locality: Austria

Type host: *Rosa canina* L.

Common name: Rose rust mite

Relation to host: The mites are vagrants on the under sides of the leaves. They may cause some rusting although the damage does not attract attention and no control has ever seemed necessary. The mites leave characteristic white streaks on the leaves which are the second stage skin castings.

Discussion: The species has a wide distribution in California which the following records hardly show.

California records:

- LOS ANGELES CO.: Pasadena, VII-1-1938
(C. Gammon)
SACRAMENTO CO.: Sacramento, VI-10-1939 (HHK)
SANTA CLARA CO.: San Jose, X-16-1943
(M. R. Bell)
YOLO CO.: Davis, II-6-1939 (E. H. Fosen)

Genus 32. *Epitrimerus Nalepa*, 1898

Das Tierreich, V. 4, p. 61, 1898

Type of genus: *Epitrimerus gemmicola* (Nal.);

Keifer, BCDA V. 27, p. 308, 1938

Discussion: The usual *Epitrimerus* species has a central longitudinal ridge, fading to the cauda, and flanked on each side by a more or less prominent lateral ridge. In a few cases (*taxodii* as one example) there are two lateral undulations forming two lateral ridges on each side of the central ridge. This condition is not adequately treated in the keys at this particular writing and the disposition of species having it must be reviewed. The genus *Calacarus* is similar to *Epitrimerus* in back structure, but the beak and genital features, as well as the lack of dorsal setae, make *Calacarus* seem not too closely related to *Epitrimerus*.

Epitrimerus abietis K. (32-4)

Plate 32-4

Epitrimerus abietis Keifer, BCDA V. 41, p. 34, 1952

Type locality: Fallen Leaf Lake

Type host: *Abies concolor* L&G., white fir

Relation to host: The mites are vagrants on the new needles, but build up slowly and are only common, if at all, in the early fall.

California record:

EL DORADO CO.: Fallen Leaf Lake IX-12-1947
(HHK)

Epitrimerus cupressi (K.) (32-5)

Plate 32-5

Platyphytoptus cupressi Keifer, BCDA V. 28, p. 485, 1939

Type locality: Sacramento

Type host: *Cupressus sempervirens* L., Italian cypress

Relation to host: The mites lurk in the crevices formed by the scale-like leaves.

Discussion: There is some question as to the proper placement of this species. It is placed here because of the shallow troughs on the back, which condition is characteristic of certain *Epitrimerus* species.

California record:

SACRAMENTO CO.: Sacramento, VIII-24-1939
(HHK)

Epitrimerus cupressifoliae K. (32-7)

Plate 32-7

Epitrimerus cupressifoliae Keifer, BCDA V. 41, p. 35, 1952

Type locality: Occidental

Type host: *Cupressus sargentii* Jepson, Sargent cypress

Additional hosts: *Cupressus macnabiana* Murr., McNab cypress; *Juniperus californicus* Carr., Cal. juniper

Relation to host: The mites live on the fresh shoots where they may develop in considerable numbers.

Discussion: No difference has been found between the cypress and the juniper populations, hence they are considered as the same species. The cypress population, which is the type series, is from Sonoma County. The juniper mites are from Mt. Diablo and South.

California records:

CONTRA COSTA CO.: Mt. Diablo, IX-20-1951
(HHK)

NAPA CO.: Pope Valley, X-28-1951 (HHK)

RIVERSIDE CO.: Perris, VI-28-1946 (HHK)

SAN BERNARDINO CO.: Phelan district, X-5-1951
(HHK)

SONOMA CO.: Occidental, IX-6-1951 (HHK)

Epitrimerus libocedri (K.) (32-8)

Plate 32-8

Platyphytoptus libocedri Keifer, BCDA V. 28, p. 486, 1939

Type locality: Paradise

Type host: *Libocedrus decurrens* Torr., Incense cedar

Relation to host: The mites are free-living on the green tips. While this species probably has a wide range with its host, only the following record is available at the present.

California record:

BUTTE CO.: Paradise, VIII-30-1939 (HHK)

Epitrimerus pseudotsugae K. (32-9)

Plate 32-9

Epitrimerus pseudotsugae Keifer, BCDA V. 35, p. 42, 1946

Type locality: Sacramento

Type host: *Pseudotsuga taxifolia* (Lamb.), Douglas fir, a Park tree

Relation to host: The mites are needle vagrants on the fresh growth. This mite has a wide range with its host but only the following data is available at this writing.

California record:

SACRAMENTO CO.: Sacramento, VIII-29-1944 (HHK)

Epitrimerus pteleae K. (32-2)

Plate 32-2

Epitrimerus pteleae Keifer, BCDA V. 27, p. 308, 1938

Type locality: Rodeo

Type host: *Ptelea baldwini crenulata* Jepson, hop tree

Relation to host: The mites discolor the leaves after the manner of the usual rust mite.

Discussion: The position of the dorsal tubercles is not typical for *Epitrimerus*, but since these tubercles have their long axis approximately parallel to the length of the body the species is referred to this genus. The species is probably deuterogynous.

California records:

CONTRA COSTA CO.: Rodeo, VI-29-1938; Mt. Diablo, IX-20-1951 (HHK)

Epitrimerus pyri (Nal.) (32-3)

Plates 32-3; 32-3d

Tegonotus pyri Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 28, p. 162, 1891

Epitrimerus pirifoliae Keifer, BCDA V. 27, p. 309, 1938

Type locality: Austria

Type host: *Pyrus communis* L., pear

Common name: Pear rust mite (approved)

Relation to host: The mites are free-living on the under sides of the leaves where they may cause rusting if numerous enough. The deutogynes usually appear in the early summer in response to the maturing of the leaves, so the mite has a tendency to disappear after the spring flare-up.

Discussion: Nalepa's original description and figures do not indicate the most noticeable feature of the protogynes here in California, namely the lateral shield lobes. For that reason the above synonymy is not at all certain in the writer's opinion.

California records:

LAKE CO.: Finley, VI-21-1937 (C. Stone)

PLACER CO.: Wiemar, VII-25-1932 (A. C. Browne)

SACRAMENTO CO.: Sacramento, VI-2-1938 (HHK)

SUTTER CO.: Riego, X-26-1940 (HHK)

VENTURA CO.: Ojai, VII-20-1946

YOLO CO.: West Sacramento, VIII-12-1941 (S. Lockwood)

YUBA CO.: Marysville, VI-23-1942 (S. F. Bailey)

Epitrimerus sierribis K. (32-1)

Plate 32-1

Epitrimerus sierribis Keifer, BCDA V. 28, p. 489, 1939

Type locality: Baxter's

Type host: *Ribes nevadense* Kell.

Relation to host: The mites are free-living on the under sides of the leaves.

California record:

PLACER CO.: Baxter's, VII-14-1939 (HHK)

Epitrimerus taxodii (K.) (32-10)

Plate 32-10

Platyphytoptus taxodii Keifer, BCDA V. 28, p. 486, 1939

Type locality: Berkeley

Type host: *Taxodium distichum* Rich., bald cypress

Relation to host: The mites are free-living on the needle sprays. They are rather waxy and leave a certain amount of debris on the needles.

Discussion: The original tree from which the type specimens were taken was on the University of California campus a short distance north of the library. This tree has now been removed. The mite has an undulating back surface, making it somewhat atypical in *Epitrimerus*, since there are about five longitudinal ridges.

California record:

ALAMEDA CO.: Berkeley, VII-20-1939

Epitrimerus trilobus (Nal.) (32-6)

Plates 32-6; 32-6d

Cecidophyes trilobus Nalepa, Anz. Akad. Wiss. math-nat. Wien, V 27, p. 2, 1890

Type locality: Austria

Type host: *Sambucus nigra* L., black elder

California host: *Sambucus glauca* Nutt.; probably others

Relation to host: The mites live on the leaves where they often cause yellowing and curling or stunting of the terminal leaflets.

Discussion: The primary types have wax stripes along the top of each dorsal ridge. Since the deutogynes have neither ridges nor stripes this is one of the better species in which to observe deutogyny. Nalepa (1924) has designated varieties to take care of host-plant relationships.

California records:

RIVERSIDE CO.: Riverside, VIII-16-1942
(F. R. Platt)

SACRAMENTO CO.: Sacramento, IX-2-1943 (HHK)

VENTURA CO.: Santa Paula, VIII-30-1940 (HHK)

YOLO CO.: Davis, IX-22-1941 (HHK)

Genus 33. *Calepitrimerus* Keifer, 1938

Bul. Cal. Dept. Agr. V. 27, p. 310, 1938

Type of genus: *Calepitrimerus cariniferus* K.

Calepitrimerus anatis K. (33-3)

Plate 33-3

Calepitrimerus anatis Keifer, BCDA V. 39, p. 31 1940

Type locality: Camp Sacramento

Type host: *Amelanchier alnifolia* Nutt., western serviceberry

Relation to host: The mites are leaf vagrants, favoring the under sides of the leaves. Numerous deutogynes occur in these populations.

California records:

EL DORADO CO.: Camp Sacramento, IX-10-1939 (HHK)

SHASTA CO.: Old Station, VIII-9-1948 (HHK)

Calepitrimerus andropogonis K. (33-2)

Plate 33-2

Calepitrimerus andropogonis Keifer, BCDA V. 33, p. 27, 1944

Type locality: Wyandotte

Type host: *Andropogon* sp., a coarse grass

Relation to host: The mites are vagrants on the leaves.

California record:

BUTTE CO.: Wyandotte, Oroville district, XI-6-1942 (HHK)

Calepitrimerus armatus (Can.) (33-7)

Phyllocoptes (?) *armatus* Canestrini, Atti Soc. Veneto-Trent. V. 12, p. 23, 1890

Calepitrimerus armatus (Can.) Keifer, BCDA V. 31, p. 122, 1942.

Type locality: Italy

Type host: *Crataegus oxycantha* L., hawthorne

Relation to host: The mites are under surface vagrants, producing some browning on the leaves. The species is deutergynous.

California record:

SAN MATEO CO.: Burlingame, V-24-1941 (HHK)

Calepitrimerus baileyi K. (33-4)

Plate 33-4; 33-4d

Calepitrimerus baileyi Keifer, BCDA V. 27, p. 310, 1938 (protogyne)

Phyllocoptes aphrastus Keifer, BCDA V. 29, p. 29, 1940 (deutogyne)

Type locality: Davis

Type host: *Pyrus malus* L., apple

Common name: Bailey's apple rust mite

Relation to host: The mites live on the under sides of the leaves among the hairs, causing slight browning to the leaf surface. The deutogynes hibernate around the buds just back of the terminal bud.

California records:

MONTEREY CO.: Salinas, VI-6-1944
(W. H. Lange)

PLACER CO.: Auburn, VI-22-1944 (F. Clark)

SACRAMENTO CO.: Sacramento, VI-10-1946
(H. L. McKenzie)

YOLO CO.: Davis, VI-24-1938 (S. F. Bailey)

BUTTE CO.: Magalia, X-30-1939 (HHK)

Calepitrimerus cariniferus K. (33-5)

Plate 33-5

Calepitrimerus cariniferus Keifer, BCDA V. 27, p. 310, 1938

Type locality: Sacramento

Type host: *Artemisia heterophylla* Nutt., worm-wood

Relation to host: The mites are vagrants, favoring the upper side of the leaves.

California records:

SACRAMENTO CO.: Sacramento, VI-20-1938 (HHK)

SUTTER CO.: Wheatland, 1944 (HHK)

Calepitrimerus umbellulariae K. (33-1)

Plate 33-1

Calepitrimerus umbellulariae Keifer, BCDA V. 28, p. 336, 1939

Type locality: Sacramento

Type host: *Umbellularia californica* Nutt., California bay (a park tree)

Relation to host: The mites are free-living on the tips and especially on the flower stems and buds. The surface pile affords the mites some protection.

Discussion: This mite is distinct from all described species mainly by the produced finger-like dorsal tubercles.

California records:

SACRAMENTO CO.: Sacramento, V-5-1939 (HHK)

SAN MATEO CO.: Redwood City, VII-5-1950 (Edwards)

SONOMA CO.: Camp Meeker, IX-6-1951 (HHK)

Calepitrimerus vitis (Nal.) (33-6)

Plate 33-6; 33-6d

Epitrimerus vitis Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 42, p. 445, 1905

Phyllocoptes vitis Nalepa, Anz. Akad. Wiss. math-nat. Wien, V. 42, p. 268, 1905 (deutogyne ?)

Type locality: Austria (?)

Type host: *Vitis vinifera* L., grape

Common name: Grape rust mite

Relation to host: The mites live on the under sides of the leaves. In California the species is strongly deutergynous.

California records:

NAPA CO.: Yountville, X-6-1944 (L. M. Smith)

PLACER CO.: Roseville, VIII-22-1951 (Riolo)

SAN BERNARDINO CO.: Cucamonga, II-3-1944 (R. B. Korsmeier)

SANTA CRUZ CO.: Vine Hill, VIII-10-1944 (HHK)

TULARE CO.: Orosi, VII-9-1940 (J. B. Steinweden)

YOLO CO.: Broderick distr., X-8-1941 (HHK)

Genus 34. *Acamina* Keifer, 1944

Bul. Cal. Dept. Agr. V. 33, p. 29, 1944

Type of genus: *Acamina nolinae* (K.)

Acamina nolinae (K.) (34-1)

Plate 34-1

Calepitrimerus nolinae Keifer, BCDA V. 28, p. 151, 1939

Type locality: Mountains west of Indio, Anza district

Type host: *Nolina parryi* Wats.

Relation to host: The mites are free-living on the younger leaves.

California record:

RIVERSIDE CO.: Anza district, X-10-1938 (HHK)

DIPTILOMIPINI

Genus 35. *Asetacus* Keifer, 1952

Bul. Cal. Dept. Agr. V. 41, p. 36, 1952

Type of genus: *Asetacus madronae* K.

Asetacus madronae K. (35-1)

Plate 35-1

Asetacus madronae Keifer, BCDA V. 41, p. 36, 1952

Type locality: Duncan's Mills

Type host: *Arbutus menziesii* Pursh., madrone

Relation to host: The mites are free-living on the leaves, favoring the lower surface.

California records:

SANTA CRUZ CO.: Laurel district, VI-24-1942 (HHK)

SONOMA CO.: Duncan's Mills, IX-4-1951 (HHK)

Genus 36. *Quadracus* Keifer, 1944

Bul. Cal. Dept. Agr. V. 33, p. 30, 1944

Type of genus: *Quadracus urticarius* (C&M.)

Quadracus urticarius (C. & M.) (36-1)

Plate 36-1

Phyllocoptes urticarius Canestrini and Massalongo, Bul. Soc. Veneto-Trent., V. 5, p. 152, 1893

Quadracus urticae Keifer, BCDA V. 33, p. 30, 1944: Roivainen, Acta Ent. Fen. #7, p. 43, 1950

Rhynacaphytoptus urticarius (C&M) Roivainen, Acta Ent. Fen. #8, p. 64, 1951

Type locality: Italy

Type host: *Urtica dioica* L., nettle

California host: *Urtica gracilis holosericea* Jepson

Relation to host: The mites live among the hairs on the under sides of the leaves.

California records:

KERN CO.: Fort Tejon, XI-20-1951 (HHK)

SACRAMENTO CO.: Sacramento, VIII-8-1943 (HHK)

Genus 37. *Rhyncaphytoptus* Keifer, 1939

Bul. Cal. Dept. Agr. V. 28, p. 149, 1939

Type of genus: *Rhyncaphytoptus ficifoliae* K.*Rhyncaphytoptus acilius* K. (37-8)

Plate 37-8

Rhyncaphytoptus acilius Keifer, BCDA V. 28, p. 491, 1939

Type locality: Sacramento

Type host: *Salix lasiolepis* Benth., pussy willow

Relation to host: The mites are free-living on the leaves. They occur on branches where all of the leaves show an abnormal amount of hair on the under surfaces. This condition of the leaves is not apparent at a short distance. Whether or not it is due to the activities of the mite population has not been determined.

California record:

SACRAMENTO CO.: Sacramento, VIII-8-1939 (HHK)*Rhyncaphytoptus ficifoliae* K. (37-7)

Plate 37-7

Rhyncaphytoptus ficifoliae Keifer, BCDA V. 28, p. 150, 1939

Type locality: Sacramento

Type host: *Ficus* sp. (*carica* L.?), fig, both black and white

Common name: Big-beaked fig leaf mite

Relation to host: The mites live among the hair on the under surfaces of the leaves.

California records:

SACRAMENTO CO.: Sacramento, IX-7-1938 (HHK)SAN JOAQUIN CO.: Stockton, X-26-1943 (Griswold)SOLANO CO.: Fairfield, VIII-26-1939 (HHK)*Rhyncaphytoptus megarostris* (K.) (37-2)

Plate 37-2

Phyllocoptes megarostris Keifer, BCDA V. 27, p. 305, 1938

Type locality: Ojai

Type host: *Quercus lobata* Nee, Valley White oak

Relation to host: The mites are free-living on the under sides of the leaves.

Discussion: As in some of the other species of this type of mite, the younger forms bear pulverulent wax. Their cast skins leave white

streaks on the leaf surface. *R. megarostris* is deuteroecious with the deutogynes hibernating in bark crevices. This mite apparently is also common on *Quercus douglasii* H&A., and perhaps *durata*, but these hosts are yet to be investigated.

California records:

SACRAMENTO CO.: Sacramento, IX-9-1943 (HHK)SAN MATEO CO.: Atherton, III-1-1951VENTURA CO.: Ojai, V-31-1938 (R. Young)YOLO CO.: Broderick district, X-8-1941 (S. F. Bailey)*Rhyncaphytoptus platani* K. (37-1)

Plate 37-1

Rhyncaphytoptus platani Keifer, BCDA V. 28, p. 230, 1939

Type locality: Sacramento

Type host: *Platanus* sp., a hybrid street tree, "Oriental plane"Additional host: *Platanus racemosa* Nutt., sycamore

Common name: Big-Beaked sycamore mite

Relation to host: The mites are under surface leaf vagrants. They are said to cause leaf browning.

California records:

ALAMEDA CO.: Berkeley, VIII-19-1942 (R. H. Smith)LOS ANGELES CO.: Los Angeles, VII-1941 (R. H. Smith)RIVERSIDE CO.: Riverside, XI-19-1941 (L. D. Bachelor)SACRAMENTO CO.: Sacramento, VII-22-1938 (HHK)VENTURA CO.: Fillmore, VIII-30-1940 (HHK)*Rhyncaphytoptus salicifoliae* K. (37-5)

Plate 37-5

Rhyncaphytoptus salicifoliae Keifer, BCDA V. 28, p. 230, 1939

Type locality: Emigrant Gap

Type host: *Salix sitchensis angustifolia* Bebb.

Relation to host: The mites are under surface leaf vagrants. The species is deuteroecious.

California record:

PLACER CO.: Emigrant Gap district, IX-20-1938 (HHK)

Rhyncaphytoptus spinifera K. (37-4)

Plate 37-4

Rhyncaphytoptus spinifera Keifer, BCDA V. 28, p. 230, 1939

Type locality: Fred's Place above Riverton

Type host: *Quercus kelloggii* Newb., black oak

Relation to host: The mites are under surface leaf vagrants

California records:

EL DORADO CO.: Fred's Place, VIII-24-1938 (HHK)

NEVADA CO.: Grass Valley district, VII-26-1940 (HHK)

Rhyncaphytoptus strigatus K. (37-3)

Plate 37-3

Rhyncaphytoptus strigatus Keifer, BCDA V. 28, p. 228, 1939

Type locality: Davis

Type host: *Acer negundo californicum* Sarg., box-elder

Relation to host: The mites are free-living on the under sides of the leaves

California record:

YOLO CO.: IX-24-1938 (HHK)

Rhyncaphytoptus ulmivagrans K. (37-6)

Plate 37-6; 37-6d

Rhyncaphytoptus ulmivagrans Keifer, BCDA V. 28, p. 420, 1939

Abacoptes platynus Keifer, BCDA V. 28 P. 491, 1939 (the deutogyne)

Rhyncaphytoptus rugatus Liro, Ann. Zool. Soc. zool. bot. Fen. Vanamo V. 8, p. 45, 1941 (the deutogyne, Finland)

Type locality: Sacramento

Type host: *Ulmus campestris* L., elm

Additional host: *Ulmus pumila* L., Asiatic elm

Relation to host: The mites are free-living on the underside of the leaves. No damage has ever been observed.

Discussion: That this species was brought to California on its host is shown by the European record in Finland.

Not all elms will support this mite. The writer attempted to rear these mites on seedling trees from large-leaf European elm-type trees which never had a population of this mite. In all cases the mites in the cells

on the leaves promptly died, and it was necessary to use seedlings from the seeds of trees which harbored the mite before it was possible to rear cultures of *ulmivagrans*. The deutogyne of *ulmivagrans* is remarkable in having a broad flat back; that is, the edges of the tergites are transversely straight for about 2/3 of the abdominal length. This would be a good generic character, and is totally unlike the evenly curved back of the protogyne. *Rhyncaphytoptus fagifoliae* K., on beech in Virginia, may possibly be a close relative of *ulmivagrans* since a deutogyne collected on beech in Virginia is almost identical in form to the deutogyne of *ulmivagrans*. It might eventually be possible to use this remarkable deutogyne in a generic sense, and resurrect *Abacoptes*.

The life history of this elm mite, *ulmivagrans*, is unusual, due to the influence of deutogyny. The deutogynes hibernate along the twigs, their flat backs being their protection. They are slow to break hibernation in the spring and no appreciable population of this mite develops on the leaves much before the middle of June. The mites then flourish until the middle of August, when the full energy of the species is used up in the production of deutogynes. The mites then disappear for the season, having been able to utilize less than half the leaf period of their host.

California records:

ALAMEDA CO.: Piedmont, VI-30-1941 (F. B. Herbert)

SACRAMENTO CO.: Sacramento, VI-26-1939 (HHK)

Genus 38. *Rhynacus* Keifer, 1951

Bul. Cal. Dept. Agr. V. 40, p. 98, 1951

Type of genus: *Rhynacus arctostaphyli* (K.)

Rhynacus abronius (K.) (38-2)

Plate 38-2

Diptilomiopus abronius Keifer, BCDA V. 28, p. 492, 1939

Type locality: San Francisco

Type host: *Rubus vitifolius* C&S., native blackberry

Relation to host: The mites live among the hairs on the under sides of the leaves.

California records:

SAN FRANCISCO CO.: San Francisco, VIII-20-1939 (HHK)

SAN MATEO CO.: Tunitas Canyon, XI-22-1940

(W. H. Lange)

SONOMA CO.: Duncan's Mills, IX-4-1951 (HHK)

Rhynacus arctostaphyli (K.) (38-1)

Plate 38-1

Diptilomiopus arctostaphyli Keifer, BCDA V. 27, p. 305, 1938

Type locality: Mt. Tamalpais

Type host: *Arctostaphylos* sp., manzanita

Relation to host: The mites live on the under sides of the second year leaves where the natural viscidities have largely disappeared.

California record:

MARIN CO.: Mt. Tamalpais, south-west ridge, VII-4-1938 (HHK)

Genus 39. *Diptacus* Keifer, 1951

Bul. Cal. Dept. Agr. V. 40, p. 99, 1951

Type of genus: *Diptacus sacramentae* (K.)

Diptacus calicoryli (K.) (39-3)

Plate 39-3

Diptilomiopus calicoryli Keifer, BCDA V. 32, p. 216, 1943

Type locality: Sacramento

Type host: *Corylus rostrata californica* A., hazelnut

Relation to host: The mites are vagrants on the under surfaces of the leaves.

Discussion: These mites develop a considerable amount of white flocculent wax so that they appear to be either small mealybugs or mealybug debris. The shrubs from which the type series originated grew in the south-east corner of Capitol Park. These plants have now been removed and the nearest location to Sacramento where this mite now occurs is 75 to 100 miles west.

California records:

SACRAMENTO CO.: Sacramento, VII-29-1943 (HHK)

SANTA CRUZ CO.: Laurel district, VI-24-1942 (HHK)

SONOMA CO.: Camp Meeker, IX-6-1951 (HHK)

Diptacus gigantorhynchus (Nal.) (39-1)

Plate 39-1

Phyllocoptes gigantorhynchus Nalepa, Anz. Akad.

Wiss. math-nat. Wien, V. 29, p. 191, 1892

Epitrimerus gigantorhynchus (Nal.), Denks. Akad.

Wiss. math-nat, Wien, V. 64, p. 392, 1896

Diptilomiopus prunorum Keifer, BCDA V. 28, p. 149, 1939

Rhyncaphytoptus gigantorhynchus (Nal.) Liro, Ann.

Zool. Soc. zool-bot. Fen. Vanamo, V. 9, p. 40, 1943

Type locality: Austria

Type host: *Prunus domestica* L., prune

Additional hosts: *Amygdalus persica* L., peach; *Prunus* sp., plum; *Rubus vitifolius* C&S., blackberry; *Prunus trilobus* Lindl., flowering almond; *Vitis californica* Benth., native grape

Common name: Big-beaked plum mite

Relation to host: The mites are vagrants on the under sides of the leaves. They may develop in considerable numbers as the season advances, but they do not seem to cause much injury to their hosts in spite of the big beak. The species appears to have a functional deutogyne, but there is no structural indication of it. The deutogynes hibernate in bark crevices.

Discussion: The short dorsal setae make this species rather anomalous in *Diptacus*.

Nalepa originally indicated the featherclaw of *gigantorhynchus* as 2-rayed. After determining that the California forms had a 5-rayed divided featherclaw, the writer described them as a new species. Recently the writer sent California specimens to Dr. Roivainen, in Finland, and he states that the European mites also have this 5-rayed divided featherclaw. The above indicated synonymy should therefore be correct.

California records:

EL DORADO CO.: Placerville, IX-16-1940

(F. B. Herbert)

KERN CO.: Wasco, XII-2-1940 (G. L. Smith)

LAKE CO.: Kelseyville, VIII-15-1939

(S. Lockwood)

PLACER CO.: Auburn, IX-16-1938

SACRAMENTO CO.: Sacramento, VII-26-1938 (HHK)

SANTA CLARA CO.: Gilroy, VII-10-1940

(A. W. Apple)

SUTTER CO.: Tudor, VIII-20-1942

VENTURA CO.: Santa Paula, VIII-31-1940 (HHK)

Diptacus sacramentae (K.) (39-2)

Plate 39-2

Diptilomiopus sacramentae Keifer, BCDA V. 28, p. 232, 1939

Type locality: Sacramento

Type host: *Alnus rhombifolia* Nutt., white alder

Additional host: *Alnus tenuifolia* Nutt., mountain alder

Relation to host: The mites are under surface leaf vagrants. Their white flocculent wax makes them appear very similar to *D. calicoryli*.

Discussion: The species is deuterogynous, and the figure is of the deutogyne. The back of the protogyne is covered with a mass of waxy strands. In the case of the deutogyne the wax assumes a regular pattern.

The tree from which the original specimens came grew in the California section of Capitol Park. Many of these native shrubs and trees

have recently been removed, including this alder tree.

The relationship that this mite bears to the European *dipterochelus* Nal. should be investigated. Our California species ranges from about sea level to over 7000 feet elevation.

California records:

EL DORADO CO.: Fallen Leaf Lake, IX-13-1951 (HHK)

NAPA CO.: Chiles, VI-5-1952 (HHK)

SACRAMENTO CO.: Sacramento, X-31-1938 (HHK);
Folsom, VIII-18-1951 (HHK)

Bibliography

- Ashmead, W. F.
1879. Orange Rust Question Solved. Canadian Entomologist, 11:160.
- Bailey, S. F. and Keifer, H. H.
1943. The Tomato Russett Mite. Jour. Ec. Ent., 36:706-712
- Baker, E. W. and Wharton, G. W.
1952. An Introduction to Acarology. MacMillan Co. 465 pp.
(Eriophyidae, pp. 147-158)
- Banks, N.
1905. A Treatise on the Acarina or Mites. Proc. U. S. N. Mus., 28:101-106.
- Banks, N.
1905. *Cecidobia salicicola*, new genus and species. Proc. Ent. Soc. Wash., 7:141-2.
- Banks, N.
1907. A Catalog of the Acarina or Mites of the United States. Proc. U. S. N. Mus., 32: 620-21.
- Banks, N.
1915. The Acarina or Mites. U. S. Dept. of Agr. Report #108:134-39.
- Batchelor, G. S.
1952. The Eriophyid Mites of the State of Washington. Washington Agr. Exp. Sta. Tech. Bul. #6, April.
- Breaky, E. P. and Batchelor, G. S.
1951. Phylloidy of Chrysanthemum and the Eriophyid mite, *Paraphytoptus chrysanthemi*. Ann. Ent. Soc. Am., 43:492.
- Essig, E. O.
1926. Insects of Western North America. MacMillan Co. 1035 pp.
(Eriophyidae pp. 43-50)
- Felt, E. P.
1906. *Eriophyes fraxiniflora* n. sp. Mem. #8, N. Y. State Mus., 2:633.
- Hassan, Ahmed S.
1928. Biology of the Eriophyidae. U. C. Publ. in Ent., 4:341-394.
- Hodgkiss, H. E.
1930. Eriophyidae of New York: The Maple Mites. N. Y. Agr. Exp. Sta. Tech. Bul. #163.
- Keifer, H. H.
1938. Eriophyid Studies. Bul. Cal. Dept. Agr., 27:181-206.
- Keifer, H. H.
1938. Eriophyid Studies II. Bul. Cal. Dept. Agr., 27:301-323.
- Keifer, H. H.
1939. Eriophyid Studies III. Bul. Cal. Dept. Agr., 28:144-162.
- Keifer, H. H.
1939. Eriophyid Studies IV. Bul. Cal. Dept. Agr., 28:223-39.
- Keifer, H. H.
1939. Eriophyid Studies V. Bul. Cal. Dept. Agr., 28:328-45.
- Keifer, H. H.
1939. Eriophyid Studies VI. Bul. Cal. Dept. Agr., 28:416-26.
- Keifer, H. H.
1939. Eriophyid Studies VII. Bul. Cal. Dept. Agr., 28:484-505.
- Keifer, H. H.
1940. Eriophyid Studies VIII. Bul. Cal. Dept. Agr., 29:21-46.
- Keifer, H. H.
1940. Eriophyid Studies IX. Bul. Cal. Dept. Agr., 29:112-117.
- Keifer, H. H.
1940. Eriophyid Studies X. Bul. Cal. Dept. Agr., 29:160-79.
- Keifer, H. H.
1941. Eriophyid Studies XI. Bul. Cal. Dept. Agr., 30:196-216.
- Keifer, H. H.
1942. Eriophyid Studies XII. Bul. Cal. Dept. Agr., 31:117-129.
- Keifer, H. H.
1943. Eriophyid Studies XIII. Bul. Cal. Dept. Agr., 32:212-222.
- Keifer, H. H.
1944. Eriophyid Studies XIV. Bul. Cal. Dept. Agr., 33:18-36.
- Keifer, H. H.
1945. Eriophyid Studies XV. Bul. Cal. Dept. Agr., 34:137-40.
- Keifer, H. H.
1946. Eriophyid Studies XVI. Bul. Cal. Dept. Agr., 35:39-48.
- Keifer, H. H.
1946. A Review of North American Eriophyid Mites. Jour. Ec. Ent., 39:563-70.
- Keifer, H. H.
1951. Eriophyid Studies XVII. Bul. Cal. Dept. Agr., 40:93-104.
- Keifer, H. H.
1952. Eriophyid Studies XVIII. Bul. Cal. Dept. Agr., 41:31-42.
- Keifer, H. H.
1952. Eriophyid Studies XIX. Bul. Cal. Dept. Agr., 41:65-74.
- Leonard, M. D.
1926. A List of Insects of New York (Eriophyid section). Cornell Univ. Agr. Exp. Sta. Mem. # 101:1076-78.
- Liro, J. I. and Roivainen, H.
1951. Eriophyidae (of Finland, in Finnish). Animalia Fennica #6, Helsinki. 281 pp.

- Nalepa, A.
1890. Zur Systematic der Gallmilben. Sitzb. Akad. Wiss. math-nat. Wien, 89:23.
- Nalepa, A.
1898. Acarina: Eriophyidae. Das Tierreich, Fourth Issue.
- Nalepa, A.
1910. Gallmilben. Zoologica, Stuttgart, Heft 61.
- Nalepa, A.
1923. Polymorphe Eriophyiden. Marcellia, 20:87.
- Nalepa, A.
1925. Zur Kenntnis der auf einheimischen Pomaceen und Amygdalen lebenden Eriophyesarten. Marcellia, 22:62.
- Nalepa, A.
1929. Neuer Katalog der bisher beschriebenen Gallmilben, ihrer Gallen und Wirtspflanzen. Marcellia, 25:67.
- Putman, W. L.
1939. The Plum Nursery Mite. Seventh Annual Rpt. Ent. Soc. Ont. p. 33.
- Roivainen, H.
1951. Contribution to the Knowledge of the Eriophyids of Finland. Acta Ent. Fen. #8:28.
- Hyder, John A.
1878. A Probable new species of Phytoptus or Gallmite. American Naturalist, 13:704-5.
- Smith, L. M. and Stafford, E. M.
1948. The Budmite and the Erineum Mite of Grapes. Hilgardia (U. C. Berkeley), 18:317-34.
- Snodgrass, R. E.
1948. The Feeding Organs of the Arachnida, including Mites and Ticks. Smiths. Misc. Coll. 110: #10

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 Artichoke leaf-hair mite - *Aceria neocynarae* (K.), 31
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*NOTE: The common names which have been approved by the American Association of Economic Entomologists bear the word "approved" in parenthesis after them. The other names are mainly those proposed by myself which are listed in the text under the treatment of each species.

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Plate Symbols

AP - Anterior genital apodeme	L1 - Left anterior leg
AP1 - Internal female genitalia	L2 - Left rear leg
B - <i>Aceria beevori</i> , Plate 9-38	LM - Left tarsus of male
C - Coxae from below	LT - Tarsus, and associated structures
CD - Cross-section outline of deutogyne	N1D - Dorsal view of first nymph
CP - Cross-section outline of protogyne	N1DA - Dorsal view of anterior section of first nymph
D - Dorsal view of mite	N1S - Side view of first nymph
DA - Dorsal view of anterior section or shield	N1V - Ventral view of first nymph
ED - Dorsal skin structure	N1VA - Ventral view of anterior section of first nymph
EDS - Dorsal skin structure in side view	N2DA - Dorsal view of anterior section of second nymph
ES - Side skin structure	N2S - Side view of second nymph
EV - Ventral skin structure	O - Egg
F - Featherclaw	R - Rostrum
F1 - Featherclaw and tarsus	S - Side view of adult mite
fs - Frontal shield seta	SA - Side view of anterior section of mite
GF - Female genitalia, ventral view	SD - Side view of deutogyne
GF1 - Female genitalia and coxae from below	SP - Side view of posterior section of mite
GFC - Female genital coverflap	SP1 - Side view of protogyne
GFD - Genitalia of deutogyne	W - <i>Aceria wyethiae</i> , Plate 9-39
GFP - Genitalia of protogyne	
gl - Semenile vesicles	
GM - Male genitalia	
GM1 - Male genitalia and coxae	
L - Left legs; also <i>Aceria lepidosparti</i> on Plate 9-29	

List of Plates

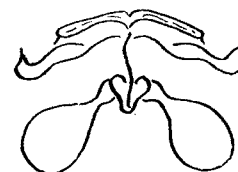
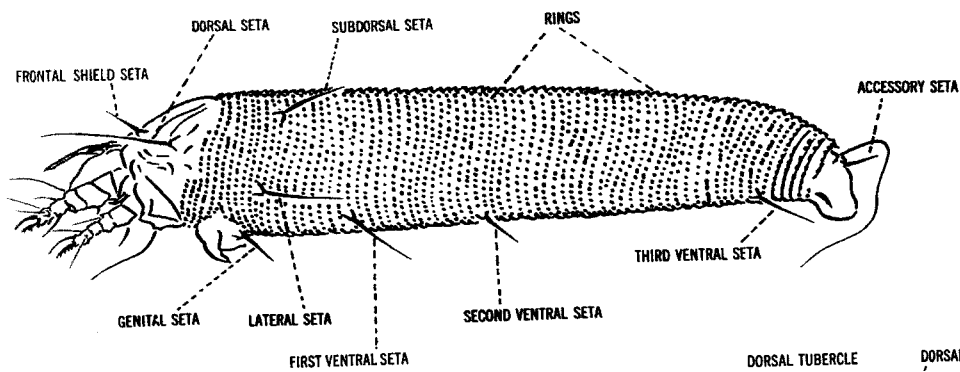
Plate A - Chart showing anatomical designations
 Plate B - Diagram of Subfamily arrangement
 Plate C - The life history of a deuteroecious mite,
Oxypleurites aesculifoliae (K.)

- Plate 1-1. *Trisetacus pini* (Nal.)
 1-2. *Trisetacus cupressi* (K.)
 2-1. *Setoptus jonesi* (K.)
 3-1. *Phytoptus avellanae* Nal.
 3-2. *Phytoptus corniseminis* K.
 3-3. *Phytoptus hedericola* K.
 4-1. *Anchiphytoptus lineatus* K.
 5-1. *Sierraphytoptus alnivagrans* K.
 6-1. *Mackiella phoenicis* K.
 7-1. *Nalepella ednae* K.
 7-2. *Nalepella tsugae* K.
 8-1. *Cecidophyes malpighianus* (Nal.)
 8-2. *Cecidophyes verilicis* (K.)
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 9-2. *Aceria cactorum* (K.)
 9-3. *Aceria erineus* (N.)
 9-4. *Aceria mackiei* (K.)
 9-5. *Aceria paramackiei* (K.)
 9-6. *Aceria waltheri* (K.)
 9-7. *Aceria brachytarsus* (K.)
 9-8. *Aceria amicus* (K.)
 9-9. *Aceria calaceris* K.
 9-10. *Aceria essigi* (Hassan)
 9-12. *Aceria parapopuli* (K.)
 9-13. *Aceria paracalifornica* (K.)
 9-14. *Aceria enceliae* (K.)
 9-15. *Aceria neoartemisiae* (K.)
 9-16. *Aceria dracunculi* (K.)
 9-17. *Aceria ligustri* (K.)
 9-18. *Aceria neosalviae* (K.)
 9-20. *Aceria granati* (Can.)
 9-21. *Aceria peucedani* (Can.)
 9-22. *Aceria boycei* (K.)
 9-23. *Aceria chrysopsis* (K.)
 9-24. *Aceria heterothecae* (K.)
 9-24.1 *Aceria eriodictyonis* K.
 9-25. *Aceria stinsonis* (K.)
 9-25.1 *Aceria caliberberis* K.
 9-26. *Aceria ceanothi* (K.)
 9-28. *Aceria sheldoni* (Ewing)
 9-29. *Aceria lepidospartii* K. (L.)
 9-38. *Aceria beevori* K. (B.)
 9-39. *Aceria wyethiae* K. (W.)
 9-30. *Aceria eriobotryae* (K.)
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 9-32. *Aceria feijoa* (K.)
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 9-34. *Aceria medicaginis* (K.)
 9-35. *Aceria langei* (K.)
 9-36. *Aceria abalis* (K.)
 9-37. *Aceria baccharis* K.
 (9-38. see 9-29)
 (9-39. see 9-29)

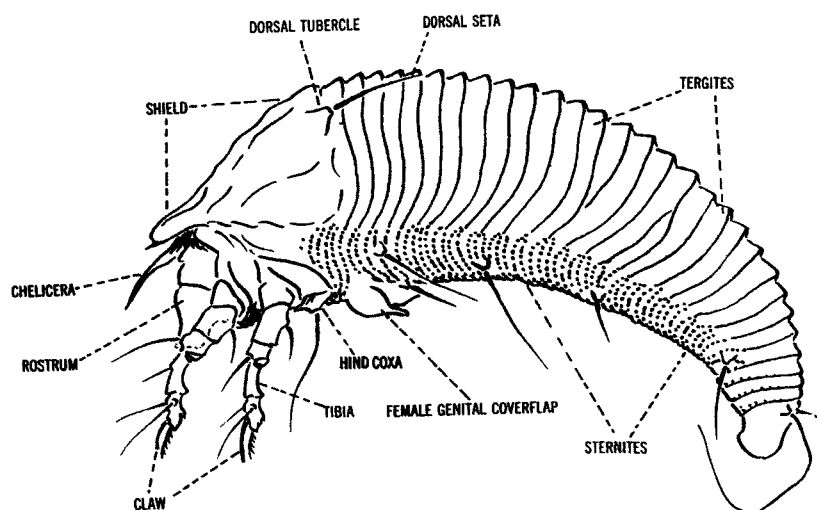
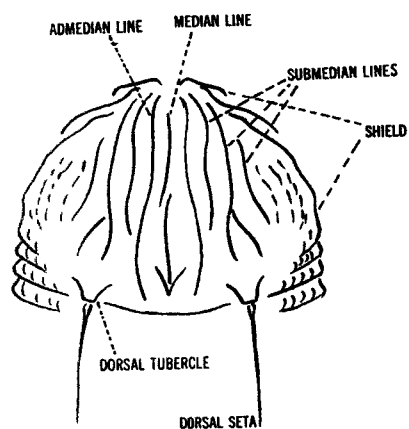
- Plate 9-40. *Aceria calibaccharis* (K.)
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 17-21. *Vasates laevigatae* (Hassan)
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 17-23. *Vasates glabri* K.
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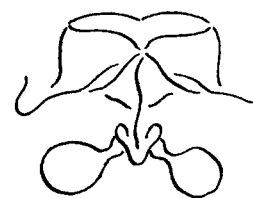
- Plate 27-1. *Acarelliptus occidentalis* K.
 28-1. *Cupacarus cuprifestor* K.
 29-1. *Phyllocoptus oleivorus* (Ashm.)
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 39-1. *Diptacus gigantorhynchus* (Nal.)
 39-2. *Diptacus sacramentae* (K.)
 39-3. *Diptacus calicoryli* (K.)



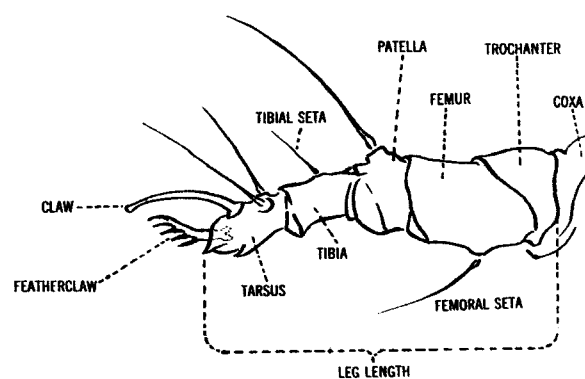
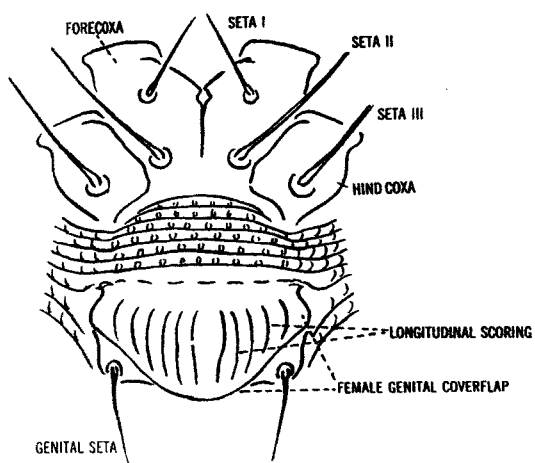
INTERNAL FEMALE GENITALIA
SHORTENED APODEME



CRESCENTIC SCORING



INTERNAL FEMALE GENITALIA
TYPICAL APODEME



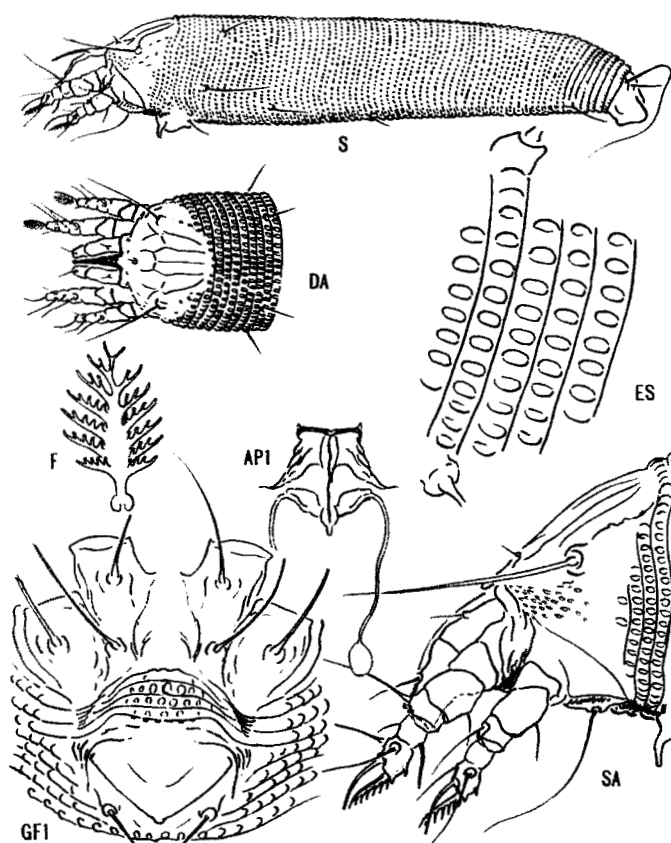


PLATE 1-1. *Trisetacus pini* (Nal.)

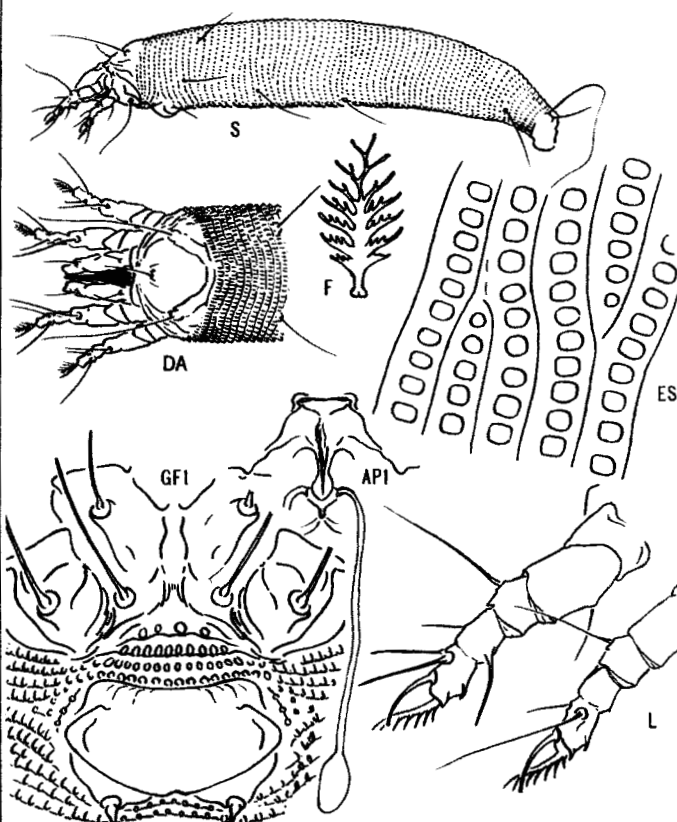


PLATE 1-2. *Trisetacus cupressi* (K.)

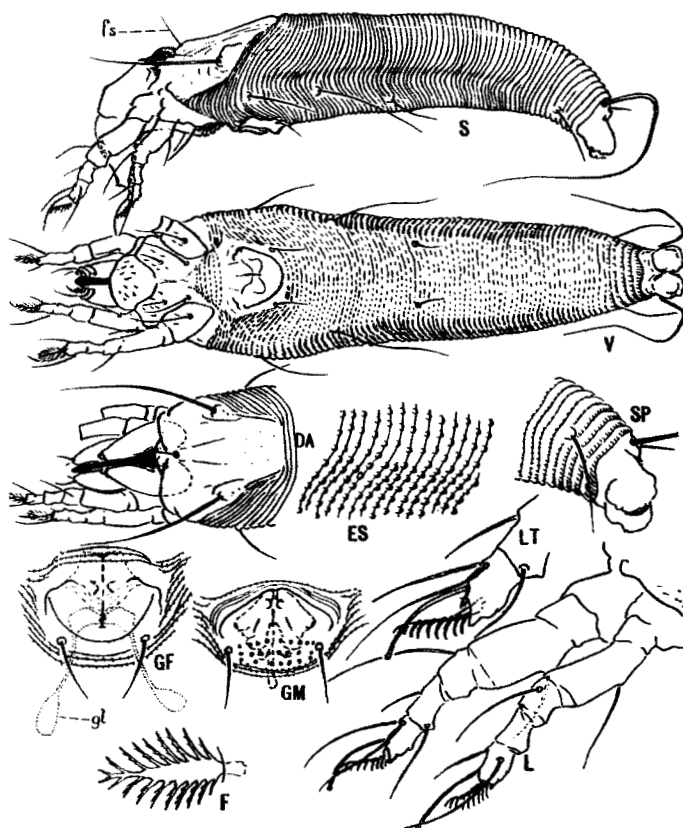


PLATE 2-1. *Setoptus jonesi* (K.)

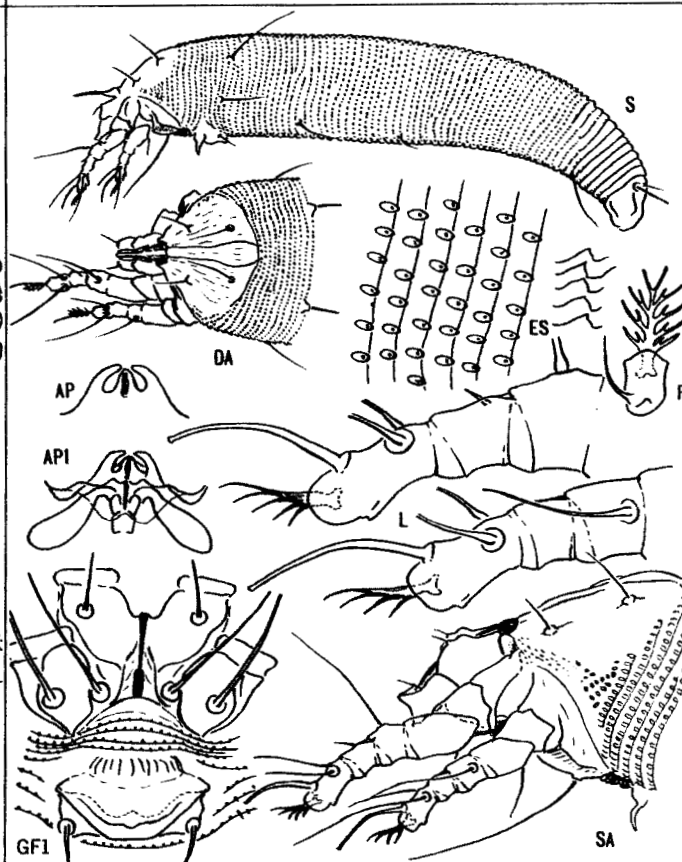


PLATE 3-1. *Phytoptus avellanae* Nal.

