SEVERAL STIGMAEID MITES FORMERLY INCLUDED IN MEDIOLATA REDESCRIBED IN ZETZELLIA OUDS, AND AGISTEMUS, NEW GENUS

(ACARINA)

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Stigmaeid mites are especially confused in the generic categories, and the disposition of the new species herein described presents a problem of this nature. Quayle (1912) described one of these species as *Caligonus terminalis;* Ewing (1917) described another as *C. mali. Caligonus* Koch is not understood by contemporary workers and is a *nomen dubium* in the light of its inadequately defined type species, *C. rufulus K.* A third species was described by Nesbitt (1946) as *Mediolata novae-scotiae.* Nesbitt appreciated the close affinities of *novae-scotiae* with *mali* and *terminalis* and he therefore referred the two latter species to *Mediolata.*

Berlese (1893) made *Mediolata* G. Can. 1889 (type: *Stigmaeus longirostris* Berl.) a synonym of *Eupalopsis* G. Can. 1886. It is apparent, however, that neither *Eupalopsis* nor *Mediolata* is appropriate for the species with which Nesbitt was concerned. *Eupalopsis* was created with *Eupalus maseriensis* Can. and Fanz. 1876 as the type species. The unusual elongation of the mouthparts, especially of the palptarsus, and the manner of subdivision of the dorsum in *E. maseriensis* and *E. pini,* as illustrated by Berlese 1887 (*maseriensis, longirostris, pini*) and Canestrini 1889 (*pini*), do not characterize the species with which this paper is concerned.

In order to name a new species close to *terminalis,* it was desirable to begin with a re-study of the species *terminalis, mali,* and *novae-scotiae* and to settle the matter of their generic status.

A new genus is proposed to accommodate two mites of the *terminalis* group.

Copies of Oudemans' unpublished drawings of his three described species of *Zetzellia* were recently sent to the writer by courtesy of Dr L. van der Hammen, Rijksmuseum van Natuurlijke Historie, Leiden, Holland. These illustrations clarify the generic status of *Caligonus mali* Ewing. Existing descriptions alone have not sufficed to relate these works of the two authors. Comparison of specimens of *C. mali* with illustrations of *Z. zacheri* Ouds. indicates that both authors were concerned with the same species. Furthermore, since *Z. methagli* Ouds., genotype, and *Z. zacheri* are clearly shown to be congeneric, it follows that the genus is appropriate for *mali* and a closely related new species herein described as *yusti.*

Insofar as generic and specific characters of stigmaeids are found in the divers arrangements and relations of platelets, setae, and special sensilla, there is a need for a generalized nomenclature to simplify description. The setae and sensilla have been typed and intricately designated by Grandjean (1944). His system has its hazards in the hands of others because homologous parts may not be correctly identified throughout the family group when supers, intergrades, and unusual relations obtain. The systems introduced here borrow from

existing nomenclatures whenever practical but are intended to be topographic or descriptive, without emphasis upon phyletic, homodynamic, or functional implications. The author's acquaintance with other genera in this and related families indicates that a flexible, utilitarian terminology is desirable, at least for the present. The nomenclature of body setae and plates is indicated on figs. 5 and 11; the leg setae and sensilla referred to in the text are labelled on figs. 2, 12, and 13.

Agistemus, new genus
(anagram of *Stigmaeus, masculine*)
(Figs. 1-7)

Dorsum of females incompletely covered with 7 delicate plates arranged as follows: 1 trapezoidal plate MP covers propodosoma to circumscribe area occupied by three pairs setae, *ae, be, ce;* 1 pair humeral plates HP; 1 large polygonal plate MM centers over metapodosoma; 1 pair small intercalary plates IN, and 1 unpaired suranal plate SA cover opisthosoma. Larger plates with or without reticular sculpturing. Eyes: 2 pairs. Twelve pairs dorsal setae; all minutely denticulate, none longer than preoculars *be* or shorter than lateral suranals *le;* all implanted on plates. Distal seta *dt* present on tibiae I, III, IV as a long flagelliform eupathid, longer on hinglegs than on foreleg. Counts of leg setae (including special sensilla—solenidia, eupathidia, *k*-spines) for individual podomeres of legs I to IV are: tarsi 13-10-8-7, tibiae 6-6-6-6, genua 4-1-0-0, femora 5-4-2-2. Each empodium with three pairs capitate rays. Trifid sensillum (multiple eupathid) on apex of palptarsus with its 3 processes reduced to minute frayed points. Males (*fleschneri*) with dorsal plates MM and IN integral; median setae thereon become shorter in rearward progression (fig. 7). Two prominent solenidia (*w*, *w*♂) on tarsi I and II; tarsi III and IV with 1 diminutive solenidion each.

Type species: *Caligonus terminalis* Quayle.

Agistemus terminalis (Quayle)
(Figs. 1-3)

Caligonus terminalis Quayle, 1912, U. Calif. Agr. Exp. Sta. Bull. 234:499.
Mediolata terminalis (Quayle), Nesbitt, 1946, Canad. Ent. 78(1):15-18.

Female.—Chelicerae with retractile stylets sharply tipped, anchored in distal one-quarter of basal pieces, partly sheathed by fixed digits; in relaxed mounts these do not protrude beyond palptibiae. Rostrum conical, does not project forward beyond mesal seta of palpfemur. Tip of palpus extends to tibio-tarsal flexure of first leg; primary claw slightly curved, about as long as palptibia, with slender accessory claw arising medially near its base. Coxal areas of capitulum (maxillicoxae) with 2 equally long (26μ) pairs flagelliform setae, alveoli of posterior pair close (8μ) behind and in line with alveoli of anterior pair; alveoli

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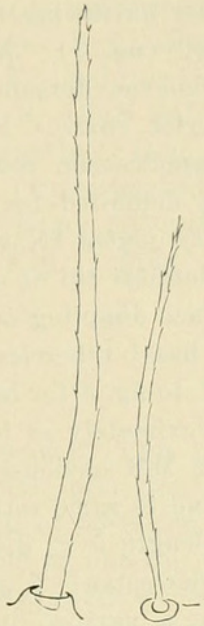
Agistemus terminalis. Fig. 1, Preocular setae *be* of *A. terminalis* (right) and *A. fleschneri* (left); Fig. 2, three segments of leg I; fig. 3, dorsal aspect of female. Millimeter scale applicable only to figs. 3, 5 and 7.



