TAXONOMIC LISTING OF PACIFIC NORTHWEST GENERA

* - indicates definite records from the Pacific Northwest

PALAEOSOMATA (=BIFEMORATINA)	
Archeonothroidea	
*_Acaronychus_	32, **fig. 64**
*_Zachvatkinella_	32, **fig. 63**
Palaeacaroidea	
Palaeacarus	32, **fig. 61**
Ctenacaroidea	
*_Aphelacarus_	32, **fig. 59**
Beklemishevia	32, **fig. 62**
*_Ctenacarus_	32, **fig. 60**
ENARTHRONOTA (=ARTHRONOTINA)	
Brachychthonioidea	
*_Brachychthonius_	29-30, **fig. 53**
*_Eobrachychthonius_	29
*_Liochthonius_	29, **figs. 54, 55, 306**
Mixochthonius	29
Neobrachychthonius	29
Neoliochthonius (=_Paraliochthonius_)	29
Poecilochthonius	29
*_Sellnickochthonius_ (=_Brachychochthonius_)	29, **figs. 56-57**
*_Synchthonius_	29
Verachthonius	29
Hypochthonioidea	
*_Eniochthonius_ (=_Hypochthoniella_)	28, **figs. 51-52**
*_Eohypochthonius_	27-28, **figs. 44-45**
*_Hypochthonius_	28, **figs. 49-50**
*_Mesoplophora_	37, **figs. 76-77, 307**
Atopochthonioidea (=Phyllochthonoidea)	
*_Atopochthonius_	26, **fig. 43**
*_Pterochthonius_	25, **figs. 39-40**
Protoplophoroidea	
*_Cosmochthonius_	26, **figs. 41-42, 48**
Phyllozetes	26
*_Sphaerochthonius_	26, **fig. 46**
Protoplophora	37, **fig. 75**
Unplaced genus	
Nipponiella	26, **fig. 47**
PARHYPOSOMATA	
Parhypochthonioidea	
*_Gehypochthonius_	34, **fig. 65**
*_Parhypochthonius_	34, **fig. 66**
MIXONOMATA (=PTYCTIMINA pt)	
Phthiracaroidea	
*_Atropocarus_	38
*_Hoplophorella_	38, **fig. 78**
Hoplophthiracarus	38
*_Phthiracarus_	38, **figs. 79-80**
Euphthiracaroidea	
*_Euphthiracarus_	41, **figs. 86-88**
*_Maerkelotritia_ (=_Oribotritia_ sensu Walker)	39-40, **figs. 83-84**
*_Mesotritia_	40
*_Microtritia_	40-41, **fig. 85**
*_Oribotritia_ (=_Plesiotritia_)	39, **figs. 81-82**
*_Rhysotritia_	40
*_Synichotritia_	41
Perlohmannioidea	
*_Perlohmannia_	65, **figs. 164-166, 188**
Epilohmannioidea	
*_Epilohmannia_	65-66, **figs. 167-169, 187**
Eulohmannioidea	
*_Eulohmannia_	35, **figs. 67-68**
DESMONOMATA	
Crotonioidea (=Nothroidea)	
*_Camisia_	36, 68, **figs. 70-71, 73, 177-178, 308**
Heminothrus	71
*_Malaconothrus_	36, **fig. 74**
Mucronothrus	36
Neonothrus	71
*_Nothrus_	69, **figs. 179-182, 186, 310**
*_Platynothrus_	69-71, **figs. 183-185, 309**
*_Trhypochthonius_	35, **fig. 69**
Trhypochthoniellus	35
*_Trimalaconothrus_	36, **fig. 72**
Nanhermannioidea	
*_Nanhermannia_	95-96, **figs. 264-265, 311**
Hermannioidea	
*_Hermannia_	96, **figs. 267-268, 317**
BRACHYPILINA	
Hermannielloidea	
*_Hermanniella_	67, **figs. 170-172, 305**
Liodoidea	
Liodes	68, **fig. 176**
*_Platyliodes_	68, **fig. 173-175, 297**
Poroliodes	68
Teleioliodes	68
Plateremaeoidea (=Gymnodamaeoidea)	
*_Gymnodamaeus_	63, **fig. 159**
*_Jacotella_	64, **figs. 162, 298-299**
*_Johnstonella_	63
*_Joshuella_	64, **fig. 163**
Licnodamaeus	62, **fig. 159**
*_Nortonella_	64
*_Odontodamaeus_	63, **figs. 157-158, 161**
Plateremaeus	62

* indicates definite records from the Pacific Northwest.

ABSTRACT

Moldenke, Andrew; Fichter, Becky. Invertebrates of the H. J. Andrews Experimental Forest, western Cascade Mountains, Oregon: IV. The oribatid mites (Acari: Cryptostigmata). Gen. Tech. Rep. PNW-GTR-217. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; 1988. 112 p.

A fully illustrated key is presented for identifying genera of oribatid mites known from or suspected of occurring in the Pacific Northwest. The manual includes an introduction detailing sampling methodology; an illustrated glossary of all terminology used; two color plates of all taxa from the H. J. Andrews Experimental Forest; a diagrammatic key to the 16 major groups of adult oribatids; illustrations to aid in quick recognition of the 16 adult groups; keys to all adult genera; and a diagrammatic key to the major types of immature oribatid mites with local species illustrated. The text on adults is broken into 16 sections, each structured around a key to the genera within each major type of oribatid mite; the text associated with the keys describes each species from the Andrews Forest, its microhabitat preference, pattern of abundance, and seasonal phenology. A total of 246 scanning electron micrographs (with pointers indicating characters useful for identification) are provided to help in identifying species.

Keywords: oribatid mites, soil ecology, key.

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Text for Adults

INTRODUCTION

Densities of adult oribatids on the forest floor in H. J. Andrews Experimental Forest range from 15,000 to 120,000 per square meter. About 60 species are abundant and found in most litter samples collected there; these species are also the most abundant and widespread species throughout the coniferous biome of the Pacific Northwest.

The Andrews Forest has been designated a Long Term Ecological Reserve by the National Science Foundation, and functions as an integral cornerstone in understanding the ecology of North America as part of a continent-wide system of special research sites (Map 1). These sites serve as foci of integrative studies of ecological dynamics, especially involving changes spanning temporal phenomena longer than the term of typical research grants. Scientists at these sites have the responsibility to facilitate correlative studies throughout the ecological biome they represent, hence every effort was made in the present work to prepare a key of generalized utility throughout the entire Pacific Northwest.

Almost nothing is known about how these species function in nutrient cycling or in regulating populations of other soil fauna and microbes. Ecological investigations into the decomposition guild have been seriously hampered for many years because mites are so small and taxonomic reviews are lacking. We have designed this paper for nonspecialists to present detailed information on the distribution, seasonality, and abundance of the mites in the Andrews Forest; to provide a key to the species; and to stimulate ecological studies on the functional roles of oribatid mites throughout the Northwest, by providing a utilitarian key to all the genera likely to be found.

The Pacific Northwest coniferous biome extends from southern British Columbia through Washington and Oregon to coastal central California and the southernmost Cascades (Mount Lassen, California). Of the 209 genera treated in this key, about three-quarters are definitely known to occur in the Pacific Northwest (indicated by * in Taxonomic List of Northwest Genera). The other sixty are deemed likely to be found in additional studies in the region (Valin Marshall, Pacific Research Centre, Canadian Department of Forestry, Victoria; and Roy Norton, Syracuse University, Syracuse, New York; pers. comm.). About 100 genera known to occur in North America (Marshall et al. 1986) were not considered in the present work based on Norton's knowledge of their distribution patterns.

The three major sections of this paper are:

a) A pictorial key to major morphological groups of adult oribatids, based on characters easily recognized under a dissecting microscope. Some groups are artificial, but each one is a coherent morphological unit. The first composite plate (figs. 3 to 23) displays typical representatives of each group. Figures 24 to 26 show uropodine mesostigmatid mites which occur in most litter samples from the Andrews Forest. They may be confused with oribatids because mites in the two groups are similar in size, shape, and color.

b) Keys to genera in each broad morphological group of adult oribatid mites. We provide 16 separate keys to decrease the confusion inherent in identifying an unfamiliar group.

c) A pictorial key to the major morphological groups of immature oribatids, using characters easily visible under a dissecting microscope.

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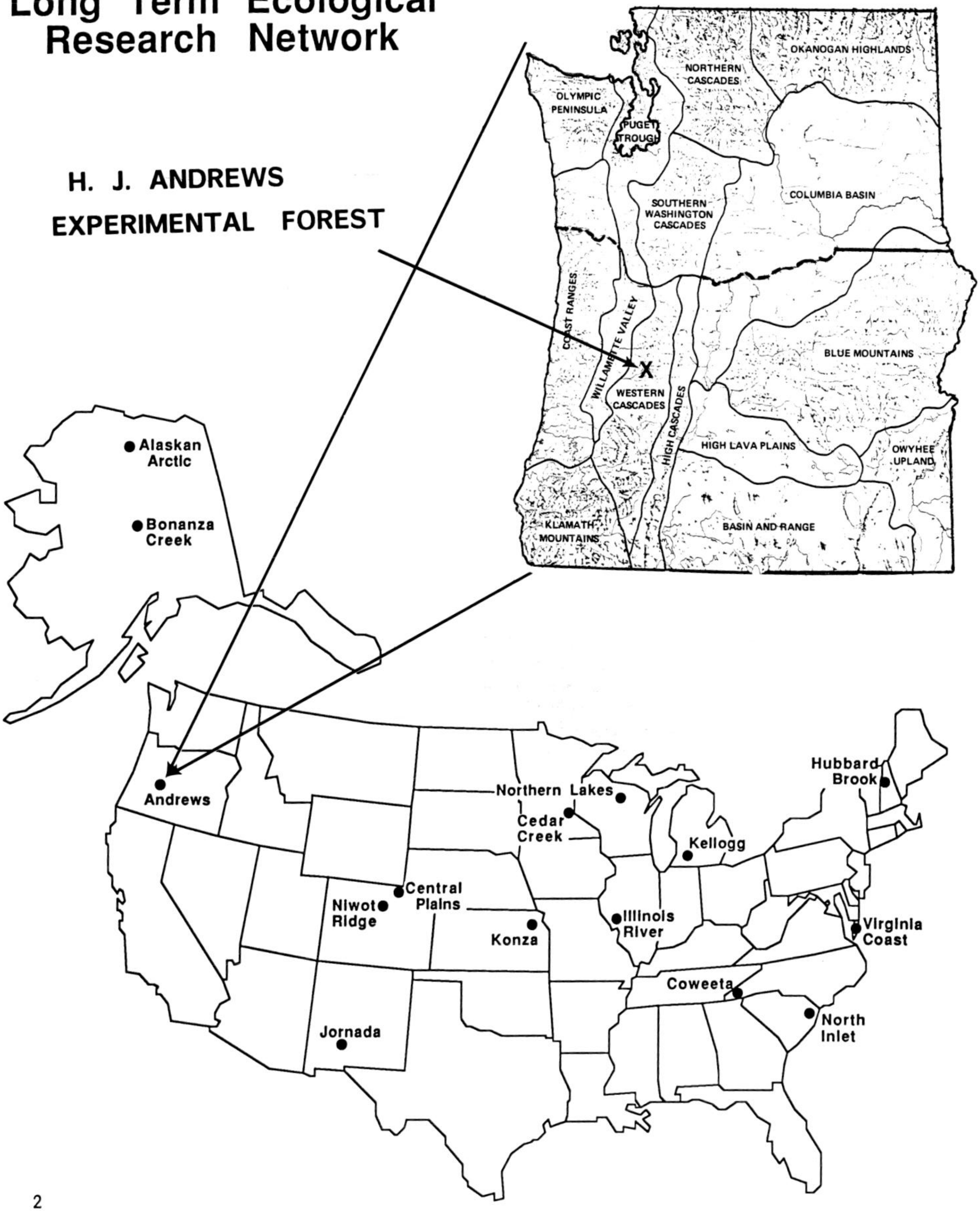
Long Term Ecological Research Network



PLANT COMMUNITY SAMPLING DESIGN

→ **successional gradient** →

	herb-dominated (1-7 yrs since clear cut)	**shrub-dominated (7-15 yrs since clear cut)**	**tree-dominated (20-35 yrs since clear cut)**	**old growth forest (300-400 yrs)**
xeric ↑	open bare ground; sparse grasses & herbs	scattered shrubby *Corylus* & *Acer*; *Rubus* & bare soil	Douglas-fir & hazel; *Rubus* & *Gaultheria*; some moss	dense overstory *Acer* & *Corylus*; moderate *Gaultheria* cover; dense moss
	dense *Epilobium* & some with dense *Rubus*	dense *Ceanothus* & *Acer*; bare ground	dense Douglas-fir & *Acer*; moderate to dense *Gaultheria*; moss present	dense moss cover; *Berberis* & *Gaultheria* OR *Rhododendron* & bare soil
↓ **mesic**	sparse herbs; some *Rubus*	dense *Ceanothus* & *Acer*; scattered herbs & fern; moss present	dense Douglas-fir & *Acer*; moderate *Gaultheria*, *Polystichum* & *Oxalis*; dense moss	dense *Polystichum* *Oxalis*, *Berberis*; dense moss

TABLE 1: At least 4 replicate samples were taken at six times each during a two year period for each one of the 4 successional x 3 moisture matrix communities. Franklin & Dyrness (1973) community designations for the different climax communities are:

xeric: *Pseudotsuga menziesii/Tsuga heterophylla; Corylus cornuta;*
mid-moisture: *Tsuga heterophylla; Rhododendron macrophyllum/Berberis nervosa;*
mesic: *Tsuga heterophylla; Polystichum munitum/Oxalis oregona.*

The four sections of photographs are:

d) Two color plates with Andrews Forest oribatids arranged in a continuous sequence by size. Resolution is not sufficient to identify them without a key. All taxa are placed in both the size and color context of an actual sample. In field-collected samples, teneral specimens (not yet fully melanized) in the process of moulting are encountered; only practical experience in sorting samples produces the ability to associate these unusual color forms with the appropriate fully adult morph.

e) A "Rogue's Gallery" of generalized adult oribatid morphotypes (figs. 3 to 23). These 16 taxa represent groups to which any oribatid collected from the forests of the Pacific Northwest can be assigned with cursory examination. Occasionally, these categories are congruent with currently recognized taxonomic entities (one to several superfamilies), but often they are artificial categories useful only in identification. This non-natural approach recognizes that many taxonomically important characters are extremely difficult for the novice taxonomist or ecologist to recognize.

f) Photographs of Andrews Forest oribatids and representative genera from other areas of the Pacific Northwest. The photographs were not chosen on esthetic grounds (many specimens carry material or cerotegument as they normally do in nature) nor to serve in a monographic revision. Most taxa are not illustrated on all surfaces, nor are all setae adequately demonstrable. We believe the pictures are appropriate to this introductory effort, however, as a means of identifying oribatid mites to genus and to show morphologic variability likely to be significant in sorting to the level of morphospecies.

g) A "Rogue's Gallery" of immature oribatids from the Andrews Forest. The life cycles of this fauna have not been studied in detail, hence this section represents an introductory aid to identifying the general group to which an immature oribatid belongs. Generic and specific distinctions are beyond the scope of this work.

All genera found in the Andrews Forest or suspected of inhabiting this region (Balogh 1972; Balogh and Mahunka 1982; Marshall et al. 1986; Norton, pers. comm.) are included in this treatment. The nomenclature adopted is that recommended in the oribatid catalog (Marshall et al. 1986), likely the only reference available to a general audience. Reference is provided to Balogh (1972) when nomenclatural treatments differ. Information on distribution of genera not yet found in the Pacific Northwest has been provided by the editors of the oribatid catalog (in press) and represents published citations; presumption that these genera may occur in the Pacific Northwest is based on the professional experience of specialists who edited this manuscript. The authors learned of the potential Northwestern distribution of the genera *Allodamaeus* (Plateremaeoidea), *Grypoceramerus* (Amerobelboidea), *Spinozetes* (Oppioidea), *Provertex* and *Passalozetes* (Passalozetoidea) for inclusion in the present text.

In some families, such as the Oppiidae and Brachychthoniidae, closely similar genera and species may be too difficult for novices to separate. Descriptive characters for all the North American genera in these groups are presented in tables for quick comparison. Taxonomic specialists should be consulted for assistance with these groups.

METHODS

A sampling design encompassing the principal tree associations of the Andrews Forest Long Term Ecological Reserve (Franklin and Dyrness 1973) was adapted in 1982 by Gary Parsons (Graduate Research Assistant, Oregon State University) to study insect fauna of the soil and litter. Each of eight climax vegetation associations was sampled in each of four successional stages; from this sampling design, we analyzed mesic, midmoisture, and xeric sequences of successional seres (Table 1). Sampling was conducted at different seasons during a 2-year period. Random samples of litter and soil were taken to a depth of 7 cm in two subsamples (later combined) of 25 x 25 cm each. Differential contribution of litter versus soil to the sample was not recorded. Samples were processed in Tullgren funnels and collected in 75-percent ethanol.

At least four replicate samples were taken from each of 12 community types (matrix of four successional seres by three moisture regimes). A total of 318 samples were were brought to the laboratory, agitated with mineral oil, and the inorganic debris allowed to settle to remove inorganic debris. Larger invertebrates were removed and the remaining mesofauna placed in a 50- x 9-mm petri plate in a film of mineral oil for identification and permanent storage. A subsample (a half or quarter of the total) was sorted in samples with abundant oribatids. Original data and specimens are available in the H. J. Andrews reference collection at Oregon State University.

ANDREWS FOREST ORIBATID FAUNA

The response of the oribatid fauna to the moisture gradient is presented in Table 2. Preference for a particular stage in succession or microhabitat is presented in Table 3. Species without a consistent preference are omitted from the tables (principally rare or uncommon species).

The pattern of seasonal abundance for each species is described in the text of the key. Most Andrews Forest oribatid species follow the same generalized phenological abundance curve, and hence the abundance of each species is compared to the phenology of total oribatids (fig. 1). Total oribatid seasonal abundance is strongly bimodal within narrow estimates of standard deviation. Abundance of nearly all species of oribatids (and likewise of total oribatids) is highest in spring and fall.

Table 2
Summary of Distribution Preferences in Andrews Forest

driest conditions

Anachipteria small
Brachychthonius
Ceratozetes 310μ
Ceratozetes 460μ
Ceratozetes 580μ
Ceratoppia small
Eohypochthonius
Hypochthonius
Jacotella
Leuroxenillus
Nanhermannia
Scheloribates 380μ
Scheloribates oblong
Zygoribatula
Oribatella 290-340μ

driest & mid-moisture

Anachipteria big
Cultroribula
Gustavia
Oribotritia megale
Perlohmannia small
Sphaerozetes

mid-moisture

Eporibatula
Eupelops
Hungarobelba
Propelops

mid-moisture to mesic conditions

Anachipteria (cerotegument)
Liacarus tan
Liochthonius
Scheloribates 280μ
Scheloribates 460μ

most mesic conditions

Ceratoppia big
Ceratozetes 380μ
Epilohmannia
Euphthiracarus
Hermanniella small
Metrioppia
Oppiella small
Oribatella mid
Oribatella big
Peltenuiala pacifica
Perlohmannia big
Quadroppia quadricarinata
Sphodrocepheus anthelionis

no preference exhibited

Achipteria
Caenobelba
Carabodes
Ceratoppia
Damaeid n.genus #2
Epidamaeus
Eremaeus
Hermanniella big
Hermanniella small
Liacarus big spp.
Nothrus silvestris
Maerkelotritia big
Maerkelotritia small
Oppiella big
Phthiracarus big
Phthiracarus small
Rhinosuctobelba
Sphodrocepheus tridactylus
Tectocepheus velatus

Table 3

Summary of Distribution Preferences in Andrews Forest

herb stage of clear-cut
- *Ceratozetes* 460μ
- *Ceratozetes* 580μ
- *Jacotella*

herb stage & shrub stage
- *Achipteria*
- *Brachychthonius*
- *Propelops*
- *Scheloribates* 380μ
- *Anachipteria* (cerotegument)

shrub stage after clear-cut
- *Eupelops*
- *Gustavia*
- *Hungarobelba*
- *Maerkelotritia* big
- *Oribatella* mid
- *Oribatella* big
- *Oribotritia megale*
- *Scheloribates* 460μ
- *Scheloribates* oblong
- *Zygoribatula*

shrub stage & tree stage
- *Hermanniella* small
- *Leuroxenillus*
- *Liochthonius*
- *Maerkelotritia* small
- *Metrioppia*
- *Nothrus silvestris*
- *Perlohmannia* big

tree stage regrowth
- *Eporibatula*
- *Euphthiracarus*
- *Nanhermannia*
- *Sphodrocepheus anthelionis*

tree regrowth & old growth
- *Anachipteria* small
- *Carabodes*
- *Ceratoppia* mid
- Damaeid n.genus #2
- *Epilohmannia*
- *Oribatella* small
- *Phthiracarus* small
- *Tenuiala*

old growth forests
- *Ceratoppia* big
- *Eremaeus*
- *Hermanniella* mid
- *Hermanniella* big
- *Liacarus* tan
- *Oppiella* small
- *Peltenuiala pacifica*
- *Phthiracarus* big
- *Sphaerozetes*
- *Sphodrocepheus tridactylus*

arboreal old growth canopy
- *Camisia carrolli*
- *Eremaeus* 2 spp.
- *Hypozetes*
- *Jugatala* 2 spp.
- *Odontodamaeus veriornatus*
- *Platyliodes macroprionus*
- *Scheloribates* sp.
- *Scapheremaeus*

no preference indicated
- *Caenobelba*
- *Ceratozetes* 310μ
- *Eohypochthonius*
- *Epidamaeus*
- *Liacarus* big spp.
- *Maerkelotritia* big
- *Oppiella* large
- *Perlohmannia* small
- *Quadroppia quadricarinata*
- *Rhinosuctobelba dicerosa*
- *Suctobelbella* spp.
- *Tectocepheus velatus*

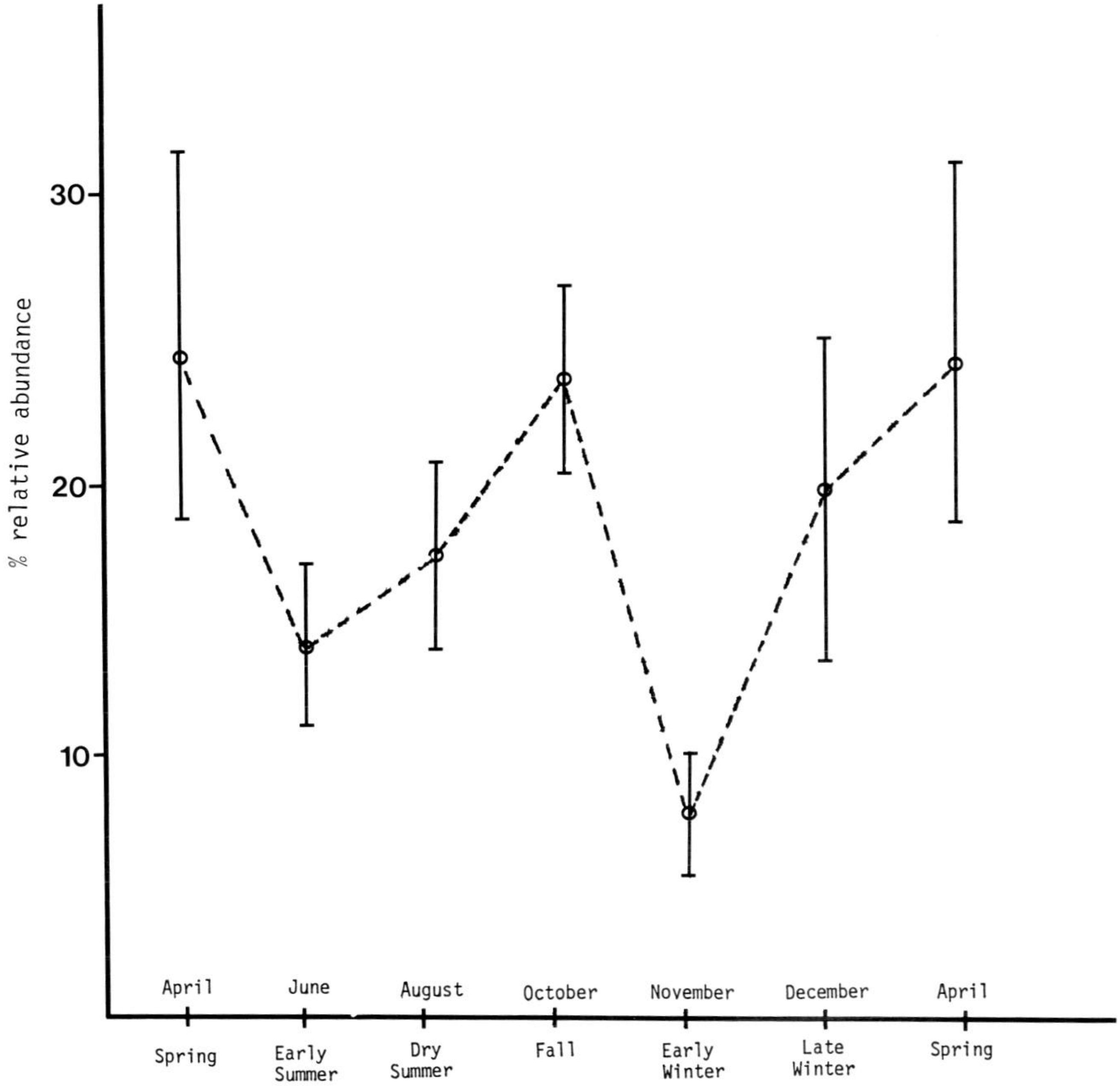


Figure 1: Bimodal pattern of abundance of total oribatid species at Andrews Forest. Means and standard deviations are calculated from the percentage of annual capture of each of the 90 commonest oribatid species. Data are calculated species by species to avoid bias inherent in the sampling design in which all sites were not sampled equivalently at all seasons.

ACKNOWLEDGMENTS

Specimens were taken primarily from those collected by Gary Parsons for his thesis research on insects of the soil and litter layers of the Andrews Forest Long Term Ecologic Reserve. Correlative unpublished studies of oribatid mites from nearby localities in Oregon, Washington, and California add significantly to the generalizations presented herein (Topic 1982; Forest floor accumulation and decomposition in the western Cascades of Oregon, Ph.D. thesis, University of Oregon; D. Walter, 1981; Patterns in a decomposer community: the oribatid mites of Monterey pine litter; M.S. thesis, University of California, Berkeley; and Seastedt and Cline, Microarthropod densities and composition in fallen and decaying trees of coniferous forests (in preparation). Special thanks go to David Walter and Gerald Krantz for sharing their expertise. Valin Marshall permitted access to an unpublished manuscript for checking nomenclatural usage and distributions, as well as providing specimens for photographs.

Valuable editorial suggestions were provided by Martha Brookes, Gerald Krantz, J. D. Lattin, Joanne Lawrence, Valin Marshall, and Roy Norton.

The scanning electron micrographs were taken by Albert Soeldner and his capable staff of the Botany and Plant Pathology Department, Oregon State University. Illustrative layout was meticulously performed by Stuart Sloan, who also prepared the half-tones for publication.

This paper represents a partial contribution (no. 17) of the project entitled "The Fallen Tree--an Extension of the Live Tree." Cooperating on the project are the U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; Oregon State University, Department of Forest Science; U. S. Department of Agriculture, Agricultural Research Service; and Oregon Department of Fish and Wildlife.

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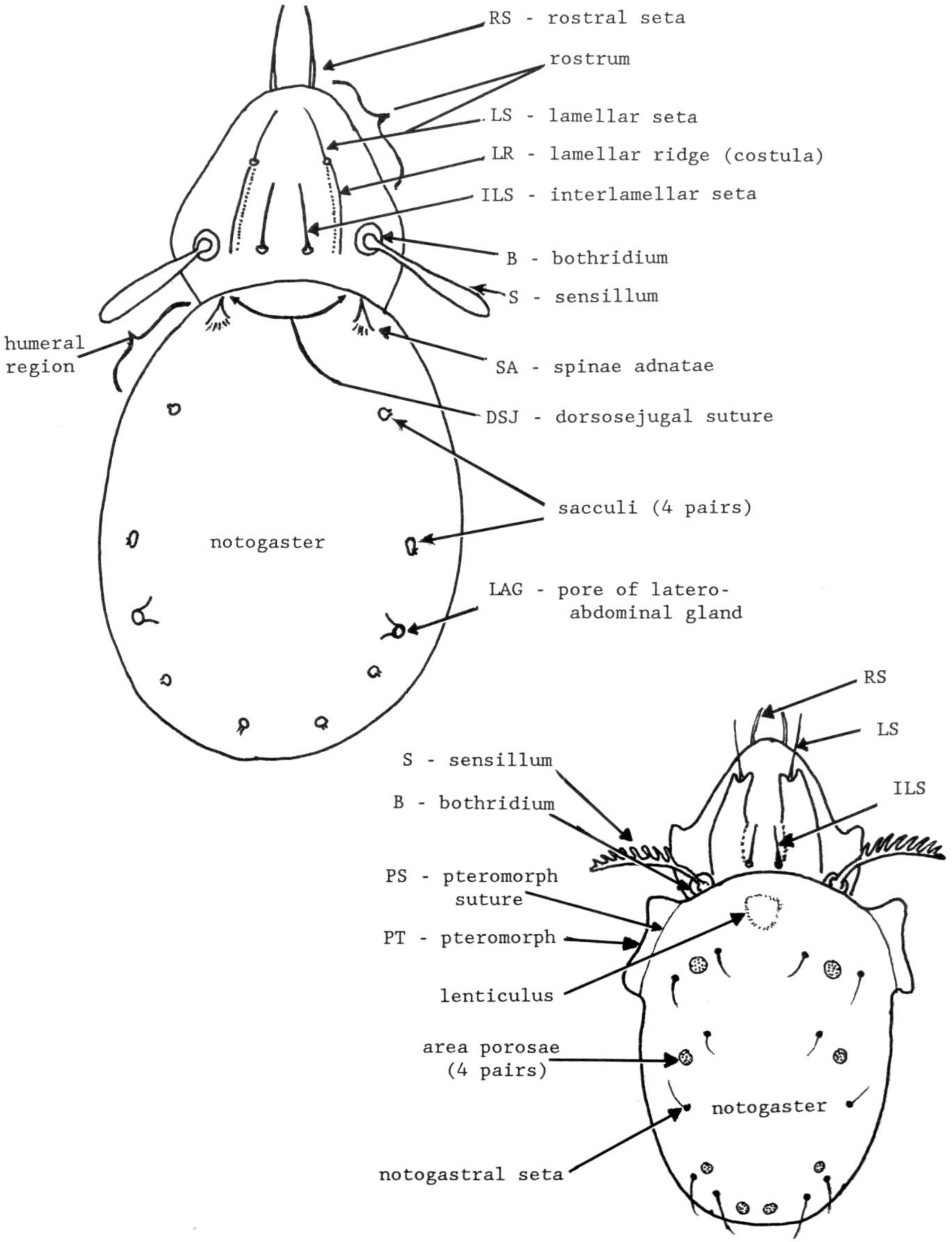
ILLUSTRATED MORPHOLOGIC ORIBATID STRUCTURES



GLOSSARY

(abbreviations in parentheses are utilized on the figures)

ABUNDANCE: relative density of one species compared to all others in sample, averaged over all samples.

ADANAL SCLERITE (AAS): ventral shield just to the side of the anal sclerite. Very few genera have adanal sclerites.

ADANAL SETAE: group of setae located just to the side of the anal sclerite, either on adanal sclerite, if present, or on the ventral surface.

ADGENITAL SCLERITE: pair of shields located just to the side of the genital sclerites. Very few of our genera have adgenital sclerites.

ADGENITAL SETAE: group of setae located just to the side of the genital plates or on the adgenital sclerite, if present.

ADNATAE: see spinae adnatae.

ANAL SCLERITE (AS): ventral shield located lateral to the anus and posterior to the genital shield.

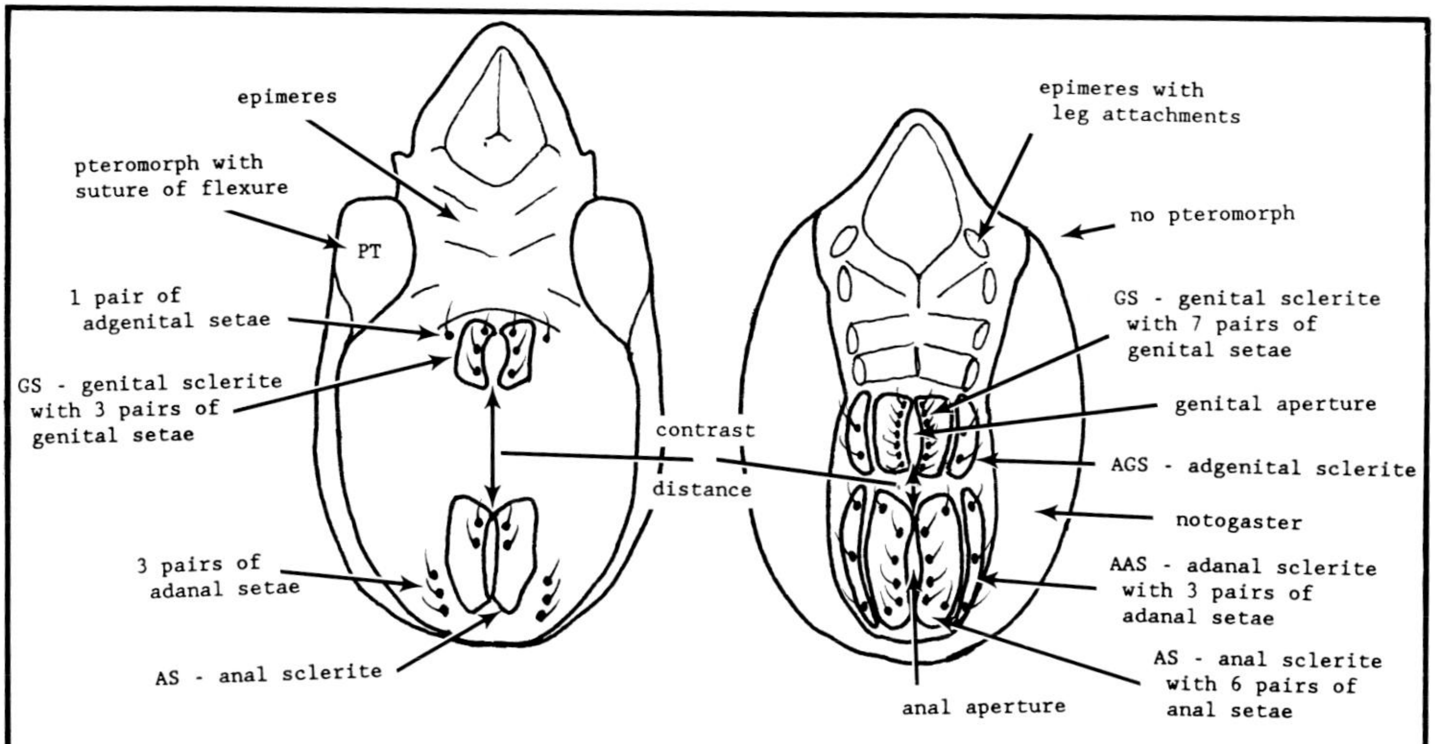


Figure 2: Diagrammatic ventral views of advanced (left) and primitive oribatids, showing the position and number of ventral sclerites.

ANTERIORLY: toward the front of the body.

ANTEROMESALLY: on the midline towards the front of the body.

APOPHYSIS: projection from the body surface.

AREAE POROSAE (AP): thinner portions of the notogaster supplied with dense fine tubular pores and thus appearing micropunctate. Usually in four pairs, if present.

BIPECTINATE: referring to a branched seta, both branches of which are comblike.

BIRAMOUS: with two branches, like a Y or a T.

BEADED LEGS: the legs of the Damaeoidea, Plateremaeoidea, and some small Oripodoidea, which are alternately swollen and narrow, resembling a necklace made from pop beads ("moniliform").

BOTHRIDIUM (B): the socket on the prosoma that gives rise to the sensillum. Usually directed laterally; if directed dorsally or hidden by the dorsosejugal suture, it is useful in identification.

CAPITATE: shaped like a ball (head) on top of a thin neck; referring to setae or the sensilla.

CARINA: a thickened ridge (usually linear) rising above the surrounding flat surface.

CARINATE: with a carina or ridge.

CEROTEGUMENT (CT): a waxy exudate covering the external body surfaces, often thick enough to obscure the setae or surface patterning.

CHELICERAE (CH): appendages near the mouth, which are pincher-like. In *Gustavia, Eupelops*, *Rhinosuctobelba*, and *Suctobelbella* they are so modified that they no longer resemble lobster-claws.

CLAVATE: club-shaped; referring to setae or the sensillum.

CONSTANCY: the number of subsamples in any of the 12 community types in which the species occurred in an abundance of more than three individuals.

COSTULA: very reduced lamellae on the surface of the prodorsum, which appear as inconspicuous longitudinal ridges ending anteriorly at the insertions of the lamellar setae.

CRISTA: a saddle-like prominence on the anteromesal portion of the notogaster of the Oripodoidea. Varies from a pair of lateral tubercules (concave between) to a pair of long, high ridges flanking a deep depression.

CUSP: tooth; generally referring to the shape of the tip of the lamella.

DECUMBENT: lying down; referring to setae relative to the body surface.

DENTATE: with tooth-like projections, usually at the tip.

DORSAL SETAE: setae located on the top surface of the notogaster.

DORSOSEJUGAL SUTURE (DSJ): the groove separating the prodorsum from the notogaster in dorsal view.

EMARGINATE: with an irregular margin, as if a bite had been removed from the edge.

EPIMERES: shields on the venter of the prosoma to which the legs and leg muscles are attached.

EPIPHYTIC: referring to mosses and lichens located on the branches of trees.

EUPTERY: presence of pteromorphs capable of flexion.

EXUVIAE: the shed skins of the nymphal stages; attached in regular geometric patterns to the surface of the adults of certain species.

FEMORAL: pertaining to the upper leg segment.

FILIFORM: thread-shaped.

FUSIFORM: spindle-shaped, wide in the middle and thin at both ends; referring to the shape of the sensillum.

GENITAL SCLERITES (GS): pair of shields surrounding the genital aperture in the center of the venter. A fully formed and distinct genital sclerite indicates adulthood.

GENITO-ANAL PLATES (GAP): mid-ventral longitudinal sclerites representing the fusion of the genital/anal sclerites and adgenital/adanal sclerites (in the Euphthiracaroidea only).

GENU: the leg segment between the femur and the tibia.

GLABROUS: smooth, shining, without setae.

GYMNONOTIC: refers to a notogaster without area porosae, sacculi, or pores.

HUMERAL ANGLE: region of the notogaster at the termini of the dorsosejugal suture; refers to the deviation from a smooth curve produced by any protrusion of the notogaster, such as pteromorphs.

INTERLAMELLAR SETAE (ILS): the prominent pair of setae on the posterior dorsal surface of the prosoma between the bases of the lamellae.

LAMELLA (L): flanged protective shield on the dorso-lateral portion of the prodorsum; fused to the surface along posteromesal edge (usually) and assuming many diverse forms (see illustration on next page for descriptive terminology).

LAMELLAR RIDGE (LR): refers to a pair of longitudinal ridges or "costulae" on the surface of the prodorsum, never present along with true lamellae.

LAMELLAR TOOTH (LT): the tooth-like anterior tip of the lamella.

LAMELLATE: with a pair of true lamellae.

LAMELLAR SETA: the seta located at the anterior tip of the lamellar cusp or lamellar ridge.

LANCEOLATE: spear-shaped, refers to setae or sensilla.

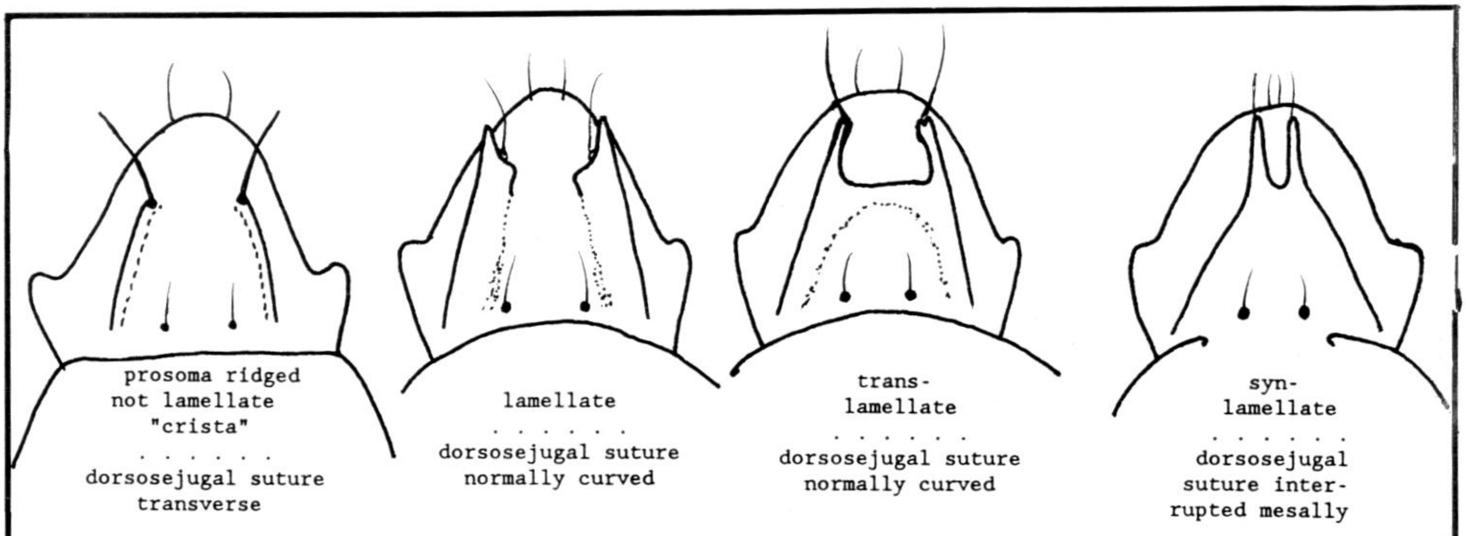


Figure 3: Diagrammatic types of lamellae.

LATERO-ABDOMINAL GLAND: a glandular structure located under the postero-lateral portion of the notogaster and opening to the surface by a large pore. Visible in very few genera of the Northwest.

LENTICULUS: a blanched lens-shaped region in the anteromedial portion of the notogaster; found on species which are otherwise darkly melanized.

MANDIBULAE: the opposable joint at the tip of the chelicerae.

MENTAL TECTUM (MT): a broad shield on the vertral surface of the prosoma concealing the chelicerae in ventral view.

MESAL: towards the midline.

MONODACTYLY: having a single tarsal claw per leg. Characteristic of all immature oribatids but very few adults except for the smallest species.

MULTISETOSE: with many setae.

NOTOGASTER: the shield covering the dorsum of the opisthosoma.

NYMPHAL SHED SKINS (NSS): exuviae of immature stages carried on the dorsum of the adult of certain species.

OPISTHONOTAL SUTURES: transverse sutures across the entire width of the opisthosoma, characterisitc of the Enarthronota.

OPISTHOSOMA: the posterior body segment; the region of the body posterior to the fourth pair of legs.

PECTINATE: comb-shaped; refers to the sensillum.

PEDOTECTUM (PT): a protrusion arising from above the base of the legs and extending forward and laterally over the leg.

PICTURE HEIGHT: the height (in microns = μ) of the full frame pictured.

PERIANAL PLATES: see adanal sclerites.

PLUMOSE: feather-like; refers to setae that are covered with finer setae.

PORI: four pairs of sac-like structures under the notogaster and opening to the surface by a constricted pore (see sacculi).

PORONOTIC: having pori under the notogaster.

PRODORSUM: the dorsal portion of the mite anterior to the notogaster.

PTEROMORPHS (PTEROGASTERS) (P): wing-like extensions of the notogaster in the humeral region.

PTEROMORPH SUTURE (PS): a sulcus resulting in an axis of flexure at the base of the pteromorphs. Few mites with pteromorphs are capable of flexing them.

PUBESCENT: with setae.

RETICULATE: a netlike surface pattern formed by fine surface ridges and grooves.

ROBUST: oval in outline, not elongate.

ROSTRAL SETAE: a pair of setae on all oribatid mites on the anterior tip of the snout.

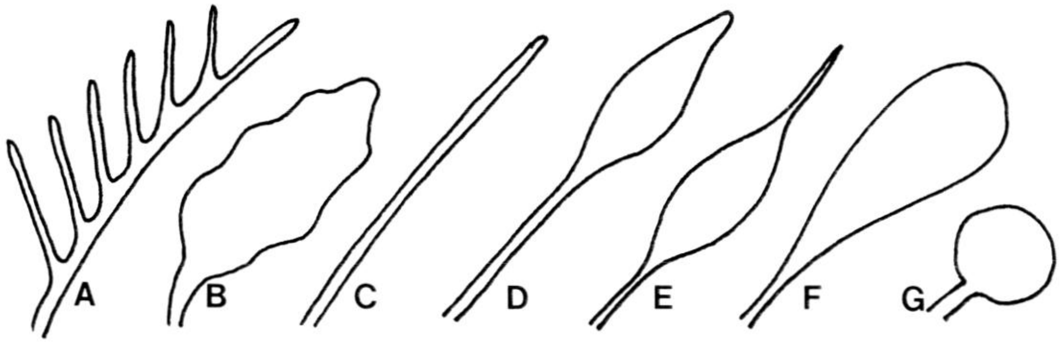
ROSTRUM (R): the anterior portion of the dorsal surface of the snout.

RUTELLUM: horizontal plate enclosing the mouth region from below.

SACCULONOTIC: notogaster with sacculi.

SACCULI: four pairs of sac-like structures located under the notogaster and opening to the surface through a slit (see pori).

SCLERITE: a hardened, inflexible shield on the body surface.



sensillar shapes: A: pectinate (comb-like); B: thalloid (leaf-like); C: filiform (hair-like); D: lanceolate (spear-like); E: fusiform (spindle-like); F: clavate (club-like); G: capitate (ball-like)

Figure 4: Types of sensillar morphology.

SENSILLUM (S): the antenna-like structure arising from the bothridial socket. (for descriptive terminology see illustration).

SERRATE: saw-like, with a linear row of teeth.

SETIFORM: formed like a simple seta.

SETOSE: bearing setae.

SPATULATE: resembling the shape of a spatula (somewhat spoon-like).

SMOOTH PATCHES: smooth regions on the dorsal surface of the prosoma in the Suctobelboidea, contrasting with the warty or carinate remainder.

SPINAE ADNATAE: a pair of tubercular teeth arising at the end of the dorsosejugal suture from the anterior edge of the notogaster.

STIPPLING: a surface pattern of fine, dense, pore-like depressions.

SULCUS: a linear groove in the surface integument.

SUPRAPLEURAL PLATES: in the Brachychthoniidae, this term refers to a series of sclerites on the side of the body between the notogaster and the usual ventral sclerites (see fig. 58 for position designation).

SUTURE: a linear groove in the surface integument, along which movement is usually possible.

SYNLAMELLATE: refers to the lamellae when they are fused for most of their length and form a shelf over the prodorsum.

TRANSLAMELLA (TL): refers to lamellae fused for their basal half to the prodorsum, apical teeth connected by a transverse carina or ridge.

TRANSLAMELLAR TEETH (TT): any tooth-like structures found along the carina joining the tips of the translamella.

TRANSVERSE: across the longitudinal body axis; usually refers to a straight line perpendicular to body length.

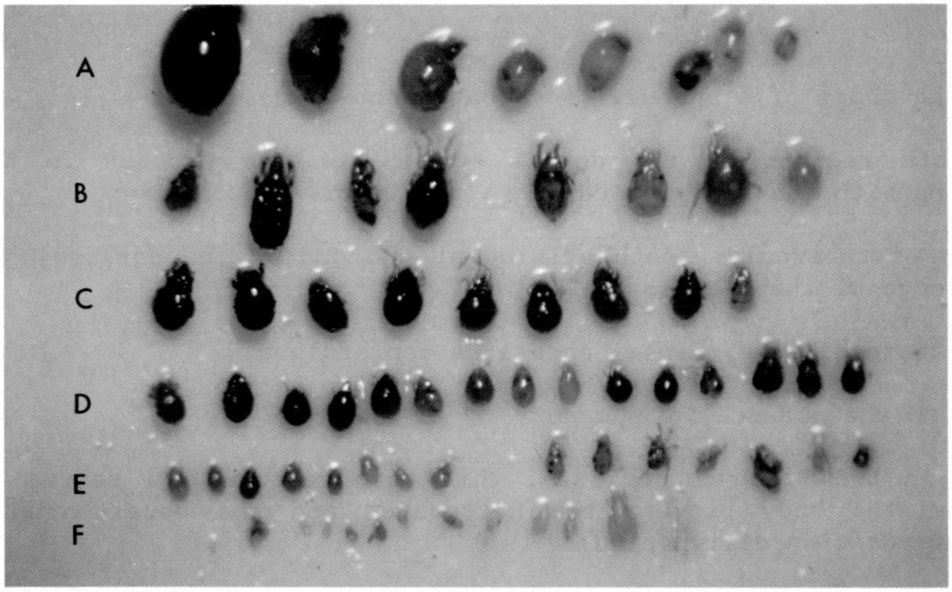
TRANSVERSE SUTURE (TS): a region of flexure entirely across either the notogaster or opisthosomal venter.

TRIDACTYLY: the normal condition in adult oribatids, possessing three tarsal claws per foot.

TRUNCATE: cut off square-transversely at the tip.

TUBERCULATE: with a short, oval protrusion from the surface.

COLOR COMPARISON OF ANDREWS FOREST SPECIES



LEGEND:

ROW A: 1)*Oribotritia megale*; 2) large *Maerkelotritia*; 3) large *Phthiracarus*; 4) medium *Phthiracarus*; 5) *Euphthiracarus tanythrix*; 6) small *Maerkelotritia*; 7) small *Phthiracarus*; 8) *Microtritia paeniminima*.

ROW B: 1) *Rhinosuctobelba dicerosa*; 2) large *Perlohmannia*; 3) small *Perlohmannia*; 4) *Epilohmannnia* n. sp.; 5) *Platylioides macroprioides*; 6) *Trachytes* sp. (non-oribatid); 7) non-oribatid; 8) non-oribatid.

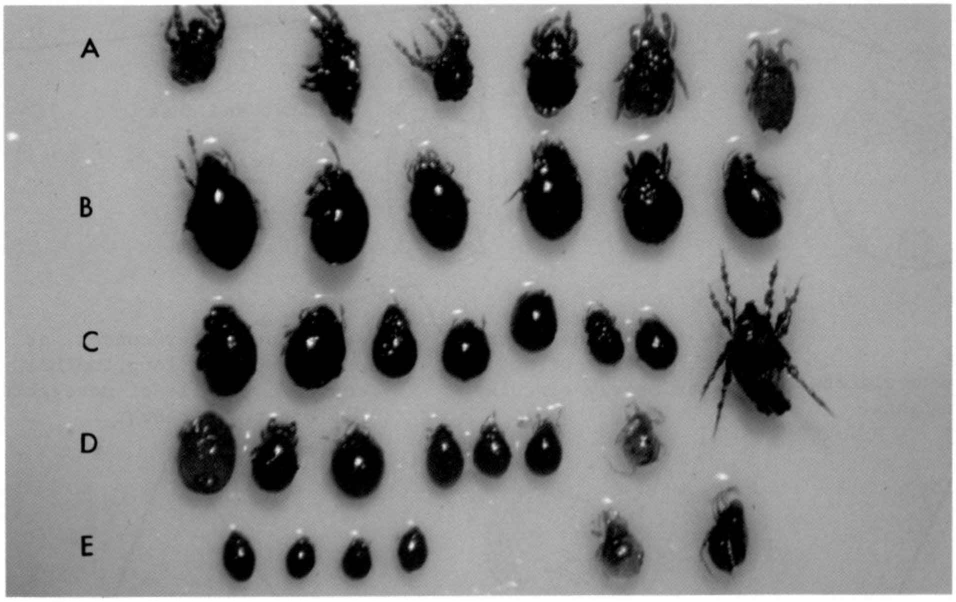
ROW C: 1) common *Eremaeus*; 2) large *Hermanniella*; 3) *Jugatala tuberosa*; 4) large *Ceratoppia*; 5) large *Ceratoppia*; 6) medium *Ceratoppia*; 7) arboreal *Eremaeus*; 8) medium *Hermanniella*; 9) Great Basin *Eremaeus*.

ROW D: 1) small *Hermanniella*; 2) *Ametroproctus* sp.; 3) *Pergalumna* sp; 4) small tan *Liacarus*; 5) *Sphaerozetes* sp.; 6) *Zygoribatula* sp.; 7) tear-shaped *Scheloribates*; 8) 160 μ *Ceratozetes* sp.; 9) *Phauloppia* sp.; 10) *Metrioppia oregonensis*; 11) 380 μ *Ceratozetes* sp.; 12) small *Ceratoppia*; 13) *Trhypochthonius americanus*; 14) *Nanhermannia* sp.; 15) *Scapheremaeus* sp.

ROW E: 1) 400 μ *Scheloribates* sp.; 2) 310 *Ceratozetes* sp.; 3) common small *Oribatella*; 4) tear-shaped *Ceratozetes*; 5) *Tectocepheus velatus*; 6) small *Carabodes*; 7) *Oppiella nova*; 8) large *Suctobelbella*; SPACE ; 9) *Oppia* sp.; 10) *Jacotella* sp.; 11) small *Caenobelba*; 12) *Hungarobelba* sp.; 13) *new genus #2* of damaeid, near Hungarobelba; 14) *Hungarobelba* sp.; 15) *Epidamaeus* sp.

ROW F: 1) *Epidamaeus* sp.; 2) *Brachychthonius* sp.; 3) *Eporibatula* sp.; 4) *Furcoribula* sp.; 5) common *Suctobelbella*; 6) *Quadroppia quadricarinata*; 7) *Oppiella* sp.; 8) *Zachvatkinella* sp.; 9) *Eohypochthonius* sp.; 10) *Hypochthoniella* sp.; 11) *Hypochthonius rufulus*; 12) *Eulohmannia ribagei*.

COLOR COMPARISON OF ANDREWS FOREST SPECIES



LEGEND:

ROW A: 1) *Caeculus* sp. (non-oribatid); 2) *Camisia spiniger*; 3) *Belba californica*; 4) *Platynothrus* sp.; 5) *Nothrus silvestris*; 6) *Camisia carrolli*.