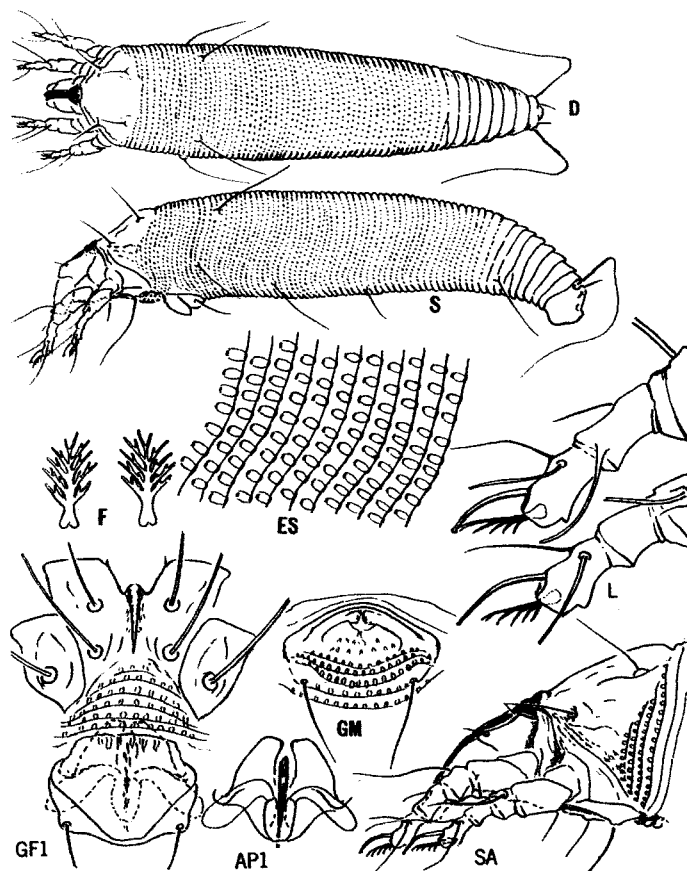


PLATE 3-2. *Phytoptus corniseminis* K.

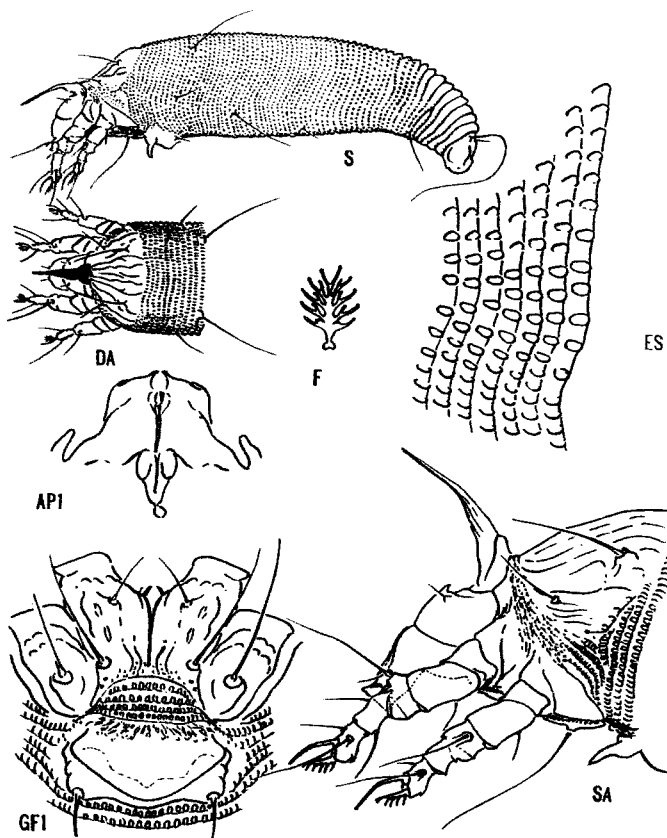


PLATE 3-3. *Phytoptus hedericola* K.

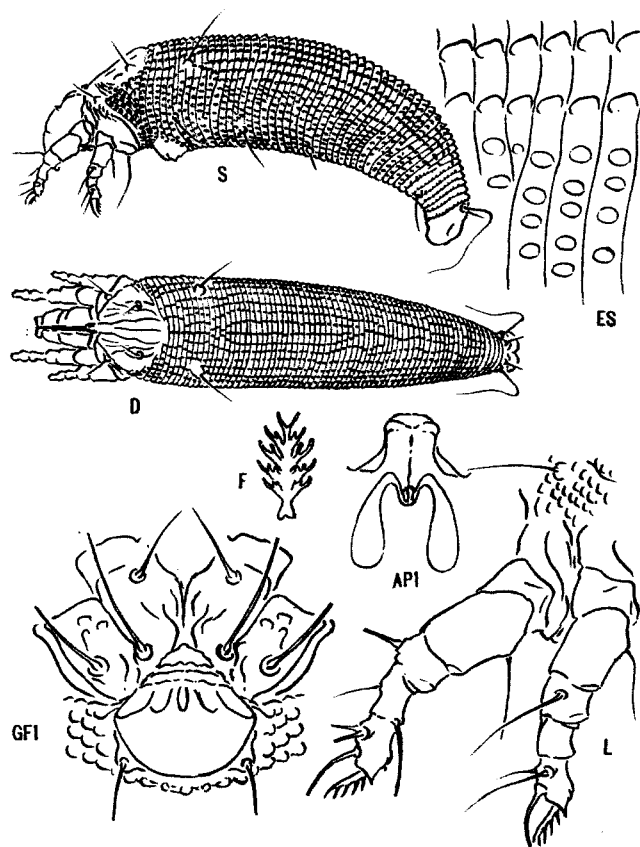


PLATE 4-1. *Anchiphytoptus lineatus* K.

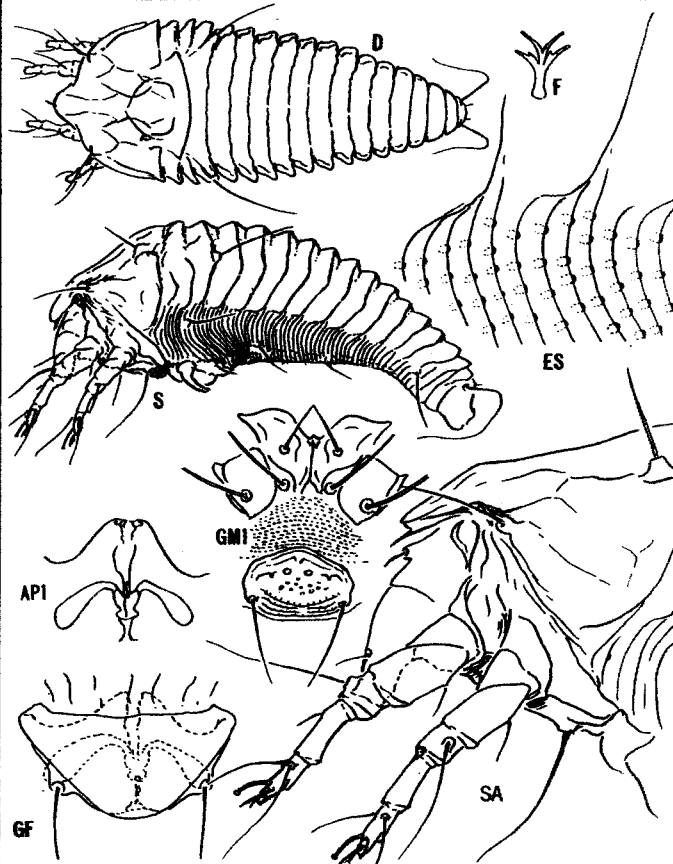


PLATE 5-1. *Sierraphytoptus alnivagrans* K.

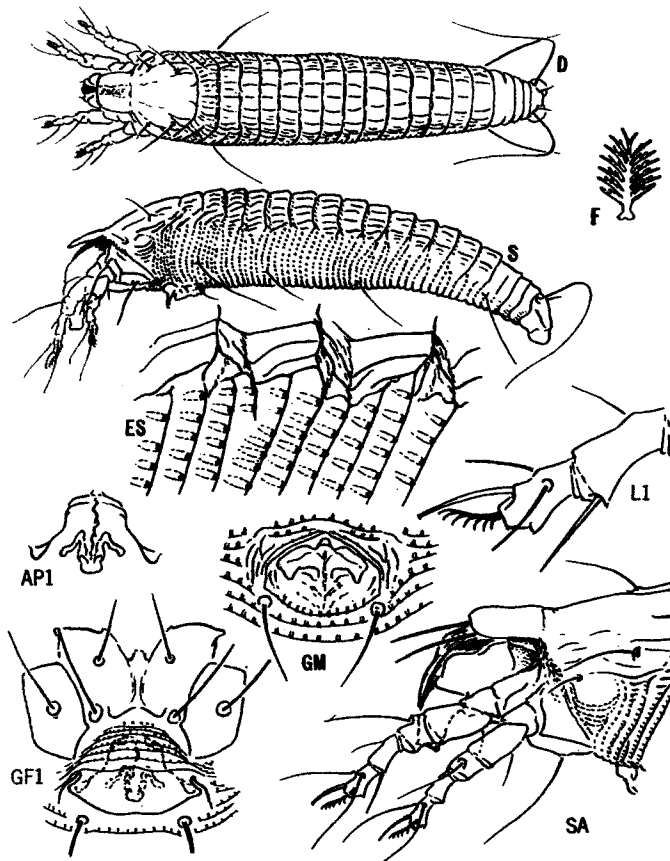


PLATE 6-1. *Mackiella phoenicis* K.

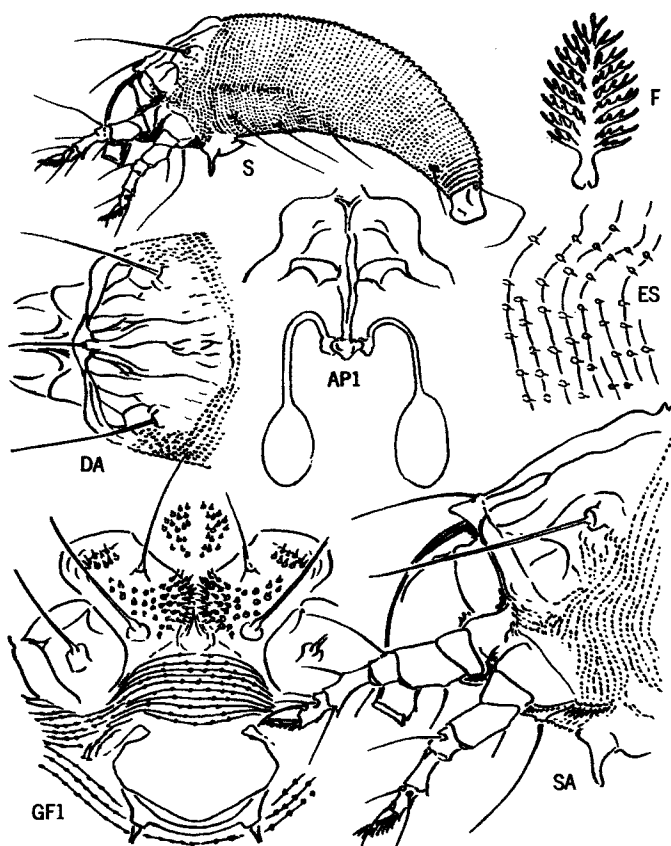


PLATE 7-1. *Nalepella ednae* K.

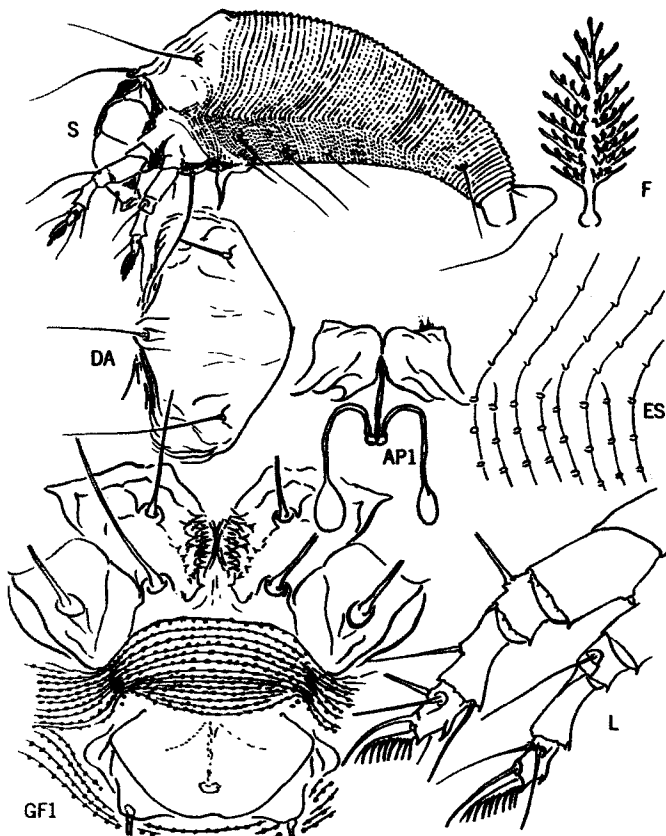


PLATE 7-2. *Nalepella tsugae* K.

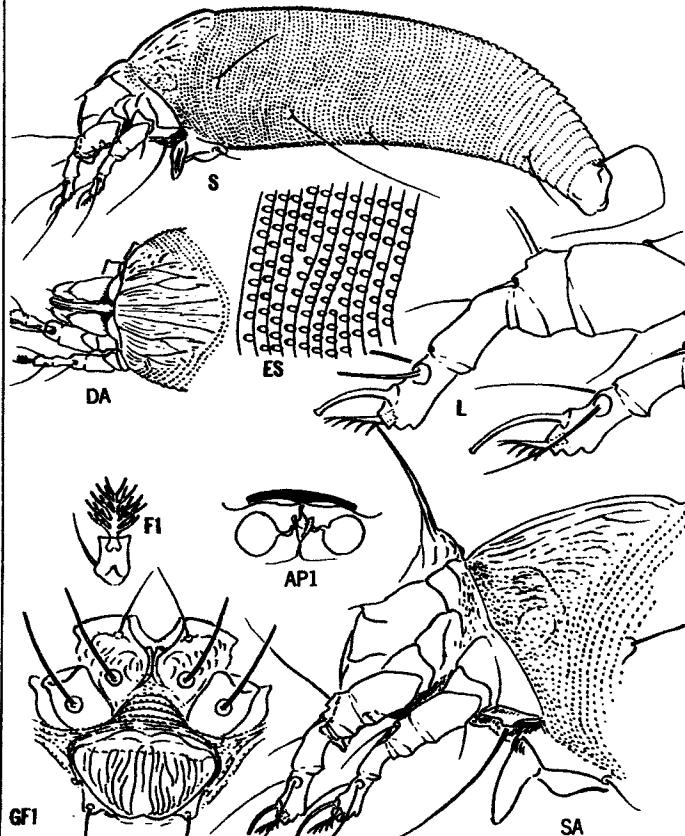


PLATE 8-1. *Cecidophyes malpighianus* (Nal.)

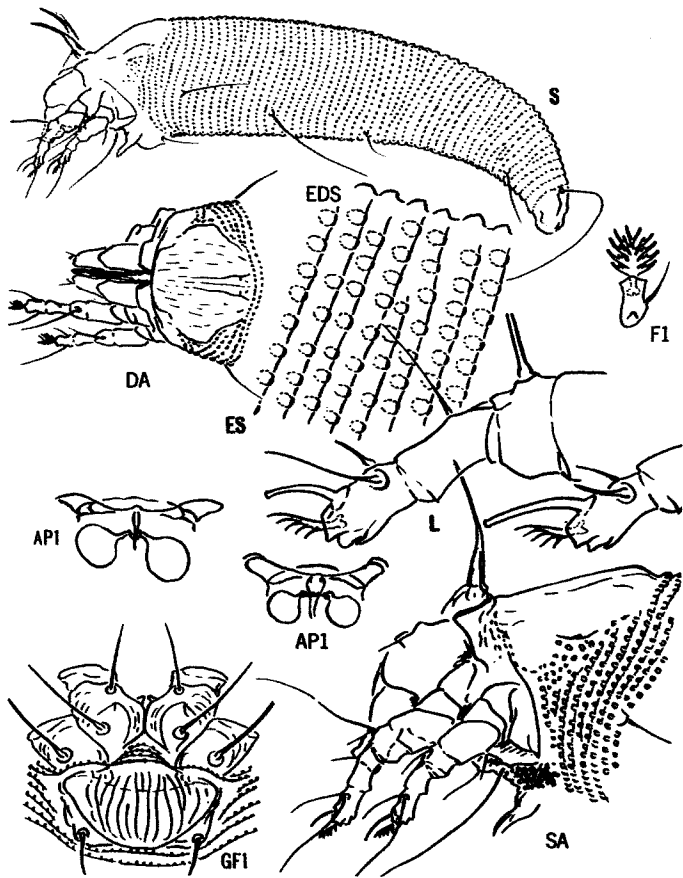


PLATE 8-2. *Cecidophyes verilicis* (K.)

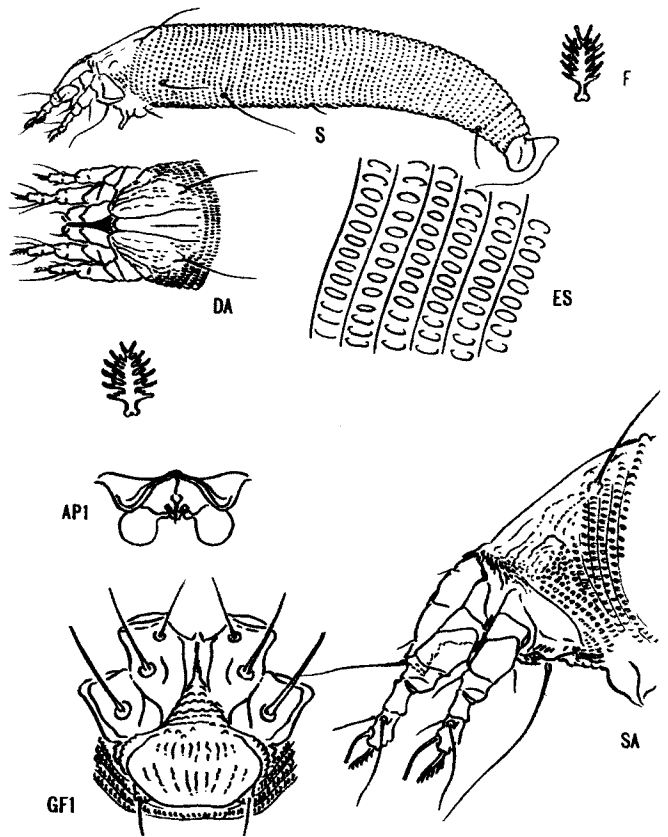


PLATE 9-1. *Aceria camelliae* K.

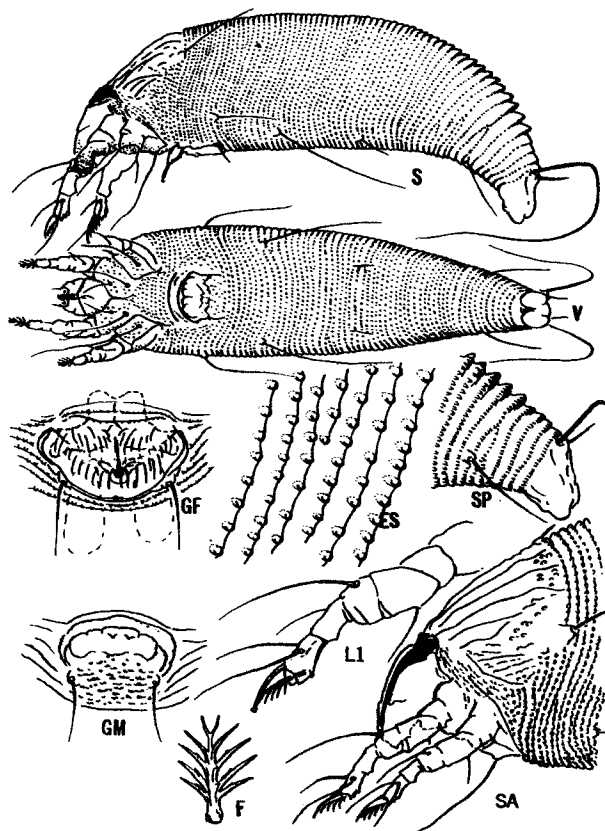


PLATE 9-2. *Aceria cactorum* (K.)

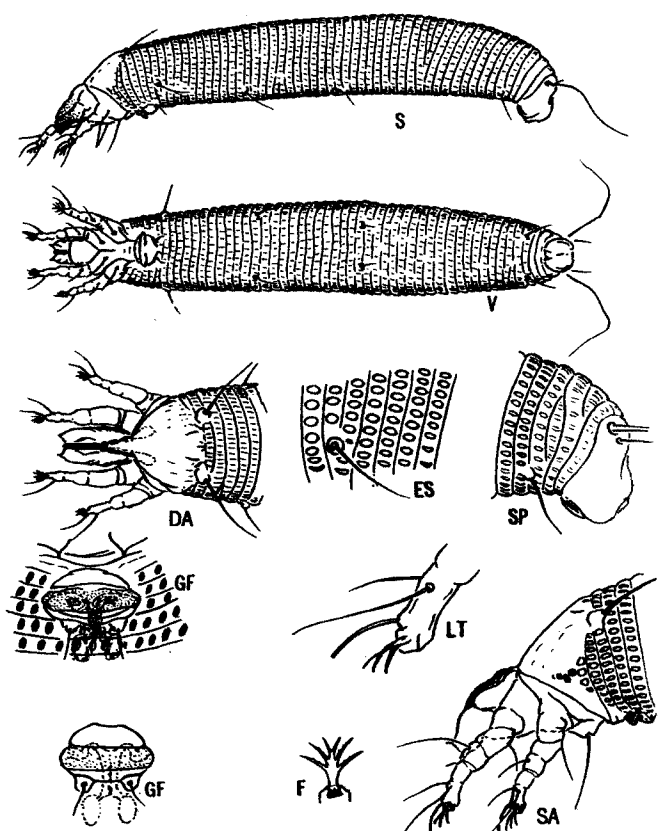
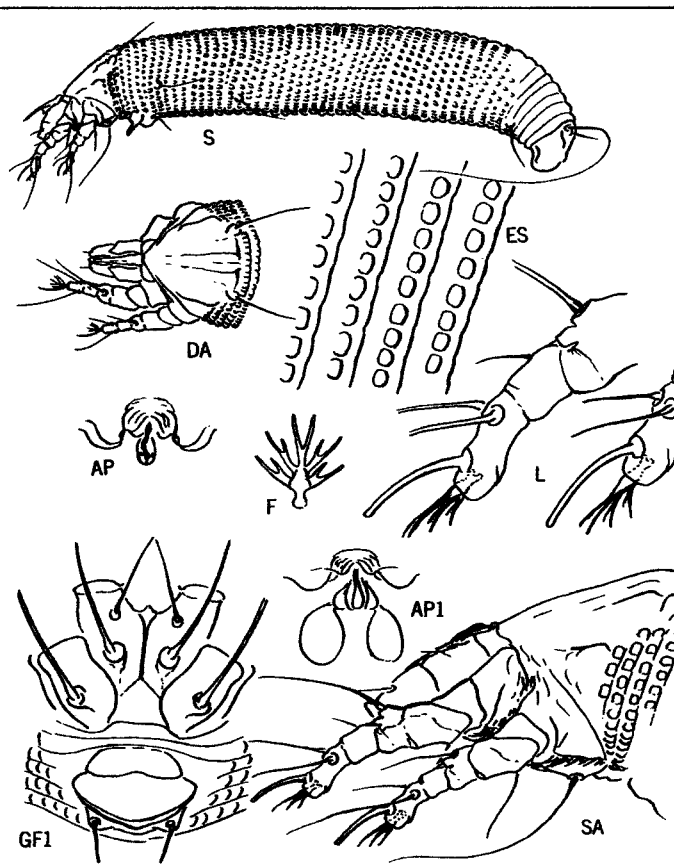
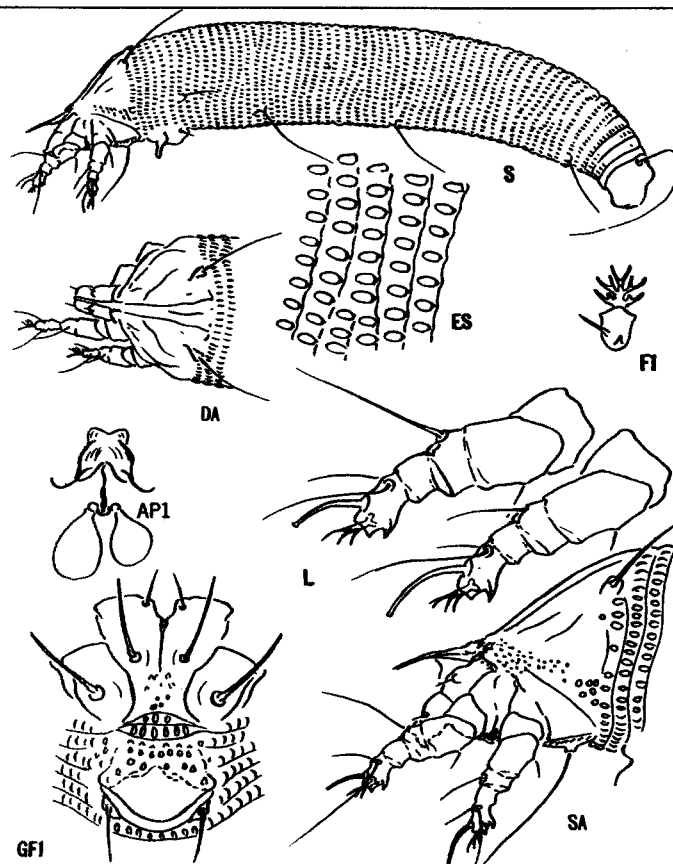
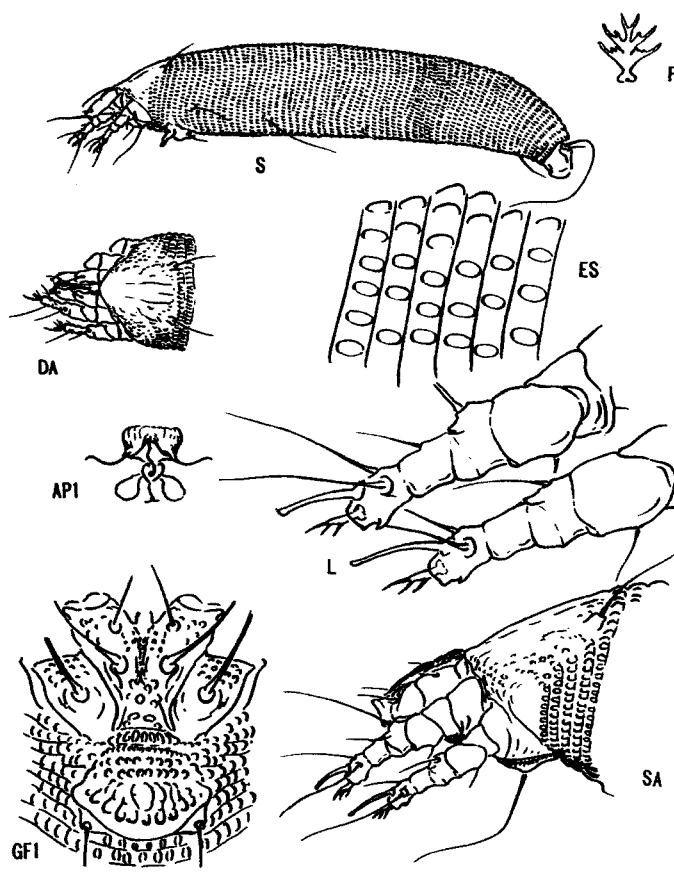
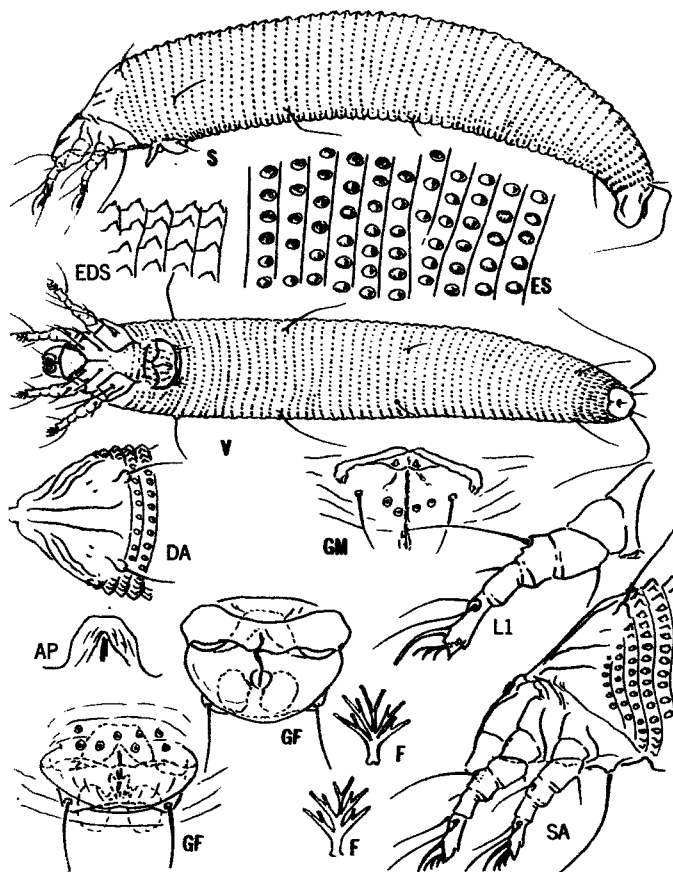


PLATE 9-3. *Aceria erineus* (N.)



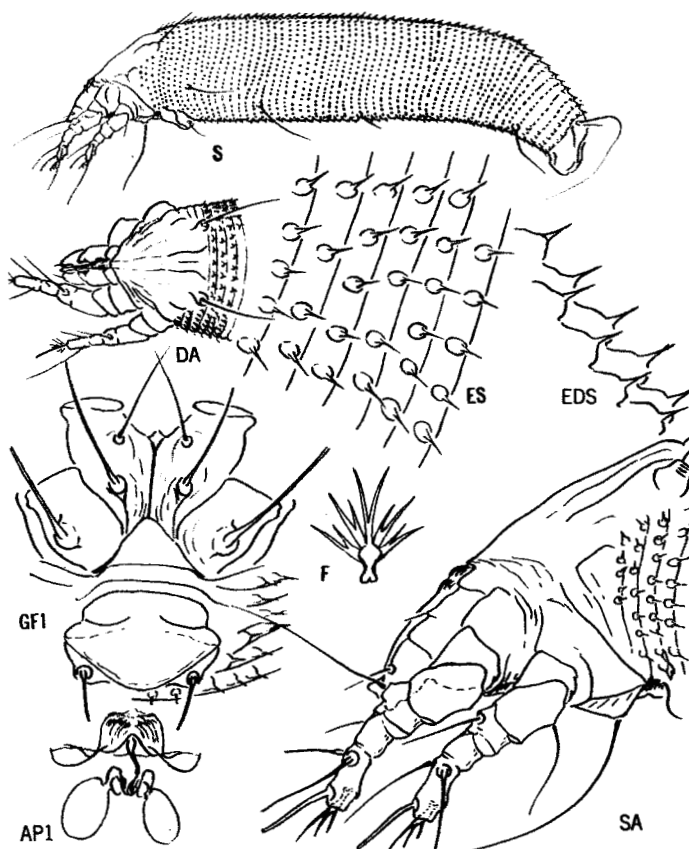


PLATE 9-8. *Aceria amicus* (K.)

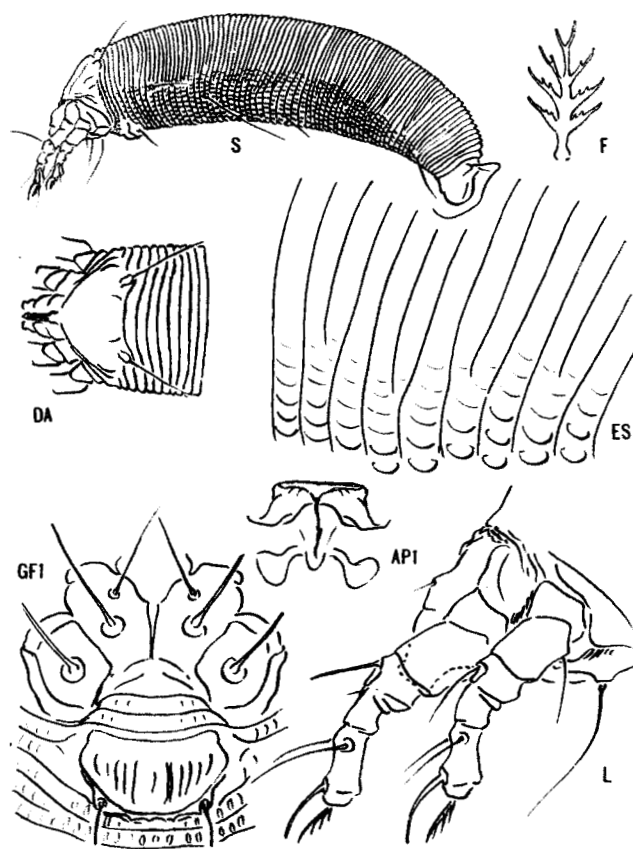


PLATE 9-9. *Aceria calaceris* K.

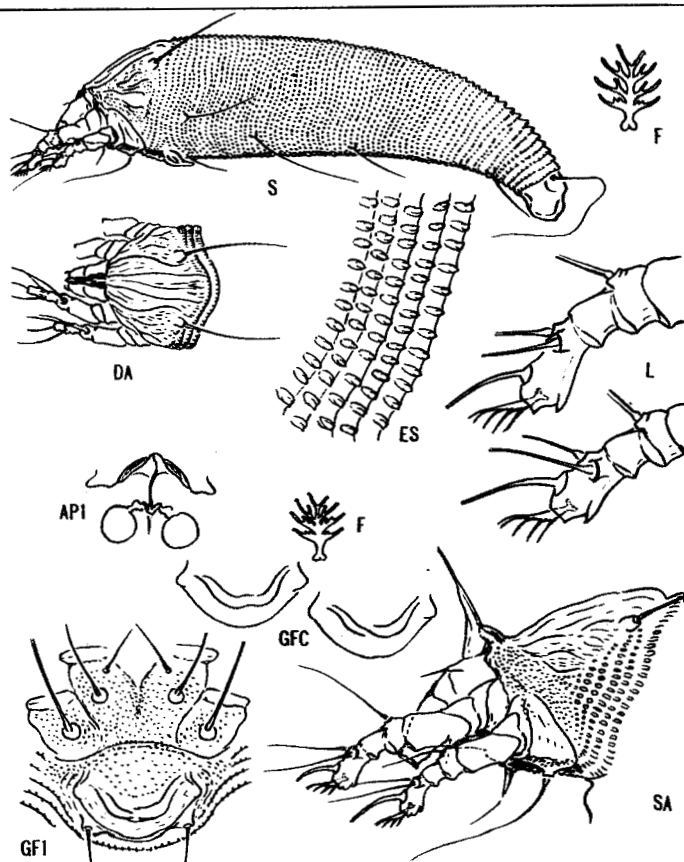


PLATE 9-10. *Aceria essigi* (Hassan)

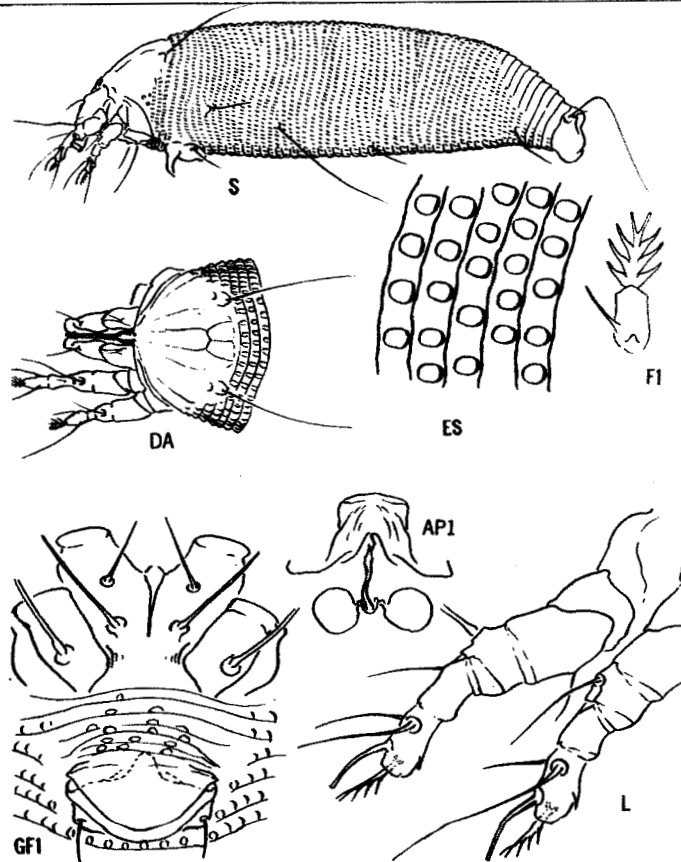


PLATE 9-12. *Aceria parapopuli* (K.)

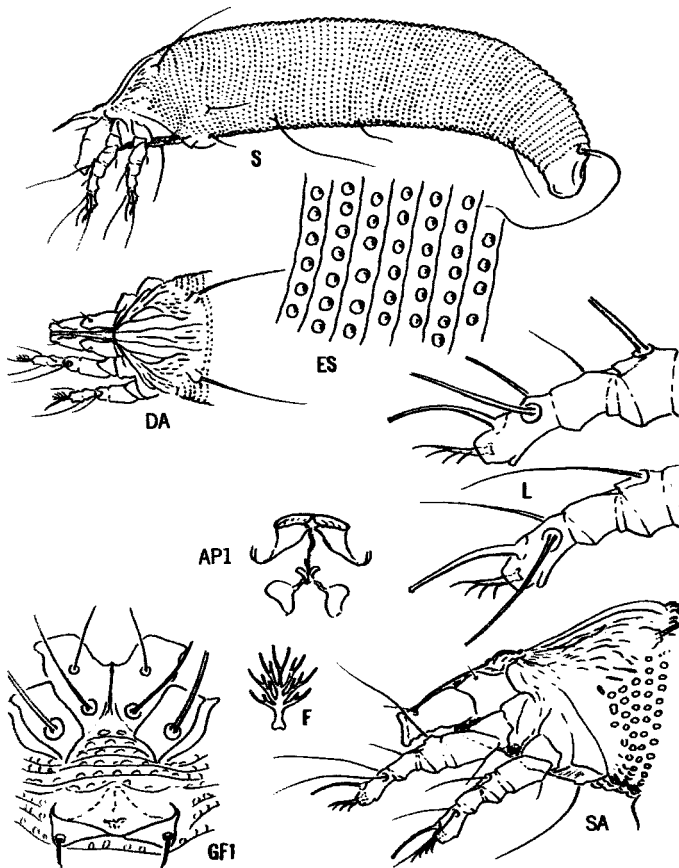


PLATE 9-13. *Aceria paracalifornica* (K.)

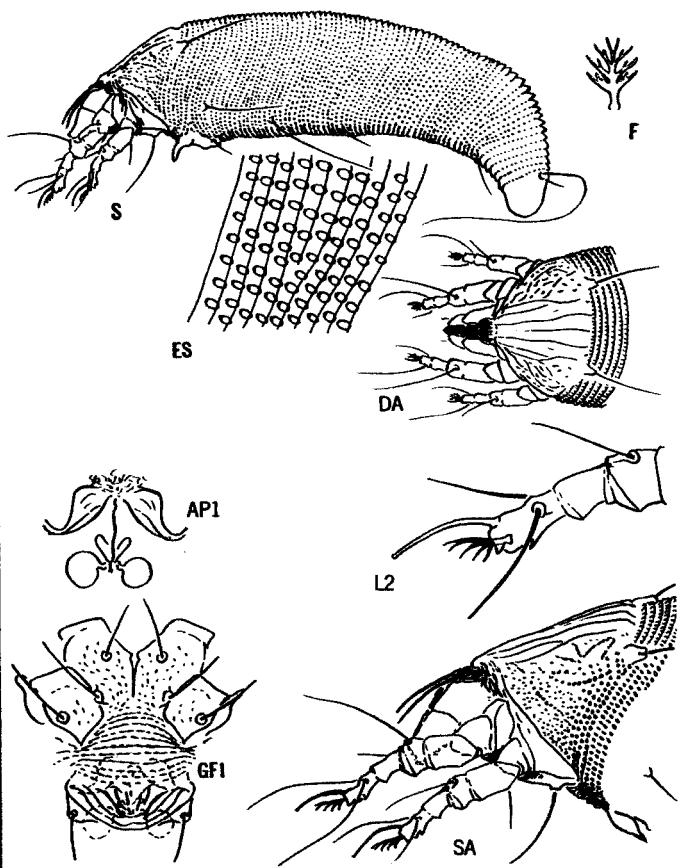


PLATE 9-14. *Aceria enceliae* (K.)

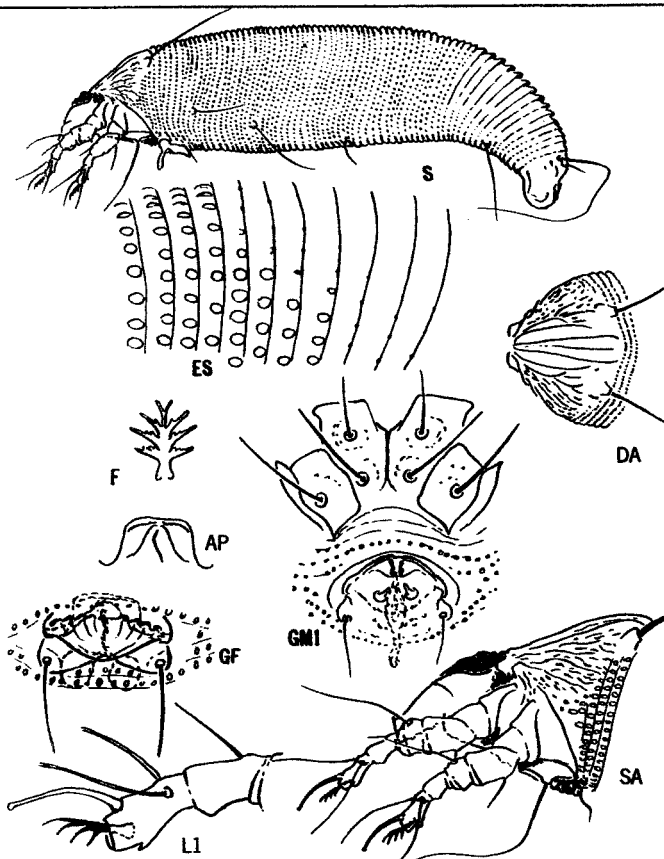


PLATE 9-15. *Aceria neoartemisiae* (K.)

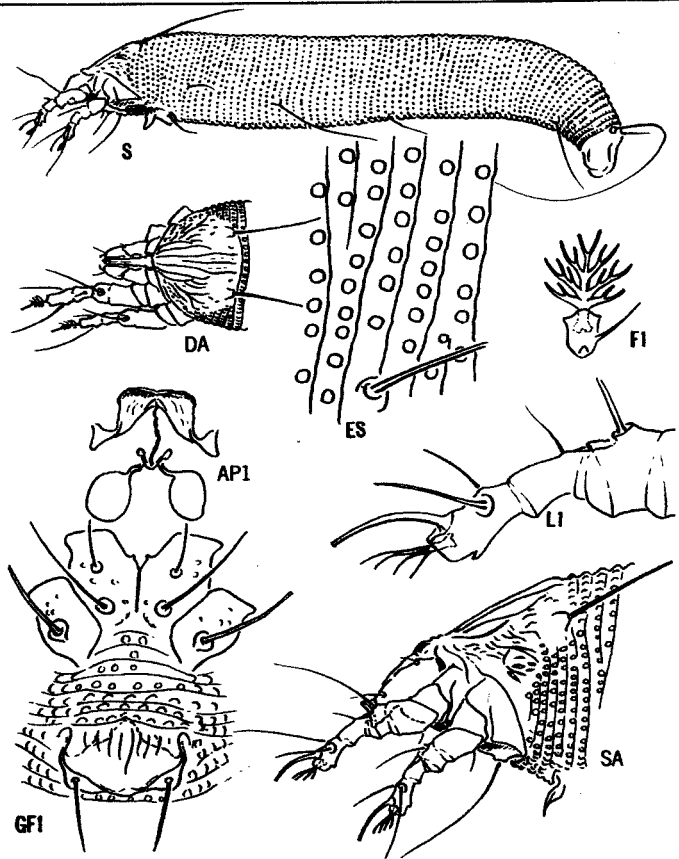


PLATE 9-16. *Aceria dracunculi* (K.)

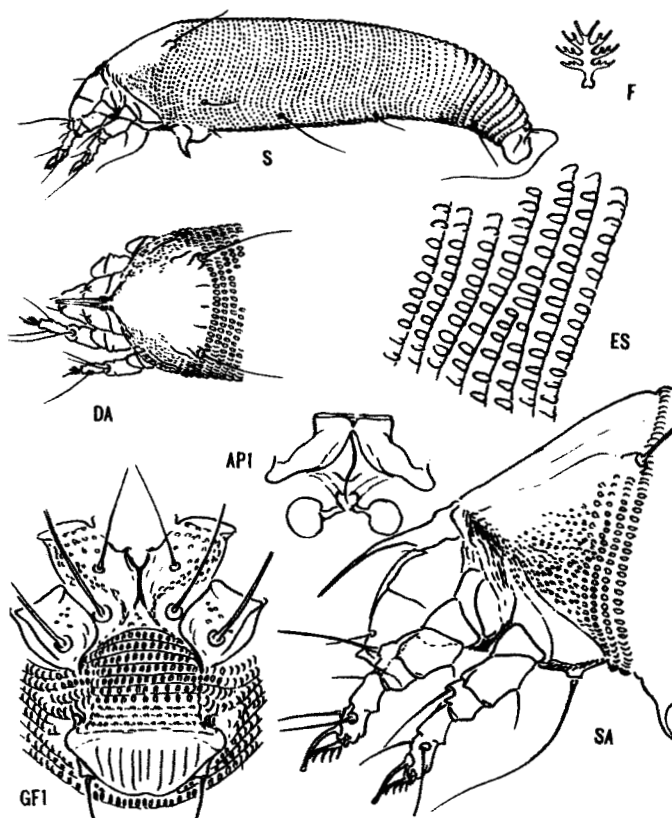


PLATE 9-17. *Aceria ligustri* (K.)

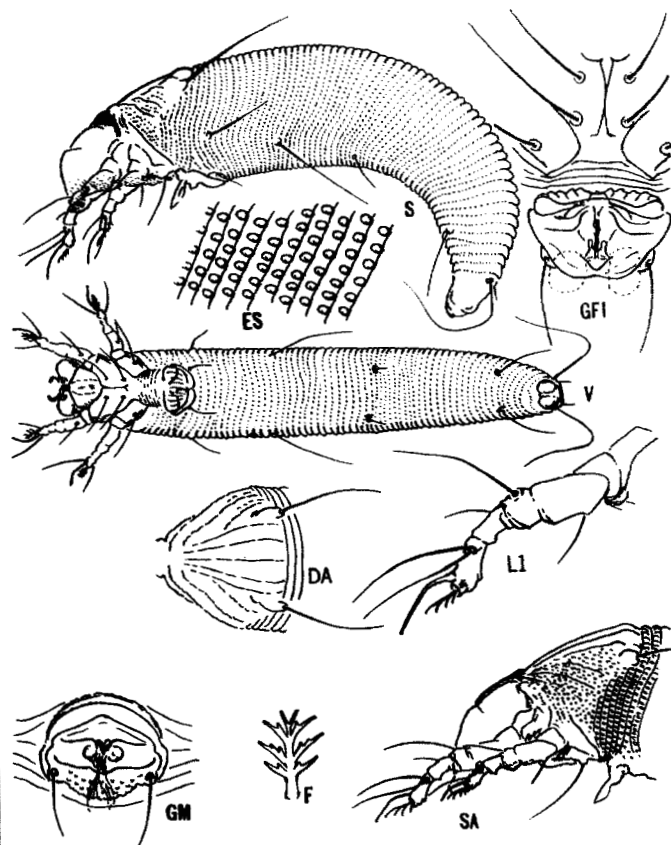


PLATE 9-18. *Aceria neosalviae* (K.)

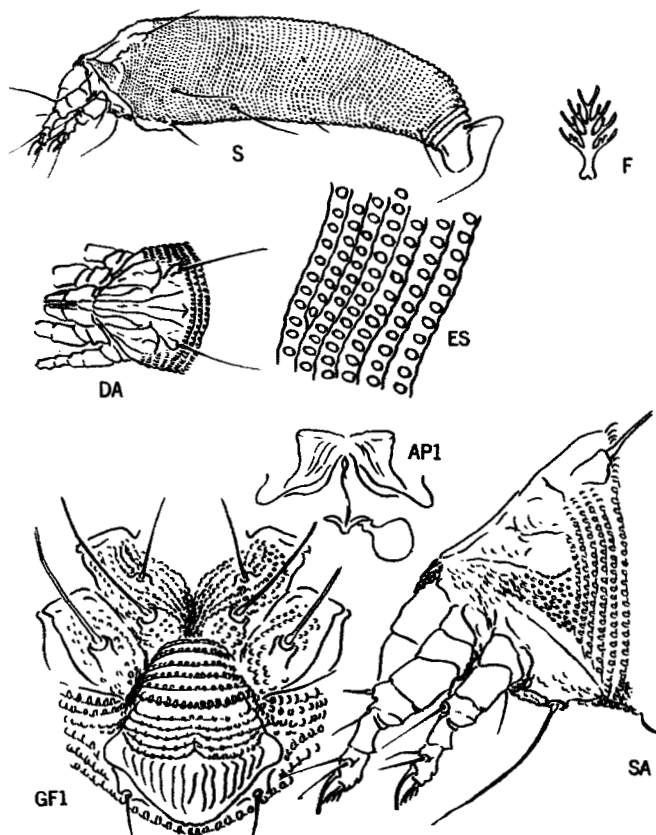


PLATE 9-20. *Aceria granati* (Can.)

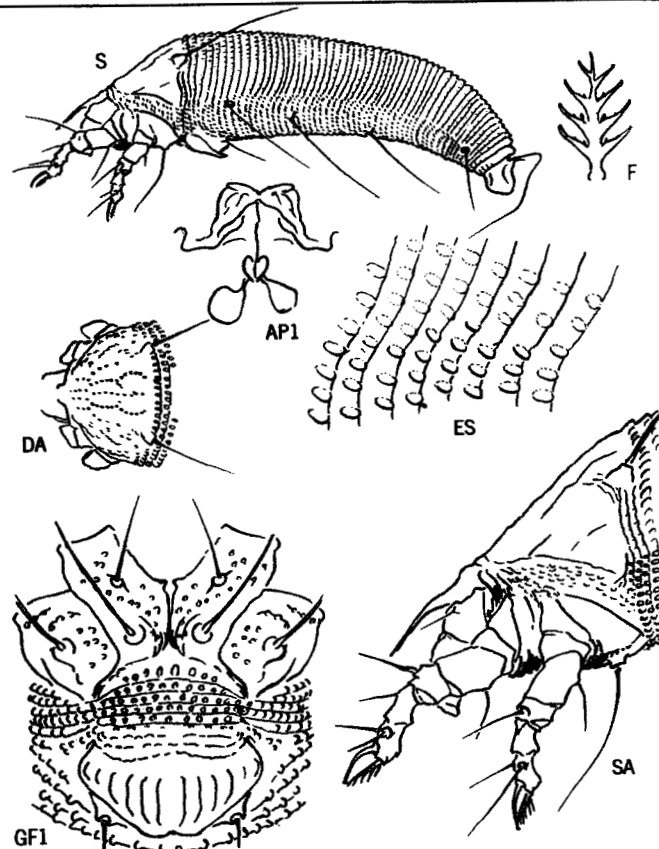


PLATE 9-21. *Aceria peucedani* (Can.)