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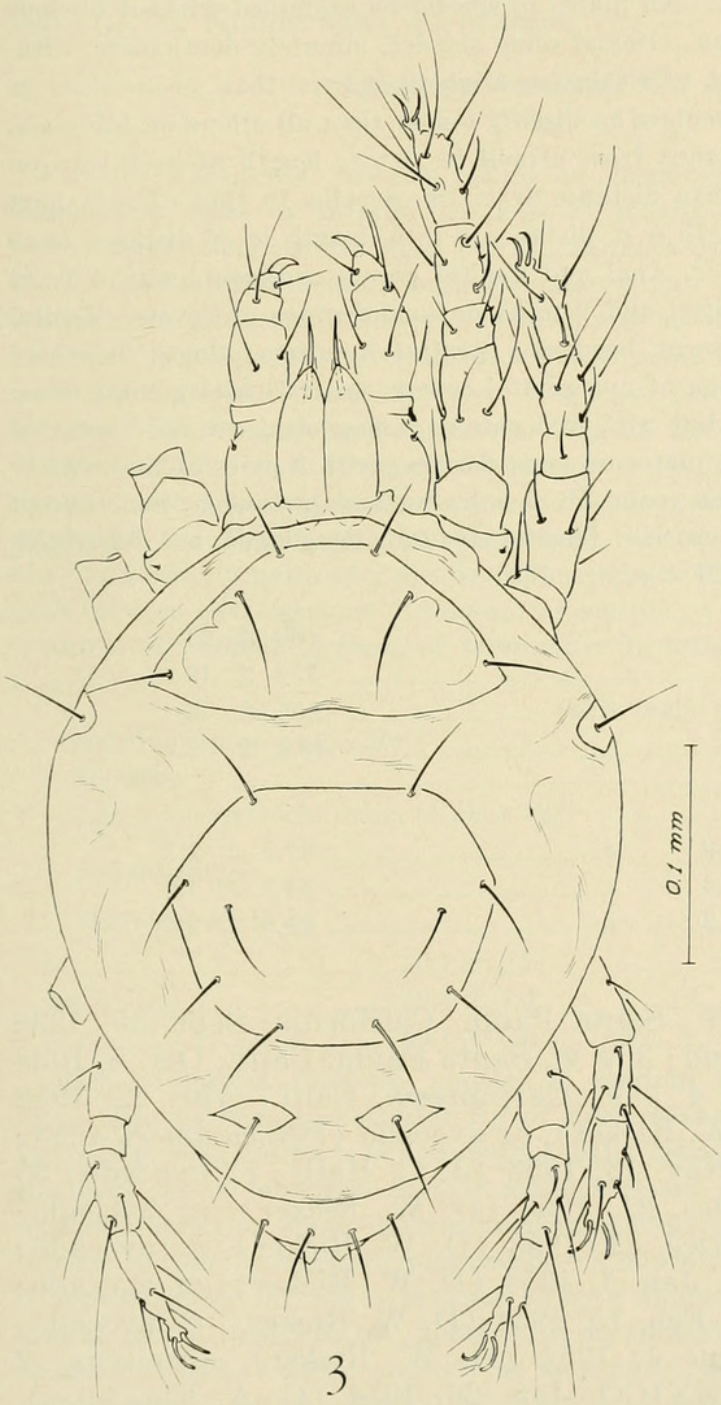

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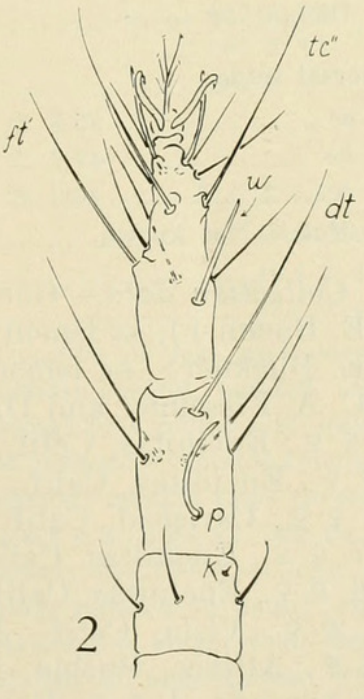

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of each member of posterior pair 40μ apart. Idiosoma widest at anterior third, gently narrowing to rounded posterior; anal covers protrude behind, visible from above (fig. 3). Median propodosomal plate MP semicircular to trapezoidal in outline, on dorsum proper but not wide enough to invade pleural region above anterior coxae. Median metapodosomal plate MM covers only mid-section of metapodosoma, roughly hexagonal to octagonal in outline, barely circumscribes area delimited by alveoli of first 5 pairs of hysterosomal setae. Paired intercalary plates IN small, delicate, well-separated. Suranal plate SA restricted to hindermost tip of opisthosoma. All plates in specimens examined without obvious surface dimpling or reticulation. Dorsal setae slender, minutely denticulate, without basal tubercles; length of verticales *ae* slightly shorter than postoculars *ce* (ref. to fig. 5 for labels); preoculars *be* slightly longer than all others on idiosoma, approximately as long as distance from alveoli *be* to *ce;* length of each seta on plate MM obviously shorter than distance from its alveolus to that of seta next behind in same series, i.e., length *a* < distance *a* to *b*, length *la* < distance *la* to *lm*, length *b* < distance *b* to *c*. Anal and genital covers confluent, with 4 pairs slender setae— 2 pairs on genital and 2 pairs on anal regions of covers. Genital plate a narrow, inverted crescent bordering genital aperture, almost bissected anteriorly by forward projection of ano-genital covers; with 2 pairs genital setae, hindermost pair on transverse line with first pair on, ano-genital covers. Venter of idiosoma without other evident plates or coxal flanges; with 3 pairs of fine setae— 1 pair on propodosoma between coxae II, 2 pairs on metapodosoma, none except genitals on venter of opisthosoma. Chaetotaxy of appendages as illustrated. Lengths of parts in microns ($M \pm \sigma$, $n = 10$):—

Anal covers to palp claw	469 ± 23
Idiosoma	354 ± 19
Leg I (coxo-troch. artic. to claw tips)	205 ± 5
Distant *be* to *ce*	46.9 ± 2.7

Dorsal setae:

ae	35.8 ± 2.9	*c*	37.2 ± 2.7
be	47.7 ± 2.4	*e*	34.9 ± 1.9
ce	40.5 ± 2.3	*le*	29.3 ± 2.4

Male.—Not known.

Collection data.—One ♀, Santa Paula, California, Sept. 30, 1938 (E. Buckner), *ex* lemon bud; 3 ♀ ♀, Santa Paula, Calif., Oct. 5, 1938 (E. Buckner), *ex* lemon; 4 ♀ ♀, Carpinteria, Calif., Apr. 22, 1952 (C. A. Fleschner and D. W. Ricker), *ex* avocado (*Persea americana*); 3 ♀ ♀, Encinitas, Calif., Nov. 16, 1953 (J. C. Hall), *ex* avocado; 35 ♀ ♀, Encinitas, Calif., Dec. 21, 1953 (D. W. Ricker), *ex* avocado; 2 ♀ ♀, Carlsbad, Calif., Dec. 21, 1953 (D. W. Ricker), *ex* avocado; 17 ♀ ♀, Encinitas, Calif., Jan. 1, 1954 (D. W. Ricker), *ex* avocado; 16 ♀ ♀, Encinitas, Calif., Feb. 15, 1954 (D. W. Ricker), *ex* avocado; 2 ♀ ♀, Vista, Calif., June 1, 1954 (D. W. Ricker), *ex* citrus; 2 ♀ ♀, Atlixco, Puebla, MEXICO, Jan. 26, 1954 (C. A. Fleschner), *ex* avocado; 4 ♀ ♀, Huatusco, Veracruz, Mexico, Feb. 9, 1954 (C. A.