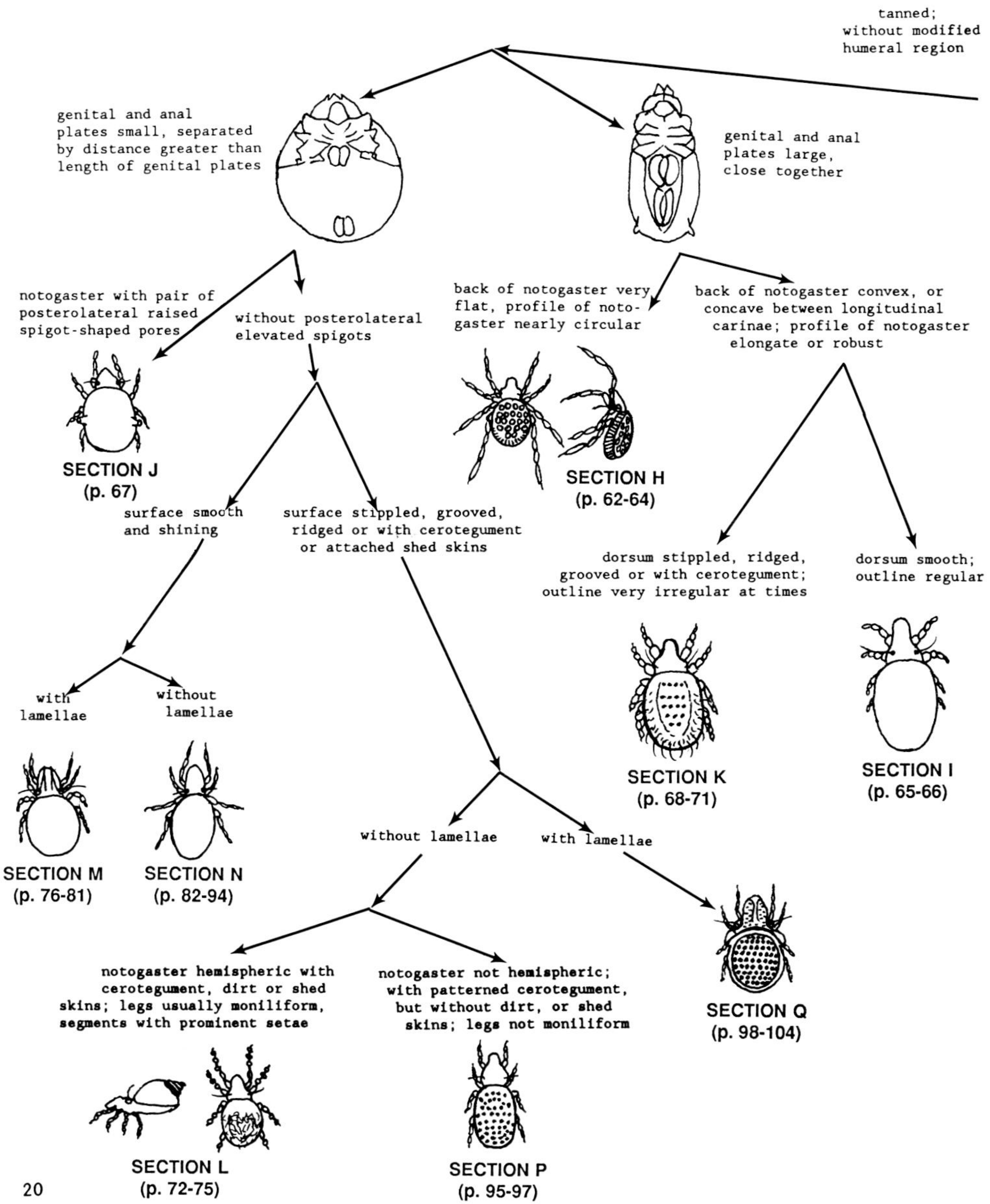
ROW B: 1) large *Stonyxenillus*; 2) *Liacarus spiniger*; 3) small *Stonyxenillus*; 4) *Leuroxenillus* sp.; 5) *Megeremaeus ditrichosus*; 6) *Liacarus robustus*.

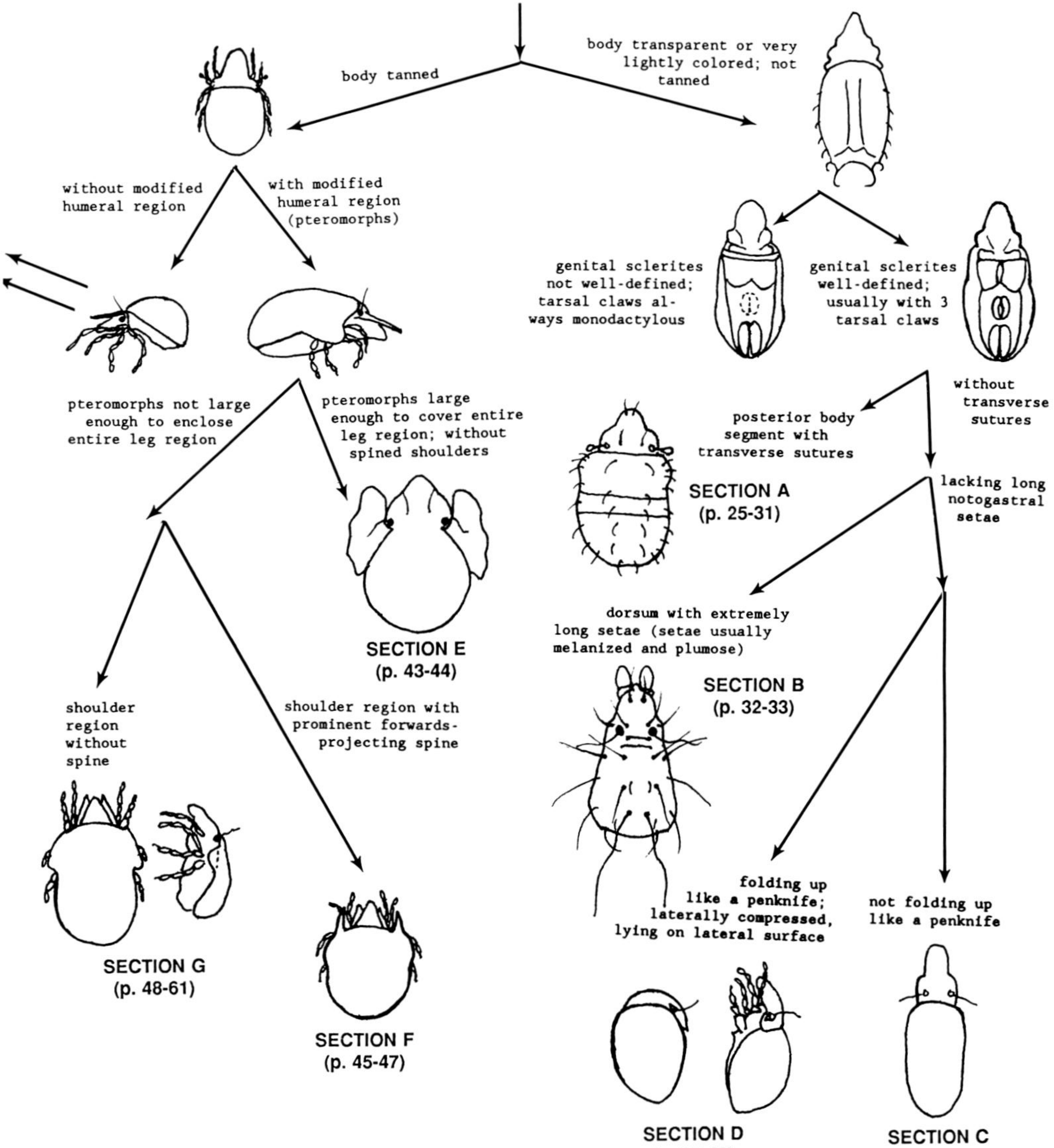
ROW C: 1) *Hermannia* sp.; 2) *Sphodrocepheus tridactylus*; 3) *Eupterotegaeus* sp.; 4) *Eupelops* sp.; 5) subalpine *Pergalumna*; 6) large *Carabodes*; 7) warty cerotegument *Anachipteria*; 8) *Belba californica*.

ROW D: 1) Uropodid (non-oribatid); 2) large *Hermanniella*; 3) *Peltenuiala californica*; 4) small tan *Liacarus*; 5) large *Oribatella*; 6) *Liacarus bidentatus*; 7) large *Caenobelba*.

ROW E: 1) *Achipteria* sp.; 2) common *Anachipteria*; 3) *Propelops canadensis*; 4) *Anachipteria* with pedotecta; 5) large *Caenobelba*; 6) *Odontodamaeus veriornatus*.

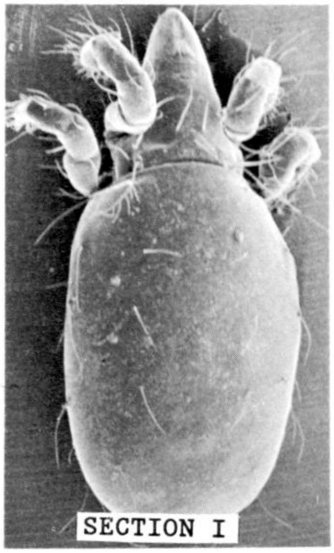
DIAGRAMMATIC KEY TO MAJOR TYPES OF ADULT ORIBATIDS





DIAGRAMMATIC KEY TO MAJOR TYPES OF ADULT ORIBATIDS

MAJOR ORIBATID TYPES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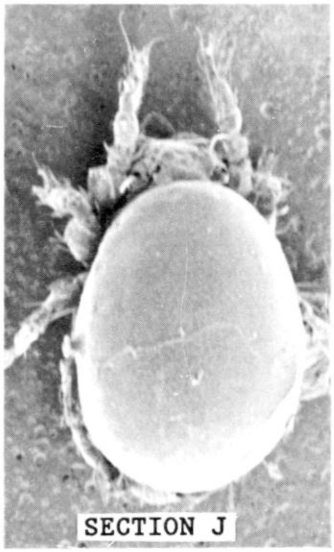
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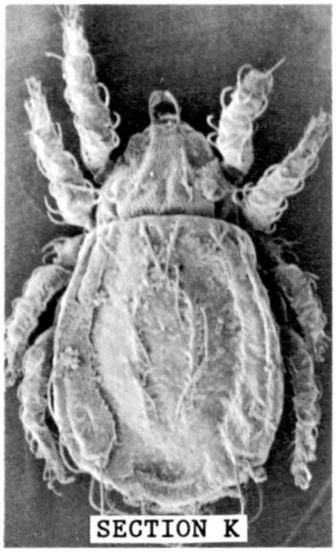
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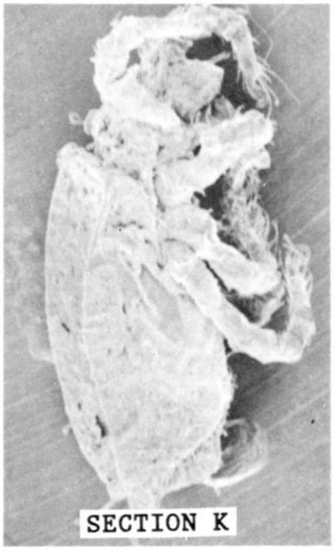
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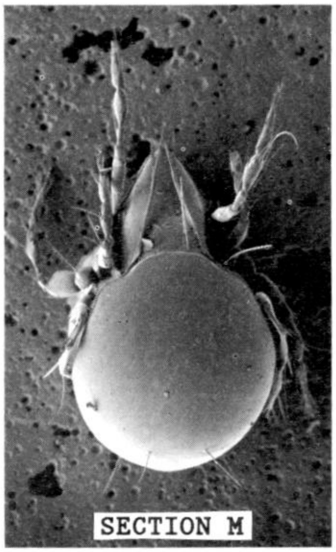
SECTION L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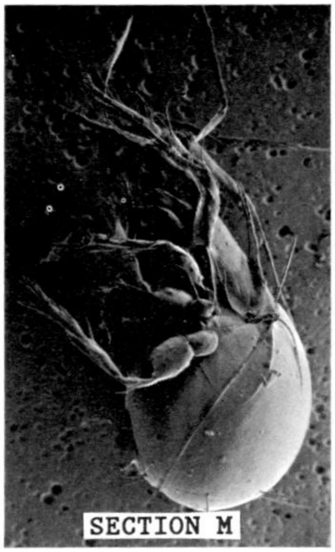
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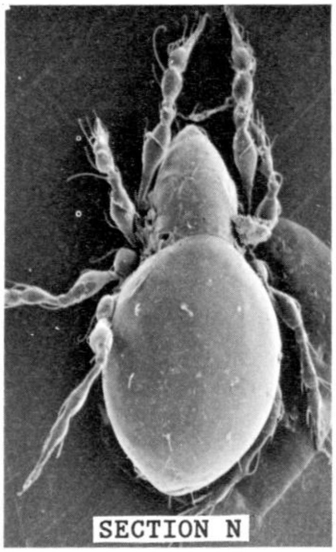
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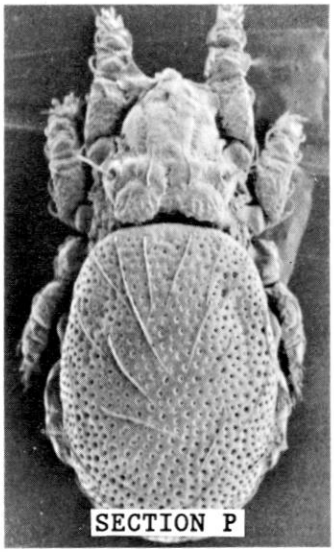
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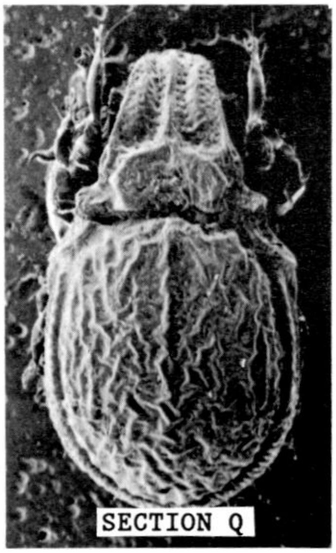
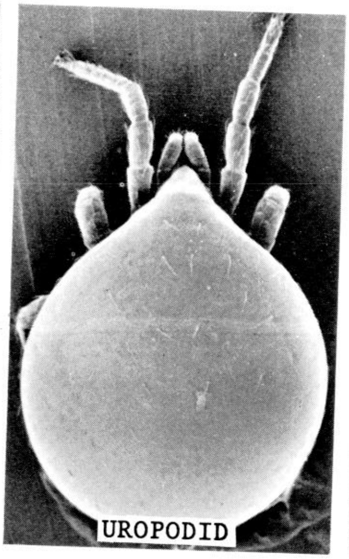

SECTION Q


SECTION Q

ABUNDANT non - ORIBATID TYPES


UROPODID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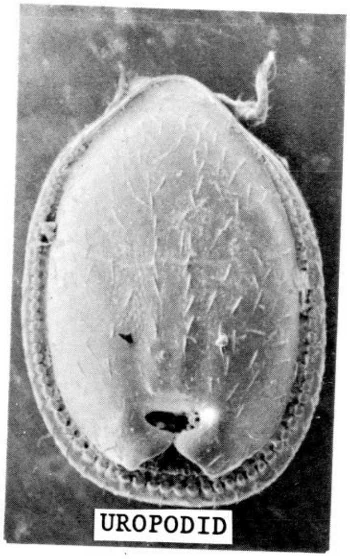
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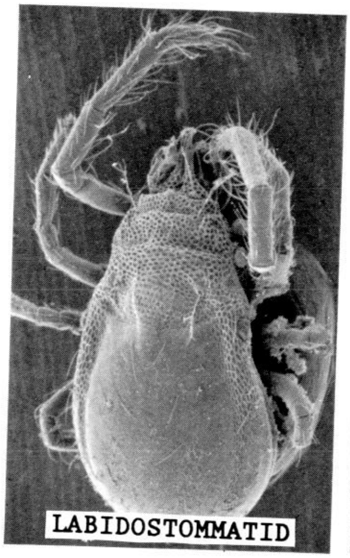
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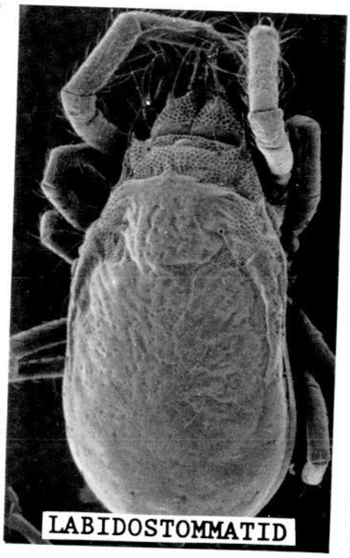
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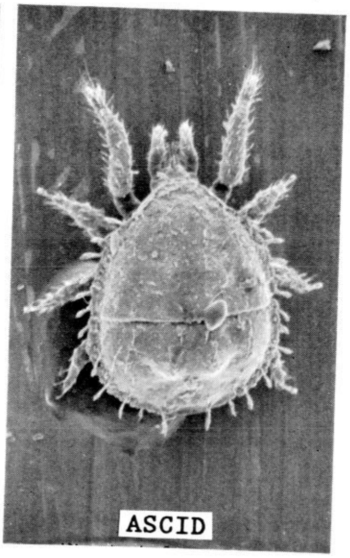
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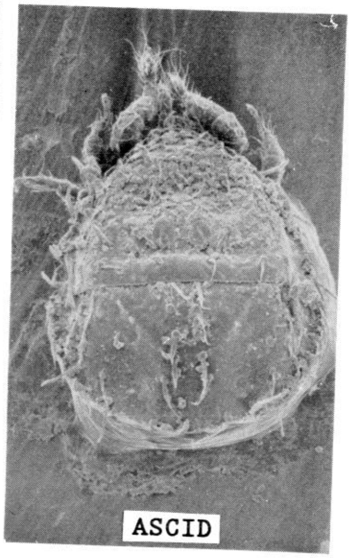
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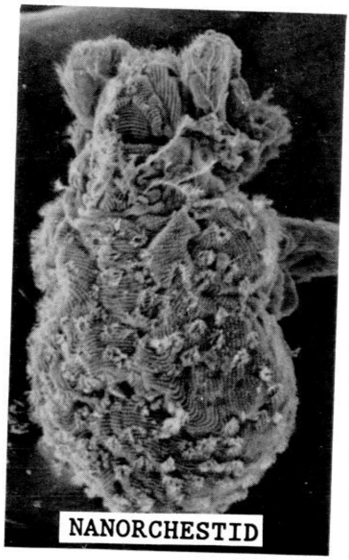
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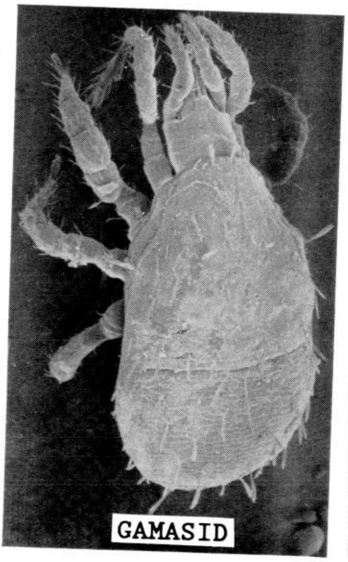
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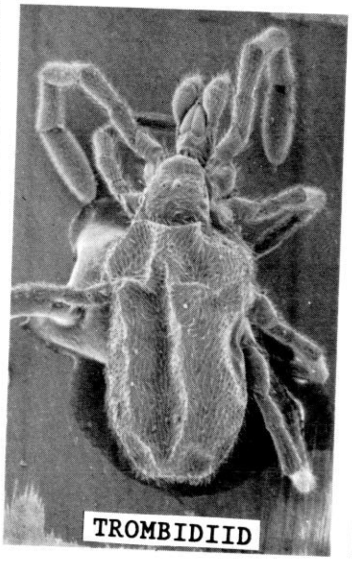
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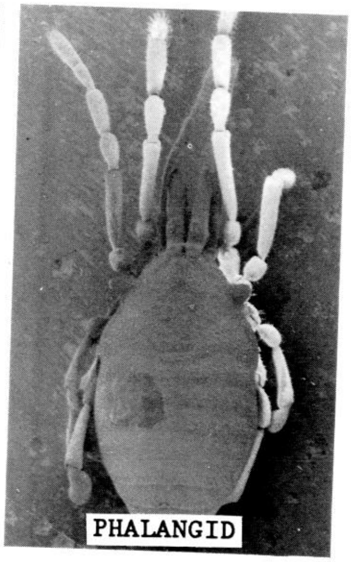

PHALANGID

SECTION A: Enarthronota

All genera included here are small to very small oribatids, which require slide mounting and high power for a clear view of structures, except for the large, flat and pink *Hypochthonius rufulus* Koch. All these genera have 1 to 4 transverse sutures across the notogaster. They are often dorso-ventrally flattened. Large prominent setae, often highly modified and ornate, are characteristic. The guts of this entire group of mites seldom contain dark-pigmented food boli. This is a diverse group, all of which have transverse opisthonotal sutures. Immatures resemble adults and care must be exercised not to confuse them with adults of similar species.

1A Dorsal setae modified (bipectinate, plate-like, or spatulate and very long) 2
1B Dorsal setae abundant but rather inconspicuous 5

2A Dorsal setae plate-like or long-spatulate; notogaster with three transverse sutures 3
2B Dorsal setae pectinate, long-pectinate, or elongate (never spatulate) 4

3A Dorsum covered with large, scale-like setae that completely hide body in dorsal and lateral views (figs. 39 and 40); sensillum filiform; tan body .... *Pterochthonius*

Pterochthonius angelus (Berlese) (275 μ), collected rarely in Andrews Forest, has been seen sporadically from other locales in western Oregon.

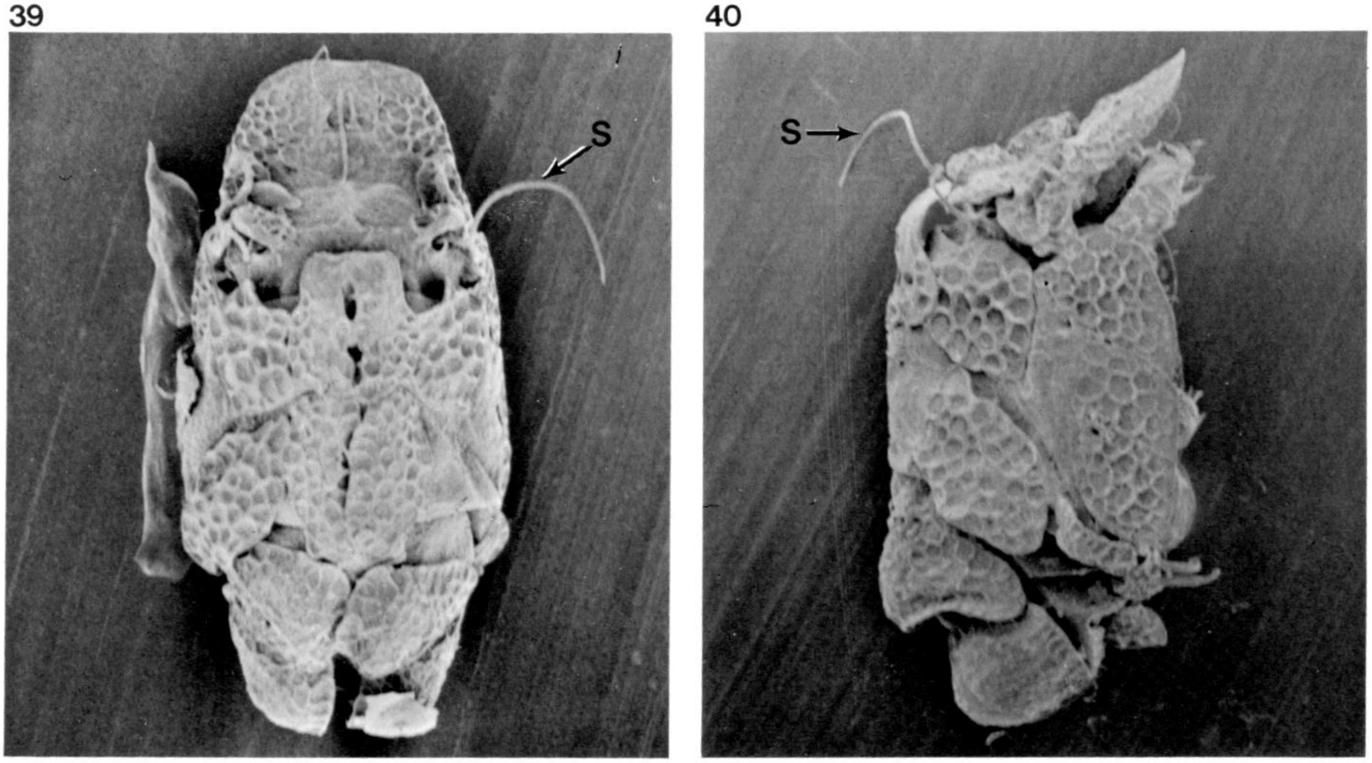
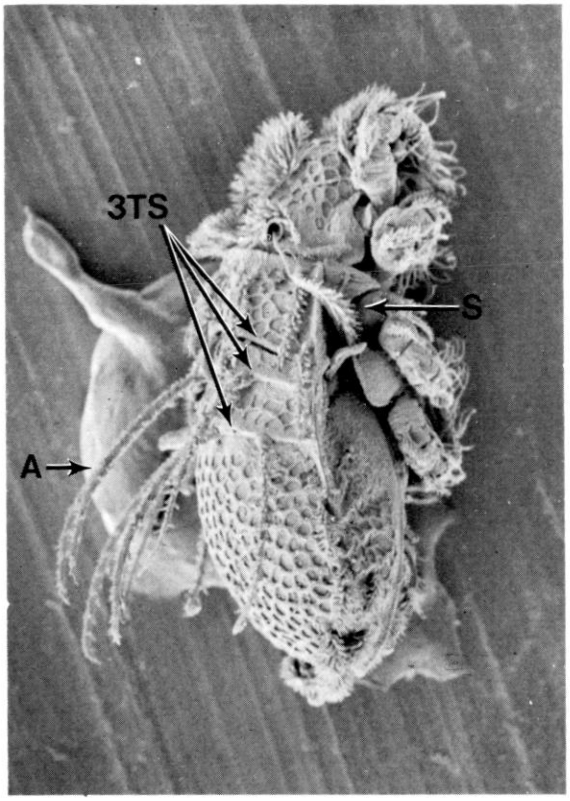


Figure 39-40: 39, 40: *Pterochthonius angelus* with plate-like setae and filiform sensillum (S); picture height 39 = 300 μ, picture height 40 = 300 μ.

41



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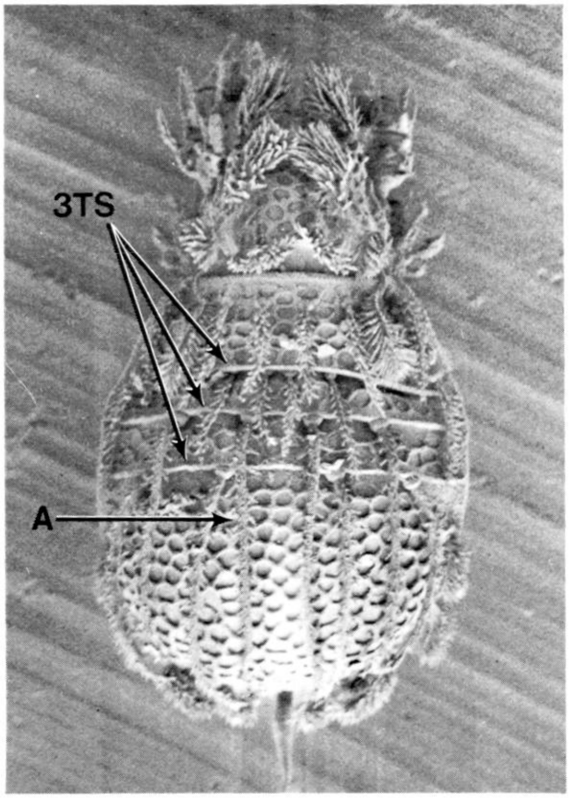


Figure 41-42: 41, 42: *Cosmochthonius lanatus* with three transverse sutures (3TS) and pectinate setae (A); picture height 41 = 300 μ, picture height 42 = 300 μ.

3B Dorsal setae of varying lengths and shapes, but the posterior transverse row always greatly elongated with bases much wider than apices; sensillum filiform with minute bristles; body color transparent (fig. 43) .... *Atopochthonius*

Atopochthonius artiodactylus Grandjean (200 μ) was encountered only once in these litter samples, but was found in rotting logs (Cline & Seastedt, unpub.). *Phyllozetes*, recorded from Texas, differs in having compoundly dentate setae on the prodorsum.

4A Dorsal setae all elongate and pectinate (some longer than half body length; figs. 41, 42 and 48); notogaster with three transverse sutures; body light yellow .... *Cosmochthonius*

Only one *Cosmochthonius* nr. *lanatus* (Michael) (200 μ) was found in these litter samples; this species was more abundant in rotting logs (Cline & Seastedt, unpub.). *Nipponiella*, reported by Walter from central California, is quite similar but has four transverse sutures and less conspicuously plumose notogastral setae (fig. 47); the prosomal setae are elongate and not conspicuously plumose (platelike in *Atopochthonius*).

4B Dorsal setae pectinate biramous (fig. 46)........... *Sphaerochthonius*

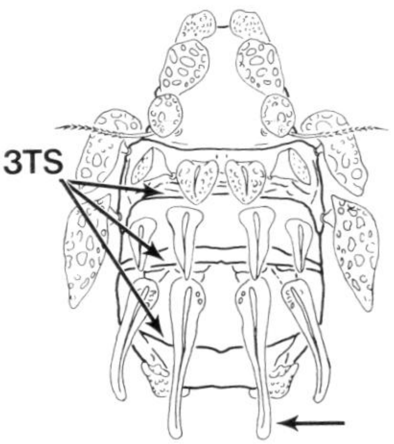
Sphaerochthonius occurs widely in both eastern and western Oregon; however, it was found only once in the Andrews Forest research grid (midmoisture clearcut).

5A **Dorsum with one transverse suture; body reddish-pink; bothridium not distinctly enlarged; sensillum pectinate 6**

5B **Dorsum with two or apparently two transverse sutures; body not pink; bothridium usually hypertrophied, with a clubbed sensillum 7**

6A **Body oval (fig. 44) and smaller, ca. 350 μ; genital plates appear transversely divided (fig. 45) ....** *Eohypochthonius*

43



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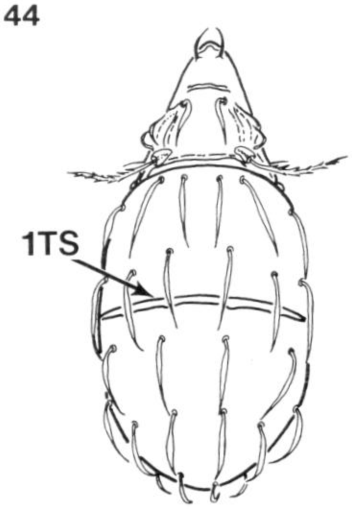

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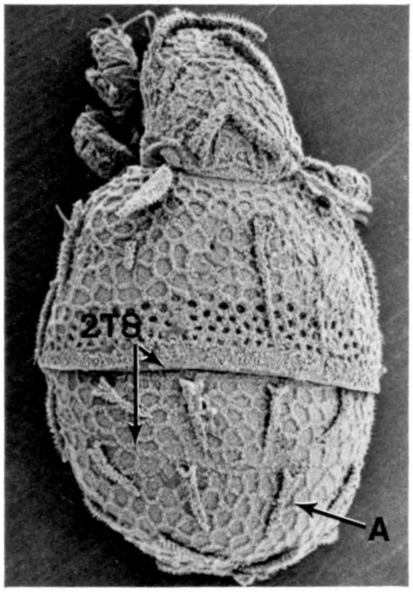
Figure 43-45; 43: *Atopochthonius* sp. with elongate flattened setae posteriorly and 3 transverse sutures (3TS); 44: *Eohypochthonius* sp. with single transverse suture (1TS) and parallel sides of the notogaster; 45: *Eohypochthonius* sp. with transversely divided genital plates in ventral view.

46



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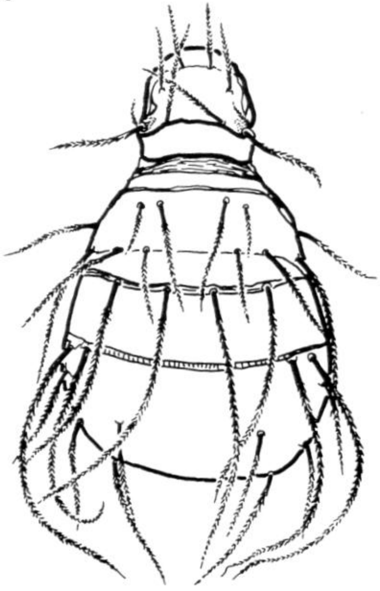

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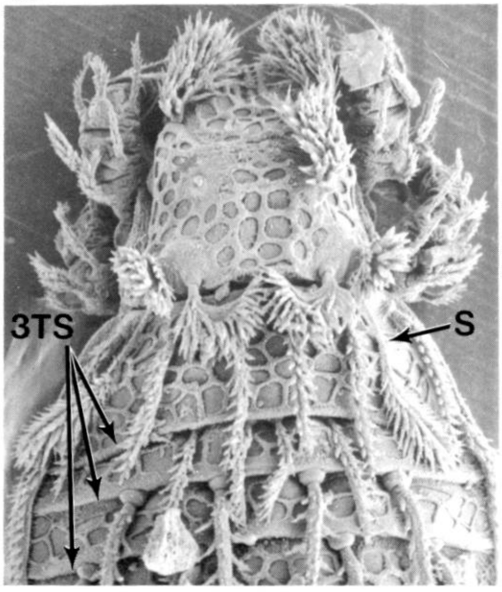


Figure 46-48; 46: *Sphaerochthonius* sp. (Oregon desert) with two transverse sutures (2TS; second difficult to see) and pectinate biramous setae (A); picture height = 250 μ; 47: *Nipponiella* sp. with elongate minutely plumose setae and two prominent transverse sutures; 48: *Cosmochthonius lanatus* with surface sculpturing and detail; note that one prosomal seta has been removed to reveal integumental pattern below (S = sensillum); picture height = 125 μ.

Eohypochthonius was infrequently found in the Andrews Forest, located in only 19 of the 52 sites and then not abundant. It seemed to favor dry sites but showed no preference for successional sere. Seasonal abundance paralleled that for total oribatids but with bimodal peaks and troughs of greater amplitude.

6B Body outline irregular, widest posteriorly to middle; body size larger, ca. 600 μ (figs. 49 and 50); genital plates normal, not transversly divided .... *Hypochthonius*

Hypochthonius rufulus Koch (600 μ) was present in 32 of the 52 sites but never exceeded 3-percent relative abundance, except in the xeric clearcut. Seasonal abundance followed the norm of total oribatids. *Hypochthonius rufulus* avoided old-growth communities and was more abundant in dry than in midmoisture or mesic sites.

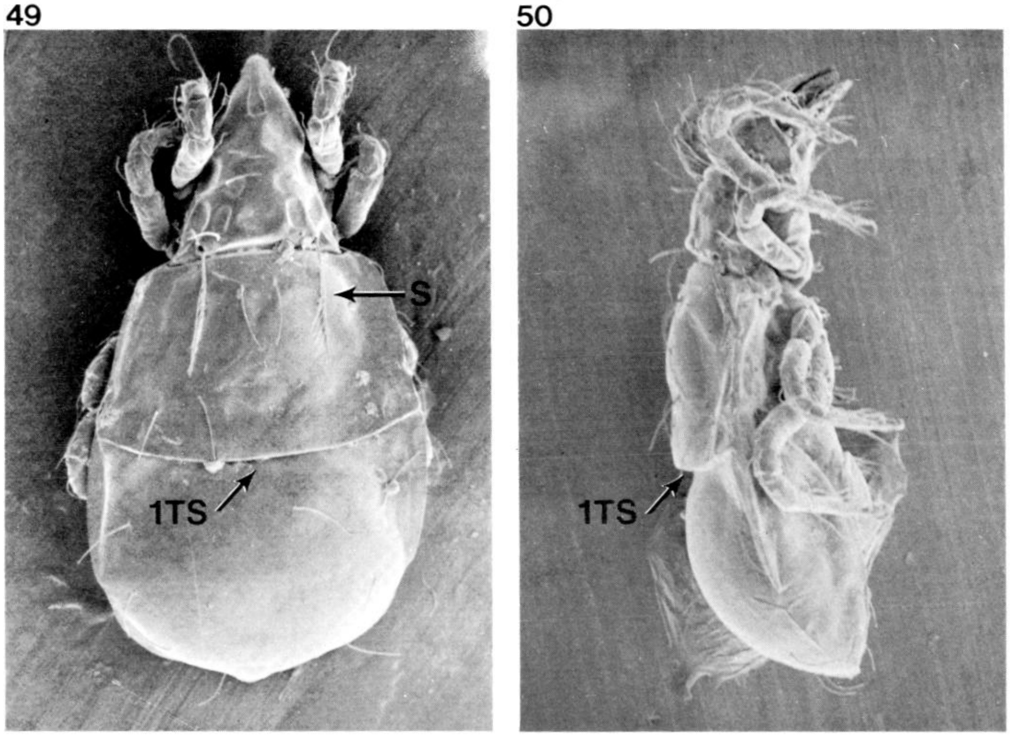


Figure 49-50: 49-50: *Hypochthonius rufulus* with one transverse suture (TS), plumose sensillum (S) and a wide posterior, dorsal and lateral views; picture height 49 = 525 μ, picture height 50 = 575 μ.

7A Transverse opisthonotal sutures convergent, anterior one incomplete (fig. 51); body yellow; prosoma elongate, length more than twice the width; body widest posterior to middle; sensillum long and indistinctly pectinate .... *Eniochthonius*

Eniochthonius (=Hypochthoniella) minutissima Berlese (figs. 51 and 52; 350 μ) was infrequently encountered in the Andrews Forest but, when present, was frequently abundant (exceeds 3-percent relative abundance in 60 percent of the instances). Its distribution was limited to the dry tree sere and the mesic clearcut, hence revealing no definable pattern. Within these two sites, however, its frequency exceeded 90 percent. Seasonal abundance patterns were distinctive; it was abundant in early winter and infrequent in early summer relative to total oribatid populations. Populations still peaked bimodally in spring and dry summer.

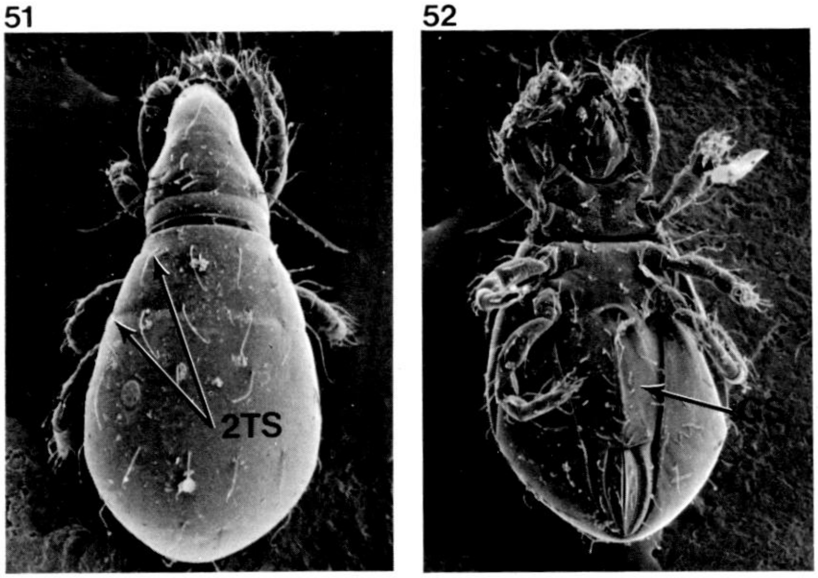


Figure 51-52; 51-52: *Eniochthonius minutissima* with two transverse convergent notogastral sutures (TS) and apparently undivided genital sclerites (GS) dorsal and ventral views; picture height 51 = 400 μ, picture height 52 = 400 μ.

7B Transverse sutures parallel (fig. 53); body white, orange, or yellow; prosoma wider than long; body rather quadrate, sides subparallel; bothridium prominent with clubbed or spatulate sensillum; body smaller (<250 μ) .... *Brachychthoniidae*

Table 4 - Characteristics of genera in the family Brachychthoniidae

	Suprapleural plates (fig. 58)	Dorsal setae	Dorsal surface pattern	Sensillum	Tergum 1 marginal setae	Color	Notes
Liochthonius	P	simple/ blade	clear	clavate/ emarginate	2	+transp.	--
Neoliochthonius	C	simple	clear	capitate	2	transp.	--
Verachthonius	E	simple	clear	fusiform/ setulose	2	transp.	--
Synchthonius	E	simple	weak	fusiform/ setulose	2	+transp.	rostral denticulation
Mixochthonius	PE	plumose	clear	fusiform/ setulose	2	transp.	--
Poecilochthonius	CE	simple	strong	fusiform/ setulose	3	yellow	rostral denticulation
Neobrachychthonius	CE	simple	clear	fusiform/ setulose	2	yellow	--
Brachychthonius	CE	simple	strong	fusiform/ setulose	3	yellow/ orange	anal setae simple
Sellnickochthonius	CEF	blade/ simple	strong	fusiform/ setulose	3	pale yellow	some rostral denticulation
Eobrachychthonius	CDEFP	simple	scatt. circles	clavate	3	yellow	terga with marginal suture

Distinctions between genera of Brachychthoniidae involve the nearly invisible suprapleural plates (column 2 in Table 4). The plates are designated by their position relative to the terga (see schematic illustration; fig. 58): P = prosomal, C = anterior edge of tergum 1, D = middle of tergum 1, E = at first transverse suture, and F = at second transverse suture. *Brachychthonius*, *Sellnickochthonius*, and *Poecilochthonius* show an integumental design under the scanning electron microscope that is not readily apparent otherwise because they are so small; the other genera are much less conspicuously patterned.

Brachychthonius sp. (fig. 53; 130 μ) was a widespread and abundant species in our samples, encountered in 42 of the 52 sites. It was characterized by a mean density greater than 20 in 8 of the 12 communities, but its occurrence was not consistent (constancy values were greater than 0.50 in only four communities). Though not among the most abundant oribatids, it exceeded 10-percent relative abundance in the xeric clearcut. This species was absent from old growth and preferred the clearcut and shrub seres. It showed a strong preference for dry > midtypical > mesic conditions. Within-replicate abundance was highly variable. Seasonal abundance was bimodal as usual but with an extremely high peak in dry summer and fall (59 percent of total yearly abundance).

Liochthonius sp. (figs. 54 and 55; 140 μ) apparently preferred shrub and tree seres, primarily in midmoisture and mesic edaphic gradients; total density was very low. It was abundant in rotting log samples taken by Cline & Seastedt (unpub.) from old growth of the Cascade Range.

Sellnickochthonius (=Brachychochthonius) (fig. 56 and 57) was encountered once in the Andrews Forest rotten-log study (Cline & Seastedt, unpub.).

Most of these genera are thought to be widespread and transcontinental. Distinguishing genera within this group will not be possible without assistance from an oribatid specialist; most of the characters cited are visible only in slide-mounted specimens.

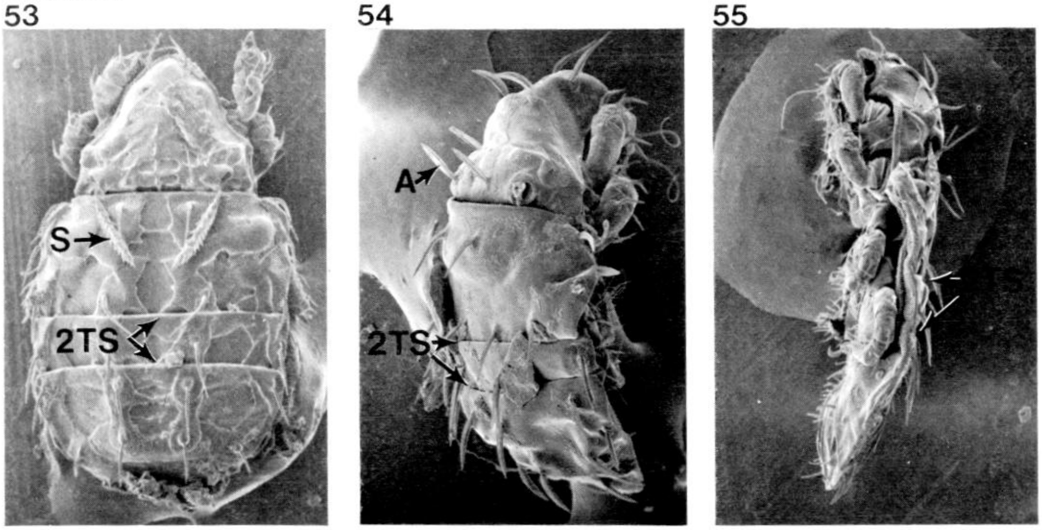


Figure 53-55; 53: *Brachychthonius* sp. with two transverse sutures (2TS) and faint integumental pattern, sensillum indicated with an (S); picture height = 175 μ; 54: *Liochthonius* sp. with two transverse sutures (2TS), little or no integumental design and blade-like simple setae (A) (large object between sutures is an artifact); picture height = 150 μ; 55: *Liochthonius* sp. note absence of suprapleural plates; picture height = 175 μ.

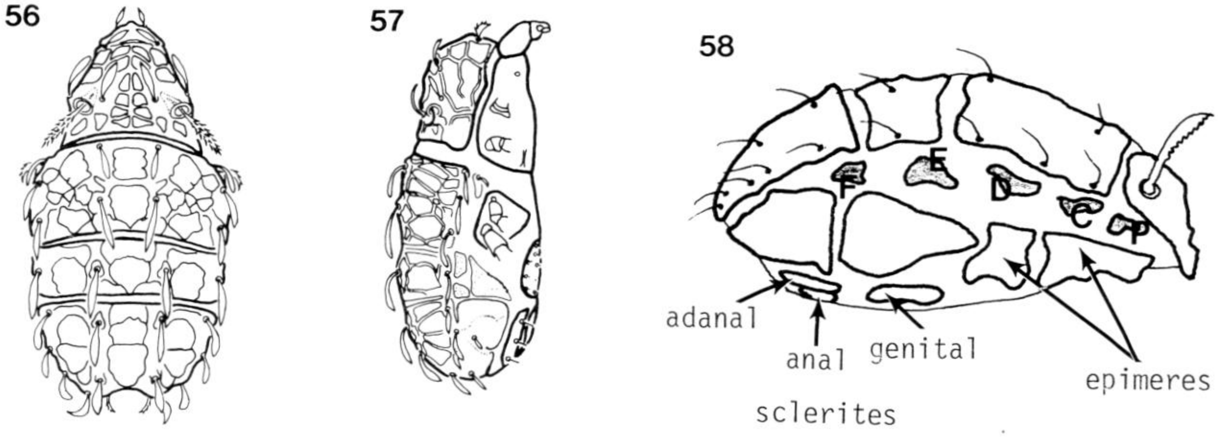


Figure 56-58; 56-57: *Sellnickochthonius* with very prominent integumental patterning and 3 pairs of stippled suprapleural plates; 58: Diagrammatic placement of suprapleural plates in the Brachychthoniidae.

SECTION B: Palaeosomata (=Bifemorata)

These primitive mites are small and distinct. They resemble weakly sclerotized acaridid mites more than their heavily pigmented oribatid relatives. These mites may be overlooked in samples containing many specimens.

Nearly all species may be recognized by the huge melanized dorsal setae. Generic designations are based largely on setal pattern, which is difficult to distinguish because the body does not remain rigid in slide mounts.

1A Dorsum of mite without melanized long setae; longest setae shorter than body; sensillum strap-shaped; minute and distinguishable from prostigmatid mites only on slides (fig. 59); 440μ ...... *Aphelacarus*

Aphelacarus acarinus (Berlese) was found in a nearly decomposed log in the Andrews Forest.

1B Dorsum with large black setae; longest setae nearly as long or longer than body (figs. 60 to 64); sensillum long and filamentous 2

2A Large dorsal black setae nonplumose; anterodorsal end of prosoma pointed and projecting over cheliceral bases; anterior transverse row of setae on opisthosoma with four short setae between two huge setae; three claws on legs II to IV (fig. 60)............ *Ctenacarus*

2B Large dorsal black setae plumose 3

3A First transverse row of opisthosomal setae comprised of four short setae (on a single sclerite) between two huge plumose setae (equal to largest on dorsum) (fig. 62)....................... *Beklemishevia*

Walter (1981) cites *Beklemishevia* from central California litter. *Palaeacarus*, differing in having two instead of three claws on legs II to IV might also occur in the Pacific Northwest and would be separable only on the basis of slide-mounted material (fig. 61).

3B First transverse row without huge sublateral plumose setae .... *Acaronychus/Zachvatkinella*

Both of these genera have been found near Andrews Forest. They were never more common than 0.1-percent relative abundance in these samples. *Zachvatkinella* sp. (300 to 350 μ; fig. 63) was present in 10 of the 52 sample sites, scattered through the habitat types, but never more than three individuals per sample. It has also been taken in old growth from the nearby Salmon Creek drainage (Topic 1982). *Acaronychus tragardhi* Grandjean was encountered twice in rotten wood samples and only once in our litter samples; it was also collected in the Salmon Creek litter studies of Topic (1982) and Walter (1981) and found to be dominant in soils from the edge of the Great Basin at Sisters (Moldenke & Lattin, unpub. data). These genera are very similar; the key character that separates them is the location of the medial pair of the first transverse row of setae on the same sclerite in *Acaronychus* (fig. 64).

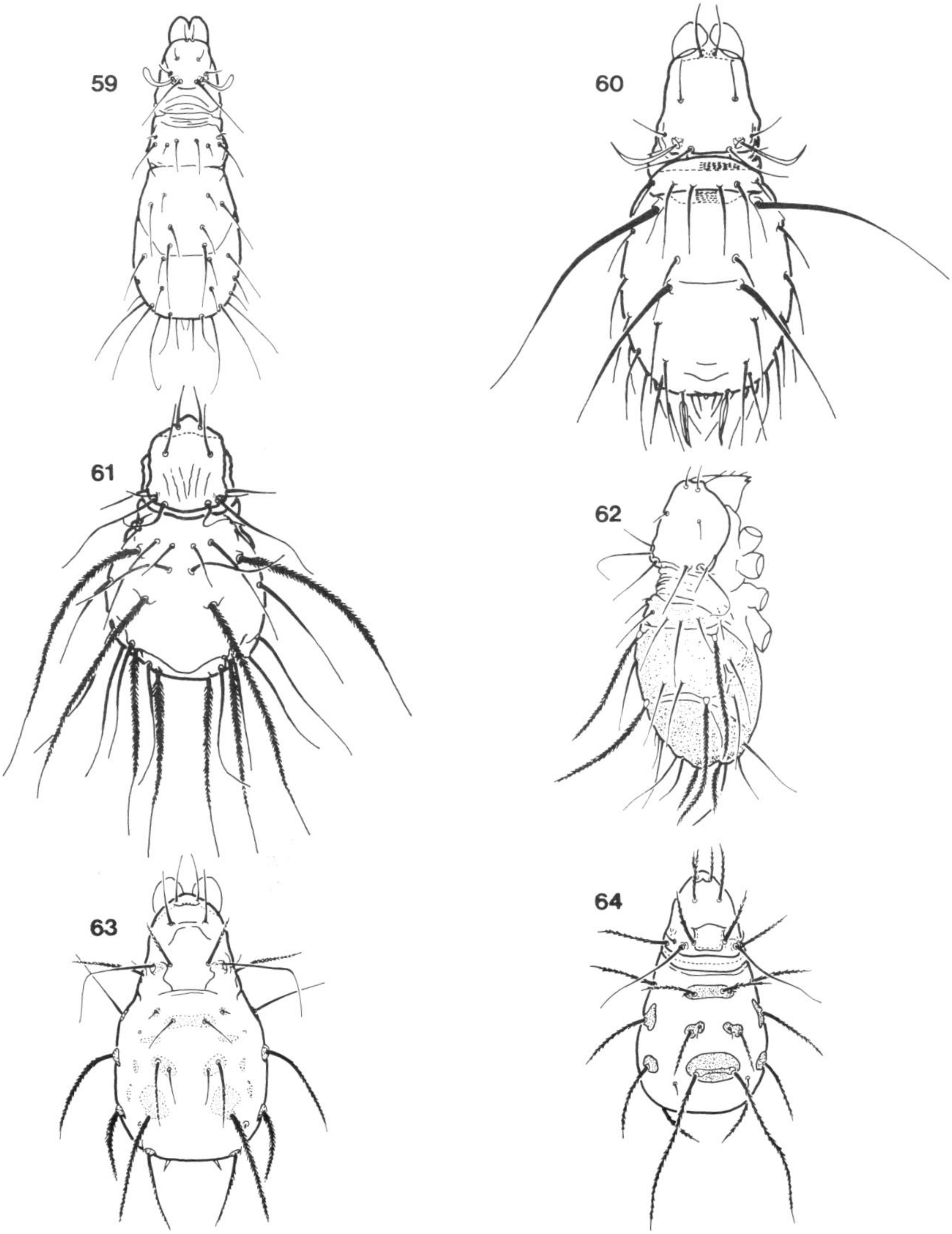


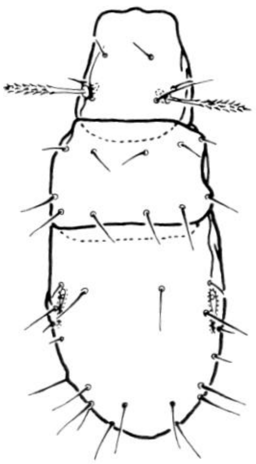
Figure 59-64; 59: *Aphelacarus* without thickened melanized setae; setae simple; 60: *Ctenacarus* with thickened non-plumose melanized setae; 61: *Palaeacarus* with thickened melanized plumose setae; 62: *Becklemishevia* with thickened melanized plumose setae; 63: *Zachvatkinella* with thickened melanized plumose setae; first transverse row of setae equal in size; 64: *Acaronychus* with thickened melanized plumose setae.

SECTION C: small transparent oribatids (unnatural grouping)

These genera are largely transparent, difficult to see, and easily confused with immatures of more advanced oribatids or adult Acarida or Prostigmata. The Palaeosomata, distinguished by large setae and more leg joints, and the Enarthronota, distinguished by a segmented opisthosoma, might initially be confused with this group.

