AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

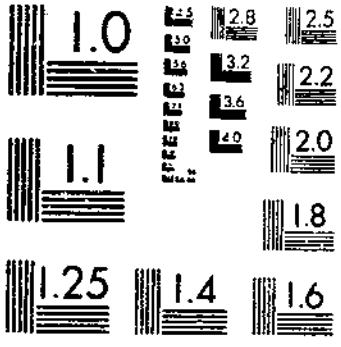
Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

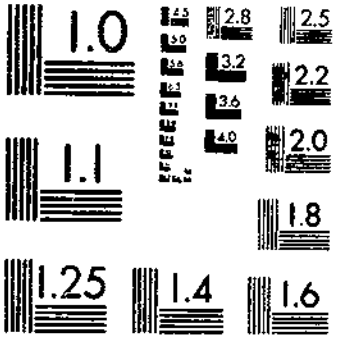
*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

TB 1052 (1952) USDA TECHNICAL BULLETINS UPDATA
CLASSIFICATION OF THE ORTHEZIIDAE. SUPPLEMENT TO CLASSIFICATION OF
MORRISON, H 1 1 OF 1

START



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Technical Bulletin No. 1052—August 1952

UNITED STATES
DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

CLASSIFICATION OF THE ORTHEZIIDAE[1]

Supplement to Classification of Scale Insects of the Subfamily Ortheziinae

By **Harold Morrison**[2]

Entomologist, Division of Insect Identification, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration

CONTENTS

	Page
Introduction	1
Key to genera of Ortheziidae	2
Genus *Orthezia* Bosc d'Antic	3
Key to species groups	3
Keys to species of *Orthezia*	4
Insignis group	4
Praelonga group	5
Graminis group	8
Urticae group	9
Genus *Arctorthezia* Cockerell	53
Key to species of *Arctorthezia*	54
Genus *Newsteadia* Green	57
Key to species of *Newsteadia*	57
Genus *Mixorthezia* Morrison	65
Key to species of *Mixorthezia*	65
Genus *Nipponorthezia* Kuwana	72
Key to species of *Nipponorthezia*	72
Genus *Ortheziola* Sulc	75
Undetermined species	75
Literature cited	76
Index to species	79

INTRODUCTION

IN THE 25 years since the appearance of the "Classification of Scale Insects of the Subfamily Ortheziinae" (Morrison *35*),[4] various lots of additional study material have accumulated, including several new species. In addition, further evidence bearing on the classification presented in that paper, a few changes in the status of certain of the specimens discussed there, and a number of species described by other workers have become known during this period. Since these additions more than double the number of known species in this group, the added information is presented in this supplement. An effort has been made

[1] Submitted for publication September 13, 1951.

[2] Hemiptera, Coccoidea.

[3] G. F. Ferris made much material available for study, J. Ghesquiere supplied information on the current status of some names that he has proposed, J. Gomez-Menor loaned for study the type examples of a new species that he had described, W. J. Hall compared specimens with types in the British Museum, A. H. Strickland made available examples of a new species described by him, and Elwood Zimmerman made available undescribed material from the Pacific islands. Edson J. Hambleton contributed the largest single group of new species. The types of the new species are for the most part included in the U. S. National Collection of Coccidae; any other disposal is indicated in the text.

More than half of the drawings accompanying the descriptions were prepared by the late Mrs. Sara Hoke Debord; the remainder are by Miss Addie M. Egbert.

[4] Italic numbers in parentheses refer to Literature Cited, p. 76.

to include some mention of all the published species or names that have been assigned to this group since the earlier review, and, wherever possible, critical disposal of them has been attempted.

The limitations on illustrations for this group of coccids were discussed in the first paper (*35, p. 97*). Since these comments apply equally well to this paper, they should be reviewed before any attempt is made to utilize the illustrations here presented.

The discovery of obviously indigenous ortheziine coccids in New Zealand, as reported by Green in 1929 (*22, p. 372*), in Mauritius on the authority of Mamet (*32, p. 117*), in mid-Africa according to Strickland (*48, p. 518*), and in Fiji and Samoa as discussed in this paper, has considerably weakened the earlier emphasis on restricted distribution for these insects (*35, p. 97*), but in numbers of known species it remains preponderantly a New World group.

The abdominal spiracles, because of their obscurity in some species and of the frequent difficulties in locating all of them with certainty in any but the most nearly perfect preparations, have been given somewhat reduced emphasis as generic characters. This action represents merely a practical compromise with the conditions under which the group usually must be studied, rather than any modification of previously held opinions as to their significance in building a classification.

Only one change has been made in the higher classification. The subgenus *Arctorthezia* Ckll. has been raised to generic rank for reasons presented under the discussion of this genus.

A single new genus, *Orthezioya* Laing (*28, p. 383*), has been described in this group since the publication of the earlier review. On the basis of current studies this genus appears to be identical with the genus *Mixorthezia* Morr. (*35, p. 151*), which was described a little earlier in 1925 than was *Orthezioya*.

No evidence suggesting any modification of the author's elevation of the ortheziine group to the family status proposed in 1927 (*36, p. 100*) has been recognized in the course of this review of accumulated material; nor has any evidence developed which suggests that the genera now known could be grouped into significant subfamilies or tribes, even though superficially striking differences between some genera do exist.

Only the adult female is considered in the keys to genera and species. Material of other stages is still too scant to permit their use in developing the classification. All recognizable species are included in the keys even if there is no further mention in the discussion.

KEY TO GENERA OF ORTHEZIIDAE

a. Tibio-tarsal separation definitely developed and further marked by an obvious reduction in diameter from tibia to tarsus; antennae usually 8-segmented, sometimes 7-segmented (2 known species); if so, then the basal segment not especially large and prominent.

b. Thoracic spiracles without disk pores within atrium of each; thoracic dorsal spine bands either continuous across the midline or narrowly interrupted on that line, or widely interrupted or wanting; in no instance continuous but with diagonal posteriorly converging clear lines producing a triangular or shield-shaped cluster of spines on the midline of each thoracic segment; wax secretion of perfect specimens showing no corresponding triangular

wax tufts; species with fully developed spine bands and tufts showing 11 marginal and 10 dorsal pairs (some fused) of bands and tufts; eyestalk not strongly pollicate; tarsal claw usually showing denticles..... *Orthezia* Bosc., p. 3

bb. Thoracic spiracles with a circle or a band of disk pores within the opening of each atrium; dorsal thoracic spine bands wide and continuous except for the presence of the two narrow posteriorly converging clear lines on each, forming a triangular or shield-shaped cluster of spines across the midline of each thoracic segment; wax secretion showing, more or less obviously, the three small median tufts corresponding to the triangular spine clusters; body spine clusters fully developed, 10 marginal pairs (including fused anterior); eyestalk strongly pollicate; claws without denticles..... *Arctorthezia* Ckll., p. 53

aa. Tibia and tarsus rigidly fused, no separation, at most this suggested by a slight constriction or a reduction in diameter of the tarsal section and with or without a linear internal septum at the junction; antennae mostly with fewer than 7 segments; if with 7 (some species of *Newsteadia*), then the basal segment unusually large and prominent.

c. Antennae with the first two segments large and conspicuous, the basal usually much stouter than the remainder and elongate cylindrical, usually (1 exception with 3) 6- to 7-segmented; the 5 anterior pairs of abdominal spiracles developed..... *Newsteadia* Green, p. 57

cc. First 2 antennal segments not thus enlarged and elongated, the antennae never more than 4-segmented; spiracles various, but not as in *Newsteadia*.

d. Beak distinctly 2-segmented, long, cylindrical, the basal segment obviously stouter; intermediate pair of anal ring setae plainly shorter than the others; antennae 3-segmented, 6 pairs of abdominal spiracles..... *Nipponorthezia* Kuw., p. 72

dd. Beak 1-segmented, at most with some suggestion of a dividing joint; anal ring setae approximately equal in length; antennae either actually or apparently 4-segmented.

e. Antennae actually 3-segmented, but appearing 4-segmented owing to position on stout basal collar bearing eyestalk (orient segments through location of single sensory pore consistently present at apex of second segment); abdominal spiracles uncertain, not yet positively located..... *Ortheziola* Sulc., p. 75

ee. Antennae actually 4-segmented; with 8 pairs of abdominal spiracles..... *Mixorthezia* Morr., p. 65

Genus ORTHEZIA Bosc d'Antic

A considerable number of interesting new species of *Orthezia* have accumulated in recent years, and marked changes in the earlier key to the species of this genus are needed to provide for their placement. In addition, it appears advantageous to reduce, through consolidation, the total number of groups of species previously established within this genus, and this revised arrangement is presented in the keys to groups and species that follow.

KEY TO SPECIES GROUPS

a. No transverse rows of normally developed spines across the ventral abdominal area enclosed within the ovisac band; at most with recognizable rows of clear pores or of truncate-conical or rounded tubercles in this area..... *insignis* group

aa. With transverse rows or bands of normally developed body spines across this enclosed ventral area.

b. Head dorsally showing distinct dermal sclerotization, usually in the form of an oval or irregular area on the midline, extending posteriorly from the anterior margin of the head, but one species showing almost complete sclerotization of the dorsal surface of the head ..... *praelonga* group

bb. No dorsal cephalic midline sclerotization.

c. With not more than 7 pairs of abdominal spiracles ..... *graminis* group

cc. Normal individuals with 8 pairs of abdominal spiracles ..... *urticae* group

KEYS TO SPECIES OF ORTHEZIA

Insignis Group

a. Body dorsally with large, conspicuous, paired or entire sclerotized plates adjacent to or across the midline on thorax and abdomen, these in addition to any cephalic midline plate present.

b. Dorsal spines and spine bands limited to the medially divided transverse band located just anterior to the anal ring; marginal spine clusters limited to the abdominal area plus a cluster around the opening of each thoracic spiracle.

c. Pattern of dorsal sclerotic plates including large cephalic and 4 transverse thoracic and abdominal unbroken across midline, plus 4 pairs, with the corresponding halves moderately separated, on the posterior abdominal segments; anterior median section of ovisac band wide (see fig. 16), with very numerous spines; eyestalk stout rounded conical; first 4 pairs of abdominal spiracles opening in derm outside associated spine cluster ..... *pinicola*, new species, p. 41

cc. Pattern of dorsal sclerotic plates differing, with all plates behind the first thoracic divided, the halves well separated, the abdomen with 5 quite large paired sclerotic plates instead of 4; anterior median section of ovisac band definitely narrower, and with perhaps a third fewer spines across a comparable area; eyestalk more strongly protruding and more slender; only the anterior one or two abdominal spiracles opening in derm outside the associated spine cluster ..... *pini*, new species, p. 40

bb. Dorsal spine bands present on both head and thorax as well as on most abdominal segments; marginal spine clusters present on head and thorax as well as on abdomen.