Fleschner), *ex* avocado; 1 deuton, Mixco, GUATEMALA, Dec. 29, 1953 (C. A. Fleschner), *ex* avocado; 23 ♀ ♀, JAPAN (Intercepted at Seattle), Jul. 26, 1948 (R. P. Owen), *ex* cypress foliage; 1 ♀, Japan (intercepted at San Francisco), Oct. 11, 1949 (E. V. Lehner), *ex* juniper; 4 ♀ ♀, Japan (intercepted at Seattle), Nov. 8, 1948 (C. A. Leckie), *ex* juniper; 2 ♀ ♀, Japan (intercepted at Seattle), Dec. 16, 1947 (W. J. N. Brown), *ex* juniper; 5 ♀ ♀, Japan (intercepted at San Pedro, Calif.), Apr. 13, 1952 (E. van Zee), *ex Citrus reticulata* fruit; 2 ♀ ♀, Japan (intercepted at Jacksonville, Fla.), Mar. 22, 1953 (J. M. Henderson), *ex* orange.

Agistemus fleschneri new species
(Figs. 4-7)

Female.—Chelicerae, rostrum, palpi as described for *terminalis*. Two pairs flagelliform setae on inferior surfaces of maxillicoxae, unequal, posterior pair (47 μ) longer than anterior pair (27 μ); distance between alveoli of posterior pair (31 μ) shorter than distance between anterior pair (41 μ); setae of anterior pair originate on tubercles. Idiosoma, dorsal plates as described for *terminalis;* larger plates of type specimen reticulated. Dorsal setae stout (fig. 1), long, minutely denticulate, set on obvious tubercles: lengths of preoculars slightly longer than all others on idiosoma, at least 2 times as long as distance *be* to *ce;* length *a* equals distance *a* to *b,* length *la* equals distance *la* to *lm,* length *b* equals distance *b* to *c*. Genital plate a narrow crescent surrounding anogenital covers, with I pair genital setae (fig. 6). Venter of idiosoma covered with fine integumental striae, without obvious plates; 3 pairs very slender setae, pairs about equally spaced along sternal area between coxal groups. Setae, apical sensilla of appendages numerically equal, qualitatively similar to those of *terminalis*. Lengths of parts in microns (M $\pm$ σ, n = 10):—

Anal covers to palp claw	457 ± 22
Idosoma	365 ± 17
Leg I (coxo-troch. artic. to claw tip)	229 ± 8

Dorsal setae:

Distance *be* to *ce*	41.3 ± 4.4		
ae	50.7 ± 2.7	*c*	69.5 ± 9.4
be	78.3 ± 3.9	e	46.4 ± 4.5
ce	69.1 ± 6.6	*le*	33.4 ± 4.5

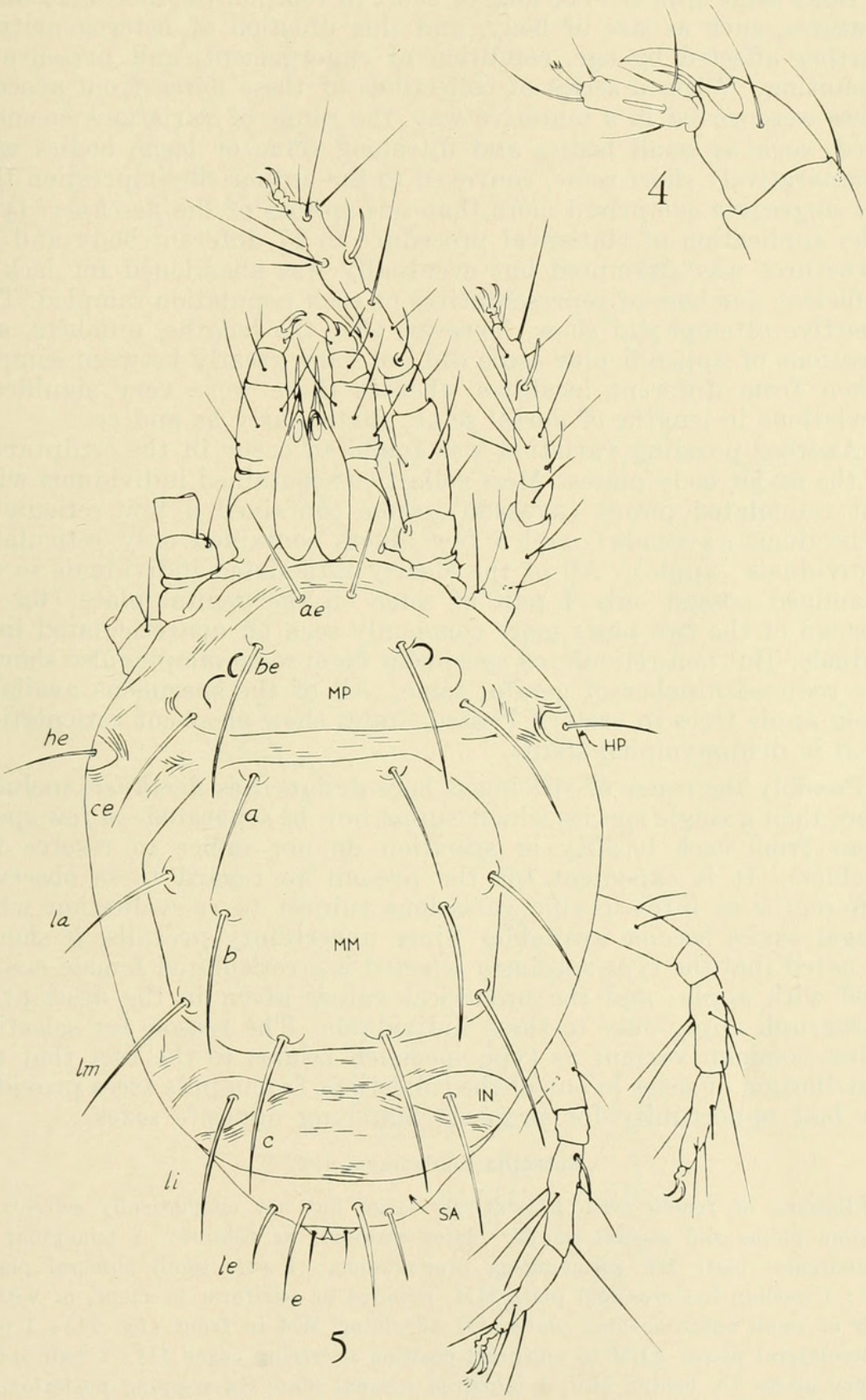
Male.—Idiosoma fusiform, smaller in relation to lengths of legs and dorsal setae than in female; posterior tip of hysterosoma almost conical, pointed (fig. 7); ano-genital covers terminal, with 3 pairs setae, dorsal pair reduced to spine-like pegs set on tubercles. Median metapodosomal and intercalary plates integral as a unit shield on dorsum; reticulated in allotype specimen; median setae thereon become shorter in rearward progression—*b* approximately 0.8 times as long as *a*, *c* approximately 0.7 times as long as *b*, *c* approximately 0.4 times as long as lateral seta *li* next behind. Setae *le*, *e* on suranal plate reduced in length over those of female, *e* about one-half as long as *le*, the latter not longer than those on ano-genital covers. Genital plate situated beneath tip of opisthosoma, with 1 pair genital setae. Two prominent solenidia *w* and *w* δ on each tarsus I and II;

solenidion of tarsus I less robust and storter than on tarsus II; alveolus of *w* on tarsus I distal, almost in line with alveolus of *w*♂ and closer to *ft'* than to *w*♂; solenidion *w* on tarsus II about equal in size to *w*♂, both addorsal, opposite. Seta *dt* of tibia II not a flagelliform eupathid, scarcely longer than dorsal seta next adjacent. Solenidion *w* present as a slender curved sensillum on tarsi III and IV, *w*♂ absent on these podomeres.