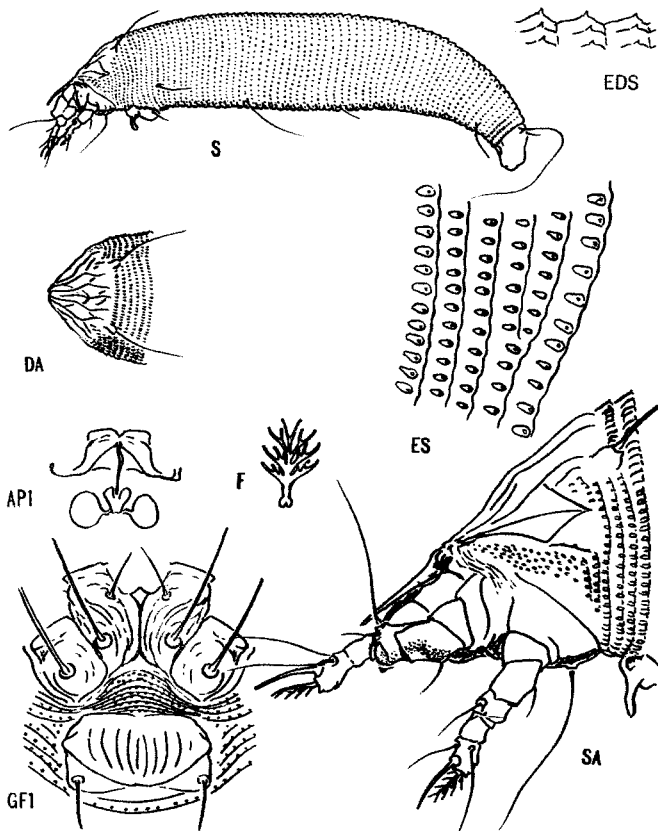


PLATE 9-22. *Aceria boycei* (K.)

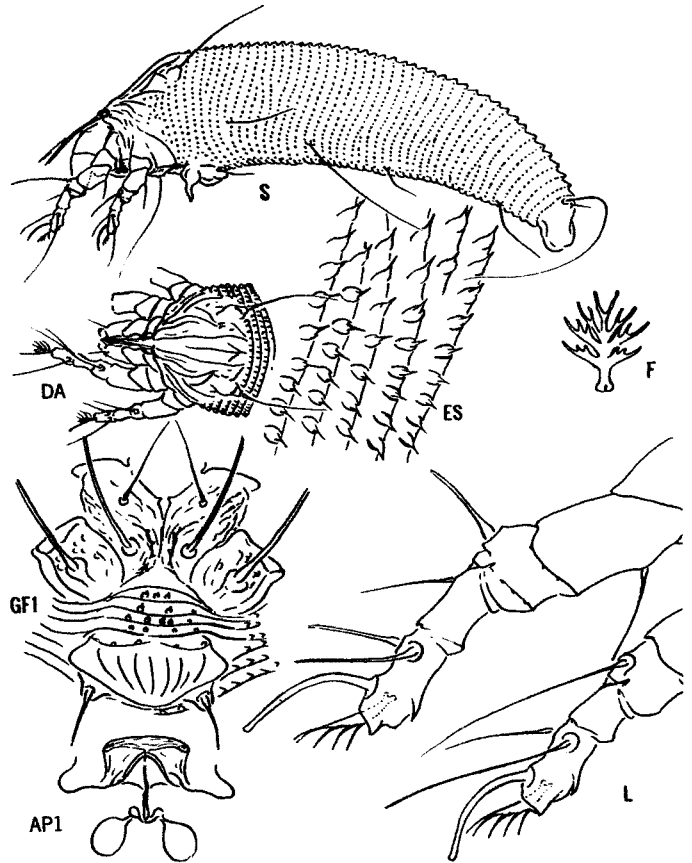


PLATE 9-23. *Aceria chrysopsis* (K.)

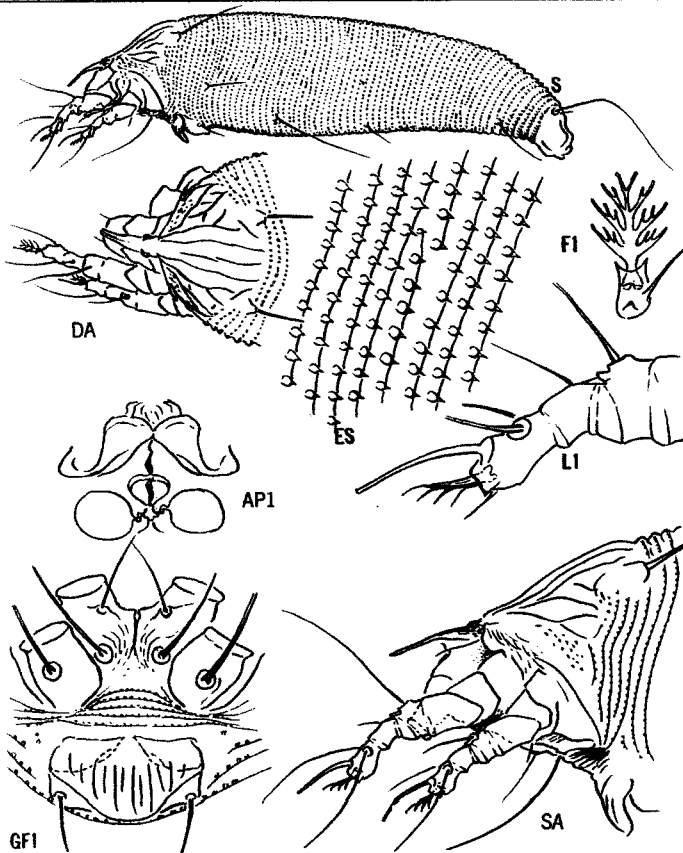


PLATE 9-24. *Aceria heterothecae* (K.)

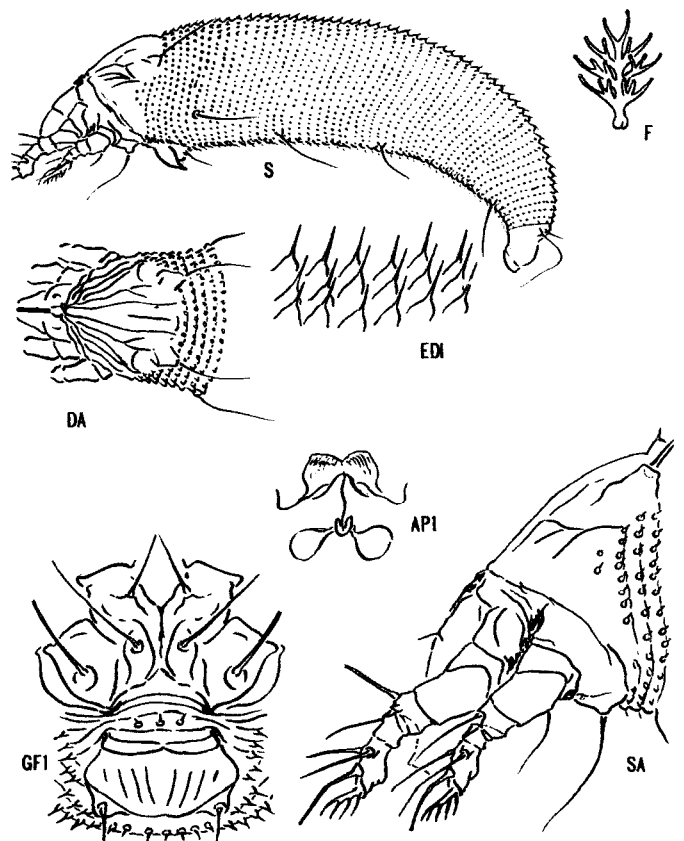


PLATE 9-24.1 *Aceria eriodictyonis* K.

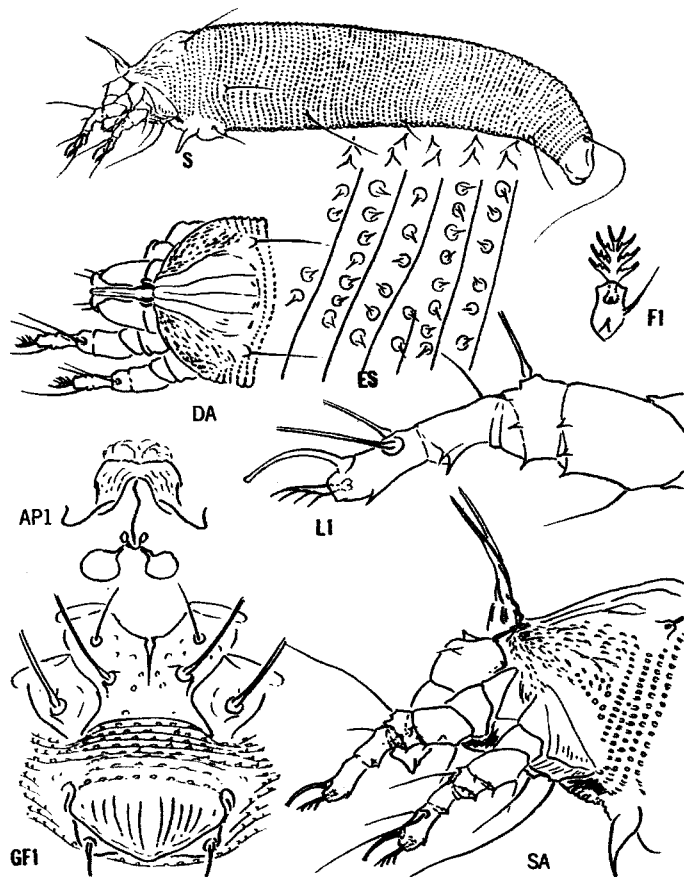


PLATE 9-25. *Aceria stinsonis* (K.)

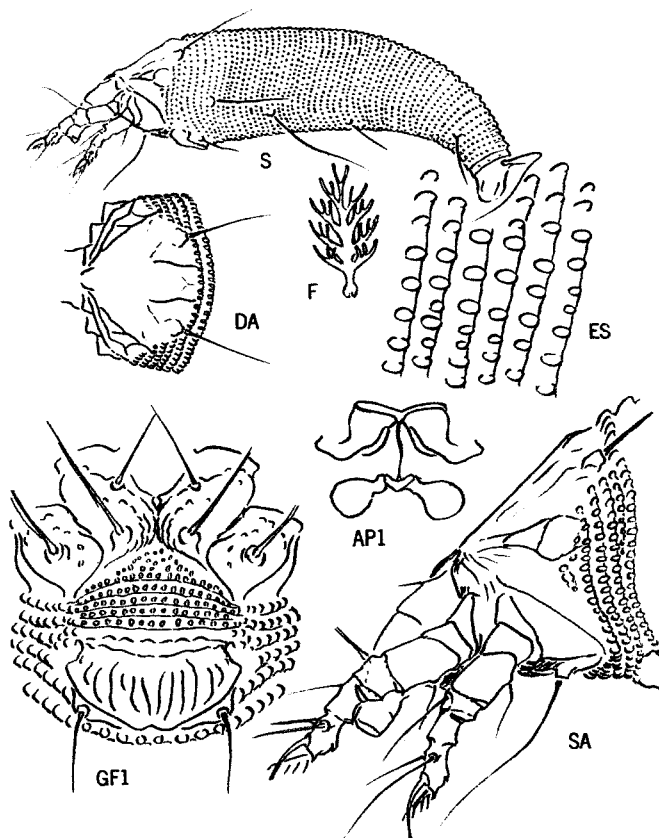


PLATE 9-25.1 *Aceria caliberberis* K.

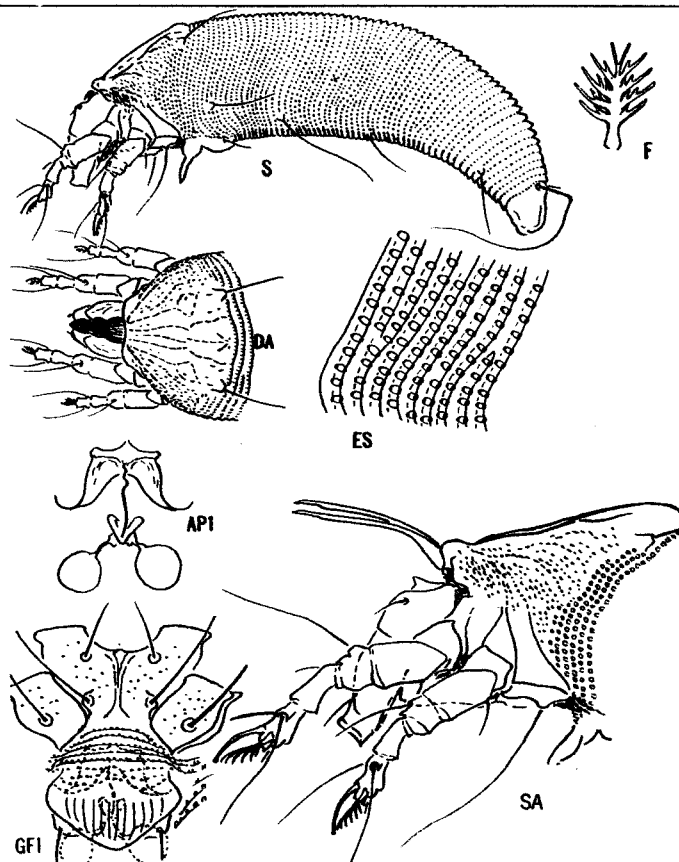


PLATE 9-26. *Aceria ceanothi* (K.)

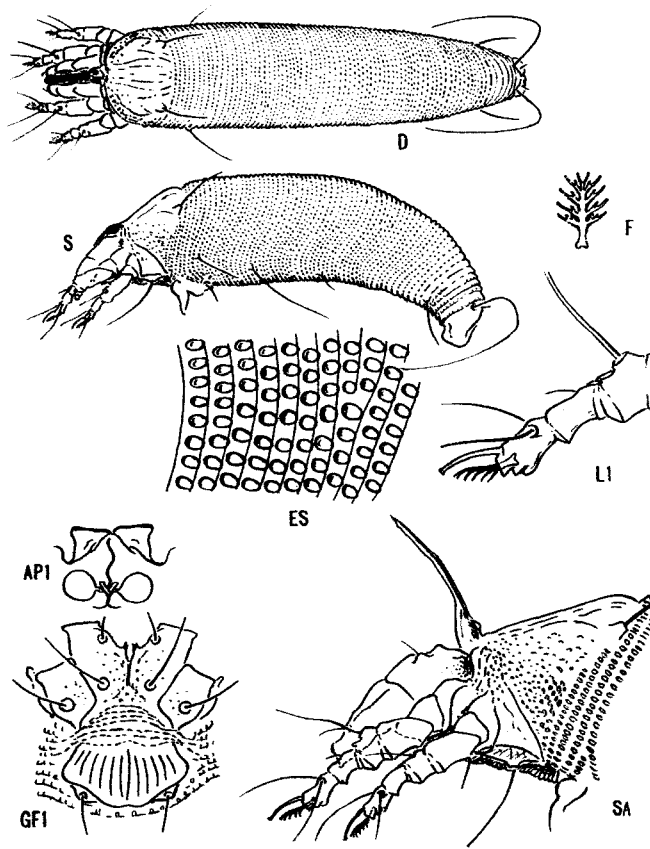


PLATE 9-28. *Aceria sheldoni* (Ewing)

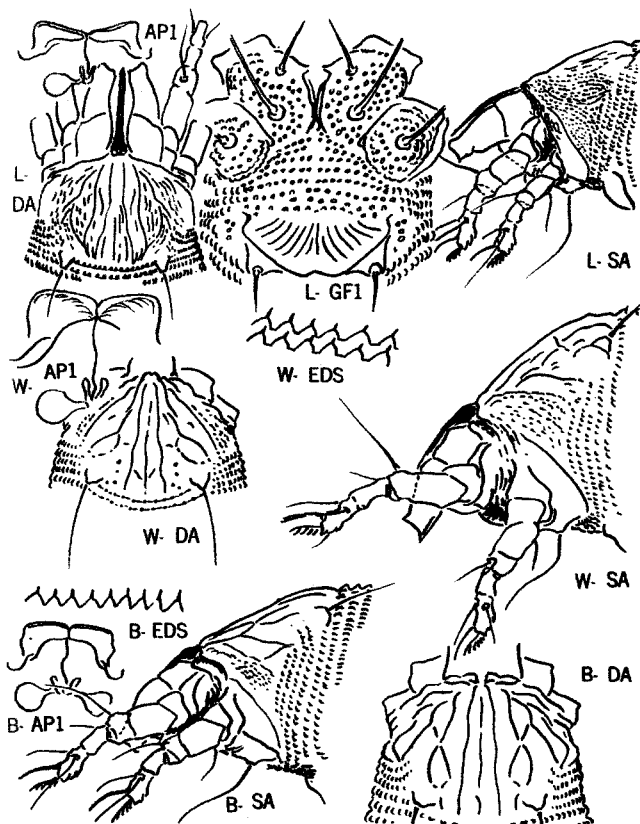


PLATE 9-29. *Aceria lepidosparti* K. (L)
 PLATE 9-39. *Aceria wyethiae* K. (W)
 PLATE 9-38. *Aceria beevori* K. (B)

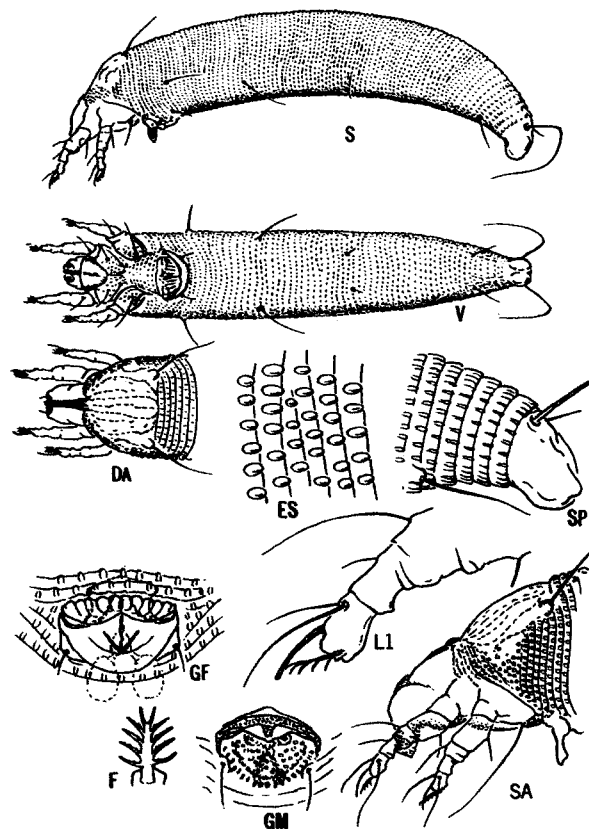


PLATE 9-30. *Aceria eriobotryae* (K.)

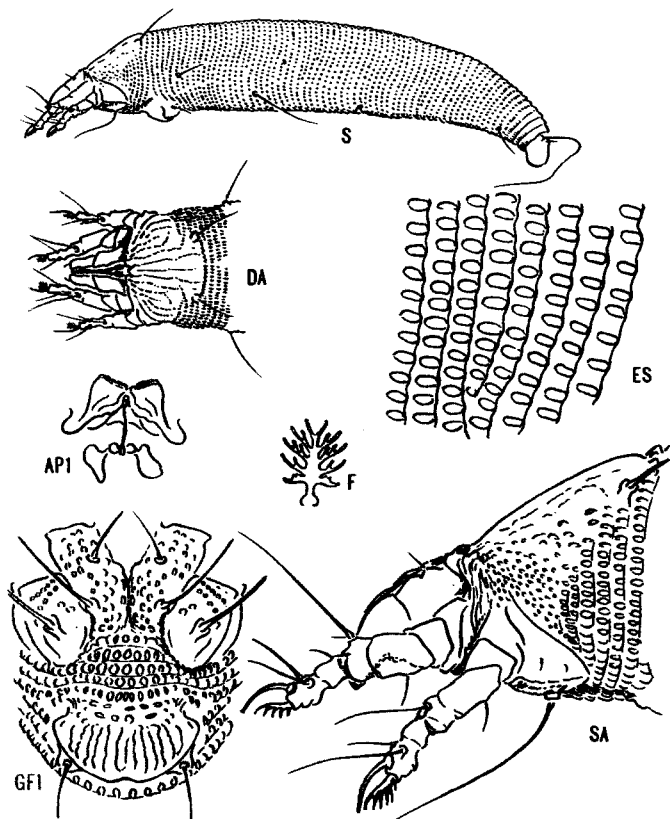


PLATE 9-31. *Aceria diospyri* K.

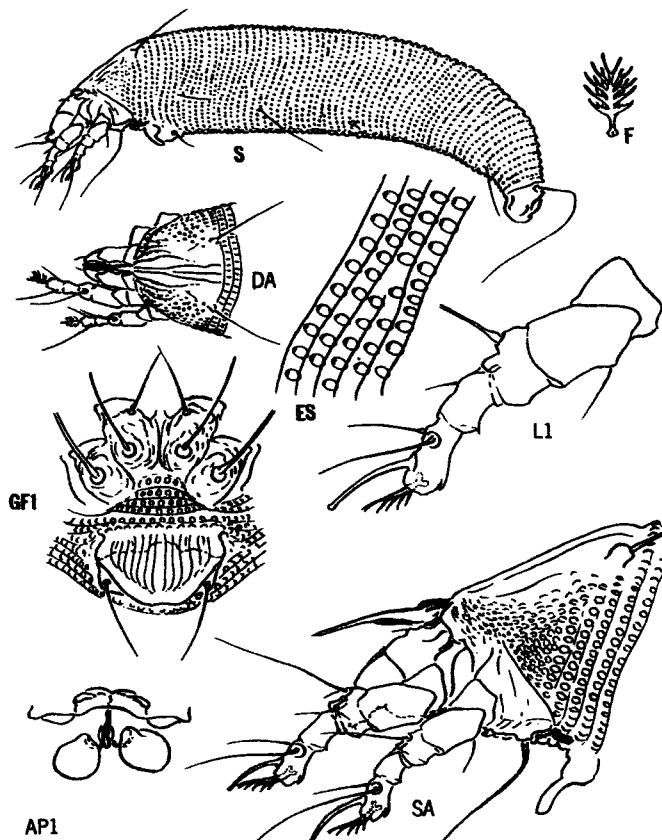


PLATE 9-32. *Aceria feijojae* (K.)

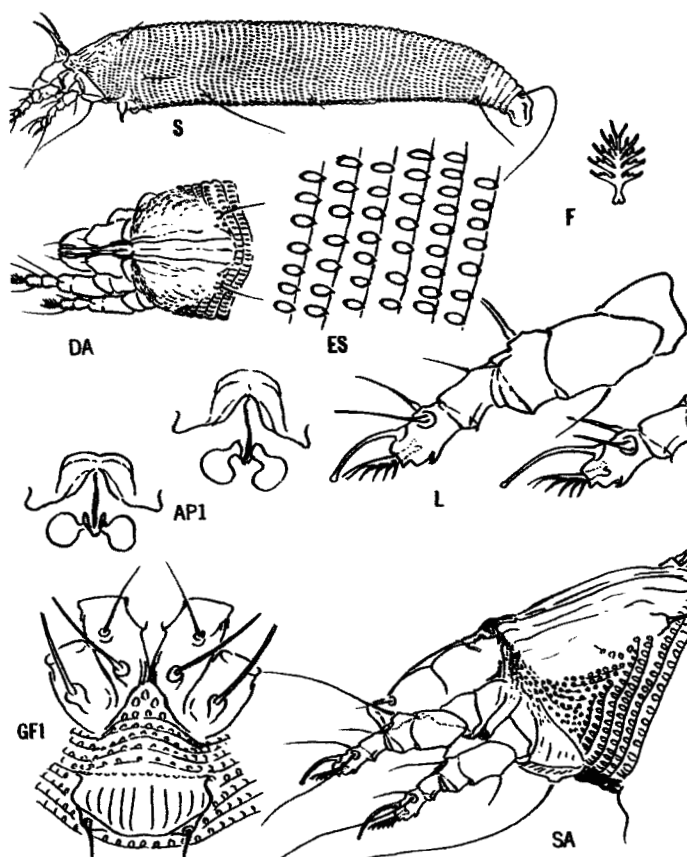


PLATE 9-33. *Aceria mori* (K.)

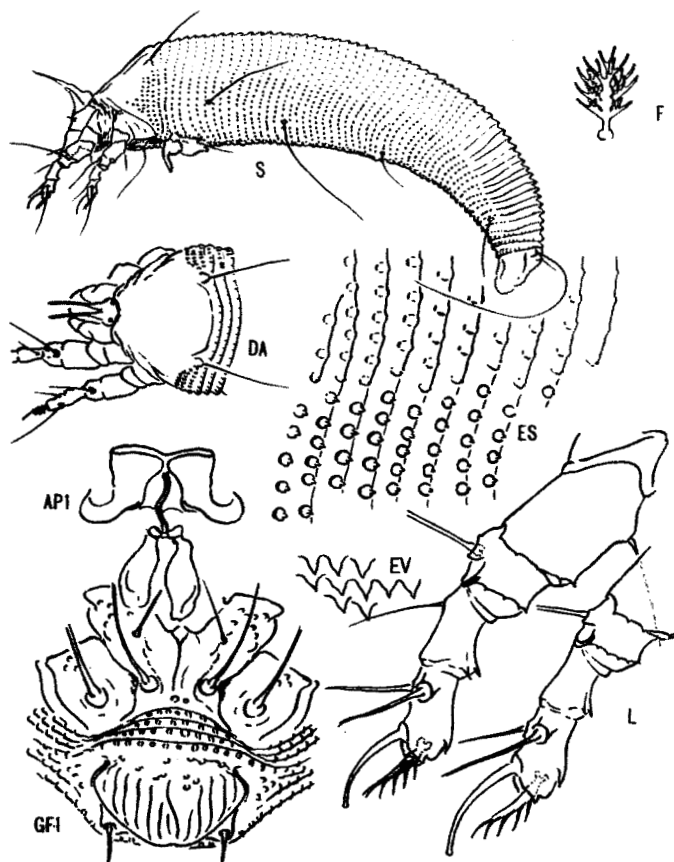


PLATE 9-34. *Aceria medicaginis* (K.)

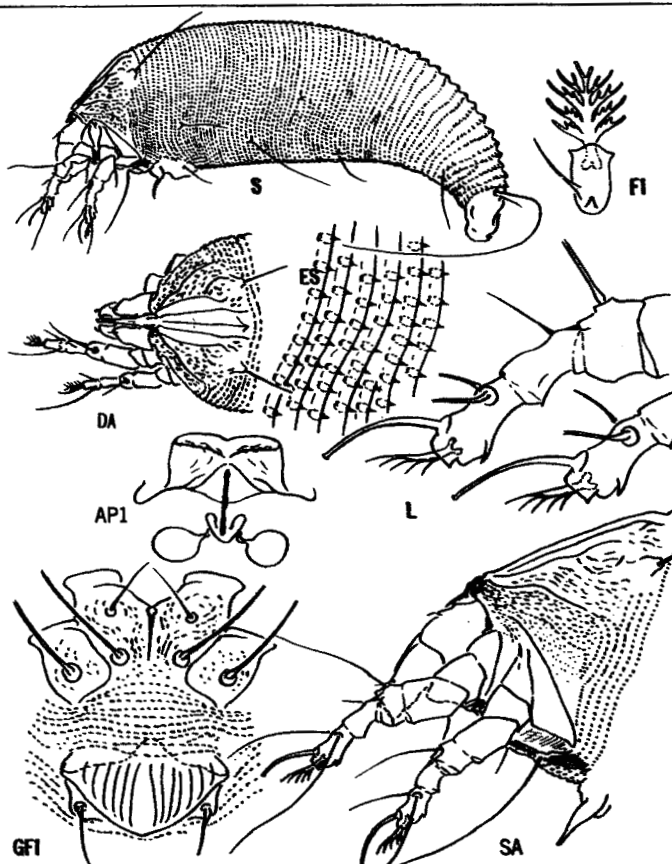


PLATE 9-35. *Aceria langei* (K.)

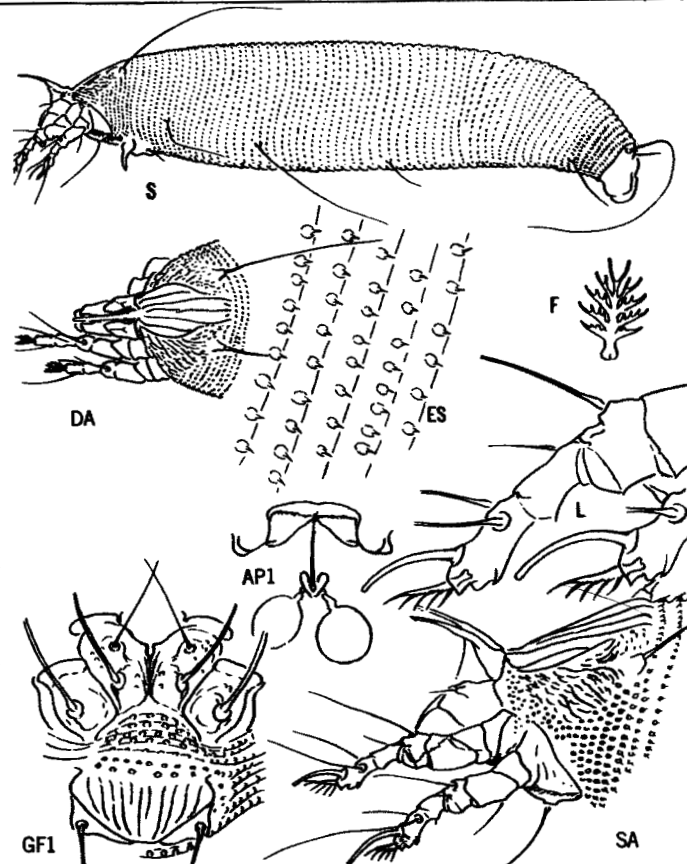


PLATE 9-36. *Aceria abilis* (K.)

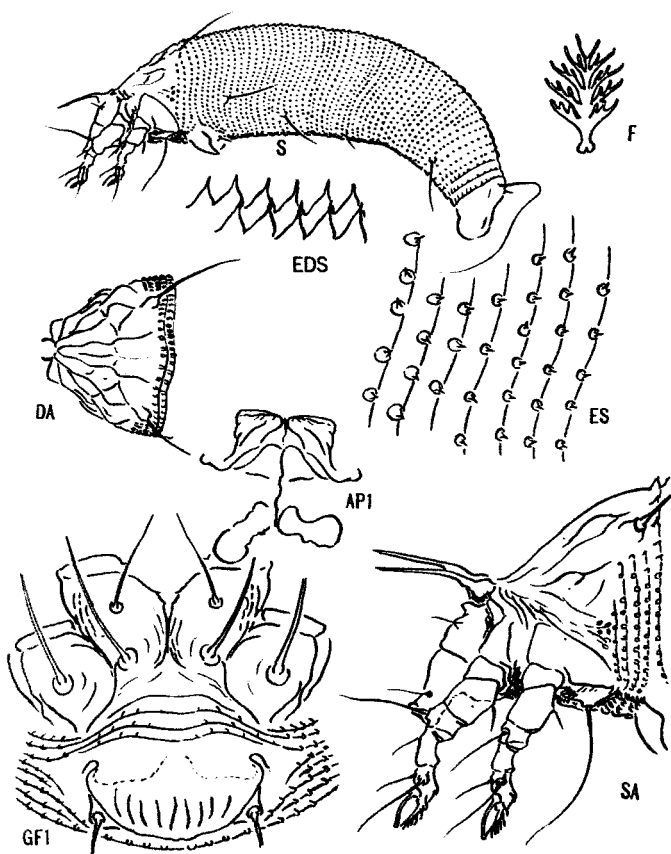


PLATE 9-37. *Aceria baccharices* K.

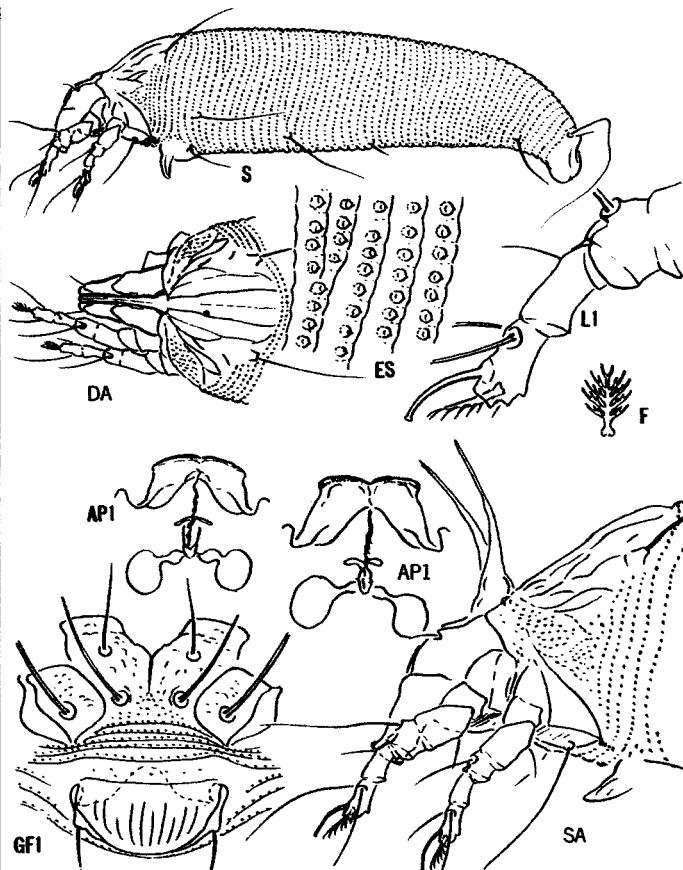


PLATE 9-40. *Aceria calibaccharis* (K.)

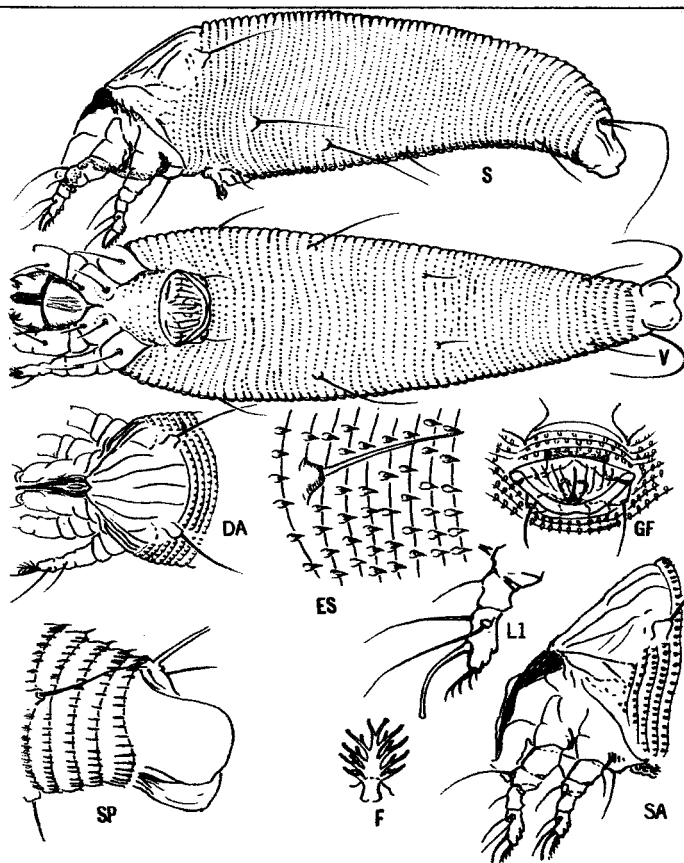


PLATE 9-41. *Aceria spinulifera* (K.)

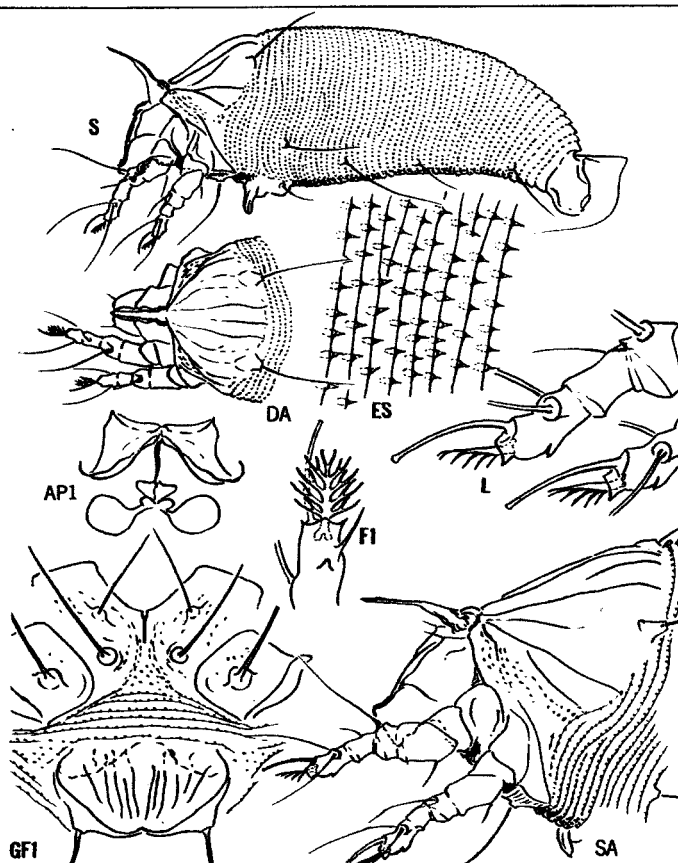
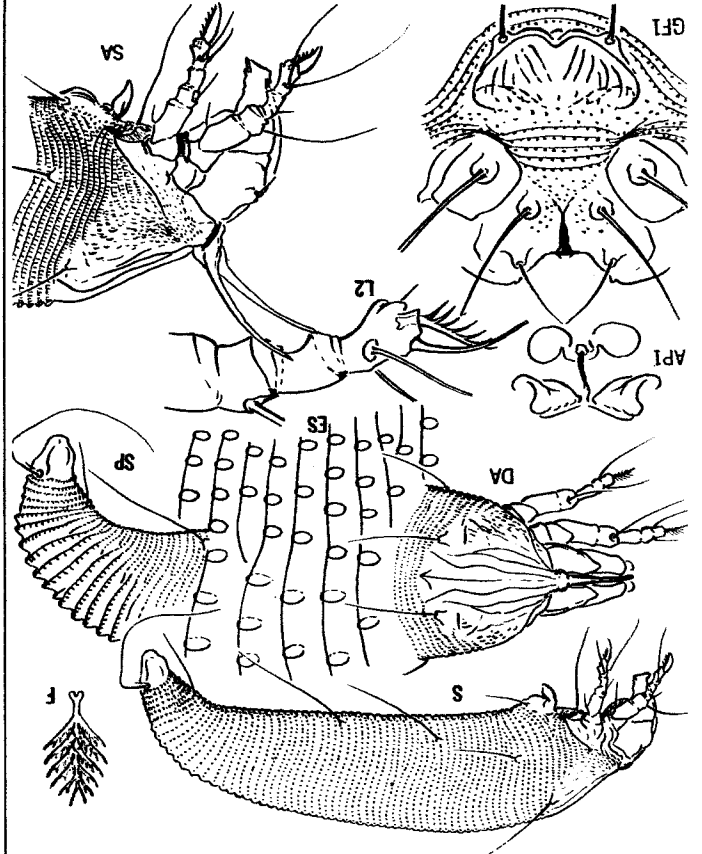
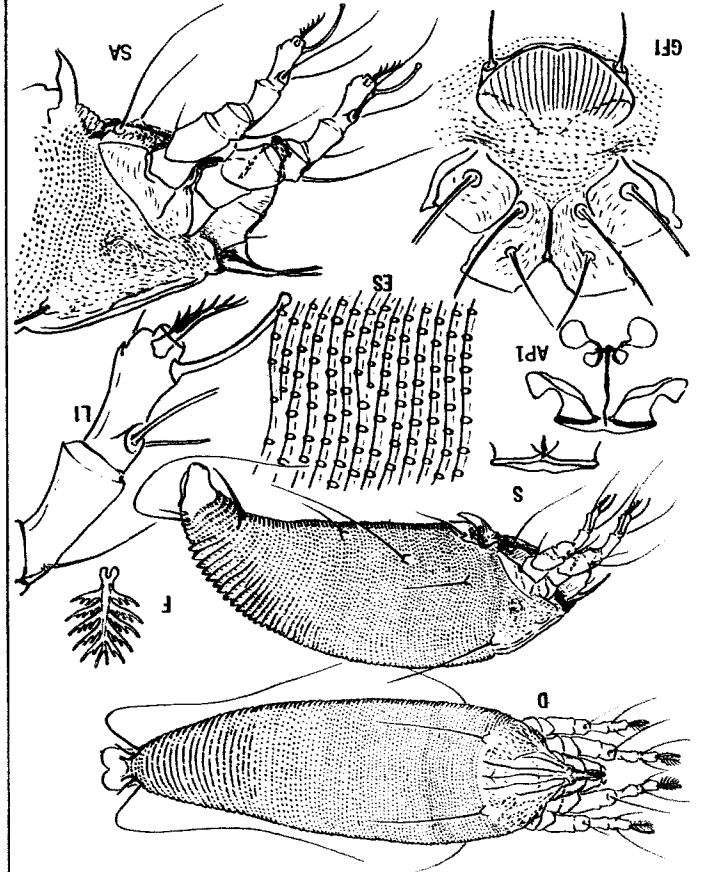
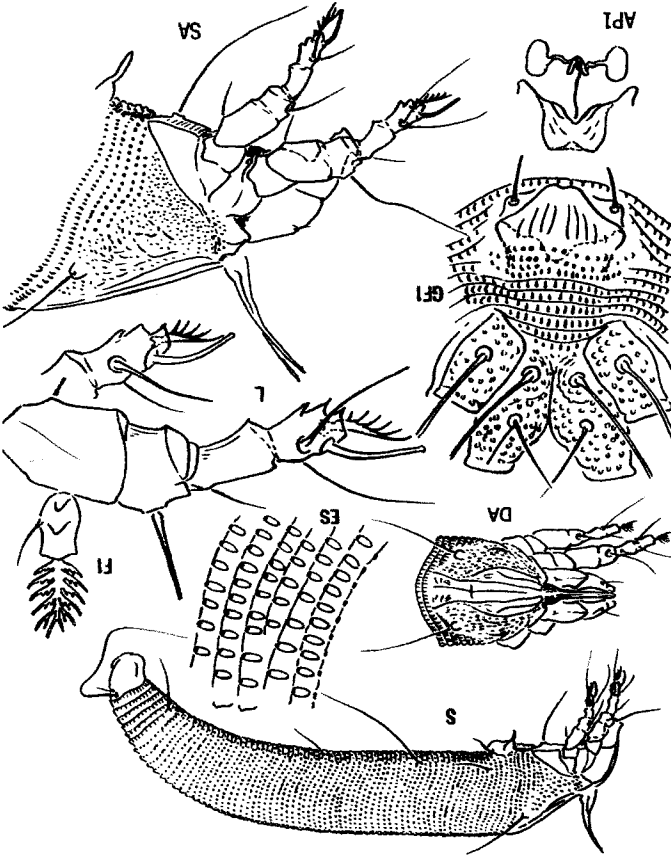
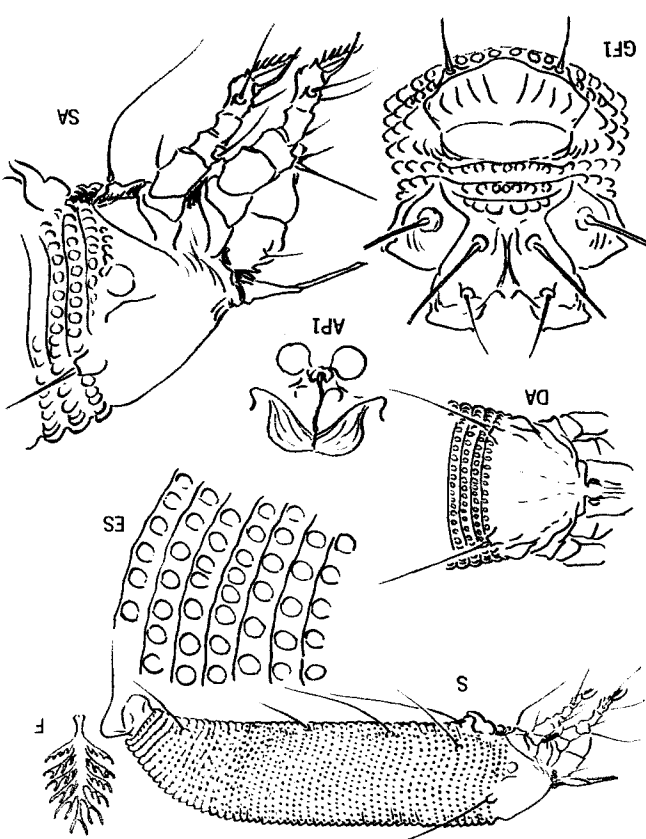


PLATE 9-42. *Aceria haplopappi* (K.)

PLATE 9-44. *Aceria magnoliae* (K.)PLATE 9-43. *Aceria neocynarae* (K.)PLATE 9-45. *Aceria neosessigi* (K.)PLATE 9-43. I *Aceria allenrolfeae* K.

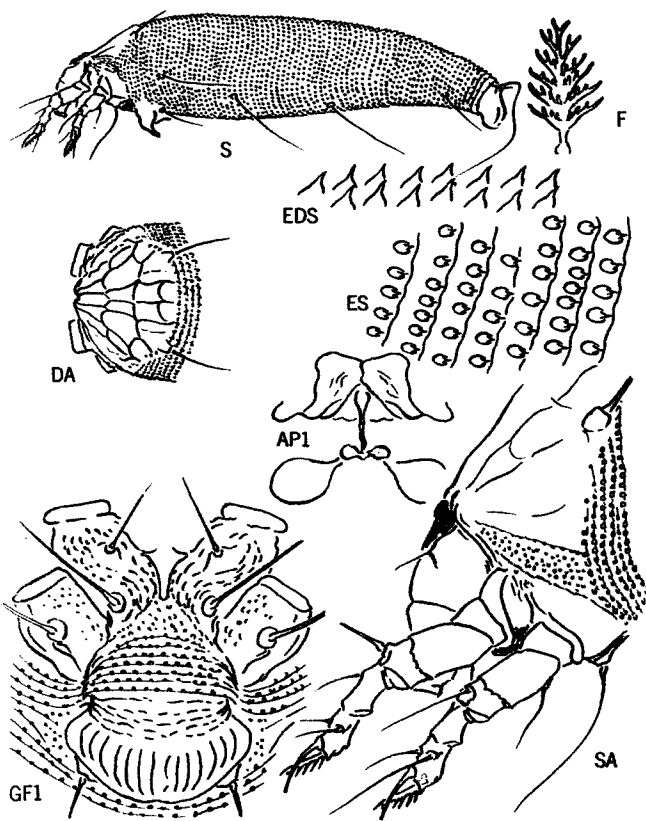


PLATE 9-45.1. *Aceria paradianthi* K.

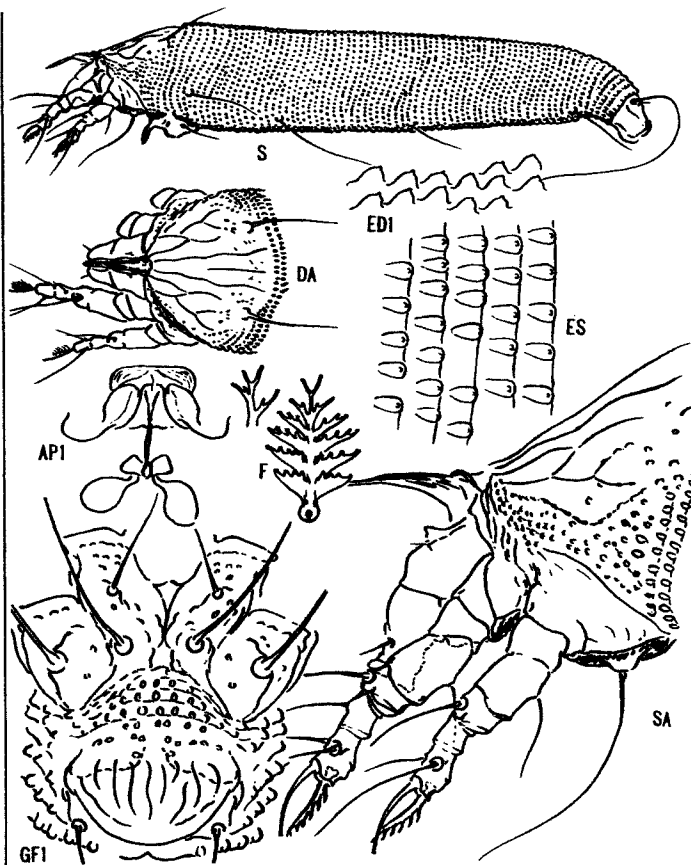


PLATE 9-46. *Aceria aloinis* (K.)

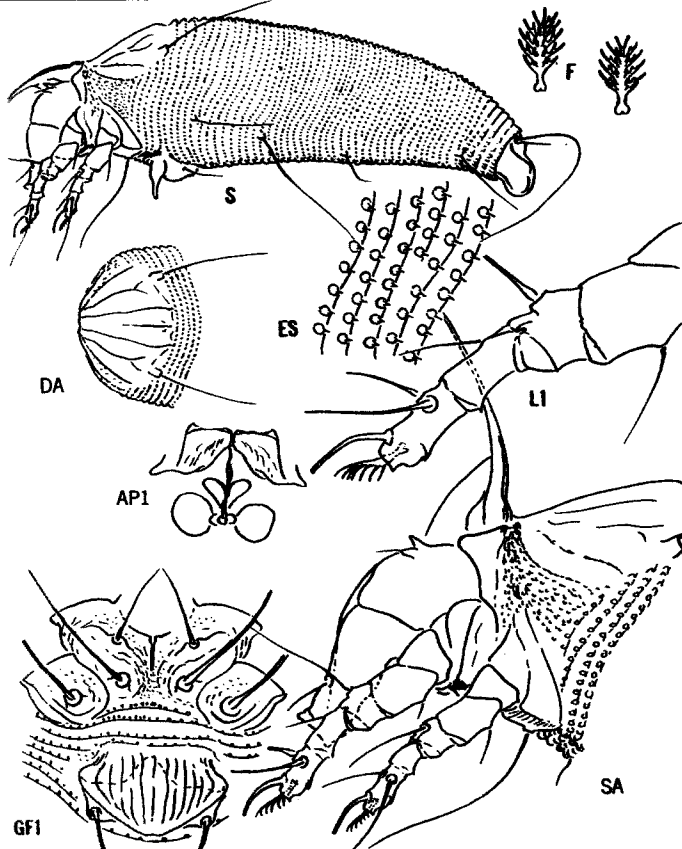


PLATE 9-47. *Aceria larreae* (K.)