d. Dorsal spine clusters much as in *insignis*, that is with well separated small clusters on head and thorax, and close paired clusters down midline of abdomen, likewise small, leaving most of the dorsal surface exposed; large sclerotic areas, of irregular shape and varying extent, present on most of body segments ..... *hambletoni*, new species, p. 36

dd. Dorsal surface well covered with spine bands, the dorsal sclerotic areas small but distinct, entire across and down the midline of head and thorax, paired and well separated and interposed between the spine bands on the abdomen ..... *guatemalensis*, new species, p. 26

aa. Any sharply defined dorsal sclerotic areas restricted to the cephalic end of the body, if present at all, abdomen with none though with light, transverse, intersegmental, invaginated sclerotic areas in one species.

e. Dorsal spine bands greatly reduced, limited to relatively small clusters making up 2 longitudinal rows, 1 on each side of the median line.

f. Dorsal spine clusters relatively large on head and transversely quadrangular, and only narrowly separated on thorax and much of abdomen; some abdominal segments showing irregular dorsal intersegmental sclerotized invaginations between median and marginal spine clusters ..... *smythi*, new species, p. 50

ff. Dorsal spine clusters much smaller on head and elongate, narrow and well separated on thorax; no abdominal sclerotization as described.

g. Cephalic dorsal sclerotized area relatively small, characteristically appearing as a narrow band, often distended near the middle, and behind this a more or less rounded disc, both on the midline..... *insignis* Browne, p. 32

gg. Cephalic dorsal sclerotized area much larger, characteristically forming two large, conspicuous, irregularly margined transverse plates..... *pseudinsignis*, new species, p. 44

ee. Dorsal spines numerous, in broad bands and clusters covering the surface; ventral abdominal spine bands represented by transverse rows of small, truncate conical or rounded tubercles.

h. Beak moderate, about 275 μ long; eyestalk small, roughly circular at base, diameter about 55 μ; anal ring consistently with 6 setae; ventral abdominal tubercles truncate conical..... *mexicana* Morr.

hh. Beak large, 470 μ long; eyestalk flat conical, unevenly elliptical at base, long diameter about 110 μ; with 8 (or more) anal ring setae (6 examples); ventral abdominal tubercles rounded..... *cacticola*, new species, p. 17

Praelonga Group

a. Normally with 7 pairs of abdominal spiracles.

b. Anterior median dorsal cephalic plate supplemented by a row of large, transversely rugose dorsal sclerotic plates, 1 to a segment, down the midline and by a similar row of even larger submarginal plates on each side of body; no disk pores associated with anterior median section of ovisac band..... *gymnolomiae*, new species, p. 28

bb. No such conspicuous dorsal plate arrangement; with disk pores in association with the anterior median section of ovisac band.

c. No disk pores at or immediately anterior to the outer (anterior) margin of the anterior median section of the ovisac band; with disk pores widely, though sparsely, distributed through most of this section of the ovisac band but not attaining the anterior margin.

d. Disk pores scattered through the posterior two-thirds of the anterior median section of the ovisac band, and with a double to irregularly triple row of these along the inner (posterior) margin of this section; eyestalk strongly protruding, slightly asymmetrically conical, rounded apically; ovisac band enclosing 4 definite transverse spine bands..... *taripes* Leon.

dd. Disk pores sparsely scattered through the anterior three-fourths of the anterior median section of the ovisac band, from a line just within the outer (anterior) margin, very few or wholly wanting through the inner (posterior) one-fourth of the band, the row of pores along the inner (posterior) margin of this section single to irregularly double; eyestalk flat conical, little elevated, eye protruding beyond the profile of the stalk; ovisac band enclosing 5 definite transverse spine bands.

e. Basal antennal segment strongly enlarged in comparison with the succeeding ones, its diameter as much as twice that of the second; beak shorter and stouter, tapering to a bluntly pointed apex, less than 250μ long; some of the spines at opening of each thoracic spiracle much reduced in size, though retaining normal shape, most of them on a moderately sclerotized plate at anterior and inner edge of atrium, this showing in mature specimens, at least..... *artemisiae* Ckll., p. 15

ee. Basal antennal segment only moderately enlarged in comparison with the succeeding ones, its diameter at middle normally less than one and one-half times that of second segment; beak longer and, for the genus, unusually sharply pointed, length over 300 μ; some of spines at opening of each thoracic spiracle somewhat reduced in size, but no evidence of a sclerotic supporting plate..*ferrisi*, new species, p. 20

cc. With at least a few disk pores at or along the outer (anterior) margin of the anterior median section of the ovisac band and, in most species, with a definite row of such pores, sometimes with this row double or triple.

f. Antennae normally relatively short and with segments broad, total length probably not exceeding 0.65 mm.; dorsal spine bands, particularly on the abdominal segments, incomplete and tapering towards outer ends; anterior median section of ovisac band with a single row of disk pores along outer (anterior) margin; dorsal sclerotic area oval..*ultima* Ckll.

ff. Antennae normally longer, 0.8 to 1.5 mm., usually appearing more slender; other characters varying but not occurring in the combination indicated above.

g. Anterior median section of ovisac band with only a single row of disk pores along inner (posterior) margin, but with a triple to quadruple band along outer (anterior) margin and without disk pores within the borders of the spine band in this area; eyestalk asymmetrically flattened conical.....*garryae* Ckll.

gg. Anterior median section of ovisac band, although varying, not presenting this exact arrangement of spines and pores, usually with the inner marginal row of disk pores double to much wider, and with pores through a part, at least, of the spine band.

h. With numerous disk pores along both the outer (anterior) and inner (posterior) margins of the anterior median section of the ovisac band, and scattered through the adjacent portions of the band, leaving perhaps a third of the width of the band without such pores.....*chisosi*, new species, p. 19

hh. Anterior median section of ovisac band not presenting this arrangement, the disk pores along margins usually fewer, especially along anterior margin, and much more than half the width of the spine band free of pores.

i. Dorsal spine bands incomplete laterally, at least on some of the posterior abdominal segments, leaving a definitely bare area on each side.

j. Incomplete dorsal spine bands confined to those of the intermediate 1 to 3 abdominal segments, the outer sections of these sometimes with scattered spines.

k. Anterior median section of ovisac band with only a single row of widely spaced quadrilocular pores along its outer (anterior) margin.....*parkeri*, new species, p. 39

kk. Anterior median section of ovisac band with an irregular band about 3 pores wide through its anterior (outer) margin (see also below).....some specimens of *longipes* Hempel

jj. Incomplete dorsal spine bands including at least most of the abdominal bands and more or less of the thoracic bands.

l. Body small, length about 1.5 mm., anterior median section of ovisac band unusually narrow, probably not more than 95 μ wide on the midline; both abdominal and thoracic dorsal spine bands wholly terminated well before reaching the marginal clusters; antennal segment III short, from often shorter than IV to, at most, only a little longer..*galapagoensis* Kuw.

ll. Body larger, length 2 mm. or more; anterior median section of ovisac band much wider, about 200 μ on the midline; outer halves of thoracic spine bands narrowly extended to margins; antennal segment III about 1.5 x segment IV_____ _____*molinarii*, new species, p. 35

ii. Dorsal spine bands complete, continued laterally to the marginal spine clusters, and more or less widened at ends.

m. Ovisac band enclosing 5 definite transverse rows or bands of spines, the fifth reduced to a small transverse cluster; eyestalk strongly developed and strongly protruding, asymmetrically conical, with base much expanded and extended posteriorly to form an acutely angled point; antennae large, length around 1.5 mm_____*longipes* Hempel

mm. Ovisac band enclosing 4 definite transverse rows or bands of spines, the area of the fifth row showing only stiff setae.

n. Antennae very long, 1.4 to 1.5 mm., length of basal segment about 230 μ, this about one and one half times its maximum width_____*acapulcoa*, new species, p. 11

nn. Antennae shorter, 0.8 to not exceeding 1.2 mm.; basal segment roughly as wide as long_____*praelonga* Dougl. p. 43

aa. Normally with 8 pairs of abdominal spiracles.

o. Entire dorsal surface of head plainly but moderately sclerotized, lightest along midline where a narrow band of spines occurs; abdomen dorsally likewise moderately sclerotized and strongly transversely infolded at the segmental lines_____*sclerotica*, new species, p. 47

oo. Derm sclerotization restricted to the dorsal cephalic sclerotic area comparable to that in related species.

p. Some of body spines, in patches or clusters among the dorsal spine bands, conspicuously larger and more heavily sclerotized than the average body spines; anterior median section of ovisac band with well developed bands of disk pores along both inner and outer margins and also with such pores scattered through the whole width of the band_____ _____*caudata* Ferris

pp. Not so, all spines uniform or approximately uniform in size; anterior median section of the ovisac band otherwise.

q. Body size every large—nearly 6 mm. long as mounted; each thoracic spiracle with opening surrounded by a dense band of small, very short, rounded conical spines; each margin of abdominal segments III through VI with plainly developed, more or less hemispherical protrusions, one to a segment, bearing more densely crowded spines than the surrounding derm_____*gigantea*, new species, p. 23

qq. Much smaller, probably never exceeding 3 mm. as mounted; no such wide band of short spines around opening of each thoracic spiracle; no abdominal marginal protuberances bearing crowded spines.

r. Dorsal spine bands on thorax and anterior abdominal segments, although transverse, terminated well away from the corresponding marginal clusters, leaving a wide, bare, longitudinal derm band between the dorsal and marginal clusters; secretion corresponding; ventral transverse spine rows enclosed within ovisac band poorly developed, apparently reduced to 3 incomplete single rows_____ _____*nigrocincta* Ckll.

rr. Dorsal spine bands complete, continuing to marginal clusters, and secretion likewise complete; the 5 ventral transverse spine bands enclosed within ovisac band very well developed, the anterior one, especially, broad and several spines wide_____*sarcobati*, new species, p. 45

Graminis Group

a. With a few conspicuous, sclerotized paired plates or areas dorsally on some of the abdominal segments; size as mounted small, 1.3 mm. or less.

b. Outer halves of the spine bands of some of the intermediate abdominal segments displaced on each half of the body by trapezoidal heavily sclerotized plates.

c. Only the antepenultimate spine band and the one preceding it shortened; 3 large sclerotized plates on each side and in front of these a fourth, considerably smaller, variable in shape, but interposed between the 2 complete bands immediately anterior to the shortened bands..... *tillandsicola*, new species, p. 52

cc. The 4 dorsal spine bands anterior to the penultimate shortened, with the outer halves on each side replaced by strongly sclerotized trapezoidal plates..... *balloui* Morr.

bb. With 3 or 4 conspicuous sclerotized plates between, or partially interrupting but not replacing, the outer ends of the intermediate abdominal dorsal spine bands on each side.