The maturity of transparent mites is most easily distinguished by examination of the genital region; fully formed genital plates are found only in the adult.

65



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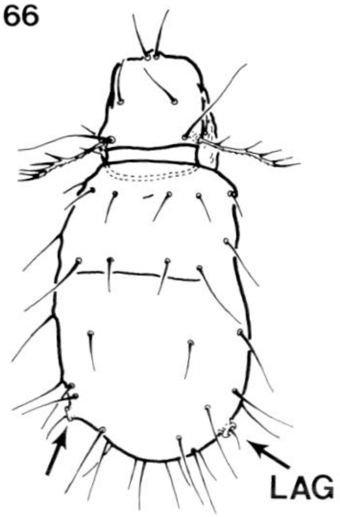

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Figure 65-68; 65: *Gehypochthonius rhadamanthus* with transverse notogastral suture and non-protruding lateroabdominal gland; 66: *Parhypochthonius aphidinus* with transverse notogastral suture and protruding latero-abdominal glands; 67-68: *Eulohmannia ribagai* with elongate body, adanal plates and U-shaped ventral groove (TG), ventral and dorsal views; picture height 67 = 525 μ, picture height 68 = 525 μ.

1A Dorsum of opisthosoma with a scarcely visible (under highest power) single transverse suture; minute mites <400 μ; chelicerae clearly visible in dorsal view 2

1B Dorsum of opisthosoma without transverse suture; larger mites >400 μ; chelicerae not visible in dorsal view 3

2A Posterolateral portion of opisthosoma with a prominent cannon-shaped projection (ca. 100 μ; fig. 66)............... *Parhypochthonius*

2B Posterolateral portion of opisthosoma with latero-abdominal gland, but lacking raised projection (ca. 400 μ; fig. 65)................. .... *Gehypochthonius*

Gehypochthonius rhadamanthus Jacot and *Parhypochthonius aphidinus* Berlese represent our only native parhypochthonioid arthronotine genera. They differ from immature *Epilohmannia* by their generally smaller size (100 to 400 μ compared with 350 to 600 μ), a scarcely visible transverse opisthonotal suture, and generally plumose sensilla (clubbed in *Epilohmannia* nymphs). Both genera appear to feed on xylem and have been taken in heavily decomposed logs (Cline and Seastedt, unpub.). *Gehypochthonius* was found only in the mesic tree stage; total density was very low.

3A With conspicuous brown stain in the region of the latero-abdominal glands (centers and pores of glands usually transparent) .... *Trhypochthonius/Trhypochthoniella*

Trhypochthonius americanus Ewing (fig. 69; 300 to 400 μ) has large latero-abdominal glands, which resemble those of the dorsoventrally flattened tannish *Perlohmannia*. *Trhypochthonius* occurred too infrequently in our samples (8/312) for association with any habitat; it was abundant only in dry shrub collection of May, 1983. *Trhypochthoniella* differs in lacking the bothridium and sensillum.

3B Without contrastingly colored latero-abdominal glands 4

4A Elongate, cylindric, unicolored (more or less transparent yellowish) body (fig. 68); without contrastingly darkened latero-abdominal gland; adanal plates present; ventral portion of opisthosoma with large indistinct U-shaped sulcus (fig. 69); sensillum pectinate; opisthosoma with longitudinal rows of prominent transparent setae .... *Eulohmannia*

Eulohmannia ribagai (Berlese) (ca. 650 μ) was rarely encountered in Andrews Forest samples. Only in the tree-stage midmoisture sere was it present in even 29 percent of the samples, never attaining 1-percent relative abundance. It seemed abundant only in dry summer. Walter (unpub.) reports that it is a species of the mineral soil horizon, which matches our results from the Coast Range.

4B Robust species; often with cerotegument; notogaster white; prosoma either white or brown; venter without U-shaped sulcus; sensillum not pectinate; adanal plates absent 5

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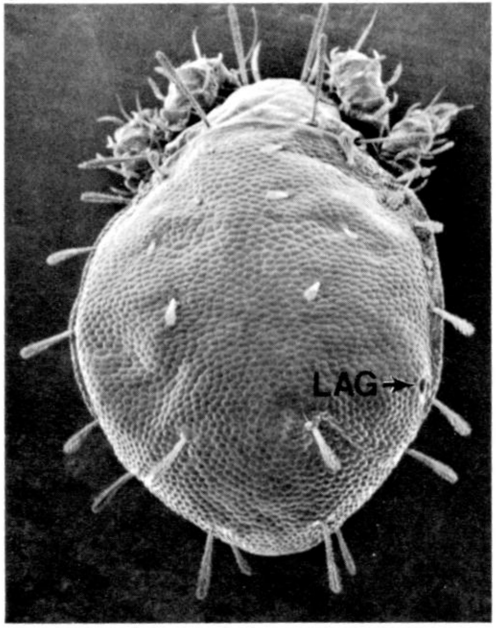

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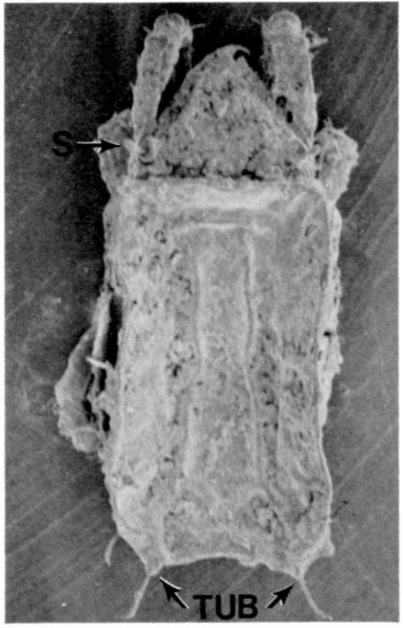

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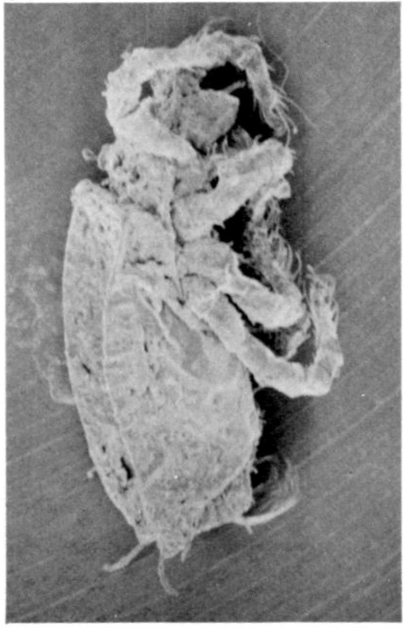

Figure 69-71; 69: *Trhypochthonius americanus* dorsal view, note that the pore of the latero-abdominal gland (LAG) is visible but there is no halo from the brown pigmentation surrounding the pore in the scanning electron microscope; picture height = 400 μ; 70-71: *Camisia carrolli* with longitudinal carinae on the notogaster and a weakly concave posterior margin between prominent tubercles (TUB); picture height 70 = 900 μ, picture height 71 = 925 μ.

5A Posterior margin of notogaster concave (fig. 70, 71, & 73); bothridium and sensillum present .... *Camisia*

Camisia carrolli Andre (figs. 70 and 71) was the most abundant and noticeable oribatid of the high canopy. Andre and Voegtlin (1981) have published on its biology; it is strictly arboreal, never appearing in litter samples. *Camisia biuris* (fig. 73) is occasionally encountered in conifer litter from Oregon and Washington; it has not yet been taken in the Andrews Forest. *Camisia segnis* (Hermann) is also recorded from western Oregon.

5B Posterior margin of notogaster convex (fig. 72, 74); bothridium absent; sensillum sometimes absent ...... *Malaconothrus/Trimalaconothrus*

These two genera have been found widely throughout western Oregon and Washington. They are distinguished by the number of tarsal claws: one in *Malaconothrus monodactylus* (Michael) (fig. 74) and three in *Trimalaconothrus simplex* (Banks) (fig. 72). Both species occurred in the Andrews Forest, but no habitat association was noted. *Mucronothrus* may also occur in the Pacific Northwest; it is monodactylous but has 18 to 20 pairs of genital setae. The other two genera have only 4 to 12 pairs.

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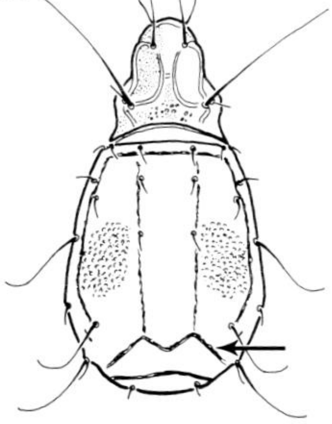

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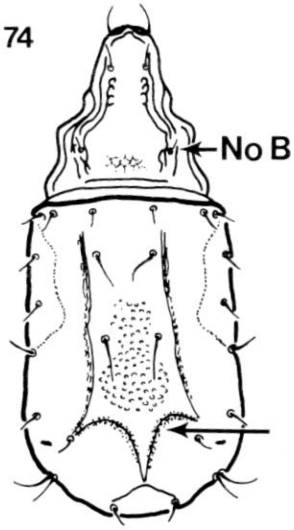

Figure 72-74; 72: *Trimalaconothrus* sp. note absence of bothridium and presence of ridged notogaster; 73: *Camisia biuris* with weak longitudinal carinae on the notogaster and strongly concave posterior margin; picture height = 1650 μ; 74: *Malaconothrus* sp. also with absence of bothridium and presence of ridged notogaster.

SECTION D: Mixonomata (in part) + Mesoplophora, the penknife mites (=Ptyctimina of older classifications)

All species in this group can flex the prosoma into the antero-ventral portion of the opisthosoma to accomplish a turtle-like protective function (compare figures 7 and 8). Whether fully expanded or contracted, nearly all specimens lie on their sides, which distinguishes them from other preserved oribatids. Published reports and our studies implicate these ptyctimine species as wood and leaf feeders. Collectively, they comprise the greatest biomass of oribatids in tree-stage and old-growth communities. A most useful reference on this group is Walker (1964); however, the generic placement of nearly all species (except *Euphthiracarus*) has been changed subsequently in the catalogue (Marshall et al. 1986).

1A With a single simple notogastral sclerite and no separate ventral sclerites other than the (ad-)genital and (ad-)anal sclerite complexes 2

1B With either a transverse (dorsal or lateroventral) complete notogastral suture (fig. 75) or a completely separate extensive pair of ventral sclerites lateral to the genital and anal sclerites (fig. 76) .... *Mesoplophora*

This couplet separates the Protoplophoroidea together with the genera related to *Mesoplophora* (Mesoplophoroidea of older classifications) from typical Mixonomata penknife mites. In *Protoplophora* (recorded by Walter from coastal central California), the notogaster is divided by a transverse suture. In *Mesoplophora* (recorded by Walter from western Oregon and California), the notogastral suture is ventrolateral and visible in ventral view (fig. 76) forming a V-shaped plate between the genital and anal sclerites and the wrap-around notogaster.

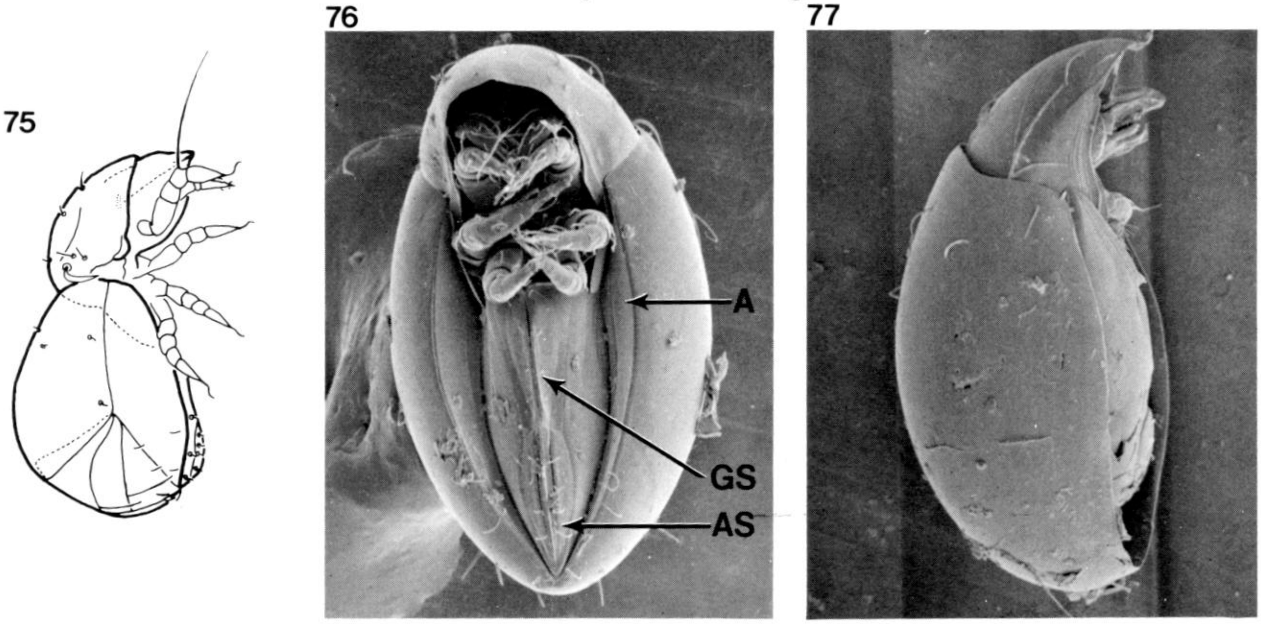

Figure 75-77; 75: *Protoplophora* sp. with transversely divided notogaster; 76: *Mesoplophora* sp. (Stinson Beach, CA.) with separate additional pair of peripheral ventral longitudinal sclerites (A) and separate complete rounded genital (GS) and anal plates (AS); notice that this specimen is immature evidenced by the incomplete development of genital sclerites; picture height = 225 μ; 77: *Mesoplophora* sp. in lateral view; picture height = 275 μ.

2A Genital and anal plates broad, separated by a transverse furrow (figs. 78 to 80); both plates visible in profile as a convex belly crossed by a prominent belt-line (fig. 78, 80)(Phthiracaroidea) .... *Phthiracarus*

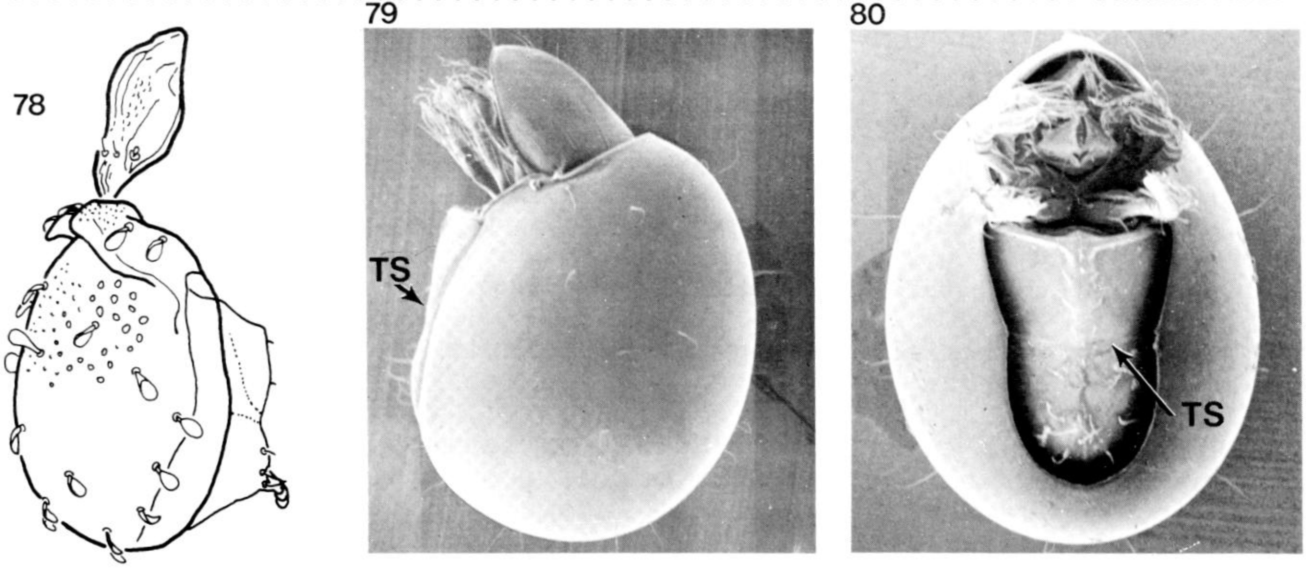

Figure 78-80; 78: *Hoplophorella* sp. with distinctly pitted notogaster and venter with transverse suture (TS); 79-80: *Phthiracarus* sp. with protuberant ventral belly crossed by complete transverse suture (TS); picture height 79 = 925 μ, 80 = 825 μ.

All genera of Phthiracaroidea will key to this couplet. Balogh (1972) differentiates genera by the pattern of ventral setae, a character apparent only to the expert. *Hoplophorella* (fig. 78) and *Atropacarus* are distinguished by a distinctly reticulated notogaster; they have been collected by Walter (unpub.) in western Oregon. *Steganacarus* (in the strict sense) as cited in the catalog is probably erroneously recorded as widespread in North America. Of the smooth genera, *Hoplophthiracarus* (eastern half of the United States) has five pairs of anal setae and erect long lamellar setae; *Phthiracarus (Archiphthiracarus)* has five pairs of anal setae and decumbent lamellar setae; *Phthiracarus* (transcontinental) has three pairs of anal setae (with the other two pairs of sockets present) and decumbent lamellar setae.

Species distinctions in *Phthiracarus* (figs. 79 and 80) are difficult; the sizes of our native taxa are apparently highly variable. We have distinguished two groups: a large tan species (750 to 950 μ) and a smaller pinkish group (ca. 600 μ).

Both "species" of *Phthiracarus* were widespread and abundant within the research design; the large species occurred in 50 of the 52 sites, and the smaller group was found on 51. Both displayed the typical bimodal seasonal abundance curve, but in qboth the spring peak lasted into early summer (a season with few oribatids in the Andrews Forest). The larger species was found more in old growth than in tree seres and more in shrub than clearcut seres; it preferred dry conditions in tree and old-growth seres and moist sites in clearcut and shrub seres. The smaller taxon prefered old-growth and tree seres over shrub and clearcut, but demonstrated no moisture preference.

2B Genital and anal plates narrow, fused into a single or double pair of long thin midventral genito-anal plates (figs. 81, 83, and 86); ventral region scarcely visible in lateral view, never as a protuberant belly (Euphthiracoidea) 3

3A Large (>800 μ) and orange-tan; ventral region with two pairs (figs. 81 and 83) of longitudinal genito-anal plates (Oribotritiidae) 4

3B Smaller (<800 μ); usually white, but if yellow-orange then only about 550 μ long; with a single pair of ventral longitudinal genito-anal plates (Euphthiracaridae) 5

4A Size 1100 to 1250 μ; body oval (compare figs. 81 and 83) in dorsal or ventral view, length of notogaster only slightly exceeding width; one pair of long setae on prosoma; genito-anal plates with inconspicuous transverse suture (fig. 81) extending nearly to lateral edges .... *Oribotritia*

Oribotritia (=Plesiotritia) megale (Walker) (figs. 81 and 82; 1000 to 1500 μ) was widespread and abundant in Andrews Forest (48 of 52 sites) with constancy values less than 0.60 only in two clearcuts. It was not reported by Walter and Topic from the Salmon Creek drainage. Seasonal occurrence followed the typical bimodal pattern. This species preferred the shrub sere and avoided clearcuts. Density was twice as high under dry and midmoisture as under mesic conditions.

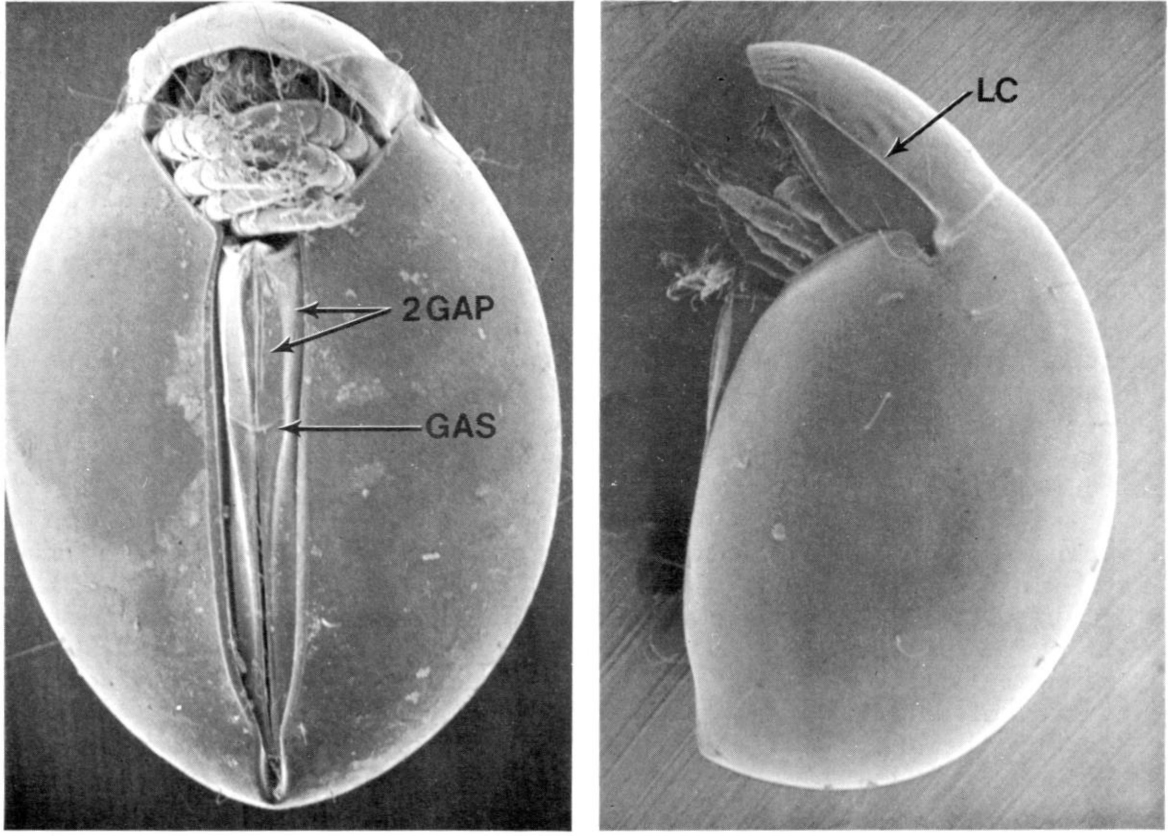

Figure 81-82; 81, 82: *Oribotritia megale* with double set of elongate genito-anal plates (GAP); oval body outline; prominent lateral carina (LC) on prodorsum; and complete genital/anal suture (GAS); picture height of 81 = 1300 μ, picture height of 82 = 1300 μ.

4B Size 400 to 1250 μ; body elongate-oval (compare figs. 81 and 83) in dorsal view, length nearly twice width; with three pairs of long setae on prosoma; genito-anal plates with transverse suture extending less than half-way to lateral margin .... *Maerkelotritia*

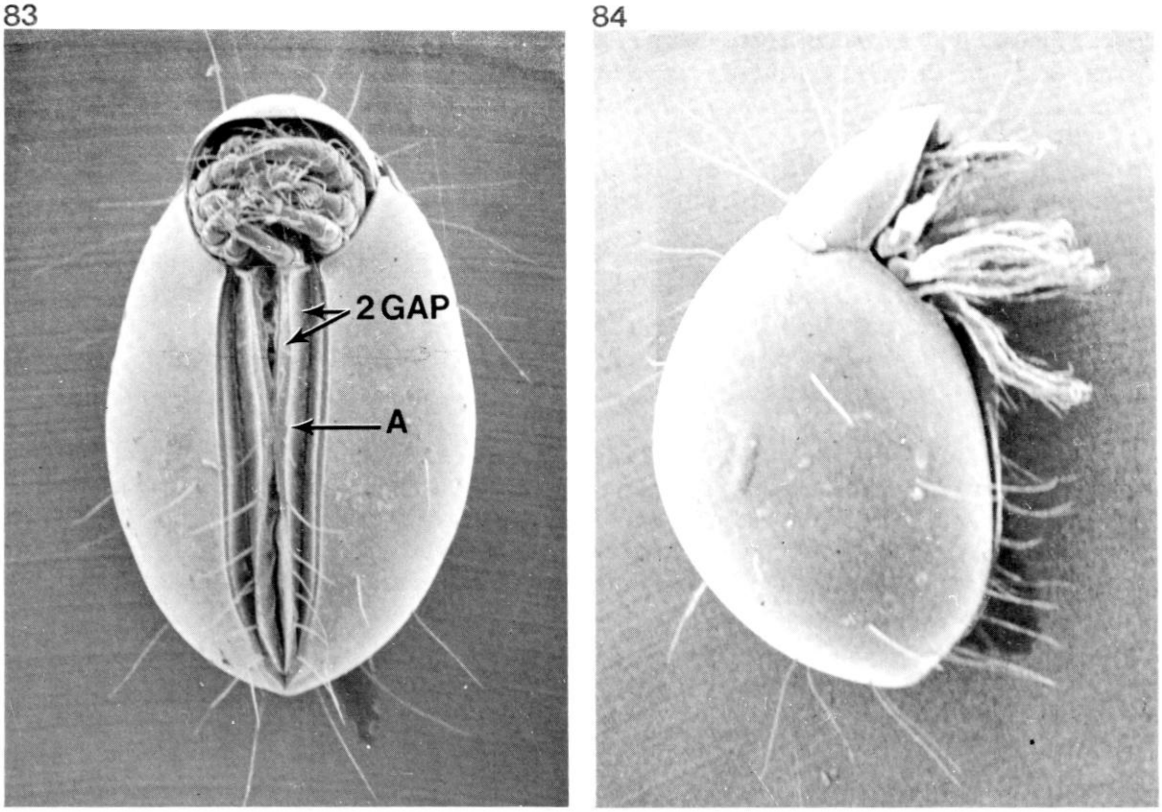

Figure 83-84: 83, 84: *Maerkelotritia* with double pair of longitudinal genito-anal plates (GAP), an insignificant transverse genital/anal suture (A), inconspicuous lateral carina on prodorsum and long setae (ventral and lateral views); picture height 83 = 1300 µ, picture height 84 = 1600 µ.

Maerkelotritia (figs. 83 and 84) is represented by at least two species in this region: a larger species *M. gibbera* (Walker) (900 to 1300 µ) and at least one smaller one. *Maerkelotritia gibbera* was widespread but not very abundant, occurring in 47 of 52 sites but only in one of the 12 sites with a constancy of >0.75. Its sparse abundance concealed any distribution pattern.

Seasonally, the typical bimodal abundance pattern apparently held, but abundance was low in late winter. The other smaller (400 to 600 µ) species of *Maerkelotritia* occurred in only 16 of 52 sites; however, 5 of 12 times it had a constancy value greater than 0.75. It was twice as abundant as *M. gibbera*. Seasonal abundance was typically bimodal, with a high spring peak. The smaller species preferred shrub and tree seres of midmoisture and the tree sere of mesic sites. *Mesotritia* is distinguished by the lack of a carina on the prodorsum; it probably occurs in the Northwest.

5A Orange-tan, 275 to 350 µ; prosoma without long erect dorsal setae; sensillum somewhat strap-like, broadened apically ...... *Microtritia*

Microtritia (=Rhysotritia part) *paeniminima* (Walker) (fig. 85) was generally distributed through Andrews Forest. It was never abundant and therefore no distributional preference can be discerned. In only one of the 12 community types did it exceed a constancy value of 0.50. Seasonal abundance followed the typical bimodal pattern, but the spring peak and early summer trough were exaggerated.

5B White or off-white; size variable 6

6A Lateral borders of genito-anal plates outlined with melanization (not visible externally in scanning electron micrographs; fig. 86), appearing to be dark arcs highlighting the genito-anal plates in ventral view; genital and anal components of the longitudinal plates separated by a medial transverse fissure and adjacent triangular darkening; setae on prodorsum long; surface of dorsum often with distinct stippling .... *Euphthiracarus*

Synichotritia caroli Walker (400 to 800 μ) is probably abundant in the Coast Range of the Pacific Northwest (Walker 1964). It is very similar to *Euphthiracarus* but lacks the ventral triangular darkenings of the genito-anal plates. Many of the individuals seem to combine characteristics of both genera; this group needs further work to distinguish the species inhabiting Andrews Forest. *Euphthiracarus tanythrix sierrensis* Walker (500 to 600 μ) was widespread (51 of 52 sites), second only to the small *Phthiracarus* among ptyctimines in abundance, but more consistent (eighth of all oribatids--low only in clearcuts). Seasonality fit the typical bimodal pattern closely. *Euphthiracarus tanythrix* was nearly absent from clearcuts; it preferred tree seral stages over shrub or old growth and mesic habitats to xeric or midmoisture. At least two other species of *Euphthiracarus* are found in western Oregon.

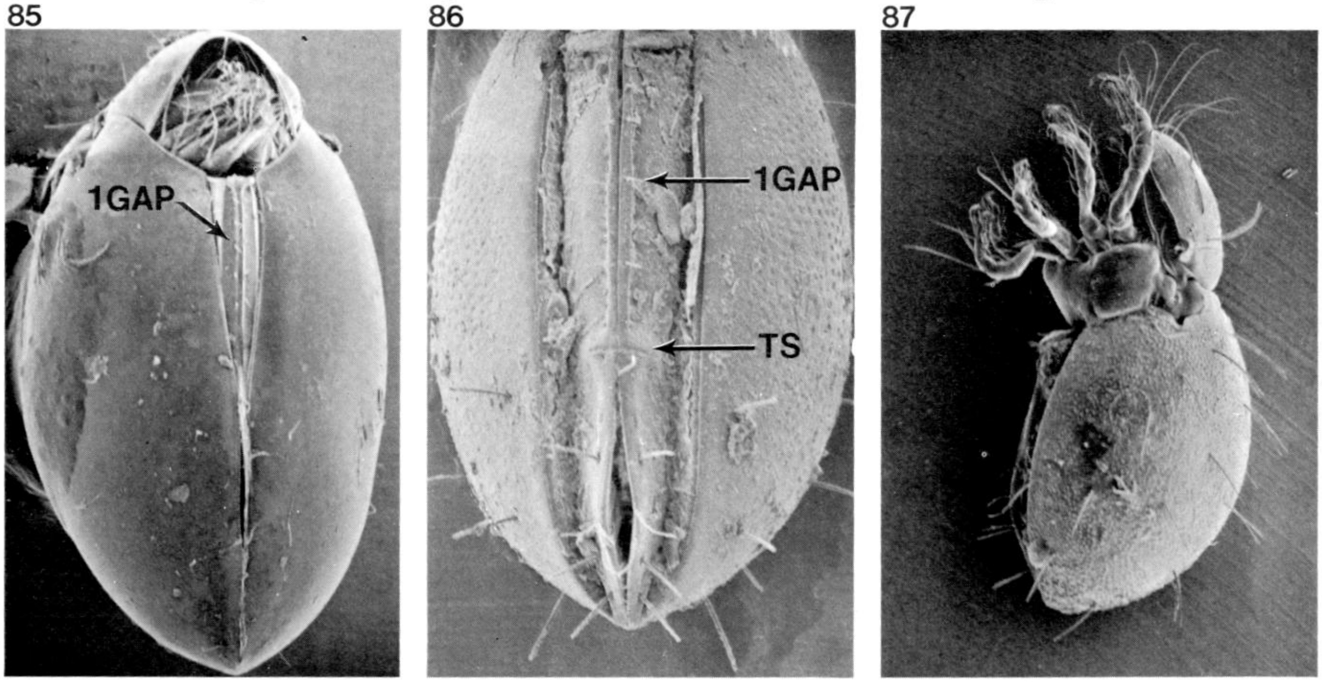

Figure 85-87; 85: *Microtritia paeniminima* with single short pair of genito-anal plates (1GAP); picture height = 675 μ; 86-87: *Euphthiracarus* sp. with a single pair of elongate longitudinal genito-anal plates, stippled notogaster and conspicuous genital/anal fissure (TS) ventral and lateral views); picture height 86 = 600 μ, picture height 87 = 1200 μ.

6B Smaller, <300 μ; ventral midline without a triangular spot or transverse fissure; genito-anal plate without dark border; setae on prodorsum rather short .... *Microtritia*

A second species of *Microtritia* is apparently abundant in the interior of rotted logs in the Andrews Forest (Cline & Seastedt, unpublished). *Rhysotritia* with 8 to 9 pairs of genital setae (four pairs in *Microtritia*) and trochanters III and IV bisetose (single in *Microtritia*) may also be expected in the region.

88

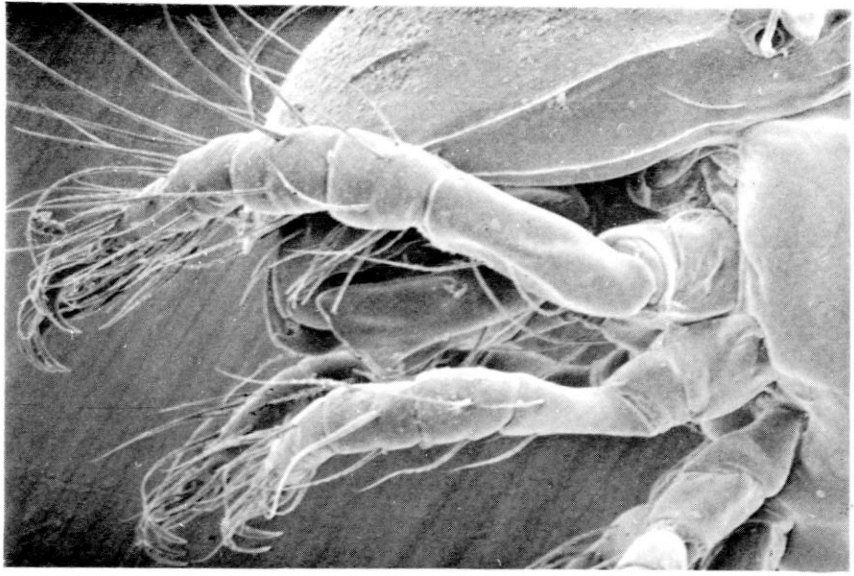

Figure 88: *Euphthiracarus* sp. showing broad flat rutella and the tips of robust pincher-like chelicerae; picture height = 240 μ.

SECTION E: galumnoid pterogasterines, winged mites with bomb-bay doors

These large, heavily pigmented mites with movable pteromorphs covering the entire leg region are a distinctive and rather uniform group. Genera are distinguished by ridges on the prodorsum and the condition of the dorsosejugal suture. These shapes are often difficult to see because of the dark pigmentation of most specimens.

1A Prosoma and opisthosoma separated by an uninterrupted dorsosejugal suture (fig. 89) .... *Neoribates*

Keying with *Neoribates* (cited by Walter from western Oregon) is the North American genus *Parakalumna*. The glabrous *Parakalumna* has pointed pteromorphs with curved anterior margins; *Neoribates* has pteromorphs with rounded anterior margins.

1B Prosoma and opisthosoma appear nearly continuous, without a continuous dorsosejugal suture fully separating them (fig. 90, 91) 2

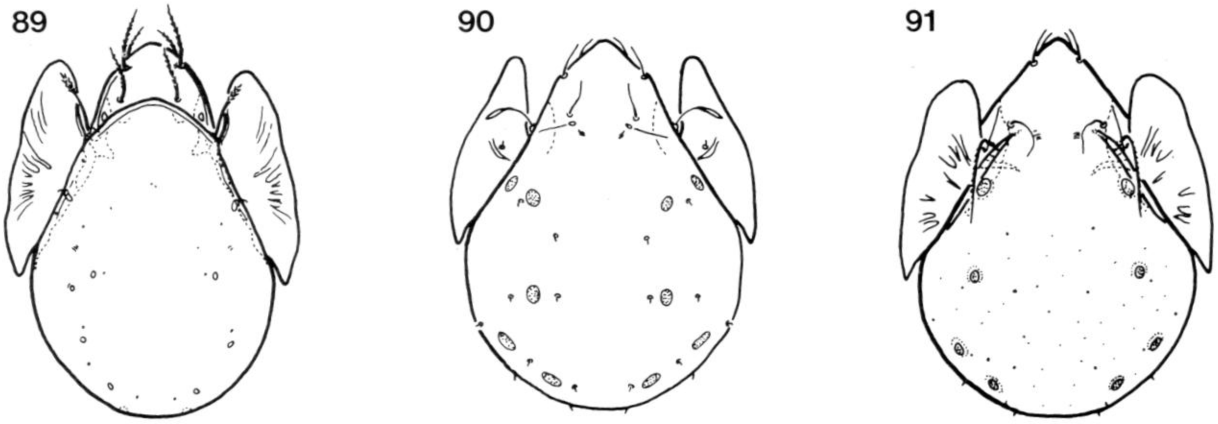

Figure 89-91; 89: *Neoribates* with uninterrupted anterior border of the notogaster; 90: *Pilogalumna* without trace of dorsosejugal suture; 91: *Acrogalumna* with hint of dorsosejugal suture and carine posterolaterally on prodorsum.

2A With traces of an interrupted dorsosejugal suture between the prodorsum and notogaster; with a mental tectum, a shield covering the head region and obscuring the chelicerae in ventral view (fig. 94) .... *Pergalumna/Galumna*

Both *Pergalumna* and *Galumna* have been taken in the xeric shrub sere. Both are rare. *Pergalumna* is abundant arboreally on oak in the Willamette Valley. *Pergalumna* has been implicated in nematode predation, and may require a diet of nematodes for successful maturation (Rockett 1976).

2B Without traces of the dorsosejugal suture separating prodorsum and notogaster; without mental tectum .... *Pilogalumna*

Keying with *Pilogalumna* (transcontinental) is *Acrogalumna* (eastern United States). *Acrogalumna* has a distinct longitudinal line in the posterolateral region of the prosoma (fig. 91).

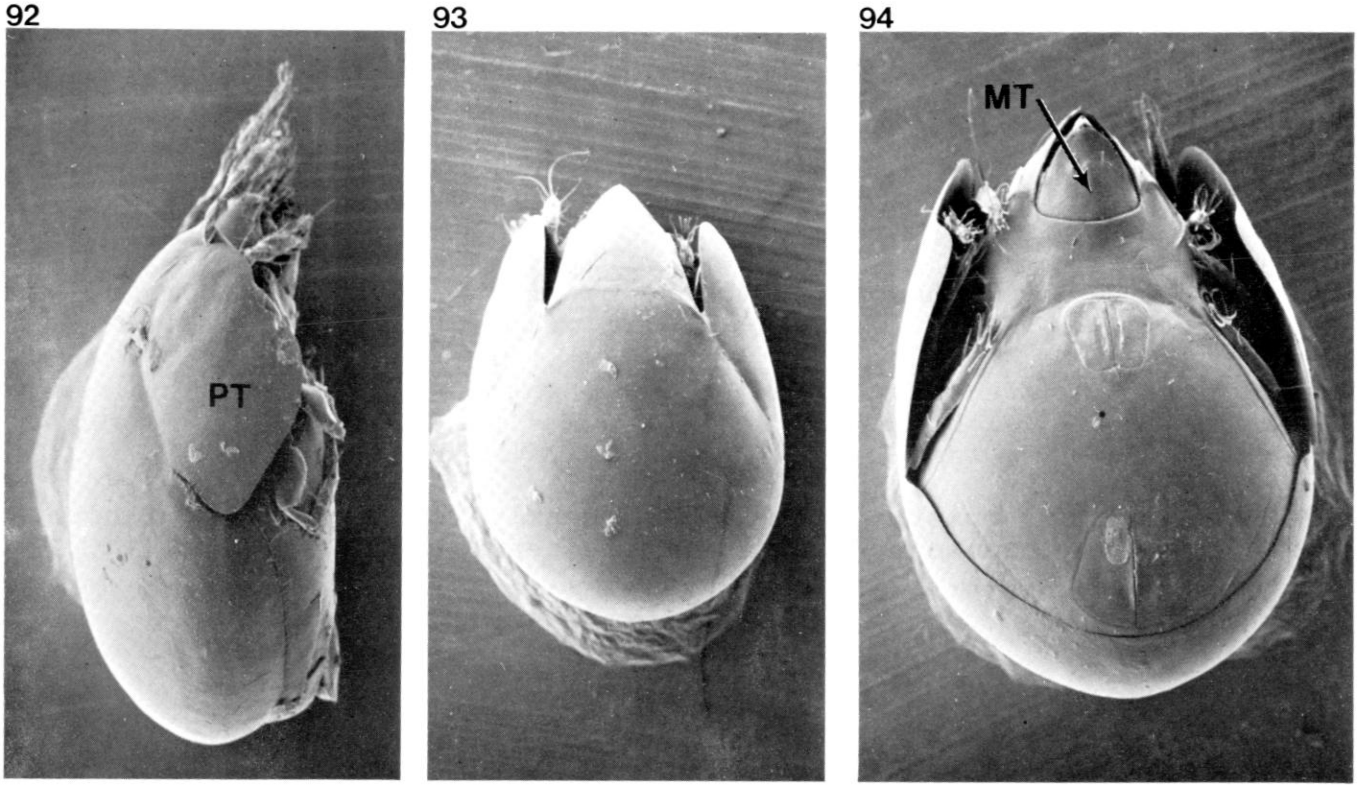

Figure 92-94; 92: *Pergalumna* sp. (Oregon Desert) in lateral view; picture height = 650 μ; 93: *Pergalumna* sp. (Andrews Forest) with 2 pair of faint longitudinal lines on prosoma; picture height = 925 μ; 94: *Pergalumna* second sp. ventral view showing mental tectum (MT); picture height = 650 μ.

SECTION F: spine-shouldered pterogasterines (Tenuialidae--Gustavioidea; Achipteriidae [without Anachipteria]--Achipterioidea)

This is an artificial grouping of two unrelated families of mites that have prominent, anteriorly directed flat broad spines arising from the shoulder region. The tenuialids are a uniform, species-poor group with genera differing primarily in the shape of the lamellae. The achipteriids are abundant and species rich; specific and even generic distinctions are usually difficult because most species are heavily melanized, and the arrangement and number of sacculi or pores is diagnostic.

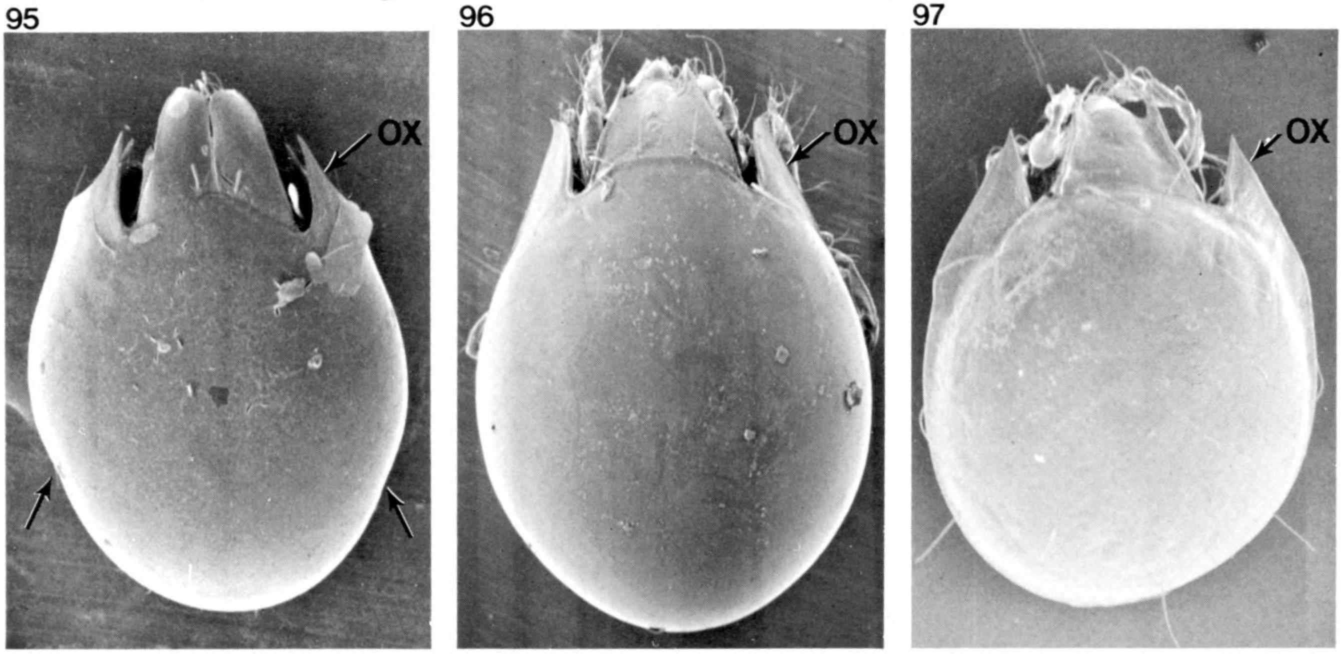

Figure 95-97; 95: *Achipteria* sp. with large forward-pointing ("oxypters" - OX) pteromorphs (P), lateral outline of body not a smooth curve; picture height = 425 μ; 96: *Tenuiala nuda* with slender forward-pointing pteromorphs (OX), lateral margin of body a smooth curve; picture height = 800 μ; 97: *Peltenuiala pacifica* with wide forward-projecting pteromorphs (OX); picture height = 825 μ.

1A Without fully developed pteromorphs, anterolateral border of notogaster unmodified and a smooth curve; shoulder extension in the anterior direction only (figs. 99 and 100)........................ 2
1B With fully developed pteromorphs, extending in part ventrally (fig. 98) .... *Achipteria/Parachipteria*

Achipteria, *Pseudachipteria*, and *Parachipteria* are distinguished by type and shapes of notogastral pores. These regions of lightened pigmentation are visible only through microscope slide mounts. *Achipteria* and *Parachipteria* are known to occur in western Oregon. *Parachipteria* has clearly visible compound "pores" (each apparently stippled, known as "areae porosae". *Achipteria* and *Pseudachipteria* have only minute pore-like structures, those of *Achipteria* are connected to tubular sacs. Walter (unpub.) records two species of *Achipteria*, *A. oregonensis* Ewing and *A. borealis* Ewing, in western Oregon.

Achipteria (figs. 95, 98 and 103; 460 to 500 μ) were found in all 52 sites (a feature shared only with *Anachipteria*, *Oppiella*, *Ceratozetes*, *Quadroppia*, *Rhinosuctobelba*, *Suctobelbella*, and *Scheloribates*). It was eighth in overall constancy and relative abundance. Ubiquitous and numerous, it tended to avoid old growth and tree seres (nearly absent from xeric old growth), but remained independent of the moisture gradient. Several of the sites exhibited erratic year-to-year variability, but *Achipteria* usually paralleled *Anachipteria* abundance. It was most abundant in late winter and infrequent in early spring.

2A Body dorsoventrally flattened (fig. 99), outline nearly circular; aspect of mite similar to a discus; notogaster with prominent large setae (fig. 97) .... *Peltenuiala*

Peltenuiala pacifica Norton (figs. 97, 99, and 102; 730 to 800 μ) was common in Andrews Forest, occurred in 39 of 52 sites, but exceeded a constancy value of 0.50 only in midmoisture old growth. Seasonal abundance was clearly atypical, but without robust data from the spring, difficult to interpret. It preferred old growth to tree and tree to shrub seres; it was least abundant in drier communities.

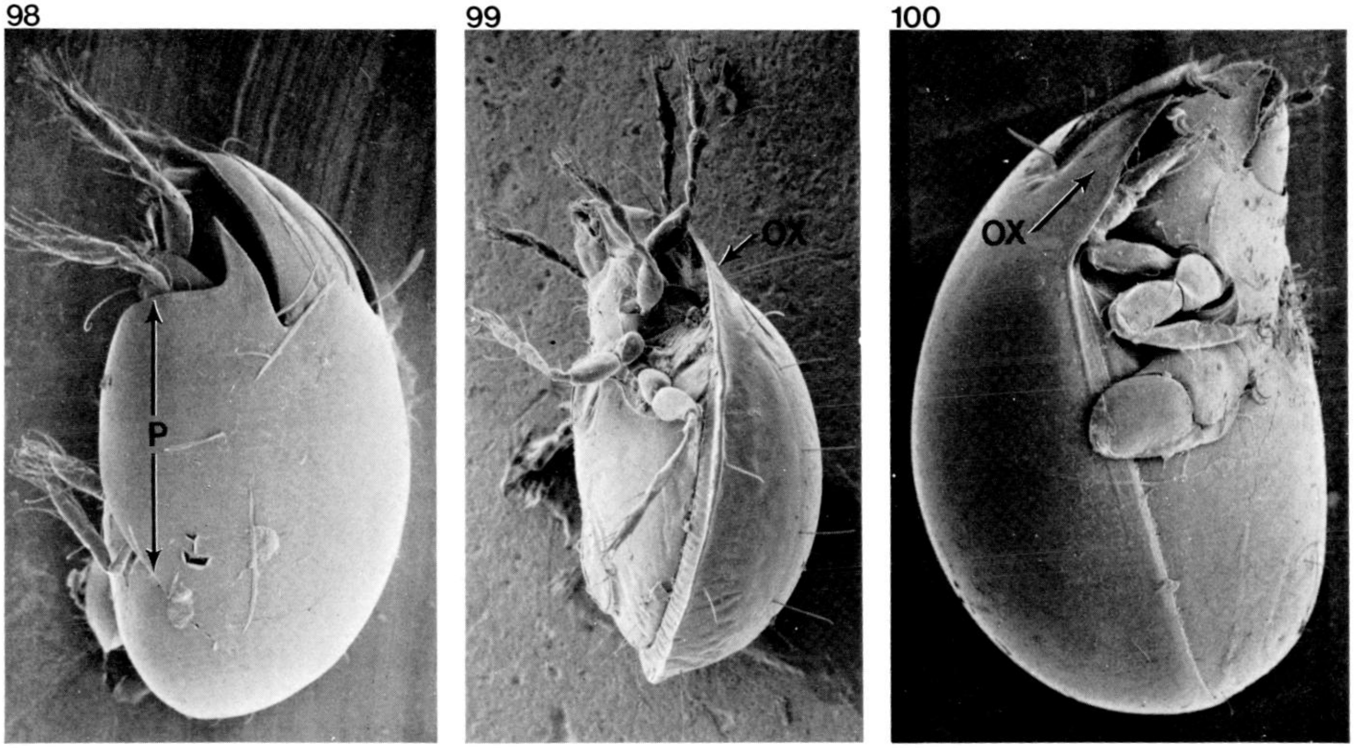

Figure 98-100; 98: *Achipteria* with fully formed ventrally-encircling pteromorphs (P); picture height = 550 μ; 99: *Peltenuiala pacifica* with a flattened body and broad forward-directed humeral projections (OX), but without pteromorphs; picture height = 1000 μ; 100: *Tenuiala nuda* with convex body shape and broad forward-directed humeral projections (OX); picture height = 750 μ.

2B Notogaster normally convex (fig. 100); outline oblong-cylindric; notogaster without setae .... *Tenuiala*

Keying with *Tenuiala* is *Tenuialoides*, distinct in having narrow translamellae (*Tenuiala* has broad, acutely pointed lamellar teeth). *Tenuiala nuda* Ewing (figs. 96, 100, 101 and 104; 710 to 800 μ) was encountered in three of 52 community sites; it apparently preferred tree and old-growth sites.

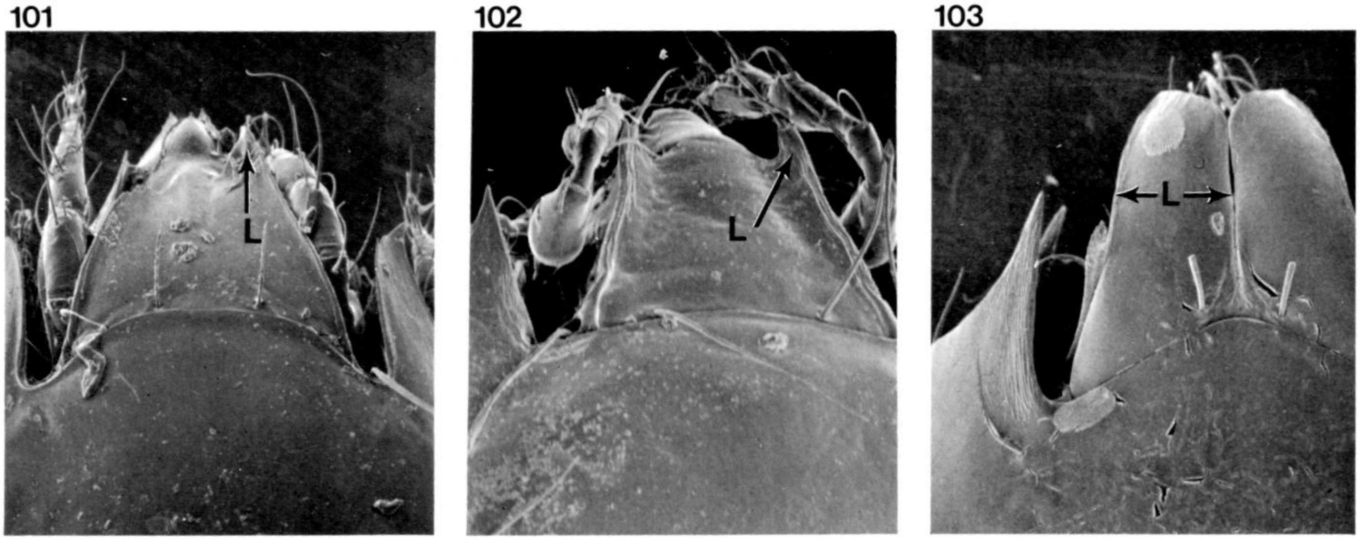

Figure 101-103; 101: *Tenuiala nuda* with narrow pointed lamellae (L); picture height = 325 μ; 102: *Peltenuiala pacifica* with narrow lamellae, widely separated (L); picture height = 325 μ; 103: *Achipteria* with broad lamellae separated by only a line (L); picture height = 125 μ.