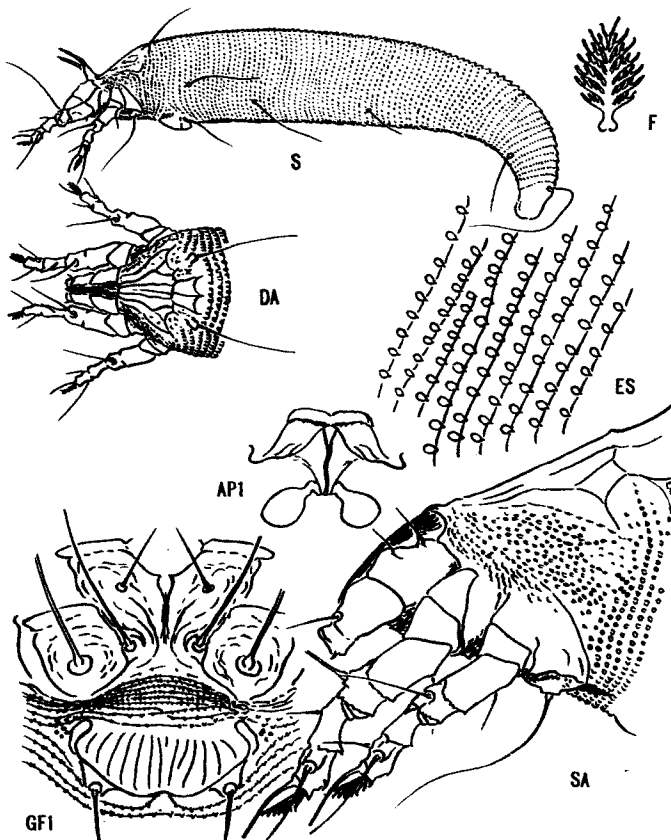


PLATE 9-48. *Aceria calilupini* K.

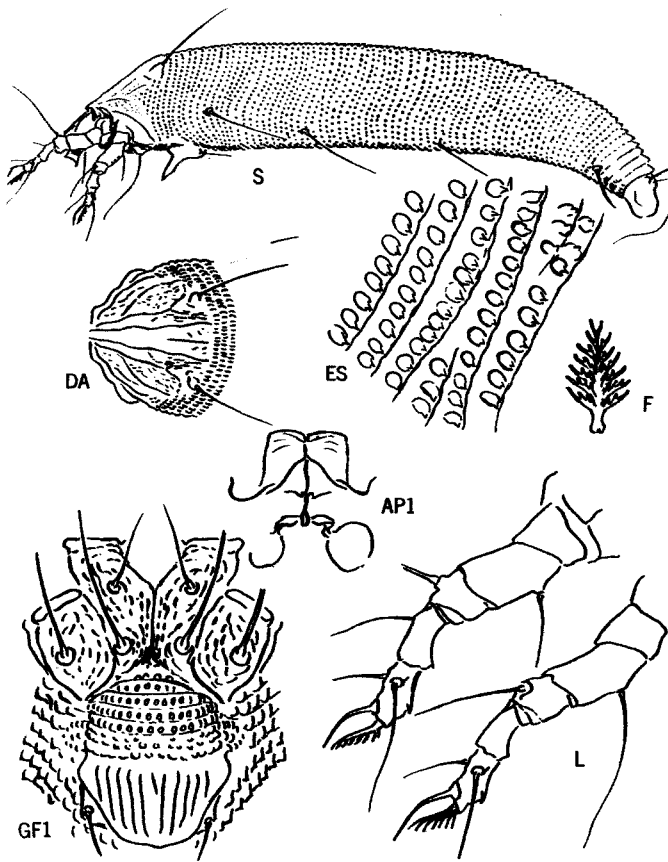


PLATE 9-49. *Aceria tulipae* (K.)

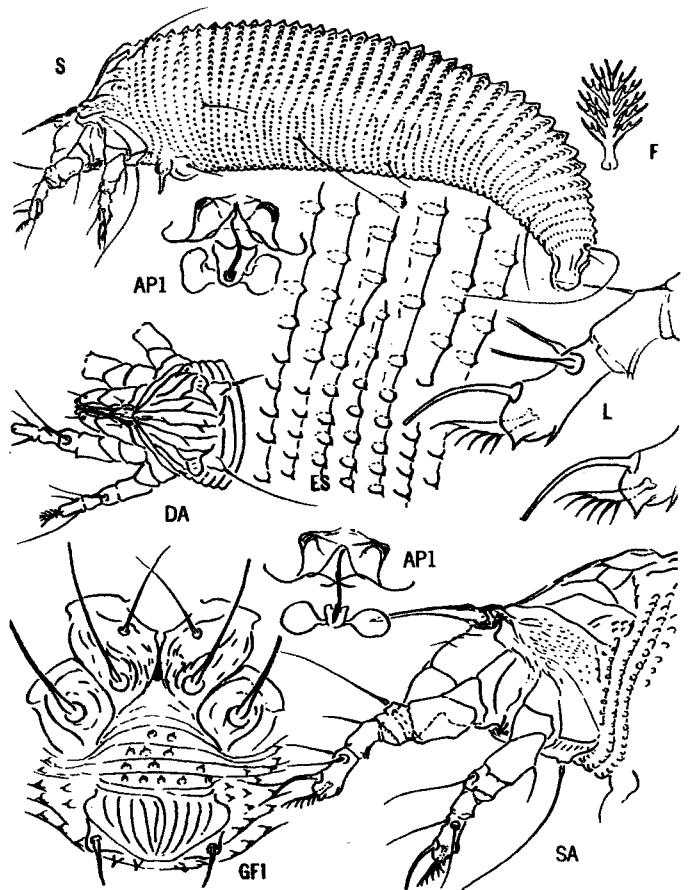


PLATE 10-1. *Paraphytoptus brickelliae* K.

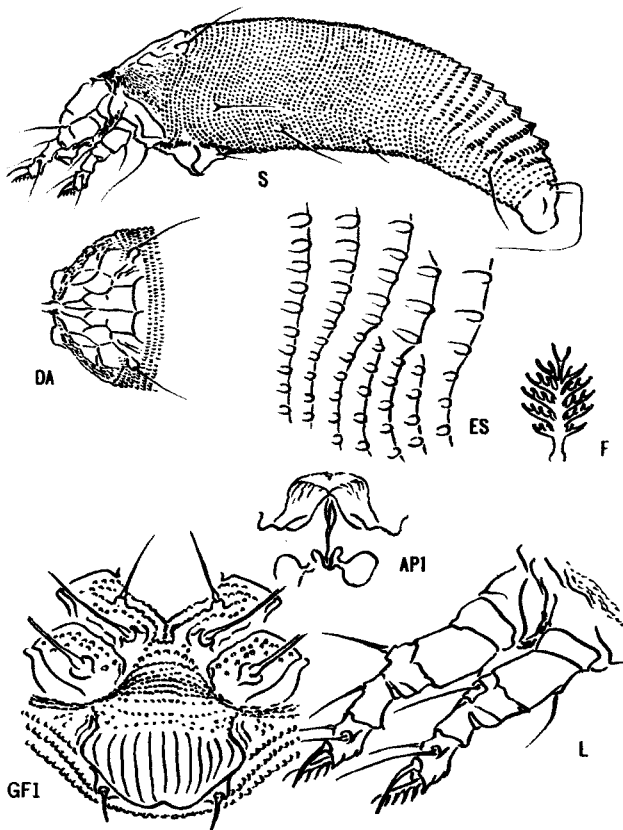


PLATE 10-1.1 *Paraphytoptus arceuthobii* K.

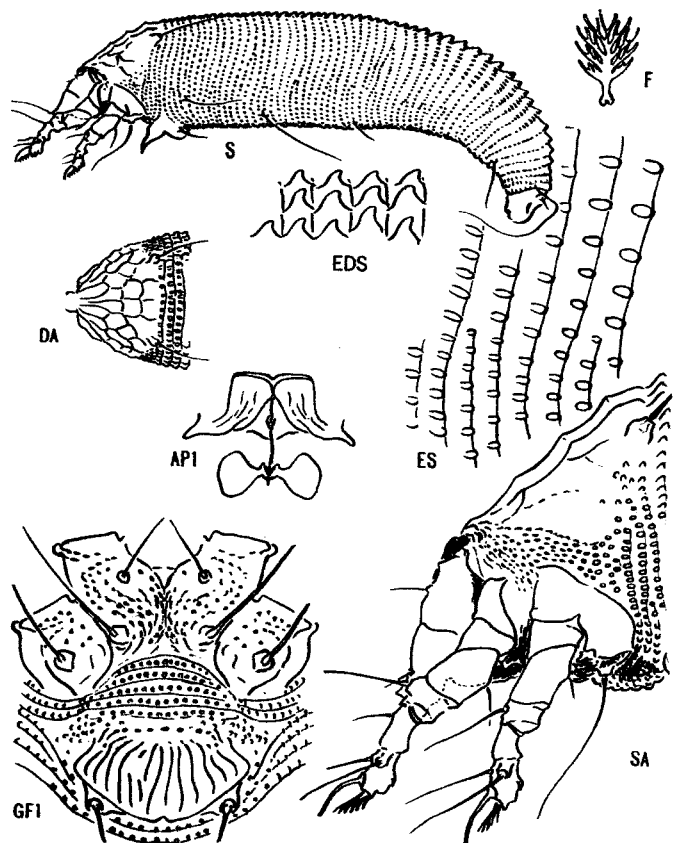


PLATE 10-2. *Paraphytoptus rhamniphagus* K.

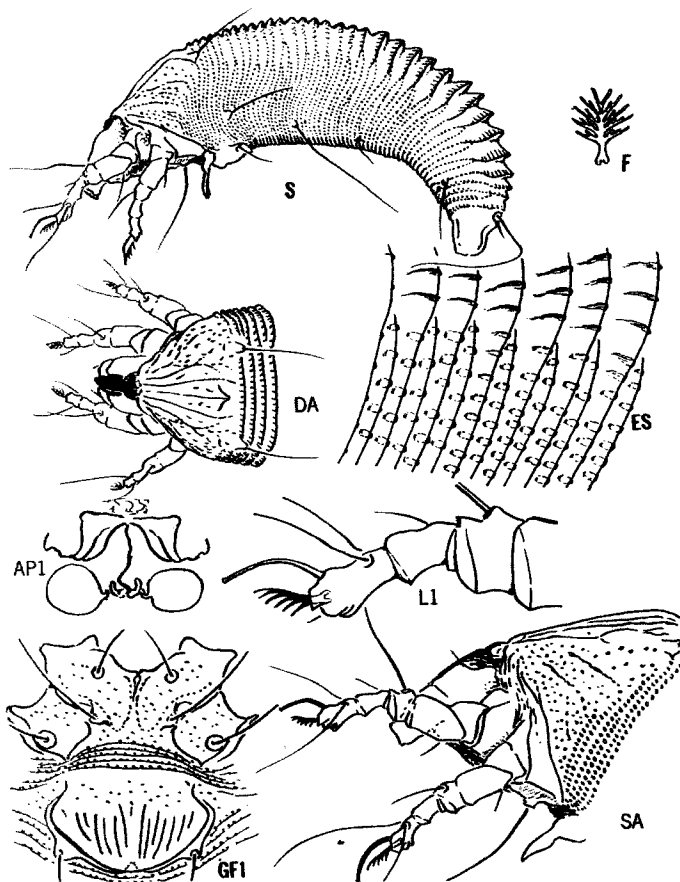


PLATE 10-3. *Paraphytoptus mcgregori* K.

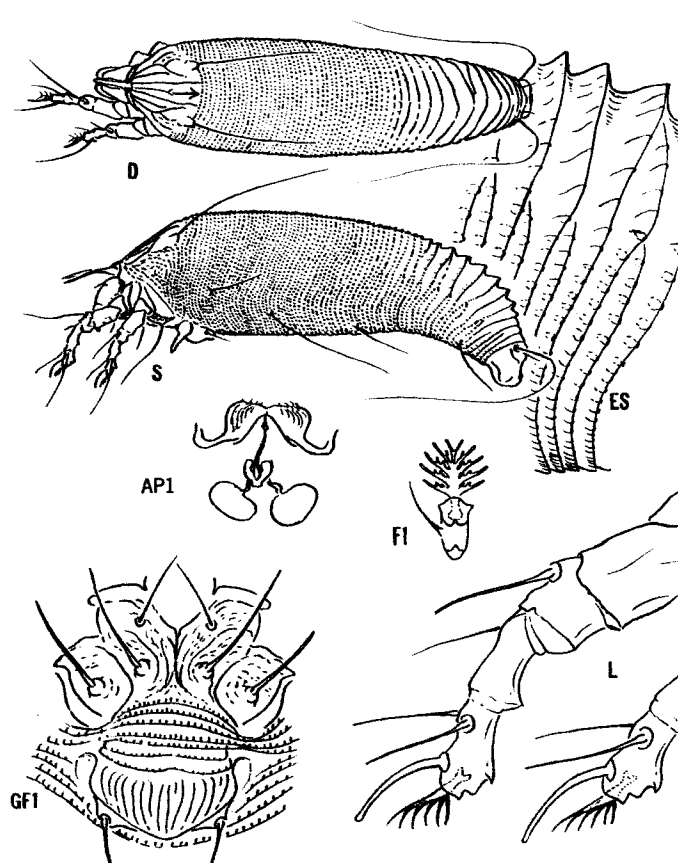


PLATE 10-4. *Paraphytoptus chrysanthemi* K.

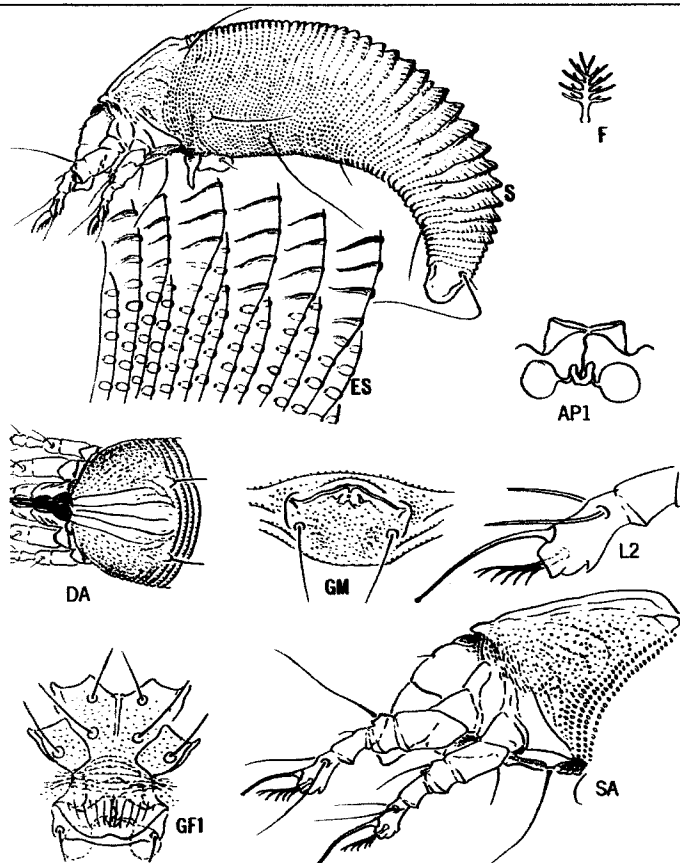


PLATE 10-5. *Paraphytoptus salviacrinis* K.

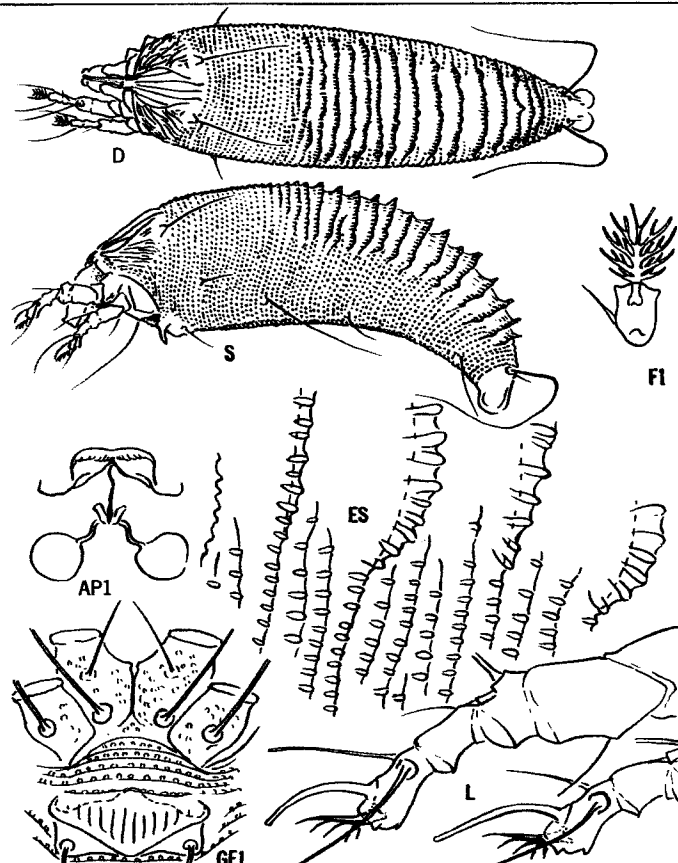


PLATE 10-6. *Paraphytoptus californicus* (Hall)

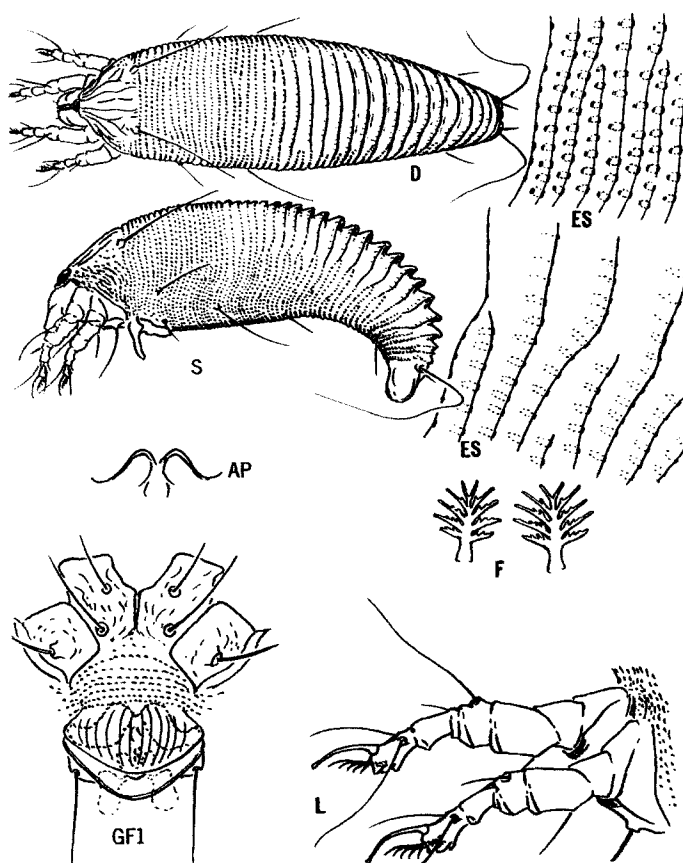


PLATE 10-7. *Paraphytoptus inaequalis* K.

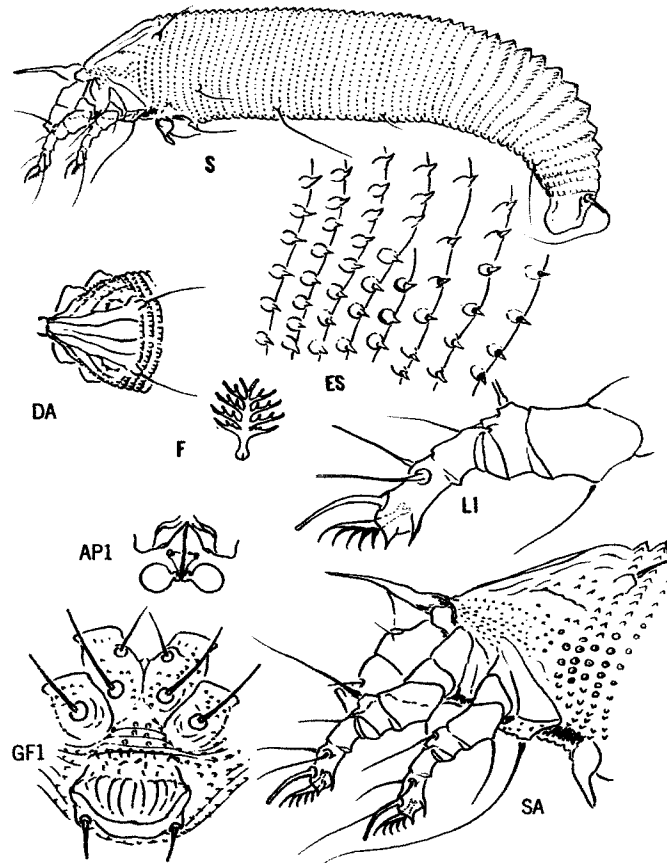


PLATE 10-8. *Paraphytoptus caliplucheae* (K.)

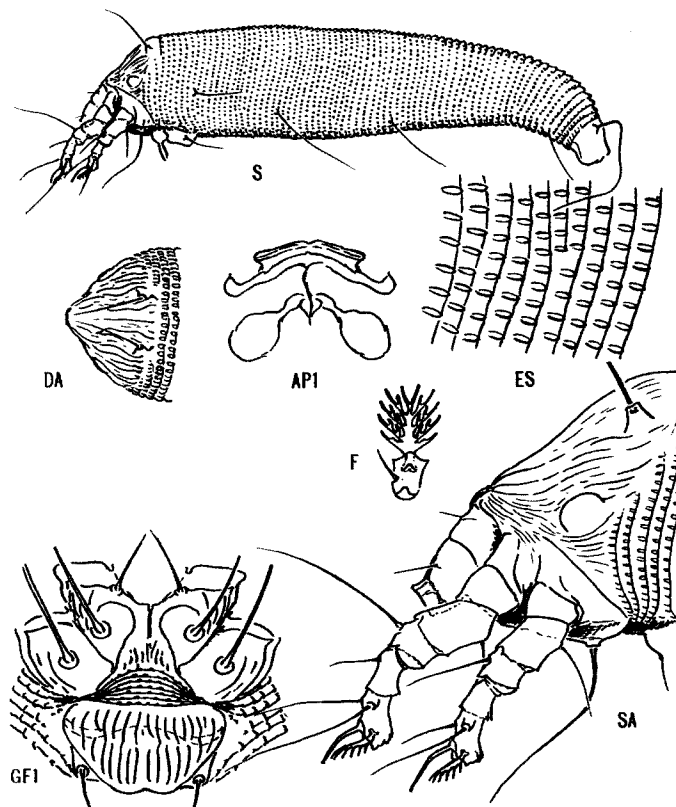


PLATE 11-1. *Eriophyes vitis* (Pgst.)

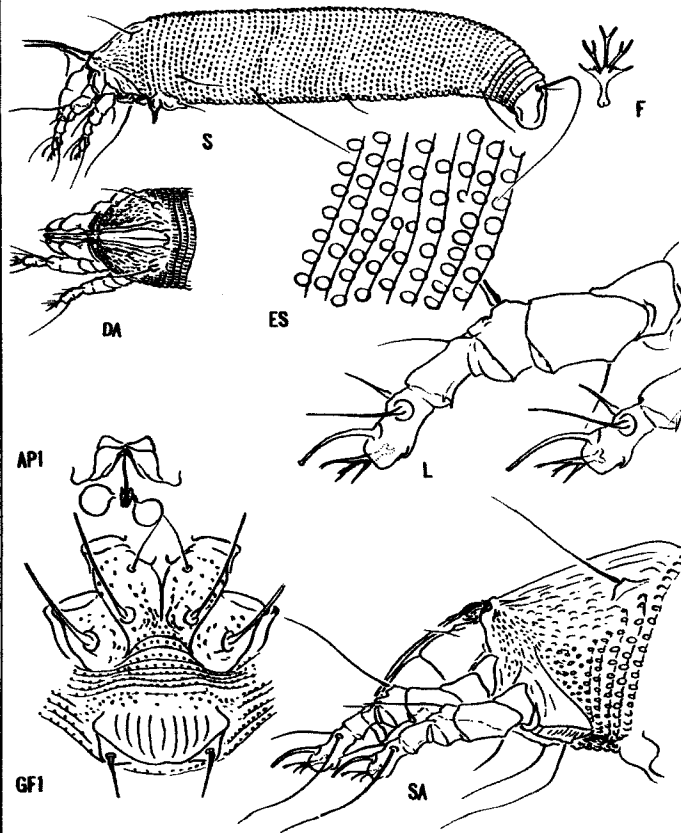


PLATE 11-2. *Eriophyes triradiatus* (Nal.)

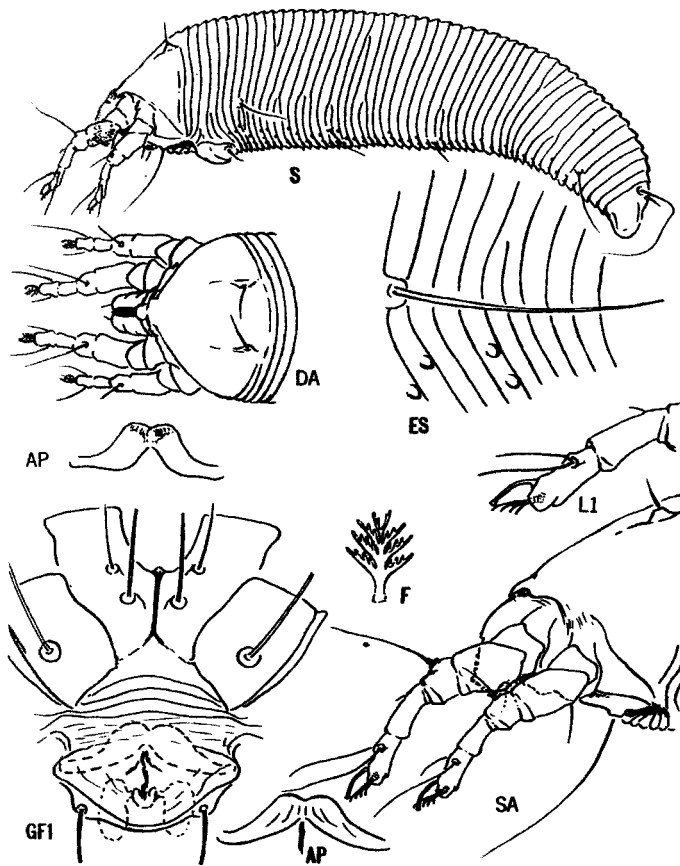


PLATE 11-3. *Eriophyes laevis* (Nal.)

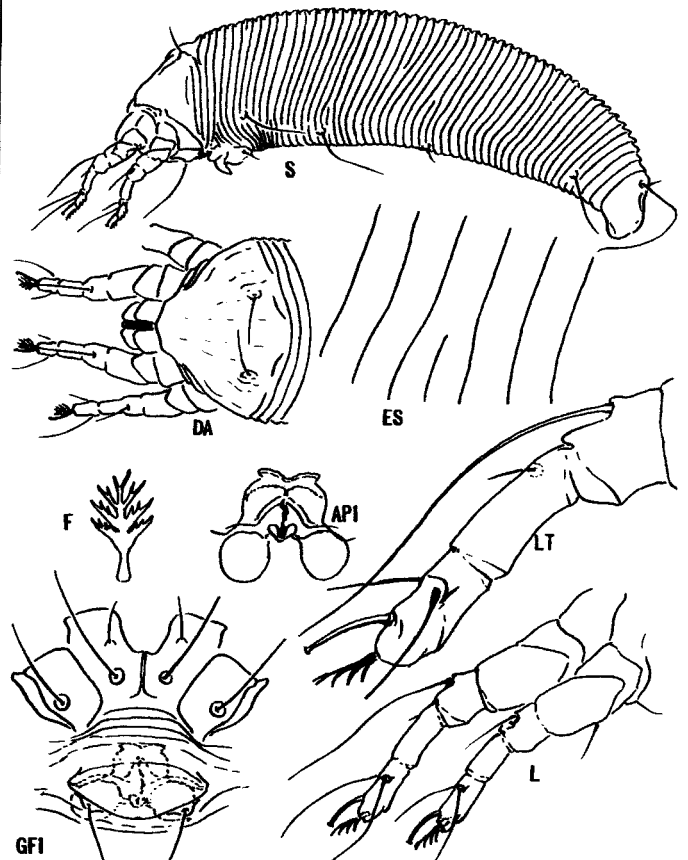


PLATE 11-4. *Eriophyes emarginatae* K.

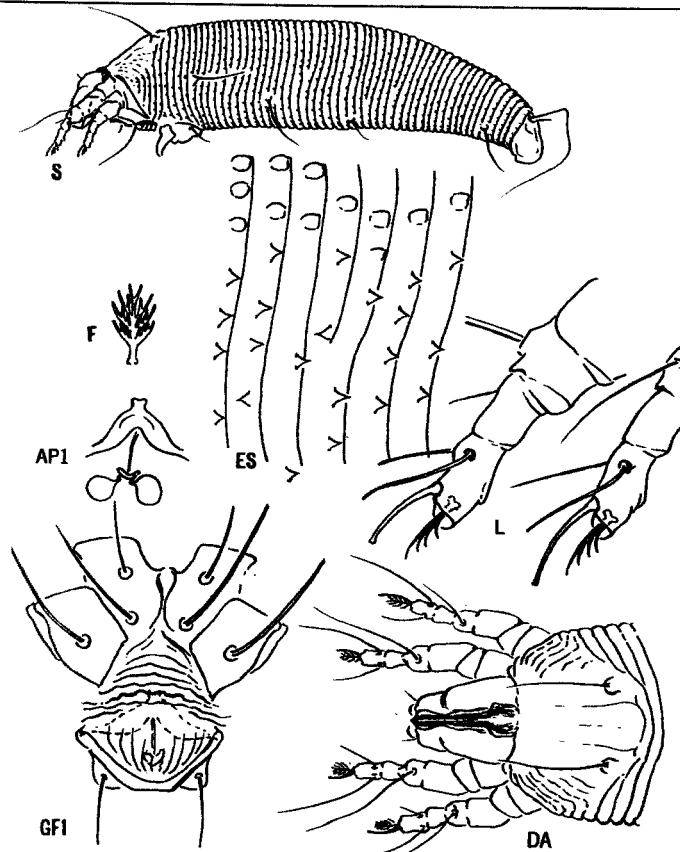


PLATE 11-5. *Eriophyes savagei*

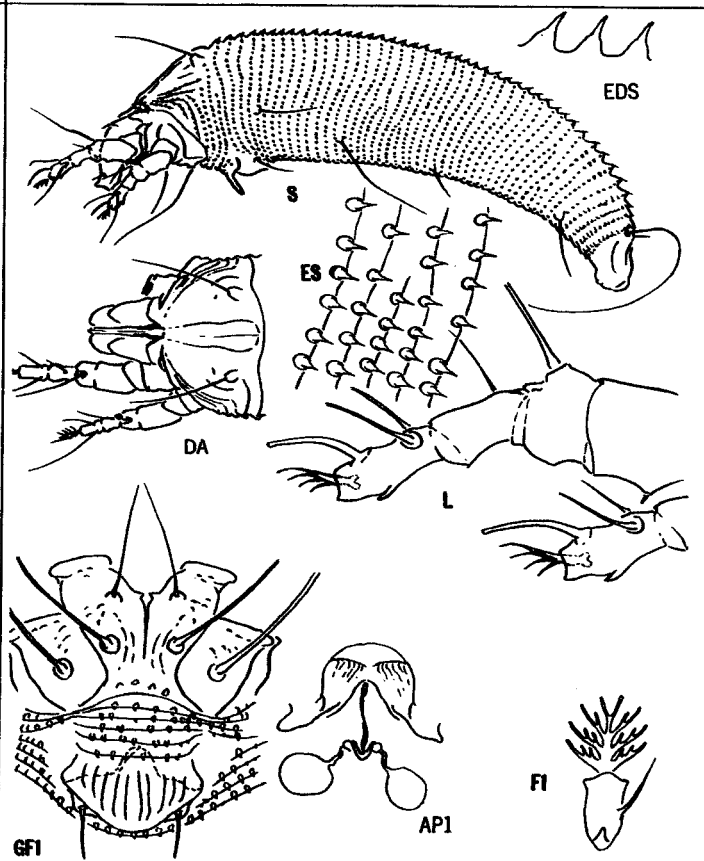


PLATE 11-6. *Eriophyes breechii* K.

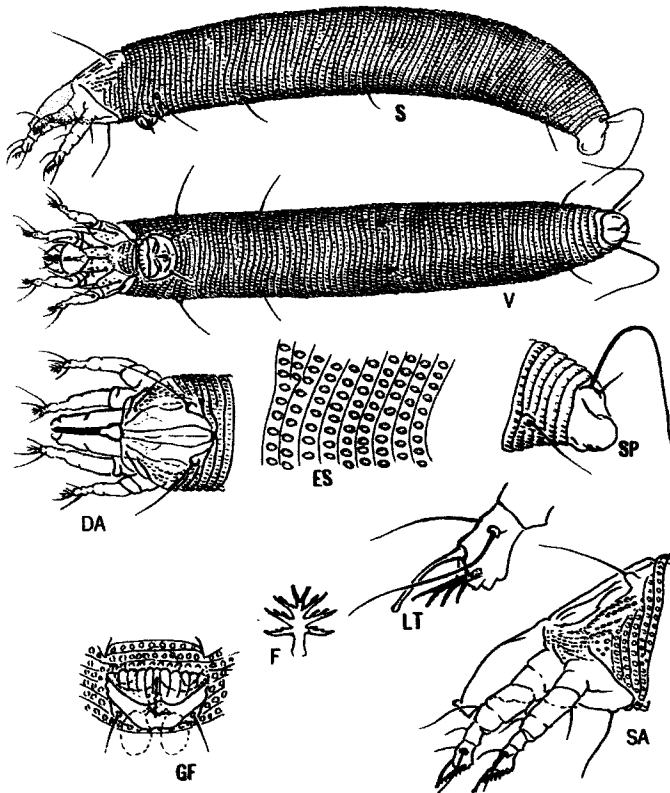


PLATE 11-7. *Eriophyes pyri* (Pgst.)

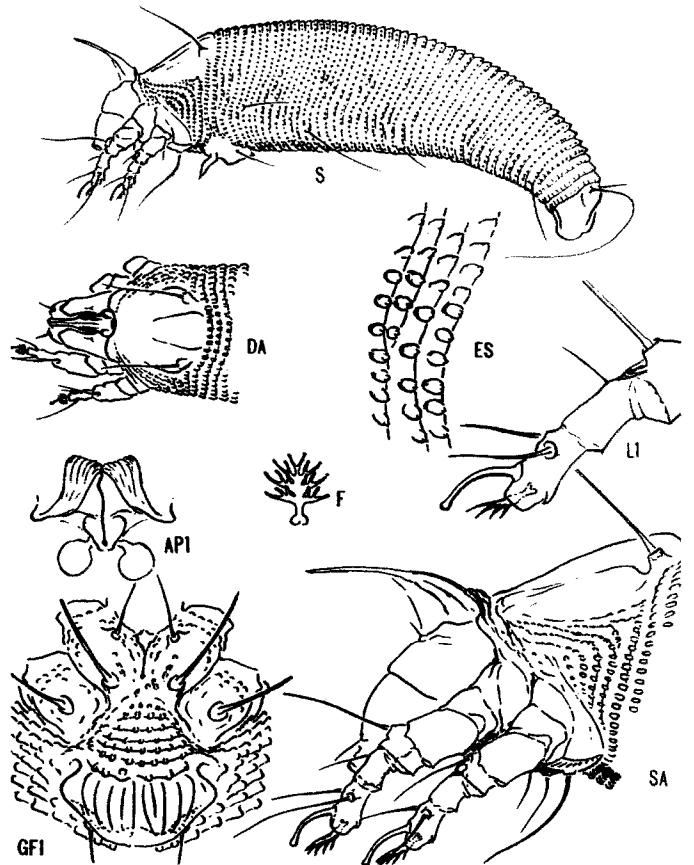


PLATE 11-8. *Eriophyes ilicifoliae* K.

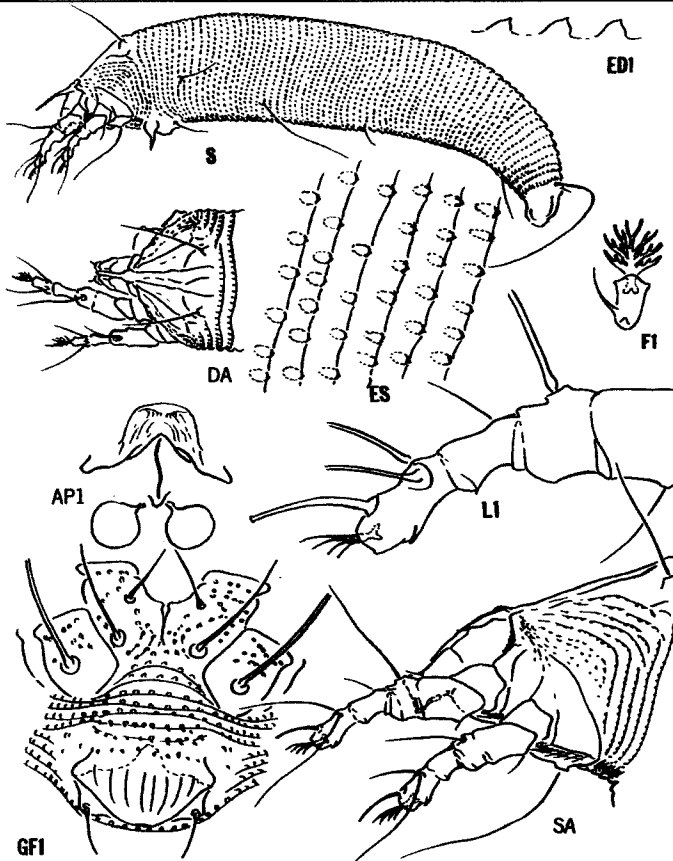


PLATE 11-9. *Eriophyes prunandersoni* K.

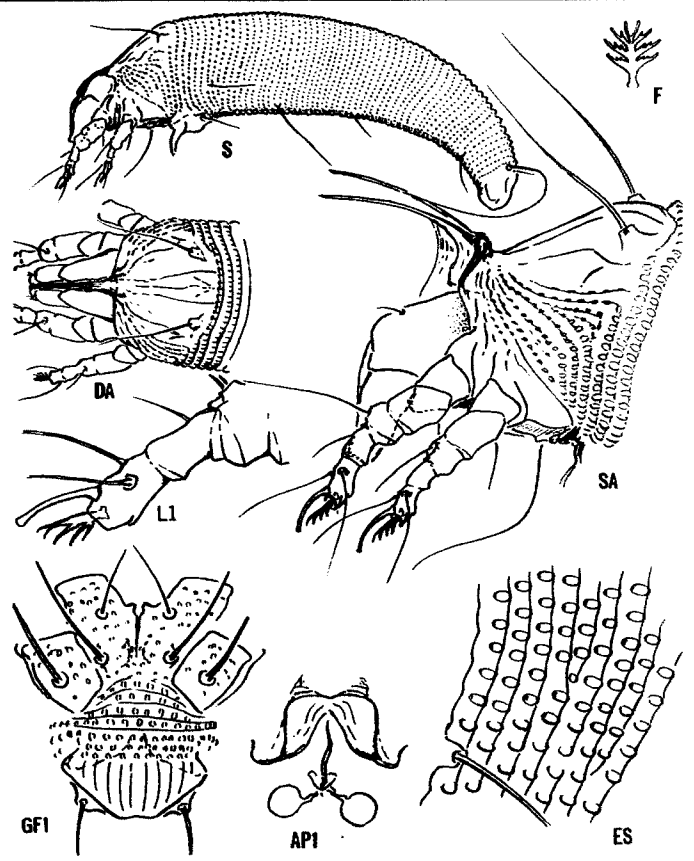


PLATE 11-10. *Eriophyes heteromeles* K.

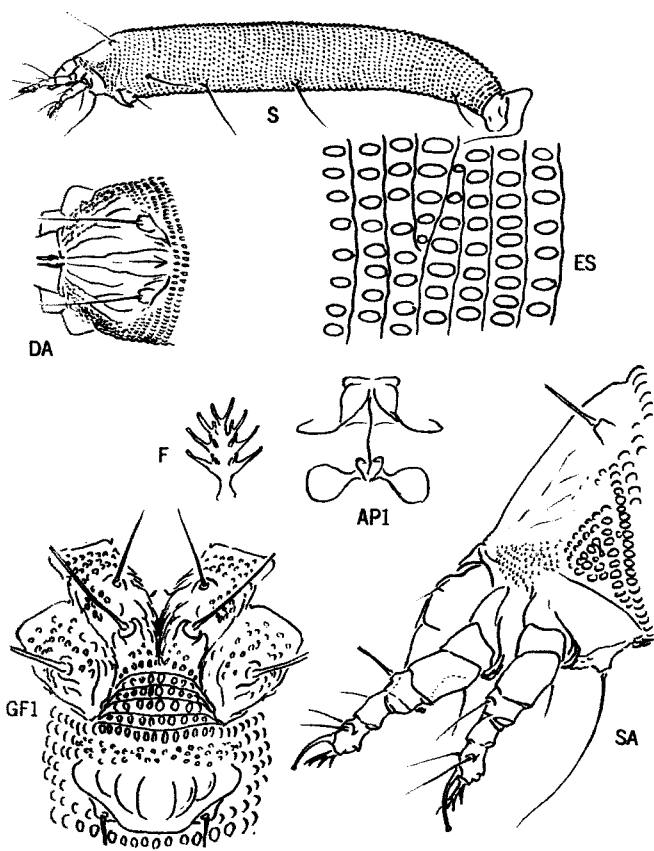


PLATE 11-11. *Eriophyes tiliae* (Pgst.)

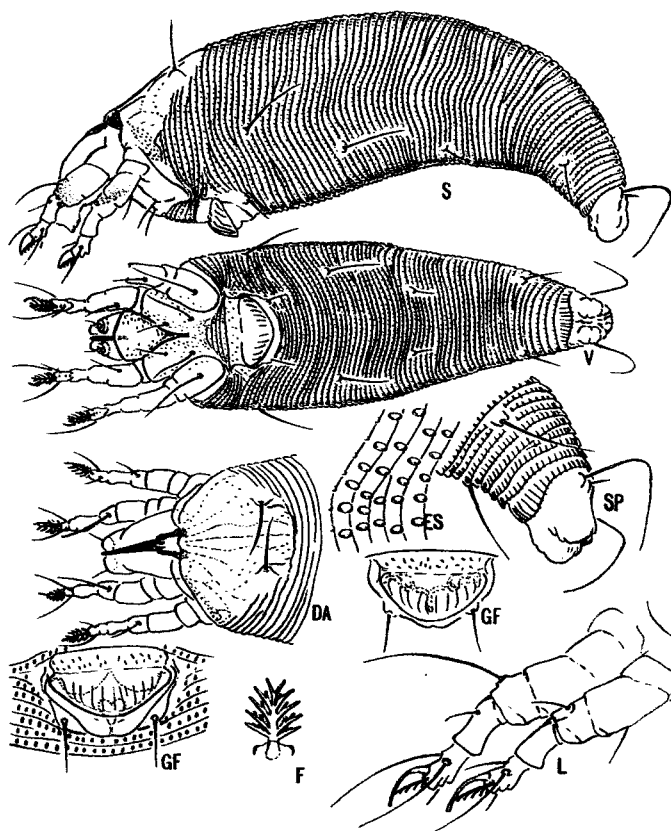


PLATE 11-12. *Eriophyes convolvens* (Nal.)

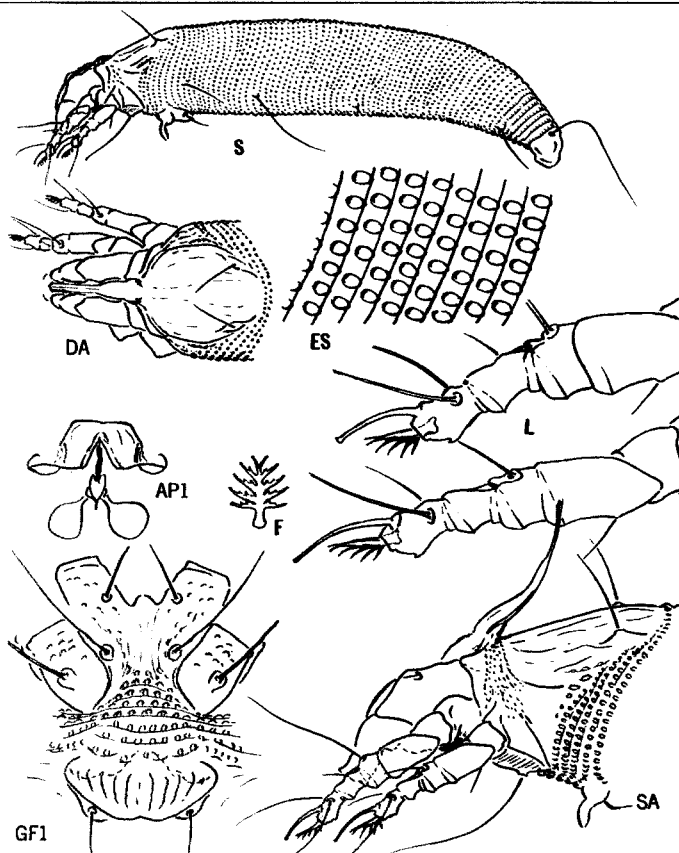


PLATE 11-13. *Eriophyes wisteriae* K.

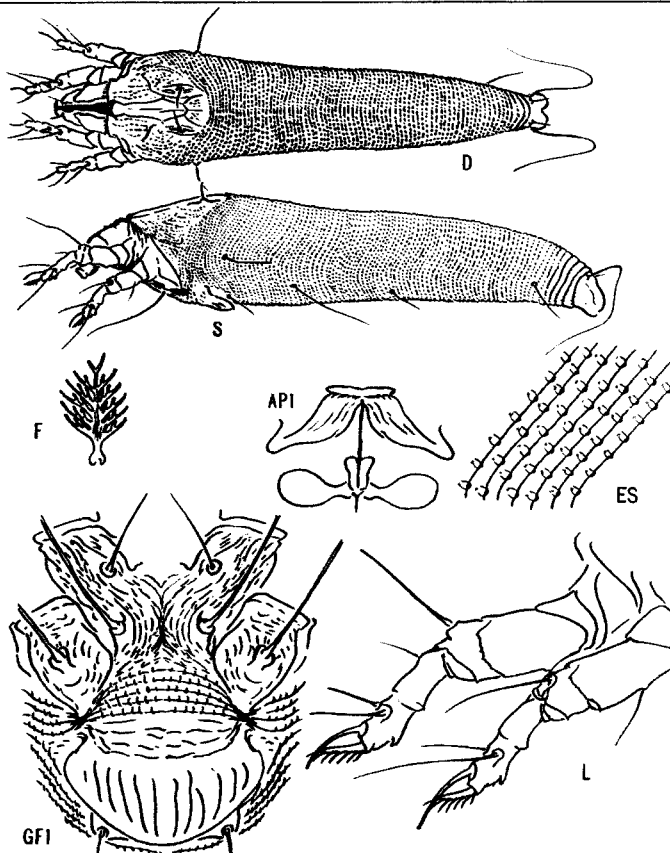


PLATE 11-14. *Eriophyes caricis* K.

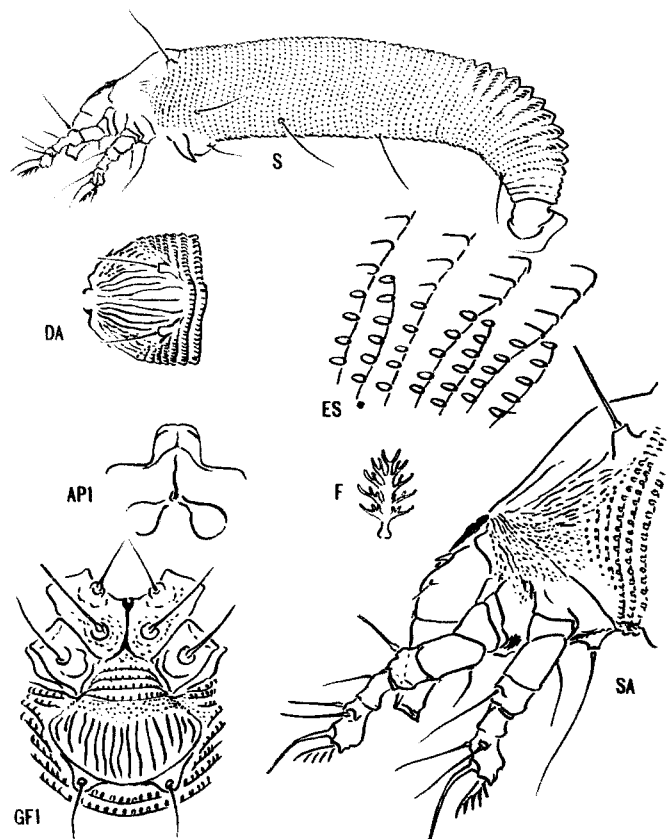


PLATE 12-1. *Pareria fremontiae* K.

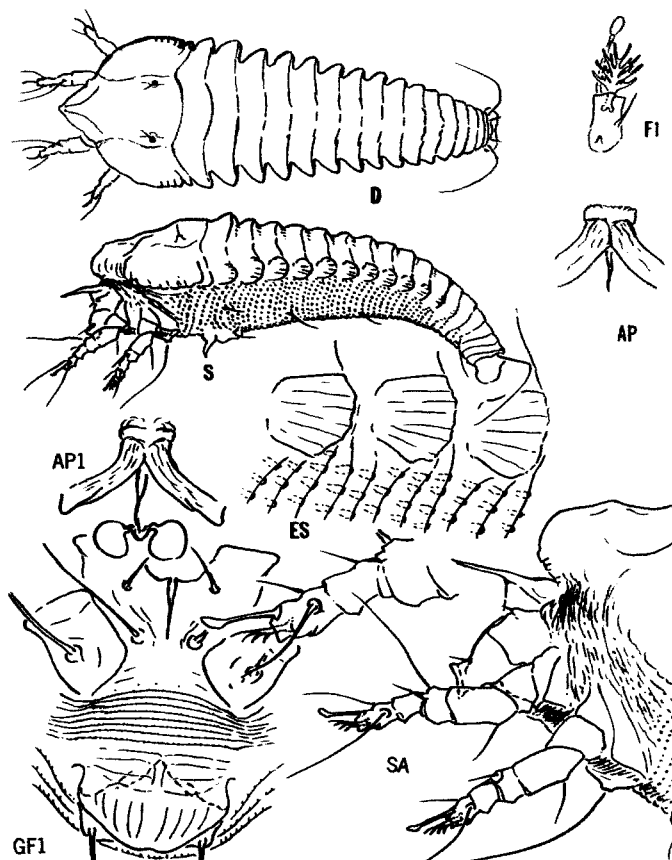


PLATE 13-1. *Oxypleurites depressus* Nal.