Types.—Holotype female and allotype with 6 paratypes on one slide, Charlottesville, Virginia, 1948 (H. N. Pollard), *ex* apple foliage, in U. S. National Museum. Paratypes: 3 ♀♀, 1 ♂, Indiana, Jul. 21, 1948 (Anon.), *ex* apple; 1 ♀, Maryland, Sept. 21, 1948 (Anon.), *ex* apple.

Collection data.—One ♀, Riverside, California, Jul. 20, 1951 (M. M. Barnes), *ex* grape; 2 ♀♀, 1 ♂, Carlsbad, Calif., Feb. 20, 1952 (D. W. Ricker), *ex* Sapota; 1 ♀, Carpinteria, Calif., Mar. 26, 1952 (C. A. Fleschner and D. W. Ricker), *ex* avocado; 1 ♀, Goleta, Calif., Nov. 6, 1952 (C. A. Fleschner and D. W. Ricker), *ex* chestnut; 1 ♀, Ventura, Calif., Nov. 18, 1952 (D. W. Ricker), *ex* avocado; 1 ♀, Santa Paula, Calif., Sept. 8, 1953 (D. W. Ricker), *ex* avocado; 7 ♀♀, 1 ♂, Ventura, Calif., Oct. 12, 1953 (D. W. Ricker), *ex* avocado; 5 ♀♀, 1 ♂, Ventura, Calif., Nov. 16, 1953 (J. C. Hall), *ex* avocado; 9 ♀♀, Carpinteria, Calif., Dec. 29, 1953 (D. W. Ricker), *ex* avocado; 15 ♀♀, 14 ♂♂, San Mateo, Florida, Feb. 17, 1950 (O. D. Link), *ex* oak leaf; 2♀♀, Valles, MEXICO, Feb. 12, 1953 (H. D. Smith), *ex* citrus; 2 ♀♀, 3 ♂♂, Fortin y Cordoba, Veracruz, Mexico, Feb. 6, 1954 (C. A. Fleschner), *ex* avocado; 2♀♀, 2 ♂♂, Huatusco, Veracruz, Mexico, Feb. 9, 1954 (C. A. Fleschner), *ex* avocado; 2 ♀♀, Escuintla, GUATEMALA, Dec. 23, 1953 (C. A. Fleschner), *ex* avocado; 2 ♀♀, Mixco, Guatemala, Dec. 29, 1953 (C. A. Fleschner), *ex* avocado; 2 ♀♀, 1 ♂, Amatitlan, Guatemala, Jan. 1, 1954 (C. A. Fleschner), *ex* avocado; 1 ♀, 1 ♂, Guatemala City, Guatemala, Jan. 3, 1954 (C. A. Fleschner), *ex* avocado; 1 ♀, 5 ♂♂, Mt. Uyuca, HONDURAS, Nov. 7, 1953 (C. A. Fleschner), *ex Persea gigantea;* 3 ♀♀, 1 ♂, Turrialba, COSTA RICA, Nov. 17, 1953 (C. A. Fleschner), *ex* avocado; 7♀♀, 5 ♂♂, San Salvador, EL SALVADOR, Nov. 29, 1953 (C. A. Fleschner), *ex* avocado; 6 ♀♀, 1 ♂, SO. AFRICA, Sept. 22, 1950 (P. J. Quin), *ex* not given.

When specimens of *fleschneri* and *terminalis* are examined side by side, the first is readily distinguished from the second species by its much longer dorsal setae set on tubercles. However, casual identifications to be made when one or the other of these species is not available may be troublesome since their differences are essentially quantitative. the lengths of the setae implanted on plate MM of *fleschneri* are at least equal to or greater than the distances between the bases of adjacent setae in the same linear series (i. e., *a-b-c, la-lm*). The length of seta *be* is approximately twice the distance between *be* and *ce* in *fleschneri*, whereas the corresponding measurements are approximately equal in *terminalis*. In *fleschneri* the posterior pair of setae on the inferior face of the maxillicoxae are much longer than the setae of the anterior pair. The fact that collections of *fleschneri* frequently contain males whereas numerous collections of *terminalis* do not may be significant.



Agistemus fleschneri. Fig. 4, Ventral face of left palpus; fig. 5, dorsal aspect of female.

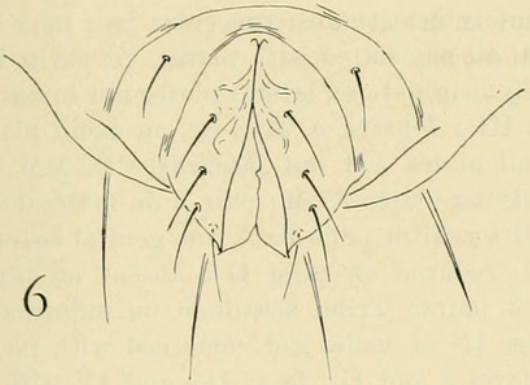
Body setae appear to be long or short in relation to other anatomical features, such as size of body, and this illustion of heterogeneity is further affected by age, condition of engorgement, and pressure in mounting. When a series of collections of these mites from avocado trees were sorted in a tentative way, the range of variations encountered, such as small bodies and ultralong setae or large bodies with comparatively short setae, conveyed to the author the impression that the aggregate comprised more than one species of the *fleschneri* type. The application of statistical procedure to 17 different body and leg structures was attempted but eventually was abandoned for lack of sufficient numbers of representatives of each population sampled. This abortive attempt did show, however, that the lengths, numbers, and locations of appendicular setae did not vary greatly between samples taken from different localities whereas there were very significant deviations in lengths of dorsal setae, particularly *be* and *ce*.

Another puzzling variation was found to occur in the sculpturing of the major body plates. Most collections contained individuals without reticulated plates (avocado), some contained a few reticulated individuals (avocado), and a few others contained only reticulated individuals (apple). All of the clearly reticulated individuals so far examined possess only 1 pair of setae on the genital plate (fig. 6) instead of the two pairs more commonly seen on nonreticulated individuals. But non-reticulated specimens from some samples also showed the reduced number of genital setae. All of the specimens available from apple trees in eastern United States show clear-cut reticulation, even in deutonymphal stadia.