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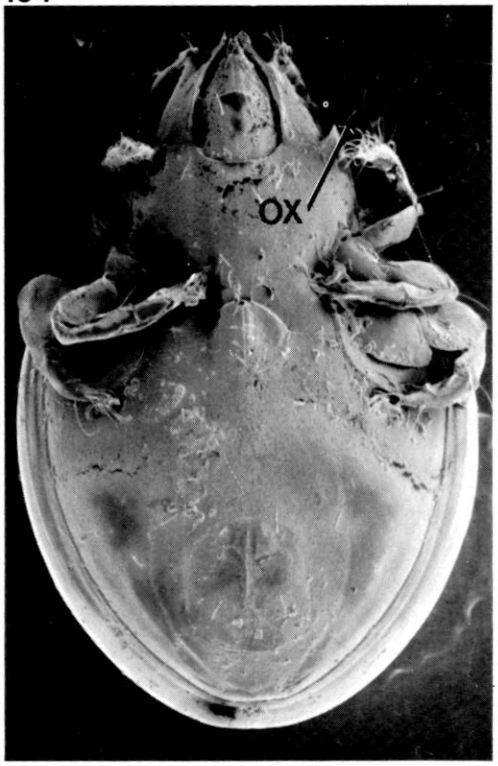

Figure 104: *Tenuiala nuda* ventral view to show the spined shoulder projections dorsal to the legs); picture height = 725 μ.

NOTE: Confusable with this group of spine-shouldered oribatids is the genus *Anachipteria* (in part); one abundant species has a well-developed pair of anterodorsal coverings of the legs ("pedotecta") in a similar position as the spined shoulder projections. These are separate structures and not to be confused with the humeral angle of the notogaster (fig. 121).

SECTION G: typical pterogasterines (Oribatelloidea, Ceratozetoidea, Phenopelopoidea, Achipterioidea)

This visually coherent group consists of genera that are difficult to distinguish once Sections E and F are removed. The Phenopelopoidea are easily recognized by their cerotegumentary patterning, though technical distinction is based on the modified shape of the chelicerae. The Microzetoidea though not expected in the Pacific Northwest, would key to this group. The Oribatelloidea (+Achipterioidea) and the Ceratozetoidea are distinguished by the relative development of their lamellae (covering entire prodorsum or thin carinate ridges, respectively) and general coloring (dark in oribatelloids, more translucent in most ceratozetoids).

The "eupterous" condition of the pteromorphs is diagnostic of several genera; this condition may cause confusion to the beginner. Eupterous oribatids are able to flex their pteromorphs to enclose their legs. This ability is readily apparent under the dissecting microscope; a prominent light-colored seam shows at the base of the pteromorph. The seam seldom shows in an electron micrograph unless the pteromorph is flexed.

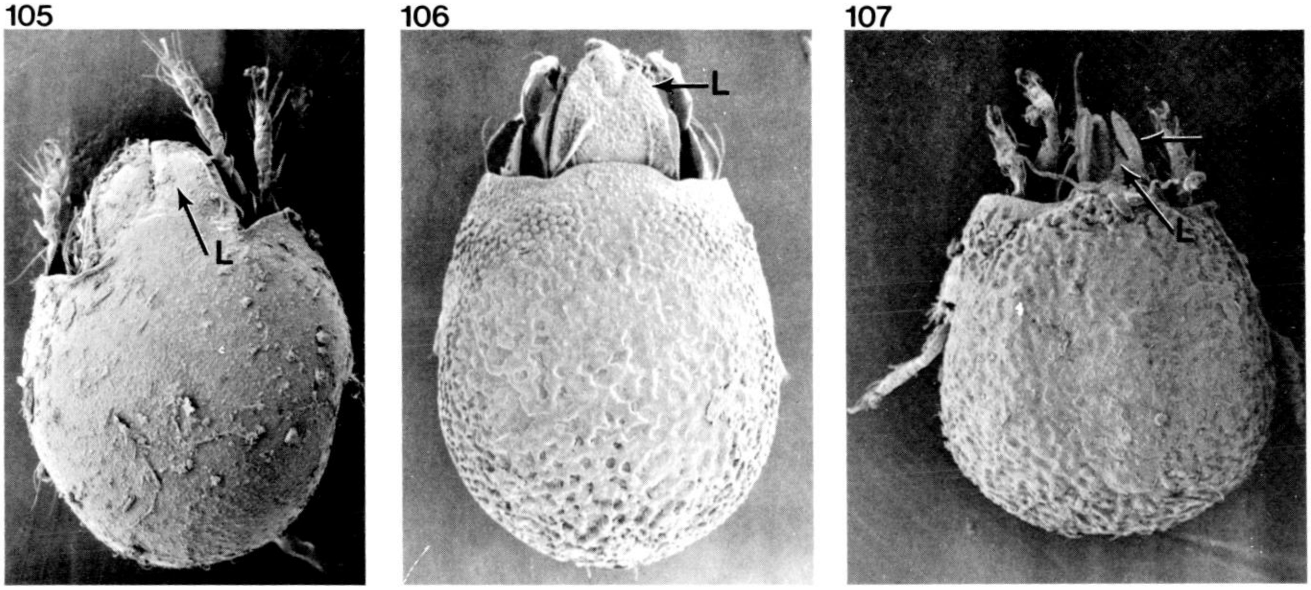

Figure 105-107; 105: *Anachipteria* sp. with conspicuous messy cerotegument, broad lamellae (L) obscuring all of prosoma; picture height = 550 μ; 106: *Propelops canadensis* with patterned cerotegument and broad anterior translamella (L); picture height = 400 μ; 107: *Eupelops* sp. with patterned cerotegument, short translamella (L) and immense interlamellar setae (ILS); picture height = 725 μ.

1A Dorsum with conspicuous (often warty) cerotegument throughout (figs. 105 to 113); pteromorphs quadrate 2
1B Dorsum without cerotegument (figs. 116 to 123) or, if present, inconspicuous 4

2A Lamellae synlamellate, with a simple linear space between lamellae (fig. 105); lenticular lightened spot at the medial portion of the dorsosejugal border (not visible in electron micrographs); black; pteromorphs (fig. 109) not joined to notogaster along a distinct light-colored line, not capable of flexing and enclosing the legs .... *Anachipteria* (part)

Anachipteria sp. "*CT*" (in the Oribatelloidea; figs. 105 and 109; 570 μ) was occasionally encountered throughout the grid, but only once exceeded a constancy value of 0.50 (mesic old growth). It inhabits primarily clearcut and shrub seres, preferring the midmoisture to mesic communities. Seasonal abundance is bimodal, with a high peak in spring and a broader, dry summer-fall peak. It is uncommon in late winter. Topic and Walter (unpub.) did not encounter it in the Salmon Creek watershed. Two other species of *Anachipteria* were found in Andrews Forest; they key out on page 53.

2B Lamellae broadly separate or medially connected by a translamellar ridge (figs. 106 and 108 to 112) (Phenopelopoidea) 3

3A Brown; cerotegument conspicuously warty, forming a uniform pattern; translamella anteriorly placed, obscuring nearly all of prodorsum in dorsal view (fig. 106); dorsum without modified setae; dorsosejugal margin of notogaster unmodified.................... *Propelops*

Propelops canadensis (Hammer) (figs. 106, 110 and 113; 340 μ) was one of the most widespread taxa in the Andrews Forest, found at 49 of the 52 sites. It was not abundant (most common in the midmoisture shrub sere), and only twice exceeded a constancy value of 0.75. Habitat preference was clearcut and shrub relative to tree and old growth seres; it was more common and constant in midmoisture than either dry or mesic sites. Seasonal abundance paralleled the bimodal pattern for total oribatids; however, the fall peak began during late dry summer.

3B Black; lenticulus prominent; cerotegument variable, not forming a uniform pattern; translamellar bridge over median portion of prosoma, leaving anterior portion of prodorsum visible; anterior border of notogaster with small anteriorly projecting lobes covering interlamellar setal bases (fig. 112); interlamellar setae modified into lamella-like structures (fig. 112); notogaster often with modified setae .... *Eupelops*

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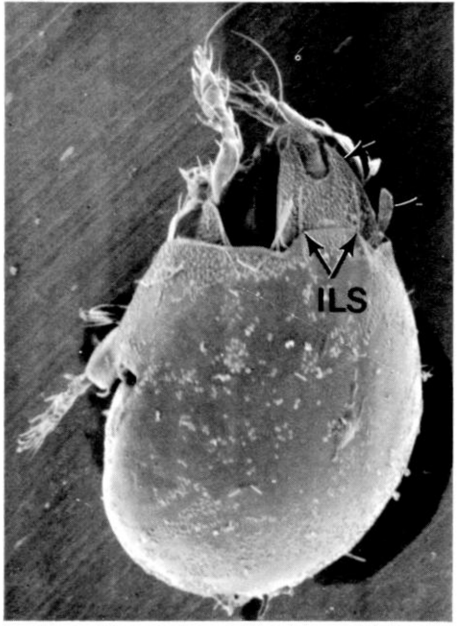

Figure 108: *Peloptulus* sp. with translamella, unmodified interlamellar setae and long spatulate sensilla; picture height = 500 μ.

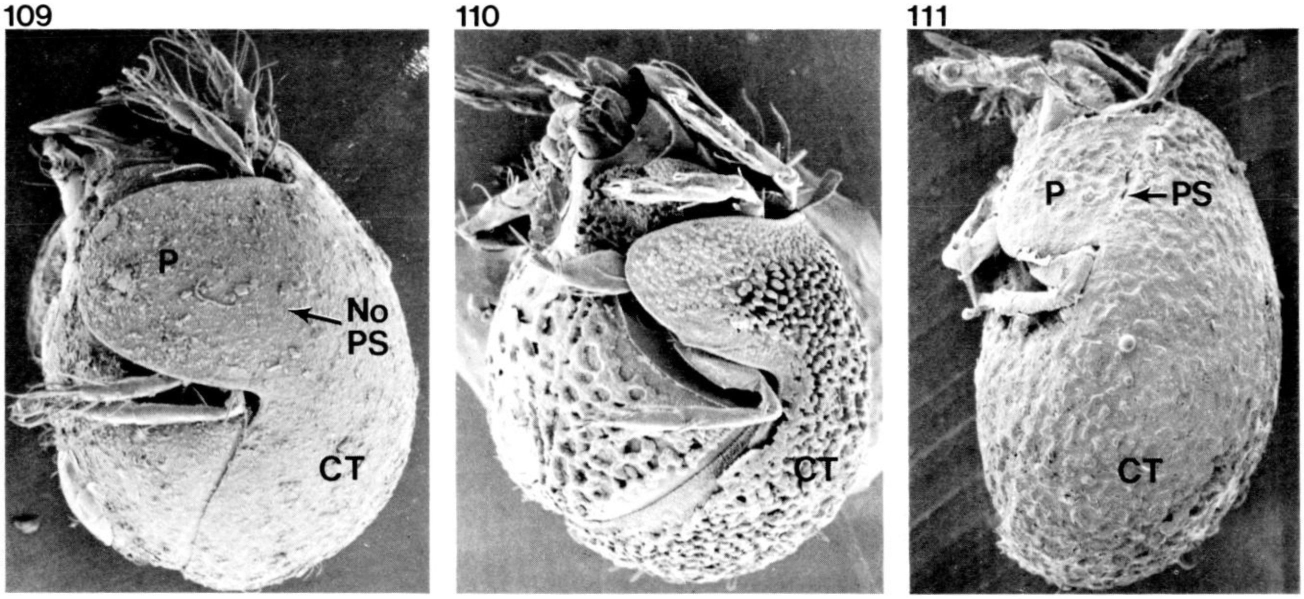

Figure 109-111; 109: *Anachipteria* sp. with cerotegument (CT) but without flexible pteromorphs (P); picture height = 425 μ; 110: *Propelops canadensis* with cerotegument (CT) but without flexible pteromorphs; picture height = 325 μ; 111: *Eupelops* sp. with cerotegument (CT) and flexible pteromorphs (PS); picture height = 525 μ.

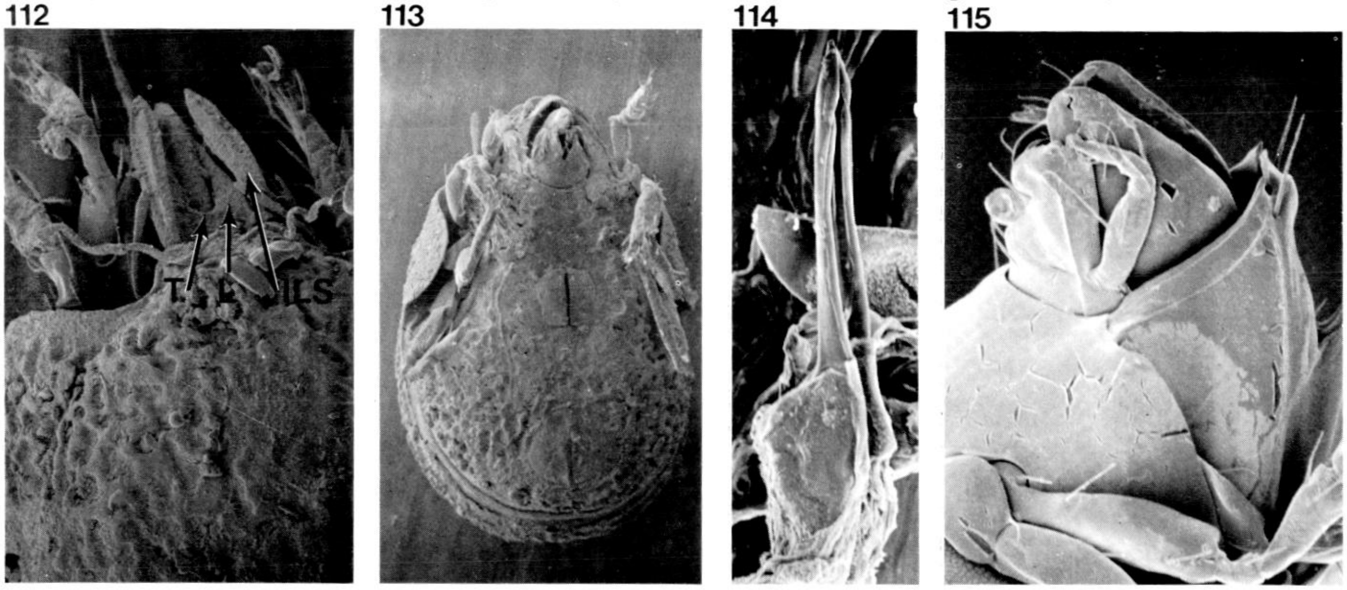

Figure 112-115; 112: *Eupelops* sp. with translamella (T) close to notogaster and huge interlamellar setae (ILS) arising from basal tubercles; picture height = 350 μ; 113: *Propelops canadensis* in ventral view, note the typically formed chelicerae; picture height = 425 μ; 114: *Eupelops* sp. with attenuate chelicerae; picture height = 150 μ; 115: *Liacarus* sp. with typically formed chelate chelicerae of most oribatids; picture height = 400 μ.

Eupelops (figs. 107, 111 and 112; 560 μ) was infrequently encountered in Andrews Forest. It was found in 13 of 52 sites, most abundantly in the midmoisture shrub sere. It occurred too infrequently to discern any seasonal abundance pattern.

Peloptulus has been collected in the Andrews Forest by Parsons, but not in the prime research grid (one specimen only; fig. 108).

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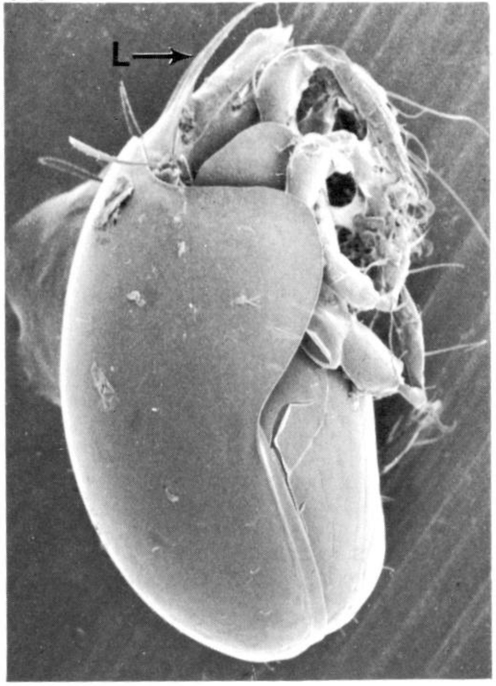

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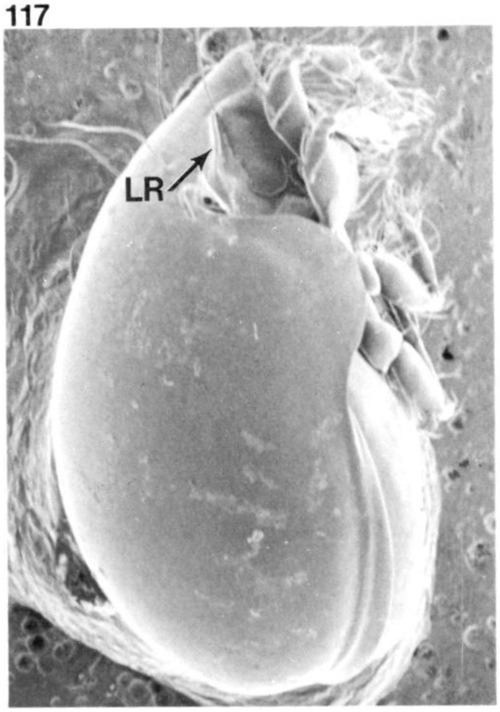

Figure 116-117; 116: *Ceratozetes* sp. lateral view, note presence of lamellae (L); picture height = 475 μ; 117: *Scheloribates* sp. lateral view, lamella visible only as linear ridge (LR); picture height = 325 μ.

4A Lamellae broad (figs. 116 and 119 to 126), covering nearly all of prosoma (Oribatelloidea, Achipterioidea) 5

4B Lamellae narrow ridges or prominent separate teeth (figs. 117 and 118) or, if broad, then with a thin translamella far forward (Oripodoidea, =Oribatuloidea (part); Ceratozetoidea) 8

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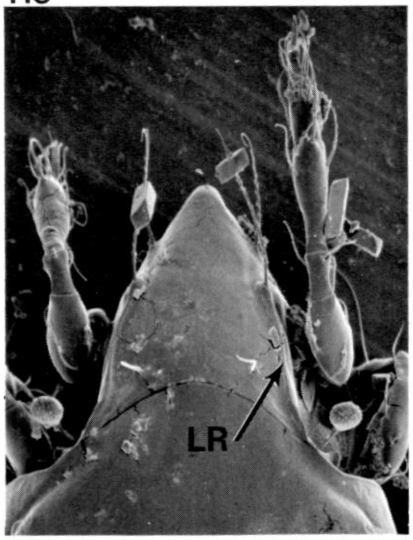

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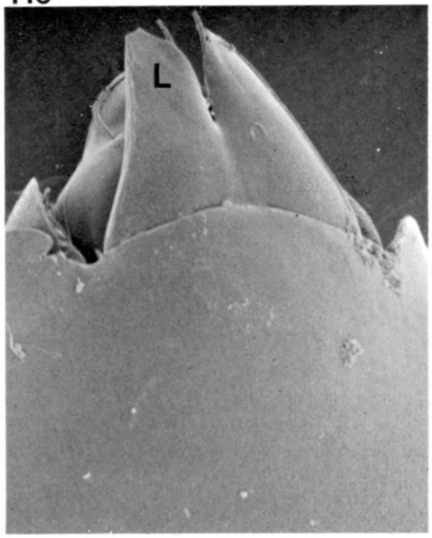

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Figure 118-120; 118: *Scheloribates* arboreal species, note the thin lamellar ridge (LR); picture height = 300 μ; 119: *Anachipteria* large species with broad lamellae (L) and prominent pedotecta; picture height = 250 μ; 120: *Oribatella* large species, lateral view of prosoma showing lamellae (L) projecting antero-dorsally over head region; picture height = 350 μ.

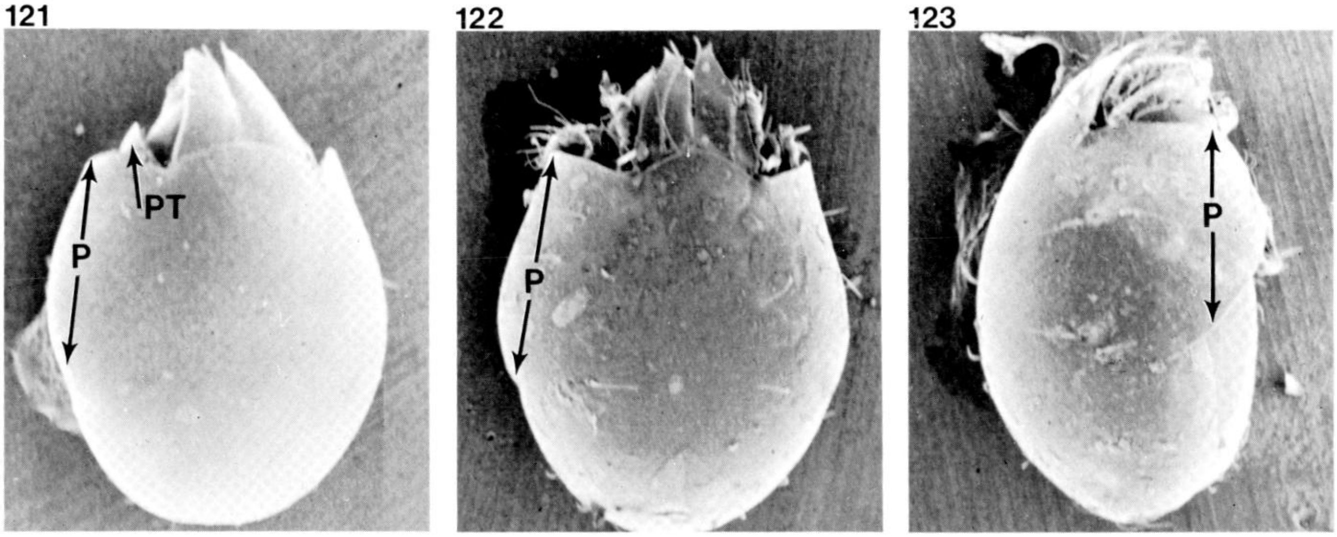

Figure 121-123; 121: *Anachipteria* large species with wide pointed lamellae and prominent pedotecta (PT); picture height = 400 μ; 122: *Anachipteria* smaller species with broadly pointed lamellae and inconspicuous pedotecta (P = pteromorph); picture height = 550 μ; 123: *Anachipteria* smaller species with inconspicuous pedotecta in lateral view (P = pteromorph); picture height = 550 μ.

5A Each lamella deeply emarginate and two-pronged (fig. 124), prominently projecting over head region in lateral view (fig. 120); bright reddish-brown; pteromorphs not projecting in dorsal profile; dorsum of opisthosoma clearly setose .... *Oribatella*

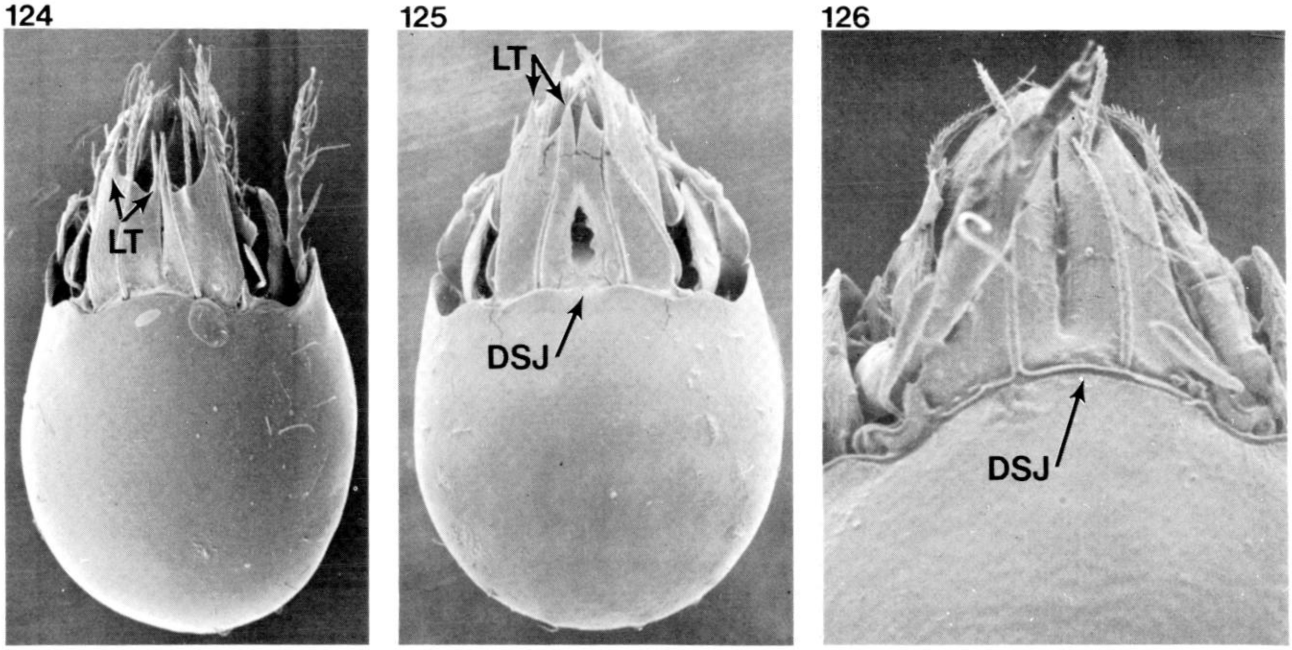

Figure 124-126; 124: *Oribatella* medium species showing the wide bidentate lamellar tips (LT) and the smooth outline of the lateral portions of the notogaster; picture height = 450 μ; 125: *Oribatella* small species; note emarginate dorsosejugal suture (DSJ), basally divergent lamellae and filiform sensillum; picture height = 300 μ; 126: *Oribatella* small species (small morph) with smaller pteromorphs, parallel interior borders of the lamellae and uninterrupted dorsosejugal suture; picture height = 125 μ.

Oribatella is a genus represented by at least five species of different sizes in western Oregon, with three or four species occurring in Andrews Forest. The most widespread and abundant was found at 51 of 52 sites but was only 18th in total abundance (fig. 126). Its size varied, with peaks at 340 μ and 290 μ; whether these two size classes represent two cryptic species or sexual differences is not known. Seasonal abundance was constant throughout the year, with a small peak in fall and a small trough in early winter. This composite size-class was generally distributed, preferred dry to midmoisture or mesic conditions and evidenced a preference for old growth and tree seres over either shrub or clearcut. The second, midsized species (390 μ; fig. 125) was encountered infrequently (20 of 52 sites). It is nearly restricted to shrub seral stages and preferred mesic to midmoisture conditions (absent in dry sites). The third and largest species (figs. 120 and 124; 570 μ) was rare and encountered primarily in the mesic shrub sere. It was exclusively a shrub species, preferring mesic to either midmoisture or xeric gradients. Seasonality data for the two larger species were similar, with a high peak in early summer but remaining infrequent from fall through late winter. (Parsons' samples were not taken in spring or dry summer in relevant sites.)

Adoribatella (recorded from Colorado) differs from *Oribatella* in having the lamellar emargination shallow and therefore the bidentate lamellar teeth tiny.

5B Lamella not deeply two-pronged, at most with two tiny teeth (figs. 119 and 125) and not prominently projecting in an antero-dorsal plane 6

6A Lamellae consisting of distinct separate flaps, not covering whole prodorsum, not appearing shelf-like in lateral view; black with lightened lenticular region near middle of dorsosejugal suture; posterior border of pteromorphs not discernable in dorsal view, profile nearly a smooth curve .... *Anachipteria* (part)

Anachipteria was represented in Andrews Forest by at least two species; the larger was easily confusable with *Achipteria* (treated in the spine-winged pterogasterine section). This larger species (figs. 119 and 121; 420 μ), present in all 52 sites, had a mean abundance greater than 20 in every site. It was the eighth most abundant and the eighth most constant species. It showed a slight avoidance of old growth and mesic sites. The seasonal distribution pattern of both fit the typical pattern. The larger species can be distinguished by the pointed plate protecting the legs and arising from them (and therefore not part of the true pteromorph). The smaller species (figs. 122 and 123; 350 to 380 μ), present in 50 of 52 sites, was characterized by a mean abundance greater than 20 in 11 of the 12 communities, and is 11th in total abundance. It was 15th in constancy, preferred the drier end of the gradient and tree and old growth seral stages (nearly absent in clearcuts). The smaller species exhibited the same erratic abundance pattern as *Achipteria*. *Achipteria* was slightly more abundant than the large *Anachipteria* and nearly twice as abundant as the small *Anachipteria*. See page 48-49 for another species of *Anachipteria*.

The genus *Tectoribates (=Anoribatella)*, distinguished by having the medial lamellar tooth the longest, is reported in the catalog from North America but has not been encountered in western Oregon.

6B Lamellae very broad, synlamellate or translamellate 7

7A Lamellae forming a continuous flat shelf obscuring entire prosoma (fig. 127), without medial split; posterior border of pteromorphs discernable in dorsal profile, interrupting a smoothly curved outline (fig. 127) .... *Lepidozetes*

Lepidozetes is known from western Oregon, but has yet to be collected in the central Cascade Mountains. *Scutozetes*, a genus found boreally across North America but not yet found in Oregon, may be distinguished by the height of the lamellae, which obscure only the medial half of the prosoma.

7B Lamellae translamellate (fig. 128), not covering entire prodorsum; posterior border of pteromorphs forming a smooth curve with the general arc of body in dorsal view (fig. 129); pteromorphs set off from notogaster by a light colored sulcus .... *Mycobates*

Keying in couplet 7B might be two additional genera with an elongate split between the translamellate lamellae: *Tegoribates* (Alaska to Colorado and Indiana) has broad, smoothly transverse lamellar tips and a typical dorsosejugal suture; *Dentizetes rudentiger* Hammer (Alberta) has a transverse dorsosejugal suture and broad multi-toothed lamellar tips (fig. 130). All three genera are expected in the forested Cascade Mountains.

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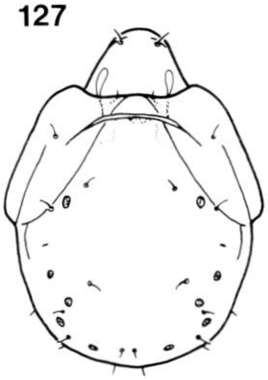

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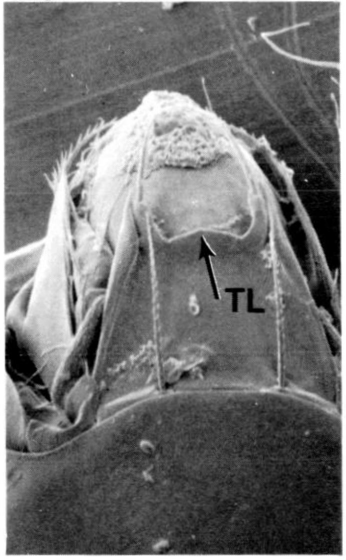

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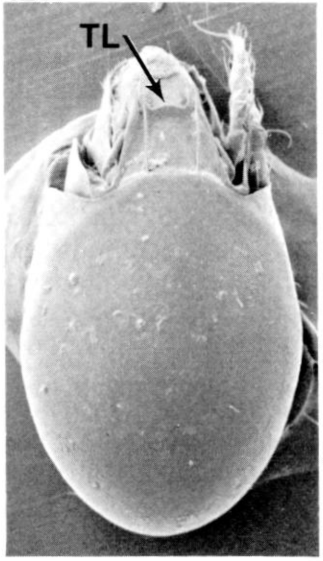

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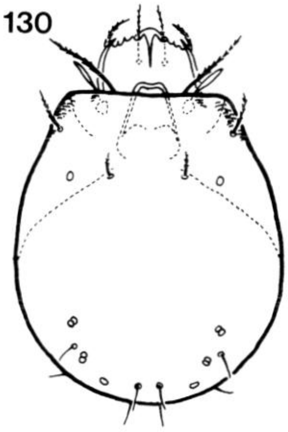

Figure 127-130; 127: *Lepidozetes* sp. with completely fused synlamellae; 128-129: *Mycobates* sp, note the translamella (TL); picture height 129 = 125 μ, picture height 130 = 250 μ; 130: *Dentizetes* with translamella (TL) and multiple-toothed lamellar cusps;

8A Posterior portion of opisthosoma with distinct large tubercular swellings (fig. 133); lamellae linear (fig. 132); sensillum clubbed; habitat arboreal .... *Jugatala*

Jugatala tuberosa Ewing is an abundant arboreal species inhabiting the upper crown of old growth Douglas-fir. Voegtlin (1982) reports it only on bare branches, with an additional unidentified species inhabiting epiphytic growth and trunk surfaces; the second species lacks the posterior tubercules of *J. tuberosa*.

8B Notogaster not tubercularly swollen posteriorly 9

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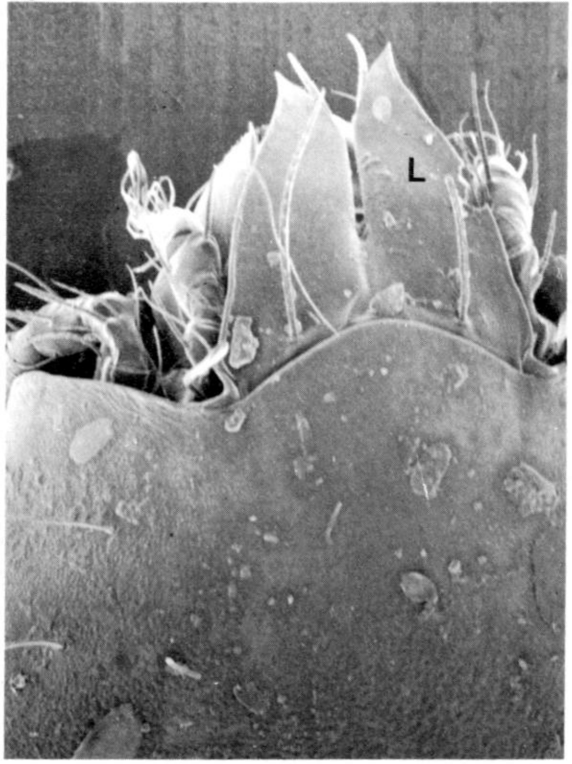

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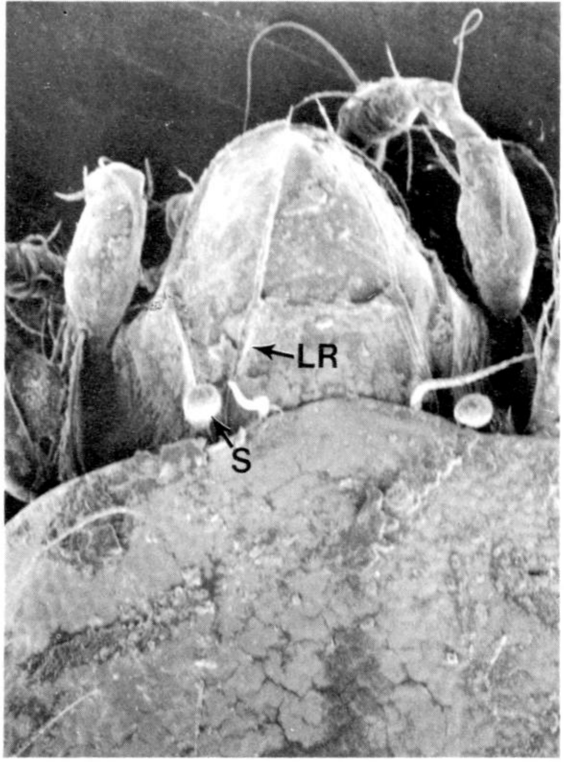
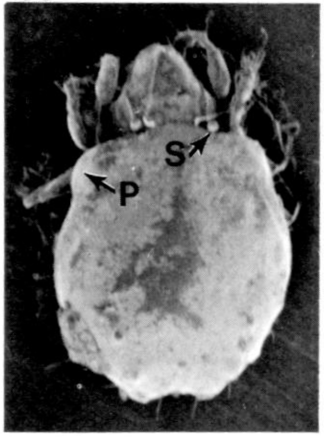


Figure 131-132; 131: *Anachipteria* small species with close-up of lamellae (L) and inconspicuous pedotecta; picture height = 325 μ; 132: *Jugatala* sp. showing near absence of lamellar structures (LR) in contrast to Figure 131; note the clubbed sensillum (S); picture height = 275 μ.

9A Lamellae present at most as tiny narrow ridges (figs. 135, 137, 140 and 141; Oripodoidea=Oribatuloidea) 10

9B Lamellae present, tooth- or horn-like (figs. 132, 133, 143 to 156) and usually with long setae on notogaster (Ceratozetoidea; Mochlozetidae) 12

133



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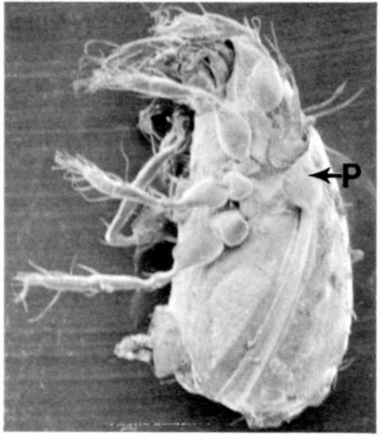

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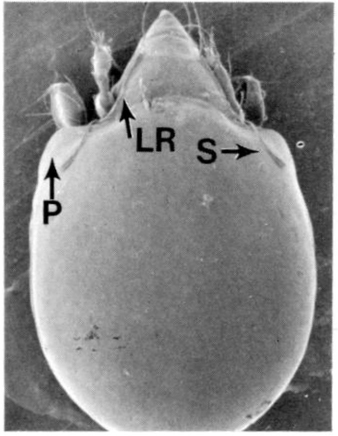

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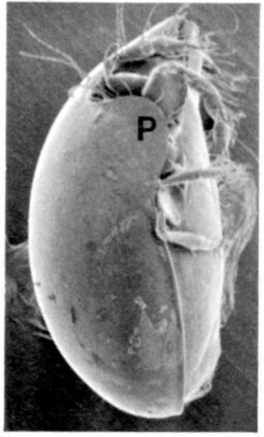
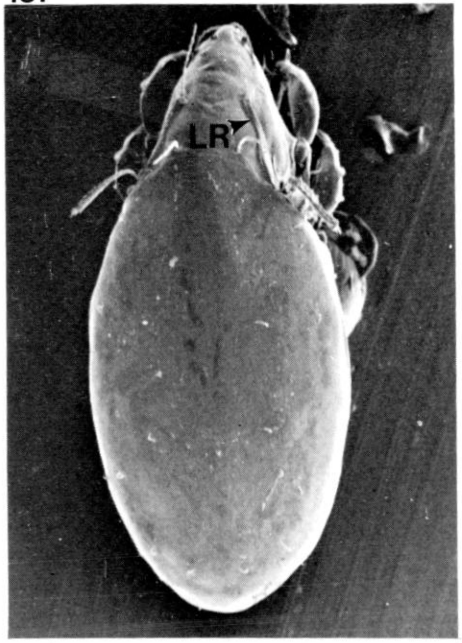


Figure 133-136; 133-134; *Jugatala tuberosa*, note posteromesal tubercular humps (TUB), very small pteromorphs (P) and clubbed sensillum (S); picture height 133 = 625 μ, picture height 134 = 525 μ; 135-136: *Scheloribates* large species, dorsal and lateral views (LR = lamellar ridge, P = pteromorph); picture height 135 = 400 μ, picture height 136 = 450 μ.

10A Pteromorphs fused to notogaster, without a lightly colored sulcus at base of pteromorph (Figs. 136 and 138); hint of lamellae on prosoma, appearing as a ridge with a large seta at the anterior and .... *Scheloribates*

Scheloribates (figs. 135 to 142) is a diverse and abundant genus throughout Oregon. In Andrews Forest, this genus is represented by at least four species.

137



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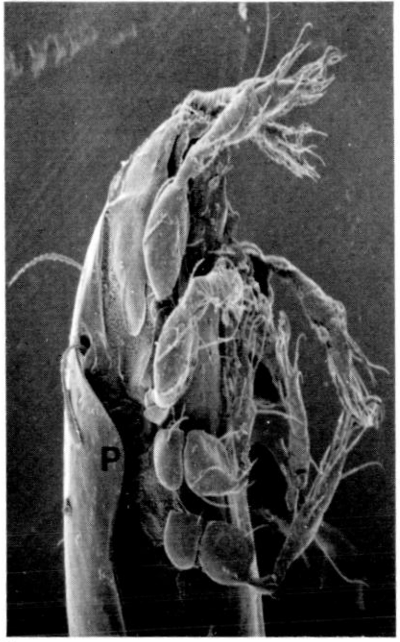

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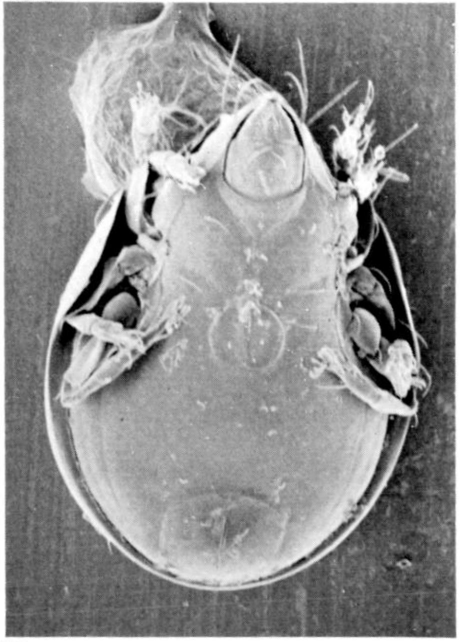

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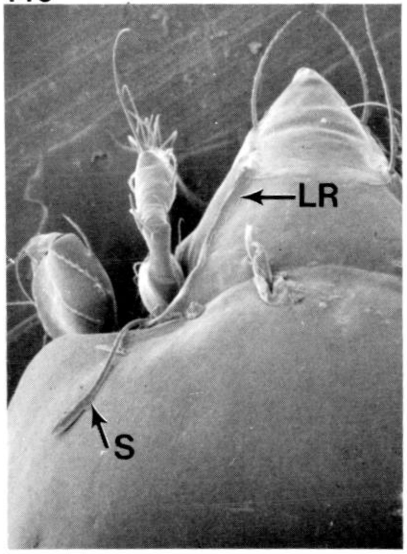

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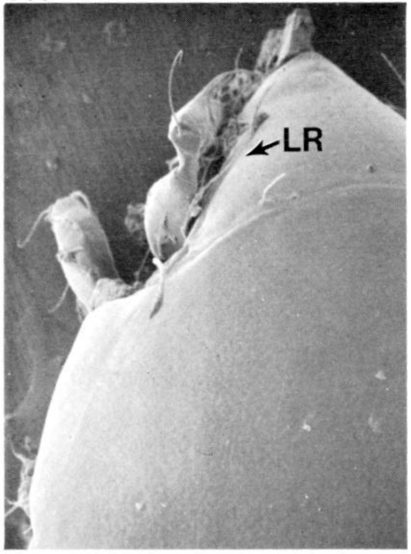

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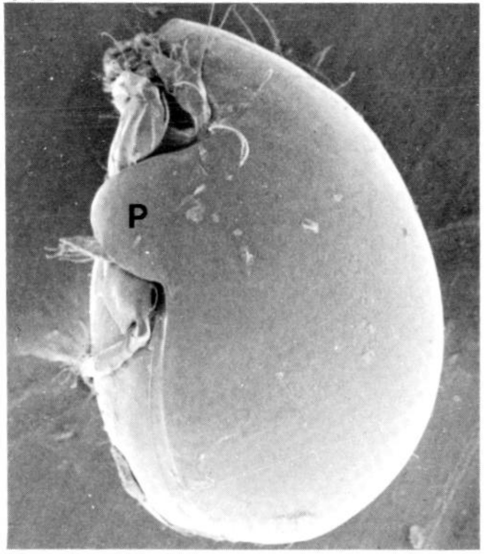


Figure 137-142; 137-138: *Scheloribates* (Ft. Rock, Oregon) in dorsal and lateral views; picture height 137 = 275 μ, picture height 138 = 200 μ; 139: *Scheloribates* sp. (470 μ) ventral view of a typical oribatuloid; picture height = 475 μ; 140: high magnification of same species showing lamellar ridge (LR) and sensillum (S) interlamellar seta broken off and partially covered by dirt); picture height = 225 μ; 141-142: *Scheloribates* tear-shaped species in dorsal and lateral views; picture height 141 = 200 μ, picture height 142 = 300 μ.

One species is strictly arboreal, inhabiting the canopy of old growth Douglas-fir; Voegtlin (1982) reports it abundantly in epiphytic growth and on the bare bark of branchlets. At least two species were found in litter. The smaller (380 to 400 μ) ranked sixth in abundance and ninth in constancy, being found on all 52 sites. The smaller species preferred clearcut and shrub seres; it was almost entirely replaced by *Scheloribates* sp. "S" in old growth. It preferred dry sites. Seasonal abundance closely corresponded to that for total oribatids. The larger species (460 to 480 μ) was almost as abundant, found on all but one of 52 sites, and ranked seventh in abundance. Constancy values exceeded 0.80 in 8 of the 12 plant communities. It preferred the shrub sere (avoided clearcuts less than tree or old growth communities) in mesic or midmoisture conditions. Seasonal abundance seemed rather uniform (with one trough in early winter) rather than bimodal. A fourth species (large, tear-drop shaped) (figs. 141 and 142; 280 μ) occurred only in the three old growth communities and the midmoisture tree site.

Also keying in couplet 10A is *Oripoda*, which is known from western Oregon (Walter unpub.). *Oripoda* is distinguished by a cylindric body (fig. 226) (width less than half the length) with the posterior portion of the parallel-sided prosoma only half to one third the width of the anterior portion of the notogaster.

10B Pteromorphs separated from notogaster by a lightly colored sulcus; lamellae present as linear ridges on sides of prodorsum; dorsosejugal suture strongly convex 11

11A Anterior margin of notogaster nearly transverse; poronotic; monodactylous .... *Xylobates*

Xylobates has been collected by Walter (unpub.) in western Oregon.

11B Anterior margin of notogaster strongly convex; sacculonotic; tridactylous .... *Haplozetes*

Keying with *Haplozetes* (fig. 143) is *Peloribates* (fig. 146), a genus reported transcontinentally from North America; it may be distinguished by 14 pairs of long notogastral setae (10 pairs in *Haplozetes* and *Xylobates*). Both genera have been collected in western Oregon by Walter (unpub.).

12A Pteromorphs separated from notogaster by true sulcus of flexure (a lightly colored line at the base of the pteromorph) 13
12B Pteromorphs not separated from notogaster by sulcus of flexure...14

13A Translamellate (figs. 128 and 129) .... *Mycobates*

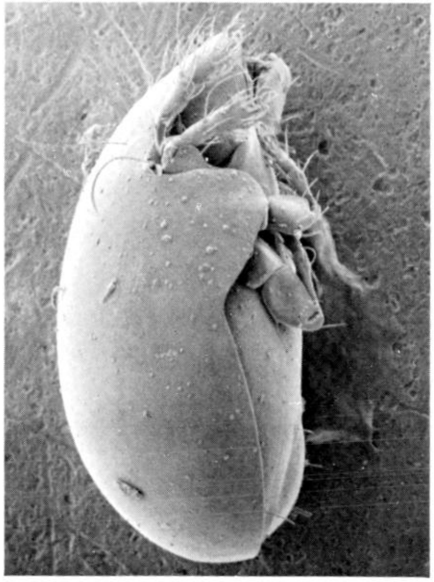
Mycobates has been collected by Walter (unpub.) in western Oregon and coastal central California (Walter 1985), but has not been encountered in Andrews Forest. *Minuthozetes*, reported from central California by Walter (1985), is distinguished by a single tarsal claw, long spindle-shaped sensilla, and a nearly straight anterior margin of the notogaster.

13B Lamellate, without translamellar ridge .... *Diapterobates*

Though not recorded from Andrews Forest, a species apparently keying to this genus has been found by Walter (unpub.) in western Oregon; the catalog reports it transcontinentally across Canada and the northern United States. Also keying here are two other distinctive genera recorded from North America by Balogh (1972) but not yet seen in Oregon. Neither genus has notogastral setae and hence can be distinguished from *Diapterobates*. *Pelopsis* (=*Parapelops*) has highly modified, flattened interlamellar setae that are apically bifurcate; it is widely distributed from the Northwest Territories to Texas. In *Punctoribates*, the dorsosejugal suture is modified and projects over nearly all of the prodorsum as a two-toothed shelf; this genus is also widely distributed from Alaska to Virginia.

14A Translamellate 15
14B Lamellae simple 17

143



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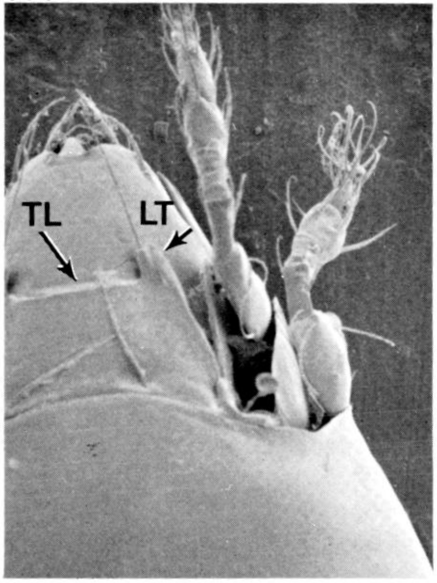

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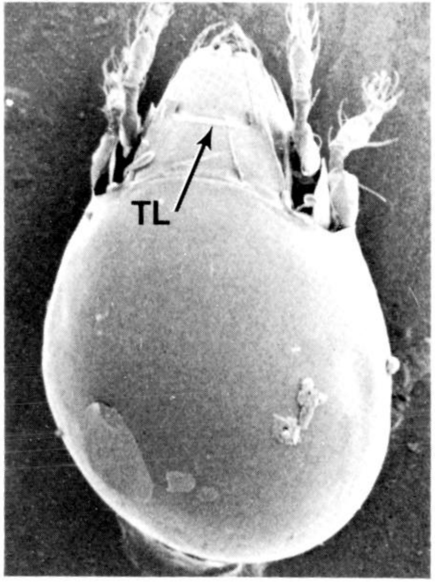
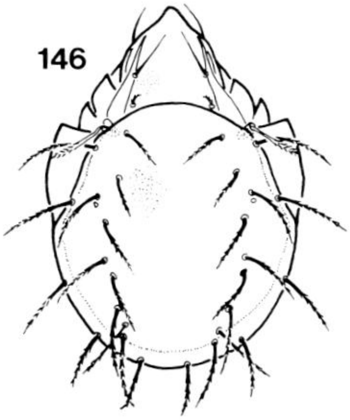


Figure 143-145; 143: *Haplozetes* without translamella, note that the pale line of flexion at the base of the pteromorph is not visible in SEM; picture height = 500 μ; 144-145: *Sphaerozetes* sp. in dorsal view, notice the translamella (TL) with apically notched teeth; picture height 144 = 225 μ, picture height 145 = 375 μ.

146



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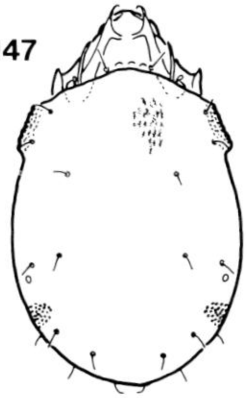


Figure 146: *Peloribates* without translamella but with prominent notogastral setae; 147: *Limnozetes* with a partial translamella and integumental patterning.

15A Translamella much wider than its flanking teeth .... *Sphaerozetes*

Sphaerozetes occurred frequently in Andrews Forest. It has three teeth on the tip of the rostrum, which distinguishes it from most similar ceratozetoid genera. *Sphaerozetes* (figs. 144, 145 and 148) preferred the mesic gradient (shrub, tree, and old growth) and xeric and midmoisture old growth.

Keying to this couplet is the aquatic genus *Limnozetes*. Unlike the smooth notogaster of *Sphaerozetes*, it has a stippled dorsum (fig. 147).

15B Translamella shorter than or equal to flanking teeth 16

16A Humeral angle small and obtuse in dorsal view; lacking two anterior pairs of dorsomedial notogastral setae .... *Trichoribates/Ceratozetes* (part)

Both genera occurred in Andrews Forest. *Ceratozetes* is very diverse and will be discussed below, where most of the species will appear to key out. *Trichoribates lamellata* (Ewing) is similar to *Ceratozetes*, but has an additional pair of notogastral setae (the subapical median pair), lamellae with two teeth at the tips and a minute capitate sensillum. *Trichoribates* was found only twice on the research grid.

Zachvatkinibates (coastal northern California) has dentate lamellar cusps and an elongate clavate sensillum; it is missing the subapical median notogastral seta but has the anteromedial setae. *Ceratozetes* has a filiform sensillum. *Podoribates*, widespread through North America is apparently glabrous and has a very short clavate sensillum.

16B Humeral region not formed into a small, yet conspicuous, obtuse angle, forming a gentle curve throughout; two anterior pairs of long dorsomedial notogastral setae present .... *Melanozetes/Fuscozetes*

These similar genera are reported from western Oregon by Walter (unpub.), but only one has so far been found in the Andrews Forest. The translamella in *Fuscozetes* is ribbon-shaped and short; in *Melanozetes*, it is linear. *Melanozetes* (figs. 149 and 150) was an infrequent species; it occurred throughout all tree stages and generally along the xeric gradient.