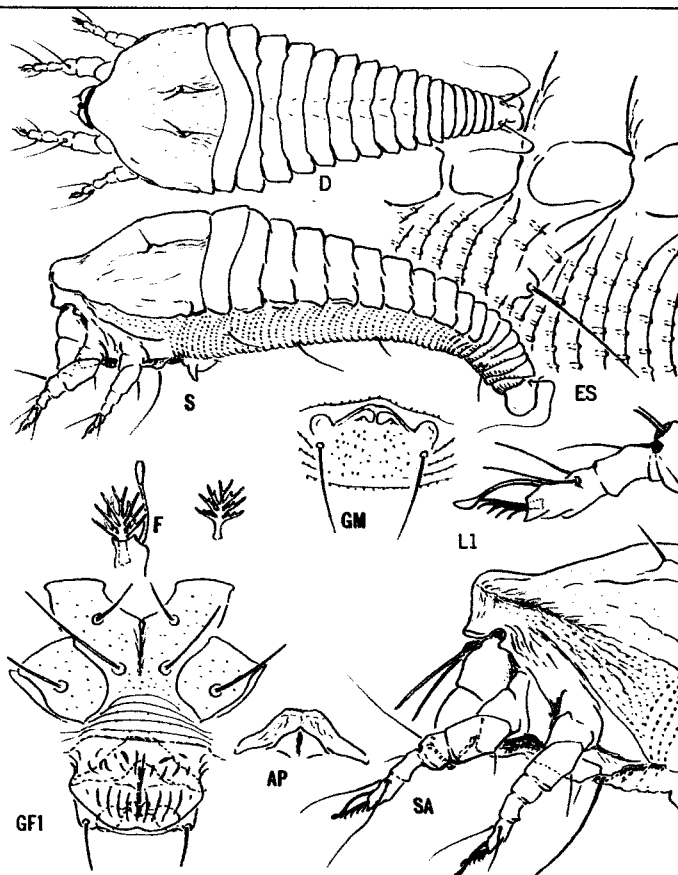


PLATE 13-2. *Oxypleurites marinalni* K.

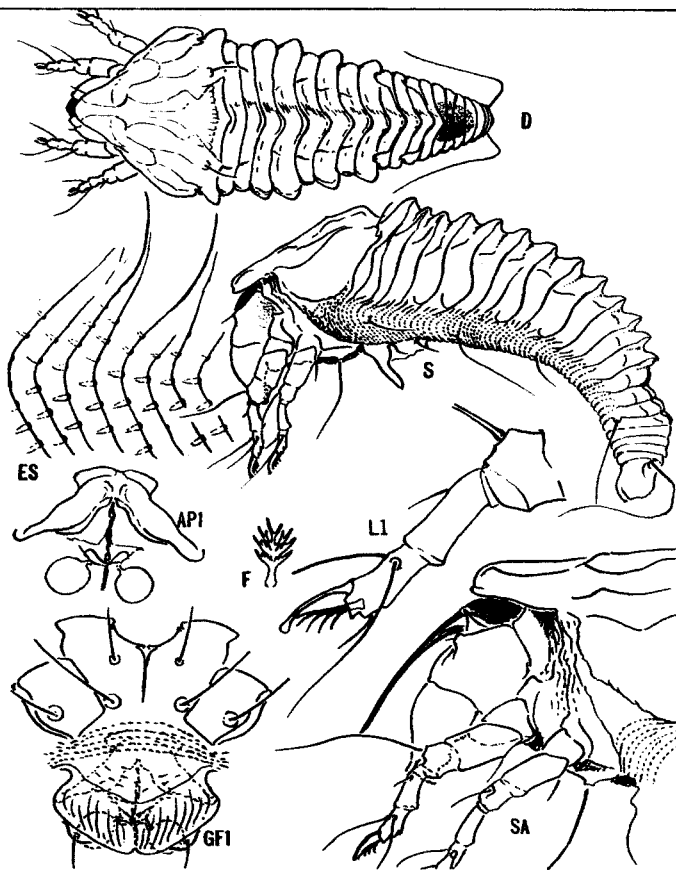


PLATE 13-3. *Oxypleurites maxwelli* K.

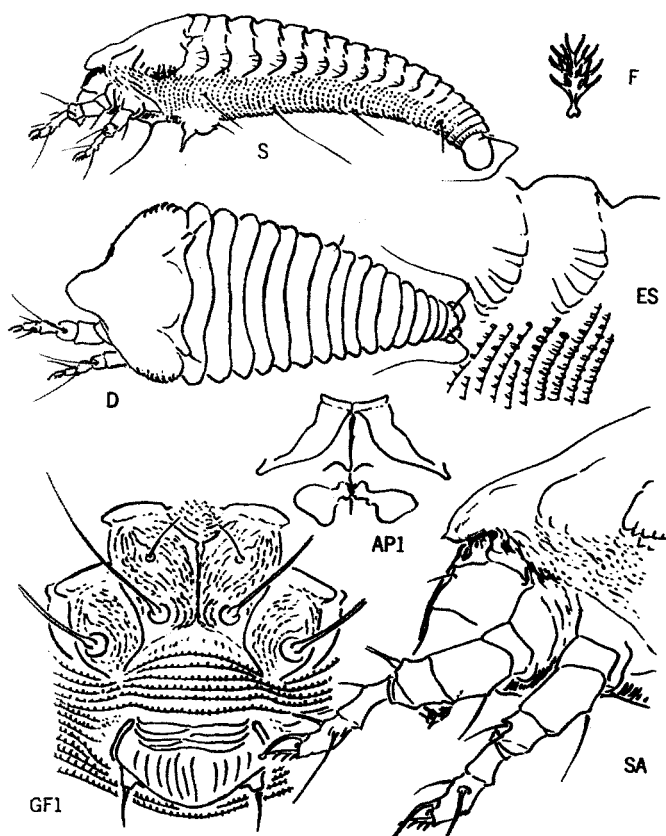


PLATE 13-4. *Oxypleurites juglandis* K.

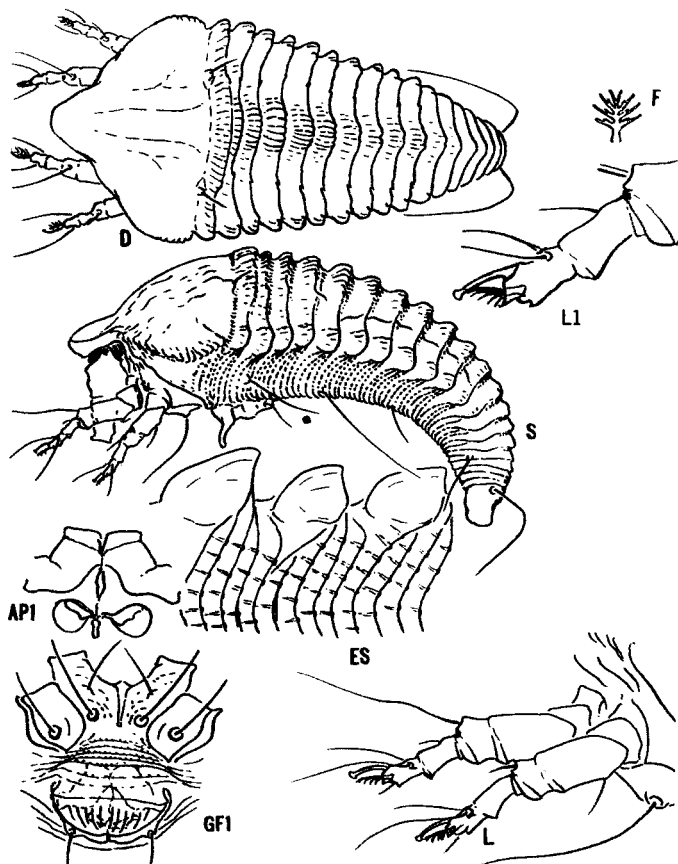


PLATE 13-5. *Oxypleurites baccharis* K.

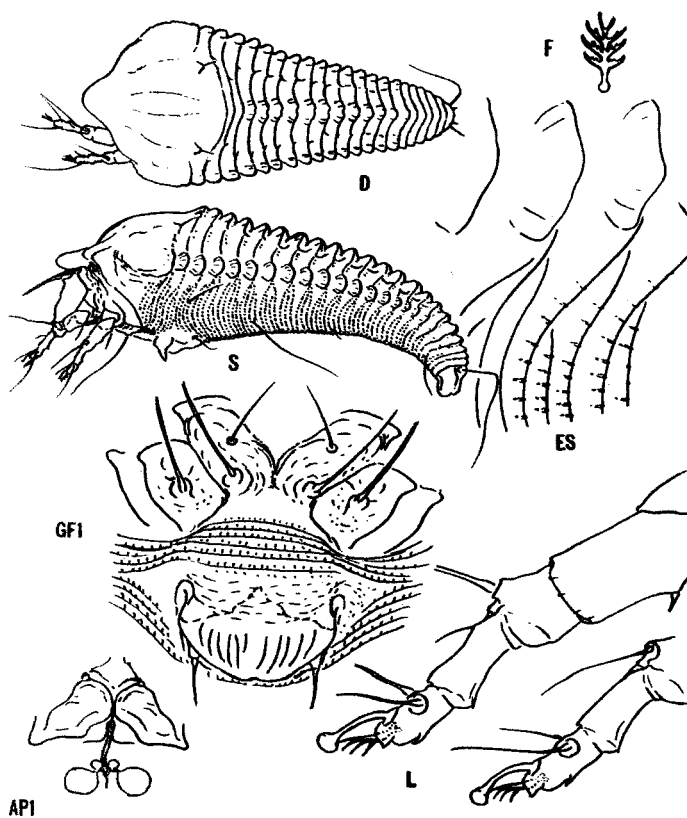


PLATE 13-6. *Oxypleurites acidotus* K.

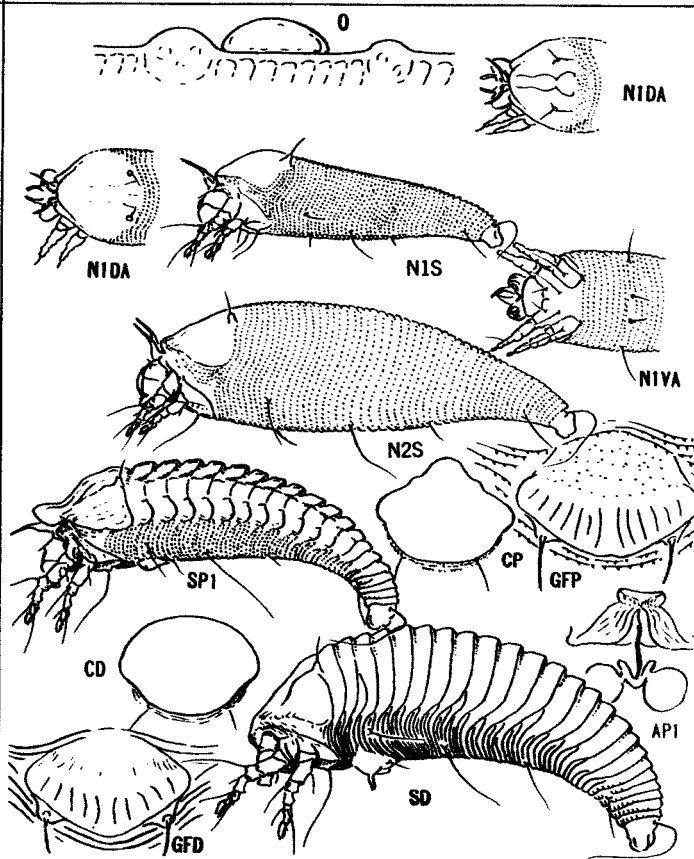


PLATE 13-7. *Oxypleurites aesculifoliae* (K.)

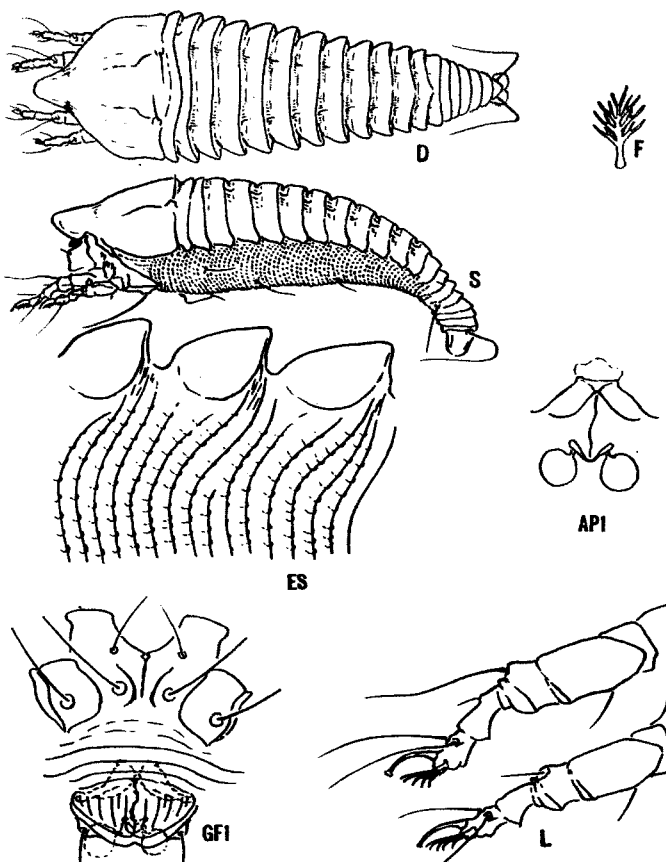


PLATE 13-8. *Oxypleurites cornifoliae* K.

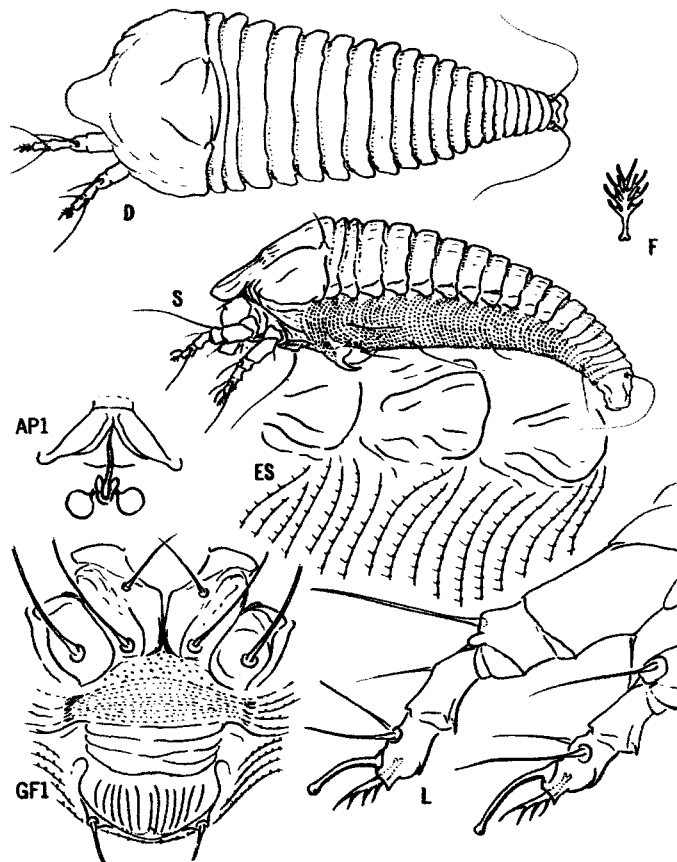


PLATE 13-9. *Oxypleurites glabratae* K.

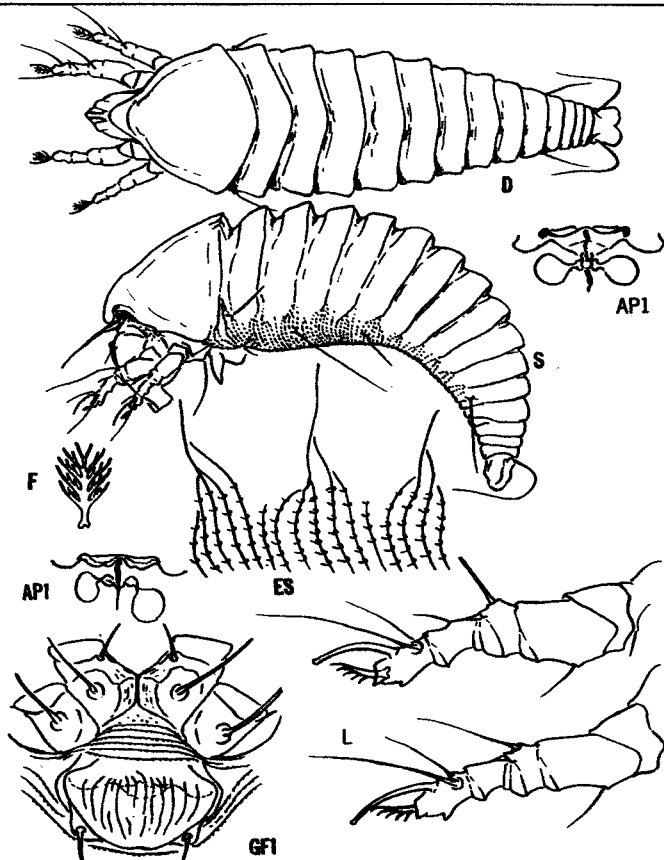


PLATE 14-1. *Coptophylla lamimani* (K.)

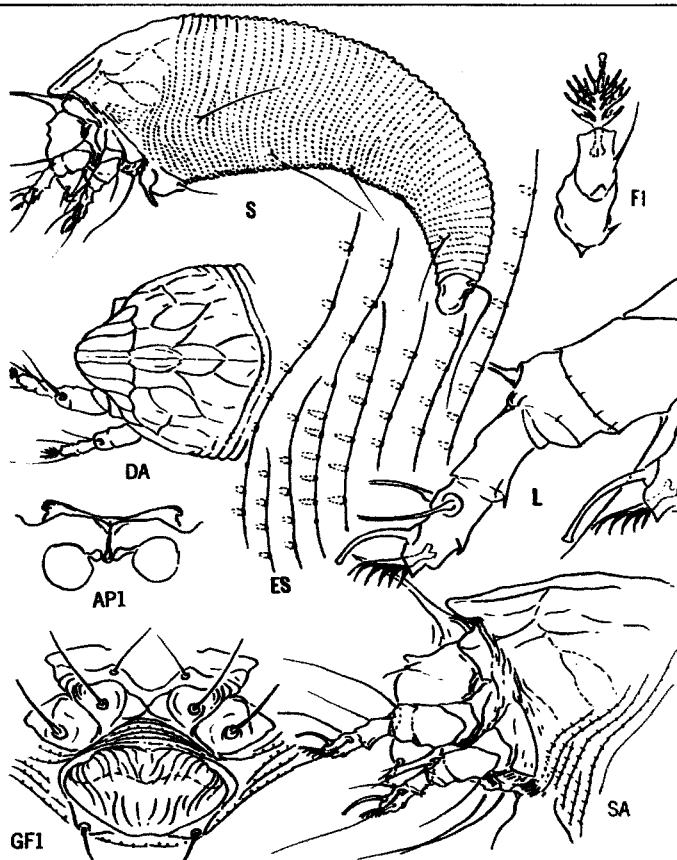


PLATE 14-2. *Coptophylla arbuti* (K.)

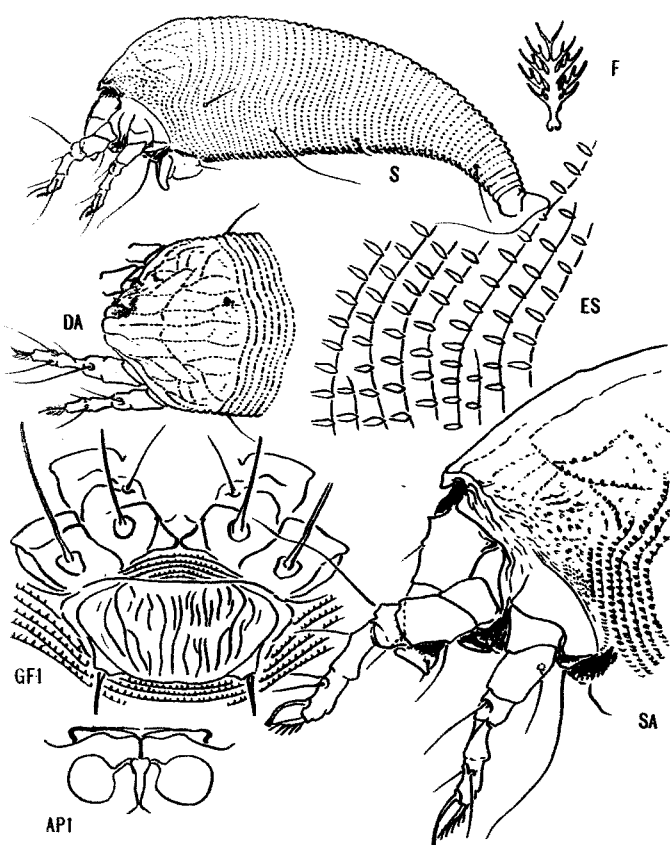


PLATE 14-3. *Coptophylla caliquerici* K.

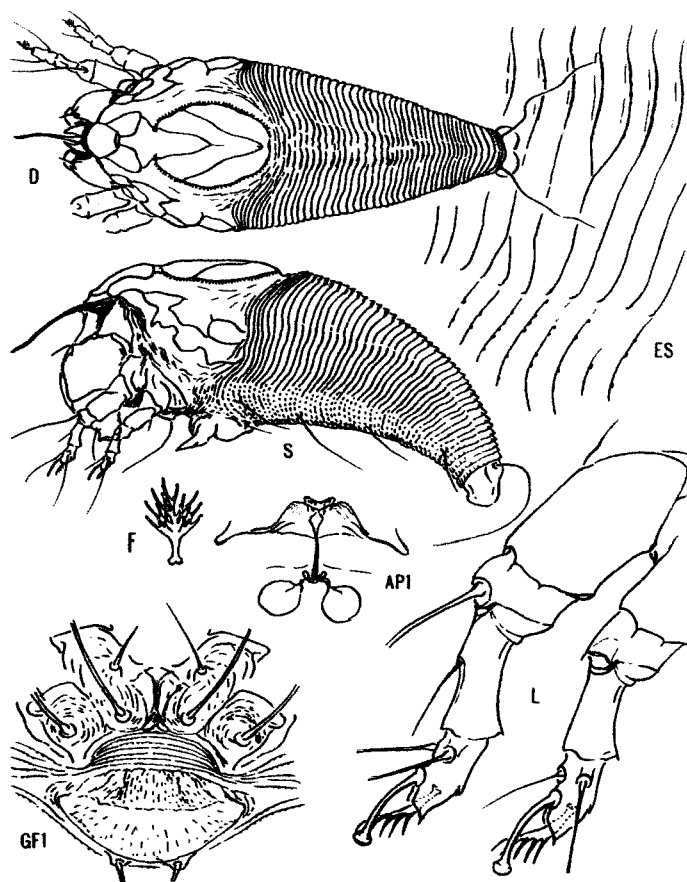


PLATE 15-1. *Calacarus pulviferus* K.

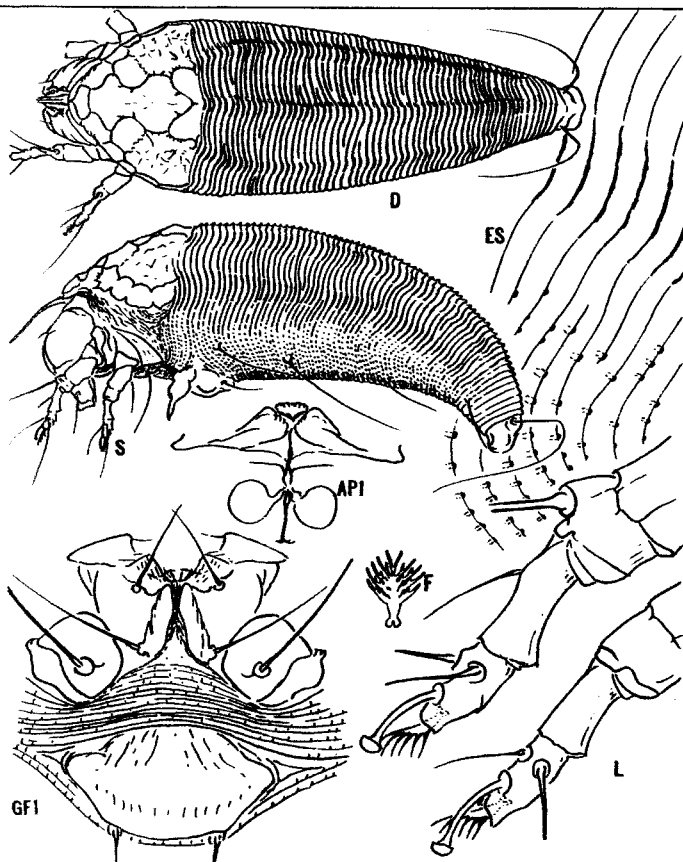


PLATE 15-2. *Calacarus adornatus* (K.)

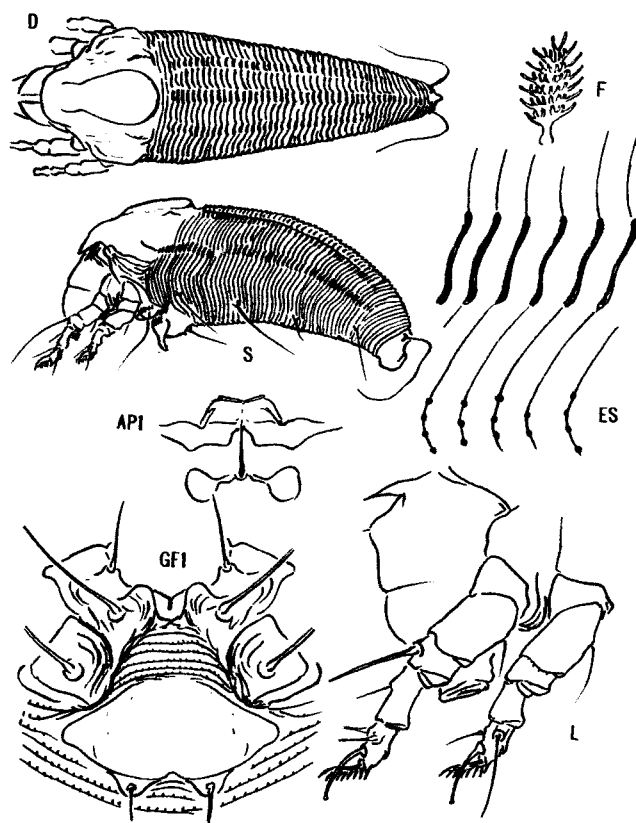


PLATE 15-3. *Calacarus tejonis* K.

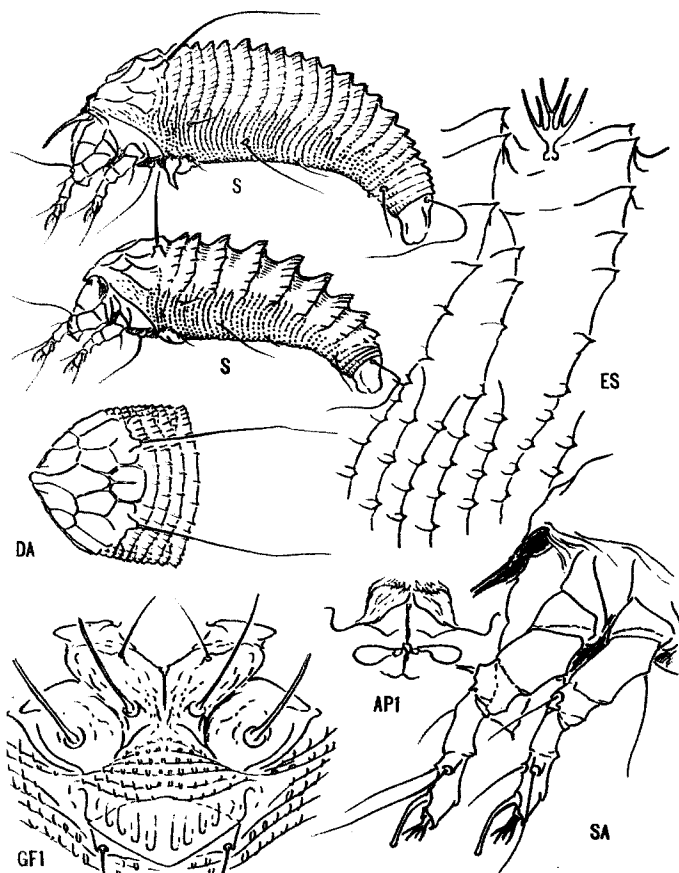


PLATE 16-1. *Anthocoptes punctidorsa* K.

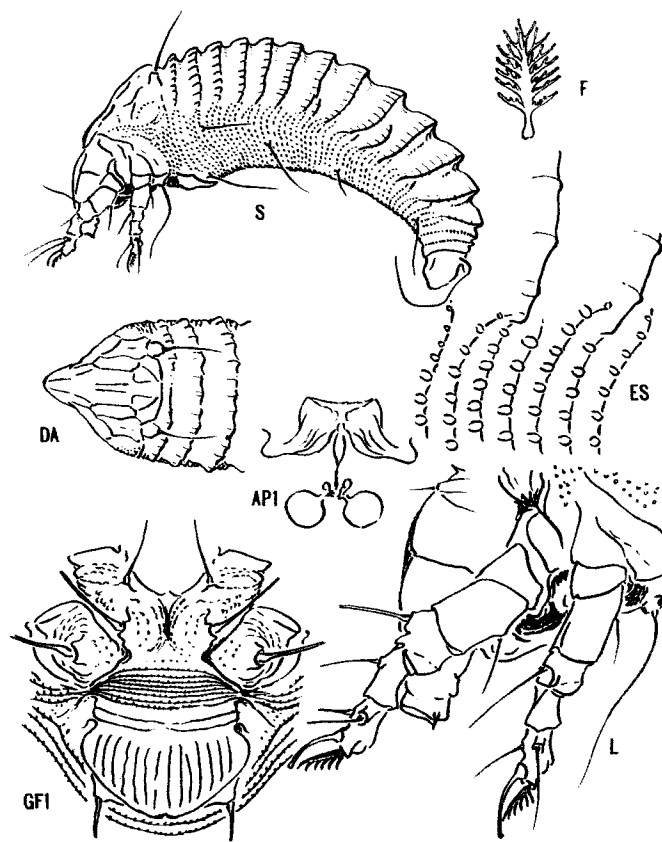


PLATE 16-2. *Anthocoptes pickeringiae* K.

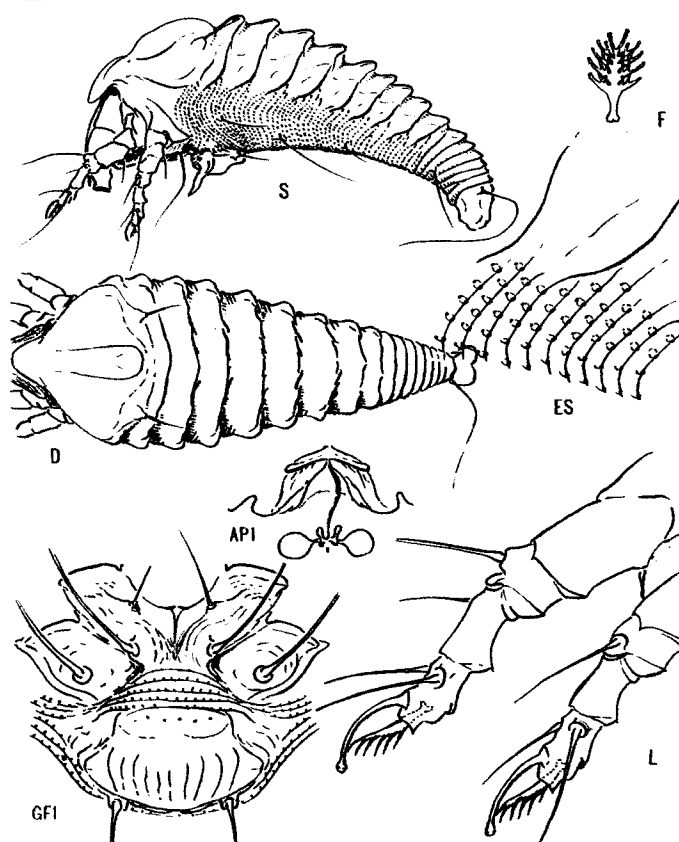


PLATE 16-3. *Anthocoptes hesperus* K.

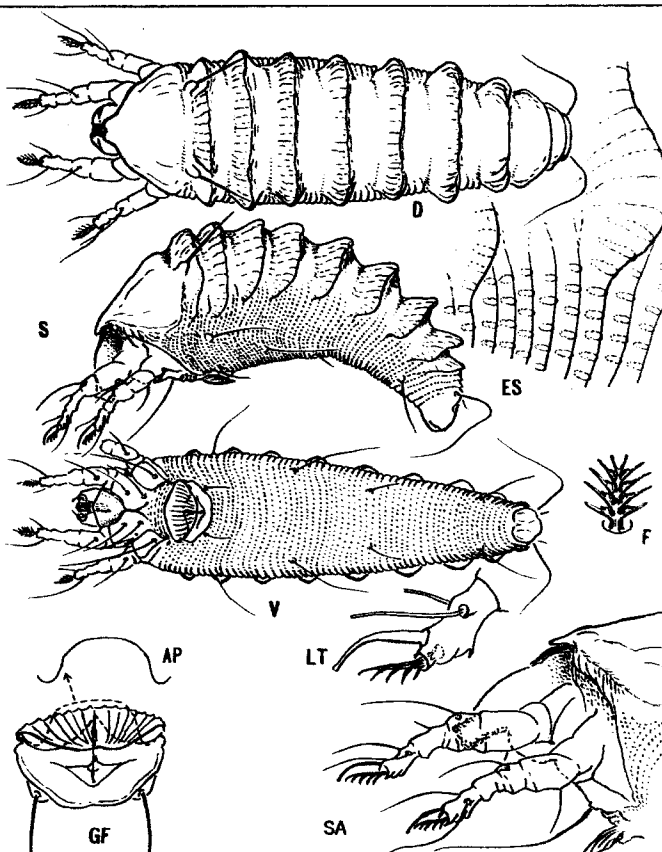


PLATE 16-4. *Anthocoptes ericameriella* K.

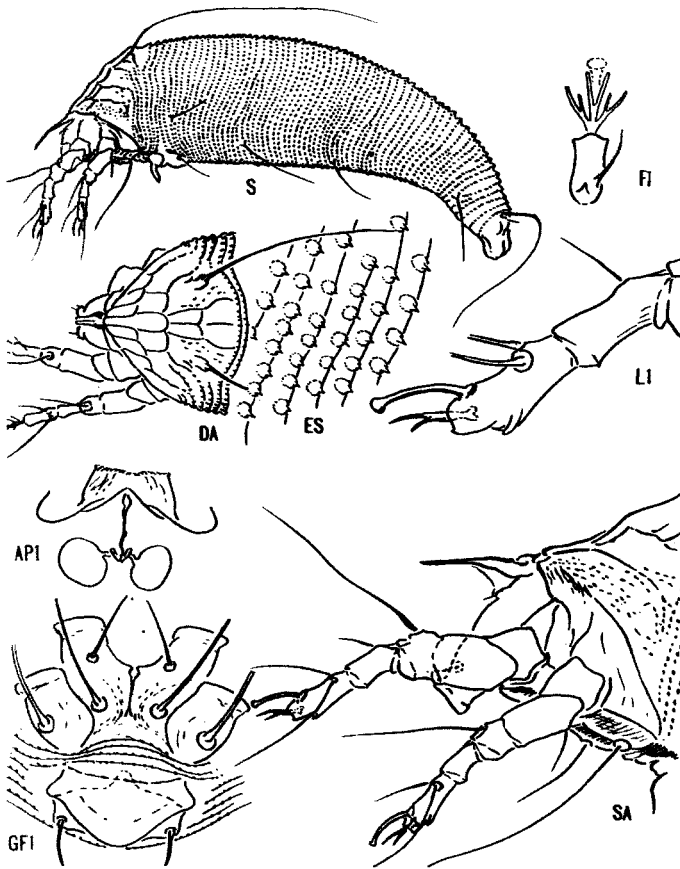


PLATE 17-1. *Vasates calulmi* (K.)

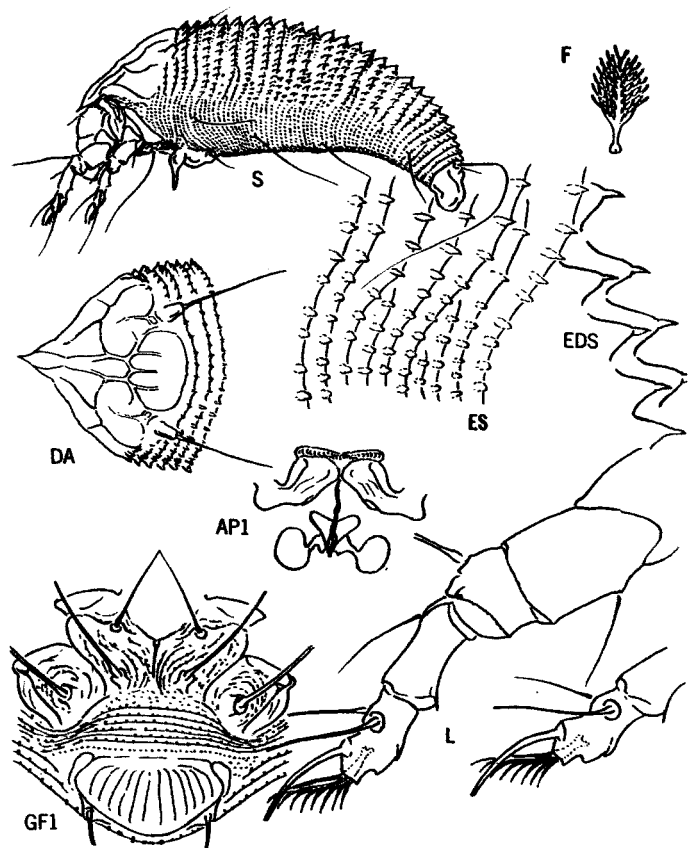


PLATE 17-2. *Vasates prosopis* (K.)

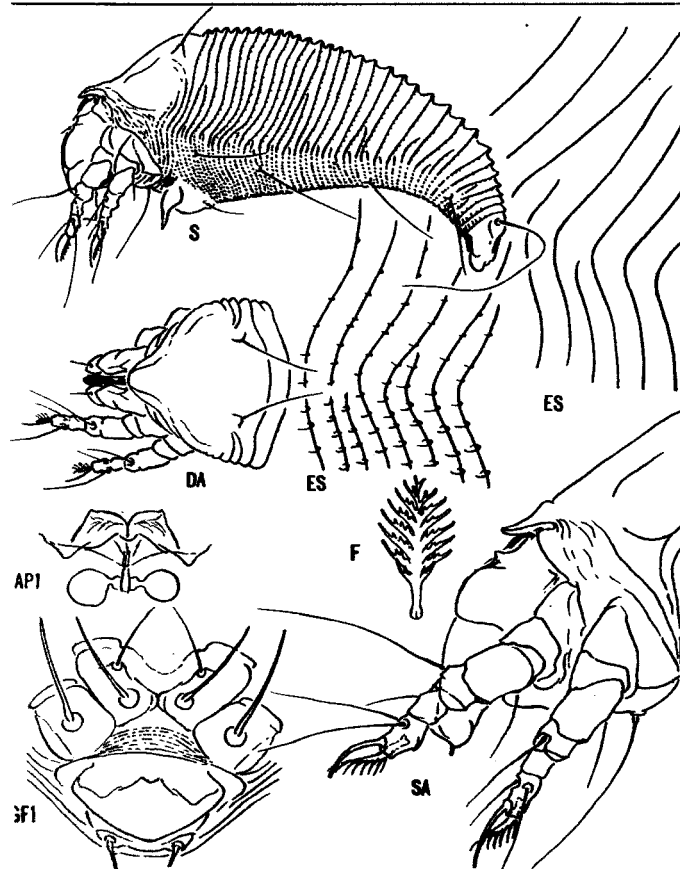


PLATE 17-3. *Vasates immigrans* (K.)

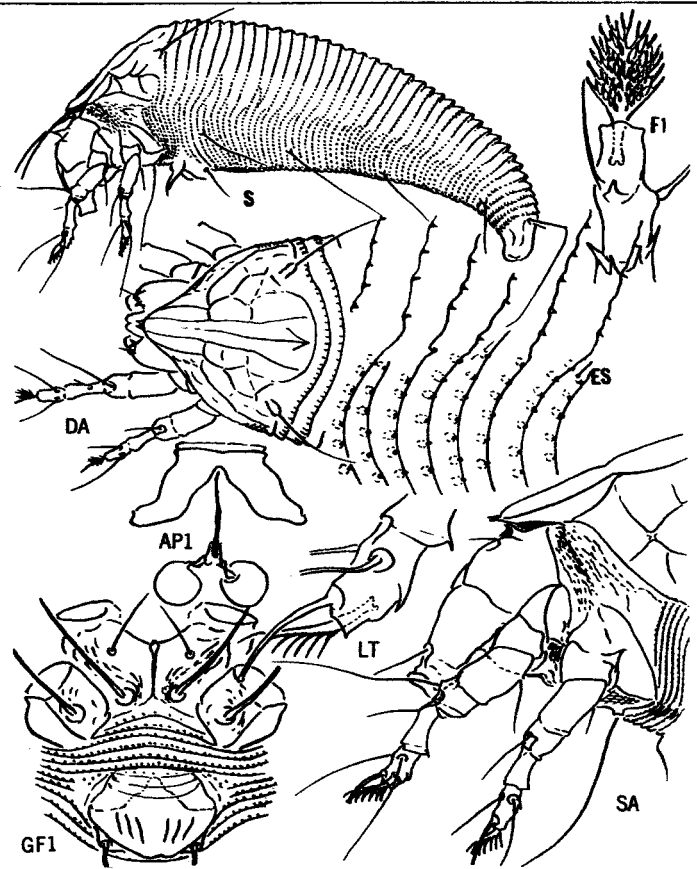


PLATE 17-4. *Vasates symphoricarpi* (K.)

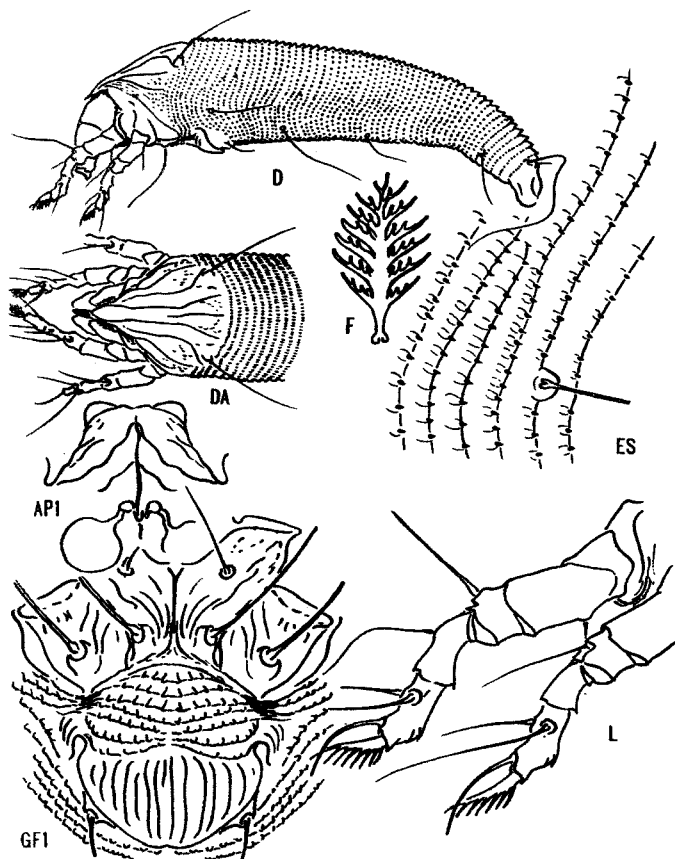


PLATE 17-5. *Vasates mckenziei* K.

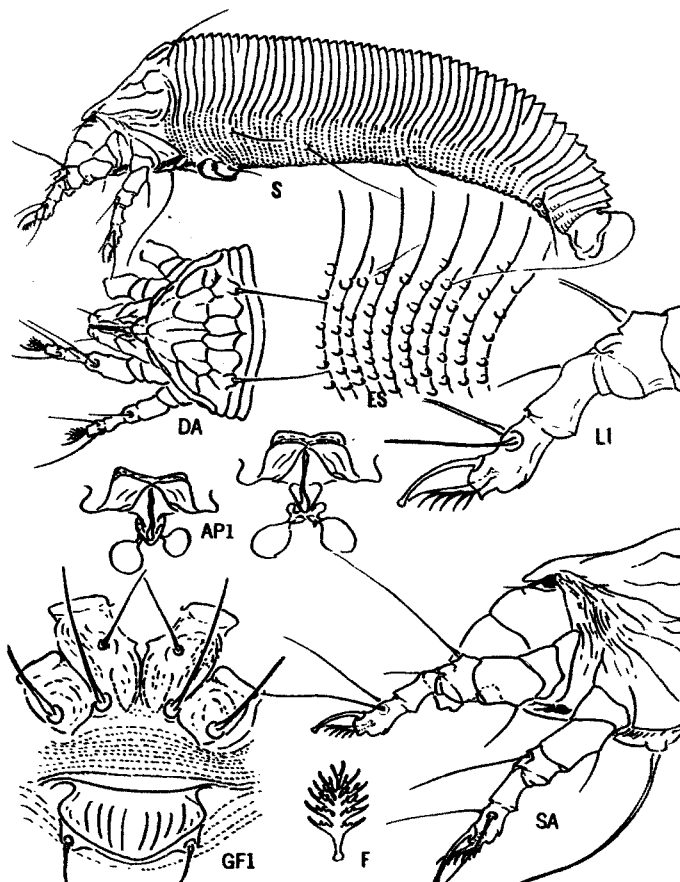


PLATE 17-6. *Vasates scotti* (K.)

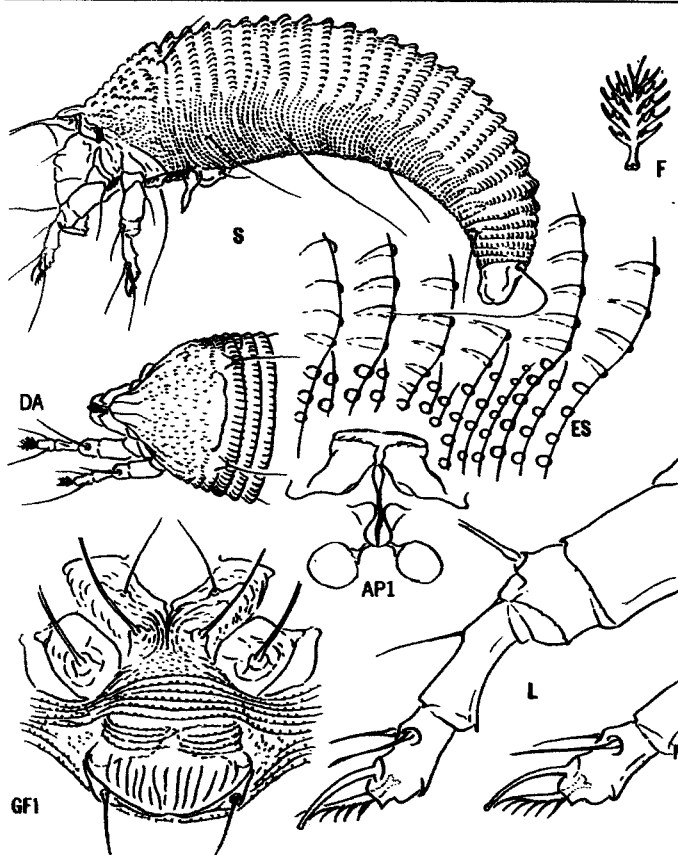


PLATE 17-7. *Vasates magnolivora* (K.)

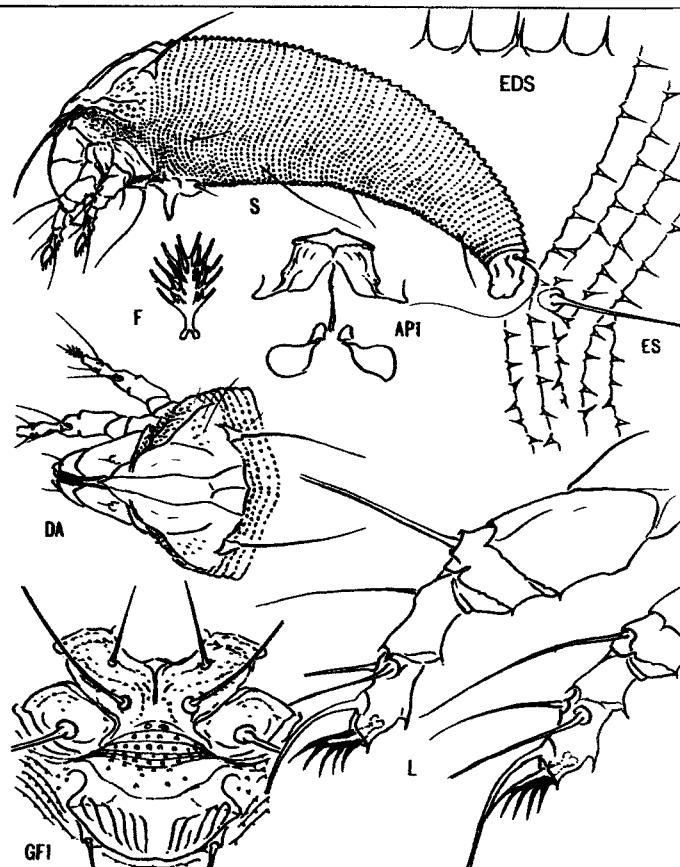


PLATE 17-8. *Vasates manzanitae* (K.)