d. With 3 such plates, usually approximating an oval shape, placed between the ends of the spine bands on each side; spine band between first and second plates widened at its outer end; apparently only 4 pairs of abdominal spiracles..... *tillandsiae* Morr. p. 52

dd. With 4 such plates between the ends of the spine bands on each side, each usually approaching an elongate rectangular to irregular shape, the anterior interrupting its spine band, the remainder not or only incompletely interrupting their spine bands; spine band between first and second plates narrowed, almost fading away at outer end; with 7 pairs of abdominal spiracles..... *bahamensis*, new species, p. 15

aa. No sclerotized plates or areas dorsally on the body.

e. Anal ring small, inner pore band strongly angulate internally opposite the setae; no disk pores through any portion of the anterior median section of the ovisac band; terminal antennal segment long and slender, around one and two-thirds length of third segment; apparently with only 4 pairs of abdominal spiracles..... *minor* Morr.

ee. Anal ring large, inner pore band at most swollen opposite setae, hardly angulate; with numerous disk spores through the inner (posterior) one-third to one-half of the anterior median section of the ovisac band; terminal antennal segment stout, not or only slightly longer than the third segment; with 7 pairs of abdominal spiracles.

f. Exposed areas of derm between marginal and dorsal spine clusters much broader than the transverse width of the associated dorsal spine clusters; secretion corresponding, the body widely exposed between dorsal and marginal tufts, and also between the dorsal tufts; superficially resembling *insignis*..... *montirola* C'kll.

ff. Exposed areas of derm between marginal and dorsal spine clusters much narrower, at most not so wide as width of corresponding dorsal spine bands; dorsal secretion leaving only a narrow exposed band between it and the marginal secretion.

g. Bare longitudinal bands evident only on the anterior portion of the body, the dorsal spine bands on most of the abdominal segments complete and continuous to the marginal spine clusters; dorsal secretion more or less obviously corresponding..... *pseudograminis* Morr.

gg. Bare longitudinal bands practically complete, continuous almost to the posterior apex of the body, all dorsal spine bands except last 2 abdominal terminating far from the marginal spine clusters; dorsal secretion more or less obviously corresponding ..... *graminis* Tinsley

Urticae Group

a. Dorsal spines confined to 5 small pairs of clusters along the median line on the posterior abdominal segments; secretion similarly limited, most of the dorsum completely exposed; marginal spine clusters and corresponding secretion absent anteriorly; ventral abdominal bands of spines poorly developed, each a single row of scattered spines ..... *nuda* Ferris

aa. Dorsal spines much more abundant, at most leaving exposed no more than a wide naked band down each half of body.

b. Spines making up spine collar surrounding opening of each thoracic spiracle very short conical, differing conspicuously in shape from remaining body spines; anal ring not sharply angulate within anteriorly and posteriorly, with a distinctly developed sclerotized wing on each side; inner spines of the 2 posterior dorsal clusters more or less distinctly reduced in size as compared with the remaining spines.

c. Larval antennae 6-segmented; inner spines of the 2 clusters just before anal ring conspicuously smaller than the remainder in the larva ..... *annae* Ckll., p. 14

cc. Larval antennae 5-segmented, the third very long and more or less constricted medially; none of the spines in the clusters just before anal ring conspicuously reduced in size in larva ..... *sonorensis* Ckll.

bb. Spine collar around opening of each thoracic spiracle, if developed, made up of spines similar in shape to and, at most, only a little smaller than the remaining body spines; inner spines of those in the 2 posterior dorsal clusters not obviously reduced in size in comparison with the remainder; other characters varying.

d. Spines especially those of the dorsal bands and clusters, elongate, slender, cylindrical for most or all of their outer length, in 2 species usually definitely, though only slightly, swollen at apices.

e. With 5 transverse bands of spines across the area enclosed by the ovisac band, these not especially broadened; no sclerotization around the bases of the individual spines and the dorsal spines not obviously swollen at outer ends, though almost appearing so at some angles ..... *ambrosicola*, new species, p. 13

ee. With either 4 or, apparently, 6 transverse bands of spines across the area enclosed by the ovisac band, most of these unusually broad and conspicuous; most of the dorsal band spines, at least, slightly enlarged at apices.

f. Individual spines in the cephalic dorsal clusters (and to a lesser degree elsewhere) surrounded at base by a small circular sclerotized disk; these disks, in a few areas, enlarged, irregular and tending to run together to form mottled sclerotic areas; first and second antennal segments large and relatively elongate, 200 and 142 μ respectively; eyestalk strongly protruding, almost pollicate, around 130 μ long; ventral area within ovisac band with 4 transverse bands of spines ..... *selaginellae*, new species, p. 49

ff. No trace of the above described sclerotization, the derm membranous; first and second antennal segments shorter and appearing stouter, 160 and 110 μ respectively; eyestalk asymmetrically rounded conical, not pollicate, length about 110 μ; ventral area within ovisac band apparently with 6 very broad transverse bands of spines_____ _____*cheilanthi* Tinsley

dd. Spines stouter, tapering from bases to rounded apices, not even faintly swollen apically.

g. Antennae normally 7-segmented, short and stout; body small, length as mounted around 2.2 to 2.75 mm.

h. Anal ring with a sclerotized lateral wing on each side and outside of this a few short conical spines; eyestalk rounded conical_____ _____*lasiorum* Ckll., p. 35

hh. Anal ring without such lateral wings; no associated conical spines; eyestalk tuberculate with flattened base_____*olivacea* Ckll., p. 37

gg. Antennae normally 8-segmented; body usually larger (1 exception), mostly around 3 mm. or more as mounted.

i. Body size quite small, probably never exceeding 1.6 mm. as mounted; antennae likewise small_____*juniperi*, new species, p. 33

ii. Body much larger, 2.5 mm. or longer as mounted; antennae appreciably longer, 0.75 mm. or more.

j. Antennae relatively short (about 0.75 mm.) and stout, first segment plainly wider than long, intermediate segments only slightly longer than wide; eyestalk stout rounded conical, strongly asymmetrical _____*boliviana* Morr.

jj. Not in this combination; antennae longer, 1 mm. or more, first segment plainly longer than wide, intermediate segments at least one and one-half times as long as wide; eyestalk otherwise.

k. Line of pores of inner band of anal ring not angularly produced opposite the end setae of the ring on each half; instead, with this line forming only a rounded bulge opposite these setae, the areas on the midline enclosed between the ends of the 2 bands narrow, elongate, almost ligulate; inner margin of first antennal segment strongly bulged, almost gibbous; eyestalk small, inconspicuous, globular with a small, only slightly expanded base; pores along inner (posterior) margin of anterior median section of ovisac band, so far as can be determined, inconspicuous and scattered_____*grandis* Hempel

kk. Not in this combination; pores of inner bands of the anal ring strongly angularly produced opposite the end setae, enclosing between them on the midline at each end a diamond-shaped area; inner face of first antennal segment not strongly bulged; eyestalk various.

l. Eyestalk small, globular on a slightly expanded base; spines associated with openings of thoracic spiracles only slightly clustered and modified; anterior median section of ovisac band with an irregular single row of pores along the inner (posterior) margin, none along the anterior margin_____ _____*graminicola* new species, p. 24

ll. Eyestalk larger, more prominent, strongly conical in profile, sometimes with lateral protuberances; spines associated with the thoracic spiracular openings grouped into a tight band around each opening and set on a definitely sclerotized derm band in mature individuals, many of these spines smaller and shorter than the average body type.

m. Eyestalk stout, bearing several (up to 4) prominent lateral tubercles having clear apices similar to the characteristic eye-spot; no multilocular disk pores along the outer (anterior) margin of the anterio-median section of the ovisac band.....*quadrua* Ferris, p. 45

mm. Eyestalk strongly conical in profile, if with lateral protuberances then these arising near base, short and much less prominent than in the preceding, usually only 1 present, rarely 2; with a definite row of disk pores along the outer (anterior) margin of the anterio-median section of the ovisac band.

n. Anterio-median section of the ovisac band with the quadrilocular pores in a wide band (up to 10 pores in width) along and through the inner (posterior) margin of the spine band.

o. Eyestalk characteristically strongly conical without trace of lateral protuberance.....*solidaginis* Sanders, p. 52

oo. Eyestalk characteristically stout conical with a distinct, sometimes prominent, lateral tubercle arising near the base.....*yasushii* Kuwana, p. 53

nn. Anterio-median section of the ovisac band with the quadrilocular pores along the inner (posterior) margin in a band at most 3 or 4 pores in width, and only very rarely with any such pores within the margin of the band itself.

p. Eyestalk characteristically strongly conical or cylindro-conical, without a suggestion of a lateral tubercle; quadrilocular pores along inner (posterior) margin of anterio-median section of ovisac band in a single, or partially irregular double row.....*newcomeri*, new species, p. 37

pp. Eyestalk characteristically stout conical, with a distinct to sometimes prominent lateral tubercle arising near base; quadrilocular pores of above described section of ovisac band forming an irregular band 3 to 4 pores wide definitely more conspicuous than in the preceding.*urticae* (L.), p. 52

ORTHEZIA ACAPULCOA, New Species

(Fig. 1; pl. 1, *A*)

ADULT FEMALE.—Length of body to ends of its apical secretionary tufts 3 mm., width across secretion about 2.5 mm., ovisac up to 4 mm. long, maximum observed total length of secretion of body and ovisac 6 mm.; completely covered by white secretionary tufts, the dorsal tufts strongly erect, apically diverging laterally from the median line in early adults, but tending to curl back toward this as the tufts grow in older specimens; anterior marginal tufts relatively short, posterior 3 or 4 pairs much longer, although variable, extending posteriorly above the fluted ovisac.