17A Notogaster apparently without setae; obtusely angled humeral regions visible in dorsal view .... *Ceratozetes (part)*

1A Sensillum clubbed..2
1B Sensillum fusiform or filiform setulose.....................3
2A Lamellar setae arising actually on prodorsum; rostral setae setulose; bothridium visible; transcontinental......*Chamobates*
2B Lamellar setae arising at tip of lamellae; rostral setae simple; bothridia hidden from dorsal view; transcontinental, reported by Walter from western Oregon.............*Humerobates*
3A Sensillum short-fusiform; rostrum pointed; from Florida and Quebec...*Euzetes*
3B Sensillum elongate filiform setulose.......................4
4A Rostrum with three tiny teeth anteriorly; legs tridactylous; notogaster poronotic; transcontinental, abundant in Oregon .... *Ceratozetes*
4B Rostrum singly pointed anteriorly; first pair of legs monodactyl, others tridactyl; notogaster without pores; northeastern United States.........................*Heterozetes*

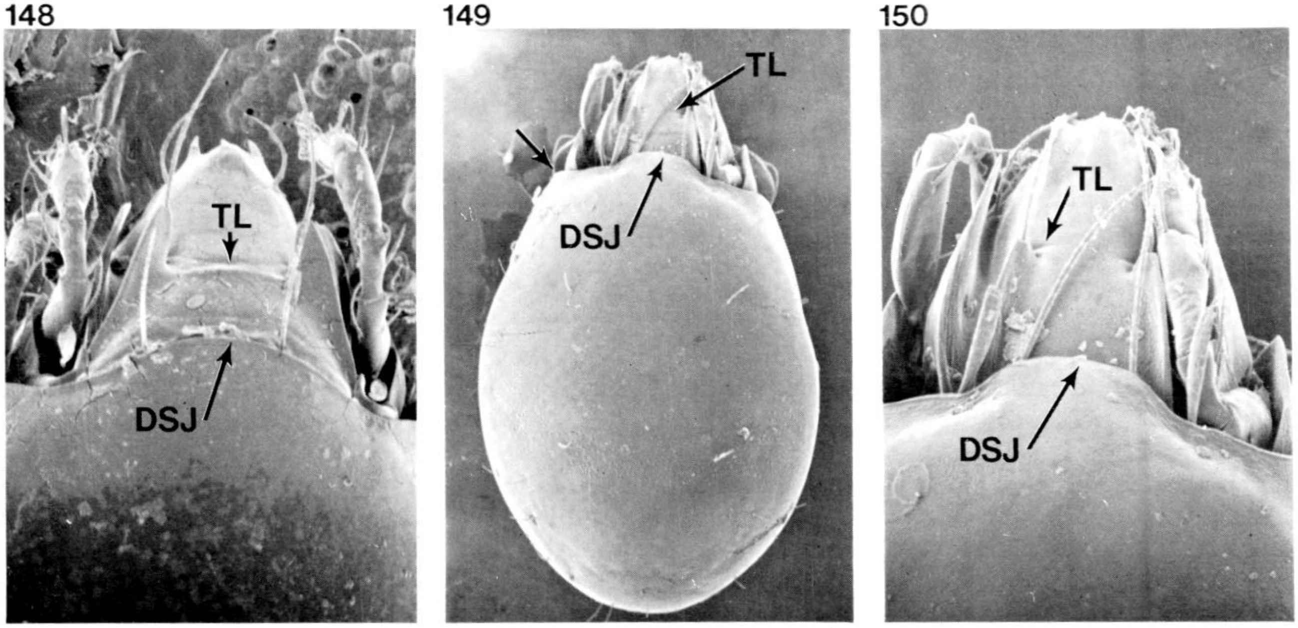


Figure 148-150; 148: *Sphaerozetes* sp. with translamella (TL); picture height = 300 μ; 149: *Melanozetes* sp. with translamella (TL) and squared off humeral region; picture height = 550 μ; 150: *Melanozetes* sp. with translamella (TL); (DSJ = dorsosejugal suture); pw = 225 μ.

17B Notogaster with setae .... *Ceratozetes/Hypozetes*

These genera are superficially similar. *Hypozetes* (fig. 156) is sacculonotic; it has 10 pairs of notogastral setae and a clubbed sensillum. Voegtlin (1982) reports that it is abundant on lichens and moss in the high crown of old-growth Douglas-fir. *Ceratozetes* is poronotic (fig. 155); it has up to 11 pairs of notogastral setae (varying to glabrous) and a filiform sensillum. *Ceratozetes* is diverse in western Oregon; at least five species were found in these samples.

The most abundant *Ceratozetes* (380 μ; figs. 151 and 152) is present in all 52 samples, and was sixth or seventh in relative abundance and constancy. Constancy exceeded 0.80 in all communities except the depauperate xeric clearcut. The seasonal abundance pattern followed the norm. The species preferred mesic more than midmoisture more than xeric sites and showed only a slight avoidance of clearcuts. A second species (310 μ; fig. 153) was also widespread and abundant; it was found in 42 of 52 sites and was 14th in total abundance. This species preferred xeric over either midmoisture or mesic sites. In clearcut and shrub seres, it occurred only in dry areas; in the tree sere, it inhabited the dry and midmoisture sequence. In old growth, it occurred abundantly in all three moisture regimes. Seasonal abundance was atypical; it was trimodally high in early summer, fall, and late winter, and least abundant in dry summer.

A third species of *Ceratozetes* (460 μ) occurred infrequently in these samples. It was abundant in xeric clearcut sites and occasional in other dry or shrub sites. It was abundant in late winter and early summer (no data available for spring), with the usual troughs in dry summer and early winter. A fourth species (perhaps two) (530-630 μ) occurred infrequently (in 23 of 52 sites), but never in a constancy over 0.50. It also was found principally on xeric clearcut sites, and occasionally in other dry sites or tree seres. The seasonal abundance was apparently normal (exceptionally low in late winter), but no data are available from fall.

A fourth species of *Ceratozetes* (tear-drop shaped; fig. 154; 330 μ) occurred only in shrub communities of midmoisture and mesic sequences. A fifth species (minute; fig. 155; 160 μ) was collected only twice in the research grid. The electron micrographs show prominent areae porosae on the notogaster but this may be an artifact of a newly moulted specimen.

The similar genus from boreal North America, *Iugoribates*, may be distinguished by a nearly transverse dorsosejugal suture. Similar to *Ceratozetes* in having a strongly convex dorsosejugal suture but with clubbed sensilla is the genus *Zetomimus* (known from New York).

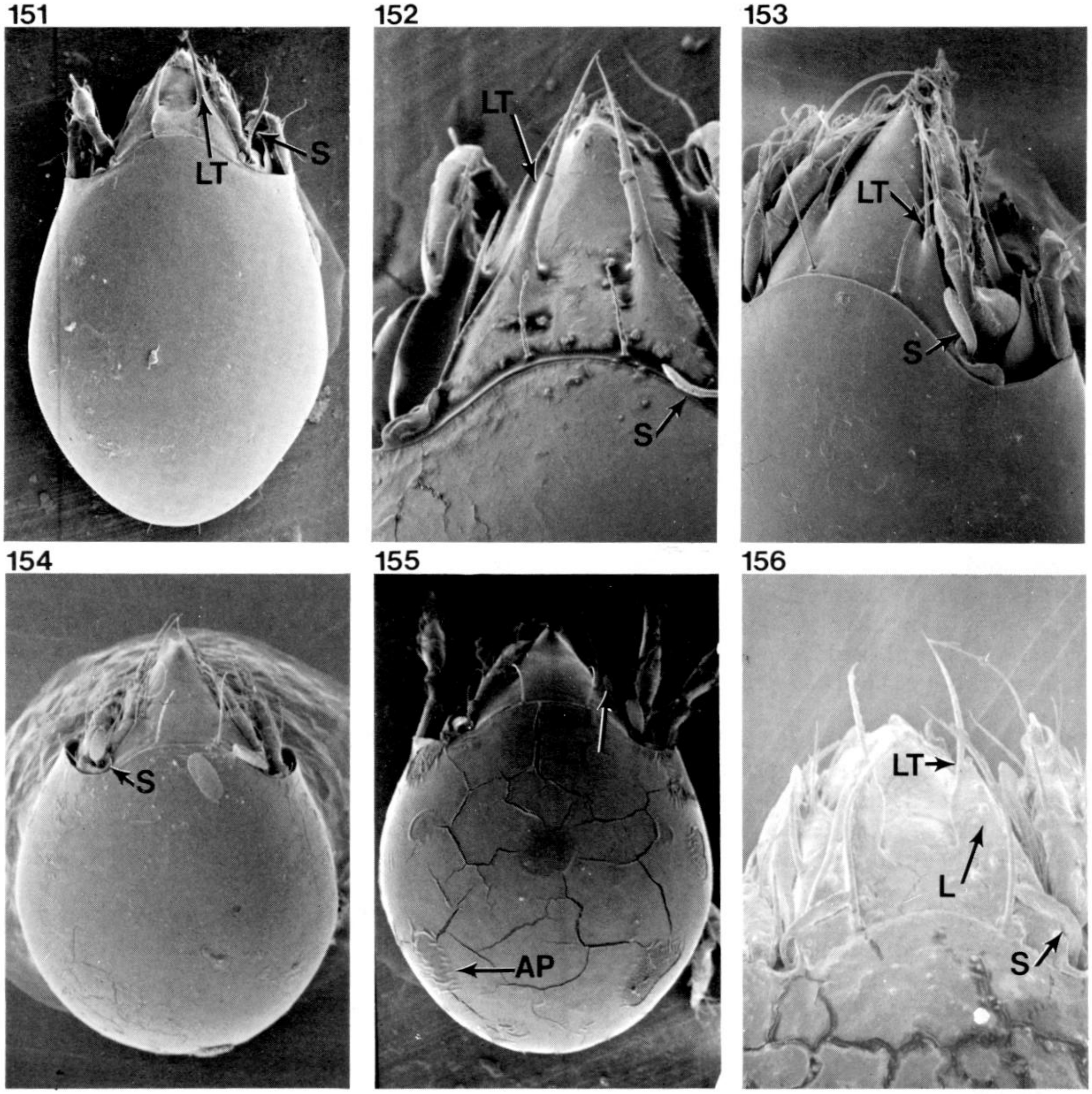
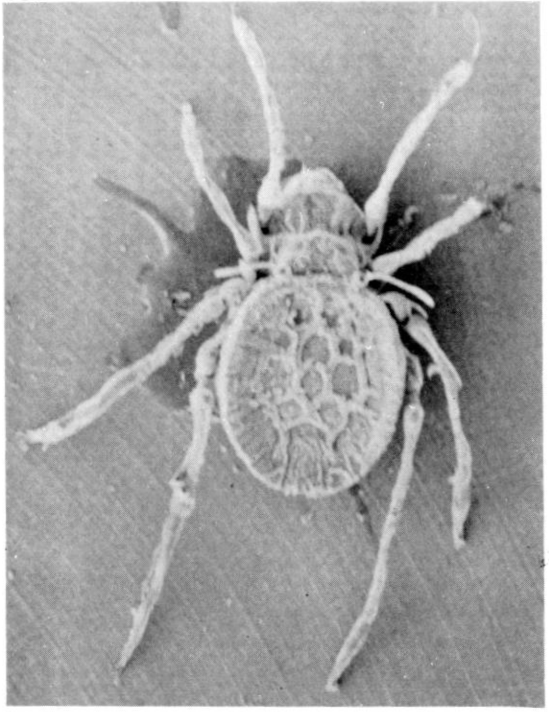


Figure 151-156; 151-152: common 380 μ *Ceratozetes* species, note the elongate shape and long lamellar teeth (LT); picture height 151 = 350 μ, picture height 152 = 175 μ; 153: smaller 310 μ species with the short lamellar teeth (LT); picture height = 200 μ; 154: the tear-shaped species; picture height = 250 μ; 155: tiny species with prominent areae porosae (AP); picture height = 275 μ; 156: *Hypozetes* sp. high magnification of prodorsum showing the lamellar teeth (LT) and the sensillum (S); picture height = 250μ.

SECTION H: Plateremaeoidea (=Gymnodamaeoidea), the flat-backed stilt mites

157



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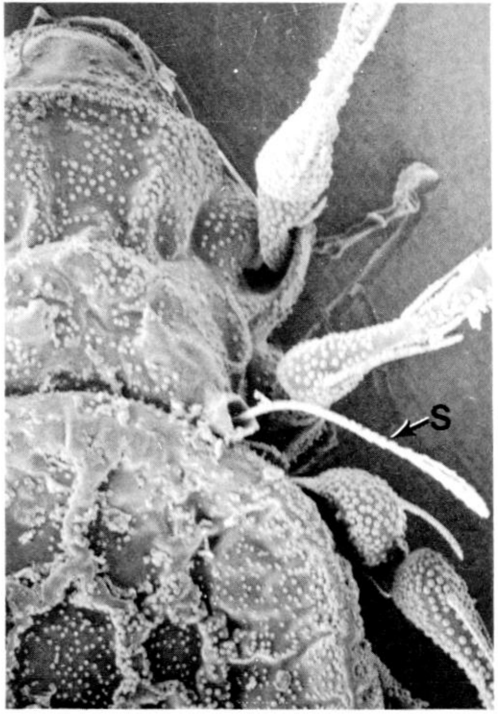

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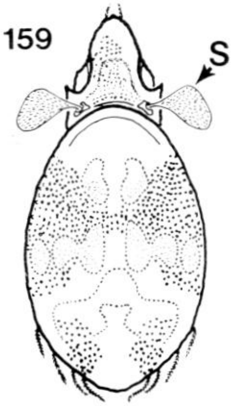

Figure 157-159; 157: *Odontodamaeus veriornatus* with elongate sensillum, extremely long legs and honeycombed notogaster; picture width = 1560 μ; 158: *Odontodamaeus veriornatus* highly magnified to show pattern of prodorsal ridges (circular central ridge and semi-circular ridge between bothridium and interlamellar seta) and tubercle bearing the interlamellar seta (S = sensillum); picture height = 425 μ; 159: *Licnodamaeus* sp. with leaf-like sensillum (S) and uniformly pitted notogaster.

1A Sensillum capitate, clavate, and densely setose or leaf-like (fig. 159); distal leg segments with prominent internal ball-and-socket joints visible in slide mounts 2
1B Sensillum elongate fusiform (figs. 157 and 158); leg segments usually without ball-and-socket joints 3

2A Sensillum leaf-like; notogaster with surface evenly pitted; often elongate, with length more than twice the width; California (fig. 159) .... *Licnodamaeus*
2B Sensillum clavate; widespread .... *Plateremaeus*

3A Larger than 500 μ; legs extremely long, femur I extending past tip of rostrum; legs 1.2 to 1.5 times body length; interlamellar seta arising from tubercle on semicircular ridges adjacent to the anteromedial border of bothridium (fig. 158) 4
3B Smaller than 500 μ; legs about equal to body length; semicircular interlamellar ridges and tubercles absent 6

4A With prominent folds along posterior margin of notogaster and tubercles on the anterior portion of notogaster .... *Pleodamaeus*
4B Without prominent folds on posterior margin of notogaster 5

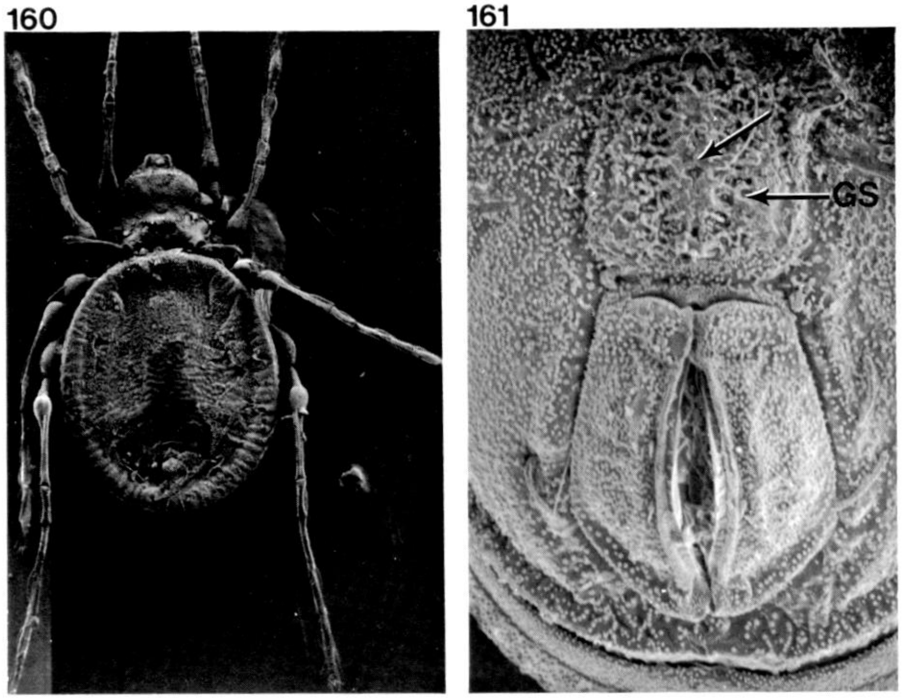

Figure 160-161; 160: *Gymnodamaeus* sp. from the eastern deserts of Oregon with curved interlamellar ridges, interlamellar tubercles and extremely long legs; picture height = 1075 μ; 161: *Odontodamaeus veriornatus* in ventral close-up showing the toothed border of the genital plates (GS) and the independent genital and anal apertures; picture height = 325 μ.

5A Inner margins of genital sclerites straight; anal and genital openings fused .... *Gymnodamaeus*

5B Inner margins of genital sclerites irregularly toothed (fig. 161); genital and anal openings independent (fig. 161); notogaster with large honeycomb design .... *Odontodamaeus*

Odontodamaeus veriornatus Hammer is a dark brown species with a honeycombed notogaster that appears prominently under a dissecting microscope (780 μ). This is probably an arboreal species, recorded by Voegtlin (1982) in high frequency in lichens and mosses of the canopy of old-growth Douglas-fir. It occurred in 38 of 52 sample sites but in very low abundance; the fact that it occurs on the ground at all makes it unusual among the taxa studied by Voegtlin. On the ground, it was most abundant in midmoisture shrub and tree communities and mesic old growth. Only one seasonal abundance peak occurred in dry summer and fall; populations were lowest in early winter. The partial advance of the fall peak is a feature shared with *Eremaeus* and *Oribotritia*.

6A Without prominent transverse ridge along posterior margin of prodorsum that joins bothridia; interlamellar setae located anteromedial to the bothridia; center of prodorsum with circular ridge; femur IV with three setae; Washington .... *Johnstonella*

6B With prominent transverse ridge along posterior margin of prodorsum joining bothridia; interlamellar setae located medially to the bothridia; center of prodorsum with an indistinct transverse ridge (not circular); femur IV with two setae; most posterior pair of notogastral setae enlarged and shaped like a bow-tie **7**

7A Notogaster longitudinally folded; six pairs of genital setae; 280 μ; Washington to Mojave Desert (fig. 163) .... *Joshuella*

We have found *Joshuella striata* in eastern Oregon and on a rotted log in the Coast Range. It has not yet been found in the Cascades.

7B Notogaster smooth or with honeycombed cerotegument (fig. 162); seven pairs of genital setae; 380 to 475 μ; Oregon and Washington .... *Jacotella*

Jacotella sp. is a small yellowish species (fig. 162; 280 μ) with no discernable pattern on the dorsum under the dissecting microscope (though one was readily apparent in the electron micrograph). It was widespread and abundant, occuring in 45 of 52 sites but most abundantly in the xeric shrub community. It demonstrated a strong preference for xeric over midmoisture over mesic conditions. It was primarily a species of the clearcut, which it preferred to shrub sites, while almost completely avoiding tree and old-growth sites. Seasonal abundance followed the same pattern outlined for *Odontodamaeus*.

Nortonella is a closely related genus known from the western United States and Canada. It differs from *Jacotella* in having only two pairs of adanal setae (three pairs in *Jacotella*).

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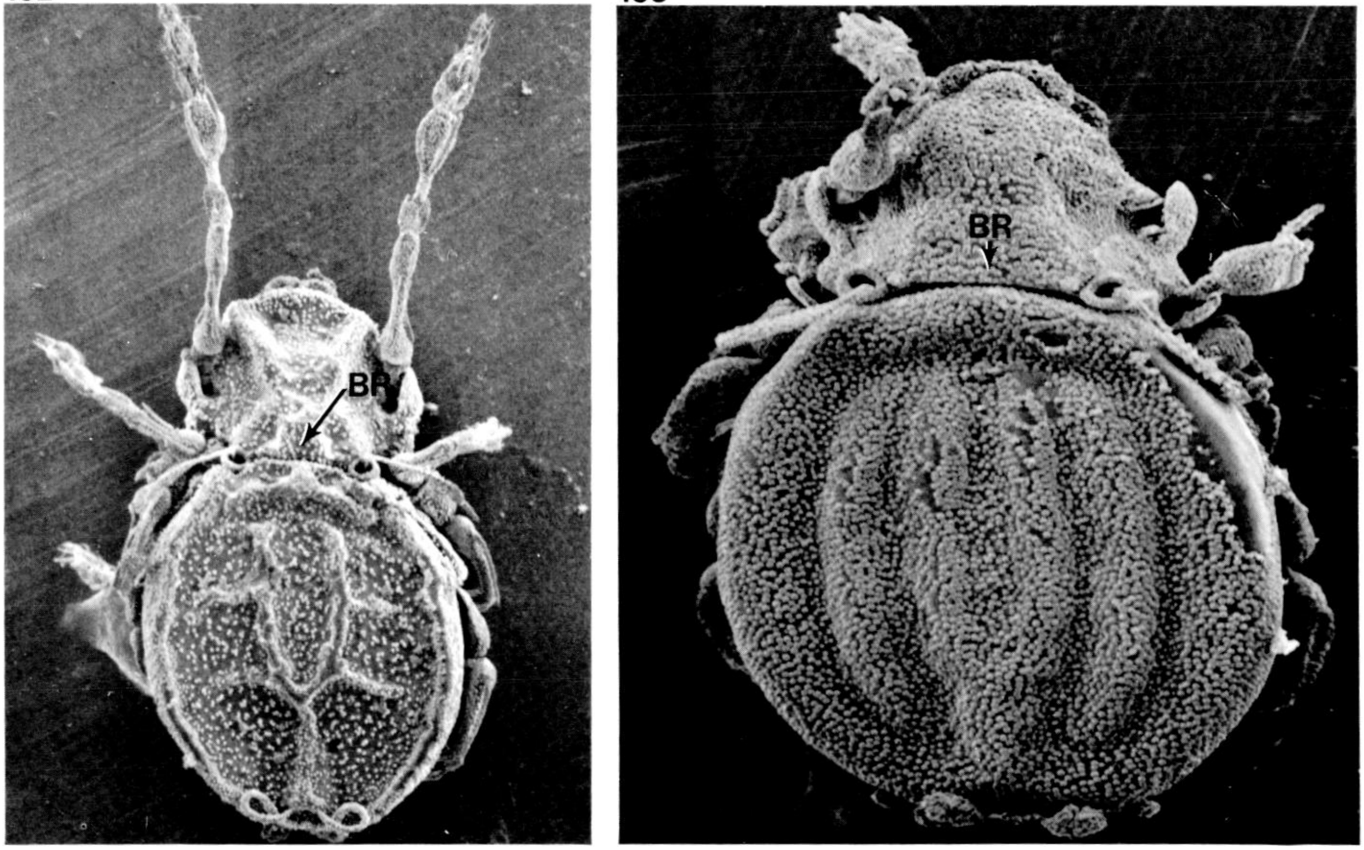


Figure 162-163; 162: *Jacotella* sp. with honeycomb notogastral pattern, presence of bothridial ridge (BR), and bow-tie posterior setae; picture height = 425 μ; 163: *Joshuella* striata with longitudinal folds on the notogaster, presence of a bothridial ridge (BR) and bow-tie posterior setae; picture height = 250 μ.

SECTION I: Perlohmannoidea and Epilohamnnioidea

1A Dorso-ventrally flattened (fig. 165); notogaster off-gray and weakly sclerotized; genital plates with indistinctly transversely divided (not visible under the scanning electron microscope; fig. 169); with an additional pair of adanal plates (fig. 169) lateral to the elongate linear anal plates; sensillum pectinate .... *Perlohmannia*

Two species of *Perlohmannia* (figs. 164 and 166) are found in Andrews Forest (neither reported by Walter and Topic from Salmon Creek). One species (860 μ) occurred primarily in scattered samples of localized abundance. It was found in 37 of 52 sites, with a preference for mesic conditions. Though widely distributed, it avoided clearcut sites, preferring shrub and tree seres. Samples were not available from fall or late winter, but abundance was apparently low from early summer to fall and high in early winter and spring. The smaller species of *Perlohmannia* (650 μ) was found in 15 of 52 sites, but is essentially restricted to xeric and mesic shrub sites. Seasonal abundance was high from early winter to spring, low in early through dry summer.

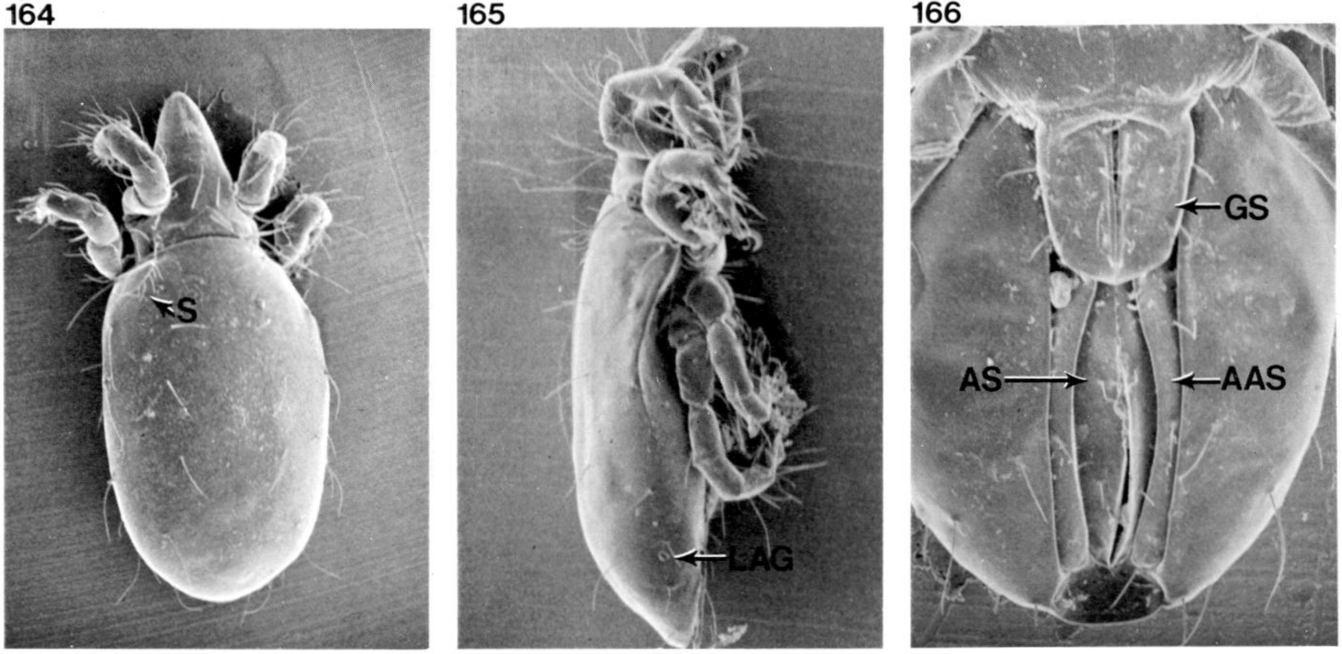


Figure 164-166: *Perlohmannia* sp.: note the pectinate sensillum (S), dorso-ventrally flattened aspect in lateral view, contiguous genital (GS) and anal plates (AS), peri-anal plates (AAS) and latero-abdominal gland (LAG) pore; picture height 164 = 1175 μ, picture height 165 = 950 μ, picture height 166 = 525 μ.

1B Not dorso-ventrally flattened, elongate (fig. 167), nearly always resting on its side when preserved (unique among oribatids, except for ptyctimines); bright red-brown and strongly sclerotized; genital plates not divided, without ventral peri-anal plates; with an indistinct transverse fold extending the full width of the ventral plate, immediately posterior to the genital plates; sensillum long and clubbed .... *Epilohmannia*

Epilohmannia n.sp. (figs. 167 to 169; 775 to 900 μ) was widespread and abundant in these samples, but exceeded a constancy value of 0.75 only in mesic tree and old-growth sites. Cline and Seastedt (unpub.) have identified numerous immatures in rotted wood samples from the Andrews Forest. It was primarily distributed in shrub, tree, and old-growth seres of mesic conditions; it also occurred in mesic clearcut and other tree and old-growth communities. Seasonal abundance peaked in fall and late winter with a low in spring (atypical!).

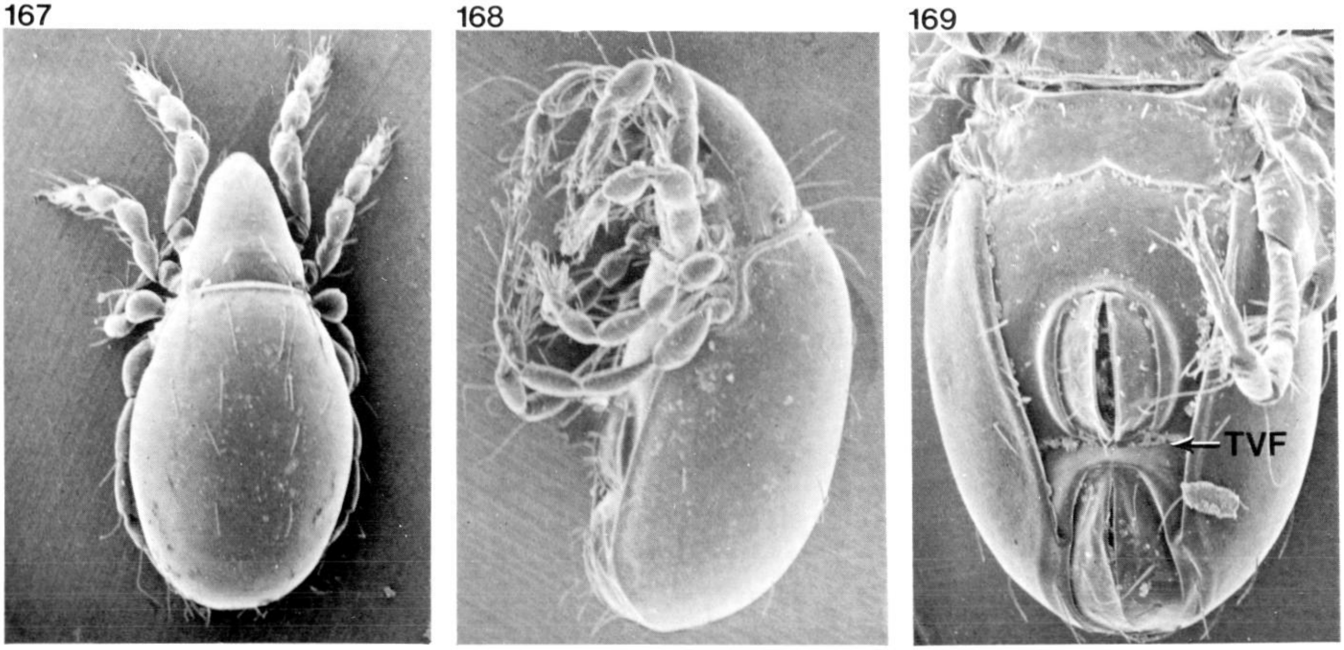


Figure 167-169: *Epilohmannia* sp.: notice the elongate notogaster, transverse ventral fold (TVF) between the genital and anal sclerites, the closely adjacent genital and anal plates, absence of adanal plates; picture height 167 = 1150 μ, picture height 168 = 975 μ, picture height 169 = 600 μ.

SECTION J: Hermannielloidea

The only genus inhabiting northwestern North America is *Hermanniella* (figs. 170 to 172). The erect cannon-like pores of the latero-abdominal glands are a character shared only with the diminutive transparent *Parhypochthonius*.

Though not abundant enough to rank among the top 15 most common oribatids of Andrews Forest, the commonest species of *Hermanniella* was found at 51 of 52 sites with a constancy value over 0.75 in all tree and old-growth sites. This species (525 μ) preferred old-growth to tree seres, which it favored over shrub and clearcut sites. It showed no preference relative to moisture gradient. The pattern of seasonal abundance closely paralleled that of total oribatids.

Several other species have been found in Oregon, often rather abundant where they occur (*H. occidentalis* Ewing; *H. robusta* Ewing cited by Walter in unpublished data). Two other species have been found in Andrews Forest: 1) a very infrequent, smaller taxon (450 μ) favoring mesic shrub and tree stages, and 2) a widespread, infrequent, larger species (700 μ), which apparently preferred xeric old growth, tree and old-growth seres in the midmoisture regime, and mesic shrub sites.

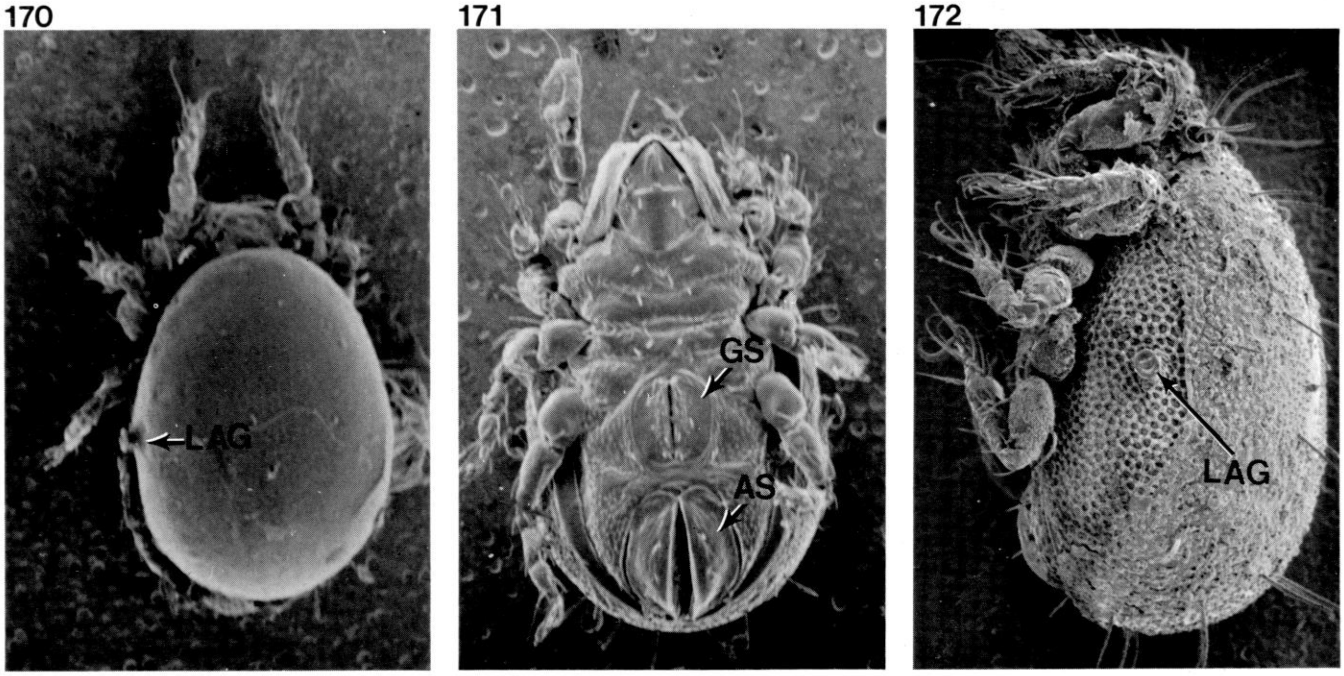


Figure 170-172: *Hermanniella*, note the protruding latero-abdominal gland (LAG) and large genital (GS) and anal sclerites (AS) in close proximity. The partial remains of the tritonymphal exuvia is visible in Fig. 172 under SEM; under a dissecting microscope this shed skin is not noticeable though it is carried by all species; picture height 170 = 700 μ, picture height 171 = 625 μ, picture height 172 = 550 μ.

SECTION K: Crotonioidea (=Nothroidea), Liodoidea

Most of the species in this group can be recognized by their large size, unusual body profile, and intricate surface sculpturing.

1A Adults carrying shed skins of immatures plastered onto dorsal surface (fig. 173); genital plate fully transversely divided (fig. 174); dorsum flat (fig. 175)(Liodoidea) .... *Platyliodes*

Other liodid genera recorded from North America include: *Telioliodes* (Florida) with exuviae with large, apical, posteriorly directed setae (nearly half as long as notogaster) and with lamellar setae; *Liodes* (all eastern United States) without lamellar setae or apical exuvial setae but with an irregularly wrinkled notogastral pattern; and *Poroliodes* (New York) without lamellar setae or apical exuvial setae but with a uniformly punctate dorsum.

Platyliodes macroprionus Woolley & Higgins (figs. 173 to 175; 750 μ) is a strictly arboreal species encountered only once in these samples. Voegtlin (1982) found all stages in high abundance on bare branches, lichens, and mosses in the high canopy of old growth.

1B Dorsum not carrying shed skins of immatures; dorsum not completely flat, usually with deep concave grooves; genital plates not fully transversely divided (Crotonioidea, in part) 2

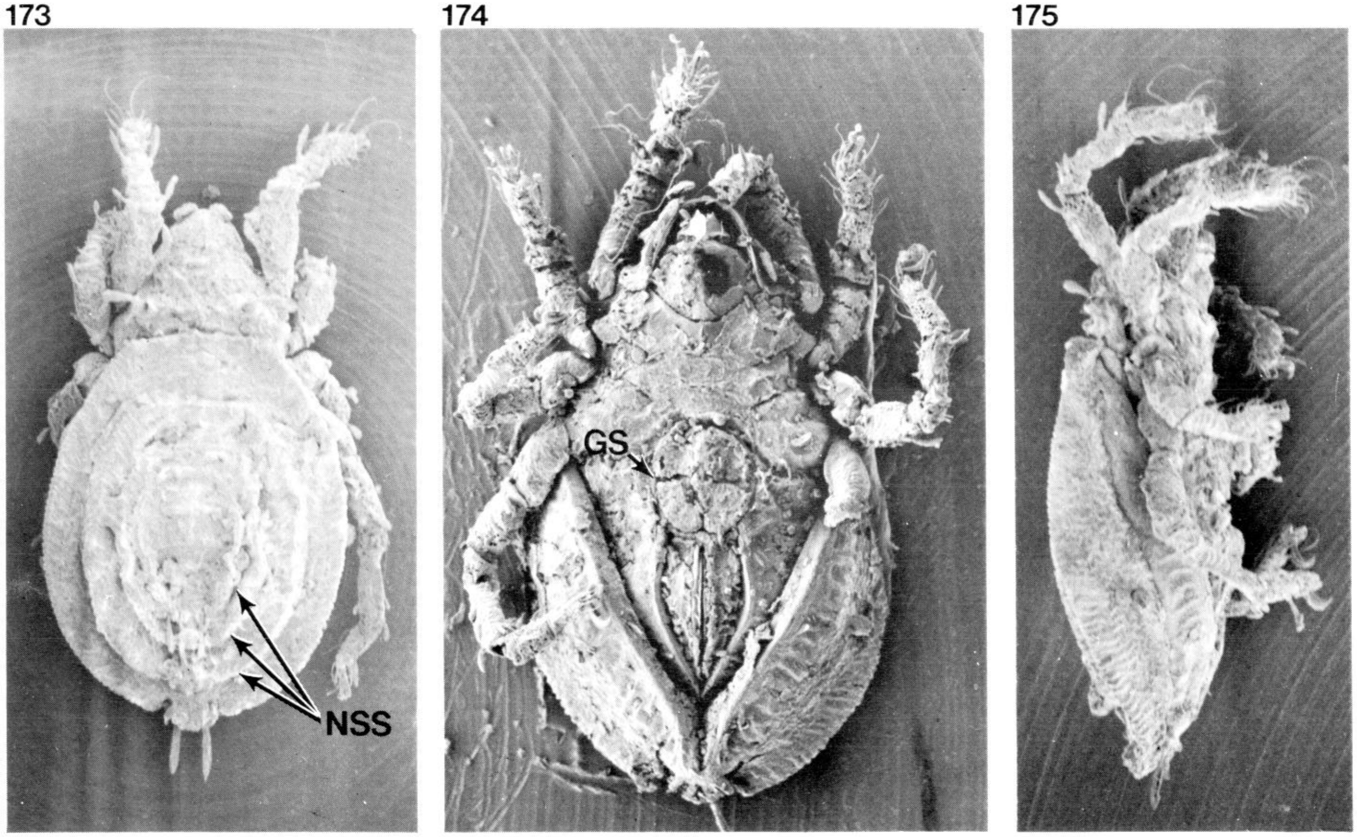
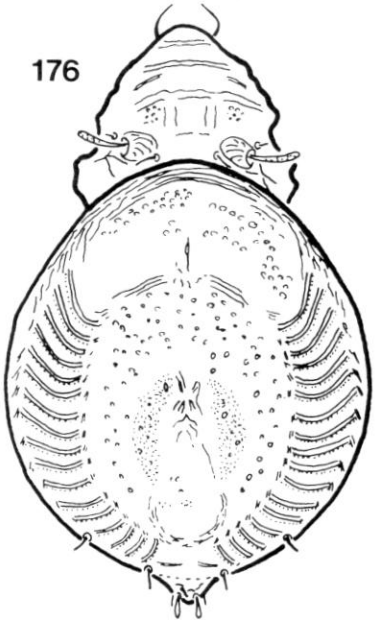


Figure 173-175: *Platyliodes macroprionus* in dorsal, ventral and lateral views, note the transversely divided genital plates (GS) and the nymphal exuviae (NSS); picture height 173 = 1125 μ, picture height 174 = 1100 μ, picture height 175 = 1100 μ.

176



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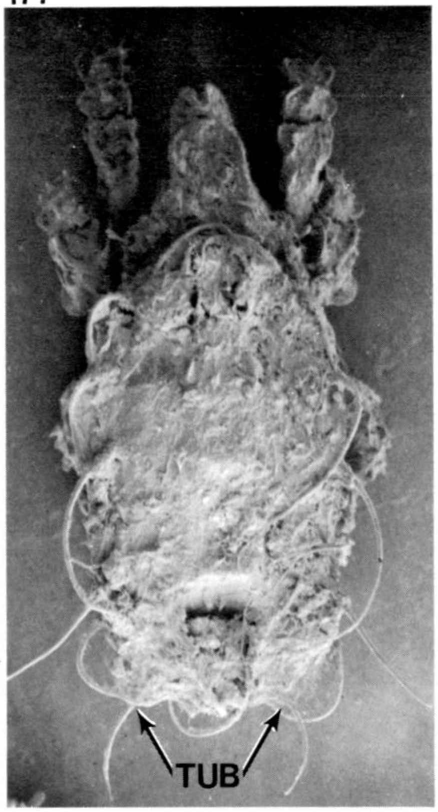

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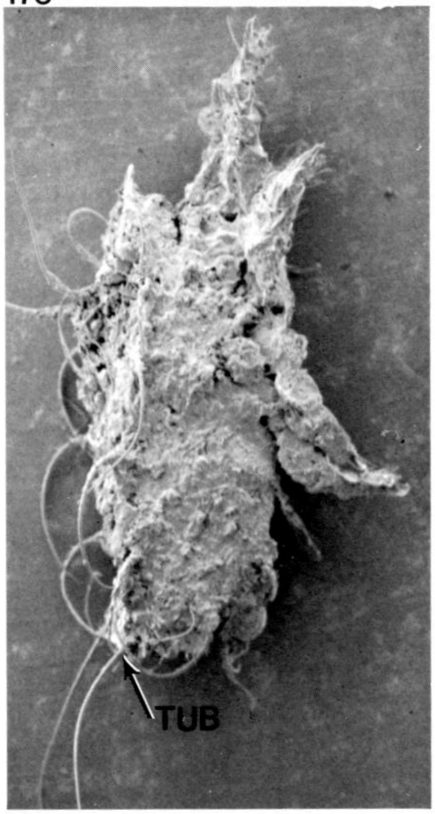

Figure 176-178: 176: *Liodes* sp. showing the integumentary pattern; 177-178: *Camisia spiniger* in dorsal and lateral views, note the concave posterior margin of the opisthosoma between the large posterolateral setae arising from prominent tubercles (TUB); picture height 177 = 1525 μ, picture height 178 = 1500 μ.

2A Entire body covered with dense cerotegument and dirt (figs. 177 to 178) .... *Camisia* (part)

Camisia spiniger (Hermann) (figs. 177 and 178; 875 to 900 μ) is apparently not primarily a soil litter species, though it was infrequently encountered there (22 of 52 sites, but never with a within-site constancy over 0.50); haphazard collecting has found it on tree trunks on several occasions. It was too infrequent in our samples to yield clear seasonality curves or plant-succession associations. Additional species of *Camisia* key out in Section C, page 36.

2B Body not covered with dense cerotegument and adhering dirt....... 3

3A Dorsal surface densely pitted; posterolateral setae much more elongate than rest of notogastral setae (fig. 179) .... *Nothrus*

Nothrus silvestris Nicolet (Fig. 179-182; 1000 μ) was a common mite in these samples. Though present in only 32 sites, and only in 4 of 12 communities with a constancy value exceeding 0.50, its large size and distinctive appearance render it one of the most familiar oribatids of the Andrews. Seasonal abundance followed the curve for total oribatids. Though no moisture preference was apparent, it showed a strong preference for tree and shrub stages (nearly absent in clearcut and old growth).

3B Bothridium present; without transverse ridge posteriorly (900 to 950 μ) .... *Platynothrus*

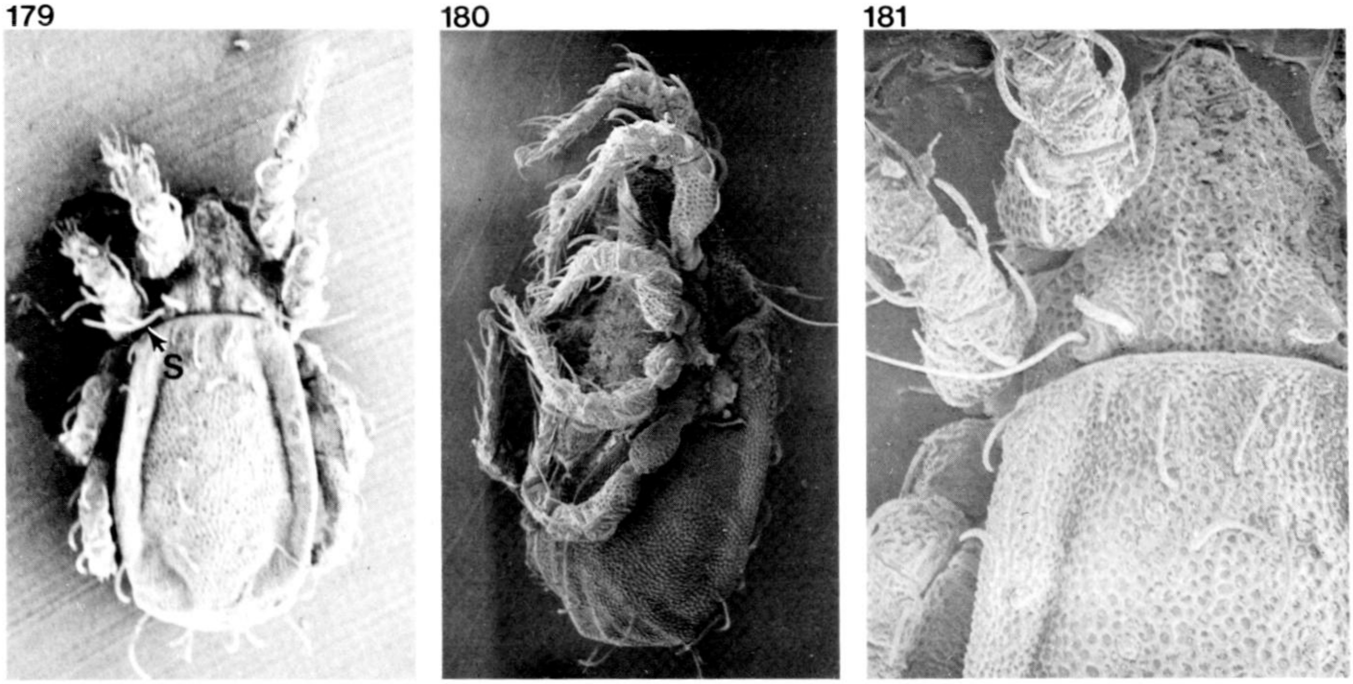

Figure 179-181: *Nothrus silvestris* in dorsal, lateral and high resolution views to show surface ornamentation, the convex posterior border of the opisthosoma and the bothridium; picture height 179 = 1525 μ, picture height 180 = 1000 μ, picture height 181 = 525 μ.

182

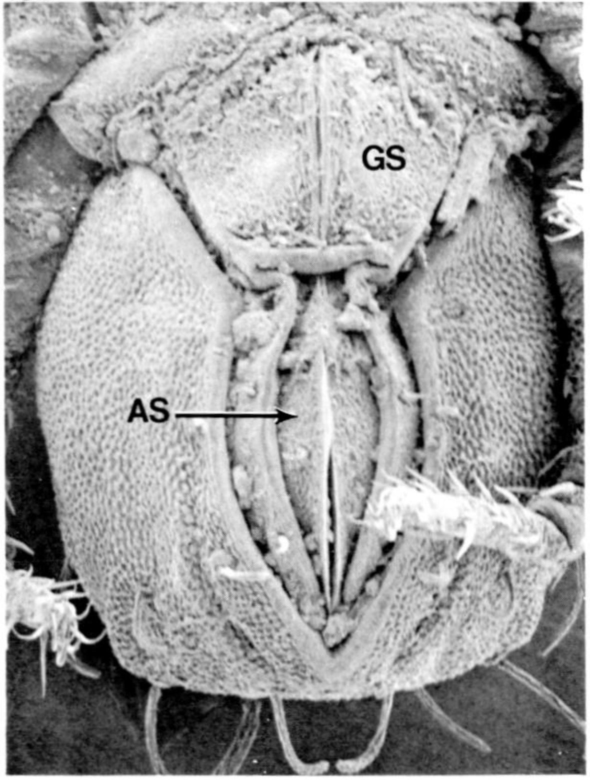

Figure 182: *Nothrus silvestris* in ventral view to show the large adjacent genital plates (GS) and anal plates (AS); picture height = 600 μ.

Platynothrus banksi (Michael) and *P. peltifer* (Koch) are common species in the mountains of western Oregon, but neither has been found in Andrews Forest. *Neonothrus*, known from Alaska, has prominent bothridia and an interrupted transverse V-shaped ridge; the sides of the notogaster are more nearly parallel and the dorsal setae more prominently blade-shaped. *Heminothrus* (s. str.) is known throughout the eastern United States and Canada; the median portion of the notogaster is somewhat concave and the posteromarginal setae arise on distinct apophyses (merely tuberculate in *Platynothrus*).

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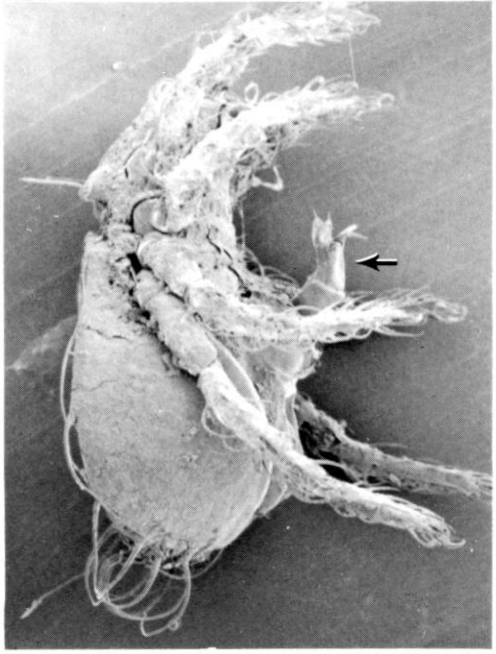

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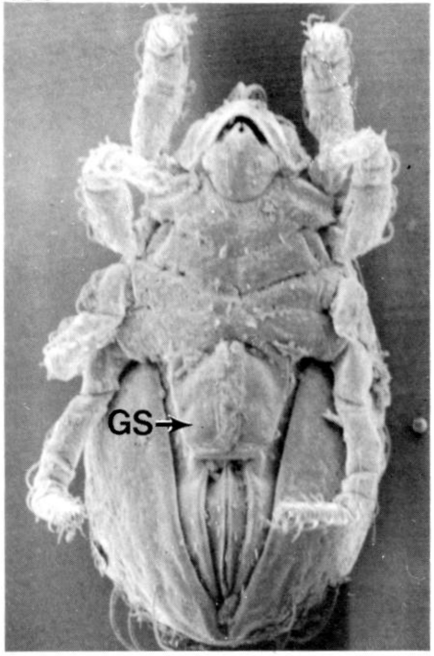

Figure 183-185: *Platynothrus banksi* in dorsal, lateral and ventral views, note that the genital plate (GS) is not divided as it is in the Liodoidea; picture height 183 = 875 μ, picture height 184 = 875 μ, picture height 185 = 875 μ. Note the extended ovipositor in Fig. 184.

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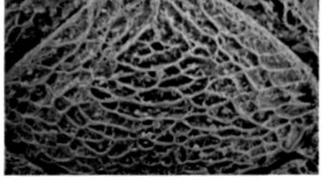

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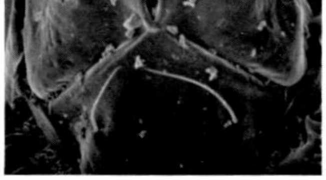

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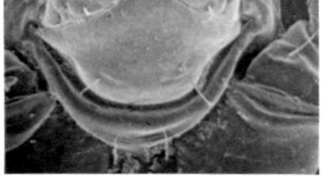

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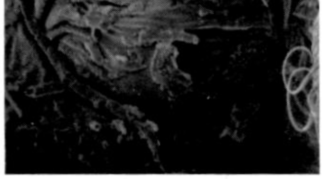
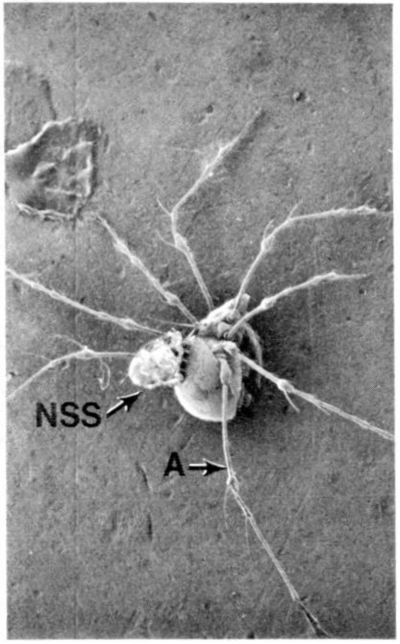


Figure 186-189: Feeding appendages with typical pincher-like chelicerae (compare to *Eupelops* and *Rhinosuctobelba*) but divergently shaped rutella (chisel-like structures forming floor of mouth region); 186: *Nothrus* sp.; picture height = 150 μ; 187: *Epilohmannia* sp.; picture height = 150 μ; 188: *Perlohmannia* sp.; picture height = 250 μ; 189: *Scapheremaeus* sp.; picture height = 70 μ.

SECTION L: Damaeoidea (=Belboidea)

The hemispheric notogaster, the beaded legs and eight pairs of longitudinally arranged notogastral setae are diagnostic for this superfamily. Generic distinctions are not often reflected in overall body form; published keys rely on the setal arrangement on the genu and tibial leg segments. *Quatrobelba* is not included in the key; it is definitely found in the Pacific Northwest but the authors do not know how to distinguish it.