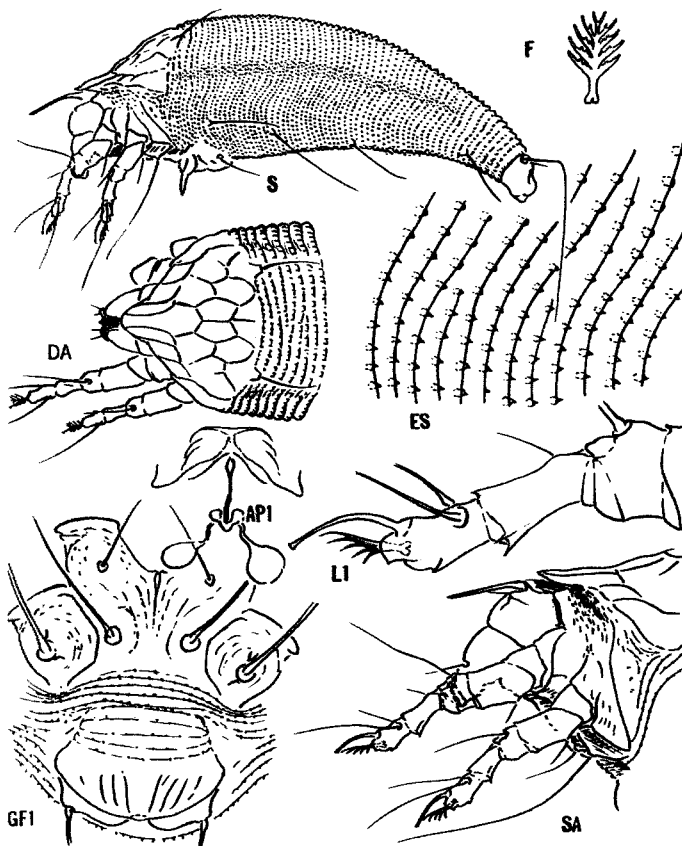


PLATE 17-9. *Vasates cotyledonis* (K.)

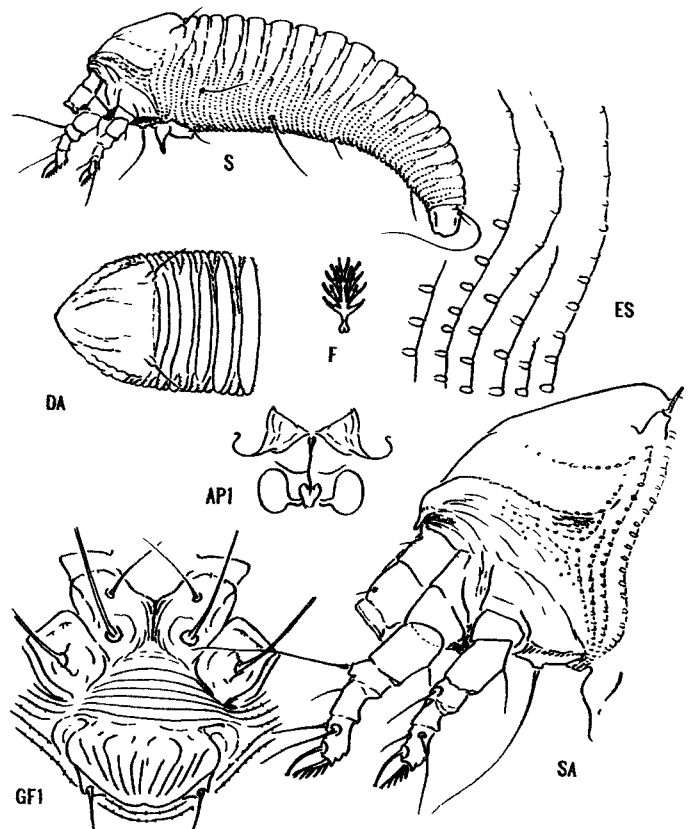


PLATE 17-10. *Vasates ambrosiae* (K.)

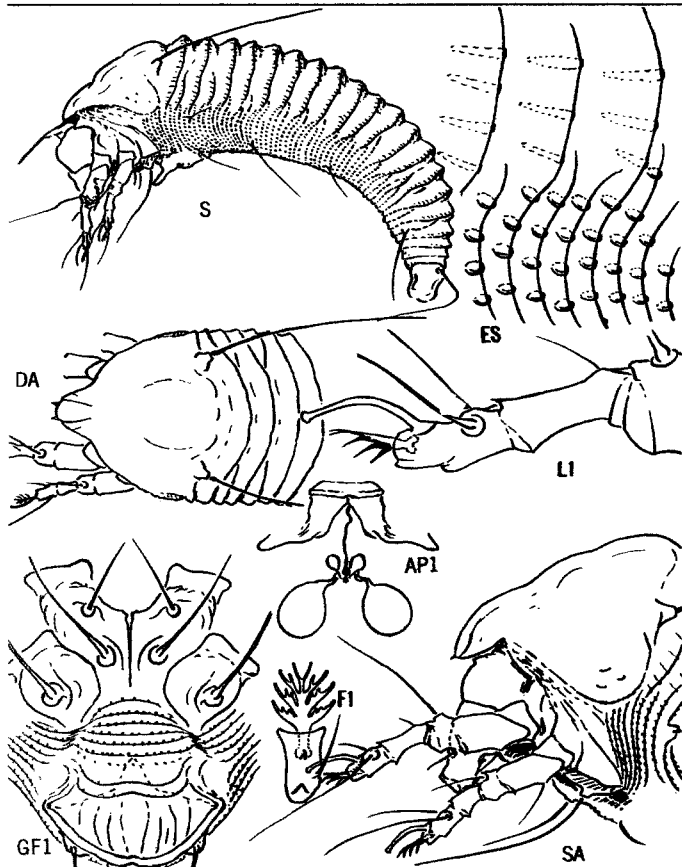


PLATE 17-11. *Vasates tamalpais* (K.)

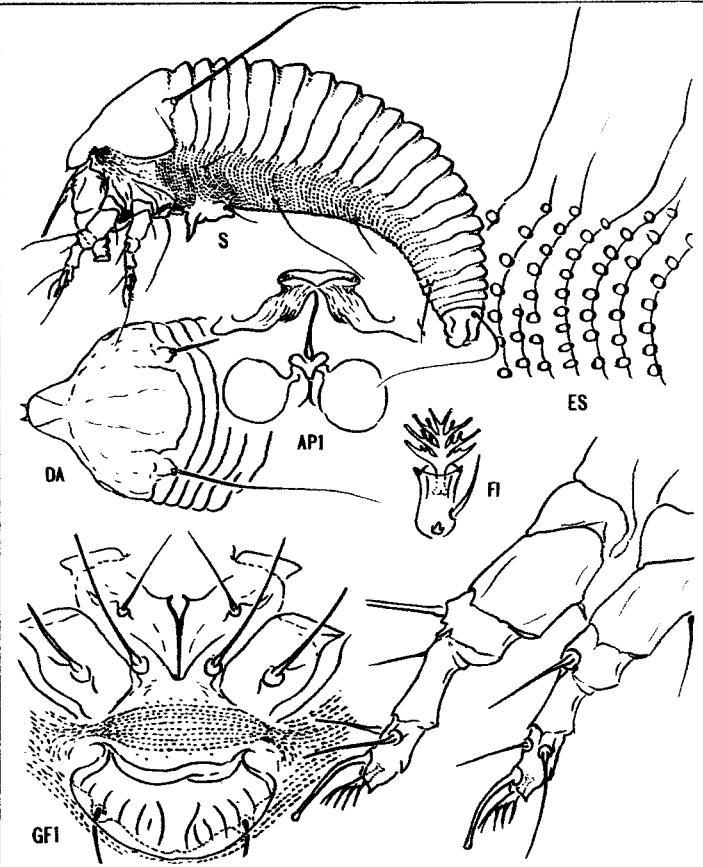


PLATE 17-12. *Vasates rhododendronis* (K.)

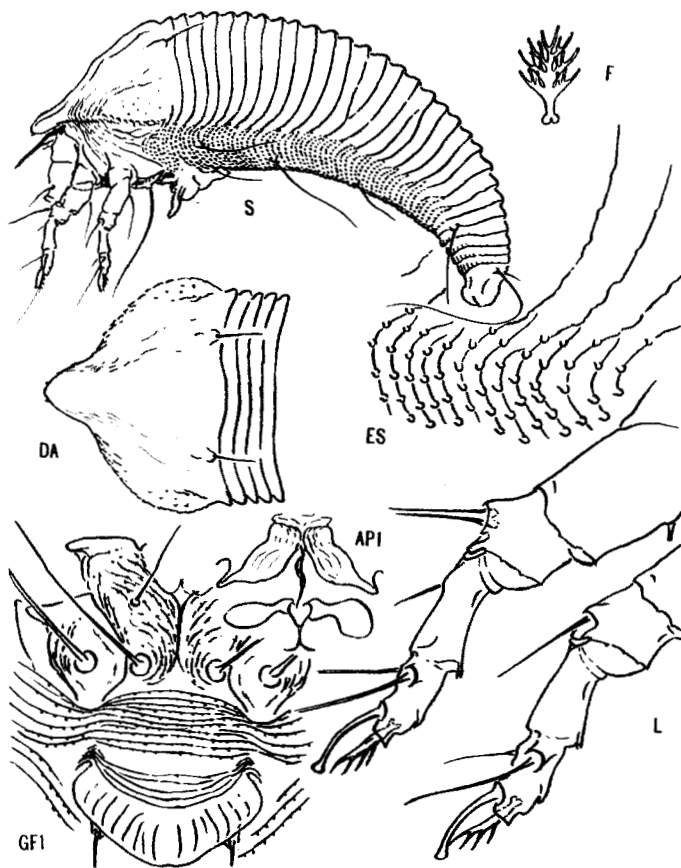


PLATE 17-13. *Vasates eurynotus* (Nal.)

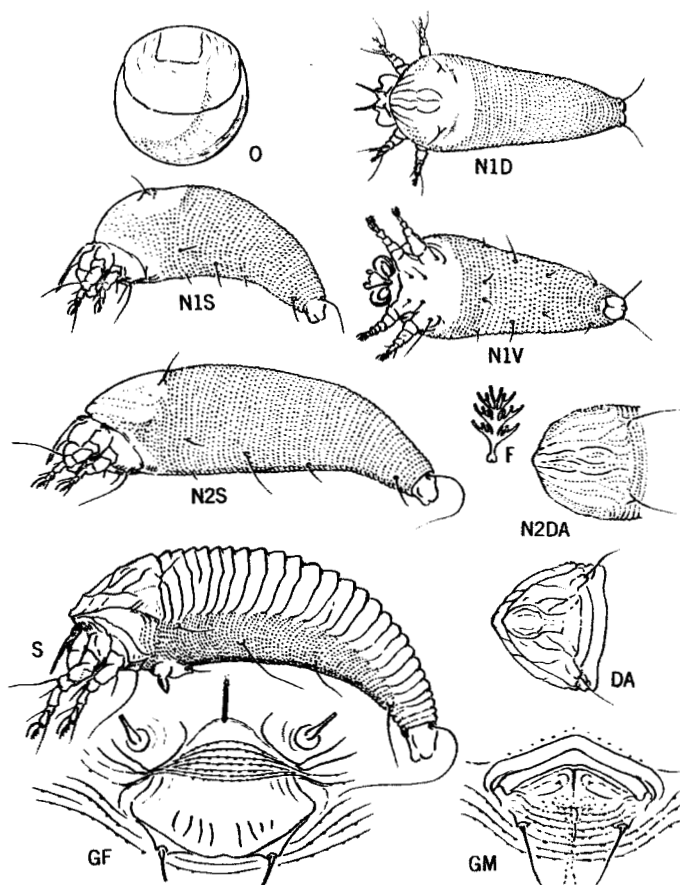


PLATE 17-14. *Vasates destructor* (K.)

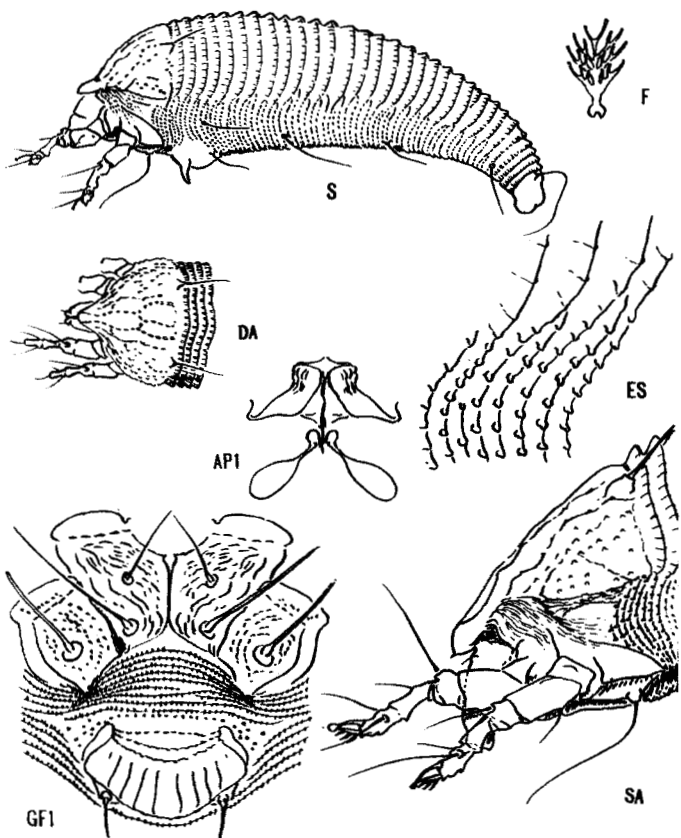


PLATE 17-15. *Vasates malivagrans* K.

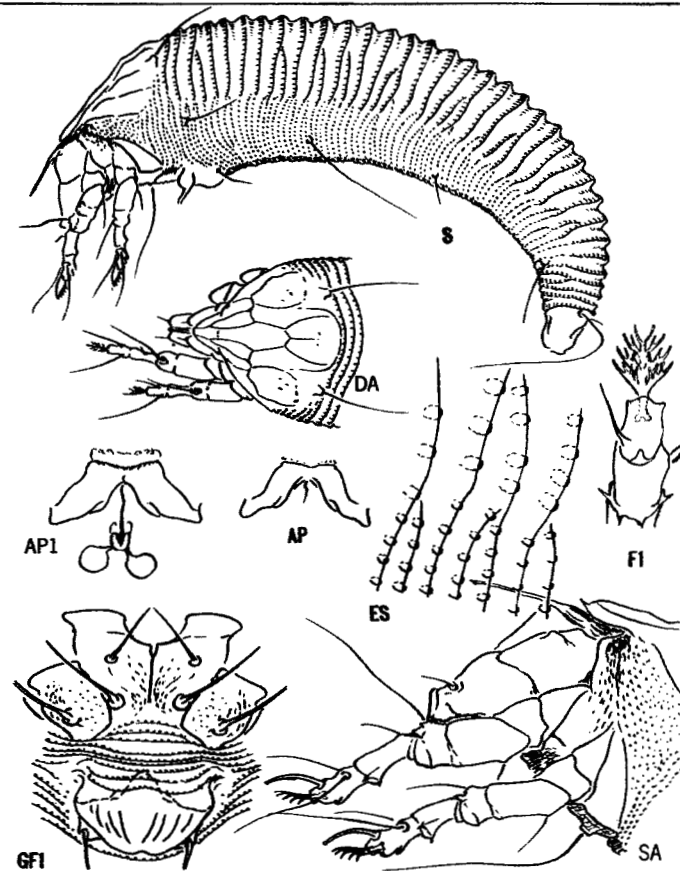


PLATE 17-16. *Vasates rhamnivagrans* (K.)

PLATE 17-18d. *Vasates cornutus* - deutogyne

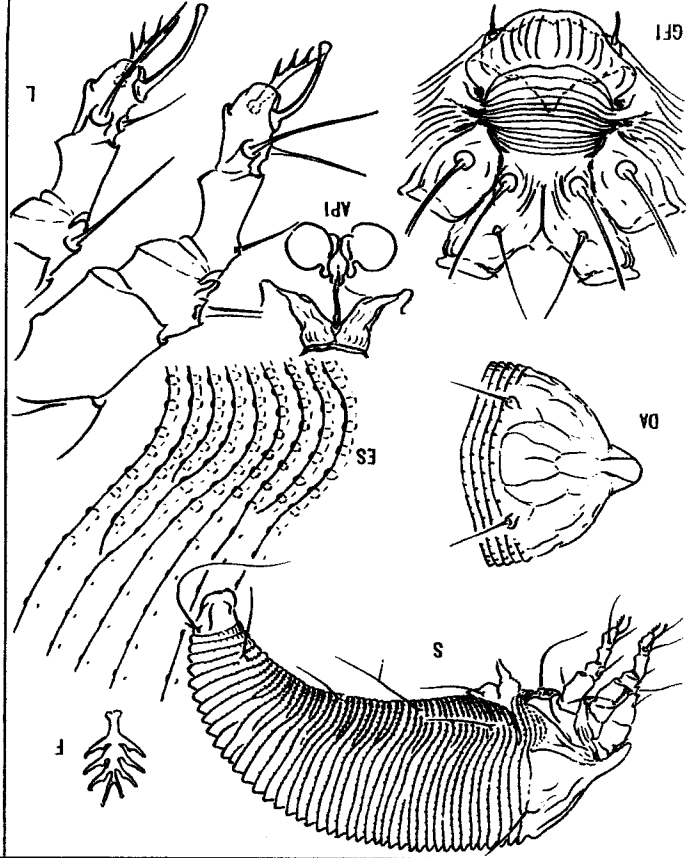


PLATE 17-20. *Vasates paraglabri* K.

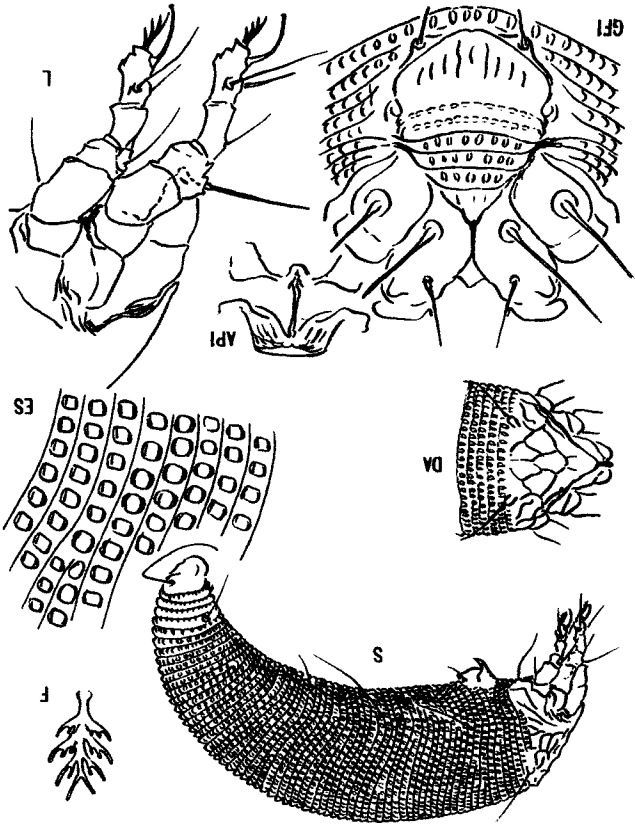


PLATE 17-17. *Vasates ligustri* (K.)

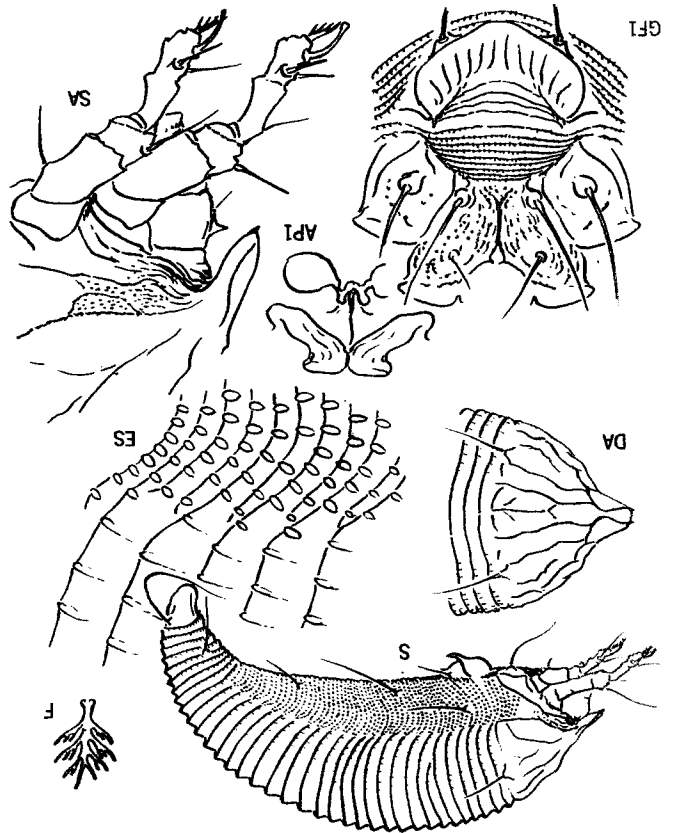
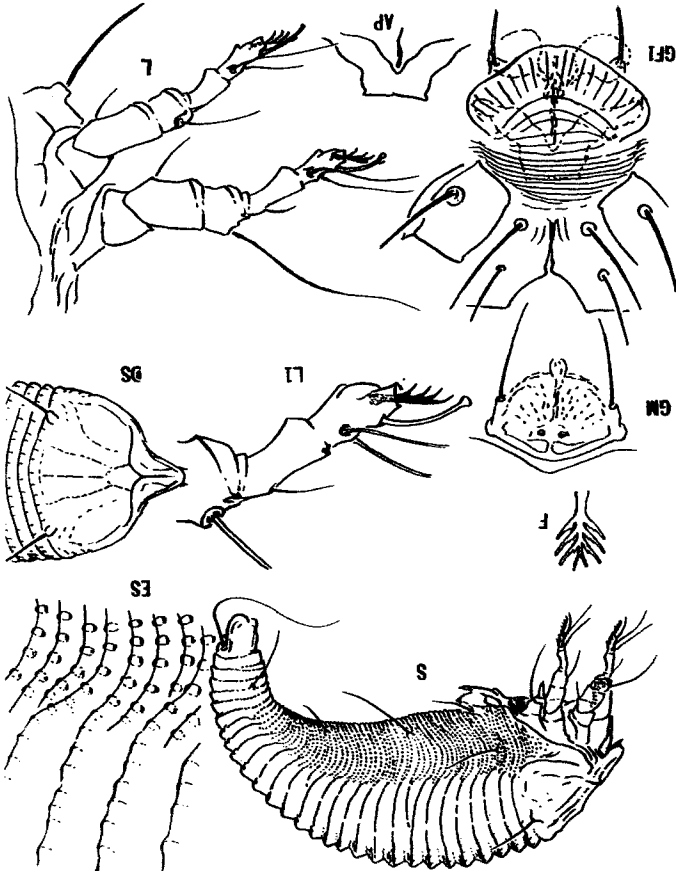


PLATE 17-18. *Vasates cornutus* (Banks)



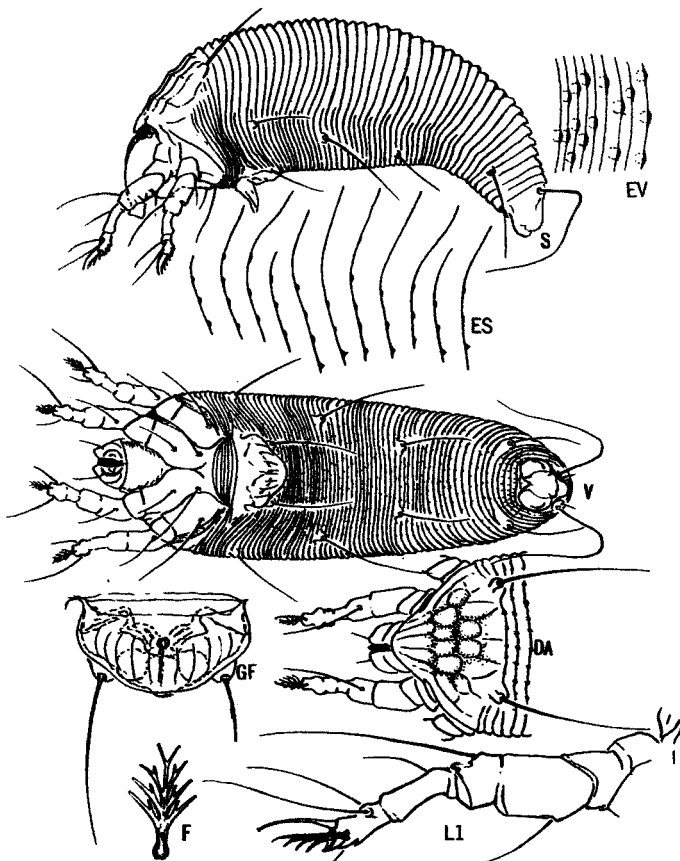


PLATE 17-21. *Vasates laevigatae* (Hassan)

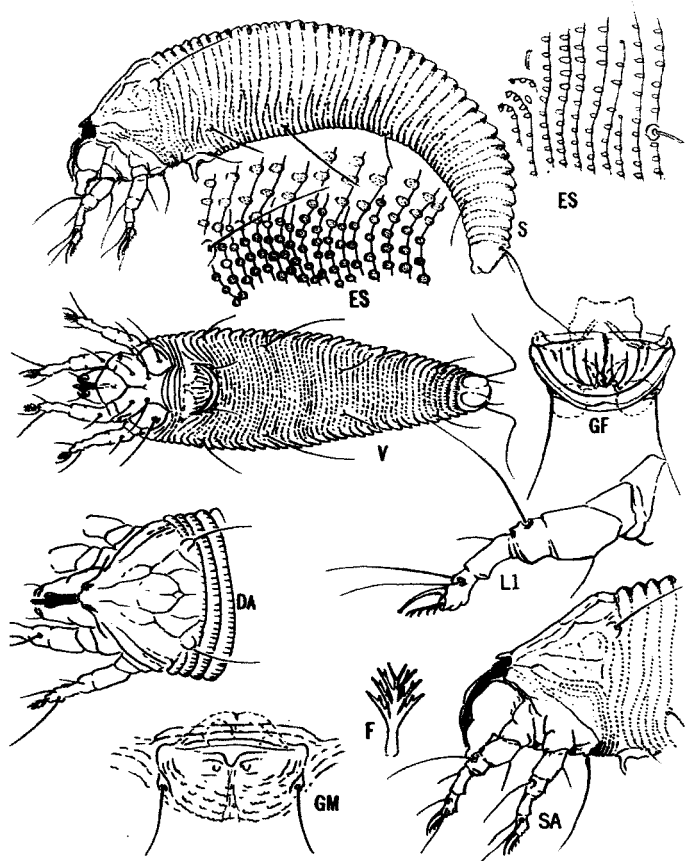


PLATE 17-22. *Vasates toxicophagus* (Ewing)

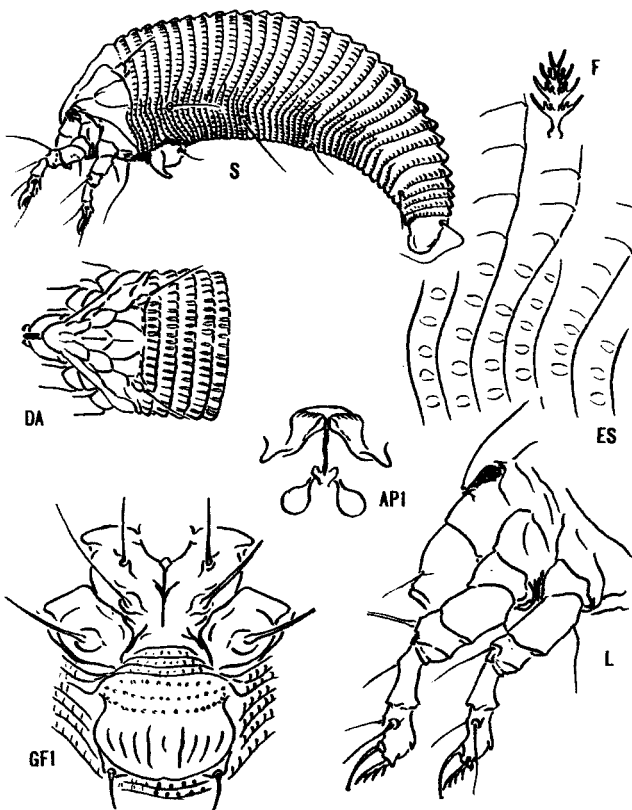


PLATE 17-23. *Vasates glabri* K.

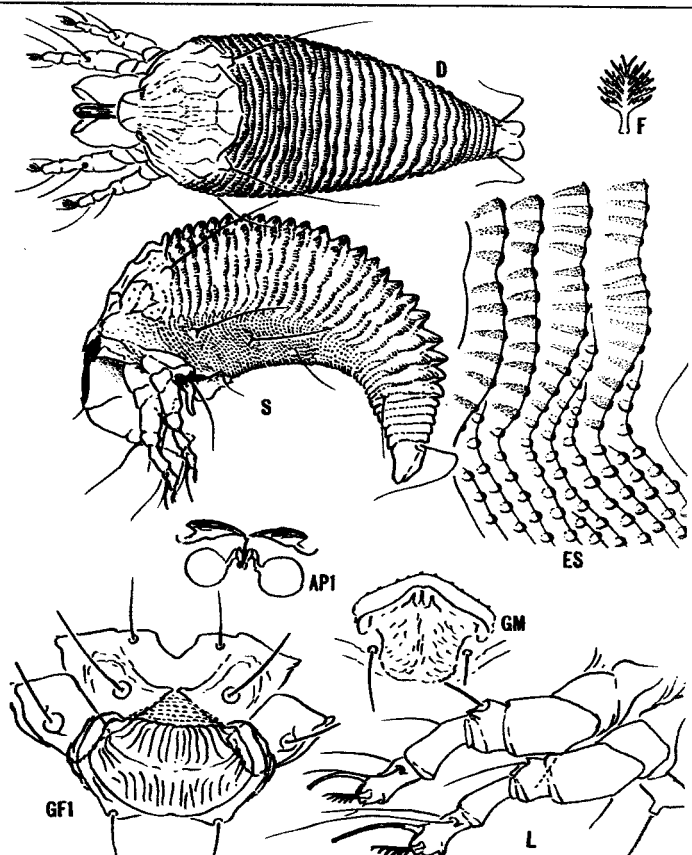


PLATE 18-1. *Gammaphytoptus camphorae* K.

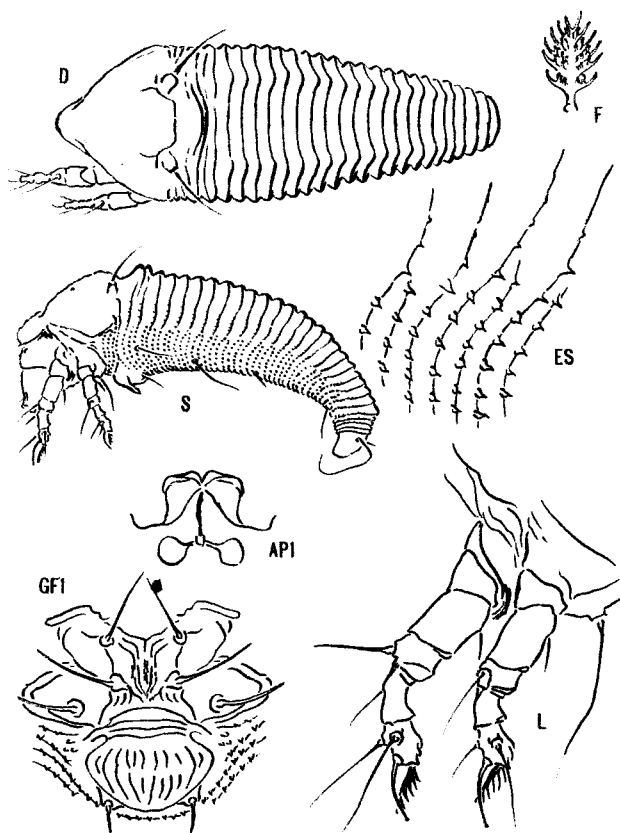


PLATE 19-1. *Tetra cercocarpi* K.

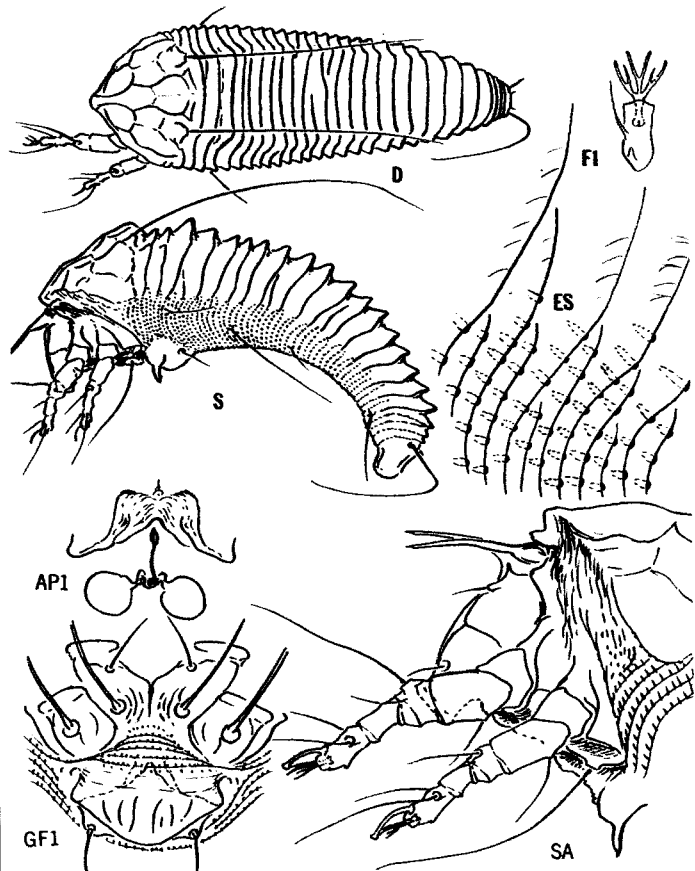


PLATE 19-2. *Tetra concava* (K.)

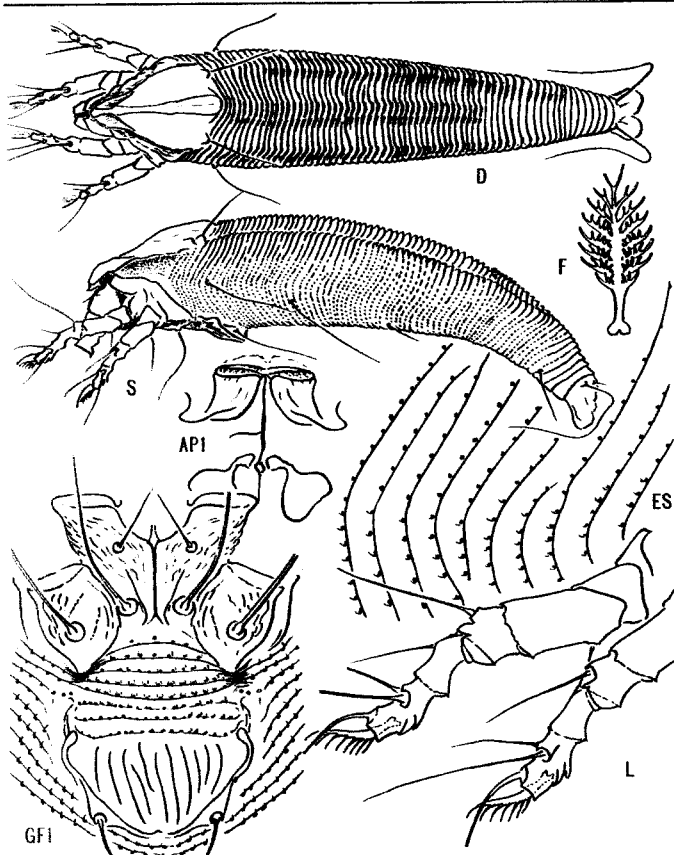


PLATE 20-1. *Abacarus hystrix* (Nal.)

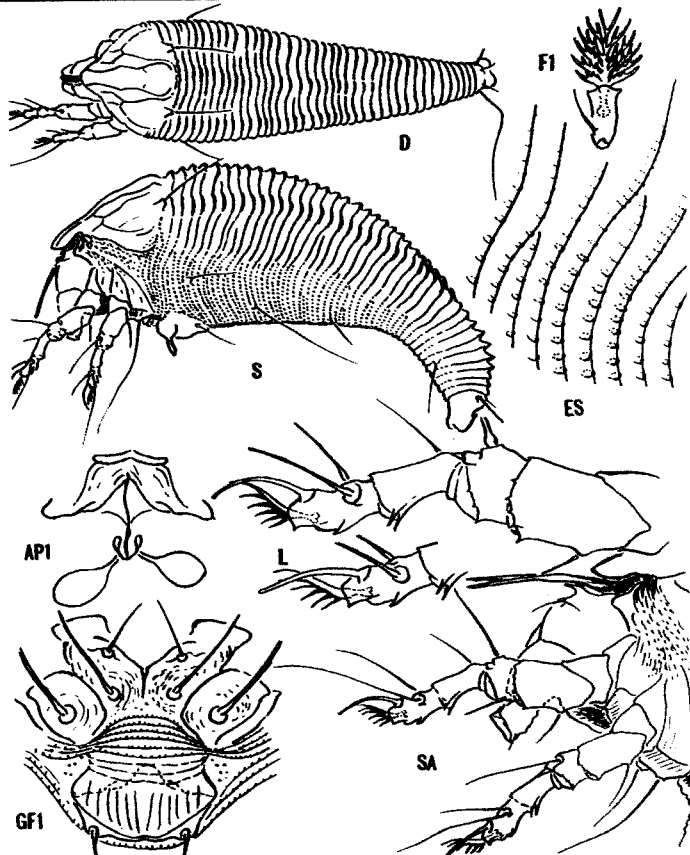


PLATE 20-2. *Abacarus acalyptus* (K.)

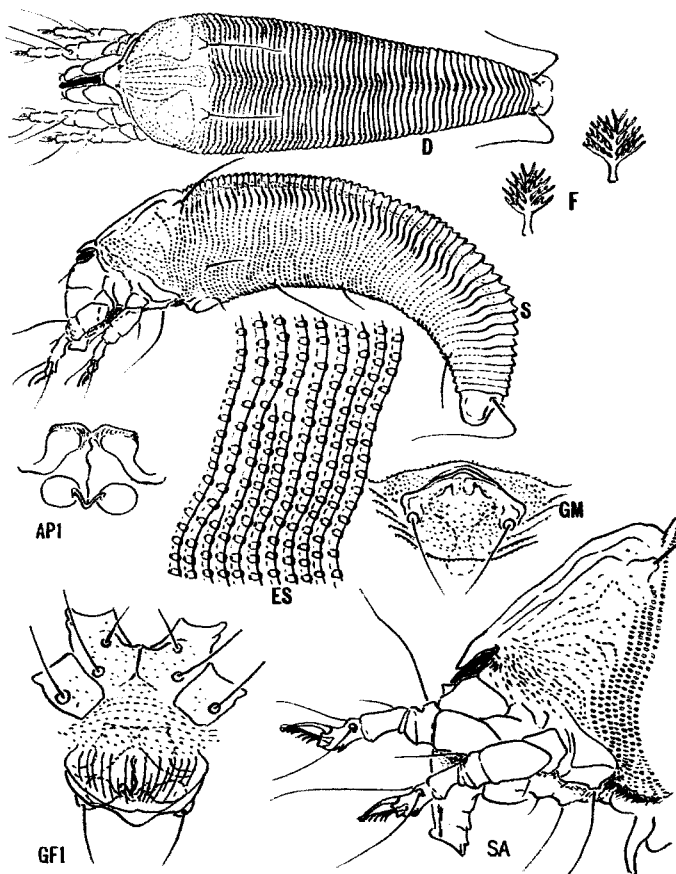


PLATE 21-1. *Tegenotus myersi* (K.)

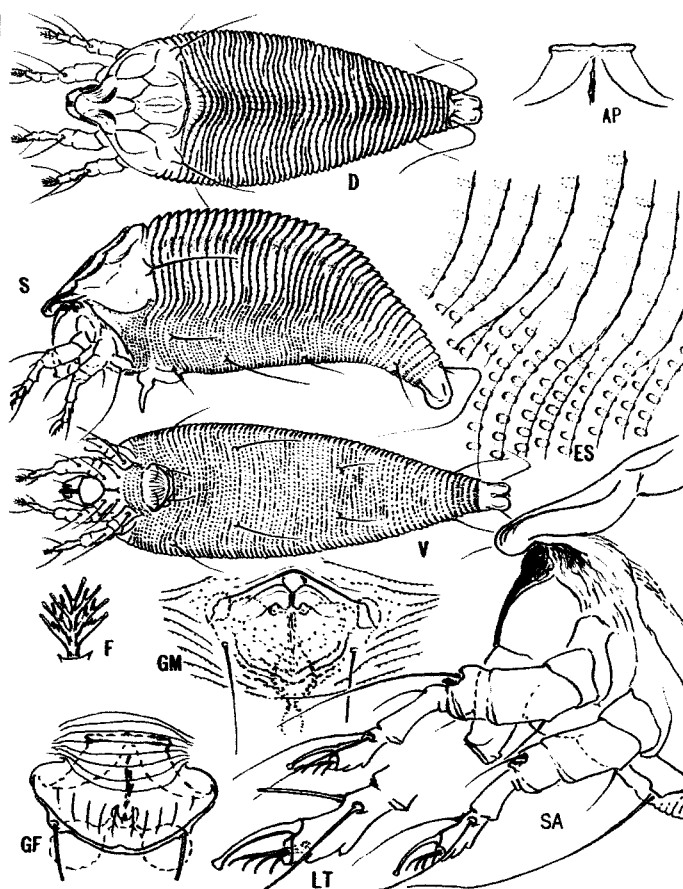


PLATE 21-2. *Tegenotus califraxini* (K.)

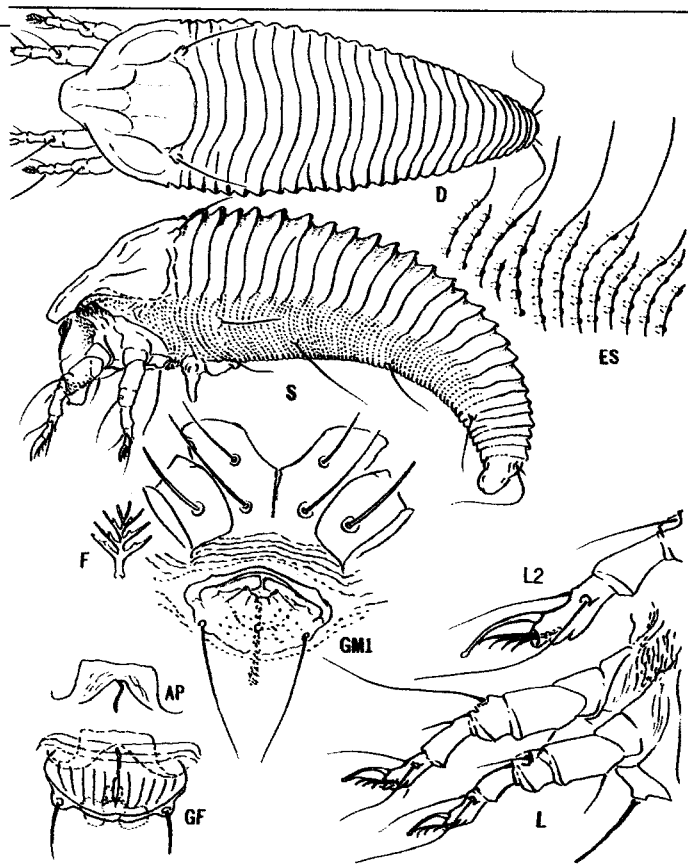


PLATE 21-3. *Tegenotus rhamnicola* (K.)

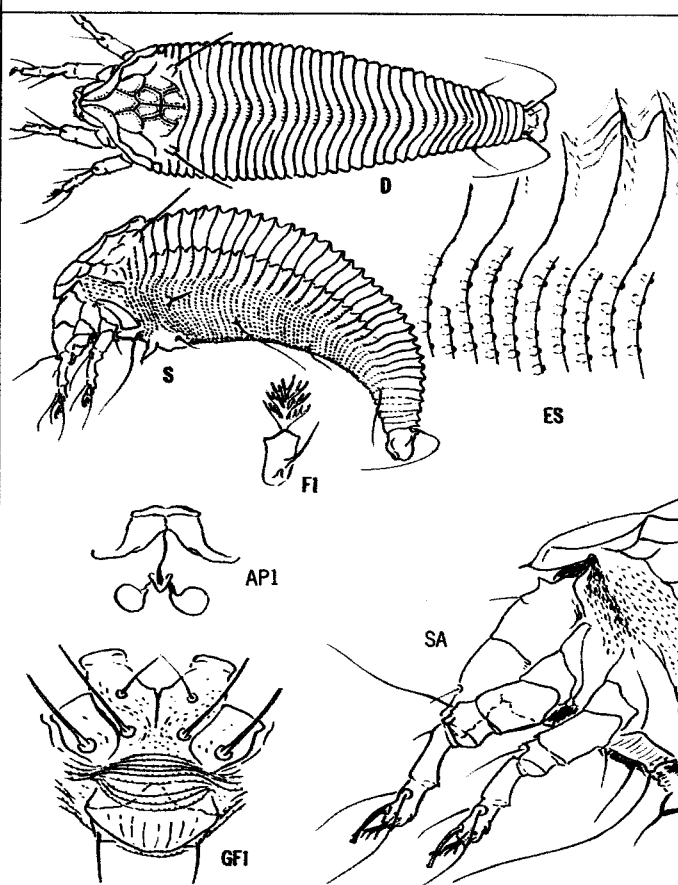


PLATE 21-4. *Tegenotus zizyphagus* (K.)

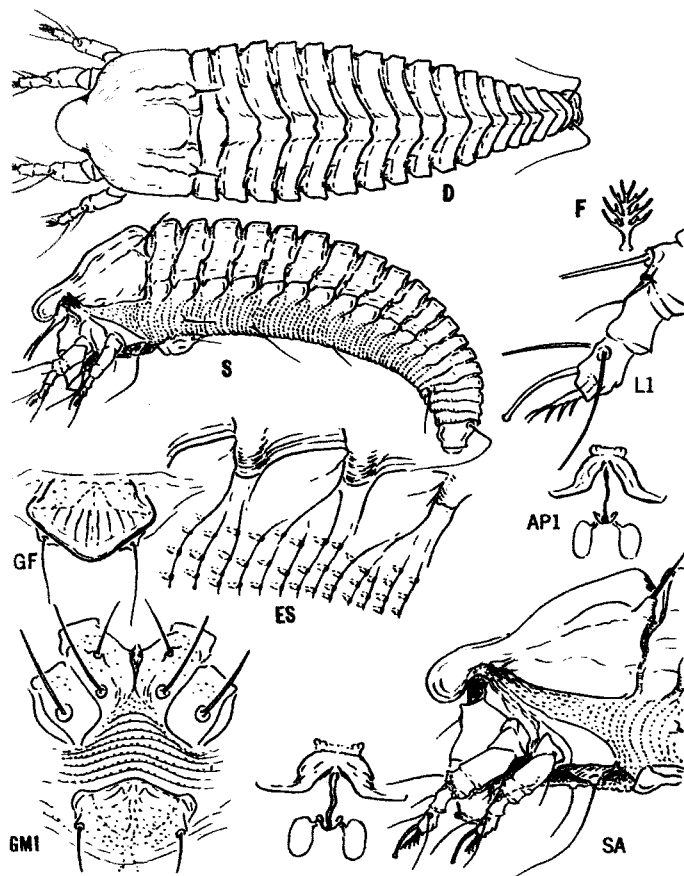


PLATE 21-5. *Tegenotus negundella* K.

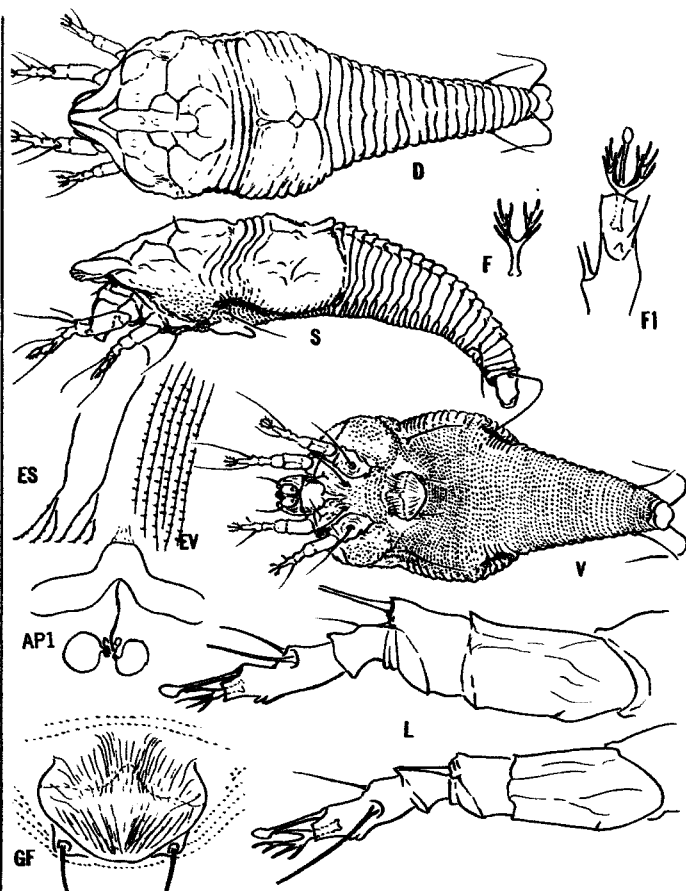


PLATE 22-1. *Tumescopites trachycarpi* K.

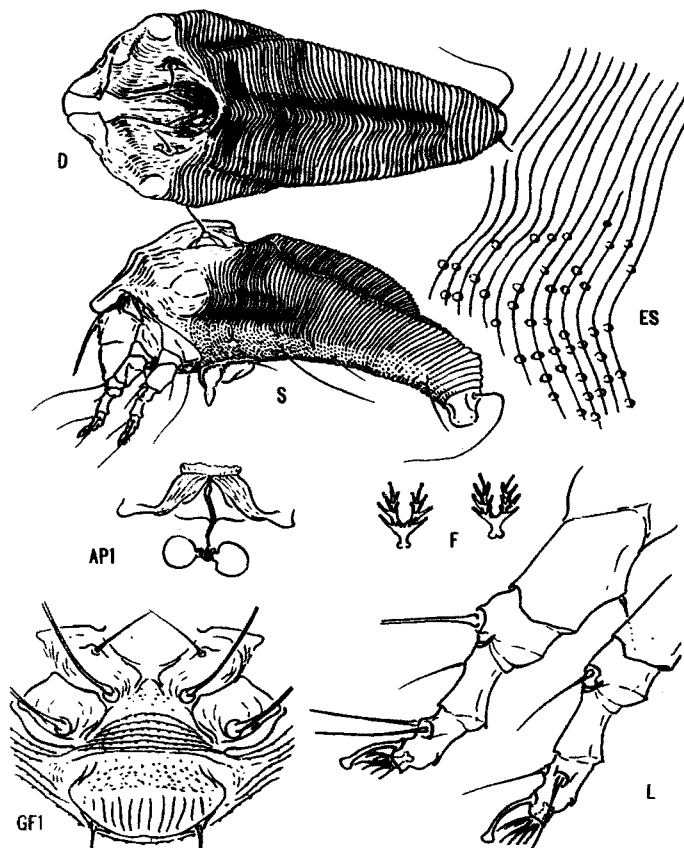


PLATE 23-1. *Acaricalus segundus* K.