Dried body dull yellow-brown; stout ovoid; length as mounted up to 2.2 mm., width up to 1.75 mm. Derm membranous throughout, except for the inconspicuous dorsal cephalic midline sclerotic area, this narrow, elongate, more or less interrupted, and formed into an inverted T through the development of narrow lateral wings along the posterior edge of the cephalic area; also continued more or less on the midline of pro- and meso-thoracic segments. Antennae 8-segmented, the segments elongated, giving a relatively slender appearance, the first segment notably longer than wide, and with inner margin only slightly curved, not strongly bulging near base; lengths of segments of shortest examined, in microns: I, 221 (x 158 width); II, 174; III, 197; IV, 186; V, 167; VI, 142; VII, 126; VIII, 205; apical spine, 28; segmental setae few, small, 12 to 16μ, stiff, tapering to slender apices, the extreme tips apparently blunted, a stout sensory seta about 32μ near end of apical segment, a shorter one, about 20μ, similarly placed on preapical. Eyestalk fairly strongly protruding, curved apex hemispherical,

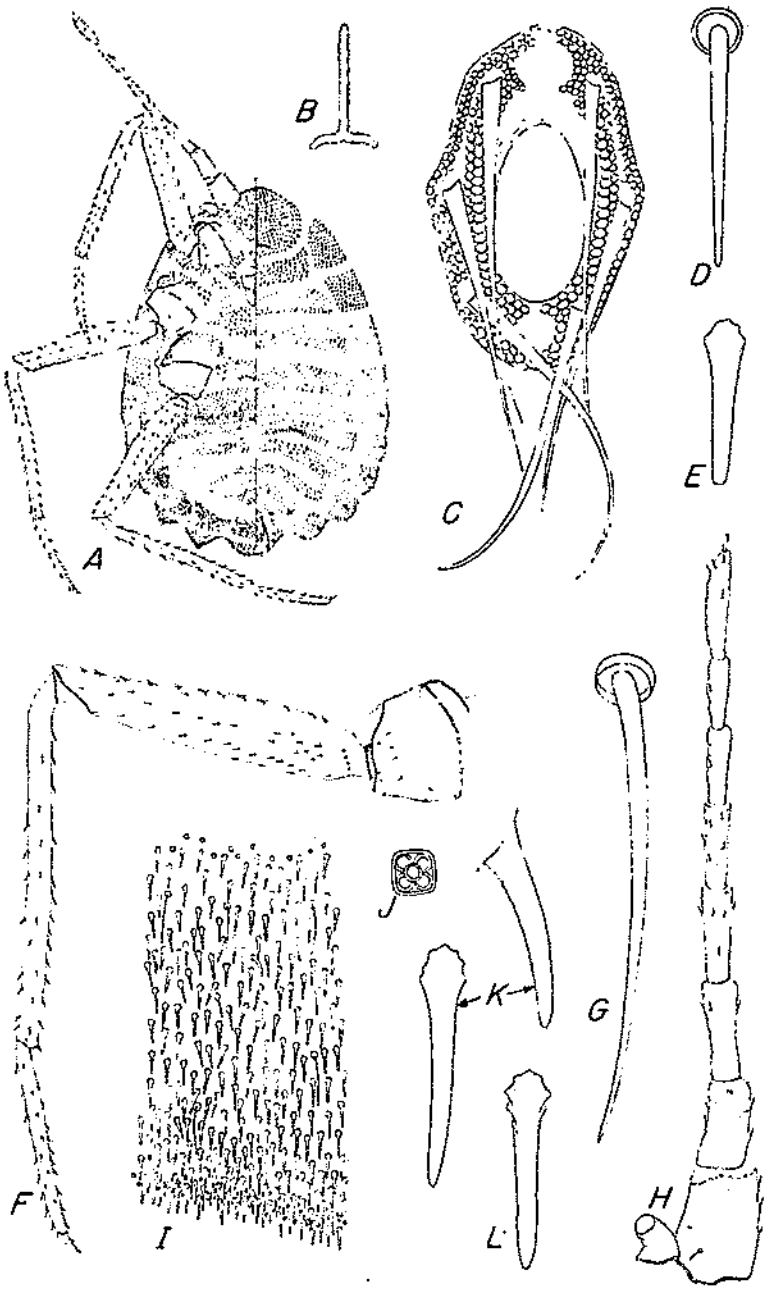


FIGURE 1.—*Orthezia acapulcoa*, adult female: *A*, Body, dorsal and ventral; *B*, cephalic dorsal sclerotization, approximate shape; *C*, anal ring; *D*, dorsal body seta; *E*, ovisac band spine; *F*, posterior leg; *G*, ventral body seta; *H*, antenna and adjacent eyestalk; *I*, ovisac band, anterior median section; *J*, quadrilocular pore, surface view; *K*, dorsal body spine, from above (left) and side (right); *L*, ventral body spine.

diameter about 44μ, base moderately expanded, maximum observed diameter 96μ, length 92μ; well sclerotized throughout, except for the apical eye itself. Legs not unusual, long, appearing slender, and bearing the usual slender but stiff, acute setae throughout, plus the stouter, almost spinelike, setae on the lower face of the apical half of the tibia and on all of that of the tarsus; lengths of parts of one posterior leg in microns: Trochanter-femur 800, tibia 830, tarsus 420, claw 80, claw digitule 24; claw denticles weakly developed, but one or more recognizable. Beak stout, conical tip rounded, length around 205μ, basal width 230μ. Thoracic spiracles characteristic for the genus, each placed in a spine cluster, a few spines near one edge of opening of atrium definitely smaller, but no special spine band or cluster associated; abdominal spiracles in 7 pairs, characteristic for the genus; tube length around 32μ. Pores of the usual small quadrilocular type, slightly variable in size, distributed in loose bands and clusters between the spine groups and in transverse rows across the ventral abdominal area; no tiny tubular ducts located; small clear disks, suggesting tiny cicatrices, present ventrally in a loose cluster, intermingled with quadrilocular pores, behind the vaginal opening. Slender setae present but few and scattered, both dorsally and ventrally, most numerous in a small cluster anterior to vulvar opening; observed length of dorsal up to 38μ, of ventral up to 41μ, extreme tips blunted, vulvar setae shorter, about 20μ and with a very narrow, ringlike basal collar. Spines abundant, in clusters covering both surfaces, except for the interspace areas, characteristically tapering uniformly from somewhat expanded base to slender, rounded or blunted apex, moderately curved in one profile, dorsal maximum about 23μ, ventral about 20μ, ovisac band about 19μ, ventral abdominal cross band about 16μ, dorsal transverse spine bands complete, continuous to the marginal clusters, usually wider at outer ends, the interspaces between and at ends of bands wide; ovisac band wide, a row of quadrilocular pores 3 to 4 wide along the inner (posterior) margin of the anterior median section, with an occasional pore within the margin of the band, and a comparable row, but with pores less crowded and with a greater number within the margin, along the anterior border of this section; with 4 transverse bands of spines within the area enclosed by the ovisac band. Anal ring elongate, length 168μ, width 120μ, inner pore band sharply protruding towards middle opposite each anterior and posterior seta, but not opposite median, and outer pore band conspicuously bulged outwardly opposite each middle seta; ends of pore bands not joined anteriorly and posteriorly; anal ring setae characteristic, length up to 260μ.

This species has been described from two mounted and a few unmounted specimens of adult females from Acapulco, Mexico, on grass, Feb. 22, collector unknown (received with the Stickney Coll. 1937) (holotype and paratypes), and from several mounted specimens received for study from G. F. Ferris and collected by him as follows: At Acapulco, Mexico, on coarse grass (No. 261); cliffs at Acapulco, on undetermined grass, Feb. 1925, and same on a coarse grass, Feb. 22, 1926 (No. 65). It seems probable that the original lot examined, from the Stickney collection, actually came from the last collection mentioned, but the associated data are inadequate to confirm this view. Paratypes of the species are returned to Professor Ferris.

This insect seems definitely related to *praelonga*, but the larger size, considerably longer antennae, especially the basal segment, and other details seem adequate for its separation.

ORTHEZIA AMBROSICOLA, New Species

ADULT FEMALE (slide preparations only).—Rather elongate ovoid, narrowed somewhat anteriorly, length of one 2.3 mm., width 1.7 mm.; membranous throughout. Antennae stout, length of segments of one, in microns: I, 134; II, 118; III, 142; IV, 87; V, 71; VI, 63; VII, 55; VIII, 142; the segments between third and apical more strongly constricted from apex to base than in most species of the genus; antennal sensory setae short and stout, others few, short, 9μ or less, blunt tipped. Eyestalk a stout cone with basal diameter roughly 87μ and total height about 80μ, unusual in the very strong development of the eyespot, this occupying the whole apical half of the cone instead of the usual small area at the apex of an

eyestalk. Legs mostly wanting, but one, posterior, stout, with length of parts in microns: Trochanter-femur 710, tibia 610, tarsus 360, claw 112, the last with 2 weak denticles, femoral and tibial setae few, 24μ or less, barely tapering, blunt-tipped. Beak stout, proportions obscured in available material. Each thoracic spiracle opening in a spine cluster with the spines moderately whorled around the opening, but not reduced in size or otherwise modified; abdominal spiracles in 8 pairs, an average tube length 44μ, diameter of expanded collar at opening 16μ. Derm pores of the usual quadrilocular type, few present dorsally, but more abundant ventrally between the transverse spine bands of the area enclosed within the ovisac band; a few with small clear rings about the diameter of the disk pores in the vulvar area. Body setae few, as with most species of the genus, scattered dorsally within the spine bands, an average dorsal seta about 40μ long, slender but blunt-tipped apically. Spines abundant, in fully developed bands over the whole body, only the last 2 dorsal pairs somewhat narrowed, leaving wider interspaces; intermediate dorsal abdominal bands widened somewhat at outer ends and slightly overlapping the margins of the adjacent marginal bands; individual spines elongate, almost cylindrical for most of length, and even appearing very slightly enlarged apically at some angles, average dorsal 24 to 26μ long; with 5 well developed transverse bands of spines ventrally within the ovisac band. Ovisac band with the spines closely crowded, anterior median section about 174μ wide, lateral portions interrupted on each side by at least 4 narrow clear bands; a continuous single row of closely set pores along the inner (posterior) margin of the anterior median section, and no row but an occasional pore along the outer (anterior) margin. Anal ring stout, 144μ long by 132μ wide, each half broad, both the inner and outer pore bands 3 or more pores wide for much of their length, inner bands strongly extended opposite anterior and posterior setae to enclose sharply defined diamond-shaped areas on the midline at each end of the ring; the 6 anal ring setae stout at base, tapering to a relatively slender but blunted tip, one as much as 220μ long.

This species has been described from two imperfect mounted adult females collected on *Ambrosia* sp., Red River, near Quanah, Tex., in 1921 by G. F. Ferris. The holotype is returned to him. In 1925 (*35, p. 136*) *Orthezia ambrosiae* Lawson was placed as a synonym of *O. solidaginis* Sanders, on the basis of a study of the original description and of specimens supplied by Professor Lawson. These specimens included only one preadult female and some representatives of younger larval stages. Although not nearly so satisfactory for examination as adult type specimens of *ambrosiae*, this material has been reviewed again in relation to the Ferris specimens described above. As a result, it is believed that they do not represent the same species and that the 1925 assignment of *ambrosiae* to synonymy was correct.

ORTHEZIA ANNAE Cockerell

Specimens of this insect were collected July 16 and Sept. 16, 1943, at Presidio, Tex., on the type host, *Atriplex canescens*, by J. H. Russell (Presidio 1046). Additional material from Professor Ferris included collections of this species from Palm Springs, Calif., on *Atriplex* sp., April 9, 1936, collected by H. D. Maple, and from Fallon, Nev., on *Atriplex* sp., July 31, 1940, collected by G. F. Ferris.

ORTHEZIA ARENARIAE Vayssiére

Through the courtesy of its describer, P. Vayssiére, and A. Balachowsky, two mounted, and presumably characteristic, specimens of this insect have been examined. Comparisons with other specimens from various European sources that have been identified as *urticae* indicate that *arenariae* is identical with *urticae*, and it is therefore placed in synonymy. However, it must be understood that this conclu-

sion is based on the examination of a very small amount of material, considering the accepted range and abundance of *urticae*. Future Old World studies, based on full ecological information and on adequate study material, may demonstrate that *urticae*, as here recognized, is actually a composite species that should be split into restricted segregates. Under such circumstances *arenariae* might again emerge as a valid name.