190



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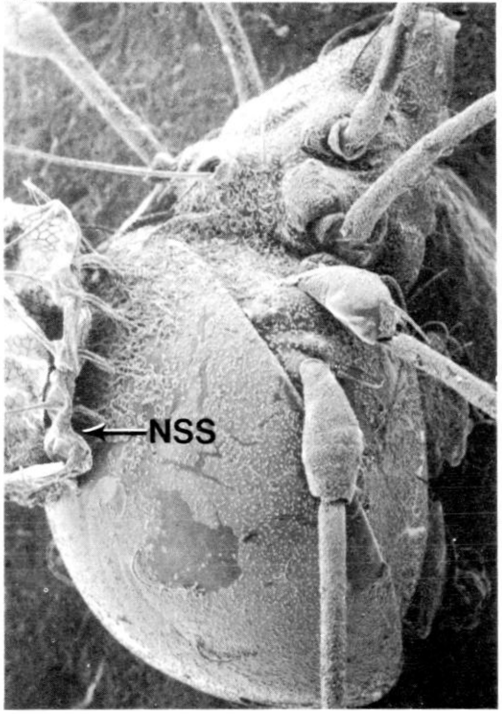

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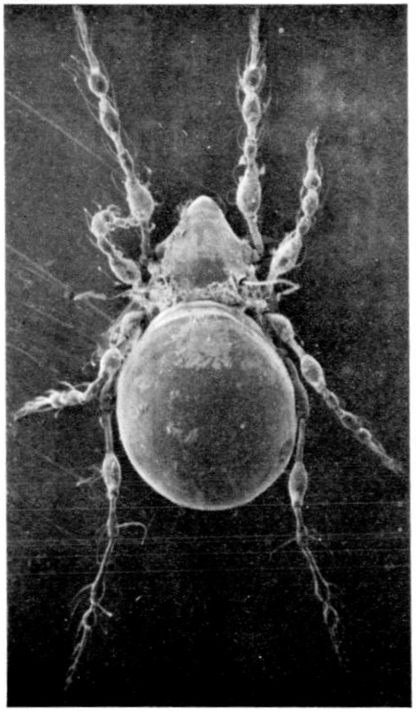


Figure 190-192; 190: *New genus* #1 (near *Damaeus*) in dorsal view (Olympic Mts., Washington); picture height = 3500 μ; 191: same species in lateral view with extremely long legs (A) and nymphal shed skins (NSS) glued to notogaster; picture height = 525 μ; 192: *Caenobelba* sp. with cerotegument and dirt removed to show absence of spinae adnatae; picture height = 1000 μ.

1A Legs extremely long, both femora and tibiae longer than body (fig. 190); clear transparent nymphal skins carried on the notogaster .... *new genus #1*

This species has been collected occasionally in the mountains of Washington, but has not yet been found in the Oregon Cascades. It differs in setal characters from the closely related *Damaeus*, expected from this region.

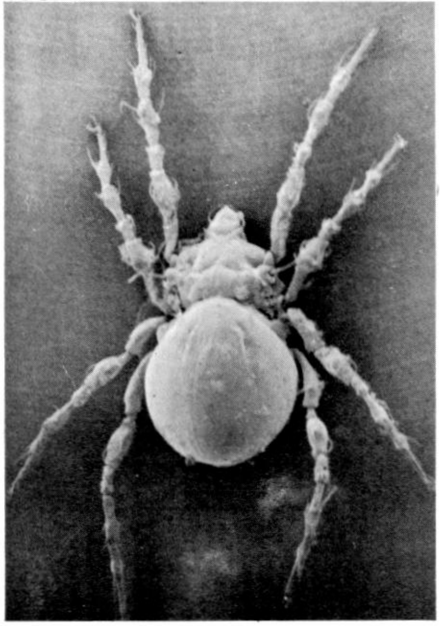
1B Legs not much exceeding body length 2

2A Spinae adnatae absent (fig. 192); sensillum filiform 3
2B Either spiny adnatae present (anteriorly directed tubercular spines arising on the notogaster just behind the dorsosejugal suture and overhanging the tip of the prosoma on either side of the midline of the body; fig. 195) *OR* **dorsum completely obscured by a pile of dirt on top of the notogaster 4**

3A With a distinct thoracic protuberance projecting between the base of the first two pairs of legs .... *Epidamaeus(Akrodamaeus)*(part)

Epidamaeus (Akrodamaeus) has cerotegument produced in filamentous columns on the notogaster (fig. 201); *Dyobelba* has a granular cerotegument that does not impair the surface sheen of the notogaster. The rostrum is prolonged into a snout in *Dyobelba*, which Walter (unpub.) has collected in western Oregon.

193



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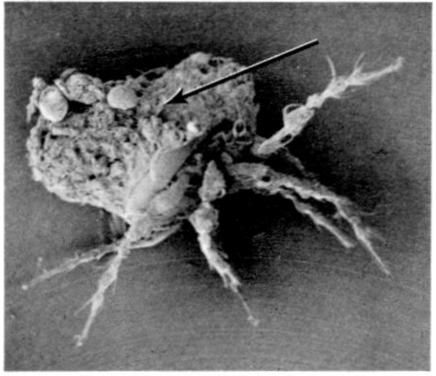

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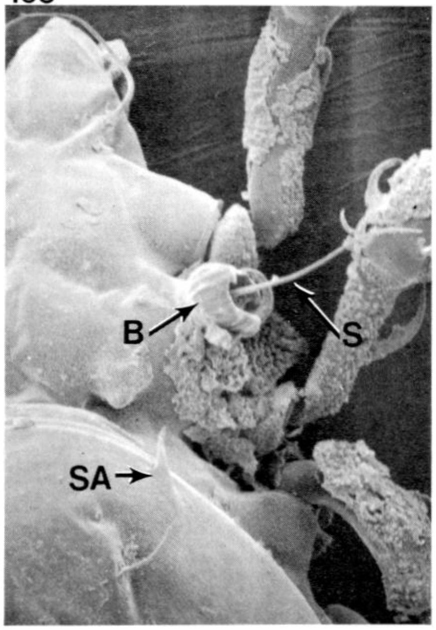

Figure 193-195: *Belba californica* displaying spinae adnatae (SA), filiform sensillum (S) and usual presence of organic debris on the notogaster; picture height 193 = 1750 μ, picture height 194 = 1400 μ, picture height 195 = 480 μ.

3B Without an apophysis between the first two pair of legs .... *Caenobelba*

Caenobelba probably comprises three different species in Andrews Forest. The mid-sized species (figs. 192 and 204; 500 to 525 μ) was by far the most abundant and widespread; a larger (625 to 765 μ) and a smaller (300 μ) species were also found throughout the grid. No preference for successional sere or for a moisture regime was apparent for the genus as a whole or for any of its constituent size classes. These oribatids were distributed in all 52 sites, with a constancy value exceeding 0.90 in all but five. Seasonal abundance followed the oribatid norm, with low density in late winter.

4A Adult dorsum completely plastered with organic debris (fig. 194); combined cerotegument and debris often exceeding volume of the body itself .... *Belba(Protobelba)*

Belba californica Norton (figs. 193 to 195; 800 μ) has not been encountered in these samples, but occurred in great numbers in a midsummer sample from a dry streambottom from MacRae Creek in Andrews Forest. It is frequent in litter samples from coastal Marys Peak (Oregon) and the coastal mountains of Washington.

4B Dorsum covered with thin cerotegument, old exuviae, or a thin film of dirt 5

5A Body pear-shaped; spinae adnatae very large; sensillum filiform or spindle-shaped .... *Hungarobelba*

Hungarobelba sp. (fig. 196; 300 to 325 μ) occurred in 50 sample sites but was never abundant (constancy value never exceeded 0.75). Seasonal occurrence followed that for total oribatids, but the peaks and troughs were of greater amplitude. This species apparently preferred shrub seres of any moisture regime and the tree sere under midmoisture conditions.

Dasybelba (figs. 197 and 198) known from the Great Basin of Oregon and Colorado is distinguished by the densely plumose setae on the legs. Different species apparently may or may not carry nymphal shed skins as adults.

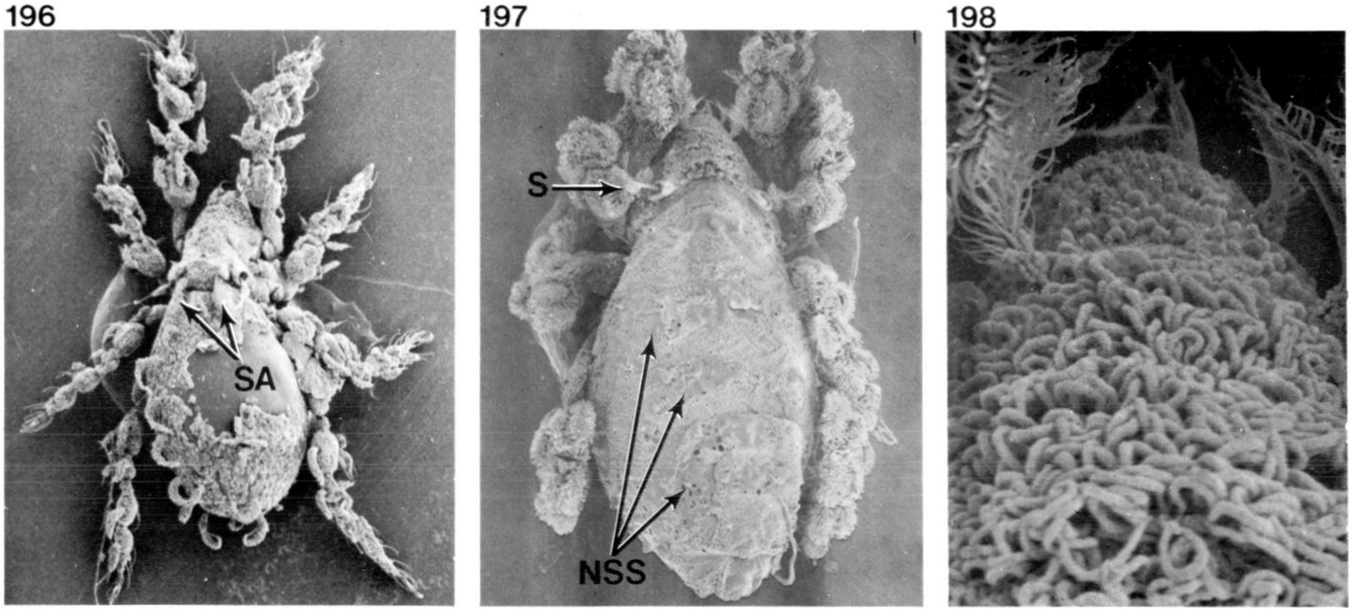

Figure 196-198; 196: *Hungarobelba* sp. with ovoid body outline, large spinae adnatae (SA), beaded legs emphasized by dense covering of cerotegument on setae and lack of nymphal shed skins; picture height = 450 μ; 197-198: *Dasybelba* sp. with clavate sensillum and densely plumose leg setae (Fort Rock, Oregon); dorsal view and high resolution of dorsosejugal region; picture height 197 = 475 μ, picture height 198 = 50 μ.

5B Body profile not pear-shaped, more or less circular 6

6A Adult with posterodorsal accretion of nymphal shed skins and associated cerotegument .... *New genus #2*

A large (370 μ) species was infrequent in the samples; it occurred in only 18 sites. Though it apparently preferred old-growth and tree seres to shrub (which it preferred to clearcuts), it was completely absent from the midmoisture old-growth site. Seasonal abundance seemed unimodal in spring and reduced through winter. This species apparently represents an undescribed genus.

Basilobelba (in the Amerobelboidea) may also key to this couplet (fig. 269). As in *Epidamaeus*, *Basilobelba* carries nymphal exuviae on its dorsum, but differs in having much less conspicuous cerotegument, no spiny adnatae, inconspicuous notogastral setae, and a ventral plate with 17 pairs of setae (four pairs in damaeoids).

6B Adult without covering of nymphal shed skins .... *Epidamaeus(Epidamaeus)*

Epidamaeus (fig. 199-201) occurred in all but one site. The possible two or three species were never abundant, with a constancy value exceeding 0.75 only twice. They revealed no habitat or moisture preference. Seasonal abundance was low in early through late winter.

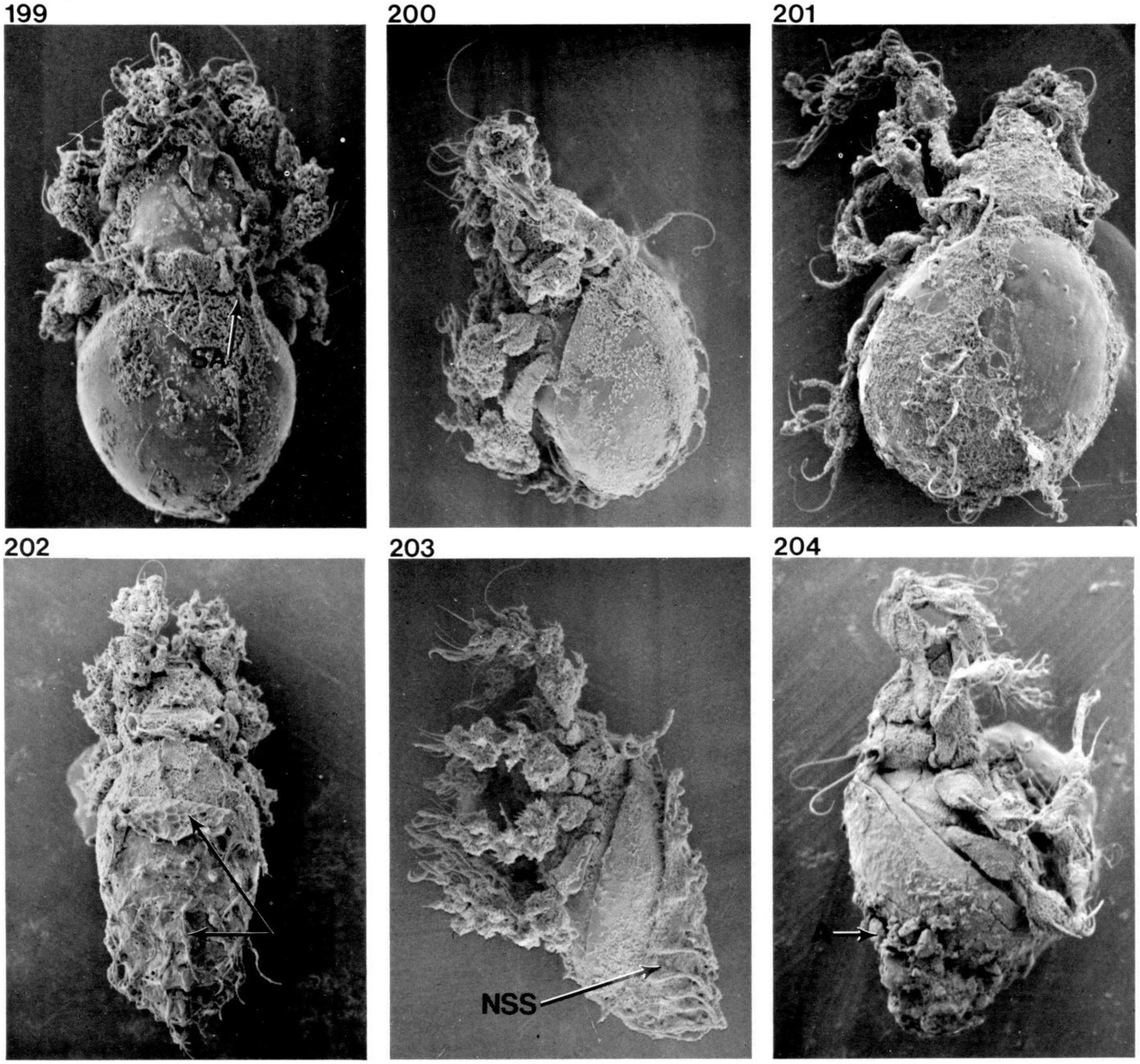

Figure 199-204; 199-200: *Epidamaeus* desert species (Ft. Rock, OR) in dorsal and lateral view (SA= spinae adnatae); picture height 199 = 275 μ, picture height 200 = 325 μ; 201: *Epidamaeus* Andrews Forest species with some cerotegument removed to show dorsosejugal region; picture height = 510 μ; 202-203: *New genus #2* showing nymphal exuvial pattern (NSS) and dense cerotegument on all leg surfaces, dorsal and lateral views; picture height 202 = 500 μ, picture height 203 = 475 μ; 204: *Caenobelba* sp. in lateral view showing position and extent of dirt and cerotegument (A); picture height = 600 μ.

SECTION M: Gustavioidea (=Liacaroidea)

This group is rich in number of genera, but the uniformity of body shape combined with the prominent lamellae prevent confusion with any other section of the key. Genera and species are distinguished largely by the shape of the lamellar teeth, easily visible on all but the most melanized species.

1A Lamellae thin and projecting all the way from their bases in an anterodorsal plane, like horns of a ceratopsian dinosaur (figs. 205 to 207) .... *Ceratoppia*

Ceratoppia was represented in these samples by three species of different sizes. The midsized species (500 to 600 μ) was most abundant, present in 48 sites. Though its constancy value exceeded 0.50 in all communities except the xeric clearcut, it was never abundant relative to total oribatids. Its seasonal abundance was rather uniform because of a high value during early summer, but it retained the typical early winter trough. It preferred tree and old-growth stages independent of moisture regime.

The large species (650 to 800 μ) was infrequent, present in only 18 sites. It showed a strong preference for old growth and was absent from clearcuts. It preferred mesic to midmoisture conditions and was nearly absent in the xeric seres. The smallest species (380 to 480 μ) was infrequent, present in only 37 sites, and exceeded constancy values of 0.50 in only three communities. Seasonal abundance was typical but for a higher than normal value in spring. Habitat choice was unclear; it seemed scattered, avoiding clearcuts and preferring xeric over mid- or mesic moisture conditions.

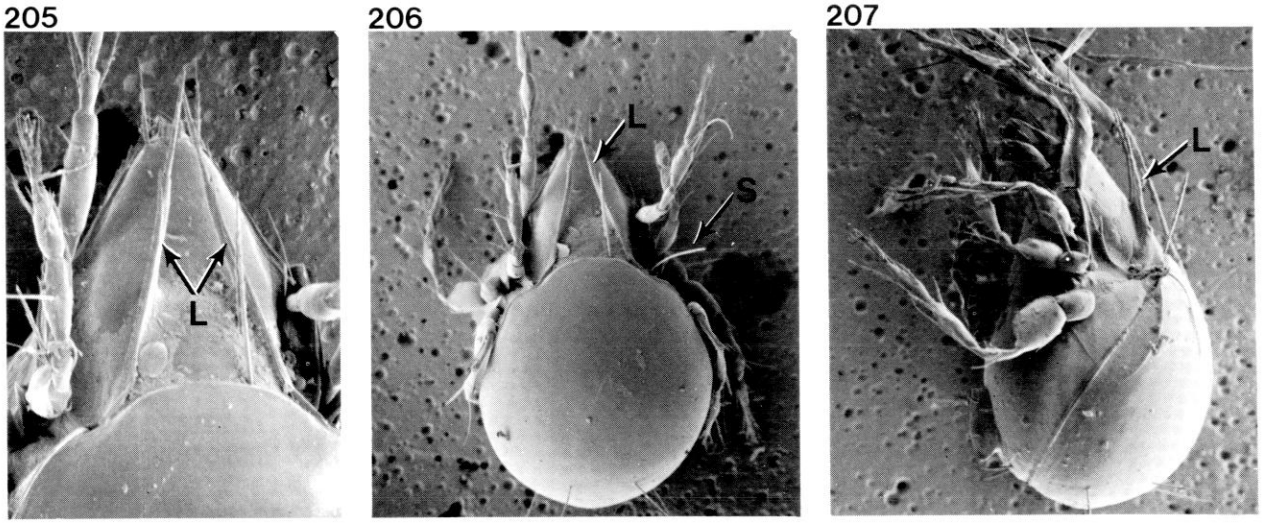

Figure 205-207: *Ceratoppia* sp. with the slender long raised lamellae (L) extending antero-dorsally far over the plane of the prosoma, note the filiform sensillum; picture height 205 = 350 μ, picture height 206 = 750 μ, picture height 207 = 750 μ.

The genus *Parapyroppia*, recorded by Walter (unpub.) from western Oregon, and *Pyroppia*, cited in the catalog from Alaska and Quebec, will also key to this couplet; they differ in the presence of a short dilated sensillum (S).

1B Lamellae not projecting freely anterodorsally like dinosaur horns 2

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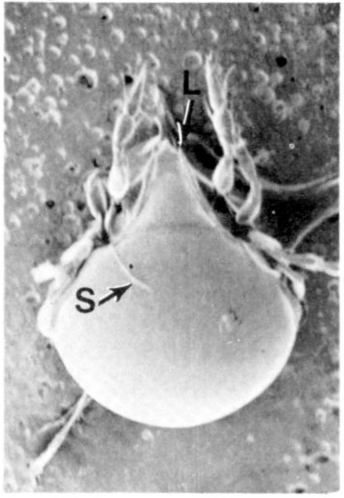

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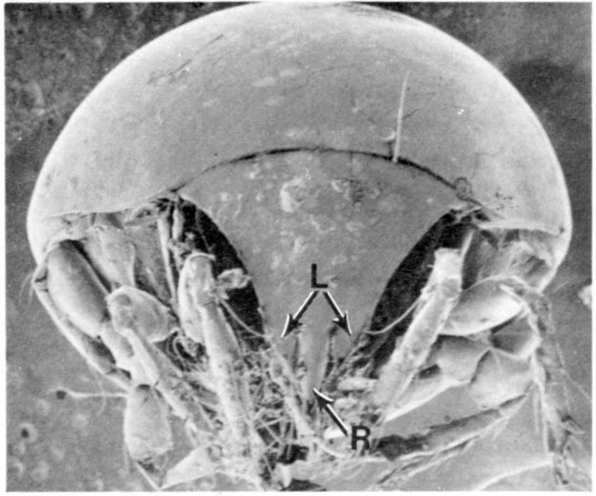

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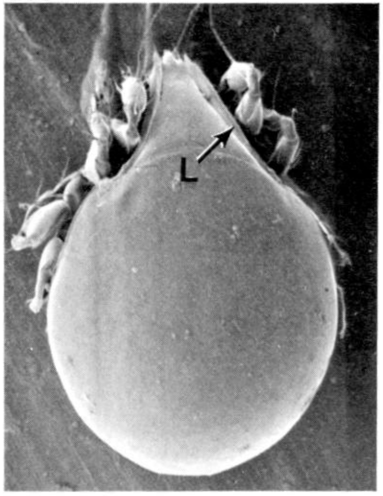

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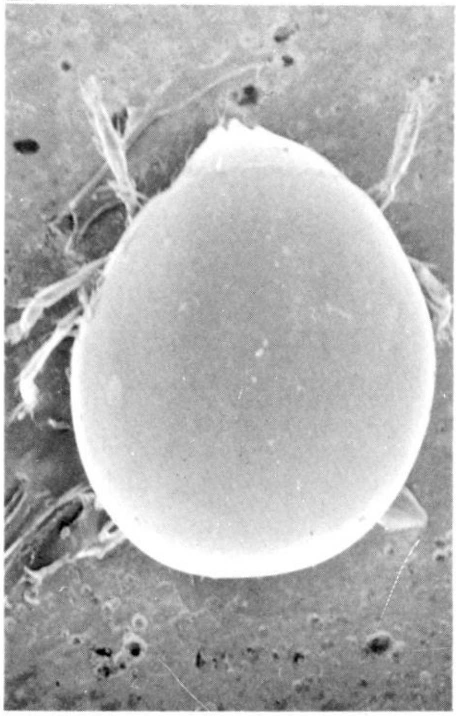

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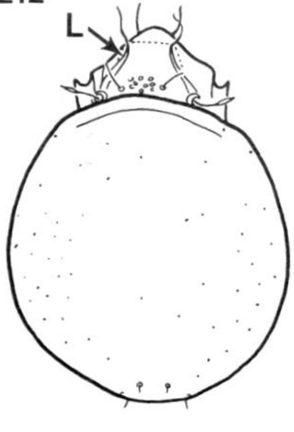

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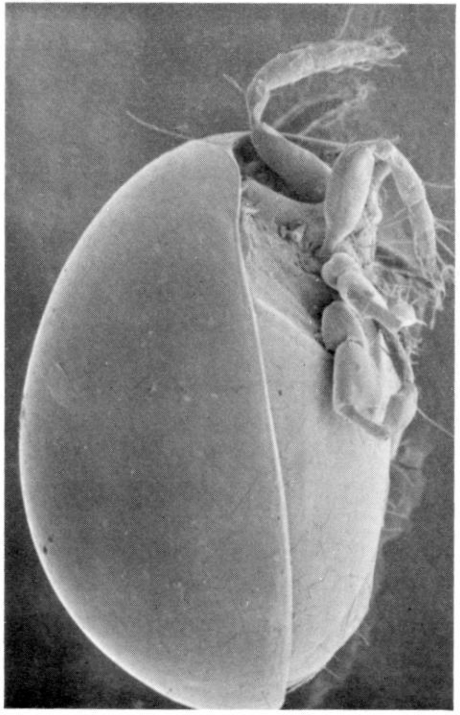

Figure 208-213; 208 & 210: *Metrioppia oregonensis* dorsal views, note convergent thin lamellae (L) and sensillum (S); picture height 208 = 675 μ, picture height 210 = 300 μ; 209, 211 & 213: *Gustavia* sp. sagittal, dorsal and lateral views, note prodorsum is mostly tucked in under notogaster and is not visible in dorsal view (R = rostrum; L= lamella); picture height 209 = 575 μ, picture height 211 = 1000 μ, picture height 213 = 750 μ; 212: *Kodiakella* sp. with thin sigmoid lamellae (L).

2A Lamellae separate, converging for their entire length (fig. 210); body shaped like a tear-drop; anterior pointed (fig. 208); sensillum pectinate .... *Metrioppia*

Metrioppia oregonensis Woolley & Higgins (figs. 208 and 210; 270 μ) was widespread and abundant in the grid. It was 11th in total density and 7th in constancy. Seasonally, its abundance followed that for total oribatids. This species strongly prefers tree and shrub successional seres over either clearcut or old growth. Abundance was much greater in mesic than in xeric or midmoisture sites. *Metrioppia* has an elongate pectinate sensillum.

With a tear-drop profile--and thus keying with *Metrioppia*--are the North American genera *Conoppia* and *Metapyroppia*, not yet collected in Oregon. *Metapyroppia* (Tennessee) is extremely robust, with the width equaling or exceeding body length; sensillum is fusiform. *Conoppia* (Northwest Territories and West Virginia) is an unrelated but similar-appearing cepheid; it is translamellate (teeth much shorter than interlamellar distance) and has prominent long interlamellar setae (reduced in *Metrioppia*).

Stonyxenillus is translamellate, with broad bidentate cusps; lamellae obscuring entire prodorsum (fig. 278). *Adoristes* and *Kodiakella* (fig. 212) have slender, simple lamellae not obscuring much of the prodorsum; the lamellae of *Kodiakella* are weakly S-shaped. *Kodiakella* is definitely known from Alaska through northern California.

2B Lamellae with a conspicuous translamellar ridge or synlamellate 3

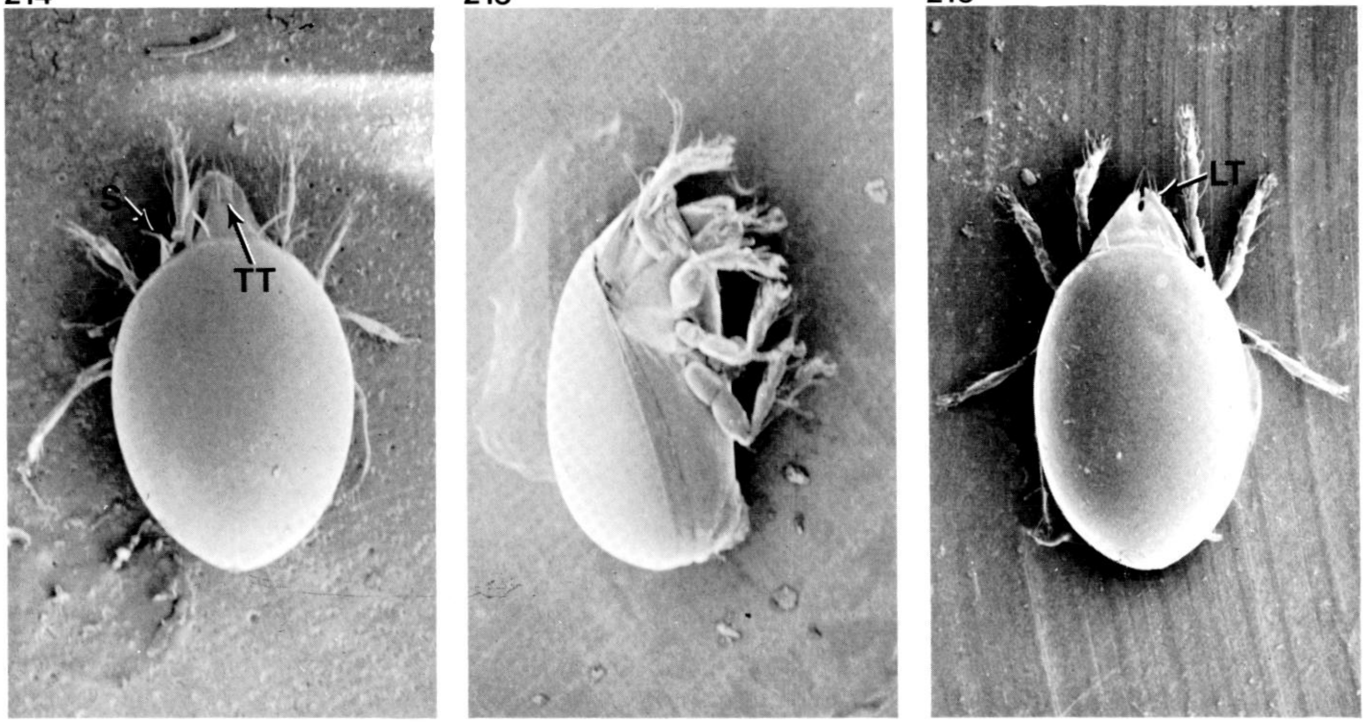

Figure 214-216; 214-215: *Liacarus* near *robustus* with very long translamellar tooth (TT) and slender double-pointed cusps in dorsal and lateral views; picture height 214 = 1800 μ, picture height 215 = 850 μ; 216: *Liacarus* small tan species with broad lamellar cusps (LT) and no medial tooth; picture height = 750 μ.

3A Tear-drop shaped (fig. 211); notogastral setae absent; prosoma directed ventrally, nearly hidden in dorsal view (fig. 211); black without a light-colored lenticulus; chelicerae not the typical lobster-claw shape, but elongate and tapering .... *Gustavia*

Gustavia sp. (figs. 209, 211 and 213; 600 μ) was widespread in these samples; it occurred in 49 of 52 sites. Though never abundant, it reached 2-percent relative abundance in the xeric shrub sere. Its seasonal abundance was typical of the total oribatid pattern. It preferred shrub (strongly avoiding clearcuts) and was found scattered through tree and old-growth sites. It avoided mesic conditions.

3B Not tear-drop shaped, anterior region not directed ventrally and not almost hidden in dorsal view 4

4A With broad lamellar teeth, lamellate or with translamellae not A-shaped; three tarsal claws .... *Liacarus* complex

	Sensillum	Lamellar teeth	Median tooth	Range
Rhaphidosus	Filiform	Short/large	-	transcontinental
Liacarus	Spindle	Short/large	+	transcontinental
Dorycranosus	Lanceolate	Short/large	+/-	transcontinental
Procorynetes	Truncate	Unequal	(+)	transcontinental
Opsioristes	Spindle	Short	-	western United States
Adoristes	Clavate	Tiny	-	eastern United States
Leuroxenillus	Setiform	Long	+	transcontinental
Stonyxenillus	Spindle	Long	+/-	transcontinental
Xenillus	Clavate	Short/long	-	transcontinental
Paenoppia	Filiform	Long	-	Colorado

Several ill-defined genera will key to this couplet (table 5). Generic distinctions are based primarily on the shape of the sensillum (Wooley 1969).

One group of species (*Liacarus bidentatus*, fig. 220; *L. spiniger*, fig. 221; and *L. robustus*, fig. 214, 215 and 217) are so darkly pigmented and the sizes and shapes so variable that definite species distinctions based on lamellar shape and translamellar teeth are not possible. This group was widespread (44 sites) and abundant through the sample grid, but the distribution pattern was confused; highest numbers and constancy appeared to be in the tree seres.

The smaller (270 to 310 μ) and light tan group of specimens (figs. 216 and 217) may represent more than one species. As a group, they were present in most sites (49) and followed the typical bimodal seasonal abundance pattern. The distribution pattern was confused, but did show an avoidance of xeric seres. This group's abundance was highest in midmoisture clearcut, midmoisture old-growth, and mesic old-growth sites, with constancy values in old growth always greater than 0.80.

The related xenillid genera *Leuroxenillus*, *Stonyxenillus* (with spindle-shaped sensilla), and *Xenillus* (with clavate sensilla) are also difficult to distinguish; they usually have prominent notogastral stippling and are treated in section Q (p. 100).

4B With narrow or apparently narrow, strongly converging lamellar teeth; translamella A-shaped (fig. 222) 5

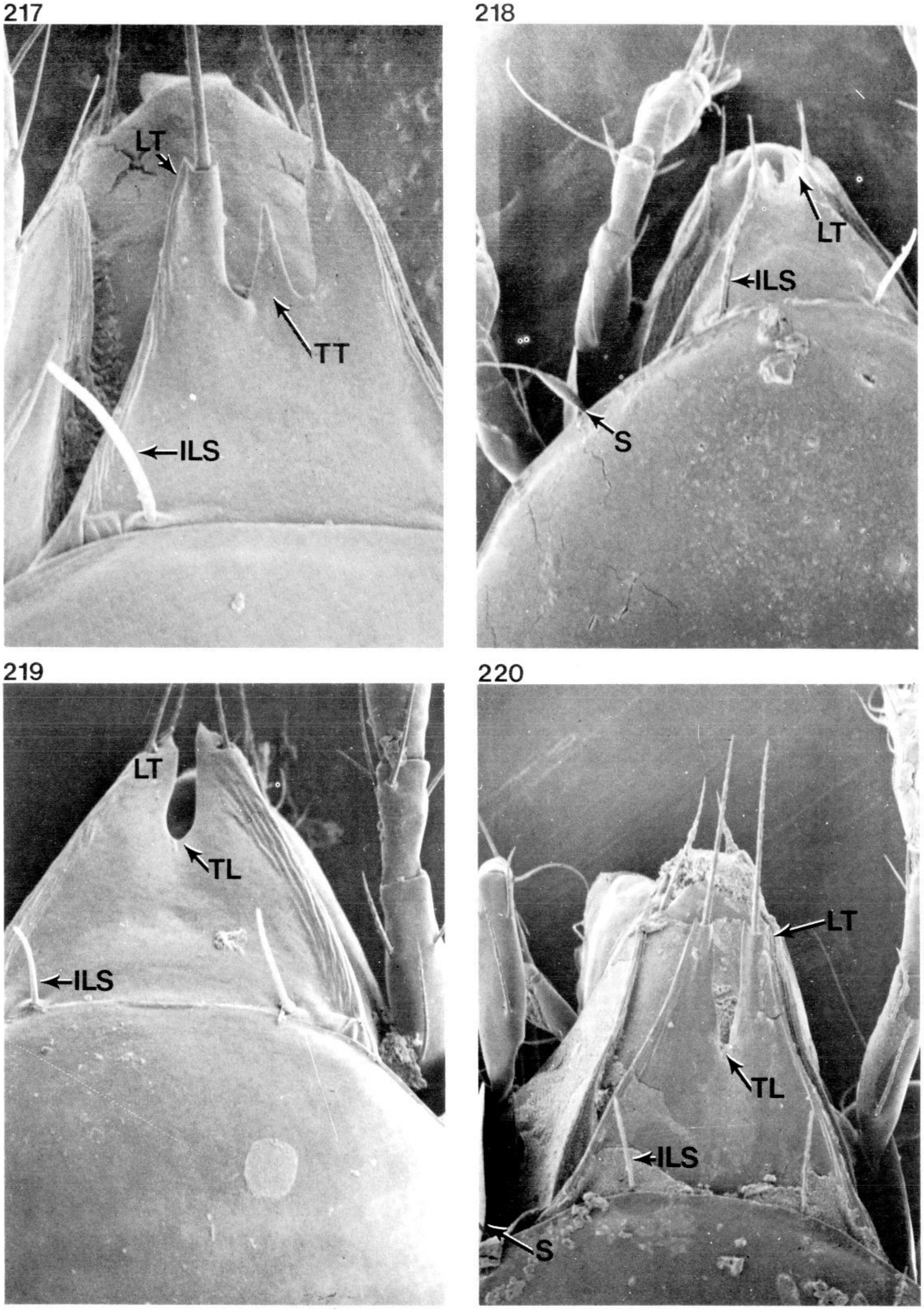

Figure 217-220; 217: *Liacarus* near *robustus* with long translamellar tooth; picture height = 225 μ; 218: *Liacarus* sp. with typical spindle-shaped sensillum, tiny cusps and no medial translamellar tooth (TT); picture height = 275 μ; 219: *Liacarus* small tan species with broad lamellar cusps and no medial tooth; picture height = 175 μ; 220: *Liacarus* near *bidentatus* with elongate double-pointed lamellar cusps (LT) with no medial tooth; picture height = 300 μ.

5A Translamella minute, lamellae strongly converging and thin; tridactylous (310 μ) .... *Furcoribula*

Furcoribula was present only in midmoisture old-growth and mesic clearcut samples; in both, it was rare.

5B Lamellae broad, synlamellate for most of their length; monodactylous (200 μ) .... *Cultroribula*

The *Cultroribula biculturata* complex was rare throughout the grid, present in only 28 sites and never with a constancy value exceeding 0.50. It was abundant in the midmoisture clearcut, nearly absent in all mesic seres, and scattered without obvious pattern otherwise. It seemed rare in early summer (no data for spring or dry summer) and uniformly abundant from fall to late winter (most common in late winter).

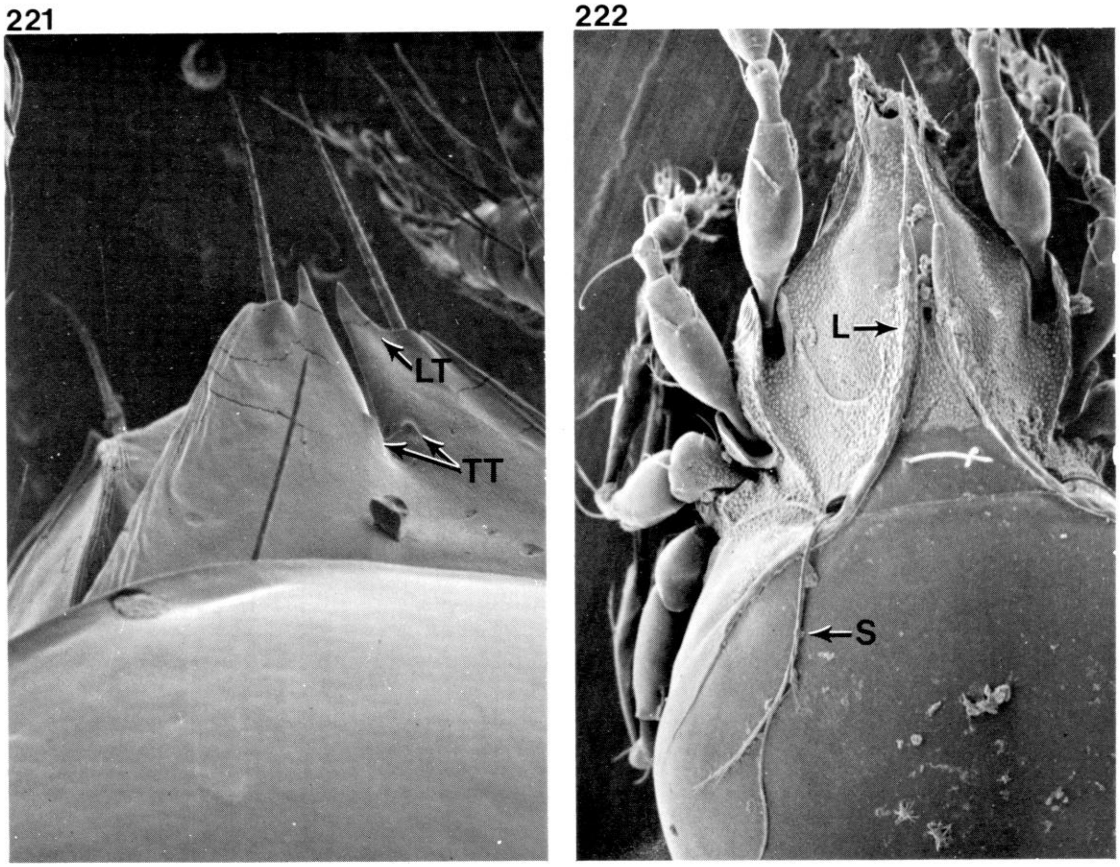

Figure 221-222: 221: *Liacarus* near *spiniger* with 2 broad points on lamellar cusps (LT) and two minute translamellar teeth (TT); picture height = 200 μ; 222: *Furcoribula* sp. high resolution of dorsum showing the converging, thin lamellae (L) which are fused to the surface for most of their length and the minute translamella; sensillum (S) is not forked, lower line is an artifact; picture height = 275 μ.

SECTION N: non-lamellate; smooth; largely the Oripodoidea (=Oribatuloidea); Oppioidea; and Eremaeoidea

This artificial grouping encompasses primarily oribatids with smooth surfaces and few prominent diagnostic characters. These species are often the most abundant in samples. The lamellar ridges, easily visible in electron micrographs, are difficult to distinguish under the dissecting microscope.

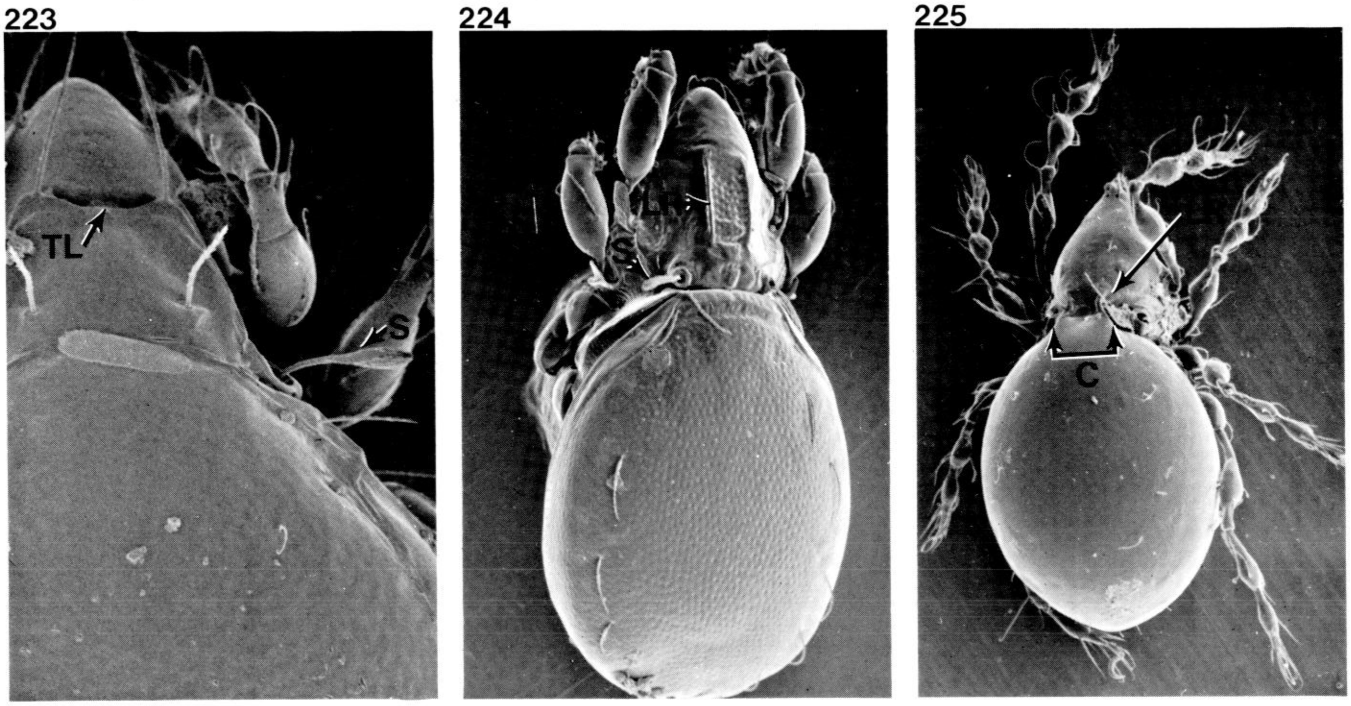

Figure 223-225; 223: *Zygoribatula* with conspicuous translamellar line (TL); picture height = 200 μ; 224: *Eremaeus* sp. with raised and parallel lamellar ridges (LR); picture height = 550 μ; 225: *Oppiella* species with costula (C) on dorsosejugal border, near absence of lamellar ridges (LR); picture height = 550 μ.

1A Lamellar ridges joined by a conspicuous translamellar ridge; lamellae without distinct teeth (figs. 223, 227 and 228) .... *Zygoribatula/Lucoppia*

Zygoribatula (figs. 223, 227 and 228), represented in Andrews Forest by one infrequent species, is distinguished from species of similar size and shape (450 to 475 μ) by the translamellar ridge. It was present in 19 of 52 sites, but attained a constancy value of greater than 0.6 only in the xeric shrub sere. It occured sparingly in other clearcut sites and in xeric tree stages. Its seasonal abundance fit the normal bimodal pattern, with all peaks and troughs more pronounced than typical.

Lucoppia, also known from western Oregon, is distinguished by linear lamellae (ribbon-shaped in *Zygoribatula*) and five pairs of very reduced genital setae (four pairs in *Zygoribatula*).

1B Lamellar ridges, if present, then not joined by translamellar ridge (figs. 224 to 225) 2

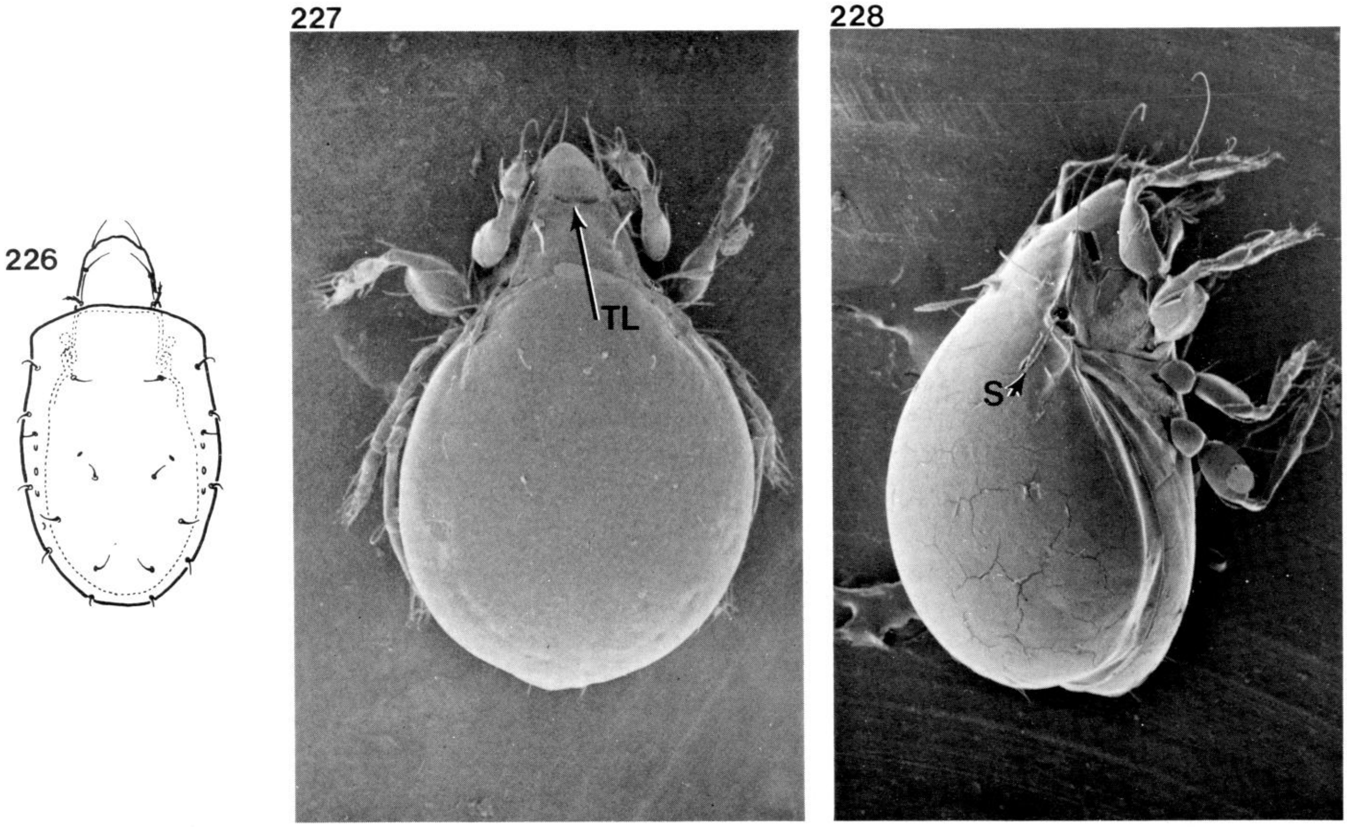

Figure 226-228; 226: *Oripoda* with shortened prodorsum and prominent humeral region; 227-228: *Zygoribatula* sp. showing translamellar ridge (TL); picture height 227 = 550 μ, picture height 228 = 550 μ.

2A Anterior margin of dorsosejugal suture either normal or with a saddle-like prominence raised vertically ("crista"; figs. 248, 251 and 253); prosoma at least one-third of body length 4

2B Anterior margin of dorsosejugal border modified, with strong obtuse angles and anteriorly projecting over at least half of prosoma as a shelf (occasionally incomplete mesally); dorsal view of prosoma (less than one-fifth of body length) covered with nearly parallel-sided plate; sensillum and bothridium not visible in dorsal view (fig. 226) .... *Oripoda*

' Several North American oribatuloid genera will key to this couplet, but none have been seen in Andrews Forest. *Gymnobates*, *Neogymnobates*, and *Gymnobatoides* have a notogaster widest at half its length and the dorsosejugal suture more than one-half the width of the mite. *Oripoda* (New York to New Mexico) and *Parapirnodus* have the notogaster widest at the humeri; in *Oripoda*, the dorsosejugal suture is only one-third the width of the mite and complete, but in *Parapirnodus* (with one tarsal claw) it is about one-half the width of the mite and much reduced.

3A Dorsosejugal suture prominent and often with cristae 4

3B Dorsosejugal suture reduced (fig. 229) or mesally interrupted; body elongate, length more than twice width; sensillum capitate .... *Eporibatula/Gerloubia*

(SEE KEY NEXT PAGE)

1A Bothridia near middorsal axis, highly visible; sensillum long filiform; posterior pronotal setae minute; Sierran California.. *Amerus*
1B Bothridia in the usual lateral position.................. 2
2A Elongate, length greater than twice the width; sensillum capitate to clavate... 3
2B Robust, length 1.5 times width; sensillum fusiform; Tennessee, Virginia, and Alaska........................ *Liebstadia*
3A One notogastral seta in dorsal humeral region (10 pairs of notogastral setae)...................................... 4
3B Two notogastral setae in dorsal humeral region (14 pairs of notogastral setae; sensillum capitate; 4 pairs of genital setae.. *Eporibatula*
4A Tridactylous................................ *Paraphauloppia*
4B Monodactylous...................................... *Gerloubia*

This is a very diverse taxonomic assemblage of genera. Though several genera are reported from the west coast, only one species has thus far been found in Andrews Forest. *Eporibatula* sp. (fig. 229; 130 μ) was infrequently collected in the research grid, primarily in mesic and xeric tree sites. The characteristics that separate the genera must be seen under a compound microscope.

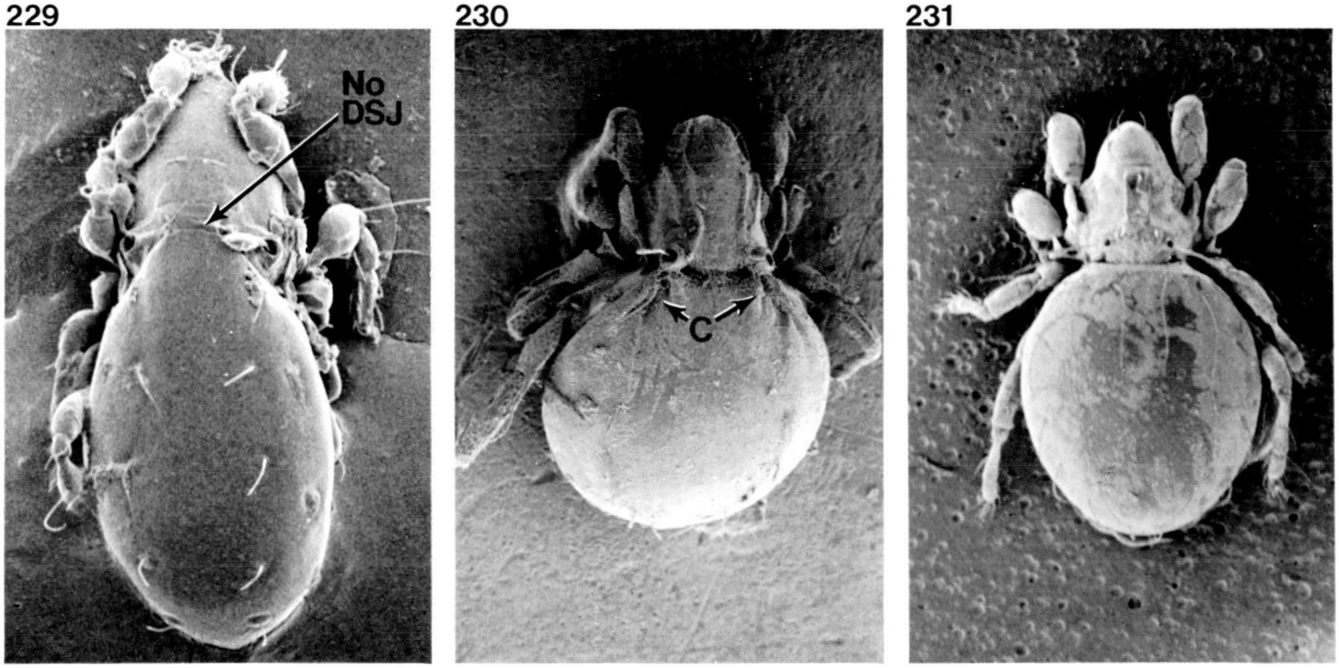

Figure 229-231; 229: *Eporibatula* sp. with nearly rudimentary dorsosejugal suture (no DSJ), lamellar ridges very reduced; picture height = 130 μ; 230: *Megeremaeus ditrichosus* with cristae on anterior margin of notogaster (C); picture height = 1350 μ; 231: *Eremaeus* sp. in dorsal view showing prominent costula, lack of spinae adnatae, and cerotegument; picture height = 975 μ.