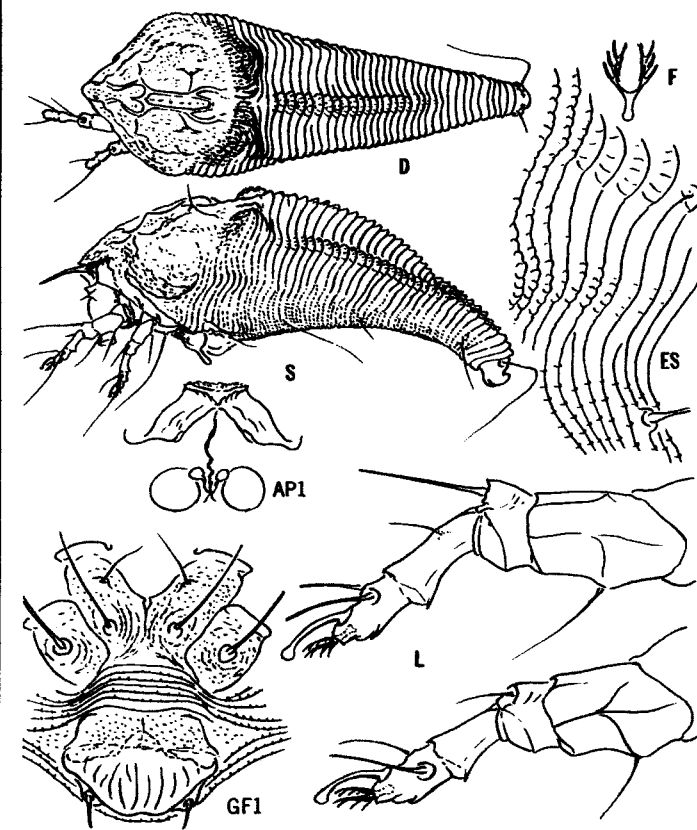


PLATE 23-2. *Acaricalus hederae* (K.)

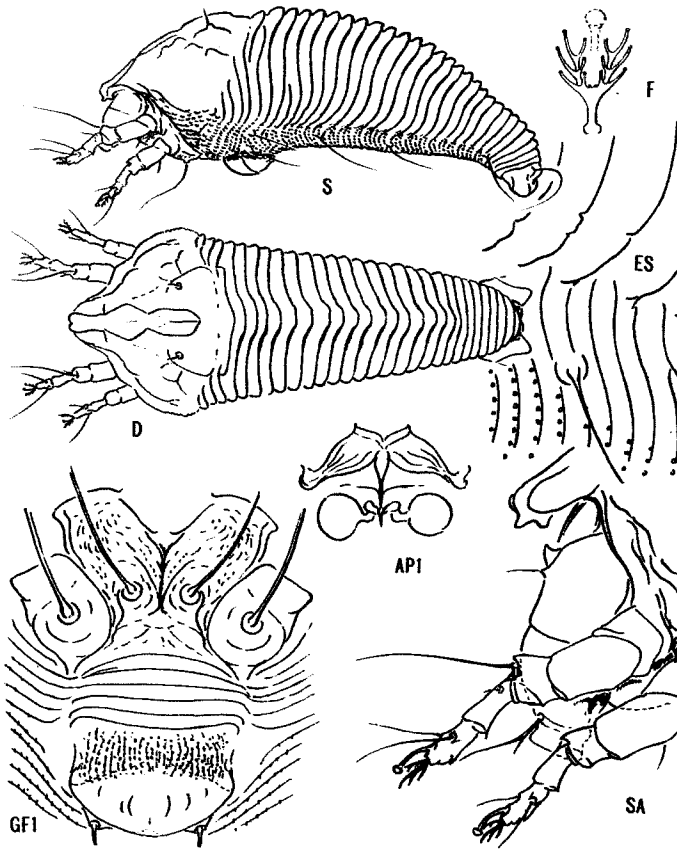


PLATE 24-1. *Acaphylla steinwedeni* K.

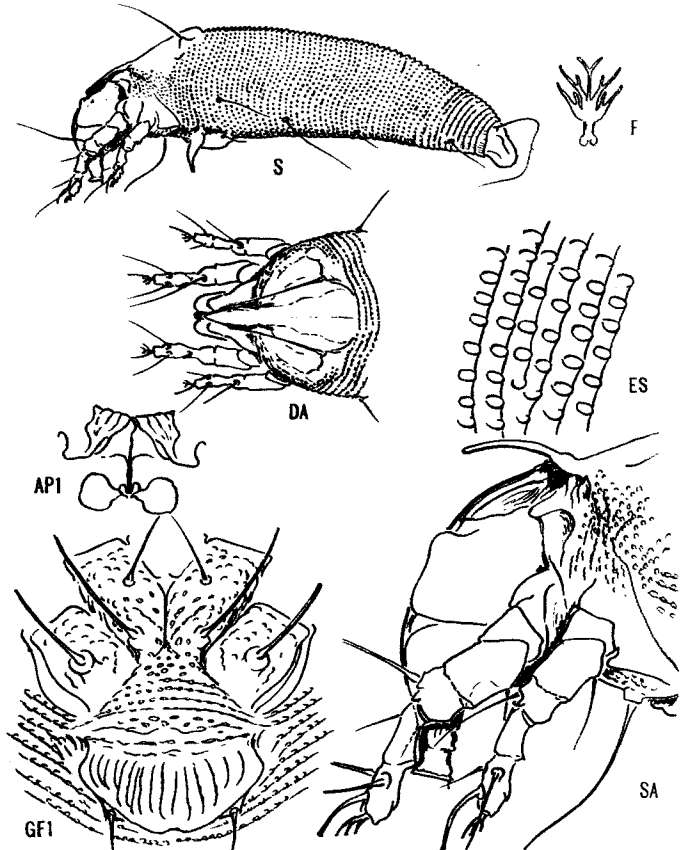


PLATE 25-1. *Phyllocoptes calisalicis* K.

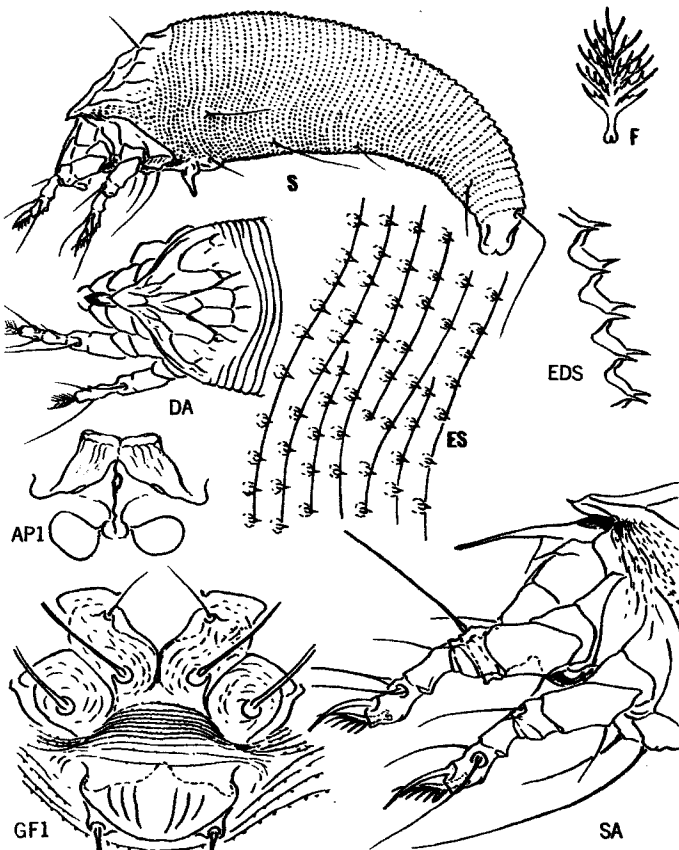


PLATE 25-2. *Phyllocoptes adalius* K.

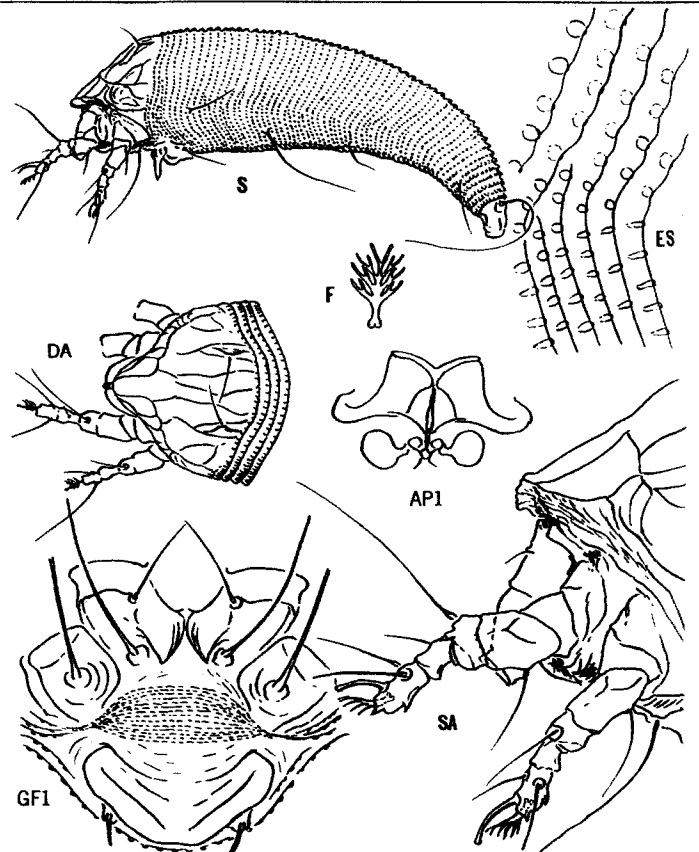


PLATE 25-3. *Phyllocoptes abaenus* K.

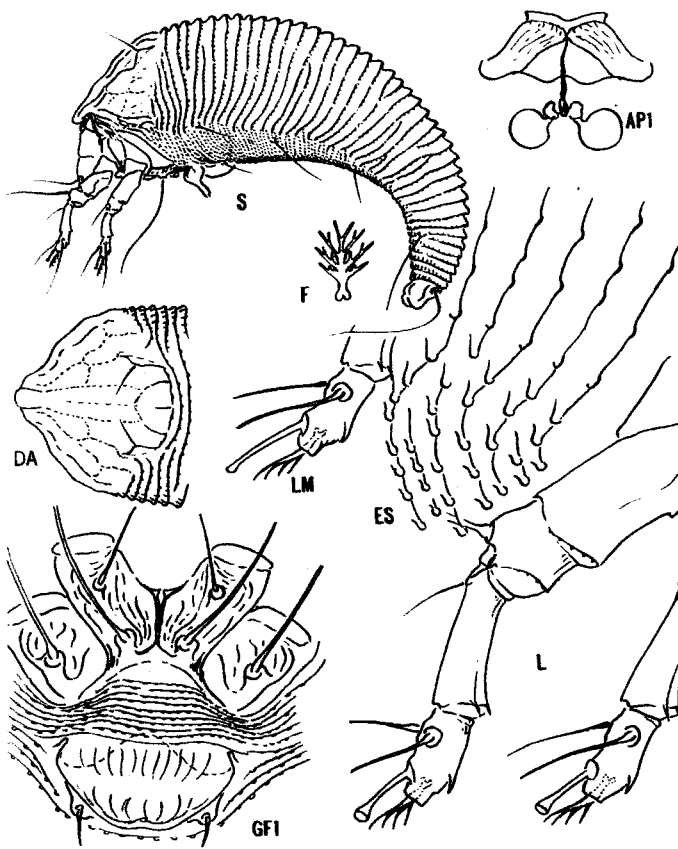


PLATE 25-4. *Phyllocoptes dimorphus* K.

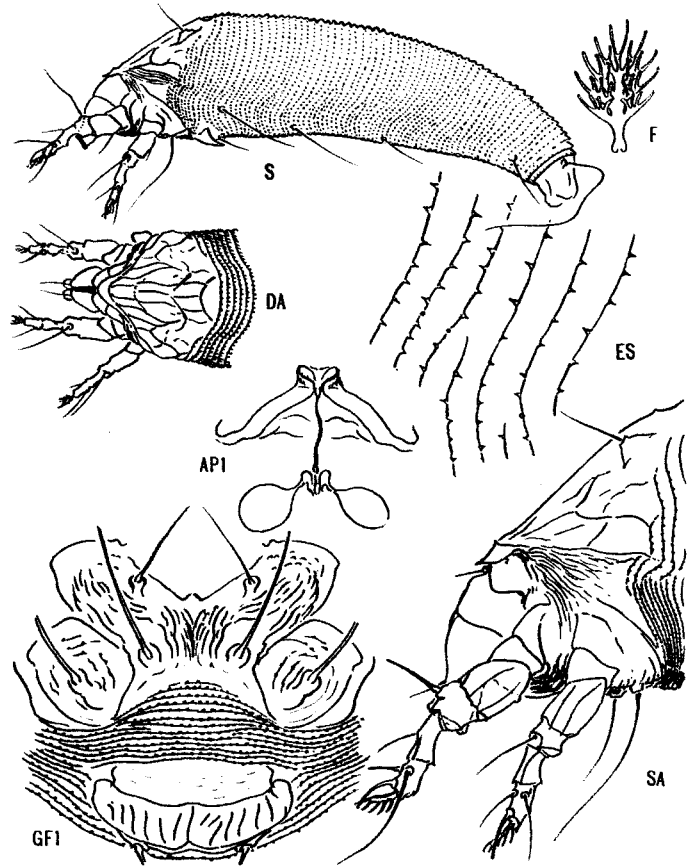


PLATE 25-5. *Phyllocoptes cedri* K.

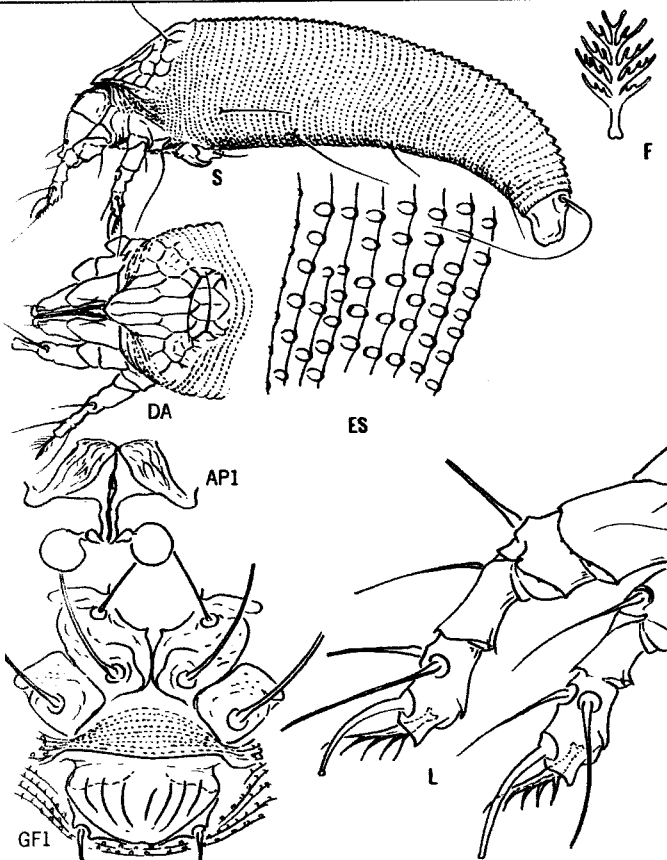


PLATE 25-6. *Phyllocoptes fructiphilus* K.

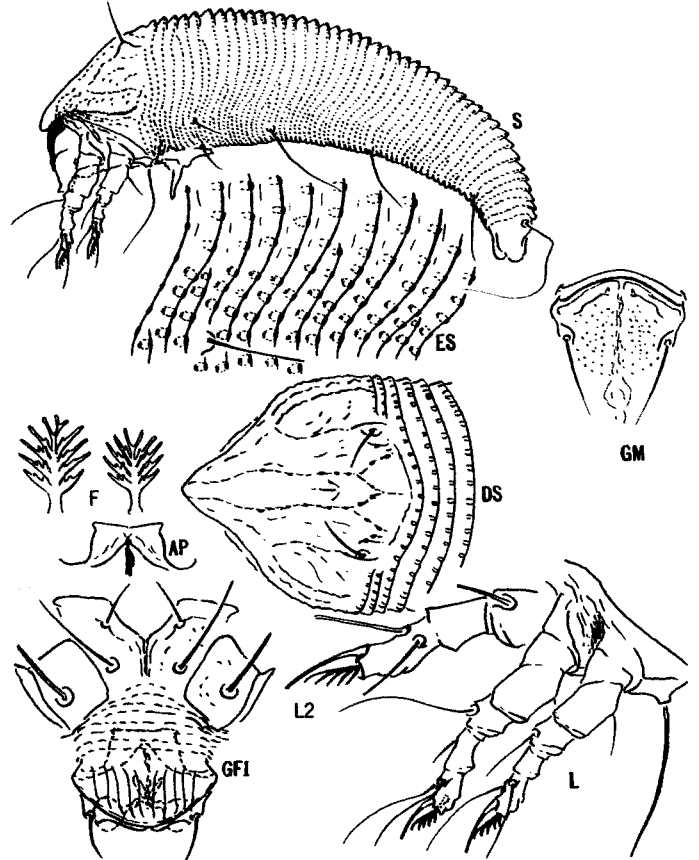


PLATE 25-7. *Phyllocoptes calirubi* K.

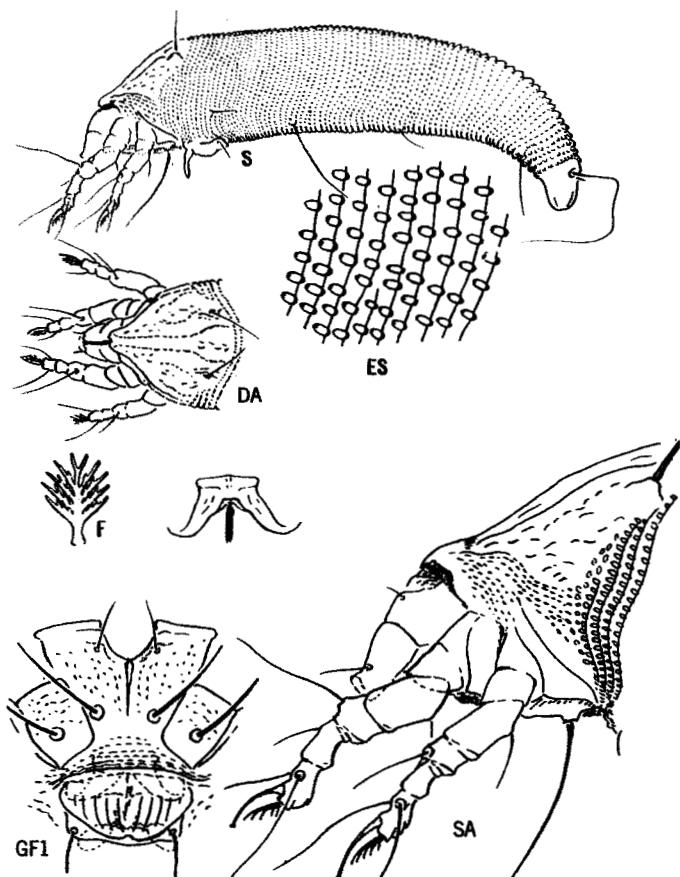


PLATE 25-8. *Phyllocoptes gracilis* (Nal.)

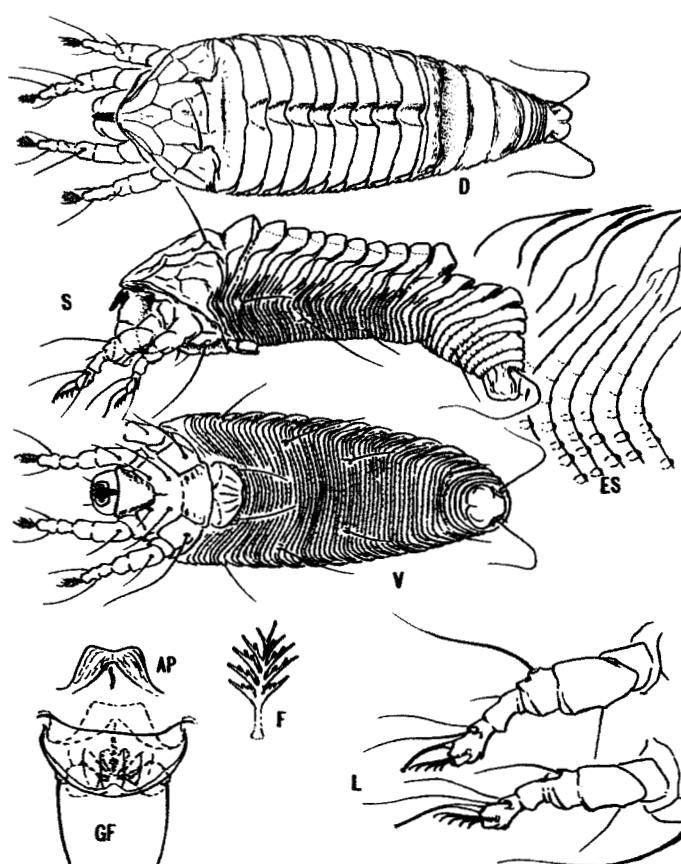


PLATE 26-1. *Caliphytoptus quercilobatae* K.

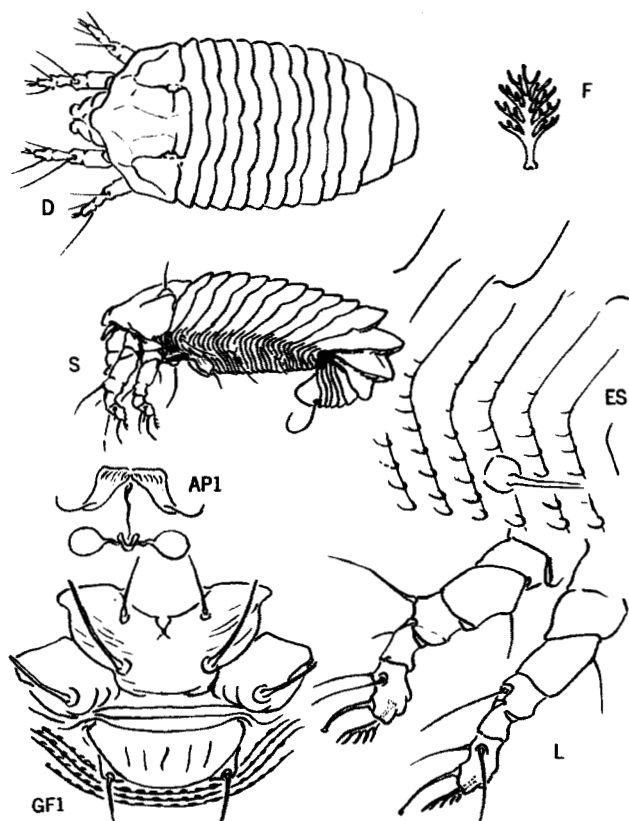


PLATE 27-1. *Acarelliptes occidentalis* K.

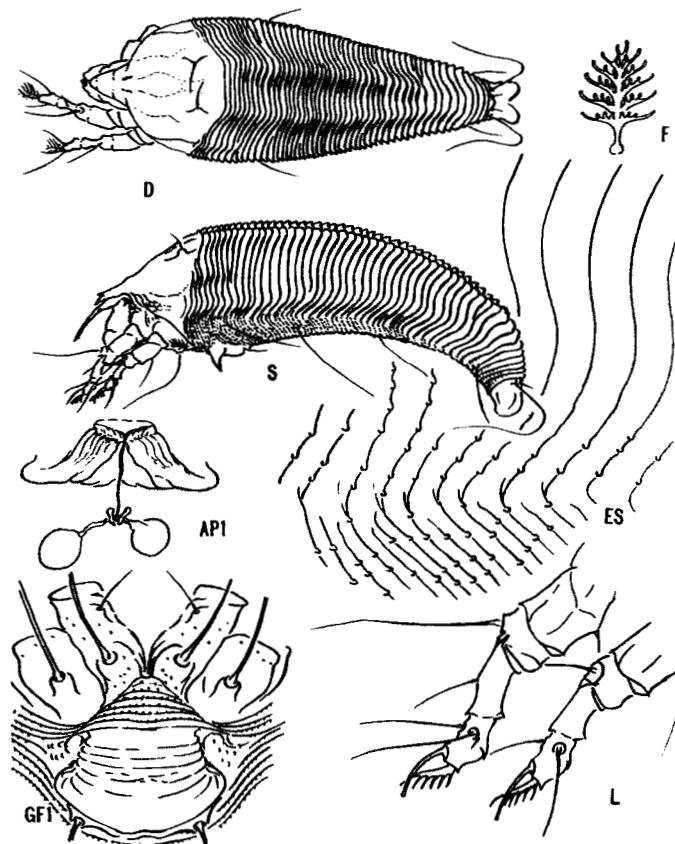


PLATE 28-1. *Cupacarus cuprifestor* K.

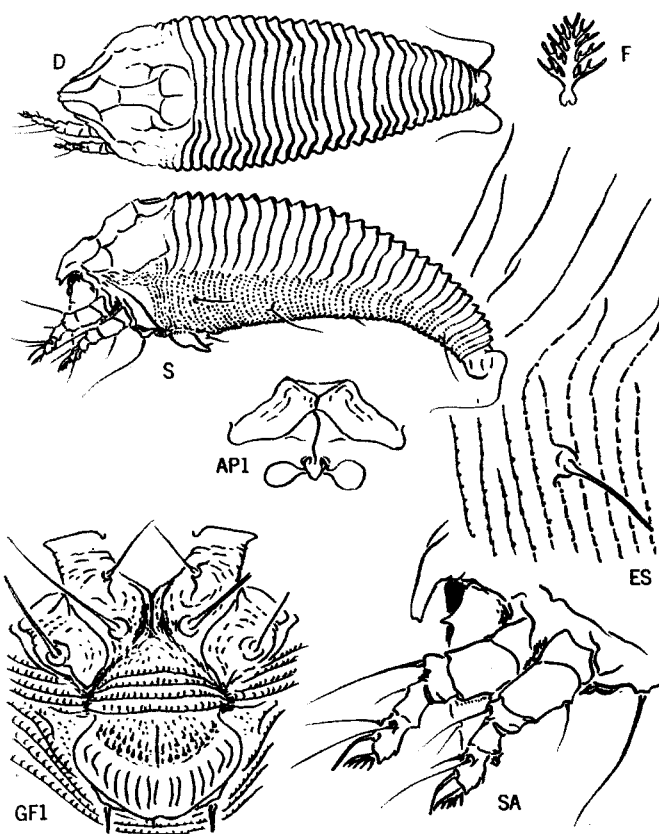


PLATE 29-1. *Phyllocoptruta oleivorus* (Ashm.)

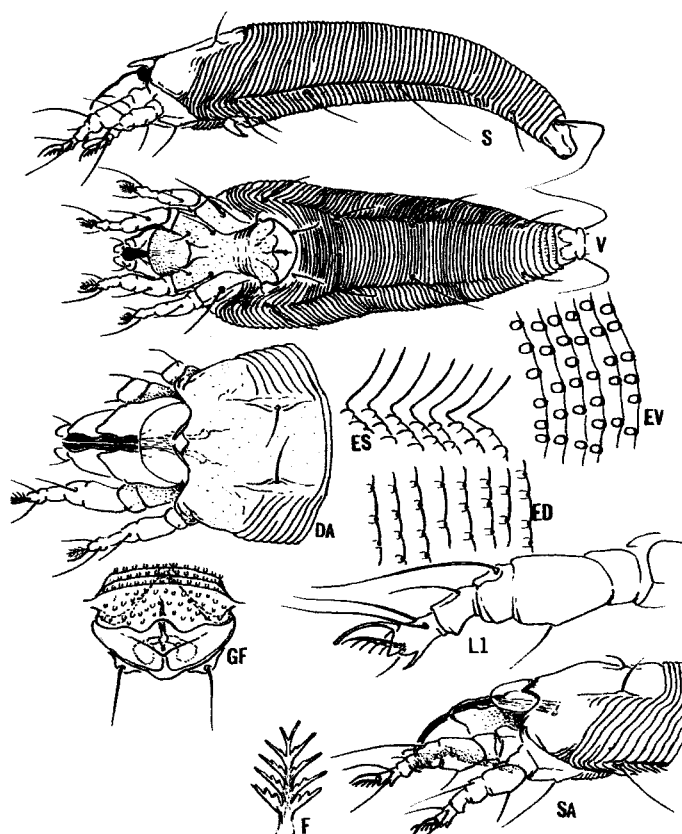


PLATE 30-1. *Platyphyoctus sabinianae* K.

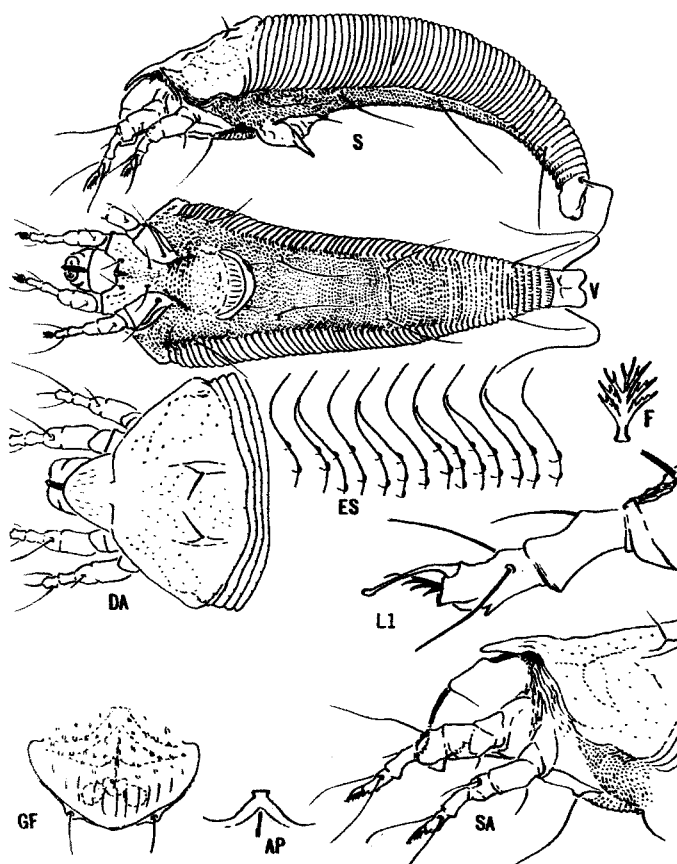


PLATE 30-2. *Platyphyoctus multisternatus* K.

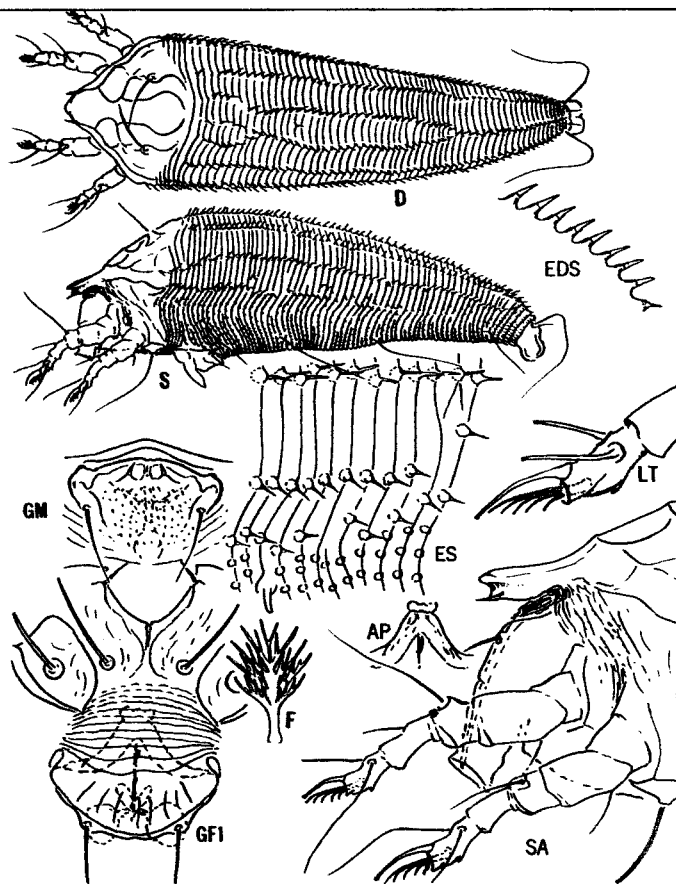


PLATE 31-1. *Callyntrotus schlechtendali* Nal.

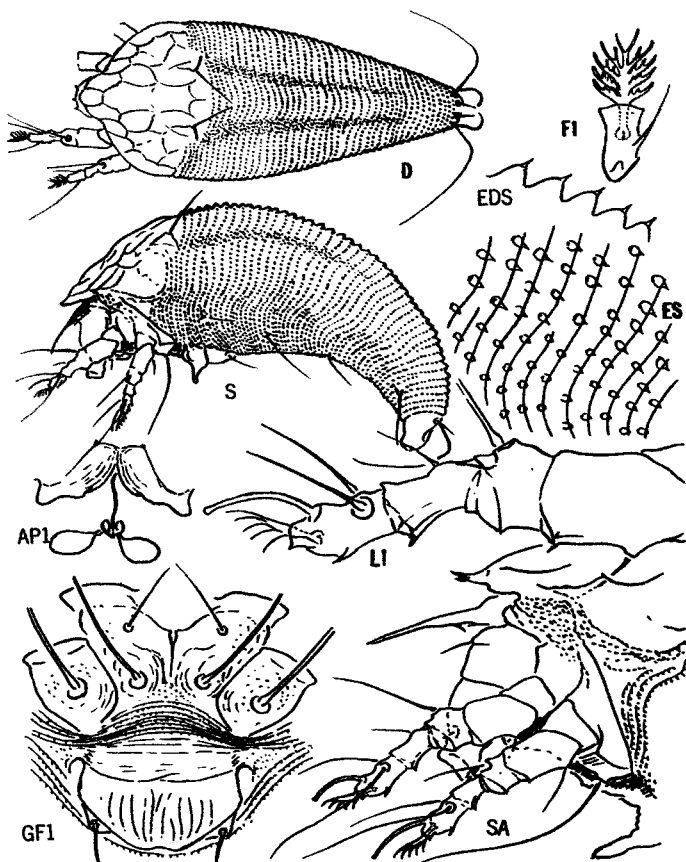


PLATE 32-1. *Epitrimerus sierribis* K.

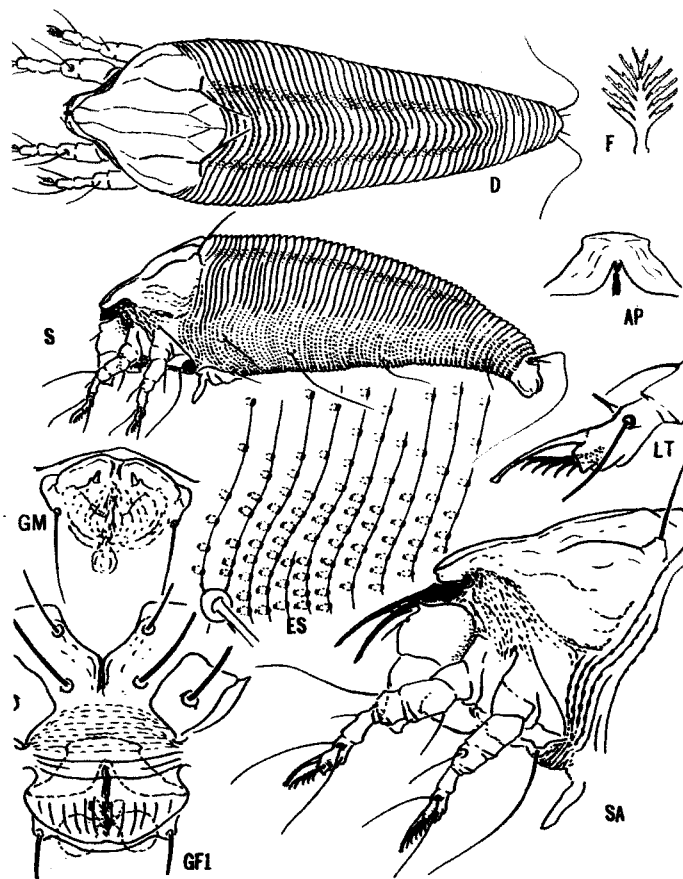


PLATE 32-2. *Epitrimerus pteleae* K.

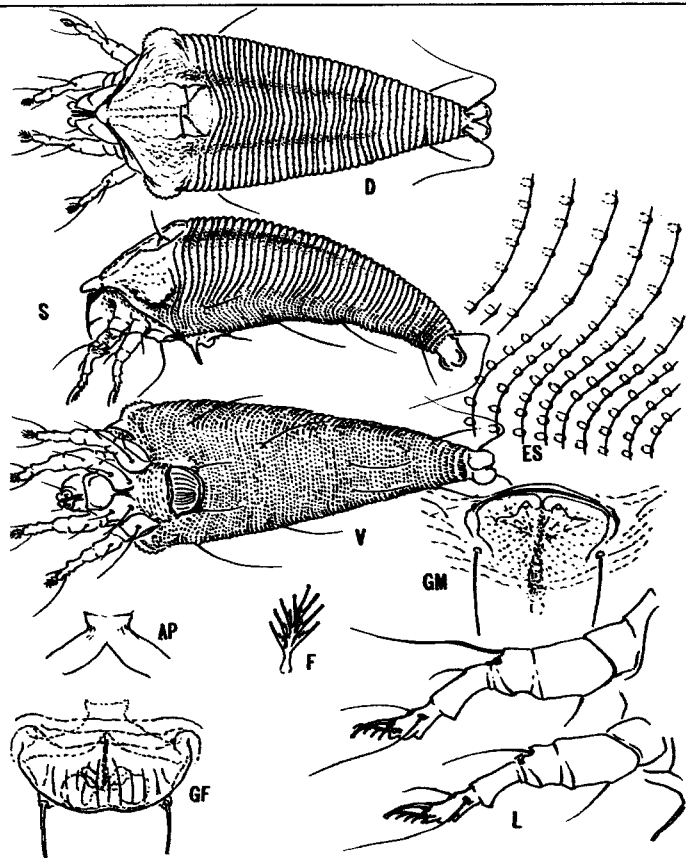


PLATE 32-3. *Epitrimerus pyri* (Nal.)

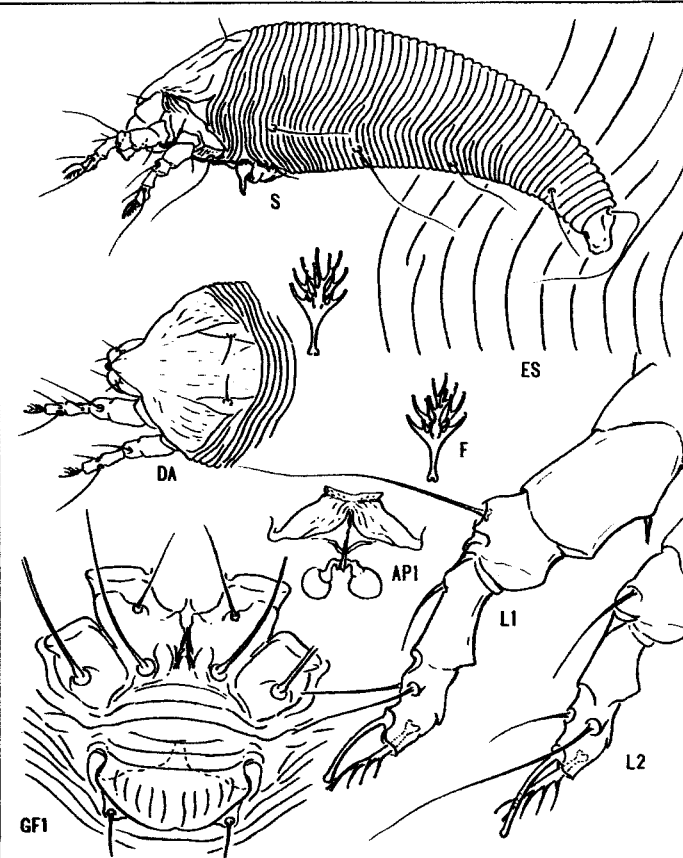


PLATE 32-3d. *Epitrimerus pyri- deutogyne*

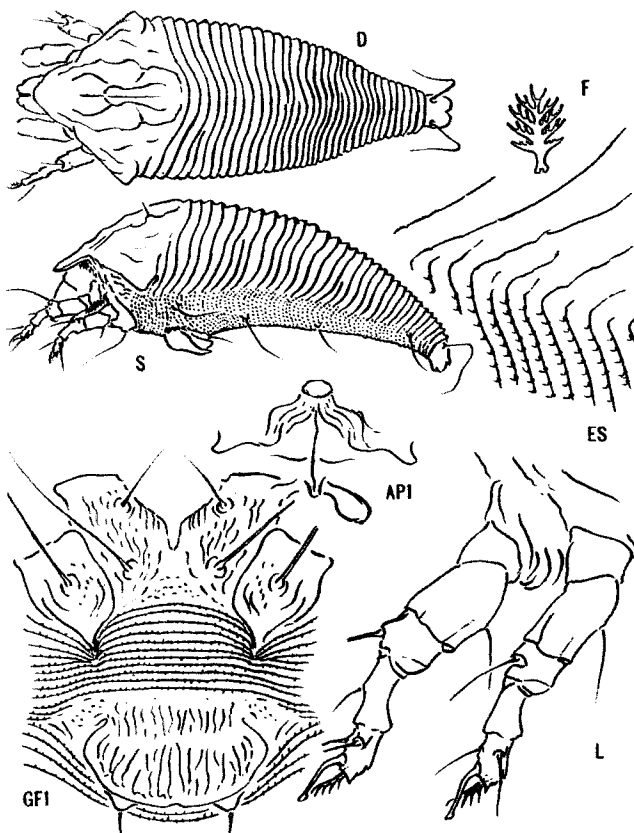


PLATE 32-4. *Epitrimerus abietis* K.

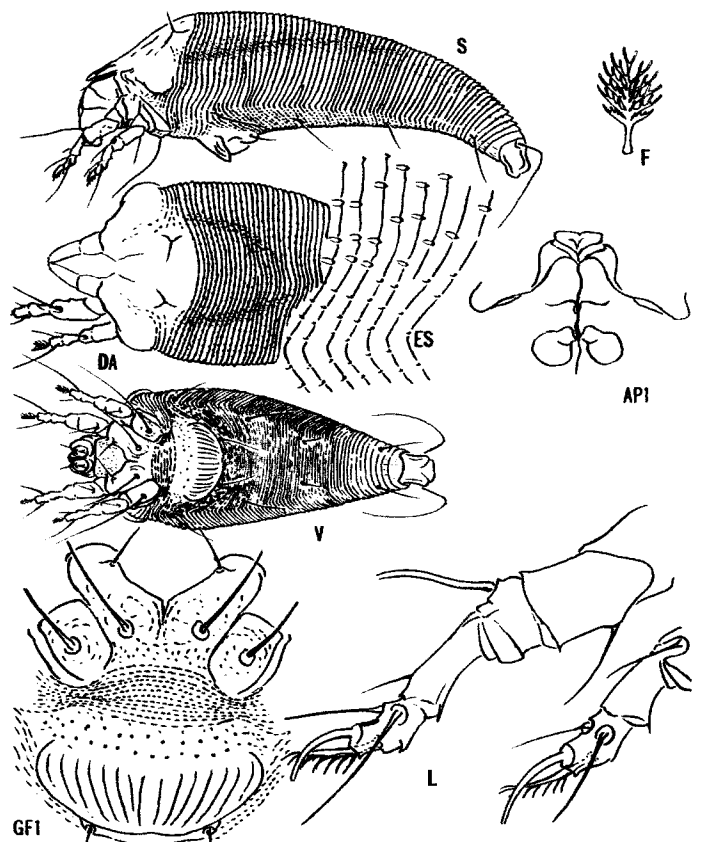


PLATE 32-5. *Epitrimerus cupressi* (K.)

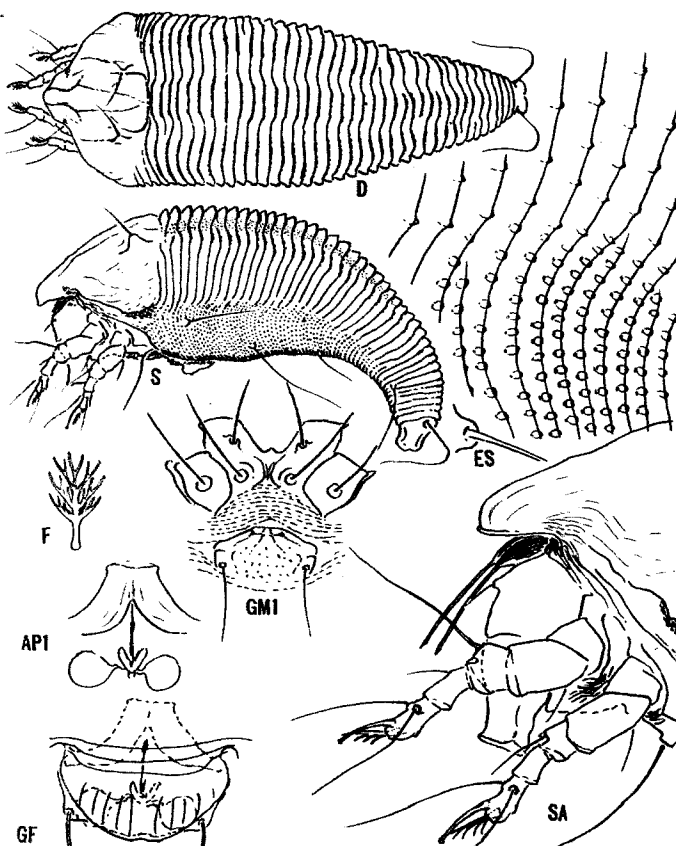


PLATE 32-6. *Epitrimerus trilobus* (Nal.)

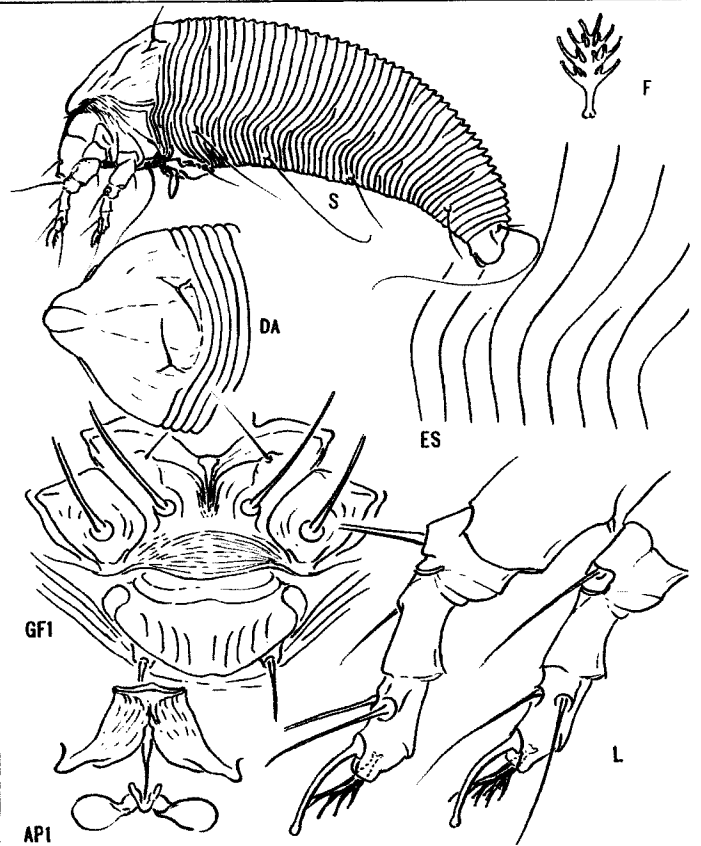


PLATE 32-6d. *Epitrimerus trilobus*- deutogyne

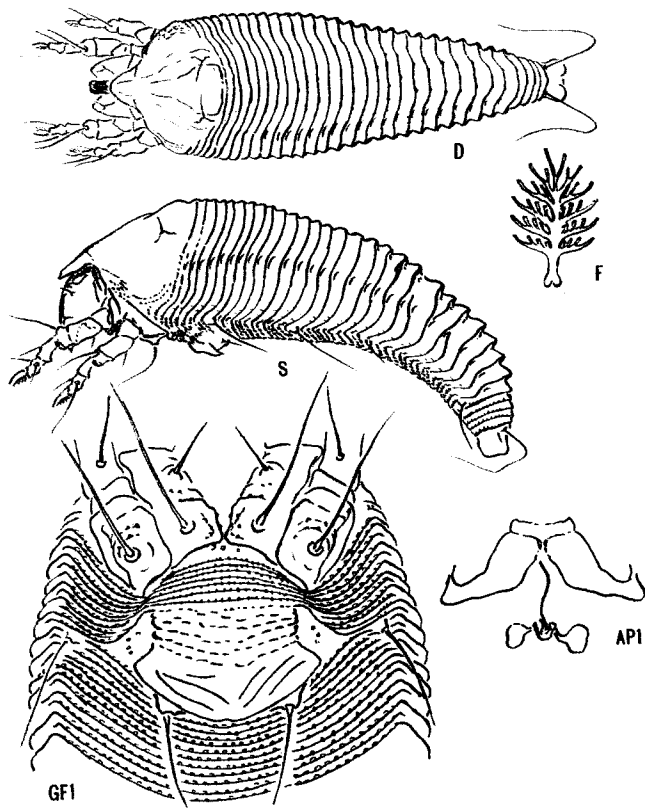


PLATE 32-7. *Epitrimerus cupressifoliae* K.

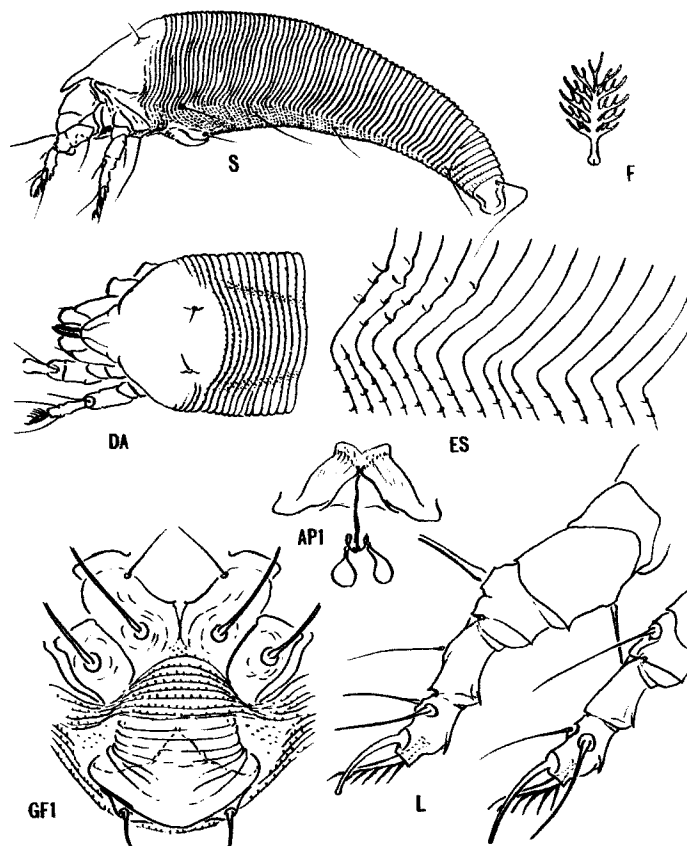


PLATE 32-8. *Epitrimerus libocedri* (K.)