This name has been used as valid in recent faunal discussions of coccids—e. g., by Balachowsky (*1, p. 190; 2, p. 265*), Bodenheimer (*3, pp. 242, 244*), Gomez-Menor (*20, p. 385*), and Rungs (*38, p. 24*)—although Balachowsky believes that it may represent merely a form of *urticae* ocurring in mountainous areas.

For additional comment see the discussion of *Orthezia urticae*.

ORTHEZIA ARGRIMONIAE Shinji

This species, described in 1935 by Shinji (*40, p. 91*), is discussed only in the Japanese language, and since no translation has been obtainable no comment on its status is possible. The illustrations accompanying the description are inadequate for proper placement.

ORTHEZIA ARTEMISIAE Cockerell

Specimens that have been accepted as representatives of this species have been received from Professor Ferris. They bear the following information as to collection: From Cold Spring Canyon, Stratford, Wash., on *Artemisia tridentata*, May 1918, collected by M. N. Becker, and from Twin Falls, Idaho, on the same host, May 26, 1921, collected by R. H. Smith. Despite this identification, these two lots come from areas so distant from the type locality that it does not seem advisable to base a supplementary description of the species, which is still needed, on these specimens. Dobzhansky (*10, p. 14*) has published another new locality record, Kern County, Calif., on *Artemisia*.

ORTHEZIA BAHAMENSIS, New Species

(Fig. 2; pl. 1, *B*)

ADULT FEMALE.—Small, body with posterior tufts of secretion about 1.5 mm. long, with dorsally fluted ovisac up to 3 mm. in total length; color of dried body an intermediate brown; secretion white throughout, completely covering the body except for a small bare area on each side of abdomen above the sclerotic plates; the dorsal tufts sloping forward, the cephalic tufts conical and protruding well beyond the head, the second pair overlapping; remaining dorsal tufts sloping posteriorly and strongly overlapping; marginal tufts following the same pattern, the anterior directed diagonally forward and out, the remainder curving posteriorly and overlapping, last 3 tufts considerably longer, digitate, slightly overlapping at base.

Body as mounted stout elliptical, length approximately 1.08 mm., width 0.96 mm. Membranous, except for dorsal transverse sclerotized plates at the outer ends of the dorsal spine bands of the third through the sixth abdominal segments, these plates on the third and fourth segments more or less completely interrupting the spine bands, but on the fifth and sixth lying anterior to the bands. Antennae 8-segmented, lengths of segments of one, in microns, as follows: I, 103; II, 95; III, 107; IV, 79; V, 82; VI, 71; VII, 75; VIII, 150; spine, 24; antennal setae few, small, blunt-tipped. Eyestalk small, short cylindrical with rounded apex, about 40μ long, base only slightly enlarged. Legs not unusual, the dorsal leg setae blunted apically, those on under side larger, tapering more, blunted to somewhat pointed; length of parts of a

posterior leg, in microns; Trochanter-femur 440, tibia 387, tarsus 268, claw 47; subapical denticle definitely more prominent than inner one. Beak 220μ long by 175μ wide at base, tapering nearly uniformly from base to well-rounded tip and with a slight suggestion of a joint near base. Thoracic spiracles not unusual, no evident clustering of the spines adjacent to the openings of each; abdominal spiracles in 7 pairs, total tube length of one about 23μ, spiracular opening distinctly larger than tube. Small quadrilocular pores and small clear disks present, but not abundant, both dorsally and ventrally, in tranverse rows or bands within the ovisac band, elsewhere in the interspaces between spine

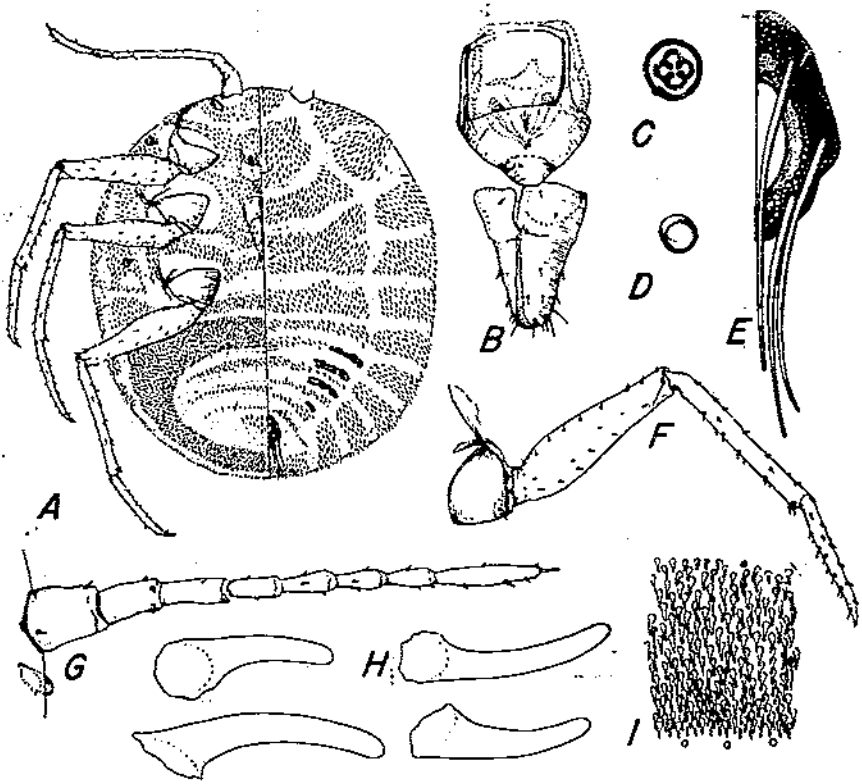


FIGURE 2.—*Orthezia bahamensis*, adult female: *A*, Body, dorsal and ventral; *B*, mouth parts; *C*, disk pore from posterior ventral area; *D*, small clear pore, same area; E, anal ring, right half; *F*, posterior leg; *G*, antenna and adjacent eyestalk; *H*, body spines, ovisac band, upper left, anterior ventral, upper right, anterior dorsal, lower left, dorsal abdominal, lower right; *I*, ovisac band, anterior median section.

bands and clusters; tiny tubular ducts more numerous, at least dorsally, intermingled with the spines in the bands and clusters, not observed within the ovisac band. Slender, inconspicuous, blunt-tipped setae present both dorsally and ventrally, maximum observed length about 28μ, most numerous in transverse rows enclosed by ovisac band, length here 10 to 24μ. Spines abundant, covering both surfaces except for sclerotic plates, interspaces between clusters, and much of the area within ovisac band, the size and shape of clusters about as shown in figure 2; with 3 recognizable transverse bands of spines within the ovisac band, the anterior broadest. Anal ring with inner pore band definitely angulate opposite the end setae, setal length about 170μ.

This species has been described from two mounted adult females taken at quarantine, Hoboken, N. J., from the Bahama Islands, on

unknown hosts by E. Kostal, on Mar. 21, 1945 (Hoboken Nos. 4153 and 4154 (holotype)), and from a few mutilated unmounted females. A larval specimen (Hoboken No. 4151) also believed to represent this species and collected by J. Adams, has likewise been examined.

ORTHEZIA CACTICOLA, New Species

(Fig. 3)

ADULT FEMALE.—No specimens available for description of condition of secretion, but obviously, from the spine pattern, with body completely covered. A large species, length as mounted, 3.8 mm., width 3 mm.; elliptical, slightly narrowed anteriorly; membranous throughout. Antennae 8-segmented, short in proportion to body size, stout, first segment more than characteristically enlarged; lengths of segments of one in microns: I, 213 x 205; II, 158; III, 119; IV, 95; V, 99; VI, 103; VII, 95; VIII, 166; spine 24; a sensory seta about 24μ near apex of each of last 2 segments; normal antennal setae small, slightly pediciliate, averaging around 8μ, with a few larger, slightly tapering, blunt-tipped; a large seta, 36μ long, stout and pointed near base of first segment. Eyestalk roughly narrow elliptical at base, flat conical, probably not more than 32μ high, with long basal dimension about 120μ. Legs, and especially the tibia, stouter than characteristic for the genus; dimensions of parts of one posterior leg in microns: Trochanter-femur, 690; tibia, 480; tarsus, 335; claw, 96; claw digitules 20 to 22, these stout but tapering to an acute tip; most of leg setae small, around 12μ, stiff, tapering, blunt-tipped, some, as those on inner face near ends of tibia and tarsi, longer and stouter, almost acute apically; claw denticles obscure, perhaps not actually developed. Beak conical with rounded apex, 450μ long, 385μ wide at base. Each thoracic spiracle about 135μ in diameter, set in a spine cluster and with numerous spines fringing the opening of atrium; abdominal spiracles present in 8 pairs, short and stout, total tube length about 32μ. Derm pores of the usual quadrilocular center type, small, averaging perhaps 5μ outside diameter, abundant and widely distributed in the ventral abdominal area enclosed by the ovisac band, elsewhere associated with the spine bands and clusters, usually scattered through the interspaces between the bands, occasionally intermingled with the spines along the margins of some bands. Minute small tubular ducts widely distributed both dorsally and ventrally, chiefly through the spine bands and clusters, with the usual scattered slender body setae, 32 to 40μ long, both dorsally and ventrally. Body spines abundant, in large bands and clusters covering the body, except for the interspaces, characteristically curved, enlarged at base, then tapering, with the apical third nearly cylindrical, up to 24μ long dorsally and ventrally, those of ovisac band around 18μ; no normal spines on the area within the ovisac band, instead with 5 recognizable loose transverse rows of hemispherical tubercles, each with sclerotized basal collar and membranous cap and with some additional scattered between the rows; with a few similar tubercles dorsally, scattered near the midline among the disk pores bordering the last 3 abdominal spine bands, some of these more elongate than mere tubercles, stout lanceolate; ovisac band well developed, the anterior median section wide, heavily crowded with spines, without intimately associated disk pores along inner (posterior) margin, but with a loose band up to 4 to 5 pores wide along, and, in part, within, the anterior margin. Anal ring nearly elliptical, slightly narrowed anteriorly, about 245μ long by 174μ wide, pore bands broad, densely crowded with pores, the inner margins strongly angularly protruding at points well behind and in front, respectively, of the anterior and posterior pairs of ring setae, not opposite as in some species; with 8 or more stout anal ring setae, maximum about 165μ, rather than with the 6 characteristic for the genus, this condition resulting from doubling of the middle setae and occurring in immature specimens as well, so apparently normal for the species; ring proper bordered on each side by a crescent-shaped rugose area bearing nearly uniformly scattered disk pores.