4A Anal plates elongate, diamond-shaped, much wider subapically (fig. 235); large species more than 700 μ; darkly pigmented; anal plates with at least four pairs of setae (Eremaeoidea) 5
4B Anal plates nearly square as a unit, sides subparallel and always less than one-quarter of body length (fig. 256); smaller species, seldom even 600 μ long 6

5A Crista present (spiny tubercles arising from notogaster along dorsosejugal suture on either side of midline) .... *Megeremaeus*

Megeremaeus ditrichosus Woolley & Higgins (fig. 230; 925 to 950 μ) has been taken frequently by Walter (unpub.) in western Oregon. In Andrews Forest, it seemed to be restricted to subalpine forest litter.

5B Crista absent (figs. 231 and 232) .... *Eremaeus*

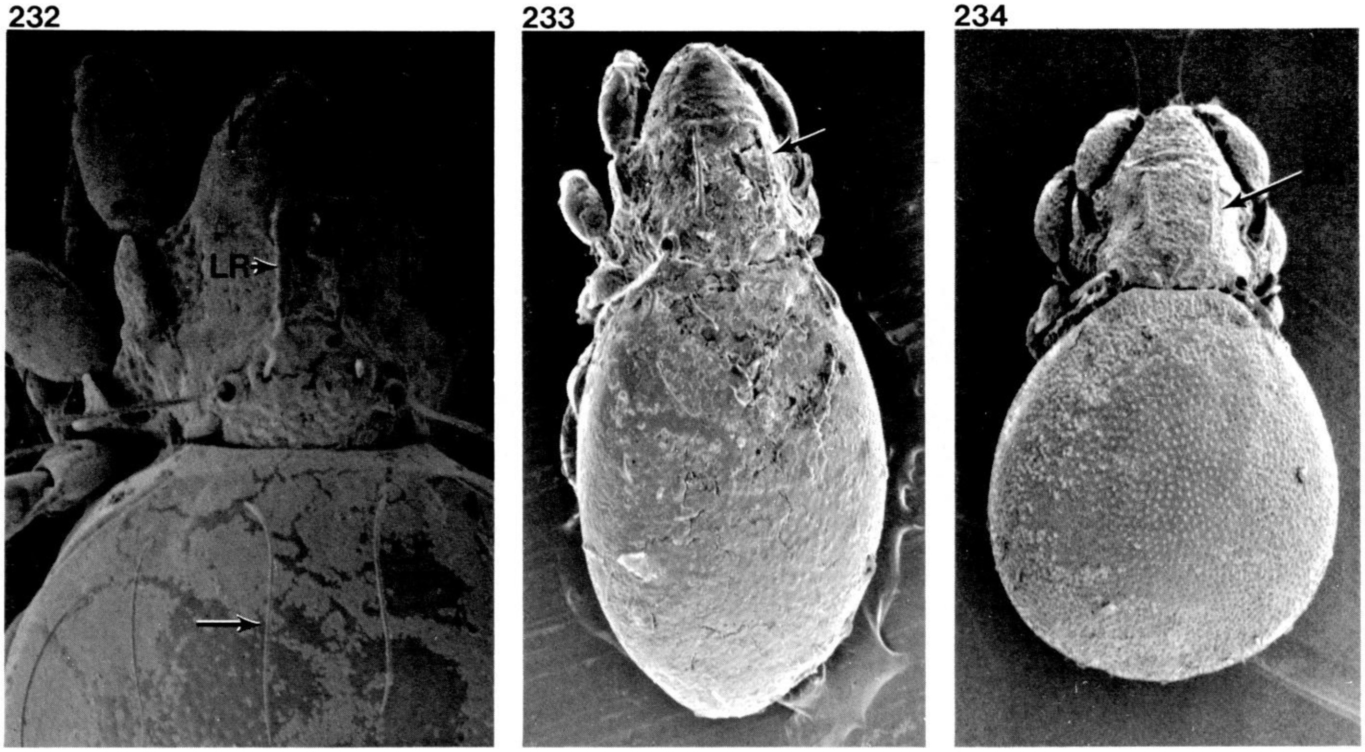

Figure 232-234; 232: *Eremaeus* arboreal species in dorsal view; picture height = 425 μ; 233: *Eremaeus* sp. Andrews Forest litter species in dorsal view, with long notogastral setae; picture height = 475 μ; 234: *Eremaeus* sp. (Marys Peak, OR.) in dorsal view (LR = lamellar ridges); picture height = 725 μ.

Many species of *Eremaeus* apparently occur in Oregon, but only four were in Andrews Forest. Voegtlin (1982) reports two species in high abundance from mosses (fig. 232) and lichens of old-growth Douglas-fir canopy. Neither species was taken on the ground. A third widespread and abundant species was found in 46 of these sites (figs. 231, 233 and 235; 750 to 780 μ). It occurred in old growth, regardless of moisture regime. Seasonal abundance followed the typical bimodal pattern, but the fall peak was advanced and declined primarily in dry summer (similar to the pattern observed for *Odontodamaeus veriornatus* and *Oribotritia megale*). A fourth species was abundant in the subalpine fir forest of Andrews Forest (fig. 270); this species has the most noticeably stippled dorsum and may key to Section P (*Kartoeremaeus*) page 96.

6A Anterior portion of prosoma modified into a linear snout (figs. 238 and 239); chelicerae highly modified, without typical chelate structure (figs. 236 to 237); deep red-brown; without contrasting food boli 7

6B Anterior tip of prosoma without linear ridge dorsally or ventrally 8

7A Anterodorsal tip of prosoma with linear ridge (fig. 239); sensillum linear .... *Rhynchobelba*

Rhynchobelba was frequent in Andrews Forest samples; it was nearly the same size, color, and shape as the largest species of *Oppiella* and has not been treated separately in our analysis.

7B Ventral portion of snout prolonged and linear (fig. 240); sensillum enlarged apically .... *Rhinosuctobelba*

Rhinosuctobelba cf. *dicerosa* Woolley & Higgins (figs. 236, 238 & 240; 500 to 575 μ) was widespread and abundant in Andrews Forest, occurring in all 52 sites. Though not abundant enough to be among the top 15 species of oribatids, constancy within the community replicates is high, dropping below 0.70 only in xeric clear-cut and old growth. It exhibits the typical seasonal pattern, but the spring peak is delayed through early summer. It is generally distributed throughout all moisture regimes and successional seres (with perhaps a slight preference for shrub and tree seres).

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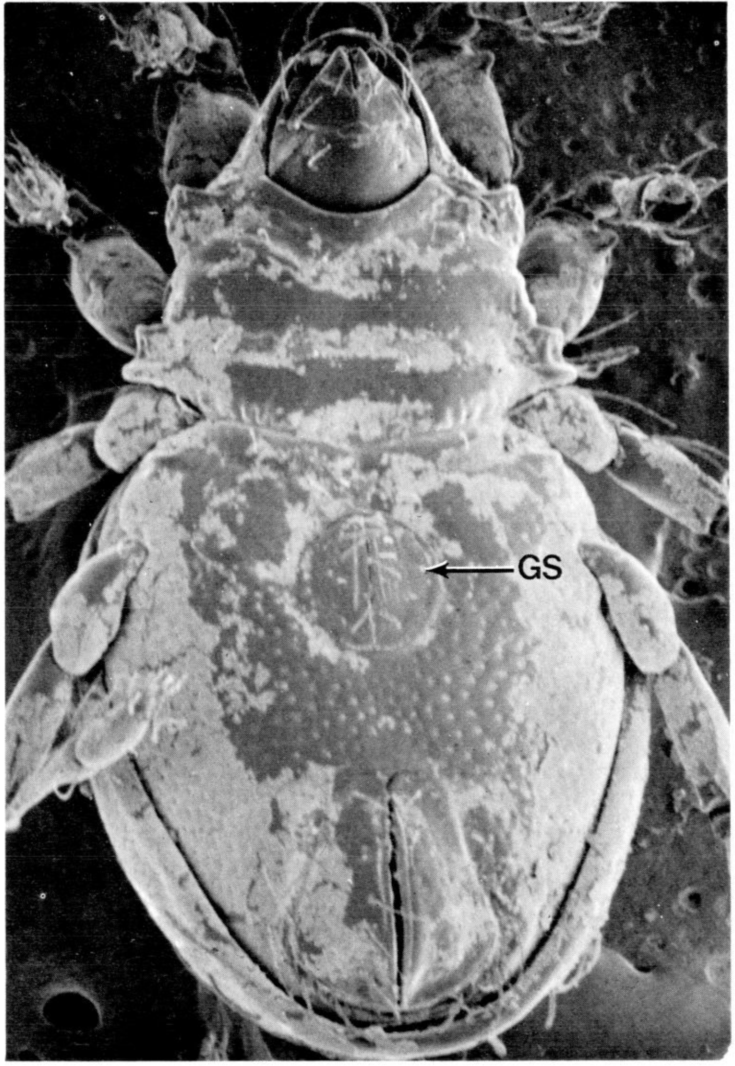
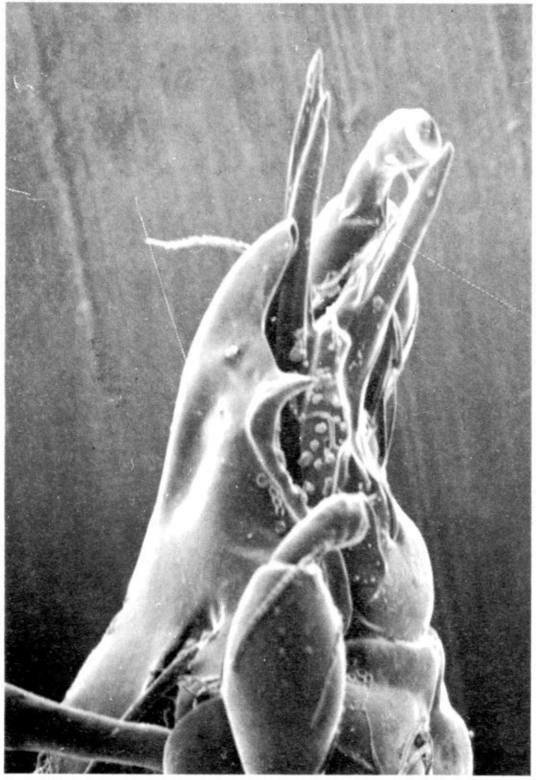


Figure 235: *Eremaeus* Andrews Forest species showing extra genital setae in ventral view (GS = genital plate); picture height = 600 μ.

236



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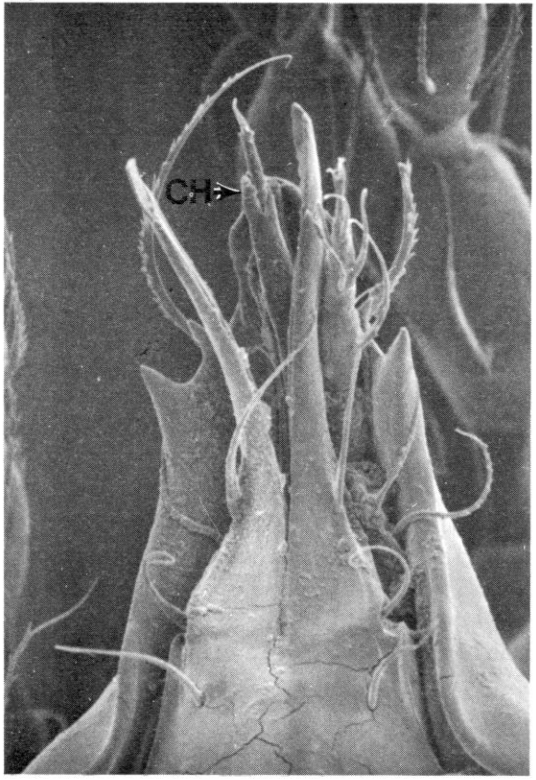

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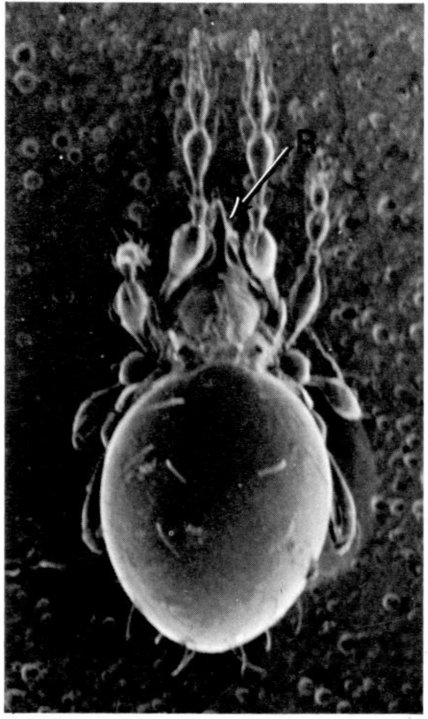

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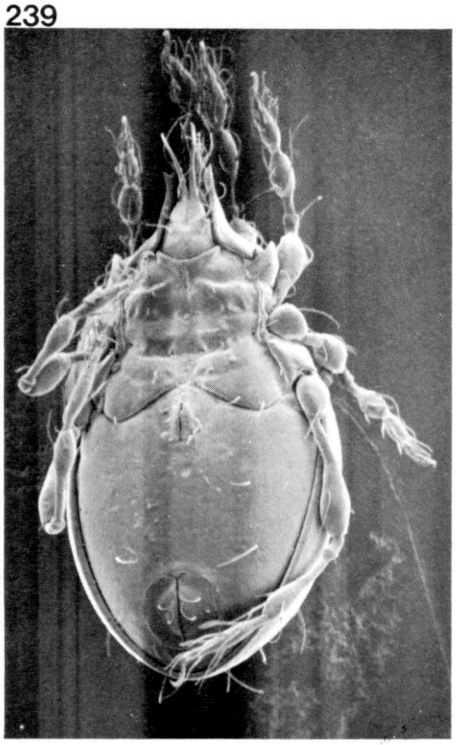

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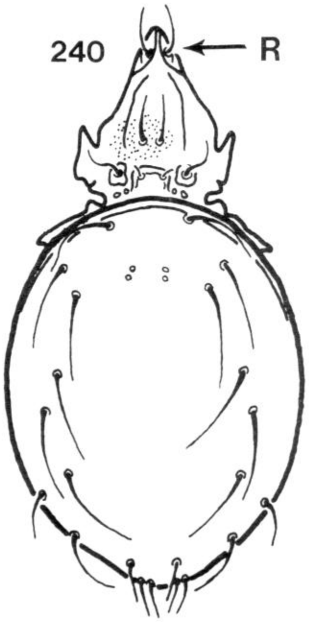

Figure 236-240; 236-237: Chelicerae of *Rhinosuctobelba dicerosa* emphasizing their elongate structure (lateral view and ventral views); picture height 236 = 225 μ, picture height 237 = 133 μ; 238: *Rhinosuctobelba dicerosa* with elongate t-shaped snout(R = rostrum); picture height = 750 μ; 239: *Rhynchobelba* with prominent antero-dorsal snout (R = rostrum); 240: *Rhinosuctobelba dicerosa* with prominent ventral snout; picture height = 750 μ.

8A Lamellae expressed as a distinct, raised linear ridge (fig. 241)... .... SEE KEY BELOW

1A Dorsosejugal suture straight.........................6
1B Dorsosejugal suture normally curved...................2
2A Dorsosejugal suture medially interrupted; aquatic; with lateral cerotegumentary border; 16 to 17 pairs of notogastral setae...........................*Hydrozetes*
2B Dorsosejugal suture not interrupted; no cerotegumentary bands; non-aquatic....................................3
3A Sacculonotic; 10 pairs of notogastral setae............5
3B Poronotic; 14(12) pairs of notogastral setae..........4
4A Lamellae linear, short.......................*Phauloppia*
4B Lamellae raised, ribbon-like ....*Oribatula*
5A Rostrum pointed.....................*Metaleius/Paraleius*
5B Rostrum rounded....................*Dometorina/Hemileius*
6A Lamellar ridges parallel and closer to each other than to sides of prodorsum; sensillum with an elbow-bend; anterior margin of notogaster with two tubercles; transcontinental........................*Dolicheremaeus*
6B Lamellar ridges converging, close to lateral margins of prodorsum; sensillum capitate.............*Dometorina*

These genera are cited in the catalog from North America but only the two in couplet 4 are likely to be found in arboreal or litter samples from the Cascades. Topic and Walter (unpub.) encountered *Oribatula* in litter samples and Voegtlin (1982) found high numbers of *Phauloppia* in arboreal canopy studies. The genus *Dometorina* (Nova Scotia) is distinguished by bothridia covered by the notogaster; *Hemileius* (eastern half of the United States and Canada) by visible bothridia; *Metaleius* (North Carolina) by normal three-clawed legs; and *Paraleius* (Louisiana) by a modified posteriorly pointing median claw.

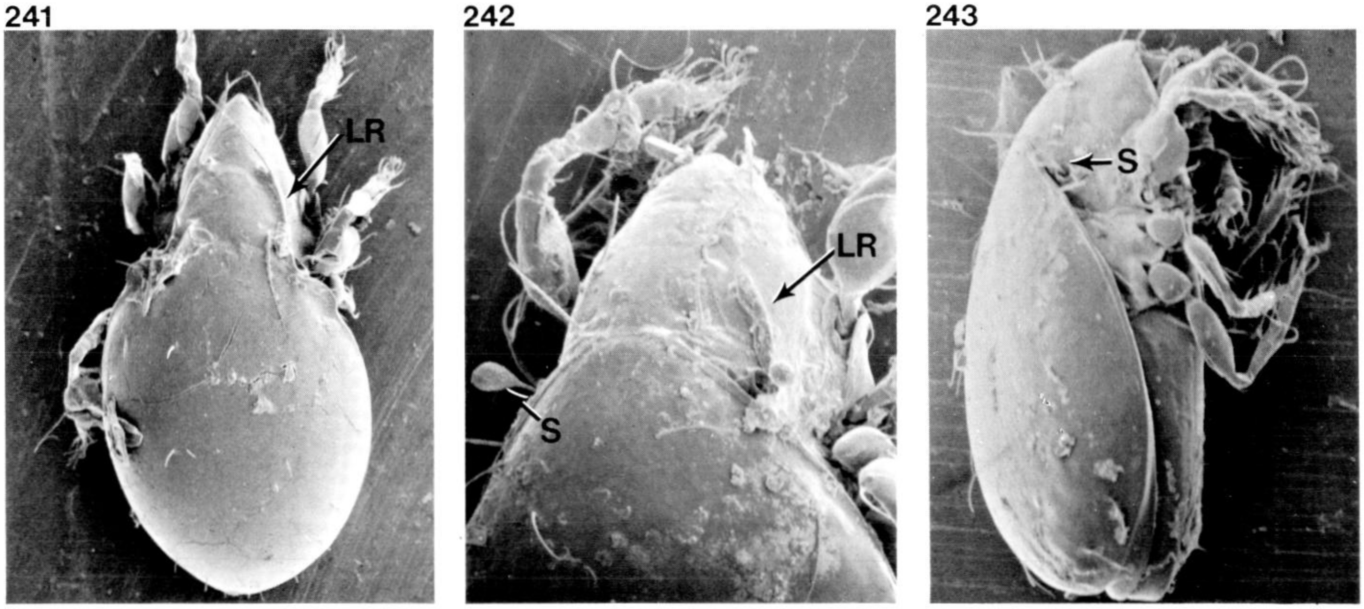

Figure 241-243; 241: *Oribatula* sp.; picture height = 400 μ; 242-243: *Phauloppia* sp. with lamellar ridges (LR) and sensillum (S) indicated; picture height 242 = 225 μ, picture height 243 = 425 μ.

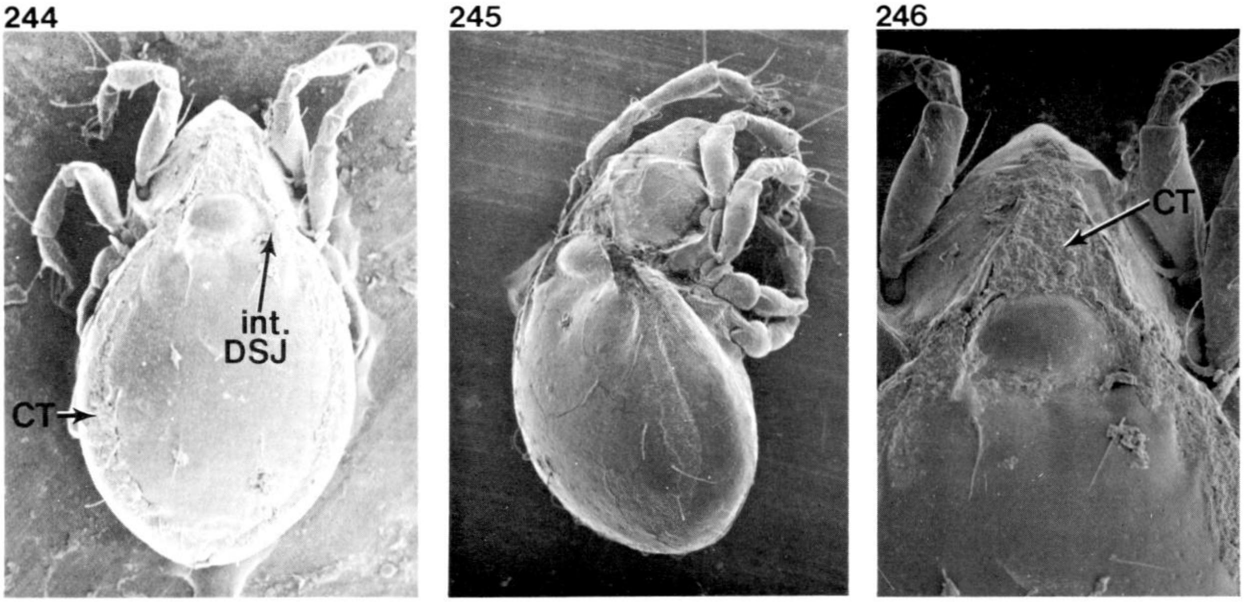

Figure 244-246; 244-246: *Hydrozetes* sp. in dorsal and lateral views with high magnification of dorsosejugal region; note the circumferential ring of cerotegument (CT) that serves as a plastron, the absence of sensilla and the broadly interrupted dorsosejugal suture; picture height 244 = 350 μ, picture height 245 = 350 μ, picture height 246 = 150 μ.

8B Without a distinct raised ridge for a lamella, but merely an indication of a line (figs. 247 to 260) 9

9A Usually larger than 300 μ; prosoma without transverse ridge, edges appearing as darker transverse lines; saddle-like structure (if present at all) not a major feature in dorsal view 10

The marine ameronothroid *Alaskozetes* (Alaska to California) will key at couplet 9 (fig. 260), but it is quite unlike the Suctobelbidae or Oppiidae. The notogaster is nearly circular; the prosoma subequal in width to the notogaster and about half its length; without traces of lamellae; with very reduced capitate sensilla; interlamellar setae many times the length of the sensillum; and a dense cluster of elongate twisted setae between the genital and anal plates.

9B Minute species, largely transparent, without dark food boli in the gut; 150 to 175 μ; with two transverse ridges across most of prosoma (figs. 250 to 251); prosoma nearly as wide as opisthosoma; anterior edge of notogaster with prominent saddle-like prominences (crista) .... *Quadroppia*

Quadroppia cf. *quadricarinata* (Michaels) (160 μ) was the second most abundant mite, occurring in all 52 sites. Its constancy value ranked fourth among total oribatids; however, its minute size renders it one of the most inconspicuous mites in the samples. Its seasonal abundance curve closely follows that for total Andrews oribatids. It prefers mesic to midmoisture to xeric seres. It appears independent of successional type, except that it is nearly absent in xeric clearcut. It is probable that a second infrequent and larger species also occurs in the Andrews Forest.

10A **Prosoma nearly as long and wide as opisthosoma; never with dark food boli; bright red-brown; costula usually present; chelicerae not the usual lobster-claw shape; dorsal portion of prosoma with pair of flattened surfaces (fig. 247-249) ....** Suctobelbidae
(SEE KEY TO GENERA)

1A Dorsosejugal suture with one or two teeth or notogaster with saddle-like crista (fig. 248)....................2
1B Dorsosejugal suture without teeth; notogaster without crista (figs. 247 and 252)..........................3
2A Notogastral setae very short but on conspicuous raised tubercles; dorsosejugal suture with median broad tooth (Illinois, North Carolina)................*Suctobelbila*
2B Notogastral setae present; dorsum normally without tubercles; dorsosejugal suture with two teeth (fig. 248).................................. *Suctobelbella*
3A Rostrum with incision (fig. 247)........... *Suctobelba*
3B Rostrum without incision (Alaska to North Carolina) ....*Allosuctobelba*

This group was represented in Andrews Forest by at least two species of *Suctobelbella* (figs. 248 and 253; ca. 200 to 250 μ). As a genus, *Suctobelbella* was found in all 52 sites, ranking first in consistency and third in abundance. It appeared uniformly distributed throughout the successional seres and moisture gradients but was lowest in the clearcut. Seasonal abundance closely fit the pattern for total oribatids.

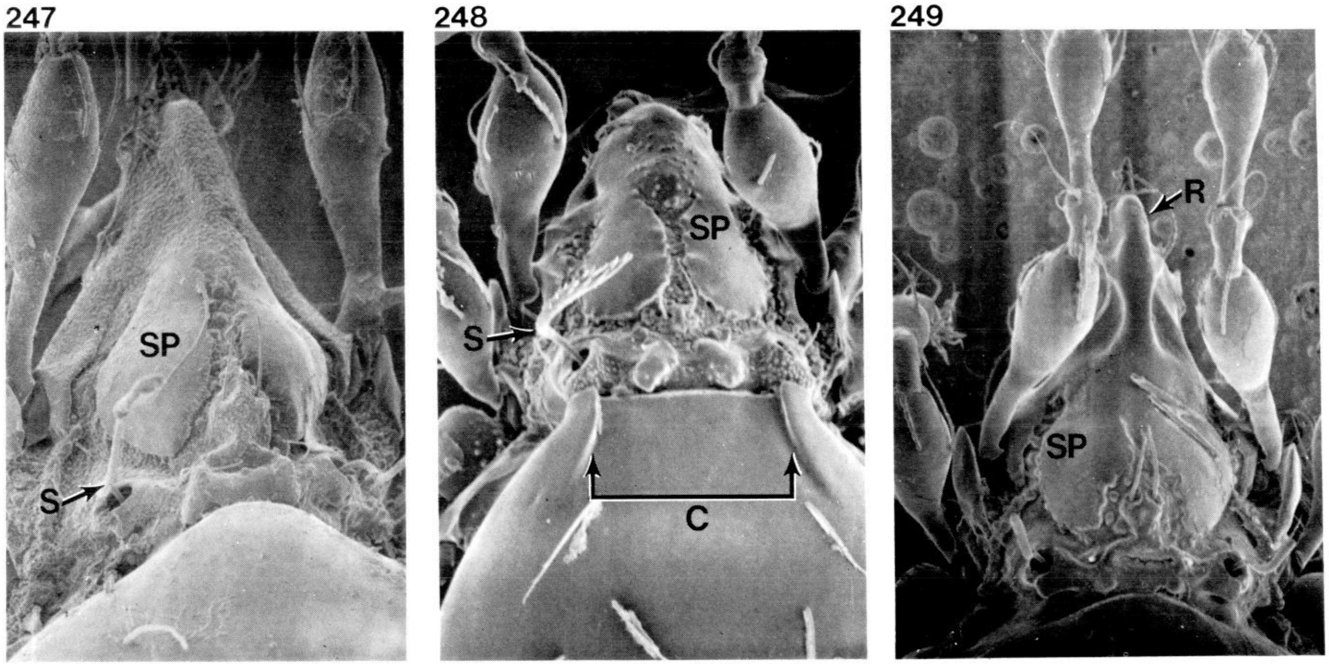

Figure 247-249; 247: *Suctobelba* sp. with smooth patches (SP) on prosoma and dorsosejugal suture without teeth; picture height = 230 μ; 248: *Suctobelbella* sp. with smooth patches (SP) on prodorsum and dorosejugal suture with a prominent pair of lateral teeth (C); picture height = 110 μ; 249: *Rhinosuctobelba dicerosa* with smooth patches (SP) on prosoma and snouted rostrum (R; S = sensillum); picture height = 300 μ.

10B Prosoma distinctly narrower than opisthosoma and never half its length; food boli usually seen as contrasting dark spots in dorsal view; legs with a single tarsal claw .... Oppiidae(principally)
(SEE TABLE OF GENERA)

Distinguishing features of the genera related to *Oppiella* are presented in tabular format for ease of reference.

	CRISTA	COSTULA	SENSILLUM	NOTES
Oribella	-	+	Fusiform	Epimeres III & IV not fused; setae and dorsum unmodified (New York, California)
Veloppia	Pair tubercles	-	Fusiform	Epimeres III & IV not fused; notogaster with longitudinal sulci; setae large 200 μ; (California, Oregon)
Autogneta	Long	+	Fusiform	Rostral tip incised; 230 μ (transcontinental)
Oppiella	Short	+	Fusiform	Figs. 254, 256, 257 & 259; 175 to 375 μ (transcontinental)
Quadroppia	Short	+/-	Golf club	Prosoma with two transverse ridge edges appearing as lines (transcontinental)
Banksinoma	Short/ converging	-	Long setose	Genital and anal plates very large, touching; 340 μ (transcontinental)
Gemmazetes	Short	-	Clavate/ filiform	Genital and anal plates very large, touching; arboreal; 300 μ (Alaska, California)
Brachioppiella	Short	-	Pectinate	Normal rostral setae (California)
Ramusella	Short	-	Pectinate	Plumose rostral setae (transcontinental)
Oppia	-	-	Long setose; fusiform	Figs. 255 & 258 (transcontinental)
Multioppia	-	-	Fusiform	Additional notogastral setae, (13 pairs not usual 10)(Quebec to Louisiana)
Ameroppia	-	-	Capitate fig. 261	Interlamellar setae absent (Illinois to tropics)
Aeroppia	-	-	Capitate/ ball	Posterior notogastral setae thick and hollow (eastern half USA)

Nearly all Andrews Forest oppiids fall into the genus *Oppiella*, a genus that probably contains at least three species locally. One species is noticeably larger (325 to 375 μ) and light reddish; it may be confused with *Rhynchobelba*, which is separable by the much deeper bright red color and the absence of all traces of food boli. Lumped in our analysis, these two species were 12th in total abundance, found in 51 of 52 sites, and have constancy values above 0.8 in all but the clearcut sites. Seasonally, they followed the typical abundance pattern, but are less frequent in dry summer than early summer. They were widespread and abundant in all successional seres and moisture types, perhaps with a slight aversion to clearcuts.

The other two species are nearly the same size (175 to 250 μ) but differ in color; one is a transparent reddish, and the other (*O. nova* (Oudemans)) is light tan. Together, they comprised the most abundant and the second most constant oribatid group in Andrews Forest. They were found in all 52 sites, and achieved a constancy value of 1.0 in all sites except the xeric clearcut. Seasonal abundance closely follows the norm. They preferred mesic to midmoisture and avoided xeric seres. Old-growth and tree seres were preferred to shrub stages, which were preferred to clearcuts.

Gemmazetes clavatus (300 μ) occurs arboreally on oak in the Willamette Valley (Walter, unpub.). The genera *Cosmoppia* (Florida), *Microppia* (transcontinental, including British Columbia) and *Pantelozetes* (Alaska) belong in this alliance, but we do not know their diagnostic characters.

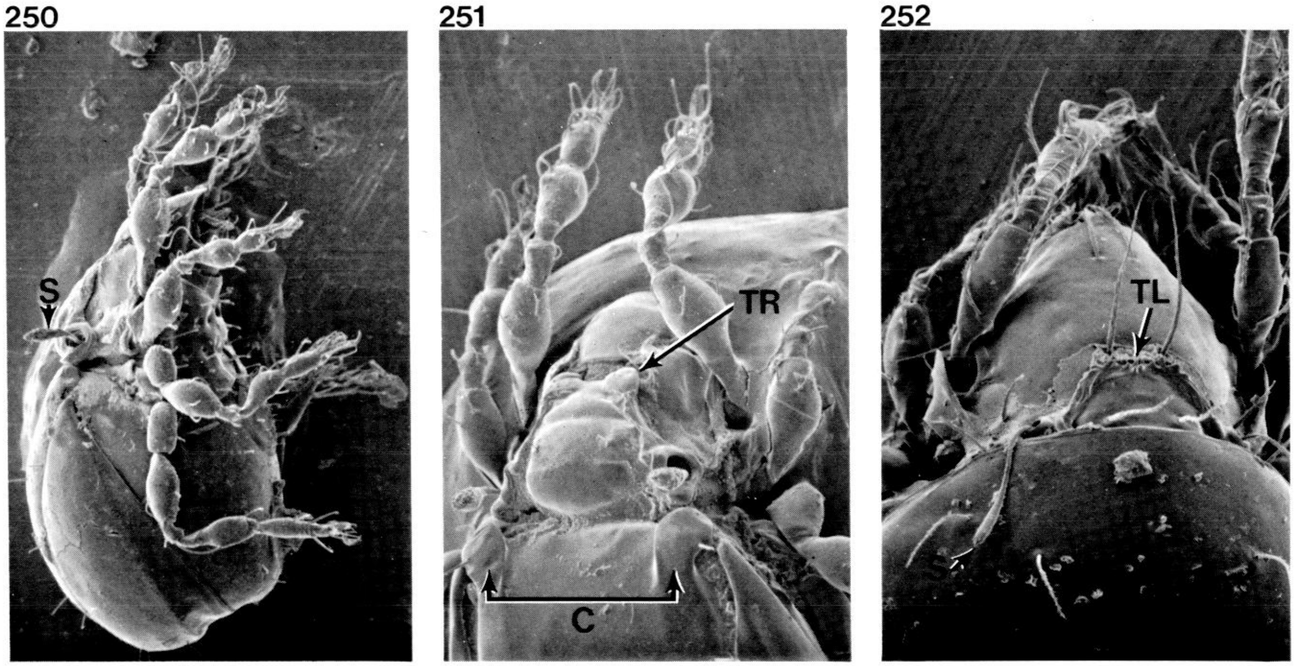

Figure 250-252; 250: *Quadroppia quadricarinata* notice the promient costula and transverse ridge on the prodorsum in lateral view; picture height = 200 μ; 251: *Quadroppia quadricarinata* with raised dorsum of prosoma highlighted by a transverse ridge (TR), with prominent costula (C); picture height = 150 μ; 252: *Banksinoma* sp. with irregular denticulations on the translamellar ridge (TR; S = sensillum); picture height = 225 μ.

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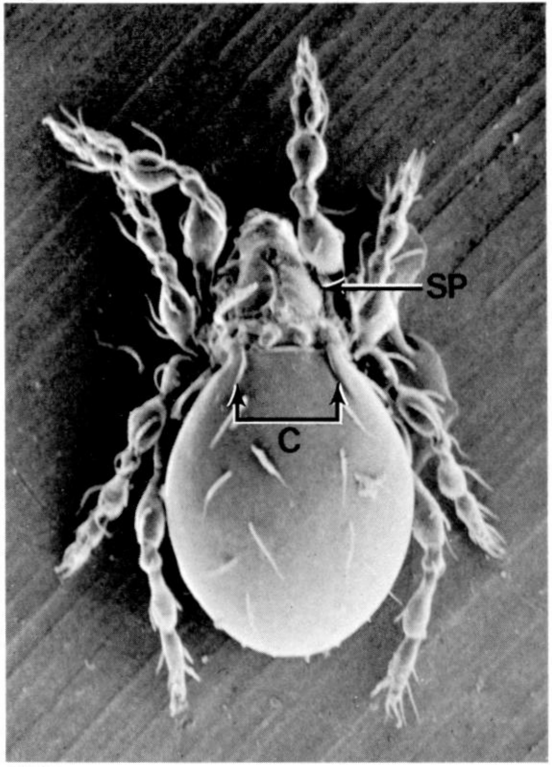

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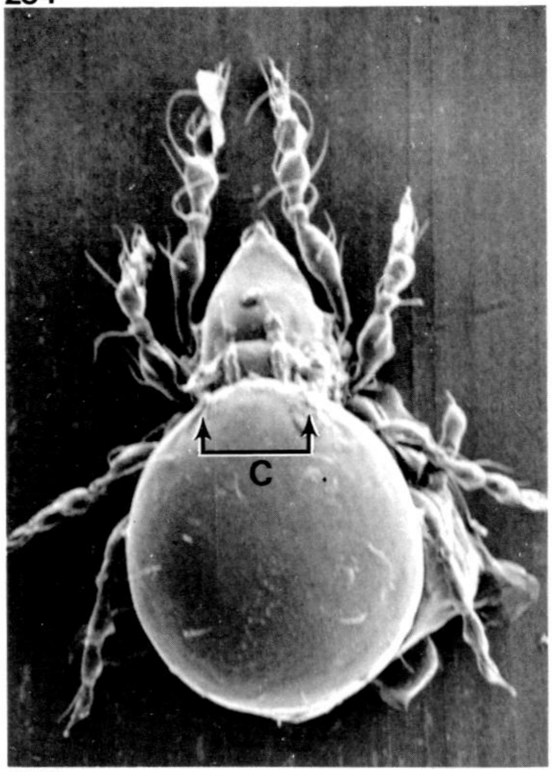

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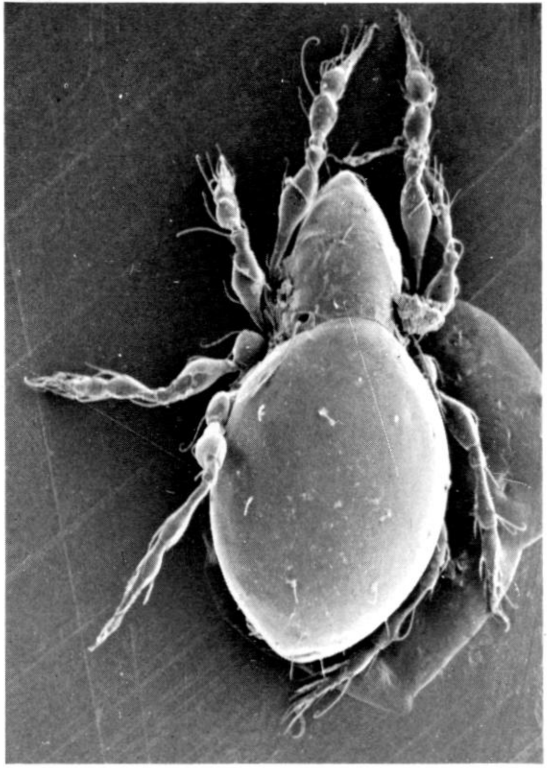

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Figure 253-256; 253: *Suctobelbella* sp. with pair of smooth patches (SP) on the prodorsum and prominent crista (C); picture height = 325 μ; 254: *Oppiella nova* dorsal view with crista (C); picture height = 400 μ; 255: *Oppia* sp. dorsal view without crista; picture height = 333 μ; 256: *Oppiella* sp. in ventral view; picture height = 400 μ.

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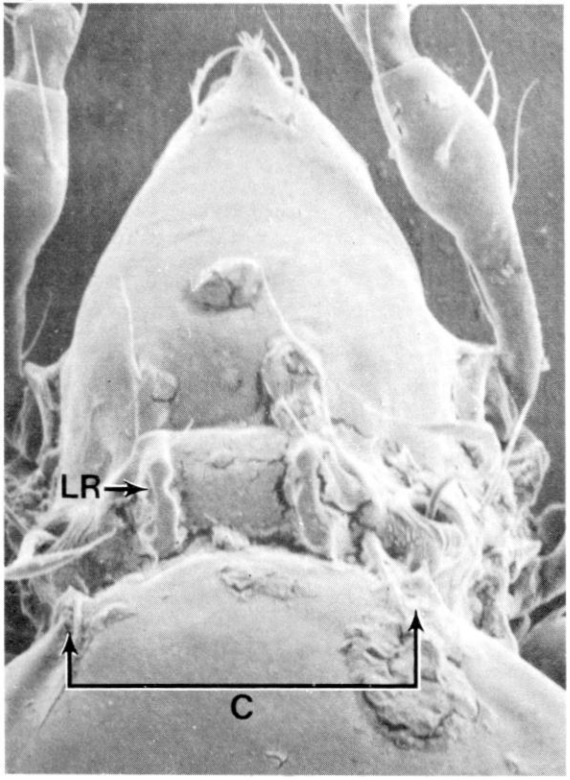

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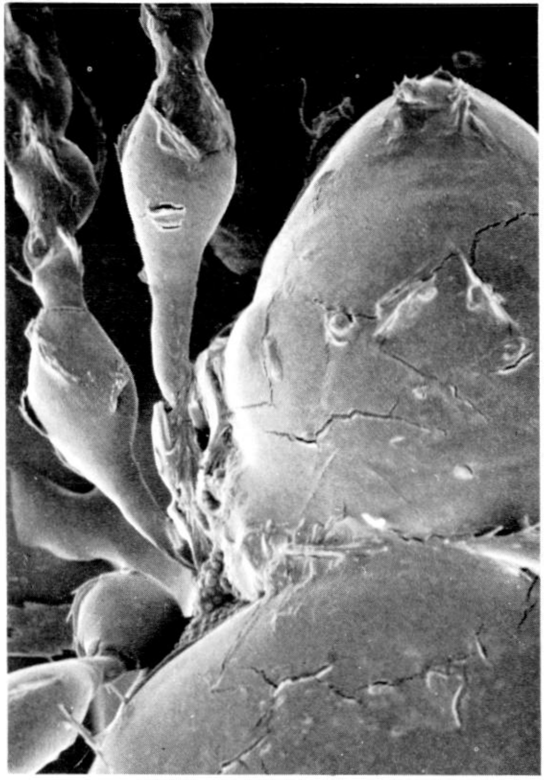

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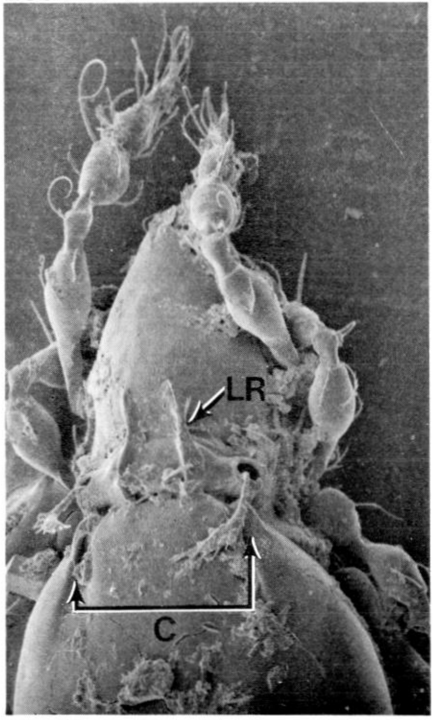

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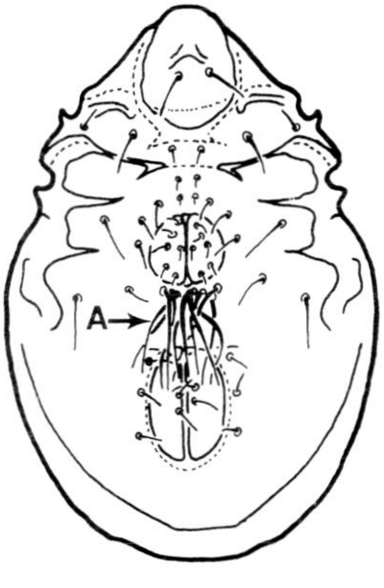

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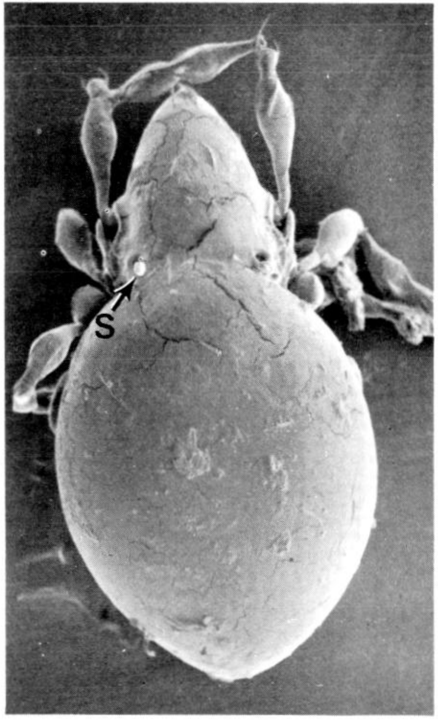

Figure 257-261; 257: *Oppiella nova* dorsosejugal region showing costula (LR) and crista (C); picture height = 150 μ; 258: *Oppia* sp. dorsosejugal region without costula or crista; picture height = 100 μ; 259: *Oppiella* sp. showing costula (LR) and crista (C); picture height = 150 μ; 260: *Alaskozetes* sp. with very elongate setae (A) posterior to the genital sclerites; 261: species near *Ameroppia* with capitate sensillum; picture height = 350 μ.

SECTION P: Mites with patterned backs; non-lamellate

This artificial category includes a wide variety of unrelated oribatids sharing only the prominent surface sculpturing and lack of lamellae. A wide variety of body shapes and sizes will key to this section.

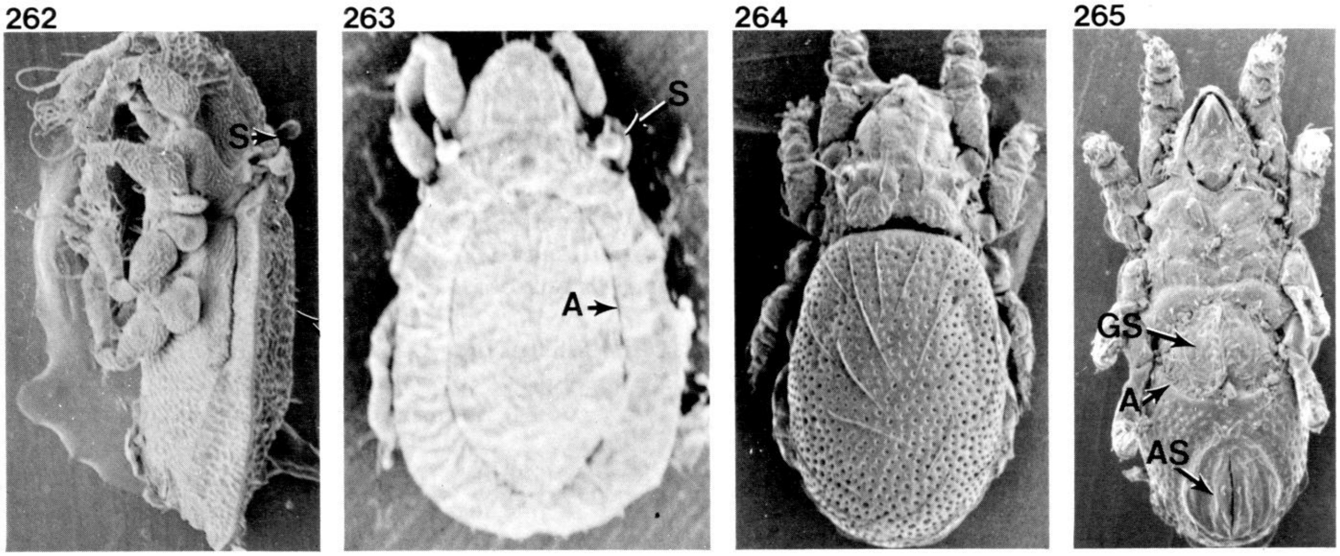

Figure 262-265; 262-263: *Scapheremaeus* arboreal species of Voegtlin in lateral and dorsal views, note the circular groove (A) within the notogastral pattern of cerotegument, capitate sensillum (S) and flat dorsum; picture height 262 = 370 μ, picture height 263 = 400 μ; 264: *Nanhermannia* with uniform punctation, oblong-cylindric body and no submarginal groove; picture height = 550 μ; 265: *Nanhermannia* sp. with large U-shaped area (A) occupying anterior half of opisthosomal venter encompassing the genital plates (GS) but anterior to the anal plates (AS); picture height = 450 μ.

1A Dorsum of opisthosoma flat (fig. 262), with complete circular groove emphasizing irregularly multiridged cerotegument (fig. 263); lamellae present, trans-lamellate, but inconspicuous amongst cerotegument; without prominent setae (Cymbaeremaeoidea) .... *Scapheremaeus*

Voegtlin (1982) found one species of *Scapheremaeus* (350 to 400 μ) abundant on bare branches of the canopy of Douglas-fir old growth; we have never encountered it in litter samples from under the same trees.

The related genus *Micreremus* differs in having four pairs of genital setae (six pairs in *Scapheremaeus*), a nonreticulate prosoma, and a uniformly honey-combed notogaster; it has not been collected in Oregon (recorded only from Massachusetts).

1B Notogaster not flat, without complete circular sulcus (at most with an indistinct pair of longitudinal folds extending three-quarters the length of notogaster); with prominent setae on notogaster ... 2

2A Body robust 3

2B Body elongate (fig. 264); with translucent U-shaped suture running between genital and anal plates, traversing most of anterior half of ventral opisthosoma (fig. 265); red-brown (Nanhermannoidea) .... *Nanhermannia*

Nanhermannia (figs. 264 and 265; 450 to 500 μ) was widespread (45 sites) but never abundant in the grid. The seasonal abundance pattern was not clear because data from fall or late winter are absent, but a peak occurred in spring--as is typical. It was distributed nearly exclusively in tree and old-growth seres (preferring the tree stage) and preferred xeric over midmoisture over mesic conditions.

3A Notogaster without longitudinal folds 4
3B Notogaster with a pair of indistinct longitudinal folds extending three-quarters the length of dorsum; humeral region with tiny, acute tubercle pointing anteriorly .... *Veloppia*

Veloppia (reported by Topic and Walter (unpub.) from Salmon Creek drainage just south of the Andrews Forest) has very long notogastral setae, conspicuous cerotegument, and two additional tubercles along the dorsosejugal suture (200 μ).

4A Dorsosejugal suture not interrupted mesally 5
4B Dorsosejugal suture interrupted mesally, strongly pointing anteriorly at midpoint..................... Licneremaeoidea (=Passalozetoidea)

The eastern genus *Licneremaeus* may be encountered in the Pacific Northwest. *Licneremaeus* has expanded, clubbed sensilla and a pattern of large honeycombs on the anterior portion of the notogaster (fig. 266). The marine *Ameronothrus* (not illustrated) may key here; its habitat is sufficient to distinguish it.

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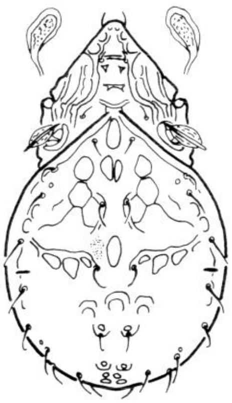

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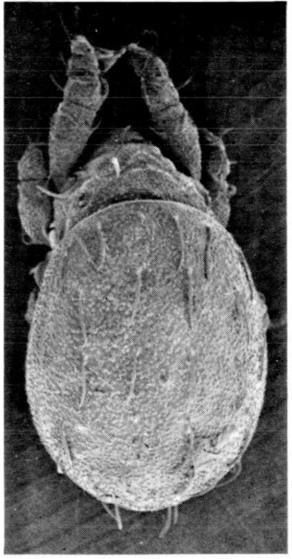

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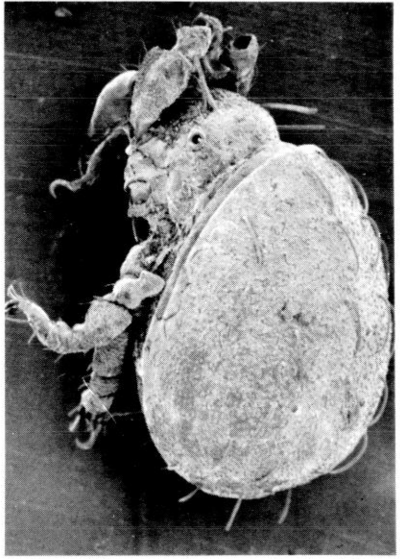

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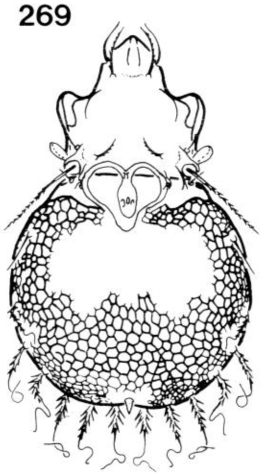

Figure 266-269; 266: *Licneremaeus* with interrupted anterior portion of notogaster; 267-268: *Hermannia* displaying convex notogaster with thick layer of cerotegument and prominent setae; picture height 267 = 900 μ, picture height 268 = 900 μ; 269: *Basilobelba* with unique nymphal exuvia.

5A Widest medially, outline of notogaster an even circular curve; bothridium small; sensillum short-capitate (fig. 206) .... *Hermannia*

Hermannia (figs. 267 and 268; 750 to 900 μ) is frequently encountered in the Coast Range, but has not turned up in Andrews Forest samples.

5B Widest at the two-thirds to three-quarters distance; bothridium prominent; sensillum elongate .... Amerobelboidea (=Eremuloidea)

Several genera of the Amerobelboidea may occur in the conifer forests of the Pacific Northwest; the following are the most likely. *Basilobelba*, recorded by Walter (1981) from central California (fig. 269), carries nymphal shed skins (with an anterior cobra-like extension) on the notogaster; has a filiform, pectinate sensillum; and long, plumose, whip-like setae posteriorly. *Fosseremus* (from North Carolina and the District of Columbia) has four prominent depressions, which give it an H-shape, interrupting the notogastral reticulation; an elongate, capitate sensillum; and a curved dorsosejugal suture. *Eremobelba* (fig. 271), reported by Walter (1981) from California litter, has a notogaster with fine pits arranged in a large honeycomb design; very long, whip-like sensilla; and prominent notogastral setae. *Damaeolus*, reported from the District of Columbia, has a finely punctate notogaster and prodorsum; elongate, spindle-shaped sensilla; and 11 pairs of elongate, twisted notogastral setae. *Eremulus*, reported from the east coast of the United States, has a finely punctate notogastral dorsum, an elongate sensillum, and 11 pairs of elongate notogastral setae.