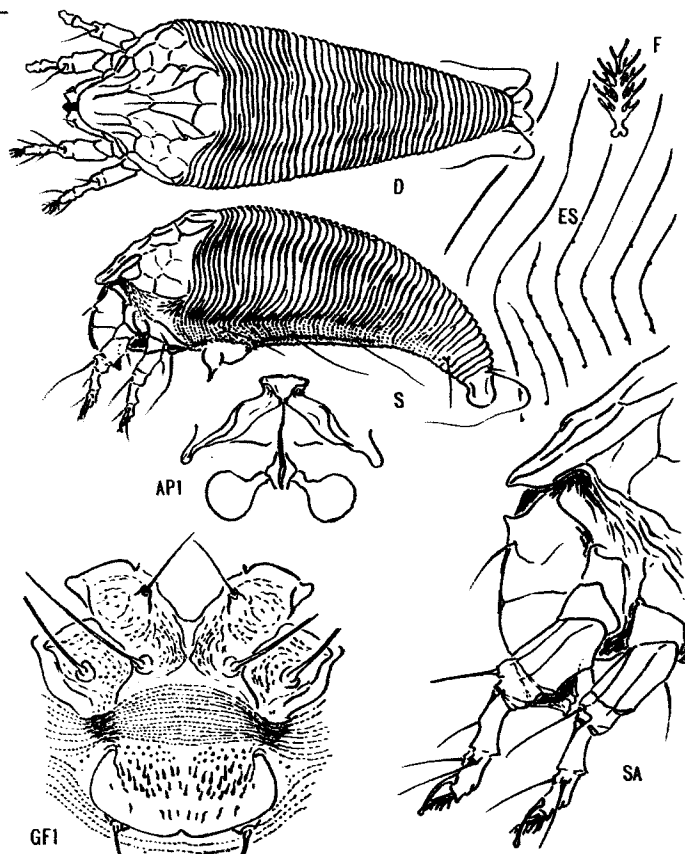


PLATE 32-9. *Epitrimerus pseudotsugae* K.

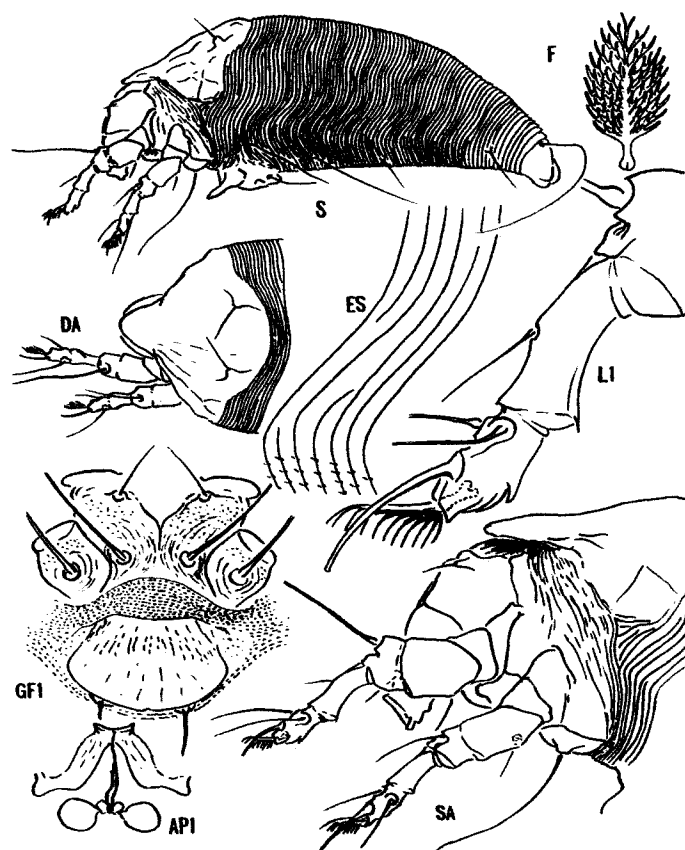


PLATE 32-10. *Epitrimerus taxodii* (K.)

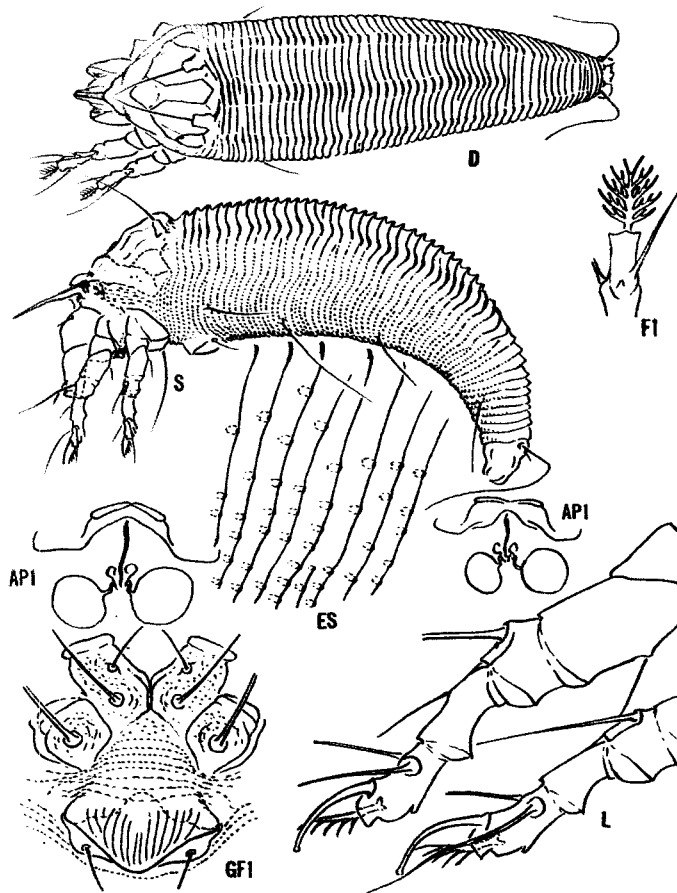


PLATE 33-1. *Calepitrimerus umbellulariae* K.

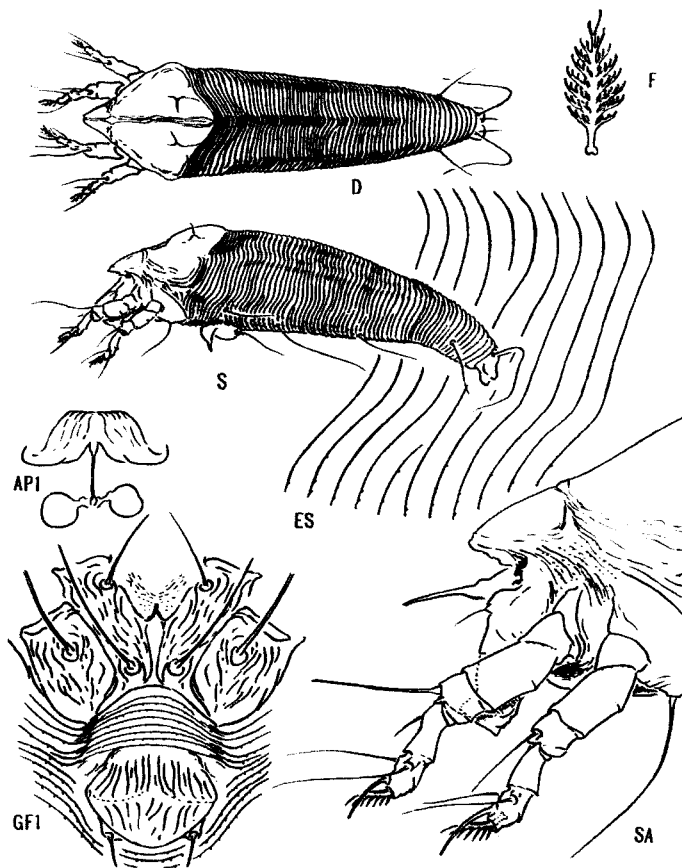


PLATE 33-2. *Calepitrimerus andropogonus* K.

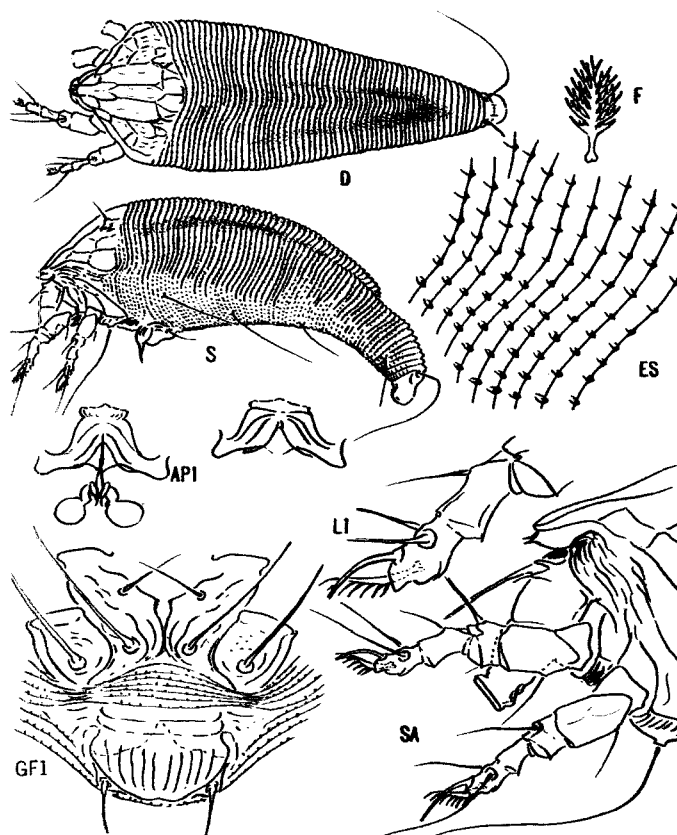


PLATE 33-3. *Calepitrimerus anatis* K.

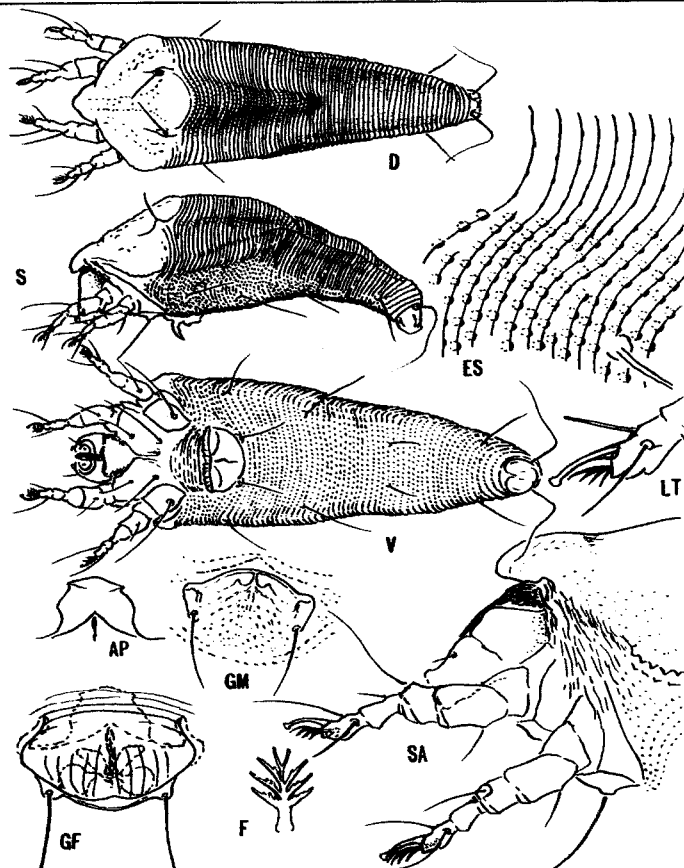


PLATE 33-4. *Calepitrimerus baileyi* K.

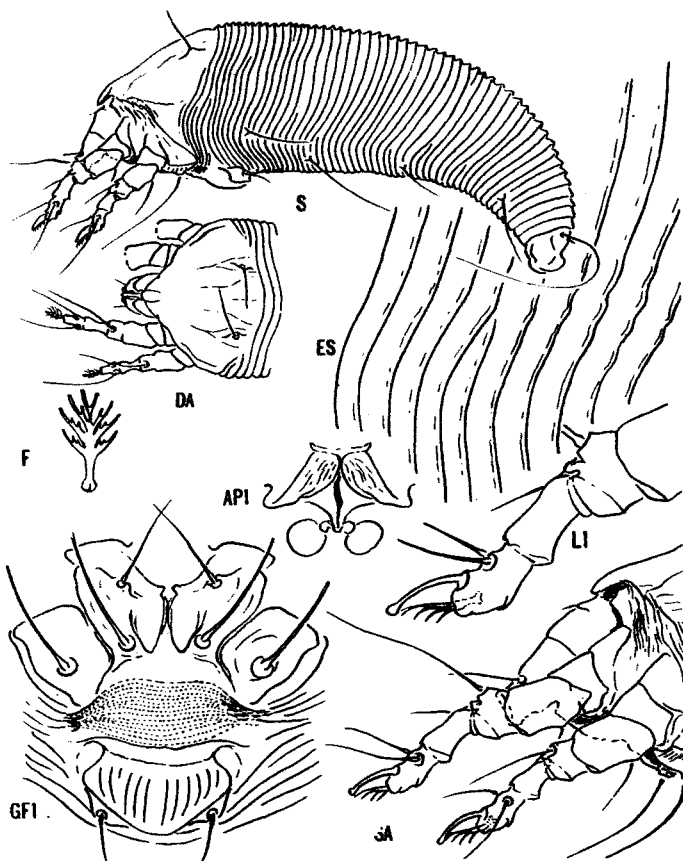


PLATE 33-4d. *Calepitrimerus baileyi*- deutogyne

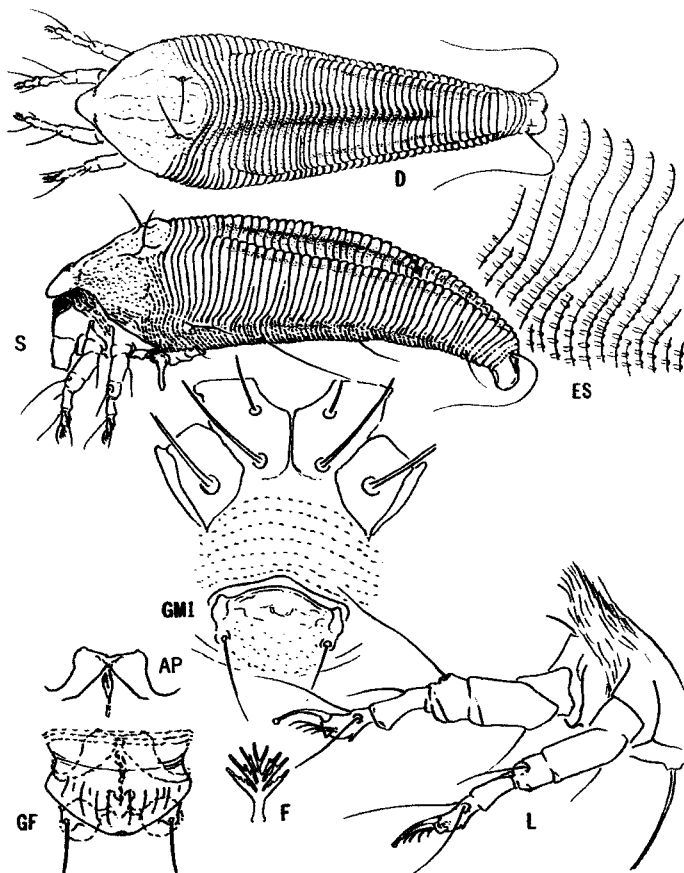


PLATE 33-5. *Calepitrimerus cariniferus* K.

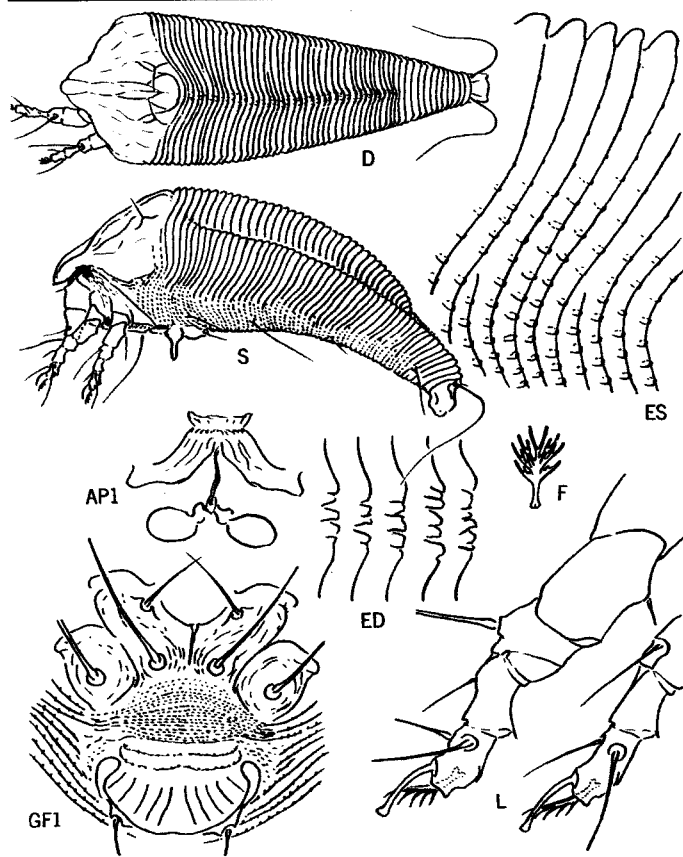


PLATE 33-6. *Calepitrimerus vitis* (Nal.)

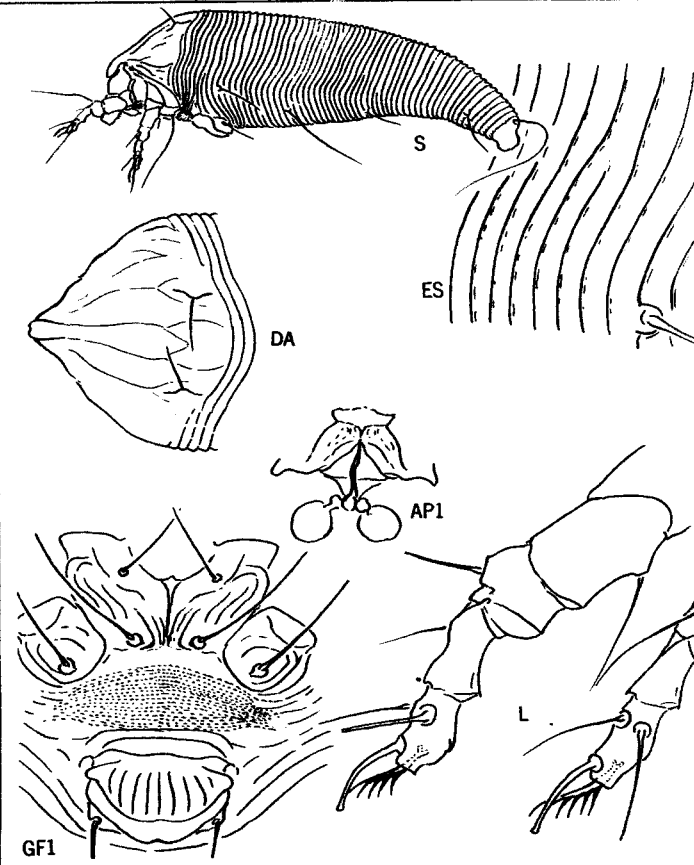


PLATE 33-6d. *Calepitrimerus vitis*- deutogyne

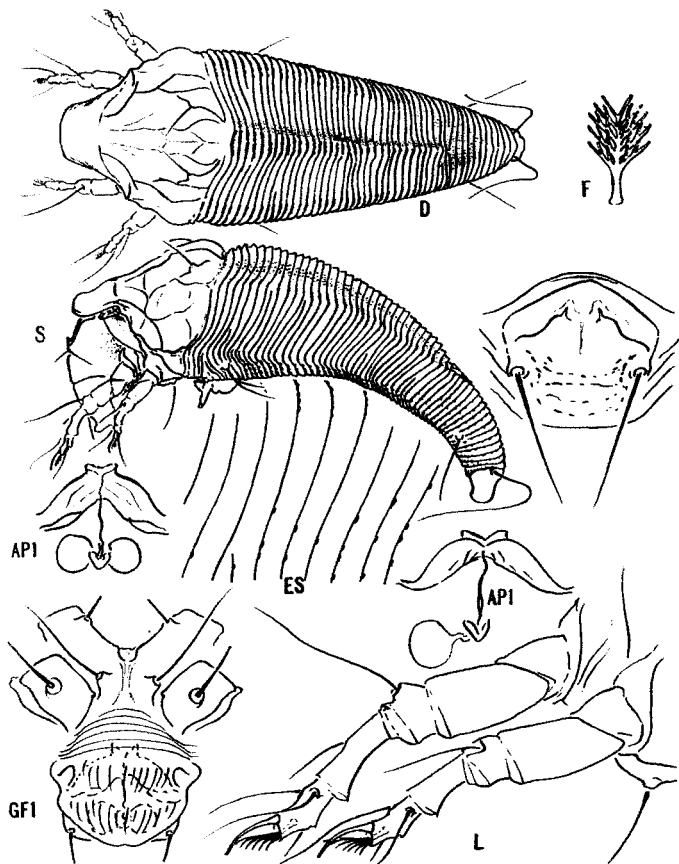


PLATE 34-1. *Acamina nolinae* (K.)

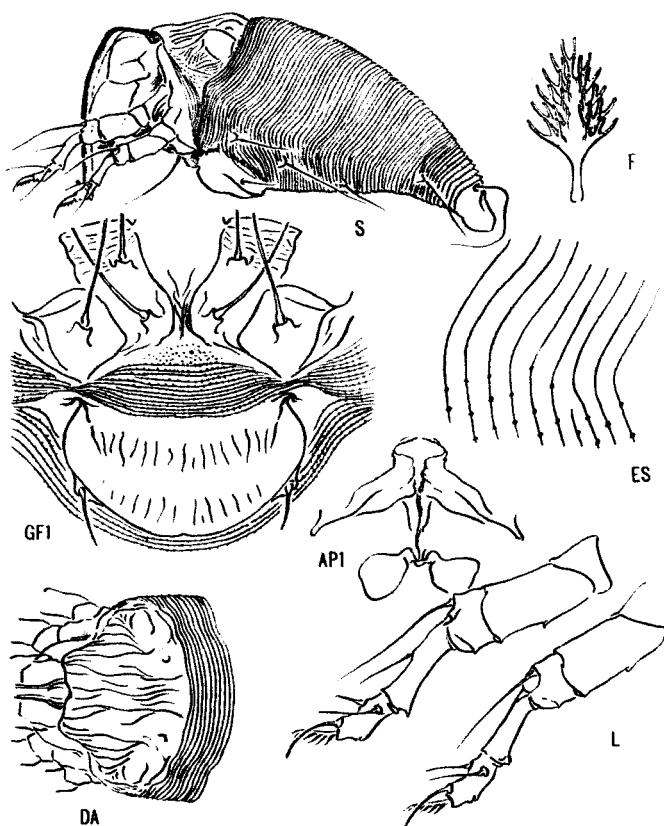


PLATE 35-1. *Asetacus madronae* K.

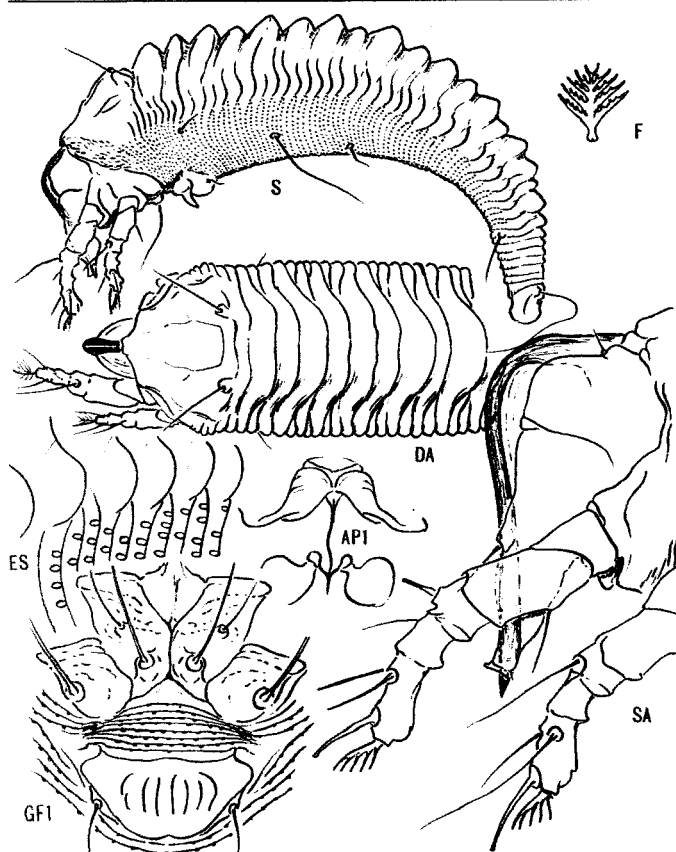


PLATE 36-1. *Quadracus urticarius* (C&M)

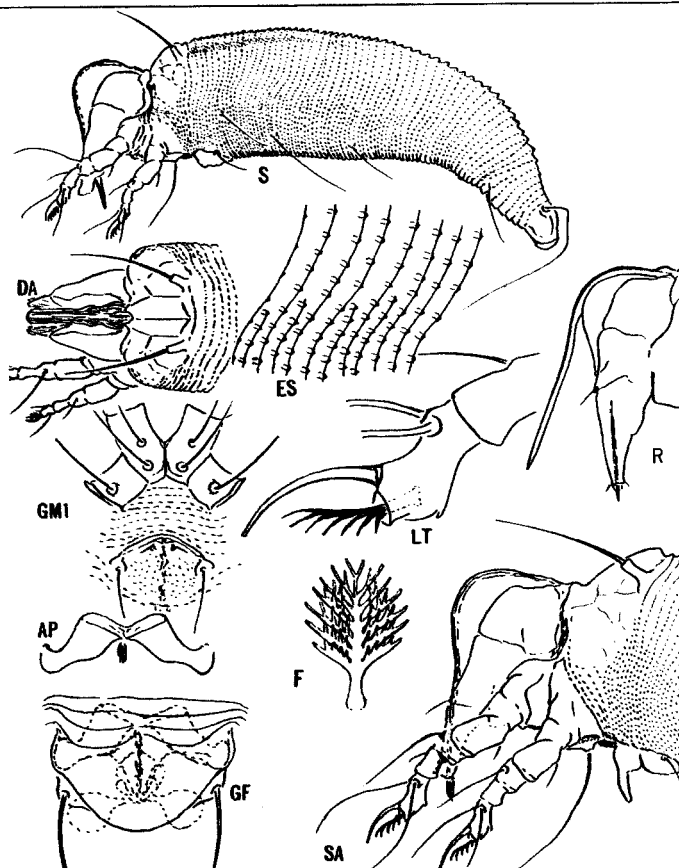


PLATE 37-1. *Rhyncaphytoptus platani* K.

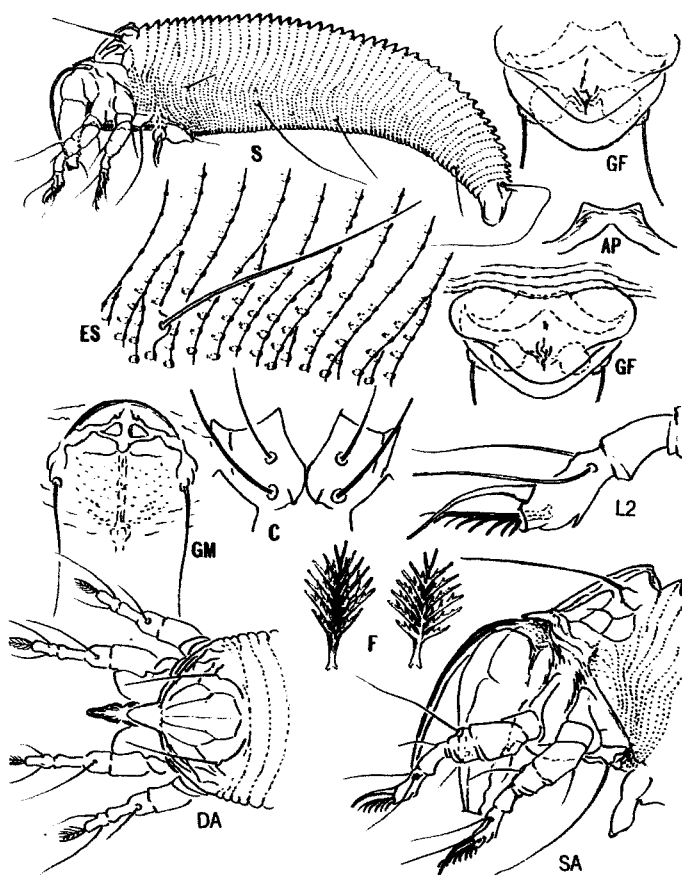


PLATE 37-2. *Rhyncaphytoptus megarostris* (K.)

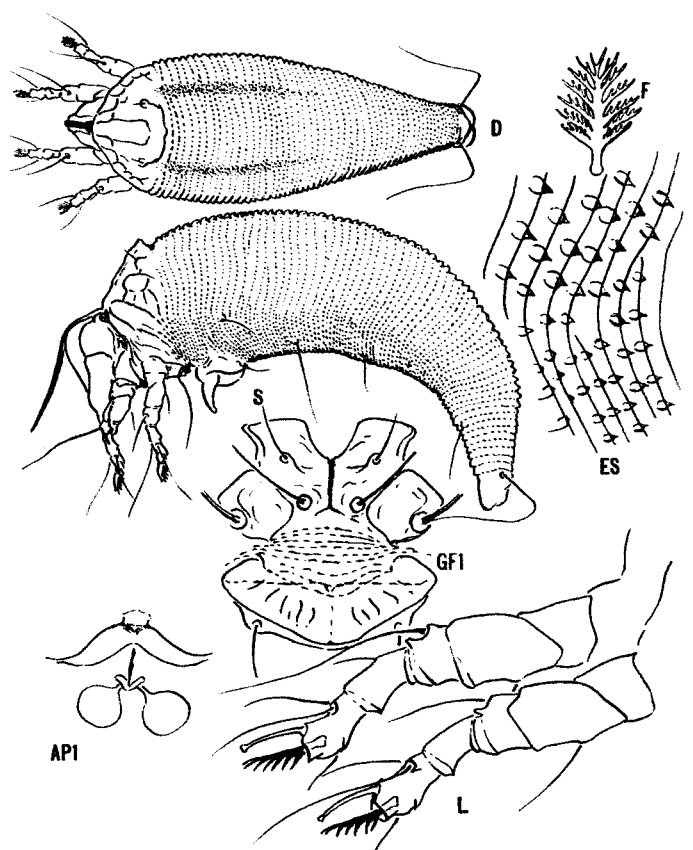


PLATE 37-3. *Rhyncaphytoptus strigatus* K.

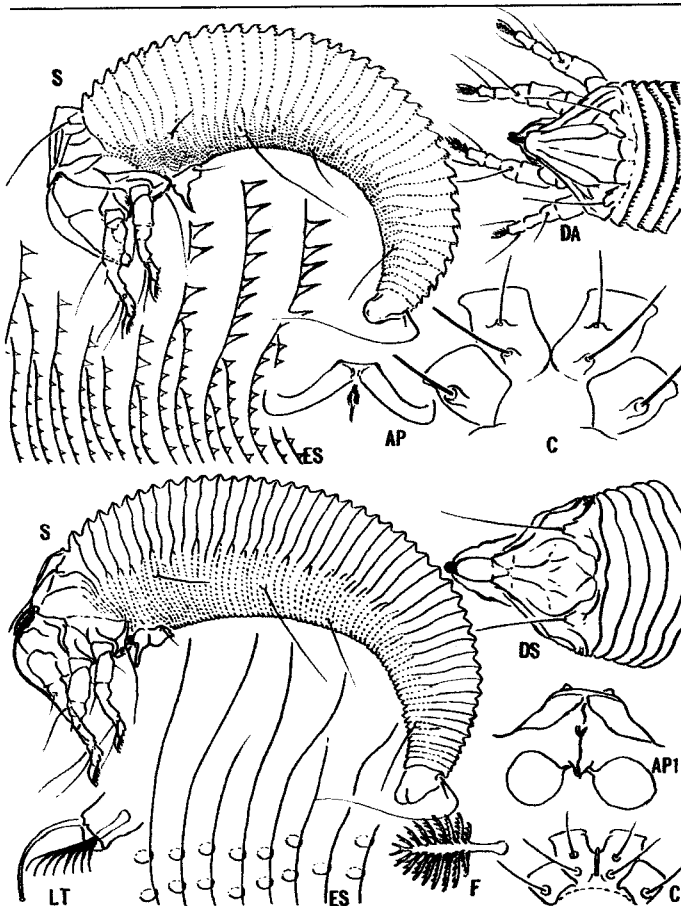


PLATE 37-4. *Rhyncaphytoptus spinifera* K.

PLATE 37-5. *Rhyncaphytoptus salicifoliae* K.

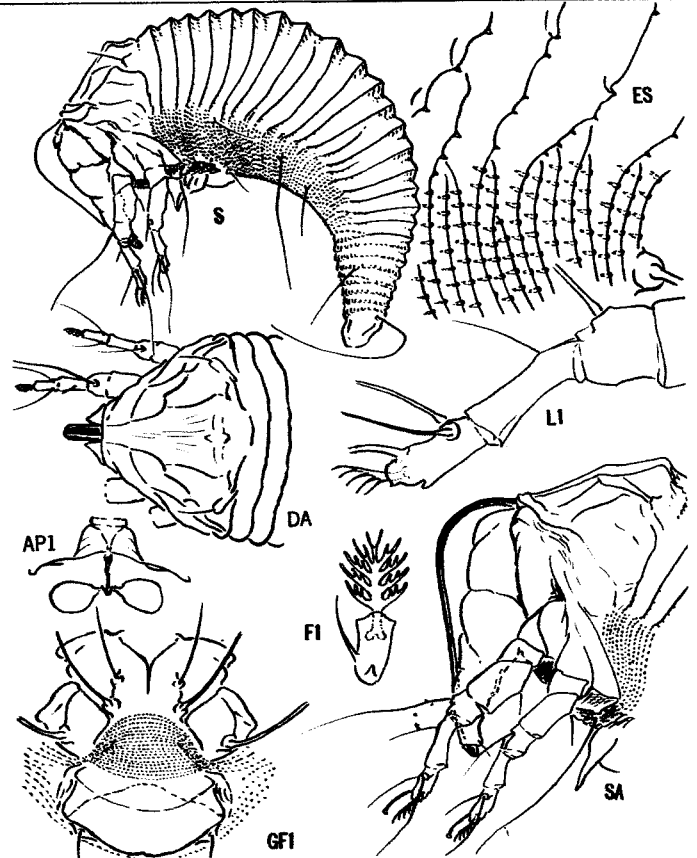


PLATE 37-6. *Rhyncaphytoptus ulmivagrans* K.

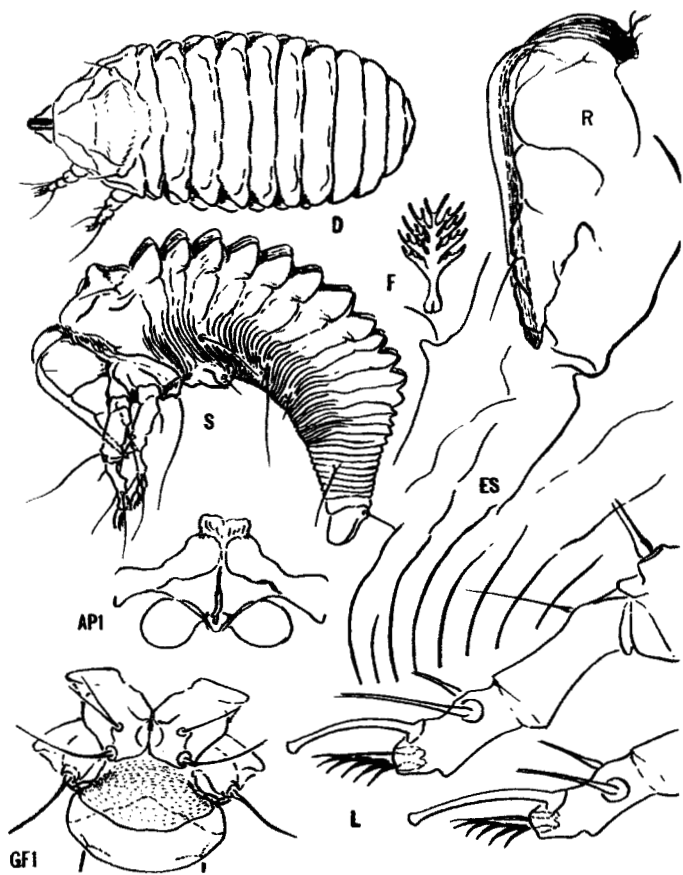


PLATE 37-6d. *Rhyncaphytoptus ulmivagrans*- deutogyne

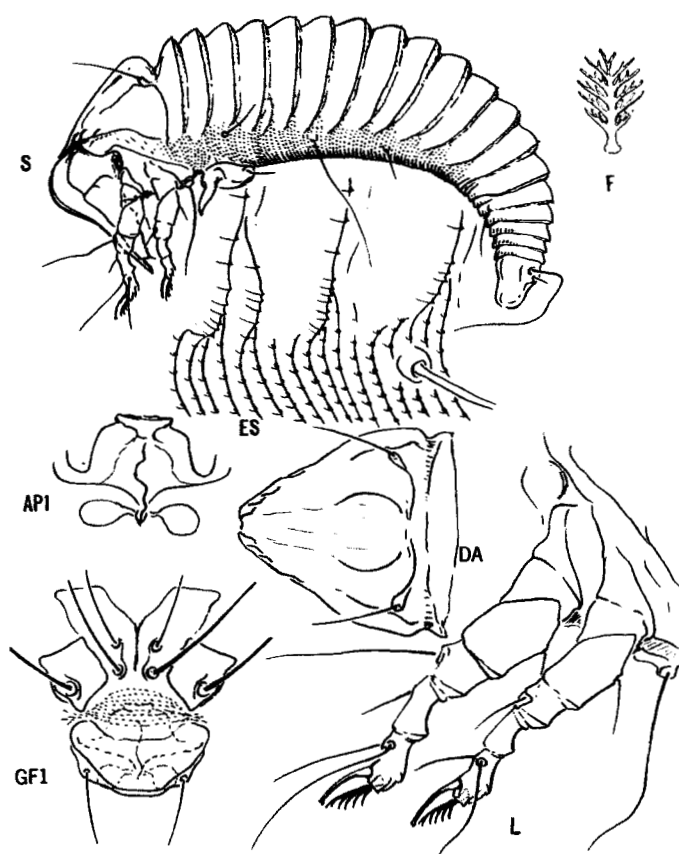


PLATE 37-7. *Rhyncaphytoptus ficifoliae* K.

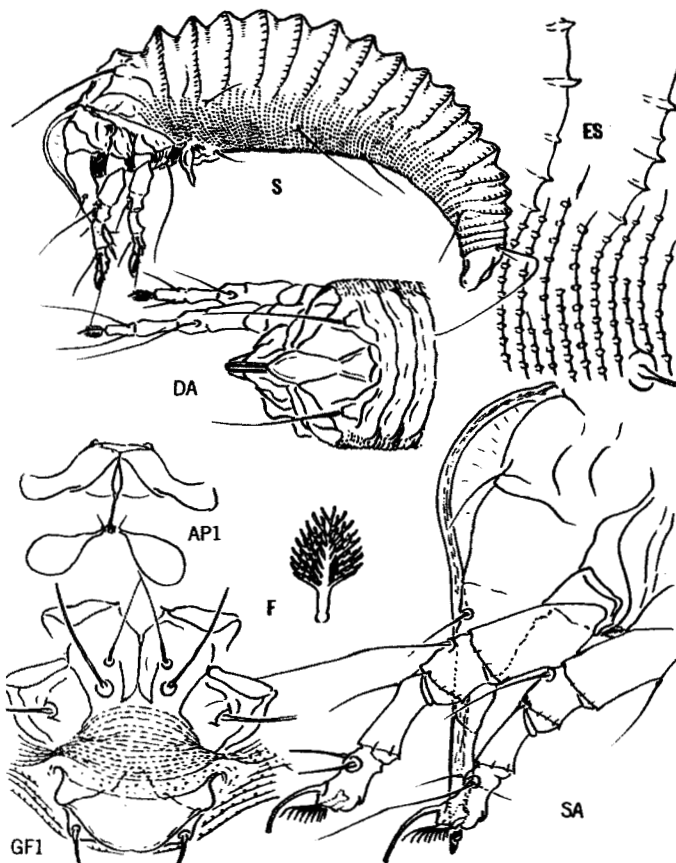


PLATE 37-8. *Rhyncaphytoptus acilius* K.

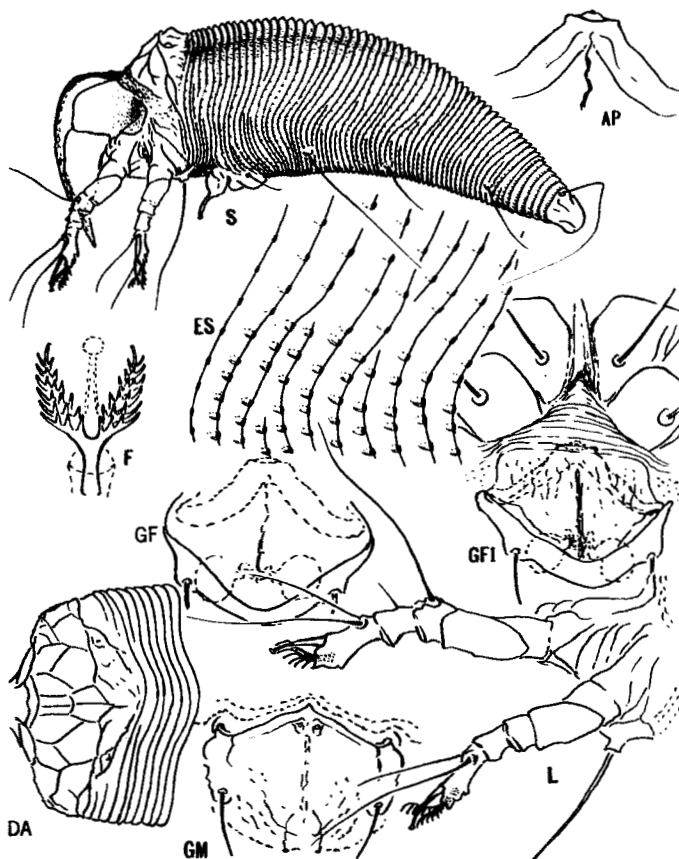


PLATE 38-1. *Rhynacus arctostaphyli* (K.)

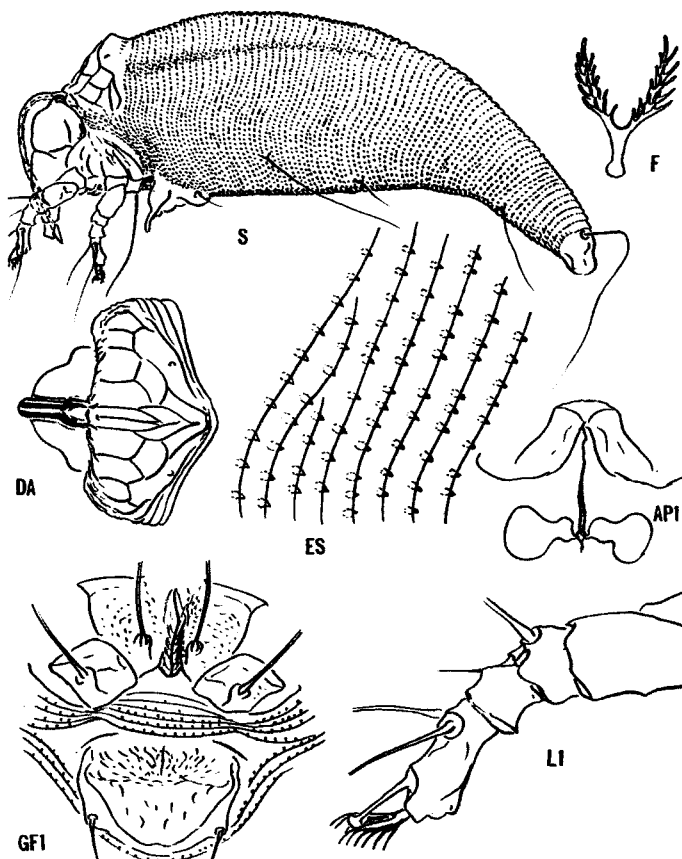


PLATE 38-2. *Rhynacus abronius* (K.)

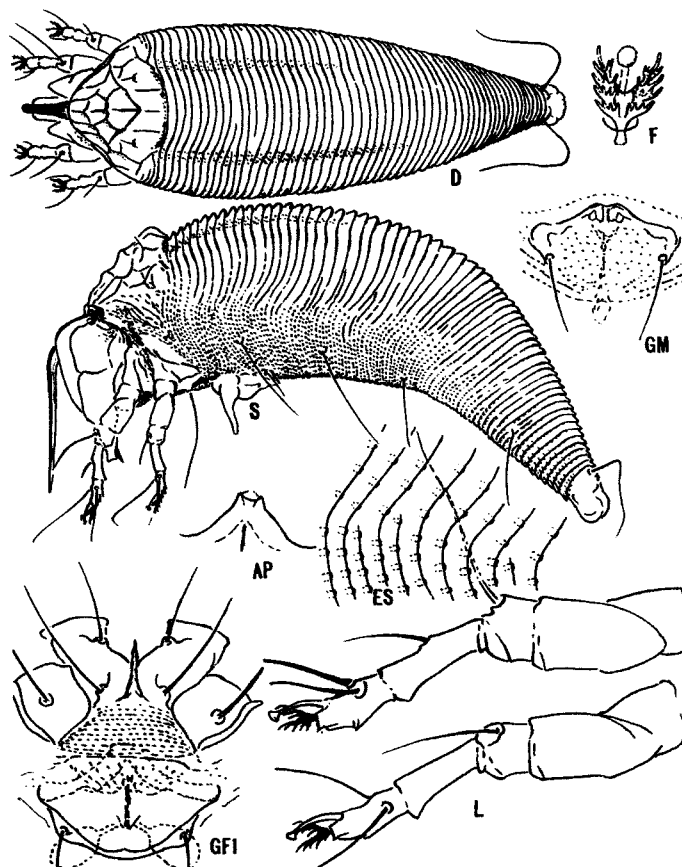


PLATE 39-1. *Diptacus gigantorhynchus* (Nal.)

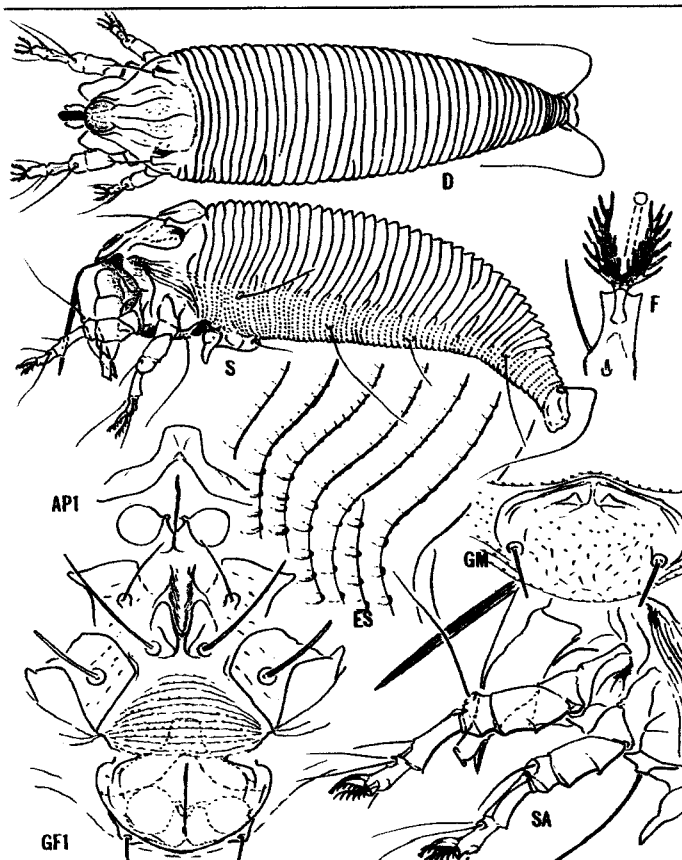


PLATE 39-2. *Diptacus sacramentae* (K.)

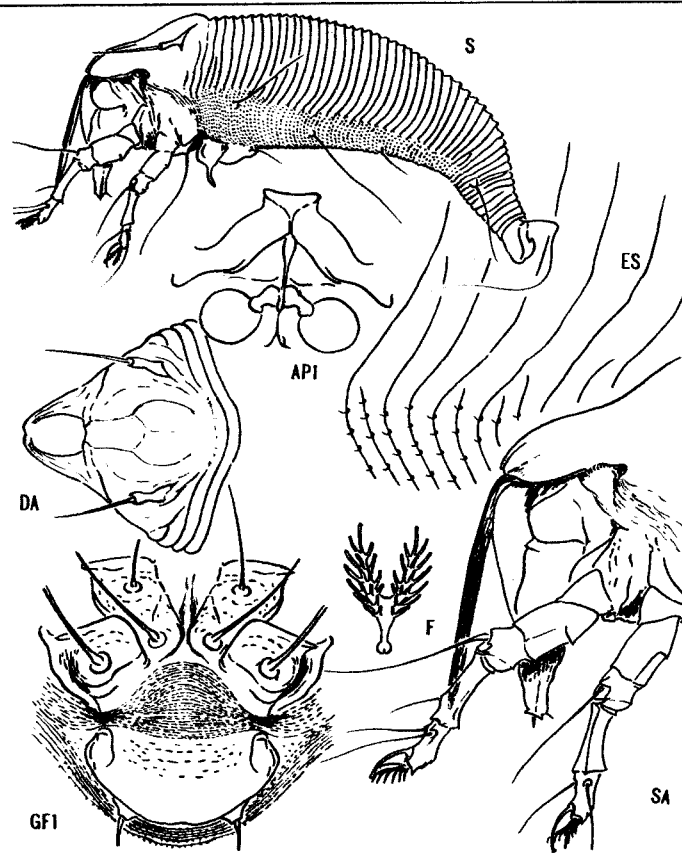


PLATE 39-3. *Diptacus calicoryli* (K.)