This species has been described from a single adult female collected on a cactus plant from Cadereyta, Mexico, at quarantine, Laredo, Tex., Dec. 9, 1946, by W. R. Walton, Jr. (Laredo 41837). Additional material, unfortunately no adults, also from cactus from Mexico (no locality) includes a lot collected at quarantine, El Paso, Tex., July 6,

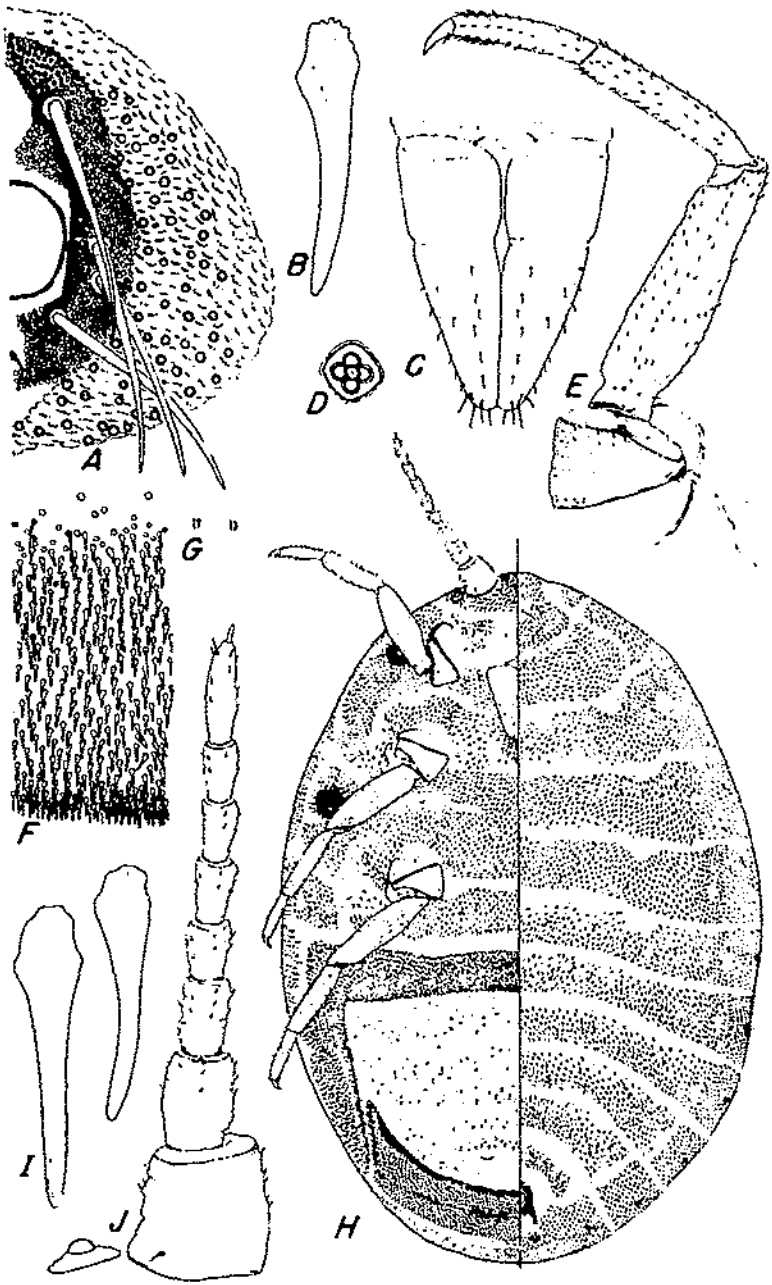


FIGURE 3.—*Orthezia cacticola*, adult female: *A*, Anal ring, right half with adjacent area of derm; *B*, body spine; *C*, beak; *D*, quadrilocular pore; *E*, posterior leg; *F*, ovisac band, anterior median section; *G*, tiny tubular ducts; *H*, body, dorsal and ventral; *I*, ovisac band spines; *J*, antenna and adjacent eyestalk.

1940 by C. F. Haller (El Paso 15798), and others collected April 30, 1941, at Laredo by J. T. Watt (Laredo 25880) and February 12, 1946, by J. Leroy Jones (Laredo 38394).

This insect approaches *Orthezia grandis* in its large size. However, although nearly twice as large, and with correspondingly larger appendages, and larger anal ring and ring setae, it appears to be more closely related to *O. mexicana* than to any other described species, as it has short tubercles rather than normal spines in the ventral abdominal area.

ORTHEZIA CHISOSI, New Species

ADULT FEMALE (only slide-mounted specimens available).—Ovoid, narrowed anteriorly; length up to 2.5 mm., width to 2.2 mm.; derm membranous except for the elongate irregularly margined dorsal cephalic thickening, this usually somewhat expanded at anterior end, then constricted, then again enlarged near middle, then constricted and often again enlarged at posterior end, but variable, with no two showing an identical pattern. Antennae stout, the third segment slightly constricted beyond middle, the last three somewhat narrowed towards the base, the terminal approaching very elongate oval, antennal setae other than sensory up to a probable maximum of 20μ long, moderately stout, tapering near apices to acute tips, sensory setae about 16μ long, not stout for this type; lengths of segments of one antenna, in microns: I, 174; II, 118; III, 158; IV, 118; V, 118; VI, 118; VII, 95; VIII, 134; spur 17.4; total excluding spur 1033; maximum total length measured 1280. Eyestalk rounded to broadly elliptical at base, broadly rounded from base to apex in profile; diameter of one 118μ, height 71μ; eyespot placed asymmetrically, not at middle of the profile curve. Legs large and stout, the leg setae relatively few, shaped as antennal setae; lengths of parts of one about average, posterior leg, in microns: Trochanter-femur 720; tibia 770; tarsus 400; claw 96; usually with 2 claw denticles, the inner the larger. Beak short and stout, about 200μ long, probably about same or wider at base, the apical setae stout and conspicuous, maximum length about 43μ. Thoracic spiracles weakly sclerotized, each opening into a spine patch with the spines somewhat smaller immediately around the opening, and showing a slight tendency to form a whorl; abdominal spiracles in 7 pairs, not unusual, diameter of collar at opening of one intermediate 9μ, length of tube 40μ. Derm pores of the usual quadrilocular type, relatively few dorsally, in interspaces between spine bands and clusters, more numerous between the lateral spine clusters and quite abundant ventrally anterior to the ovisac band, the latter pores more lightly sclerotized than the dorsal and lateral pores, and somewhat smaller; disk pores very abundant in association with ovisac band, as detailed later; small, circular, clear disks associated with the quadrilocules throughout, but comparatively few in number. Body setae distributed much as in other species, middorsal abdominal about 24 to 28μ long. Body spines only a little expanded basally, slightly curved in one profile and tapering gradually to rounded apex, middorsal about 18 to 20μ long; dorsal spine bands more or less complete, that is, continuing in some fashion from midline to marginal cluster on each side, but with the spines in each cluster varying in density of occurrence and orientation and with the spines in the outer halves of some of the abdominal bands reduced in numbers, or even wanting, sometimes leaving some bare dermal areas in addition to the relatively wide interspaces between the spine bands; spines in marginal clusters more crowded and more uniformly distributed; spines wholly or almost wholly lacking ventrally in the area behind the beak and between the coxae; characteristically with 5 transverse bands of spines across the area enclosed by the ovisac band, and 2 small supplementary clusters, 1 on each side, behind these and close to the posterior portion of the ovisac band. Ovisac band rather narrow, interrupted 3 times on each side towards the posterior apex, the anterior median section (and the rest as well) crowded with quadrilocular disk pores through the inner (posterior) one-half to two-thirds of its width, with a close double to triple row along the inner margin and with numerous such pores loosely distributed along and before the outer (anterior) margin; this appearance somewhat less striking in old specimens with distended bodies. Anal ring relatively weakly developed; length of one 140μ, width 100μ; both the inner and outer pore bands narrow, the inner not at all produced internally opposite anterior and posterior ring

setae; the 6 anal ring setae stout at base, tapering fairly uniformly to slender apices, but slightly blunted at ends.

This insect has been described from two lots of slide-mounted specimens collected by G. F. Ferris in Texas, as follows: On grass, Chisos Mountains (T–289) (holotype and paratypes), same (T–767–C. C.) (paratypes); presumably these collections were made, with others, in the summer of 1921. The holotype and some paratypes have been returned to Professor Ferris at Stanford.

ORTHEZIA (ARCTORTHEZIA) COSTIS Ghesquière, Nom. Nud.

This name, published by J. Ghesquière (*14, p. 268*) in 1933 in an account of an exhibition of specimens, was reported as collected on *Costus afer* (Zingiberaceae) at Mayumbe, Belgian Congo. It has never been validated through the publication of a description, and recently Dr. Ghesquière (in litt.) has advised that it was placed eventually as identical with *Orthezia insignis* Browne.

ORTHEZIA FERRISI, New Species

(Fig. 4; pl. 1, C)

ADULT FEMALE.—Dried female with secretion around 2.75 mm. long by 2.5 mm. wide, normally completely covered by tufts of secretion, these developed very much as with *O. annae*, with the anterior marginal tufts stout and the posterior much elongated and strongly overlapping the ovisac; total observed length with ovisac up to 5.5 mm.; ovisac strongly fluted, slightly upcurved towards tip.