Possibly the range of specimens here designed as *fleschneri* includes more than a single species which cannot now be separated—a few specimens from each locality or situation do not suffice to resolve the problem. It is expedient for the present to regard these observed differences as intra-specific variations subject to re-evaluation when longer series become available. Since uncertainty prevails, it should be noted that the type specimen selected is a reticulated female associated with apple; and the numerical values given in the descriptive paragraph apply only to these individuals. The reason for selecting a less common variant as type specimen relates to the fact that the distribution of sexes in one of the collections from apple trees provided the best opportunity for properly matching opposite sexes.

Zetzellia Oudemans, 1927

Idiosoma of female with 2 relatively large but not emphatically sclerotized median plates and several smaller plates arranged as follows: 1 triangular or semicircular plate MP surmounting propodosoma; 1 pair small numeral plates HP; 1 median hysterosomal plate MM, rounded or pyriform in shape, or with a pair of small antero-median plates AH adjoining MM in front (fig. 11); 1 pair anterolateral plates ALM in marginal position overlying coxae III; 1 pair intercalary plates IN behind MM, 1 unpaired suranal plate SA capping posterior tip of opisthosoma. Reticulation of dorsal plates not observed. Eyes: 2 pairs; anterior pair with well-defined dioptic apparatus; posterior pair faintly discernible.



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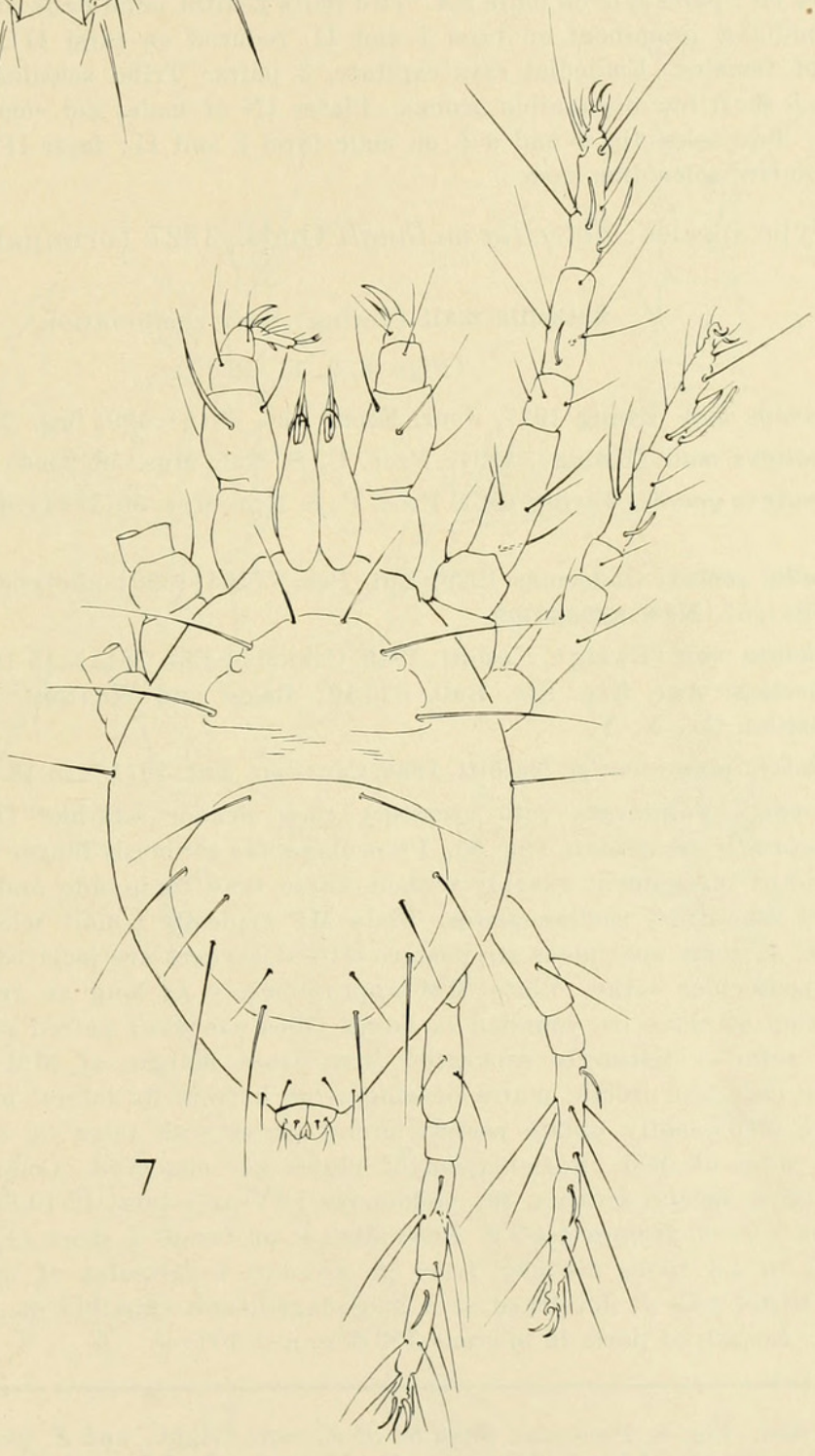

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Agistemus fleschneri. Fig. 6, female genital area; fig. 7, dorsal view of male.

Twelve pairs dorsal setae, all slender, minutely denticulate; preocular pair may be slightly longer than all others on idiosoma, all associated with plates, viz.: 3 pairs on plate MP (postocular pair *ce* occasionally originate on lateral plates not integral with MP); 1 pair humeral setae on plaes HP; 4 pairs, *a, b, c, lm,* on ovoid plate MM—or pair *a* may be set apart on small plates AM not integral with MM of pyriform shape (c. f. *mali*); pair *la* on outlying plates ALM; pair *li* on intercalary plates IN; pairs *e, le* on plate SA. Two pairs genital setae flank ano-genital covers. Solenidia *w* prominent on tarsi I and II, reduced on tarsi III, absent on tarsi IV of females. Empodial rays capitate, 3 pairs. Trifid sensillum on palptarsus with 3 short but discernible prongs. Plates IN of males not combined with plate MM. Two solenidia *w* and *w*♂ on male tarsi I and II; tarsi III and IV with 1 diminutive solenidion each.

Type species: *Zetzellia methagli* Ouds., 1927 (original designation).

Zetzellia mali (Ewing), new combination

(Figs. 8, 9, 11, 12-15)

Caligonus mali Ewing 1917, Jour. Econ. Ent. 10(5):499, figs. 25-6.

Syncaligus mali (Ewing), 1921. Proc. U. S. Nat. Mus. 59(2394):664.