Kartoeremaeus (transcontinental; fig. 270) is an eremaeoid with a densely pitted cerotegument (450 to 600 μ); it differs from the amerobelboid genera in having three claws; only a single pair of adgenital setae (three in Amerobelboidea); four to five pairs of genital setae (two in Amerobelboidea), and more than three pairs of adanal setae.

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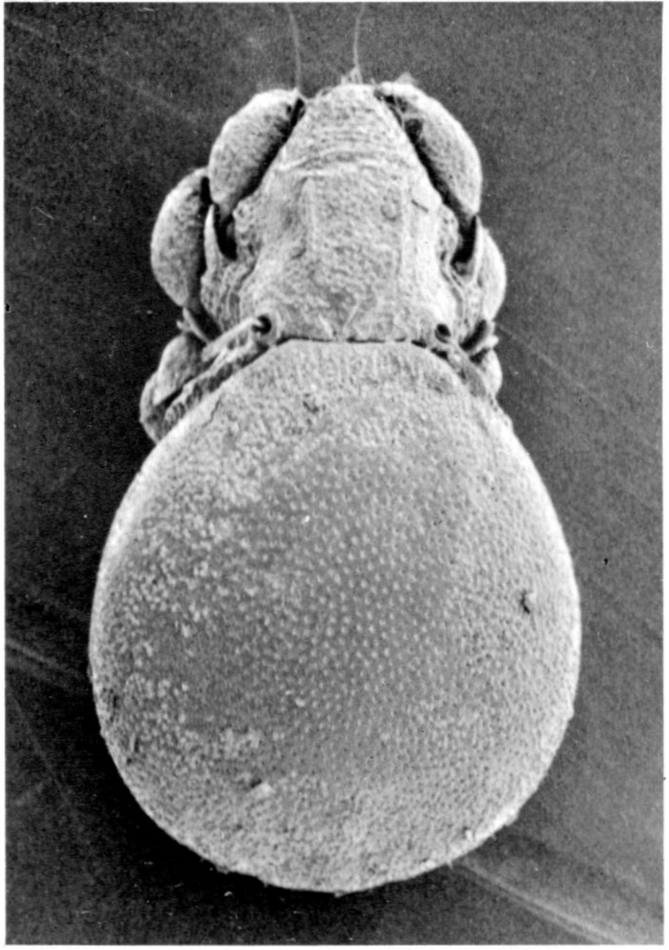

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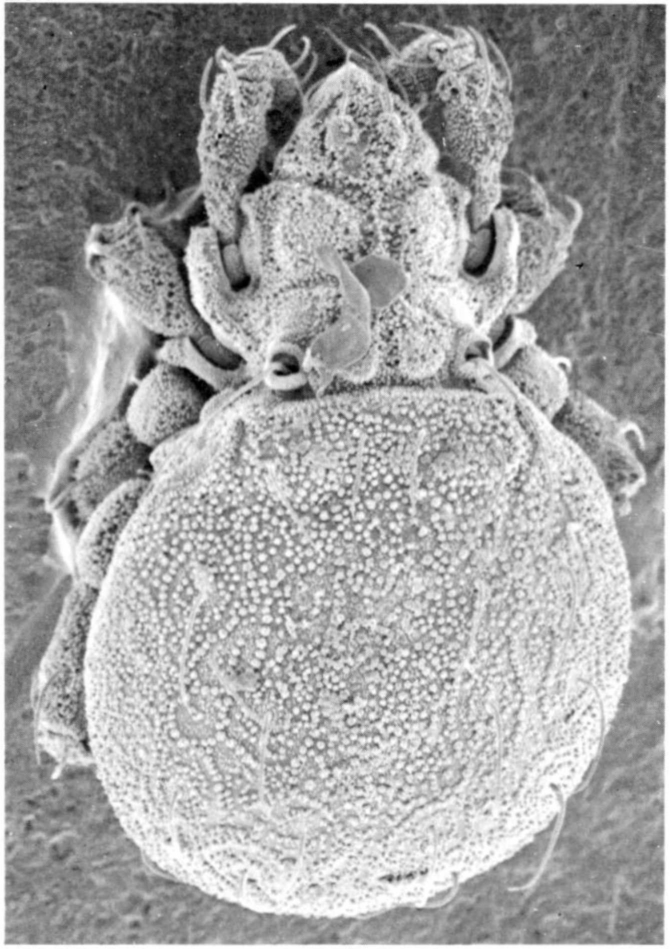

Figure 270-271; 270: *Kartoeremaeus* subalpine species with pitted integument; picture height = 700 μ; 271: *Eremobelba* sp. with patterned cerotegument and prominent notogastral setae; picture height = 450 μ.

SECTION Q: Mites with patterned notogasters and lamellae; Cepheoidea, Carabodoidea

This is an artificial category created for convenience of identification. Mites falling into this section are instantly distinguished from those appertaining to the other sections; however, such a wide variety of body shapes and cerotegumentary patterns are possible that there is no single type representative of the whole group.

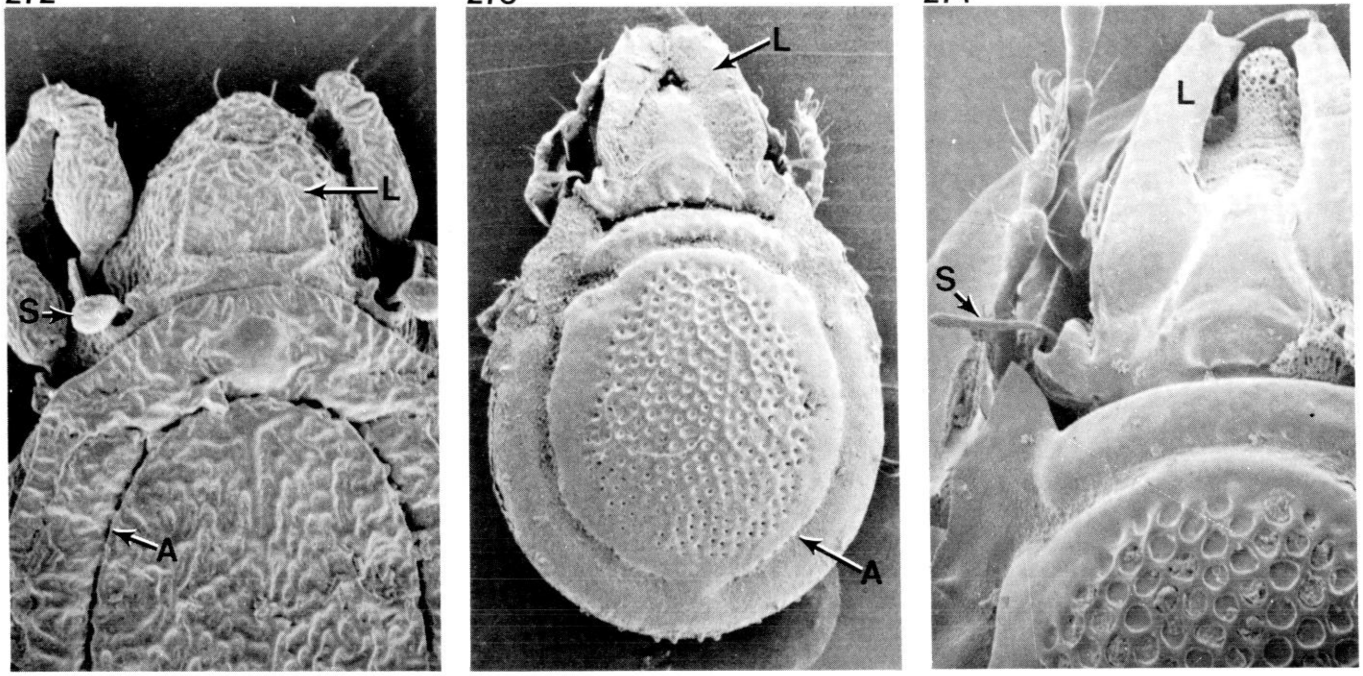

Figure 272-274; 272: *Scapheremaeus* arboreal species with nearly obscured lamellae (L), a flat dorsum, a capitate sensillum (S), and a circular groove (A) in the cerotegument; picture height = 250 μ; 273: *Eupterotegaeus* dorsal view with large lamellae (L), thickly patterned cerotegument and circular groove (A); picture height = 750 μ; 274: *Eupterotegaeus* sp. with the broad lamellae (L) incurved at their tips (S = sensillum); picture height = 400 μ.

1A Notogaster with concentric pattern of at least one complete circular groove (figs. 272 and 273) 2
1B Notogaster without one or more complete concentric circles forming a major part of the integumentary pattern; circular grooves, when present, not complete anteriorly 3

2A Notogaster convex, with exuviae forming one or two concentric circles; prosoma nearly one half length of opisthosoma, covered with dense cerotegument; lamellae projecting as prominent anterior horns (apically flexed mesally, though often obscured with cerotegument) .... *Eupterotegaeus*

Eupterotegaeus (figs. 273, 274 and 293; 675 to 750 μ) was represented by an infrequent species that occurred in 12 sites, but nowhere with a constancy value above 0.50. It was present primarily in midmoisture shrub and mesic old-growth stages. It was not abundant enough to reveal its habitat preference or seasonal pattern.

2B Notogaster flat, with circular groove enclosing a prominent honeycomb design (figs. 262, 263 and 272); lamellae thin and translamellate, indistinct in the dense cerotegument covering the dorsum .... *Scapheremaeus*

Voegtlin (1982) discovered one species (350 to 400 μ) abundant on bare branches of old-growth canopy; it has not been encountered in litter from under the same trees.

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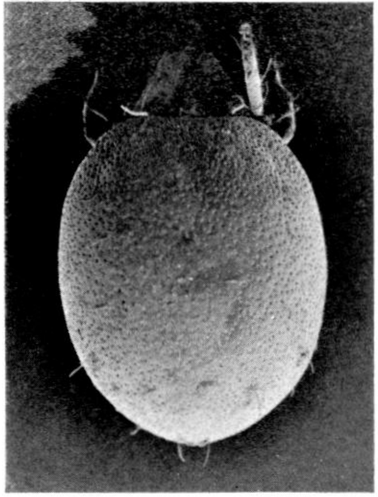

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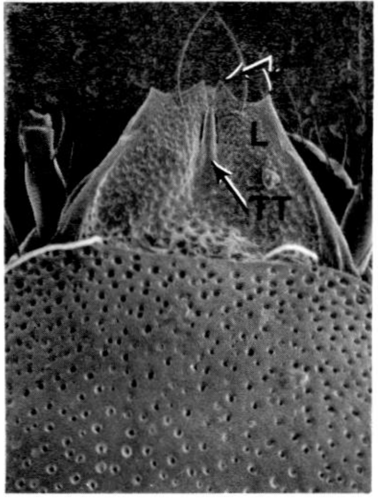

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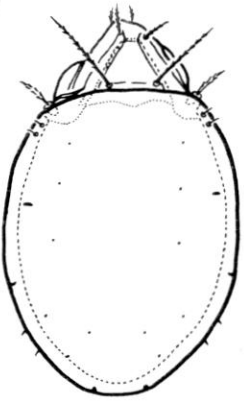

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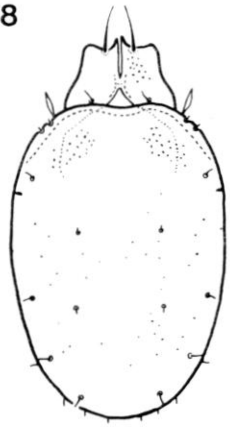

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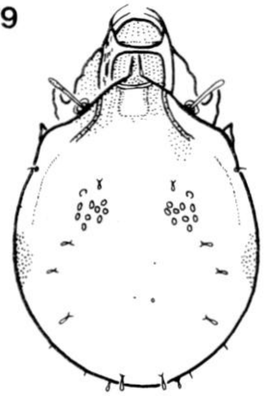

Figure 275-279; 275: *Leuroxenillus*, the form with notogastral setae in dorsal view; picture height = 1350 μ; 276: *Leuroxenillus* with regular field of coarse punctation, convergent lamellae with a tooth-like projection from the translamella (TT); picture height = 900 μ; 277: *Stenoxenillus* sp. with converging simple lamellae; 278: *Stonyxenillus* with broad translamellar cusps and a short translamellar ridge; 279: *Scutovertex* sp. with narrow translamellar cusps and a wide translamellar ridge, anterior border of notogaster interrupted.

3A Dorsum with irregular pattern of transverse ridges and grooves; lamellae prominent, covering all of prosoma, strongly converging (fig. 280) .... *Ametroproctus/Coropoculia*

Ametroproctus is abundant in old-growth canopy (500 to 520 μ) and has not been collected in litter (fig. 280).

Ametroproctus (Coropoculia) was collected six times in the research grid (each time represented by only a single individual (fig. 281). It has indistinct lateral notogastral setae and six pairs of genital setae (notogastral setae absent; four pairs of genital setae in *Ametroproctus*).

3B Dorsum without irregular pattern of transverse ridges and grooves 4

4A Dorsum with prominent pattern of equally spaced punctures (figs. 275 and 276); no cerotegument on body and lamellae; lamellae sharply pointed anteriorly .... *Leuroxenillus*

How many species are represented in Andrews Forest samples (900 to 1200 μ) is not clear. One group of specimens (=*Leuroxenillus trichionus*?) is characterized by long notogastral setae (fig. 275). It occurred in 15 sites, but was too infrequent to show seasonal patterns. It was encountered only in xeric sites, which it prefers to shrub and tree communities. The other group (=*Stonyxenillus*?; fig. 278) appeared to lack setae under the dissecting microscope; one or two species were present. Though infrequent, this group was widely distributed and occurred in 48 sites. It demonstrated the typical seasonality pattern and occurred in roughly equal abundance in shrub, tree, and old-growth communities.

The genus *Xenillus* (distinguished by its capitate sensillum) is also reported from North America (Balogh 1972). *Stenoxenillus* (fig. 277; Alabama and North Carolina) differs from both these genera in having narrow lamellae (weakly translamellate), which end in short pointed tips.

4B Dorsum and lamellae covered with patterned cerotegument, not shiny (figs. 282 and 287) 5

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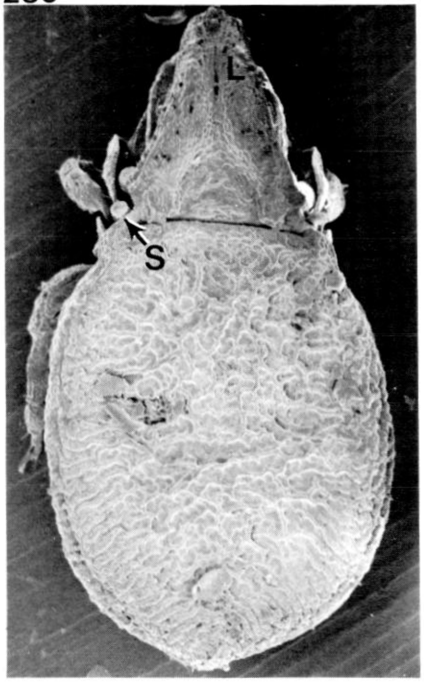

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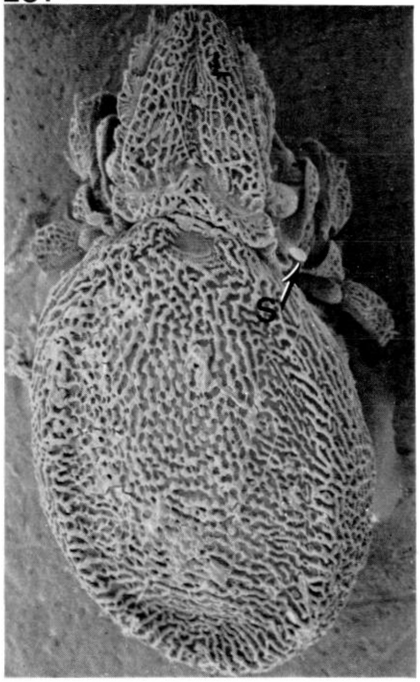

Figure 280-281; 280: *Ametroproctus* with a prominent pattern of transverse ridges and grooves, broad strongly converging lamellae (L), and capitate sensillum (S); picture height = 550 μ; 281: *Ametroproctus (Coropoculia)* with prominent pattern of irregular ridges, equally prominent on convergent lamellae (L); picture height = 650 μ.

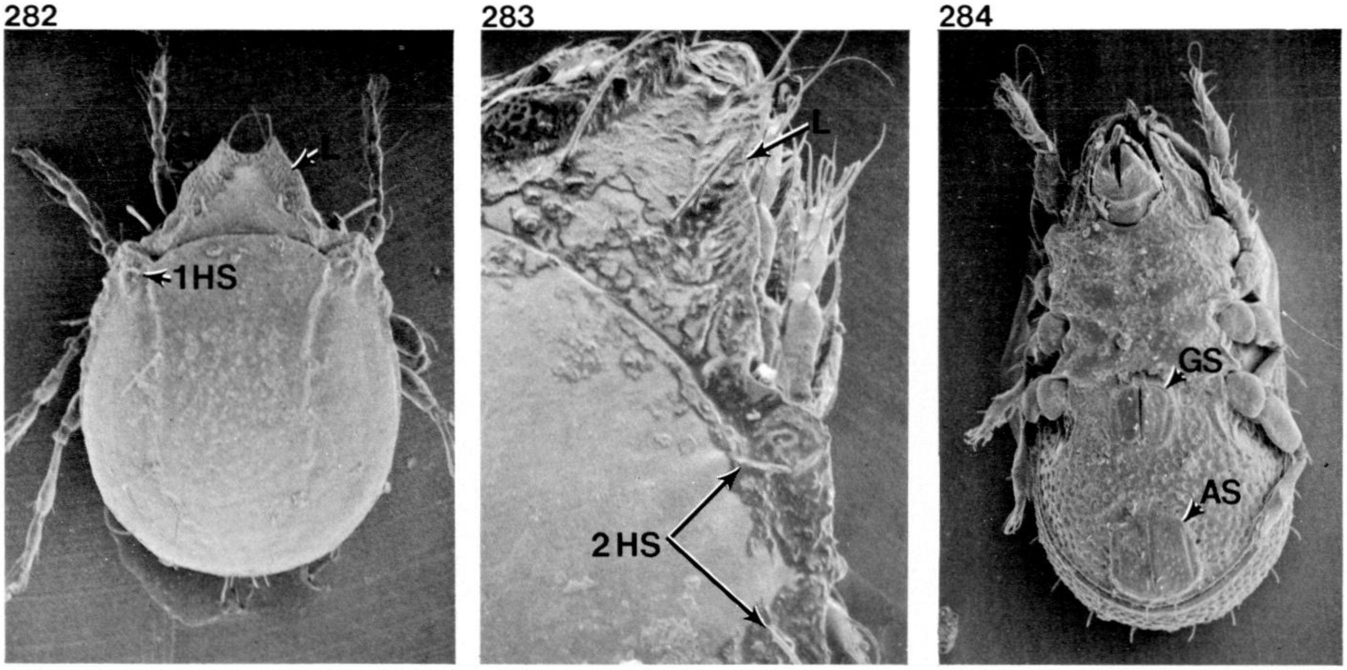

Figure 282-284; 282: *Sphodrocepheus tridactylus* with wide, strongly convergent lamellae (L), a thin cerotegument, 1 pair of humeral notogastral setae and nearly circular profile; picture height = 1100 μ; 283: *Sphodrocepheus anthelionus* with broad converging lamellae (L) and 2 pairs of humeral notogastral setae (HS); picture height = 550 μ; 284: *Carabodes* sp. in ventral view showing typical arrangement of genital and anal plates; picture height = 375 μ.

5A Notogaster circular (fig. 282); lamellae and whole prosoma strongly convergent (Cepheoidea) 6

5B Notogaster distinctly longer than wide; lamellae subparallel to weakly convergent (Carabodoidea) (fig. 285) 8

6A Bothridium enlarged and eye-like; sensillum shortened and globular; arboreal (fig. 289) .... *Ommatocepheus*

Ommatocepheus cf. *clavatus* Wooley is an abundant arboreal mite characteristic of Garry oak in the Willamette Valley; it was not encountered in Andrews Forest.

6B Bothridium and sensillum not so modified 7

7A Three tarsal claws; notogaster strongly convex .... *Sphodrocepheus*

Two species occurred in Andrews Forest (figs. 282 and 283). Both had the fall abundance peak partially shifted into dry summer. *Sphodrocepheus tridactylus* Woolley & Hammer is slightly smaller and is distinguished by the shorter notogastral setae and one pair of setae at the humeral expansion; it was endemic to old growth, occurring in 28 sites. It appeared to have no moisture preference between different old-growth sites. *Sphodrocepheus anthelionus* Woolley & Hammer has longer notogastral setae, a distinct translamella, and two pairs of setae at the humeral expansion. The species was limited to the tree stage, exhibiting a preference for mesic over midmoisture over xeric regimes; this species, much more numerous, was found in 31 sites and along the Topic and Walter (unpub.) gradient in Salmon Creek.

7B With a single tarsal claw .... *Cepheus/Oribatodes*

Cepheus (fig. 288) is synlamellate (with diverging apices); *Oribatodes* has separate lamellae with converging apices. Walter (unpub.) has collected both genera in western Oregon, but as of yet neither has been found in the Andrews Forest.

8A Dorsosejugal suture not present; translamellar bridge visible as prominent anterior transverse line; sensillum capitate, prominent and black; brown .... *Tectocepheus*

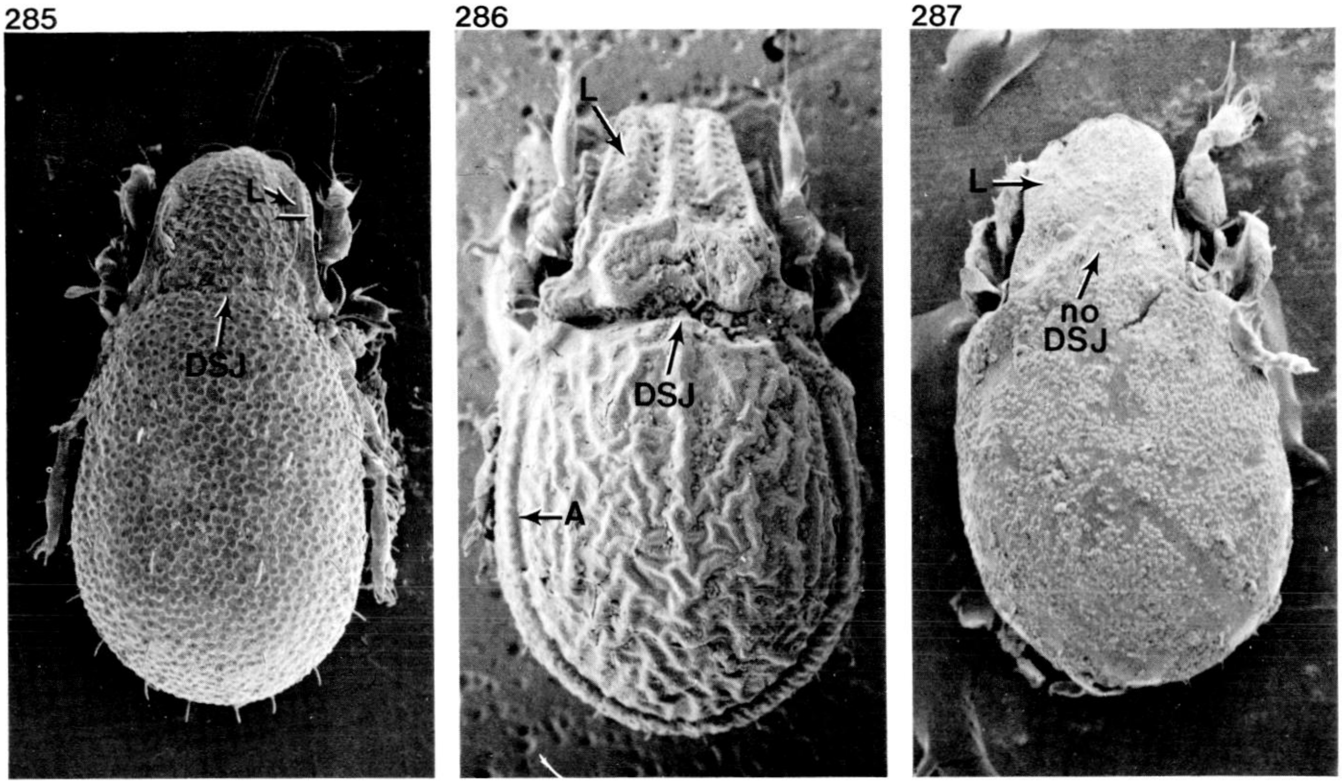

Figure 285-287; 285: *Carabodes* with a thick cerotegument, nearly parallel lamellae, elongate body and distinct dorsosejugal suture; picture height = 375 μ; 286: *Carabodes* large black species with prominent concentric groove (A), reticulated dorsum and parallel lamellae (L); picture height = 550 μ; 287: *Tectocepheus velatus* with a thick cerotegument, parallel lamellae (L), elongate body and vestigial dorsosejugal suture (300x); picture height = 325 μ.

Tectocepheus (fig. 287) was encountered in all 52 sites and had a constancy value above 0.70 everywhere except the depauperate xeric clearcut. Though widespread and constant, it was not generally abundant. Seasonal abundance patterns were bimodal but notably low in early summer and high in early winter. No preferred successional sere was evident and the distribution was apparently independent of the moisture regimes as well. Abundance was high in the midmoisture clearcut site.

Also keying to this position is *Scutovertex* (fig. 279; Licneremaeoidea). Walter (1981) records it from central California litter. It has a fusiform sensillum, thin parallel lamellae connected by a transverse bridge, irregularly wrinkled notogaster, and a strongly curved and medially interrupted dorsosejugal suture.

8B Dorsosejugal suture present, distinct especially under the light microscope; translamellar bridge not visible as prominent dark bar across head region 9

9A Dorsum with pattern of longitudinal ridges and grooves in cerotegument; notogaster strongly convex, nearly hemispheric; color black .... *Exochocepheus*

Exochocepheus (fig. 292) has been collected only once in a subalpine meadow of Andrews Forest. A similar genus, *Niphocepheus* (fig. 290), also possibly occurs in the Pacific Northwest. Unlike *Exochocepheus*, which has simple lamellae with the teeth shorter than the lamellar bases, *Niphocepheus* is synlamellate with the length of the teeth subequal to the lamellar bases.

9B Dorsum with dense, indistinct warts or irregular folds and ridges, surrounded by a circumferential groove (incomplete anteriorly); yellow or black .... *Carabodes*

Carabodes probably is comprised of at least two small yellowish species locally (figs. 284-285; 250 to 350 μ). *Carabodes* was present in 45 of the sites; it ranked 6th in total density, 10th in relative abundance but less than 20th in constancy. Seasonal abundance fit the norm for Andrews oribatids. It was nearly absent from clearcut and shrub samples (constancy less than 0.5), and seemed to prefer tree and old-growth sites in all three moisture regimes equally (but is inexplicably absent from the mesic tree site).

An additional distinctive species of *Carabodes*, much larger and completely black, is present in the Andrews Forest (fig. 286; 500 μ). It was an infrequent species found in only 7 of 52 sites and restricted to mesic shrub.

Odontocepheus has a transverse anterior margin of the notogaster with two teeth and a row of four large, anteriorly directed setae just posteriad. *Dolicheremaeus* has a transverse anterior margin of the notogaster with two tubercles but without the row of anteriorly directed setae (fig. 291). *Tegeocranellus* resembles the profile of *Carabodes*, with a convex anterior notogastral margin; in *Tegeocranellus* the anterior portion of the notogaster has a pair of longitudinal folds.

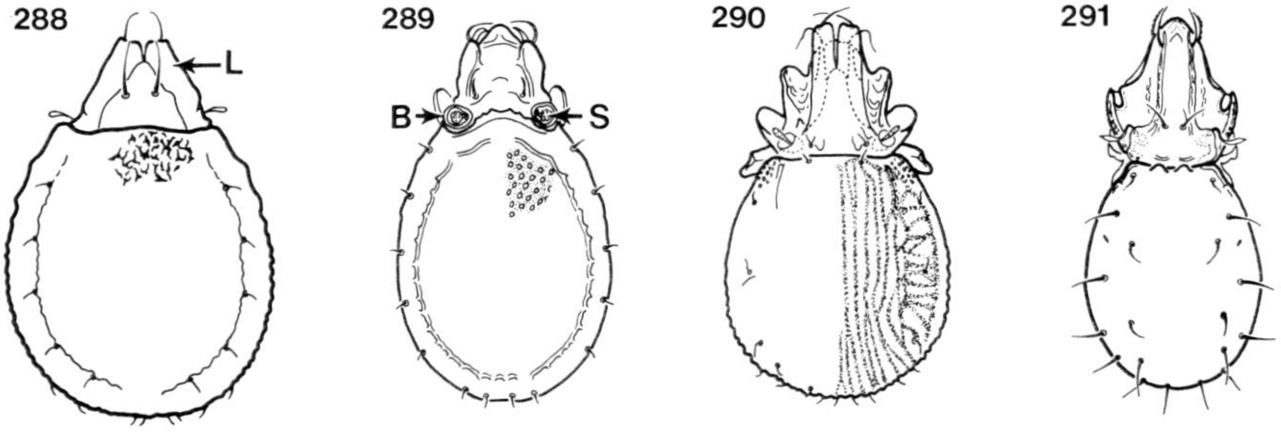

Figure 288-291; 288: *Cepheus* sp. with converging synlamellae (L); 289: *Ommatocepheus* sp. with enlarged bothridium and capitate sensilla; 290: *Niphocepheus* sp. with pattern of many longitudinal lines in the cerotegument; 291: *Dolicheremaeus* sp. with transverse anterior notogastral margin.

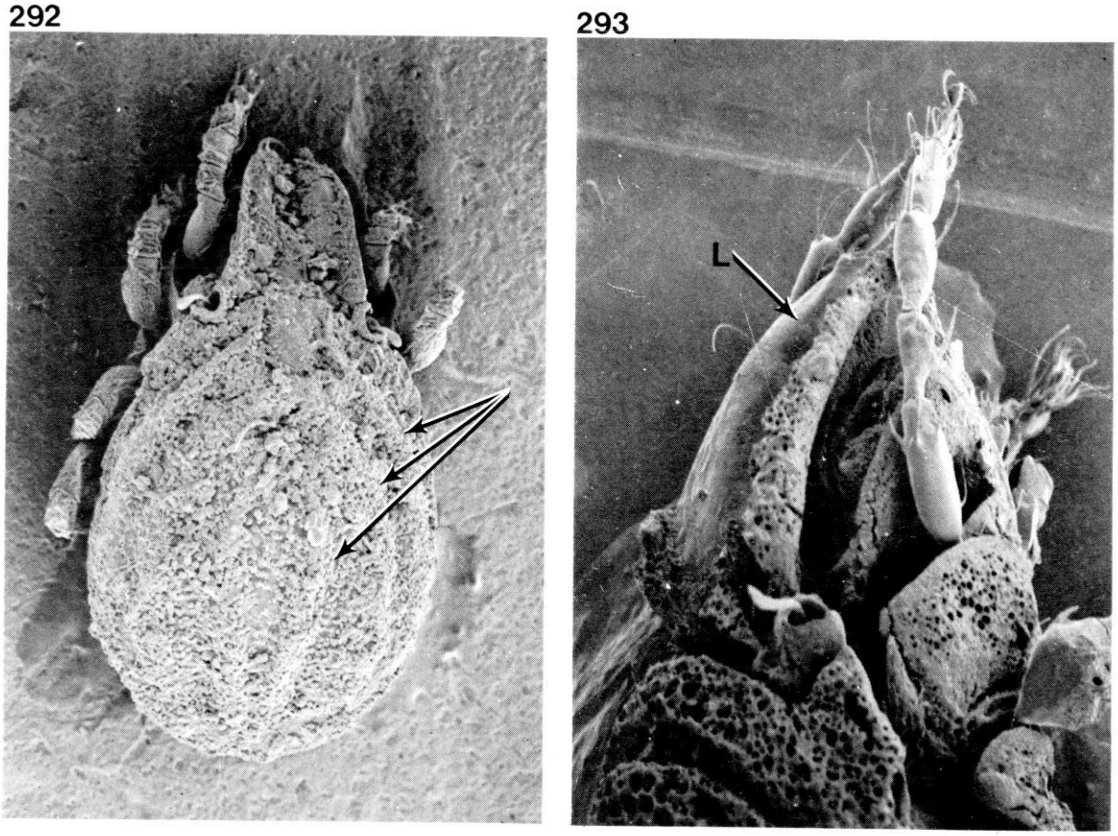

Figure 292-293; 292: *Exochocepheus* sp. with three longitudinal ridges on the notogastral cerotegument; picture height = 750 μ; 293: *Eupterotegaeus* sp. high resolution lateral view of head region showing the lamellae (L); picture height = 375 μ.

MAJOR TYPES OF IMMATURES

Figure 294-305; 294: Cepheoidea (*Sphodrocepheus*, protonymph); picture height = 1100 μ; 295: Cepheoidea (*Sphodrocepheus*, tritonymph); picture height = 550 μ; 296: Cepheoidea (*Ommatocepheus*); 297: Liodoidea (*Platyliodes*); picture height = 1000 μ; 298: Plateremaeoidea (*Jacotella*, tritonymph with nymphal exuviae removed); picture height = 525 μ; 299: Plateremaeoidea (*Jacotella*, tritonymph); picture height = 475 μ; 300: Damaeoidea (*Caenobelba*); picture height = 850 μ; 301: Damaeoidea (*Epidamaeus*); picture height = 600 μ; 302: Damaeoidea (*Hungarobelba*); picture height = 425 μ; 303: Eremaeoidea (*Megeremaeus*); picture height = 450 μ; 304: Eremaeoidea (*Eremaeus*, common species); picture height = 450 μ; 305: Hermanniellioidea (*Hermanniella*); picture height = 450 μ.

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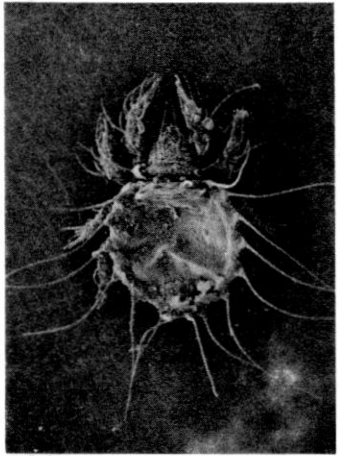

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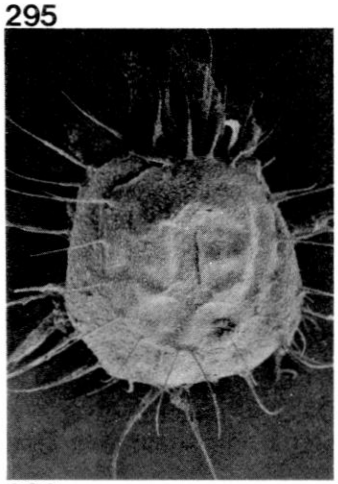

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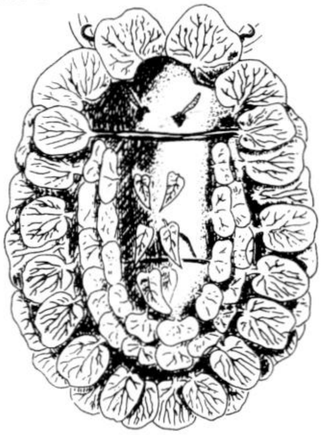

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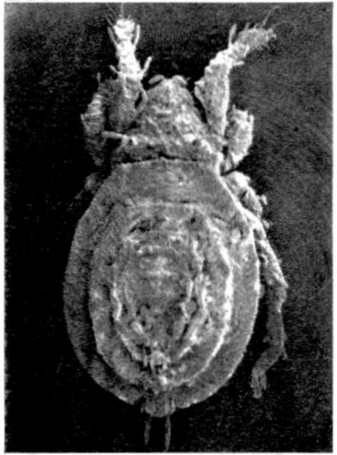

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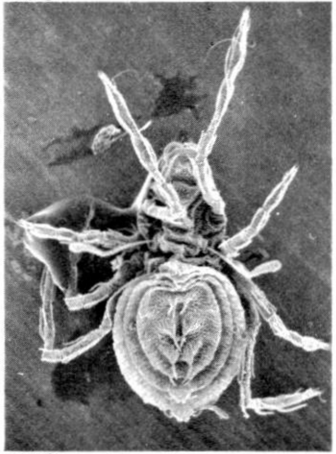

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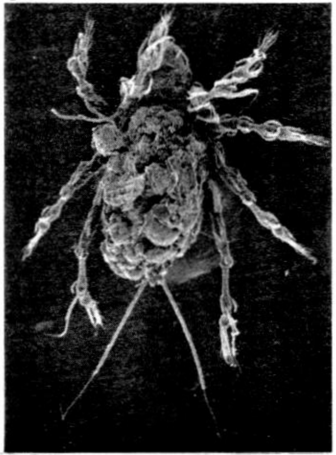

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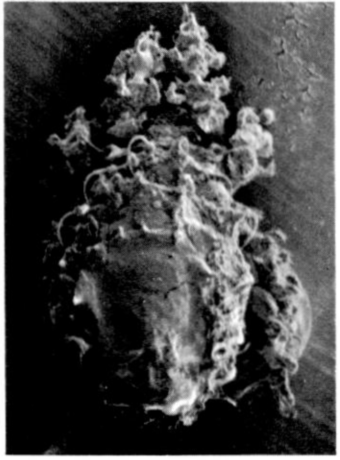

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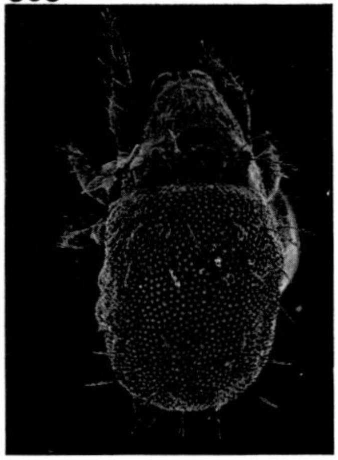

MAJOR TYPES OF IMMATURES

Figure 306-317; 306: Enarthronota (*Liochthonius*); picture height = 175 μ; 307: Mesoplophoroidea (*Mesoplophora*); picture height = 275 μ; 308: Crotonioidea (*Camisia*); picture height = 925 μ; 309: Crotonioidea (*Platynothrus*); picture height = 775 μ; 310: Crotonioidea (*Nothrus*); picture height = 675 μ; 311: Nanhermannioidea (*Nanhermannia*); picture height = 425 μ; 312: Gustavioidea (*Ceratoppia*); picture height = 1100 μ; 313: Gustavioidea (*Liacarus*?); picture height = 700 μ; 314: Gustavioidea (*Leuroxenillus*?); picture height = 775 μ; 315: Oppioidea/Oripodoidea; picture height = 300 μ; 316: Oppioidea/Oripodoidea; picture height = 350 μ; 317: Hermannioidea (*Hermannia*); picture height = 500 μ.

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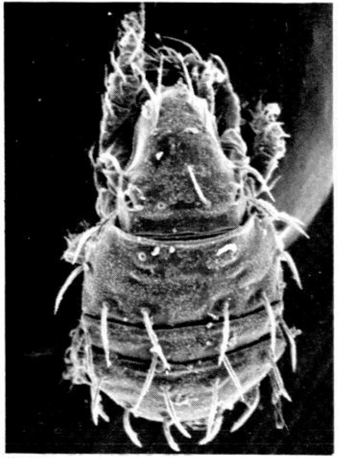

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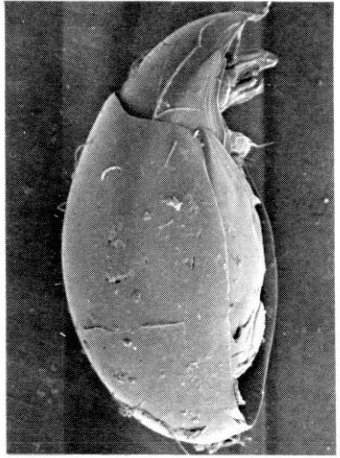

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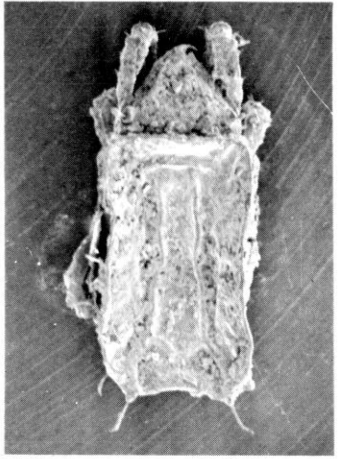

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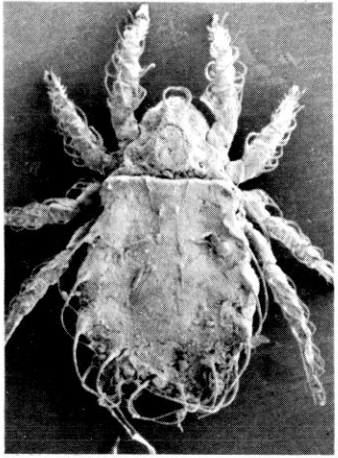

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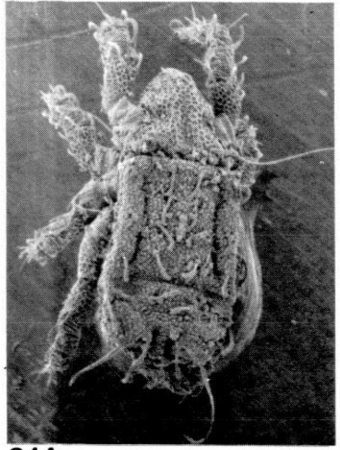

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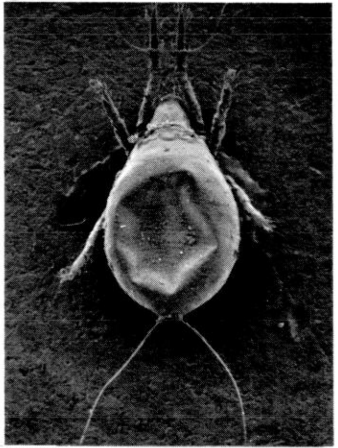

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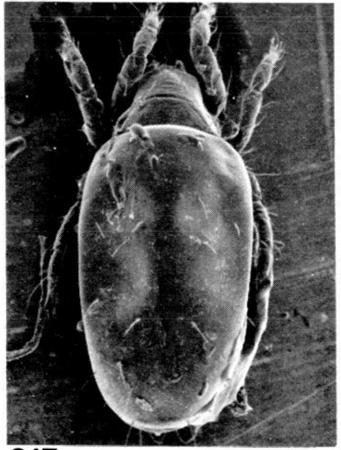

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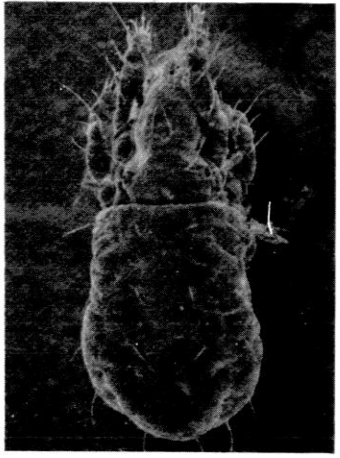

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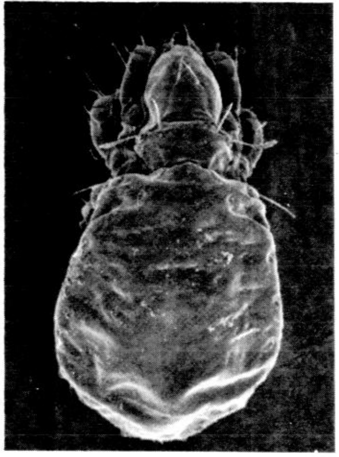

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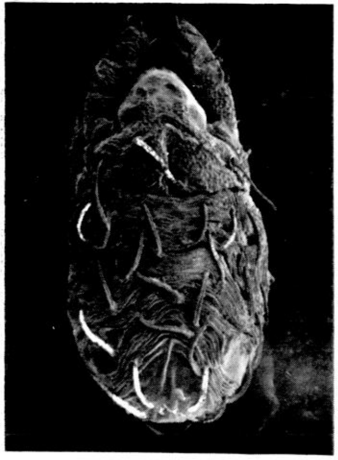

MAJOR TYPES OF IMMATURES

Figure 318-323; 318: Tectocepheoidea (*Tectocepheus*); picture height = 200 μ; 319: Phenopelopoidea (*Eupelops*); picture height = 350 μ; 320: Phenopelopoidea (*Propelops?*); picture height = 400 μ; 321: Achipteriidae; picture height = 450 μ; 322: Achipteriidae; picture height = 425 μ; 323: Achipteriidae; picture height = 425 μ.

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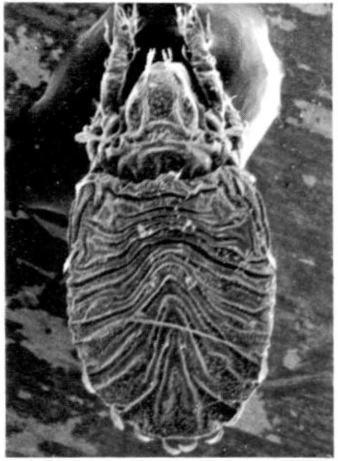

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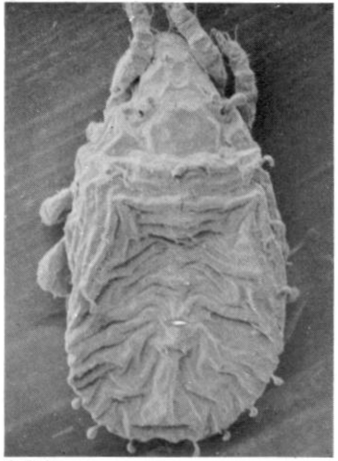

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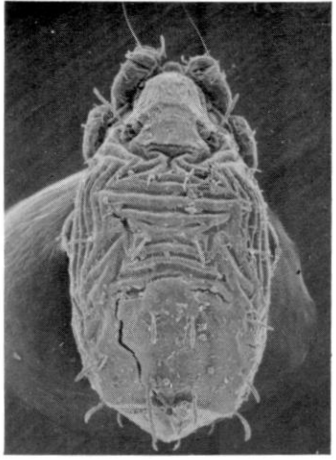

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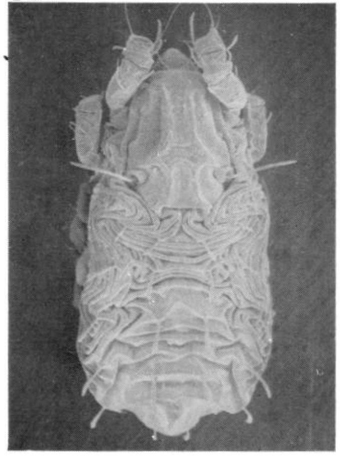

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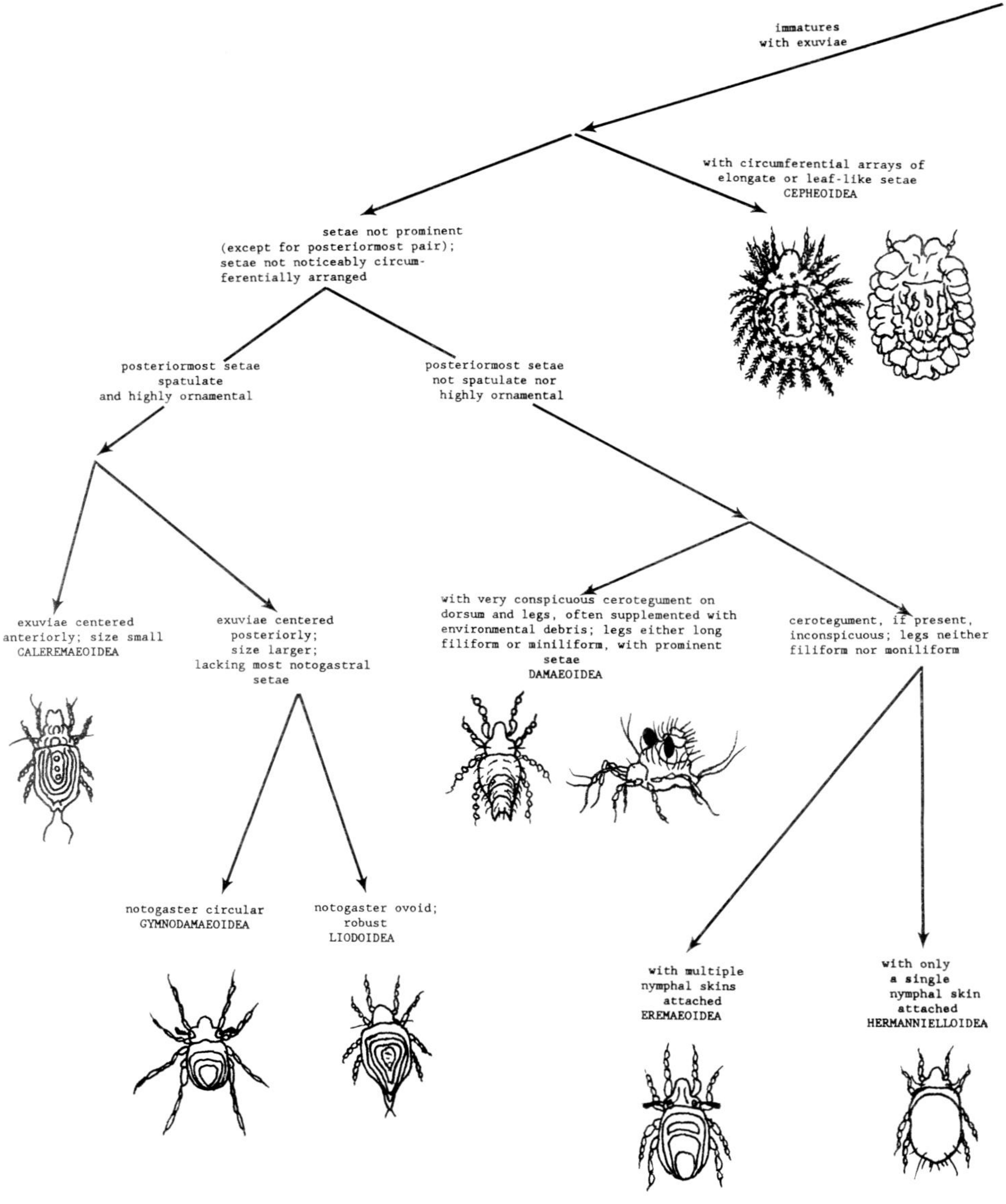
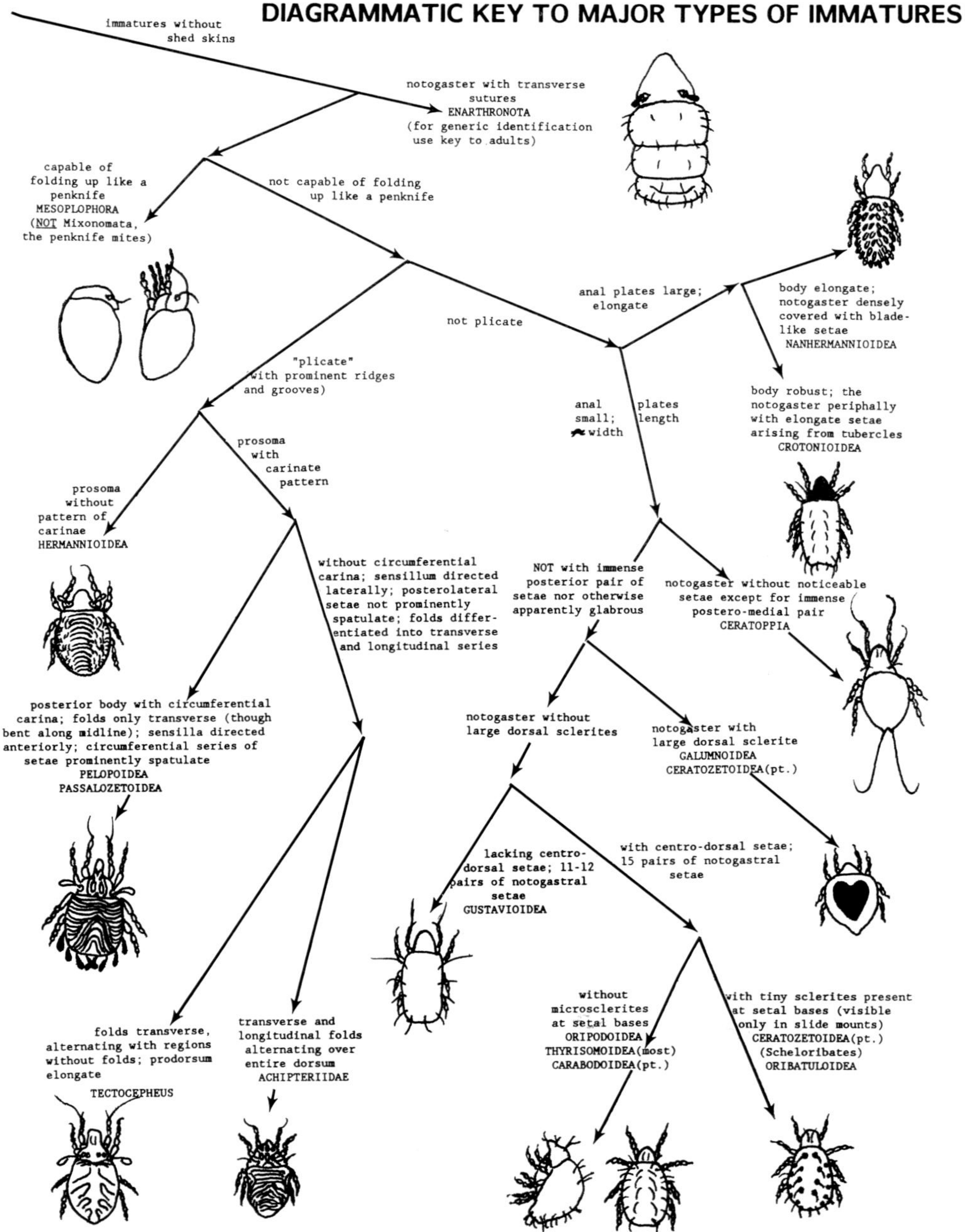
DIAGRAMMATIC KEY TO MAJOR TYPES OF IMMATURES



DIAGRAMMATIC KEY TO MAJOR TYPES OF IMMATURES



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