Body of female, as mounted, ovoid, length around 2.1 mm., width near 1.6 mm., membranous, except for the elongate, irregularly margined, more or less spindle-shaped dorsal cephalic sclerotic plate. Antennae 8-segmented, lengths of segments of an average one, in microns: I, 126; II, 87; III, 126; IV, 95; V, 95; VI, 79; VII, 87; VIII, 190; spur 30; antennal setae few, stiff, somewhat tapering with truncate tips, 18 to 24μ long. Eyestalk very flat conical, base irregular in shape, about 100μ x 90μ, the eye protruding hemispherically from the apex. Legs of intermediate stoutness, length of parts of one hind leg, in microns: Trochanter-femur 640, tibia 580, tarsus 368, claw 96; claw with 2 small, well separated denticles on the apical third; ordinary leg setae stiff, tapering apically, truncate as with antennal setae, around 24μ long, not numerous. Beak relatively slender and elongate, 300 to 350μ long, 220μ or more in basal width, depending on compression. Thoracic spiracles not unusual, opening into the midst of a spine cluster, with none of these especially modified in size or shape; abdominal spiracles in 7 pairs, diameter of atrium of one intermediate 12μ, length of sclerotized tube 40μ. Derm pores not unusual, distributed sparsely between the spine bands dorsally, more abundant in the interspaces towards margins, still more abundant ventrally, and present in heavy transverse bands across the ventral abdominal area enclosed by the ovisac band; some clear disks of varying sizes ventrally just in front of the ovisac band. Body spines numerous, characteristically somewhat curved, only slightly enlarged basally and tapering only a little towards the rounded tip, an average spine about 24μ long; the dorsal transverse bands complete and broadened towards lateral apices, marginal clusters high, that is long dorsoventrally, with 5 well developed transverse bands of spines across the enclosed ventral abdominal area, the posterior short and small. Ovisac band well developed, anterio-median section around 215μ wide, no disk pores along outer (anterior) margin, but a definite single row within the anterior edge of the band, located perhaps one-eighth to one-tenth of the band width from its anterior margin, with scattered disk pores through the intermediate two-thirds of this section of the spine band, and with a single to irregularly double row of pores along the inner (posterior) margin of the band; each lateral section of band interrupted 5 times by narrow clear spaces, each bearing a row of disk pores. Anal ring elliptical, or somewhat narrowed anteriorly, dimensions of one 170μ long by 112μ wide, each inner pore row produced somewhat internally opposite the anterior ring seta, but not obviously so

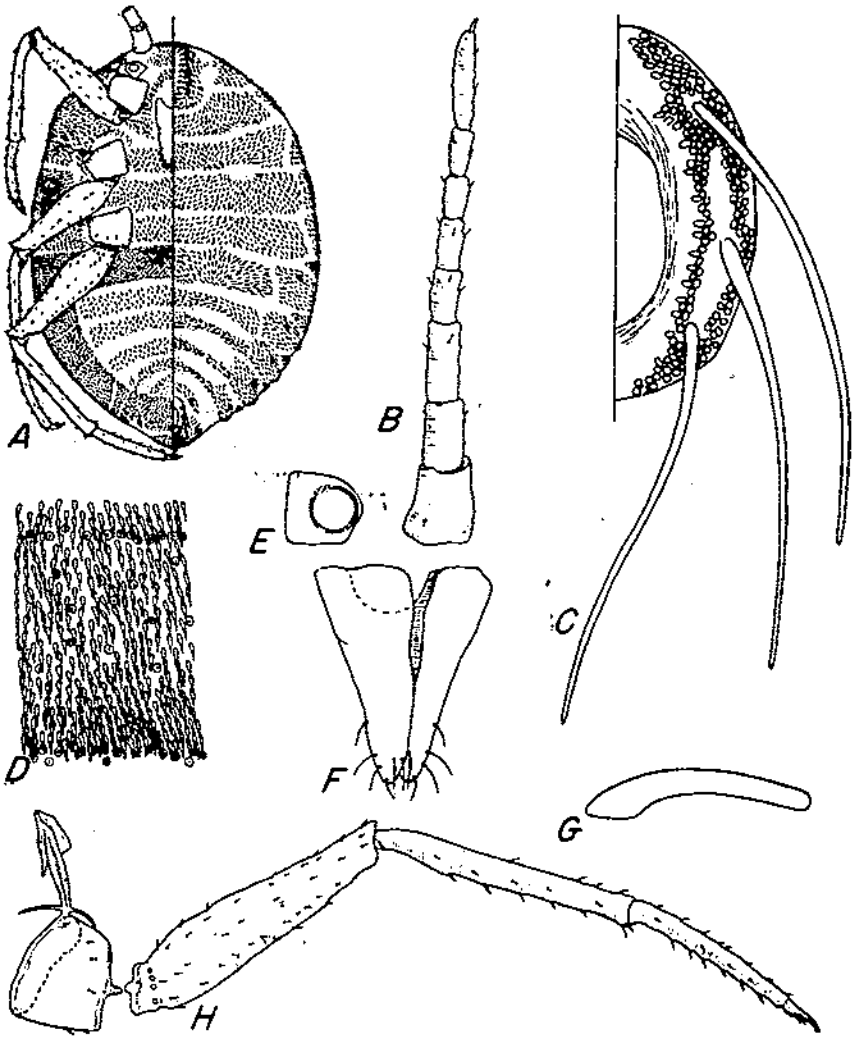


FIGURE 4.—*Orthezia ferrini*, adult female: *A*, Body, dorsal and ventral; *B*, antenna; *C*, anal ring, right half; *D*, ovisac band, anterior median section; *E*, eyestalk; *F*, beak; *G*, dorsal spine; *H*, posterior leg.

produced opposite the posterior one, the setae relatively slender in comparison with some other species, around 210μ long where perfect.

This insect has been described primarily from a few specimens collected by G. F. Ferris from *Franseria* at Socorro, lower California, Mexico, on March 3, 1939, but has been drawn to include also additional specimens collected in 1941 by Ira Wiggins from *Helianthus niveus*, Kino Bay, Sonora, Mexico, although some minor anatomical divergences appear in the latter specimens; for example, the antennae on these are somewhat longer and the legs and beak are somewhat shorter as compared with the Socorro material.

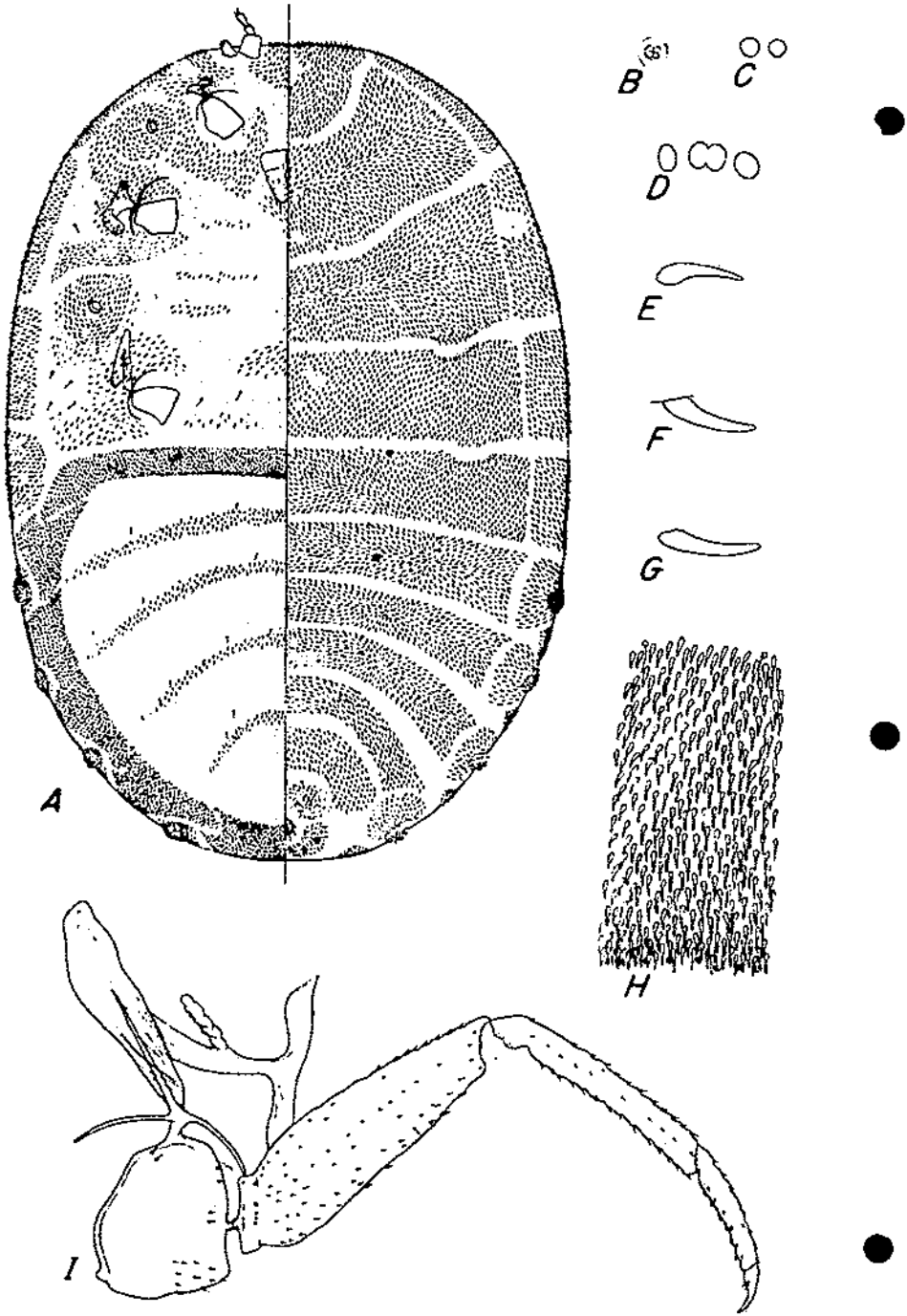


FIGURE 5.—*Orthezia gigantea*, adult female: *A*, Body, dorsal and ventral; *B*, disk pore; *C*, dorsal clear pores; *D*, ventral abdominal clear pores; *E*, ovisac band spine; *F*, dorsal spine; *G*, spine from abdominal marginal protrusion; *H*, ovisac band, anterior median section; *I*, posterior leg.

The holotype and some paratypes have been returned to Stanford University.

ORTHEZIA GIGANTEA, New Species

(Figs. 5 and 6; pl. 1, *D*)

ADULT FEMALE.—Dried adult female inverted cordate in shape, broadly pointed anteriorly, notched posteriorly; length with secretion 7.5 mm., width 6.5 mm.; dried body color brown, apparently normally completely covered by secretion, but this nowhere long and coalesced into conspicuous plates; instead the usual plates, both lateral and dorsal, apparently made up of a number of small tufts that are poorly coalesced and in the marginal areas form circular rosettelike clusters corresponding, in position with the usual solid marginal tufts; secretion dorsally, as laterally, short, confused and even with the surface somewhat fuzzy in contrast to the usual sharply formed plates; ovisac long, broken) about 5 mm. long (perhaps incompletely formed), mostly smooth with 5 longitudinal striae and a few longitudinal ribs.