Syncaligus quercus Ewing 1921, Proc. U. S. Nat. Mus. 59(2394):665. **New synonymy.**

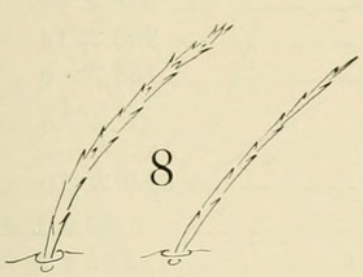
Zetzellia zacheri Oudemans 1929, Ent. Ber. 7(165):396; allotype male, Ent. Ber. 8(179):257. **New synonymy.**

Mediolata mali (Ewing), Nesbitt, 1946, Canadian Ent. 78(1):15-18; Garman, 1948, Connecticut Agr. Exp. Sta. Bull. 520.19; Baker and Wharton, 1952, Acarology, Macmillan Co., N. Y.

Mediolata novae-scotiae Nesbitt, 1946, Canadian Ent. 78(1):15-18. **New synonymy.**

Female.—Palptarsus with accessory claw slender seta-like (fig. 15). Dorsal setae faintly denticulate (fig. 8). Preocular setae obviously longer than postoculars. Striae of integument sharply etched, these tend to invade and subdivide delicately selerotized median plates. Plate MP typically a unit sclerite on propodosoma; in some specimens its postero-lateral corners are isolated as plates bearing postocular setae. Plate MM approximately as long as greatest width at position of setae *lm,* rounded in front, sides concave; paired plates AM which bear setae *a* distinctly separated from front margin of MM; rows of short striae may also isolate plates bearing setae *b* from its lateral margins; likewise striae infrequently isolate postero-lateral plates with setae *lm* and *c* on one or both sides of MM. Reticulation of plates not observed. Counts of leg setae, including special sensilla, for podomeres I-IV are: tarsi 12-10-8-7, tibiae 6-6-6-4, genua 3-0-0-0, femora 4-4-2-2. Solenidion *w* on tarsus I short (11.5 μ), its length equal to 1.3 times distance from its alveolus to alveolus of opposite eupathid *ft'*. Distal seta *dt* developed as a long flagelliform eupathid on tibiae I and III only. Length of parts in microns ($M \pm \sigma$, $n = 10$):—

Zetzellia. Fig. 8, Preocular setae *be* of *Z. mali* (right) and *Z. yusti* (left); fig. 9, three segments of leg I of female; fig. 10, tarsus I of *Z. yusti* drawn to same scale as fig. 9. Scale for fig. 11 also applicable to fig. 14.



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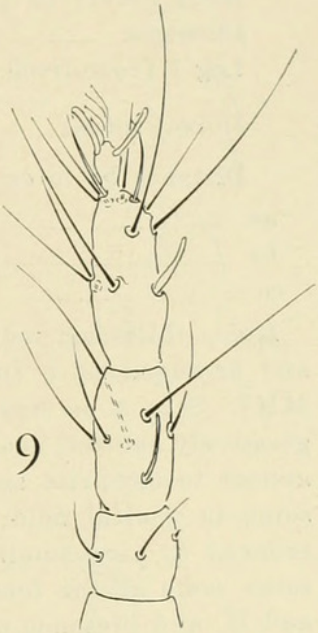

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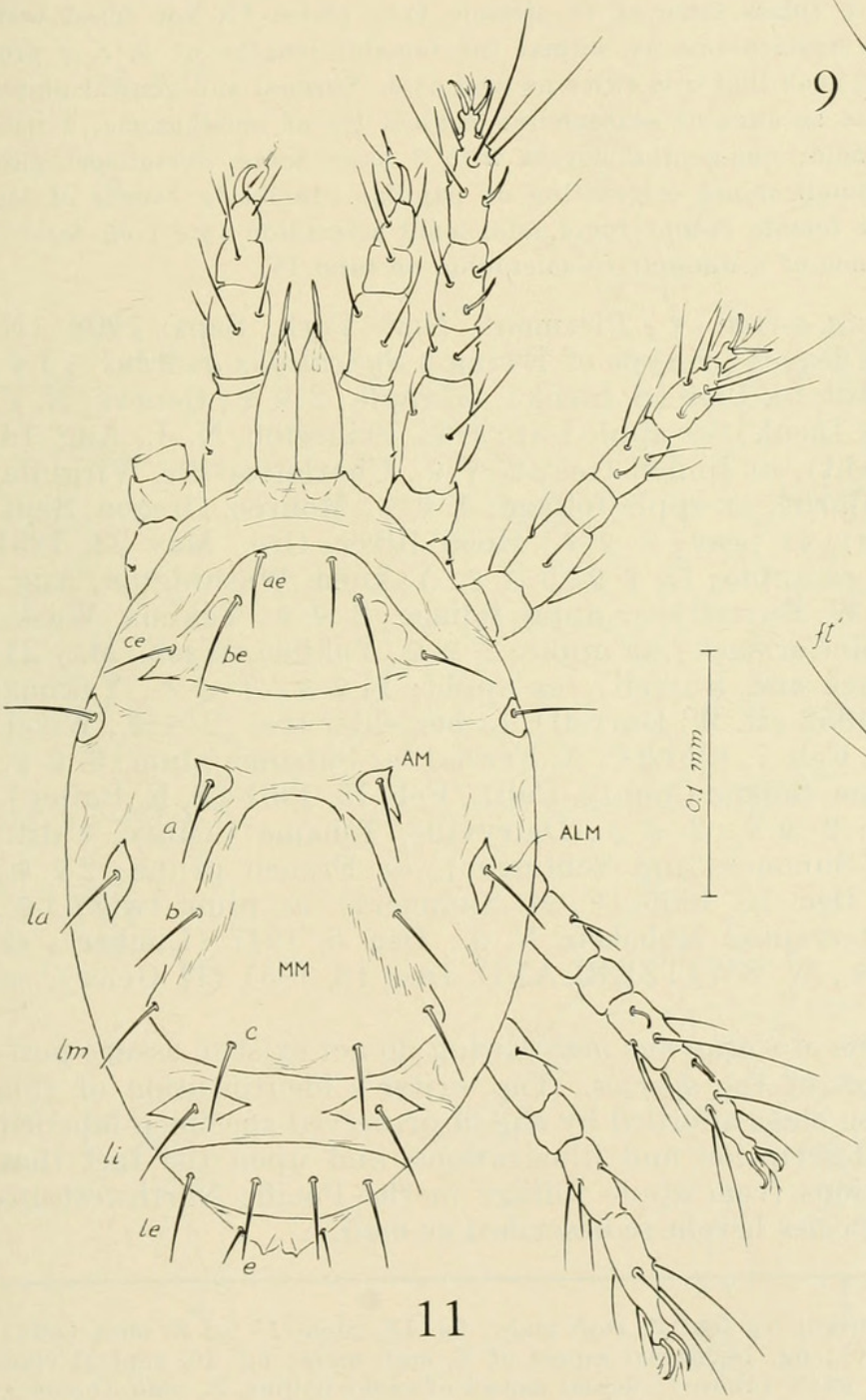

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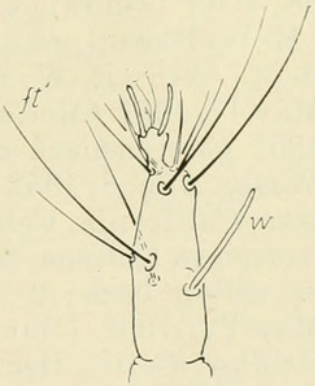

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Anal covers to palp claw	398 ± 29
Idiosoma	282 ± 12
Leg I (coxo-troch. artic. to claw tips)	158 ± 8

Dorsal setae:

Distance *be* to *ce*	32.9 ± 2.0

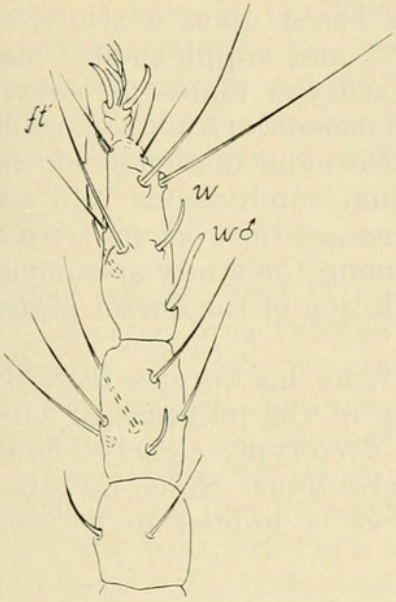
ae	23.8 ± 1.4	*c*	30.9 ± 2.5
be	36.7 ± 3.9	*e*	33.6 ± 2.4
ce	31.6 ± 2.3	*le*	31.9 ± 2.0

Male.—Idiosoma reduced, spindle-shaped (fig. 14); distribution of dorsal setae and arrangement o fplaes same as fr ofemale (i.e., plates IN not fused with MM). Seta *a* on hysterosoma as normal for female; lengths of *b*, *c*, *e* progressively shorter, such that *a* is twice as long as *e*. Suranal and genital plates appear to comprise as annulus surrounding conical tip of opisthosoma, 1 pair setae in genital field; ano-genital covers with 3 pairs setae, dorsalmost pair reduced to very small spines originating on papillae. Inclusive counts of leg setae same as for female except for 1 additional solenidion (*w*♂) on tarsi I and II, and presence of a diminutive solenidion on tarsi IV.

Collection data.—One ♀, Piermont, New York, Sept. 1908 (N. Banks?), *ex* oak leaves (co-type of Ewing's *Syncaligus quercus*); 1 ♀, Geneva, N. Y., Jul. 13, 1949 (S. Lienk), *ex* apple; 2 ♀ ♀, Geneva, N. Y. Aug. 5, 1949 (S. Lienk), *ex* apple leaf; 1 ♀, Princeton, N. J., Aug. 18, 1949 (H. J. Dodd), *ex* linden tree; 2 ♀ ♀, Charlottesville, Virginia, 1948 (H. N. Pollard), *ex* apple foliage; 4 ♀ ♀, Monroe, Oregon, Sept. 28, 1939 (Jones), *ex* pear; 2 ♀ ♀, Hood River, Ore., May 23, 1951 (E. W. Baker), *ex* apple; 12 ♀ ♀, 5 ♂ ♂, Yakima, Washington, Aug.-Sept., 1948 (R. W. Burrell), *ex* apple foliage; 2 ♀ ♀, Yakima, Wash., May 17, 1951 (McCormack), *ex* apple; 2 ♀ ♀, Yakima, Wash., May 21, 1951 (McCormack and Burrell), *ex* apple; 14 ♀ ♀, 3 ♂ ♂, Yakima, Wash., Aug. 8, 1952 (R. W. Burrell), *ex* box elder tree; 2 ♀ ♀, Woodlake, California. Feb. 7, 1951 (C. A. Ferris), *ex* Satsuma plum; 3 ♀ ♀, American Canyon, Solano County, Calif., Feb. 15, 1951 (S. F. Bailey), *ex* willow bark; 2 ♀ ♀, 2 ♂ ♂, Dairyville, Tehama County, Calif., May 22, 1952 (Summers and Schlinger), *ex* French prune; 2 ♀ ♀, Gridley, Calif., Dec. 15, 1956 (F. M. Summers), *ex* plum twig; 1 ♀, HOLLAND, intercepted Hoboken, N. J., Dec. 5, 1947 (Limber), *ex* azalea stem; 1 ♀, W. SWITZERLAND, Dec. 18, 1951 (P. Geier), *ex* apple tree.

Type specimens of *Caligonus mali* Ewing do not exist to assure positive identification of the species. The writer's identification of this species rests upon clues afforded by one ill-preserved specimen labelled by Ewing, his description and illustrations, and upon the fact that available collections from apple foliage in the Pacific Northwest include only the species herein re-described as *mali*.

Zetzellia. Fig. 12. Right leg I of *Z. mali* male; fig. 13, tibiae IV of *Z. mali* (left) and *Z. yusti* (right); fig. 14, dorsal aspect of Z. mali male; fig. 15, ventral view of right palpus, *Z. yusti* (above); dorsal aspect of right palpus, *Z. mali* (below).



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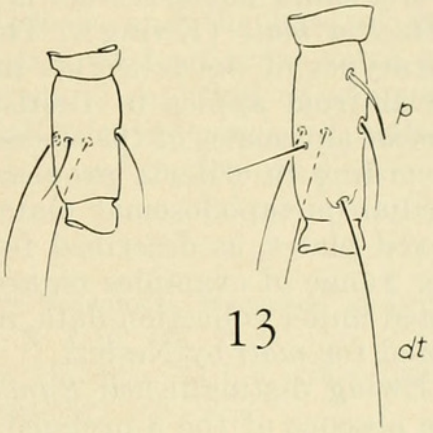

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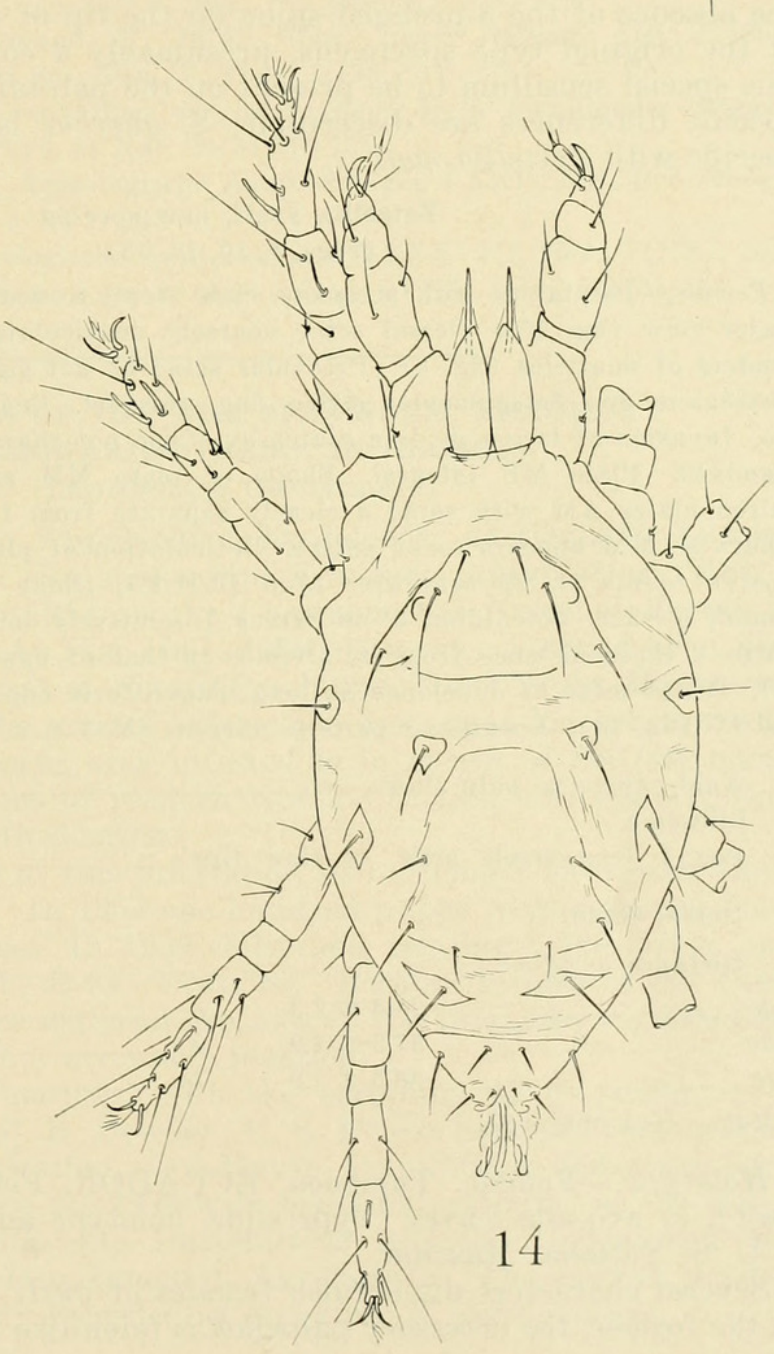
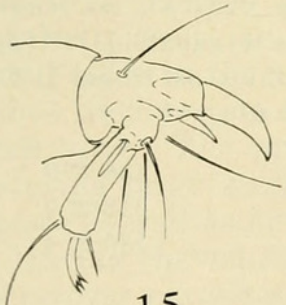
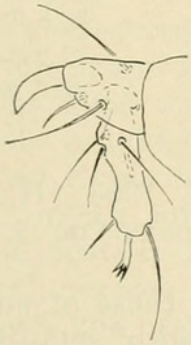


14



15



Mediolata novae-scotiae is here regarded as indistinguishable from *Zetzellia mali* (Ewing). This conclusion is based upon a study of paratypes of *novae-scotiae* in the U. S. N. M. and supplemental material from apples in British Columbia. Paratype males of *novae-scotiae* and males of the species here described as *mali* are not separable according to criteria proposed by Nesbitt. Also the tendency of the median metapodosomal plate to show marginal subdivisions into adnexed plates, as described for females of *novae-scotiae*, occurs within the range of examples regarded as *mali*. Among the study specimens listed under collection data, none show reticulation of the dorsal plates noted for *mali* by Nesbitt.

Ewing distinguished *Syncaligus quercus* from his species *mali* by the absence of the 3-pronged spine on the tip of the palptarsus. One of the original type specimens, presumably a co-type, clearly shows this special sensillum to be present on the palptarsus. Since no other specific differences are discernible, *S. quercus* is judged to be conspecific with *Zetzellia mali*.

Zetzellia yusti, new species

(Figs. 8, 10, 13, 15)

Female.—Palptarsus with accessory claw stout, a small talon-like replica of major claw (fig. 15). Dorsal setae coarsely denticulate, bluntly tipped with clusters of denticles (fig. 8). Preocular setae *be* not significantly longer than postoculars *ce*. Integumental striae fine, close-set, their patterns difficult to see. Invasion of larger median plates by striae not characteristic of specimens examined. Plate MP integral. Shape of plate MM as described for *mali;* paired plates AM with setae *a* clearly separate from front margins of MM; otherwise MM appears to be entire. Reticulation of plates not observed. Inclusive counts of leg seta are: tarsi 12-10-8-7, tibiae 6-6-6-6, genua 4-1-0-0, femora 5-4-2-2. Solenidion *w* on tarsus I relatively long (22.3 μ), its length equals 2 times distance from its alveolus to that of opposite eupathid *ft'* (fig. 10). Distal setae *dt* developed as long, flagelliform eupathids on tibiae I, III and IV (fig. 13). Lengths of parts in microns ($M \pm \sigma$, $n = 6$):—

Anal covers to palp claw	438 ± 9
Idiosoma	348 ± 9
Leg I (coxo-troch. artic. to claw tips)	180 ± 4

Dorsal setae:

Distance *be* to *ce*	34.2 ± 1.6		
ae	24.3 ± 2.2	*c*	33.8 ± 1.4
be	37.2 ± 1.9	*e*	27.0 ± 0.0
ce	36.5 ± 1.9	*le*	26.6 ± 0.7

Male.—Not observed.

Holotype.—Female, Tumbaco, ECUADOR, Feb. 12, 1954 (H. R. Yust), *ex* avocado leaves. Type slide, holotype and 4 paratype ♀ ♀, in U. S. National Museum.

Several characters distinguish females of *yusti* from those of *mali*. In the former, the accessory palpclaw is talon-like instead of seta-like;

the dorsal setae are coarsely denticulated; solenidion *w* of tarsus I is twice as long as the distance between its base and the base of the eupathid *ft'* opposite: the preocular *be* and postocular *ce* setae on propodosoma are equally long; solenidion *p* and eupathid *dt* occur on *tibia* IV (these are absent on the corresponding podomeres of *mali*); there is one addtional seta on genua I and II and on femora I.

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PARASITES OF THE ELM SPANWORM, ENNOMOS SUBSIGNARIUS (HBN.), IN GEORGIA

(Lepidoptera: Geometridae)

Defoliation of the Appalachian hardwoods, particularly hickory and red oak, by the elm spanworm, *Ennomos subsignarius* (Hbn.), was first detected in 1954 on the Chattahoochee National Forest in northern Georgia. At that time defoliation was confined to a few small spots in the areas of Potato Patch and Three Forks Mountains. Since its detection the area of infestation has expanded substantially each year. The present area infested is in excess of 860,000 acres, covering large sections of western North Carolina and eastern Tennessee as well as north Georgia.

During the course of this infestation two attempts have been made to recover parasites. In 1956 one hundred pupae were collected from each of four locations. In 1959 collections totaling 1,166 larvae and 845 pupae were made at five locations. Because several of the parasites reared from this material are new to the literature as attacking the elm spanworm, they are worth mention.

The 1956 determinations, with the exception of *C. analis*, were kindly provided by P. B. Dowden, U. S. Forest Service, Northeastern Forest Experiment Station, New Haven, Connecticut. Determinations of *C. analis*, and those for 1959 were made by personnel of the Insect Identification and Parasite Introduction Section, Agricultural Research Service, U.S. Department of Agriculture. The asterisk denotes species not previously recorded as attacking *E. subsignarius*.