Distended females as mounted elliptical to slightly ovoid, up to 7.5 mm. long by 6 mm. wide, though usually somewhat shorter. With a large, moderately sclerotized, cephalic median dorsal plate and 4 pairs of hemispherical, moderately sclerotized protuberances along the margins of the posterior half of the abdomen;

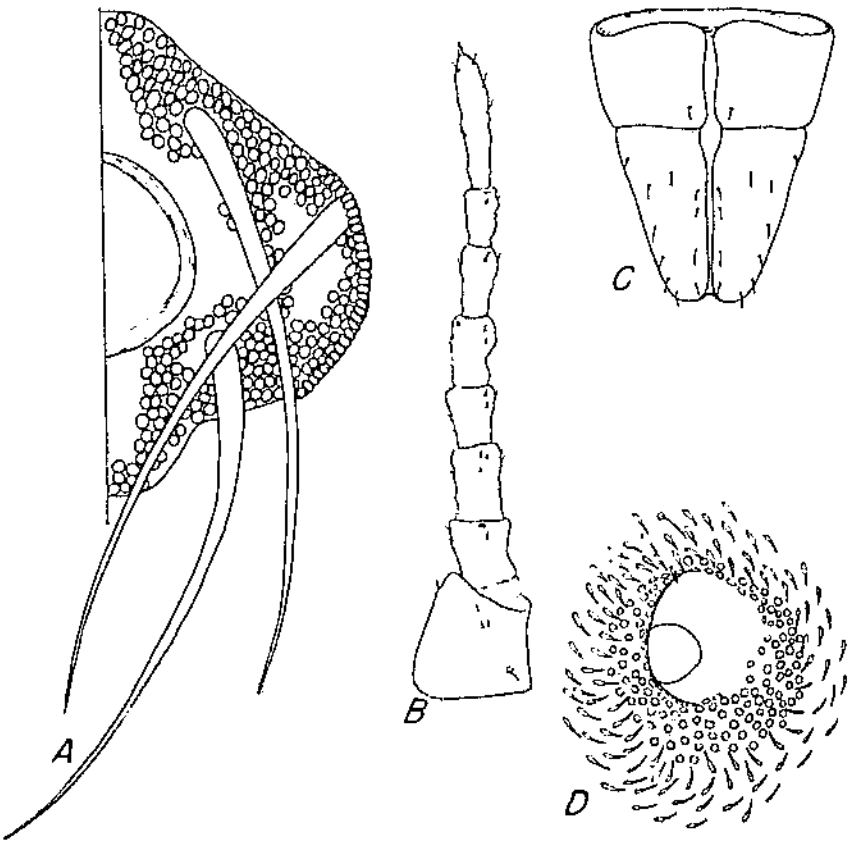


FIGURE 6.—*Orthezia gigantea*, adult female: *A*, Anal ring, right half; *B*, antenna; *C*, beak; *D*, group of specialized and regular spines around opening of thoracic spiracle.

derm otherwise appearing membranous. Antennae characteristically 8-segmented (one with 7 observed), lengths of segments of one, in microns, as follows: I, 213; II, 126; III, 126; IV, 95; V, 118; VI, 111; VII, 103; VIII, 230; spur 24; antennal setae few, stiff tapering, but with extreme tips blunted, about 24μ long. Eyestalk strongly protruding, stout rounded conical, not much expanded basally, height about 120μ, long basal diameter about 135μ. Legs stout, trochanter-femur 830μ, tibia 670μ, tarsus 350μ, claw 130μ in one hind leg, ordinary setae 12 to 16μ, stiff, claw denticles and digitules uncertain from available material. Beak stout, rounded-conical, about 450μ long, a slight indication of a joint a little closer to base than to tip. Thoracic spiracles large, each opening in a spine cluster and surrounded by a conspicuous band of rounded-conical tubercles having basal diameters about the same as those of adjacent spines; so far as can be determined, with 8 pairs of abdominal spiracles, these not unusual, diameter of opening around 16μ, length approximately 50μ. Disk pores about 4μ in diameter, appearing small on so large an insect, widely scattered over the derm both dorsally and ventrally, and in crowded bands across the enclosed ventral abdominal area; smaller round disks present, also widely scattered, but considerably less abundant; ventrally within the enclosed abdominal area with numerous larger clear disks of variable size, these often coalesced into groups of 2 or 3. Body spines numerous, in fully developed bands and clusters, the spines rather loosely grouped within each band and not all pointing in one direction, showing curved lines and semi-whorls; margins of the posterior abdominal segments showing conspicuous, hemispherical, slightly sclerotized protuberances, each roughly 160 to 200μ in diameter and relatively closely crowded with spines; these protuberances in 4 pairs, placed close to the third to sixth abdominal spiracles; so far as can be determined, with 4 relatively narrow transverse bands of spines across the enclosed ventral abdominal area. Ovisac band wide, each lateral section interrupted by 3 narrow clear streaks, crowded with disk pores, anterior median section without disk pores, but with setae in the outer (anterior) margin, and a single loose row of disk pores along the inner (posterior) margin. Anal ring somewhat distorted, appearing about 120μ long and 120μ wide, more or less constricted towards the ends, each half wide, with numerous pores in 2 bands joined at ends and between each 2 setae, interspaces at ends between halves nearly ligulate, not at all diamond-shaped; with the usual 6 setae about 135μ long.

This insect, remarkable both for its enormous size and for some of its morphological characteristics, has been described from a few specimens collected by G. F. Ferris on an undetermined tree in Chiriqui Province, Panama, in 1938. It was found beneath a bark scale on the trunk of the tree.

The holotype and some paratypes have been returned to Professor Ferris.

ORTHEZIA GRAMINICOLA, New Species

(Figs. 7 and 8; pl. 1, *E*)

ADULT FEMALE.—Dried body with long dorsal secretionary tufts, 3.75 mm. long and 1.7 mm. wide, total length with ovisac 6 mm.; completely covered by secretion dorsally, the anterior dorsal tufts quadrate and directed forward, the remaining dorsals directed posteriorly at a gradually increasing angle, the abdominal pairs thin and strongly overlapping, these erect dorsal tufts occupying the middle part of the dorsum, with the submarginal areas covered by small flattened scalelike tufts of secretion; marginal secretionary tufts well developed, the anterior pair digitate and directed diagonally forward and outward, the second pair similarly shaped, but directed squarely outward, the 3 thoracic tufts flattened, somewhat overlapping and turned backward, the 5 abdominal tufts longer and more slender, strongly curved or directed backwards, gradually increasing in length, the apical as much as 5 mm. long; ovisac distinctly fluted dorsally, almost straight.

As mounted, stout elliptical, length up to 2.7 mm., width to 1.95 mm.; membranous throughout, no cephalic or other sclerotization, heavily covered with spine bands and clusters. Antennae not unusual, lengths of segments of one, in microns: I, 197; II, 138; III, 166; IV, 120; V, 107; VI, 87; VII, 81; VIII, 160; spine 17; setae on segments few, small almost cylindrical, bluntly rounded

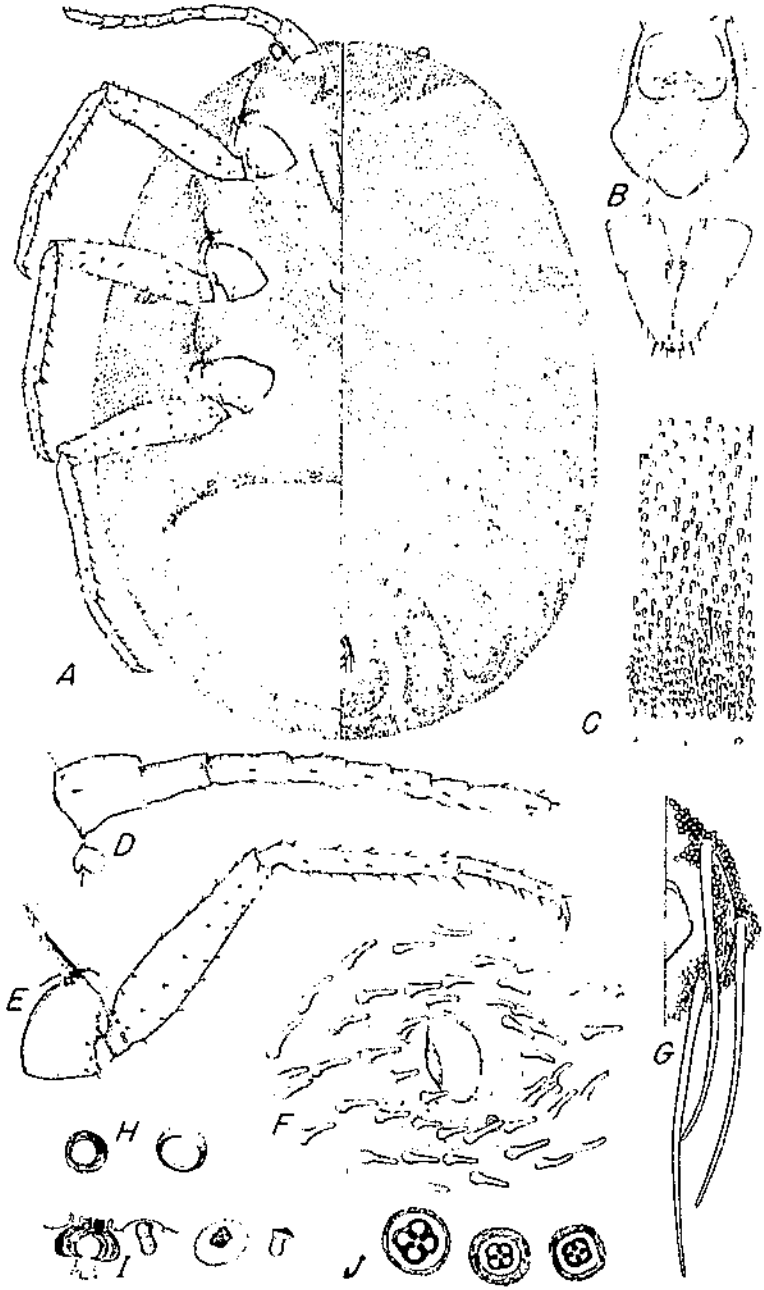


FIGURE 7.--*Orthezia graminicola*, adult female: *A*, Body, dorsal and ventral; *B*, mouth parts; *C*, ovisac band, anterior median section; *D*, antenna and adjacent eyestalk; *E*, posterior leg; *F*, thoracic spiracle and spines adjacent to opening; *G*, anal ring, right half; *H*, small clear pores; *I*, quadrilocular disk pore and simple tubular ducts, surface and profile; *J*, quadrilocular pores, showing variations in size and surface appearance.

apically. Eyestalk very short, in profile appearing as a globe set on a flattened, expanded base, height about 55μ, maximum width of base about 71μ. Legs not unusual, lengths of parts of posterior leg, in microns: Trochanter-femur, 700; tibia, 608; tarsus, 308; claw, 85; with 2 small denticles on claw, the subapical a little larger than the other. Beak stout conical, rounded at apex, some suggestion of a joint towards base; length 280μ, width about 240μ. Thoracic spiracles not unusual, each opening near the middle of a large spine cluster, but the spines not closely crowded around the opening in a tight band as in some related species; abdominal spiracles in 8 pairs, the sclerotized tube of each around 40μ long. Quadrilocular disk pores present in transverse bands across the posterior portion of the ventral abdominal area, and in considerable numbers, associated with the ventral spine clusters located mesad of the coxae; elsewhere, both dorsally and ventrally, less numerous, mostly scattered along the interspaces between the spine clusters; small clear rings present over both surfaces, not abundant, mostly scattered through the interspaces between the spine clusters; tiny short tubular ducts widely distributed, through the dorsal and marginal spine clusters, also present in the interspaces and the ventral abdominal area; body setae few, scattered, inconspicuous among the spines, somewhat more numerous and more evident ventrally in the vulvar area. Spines abundant, closely covering the entire body as in *solidaginis* and related forms, the ends of the dorsal and marginal bands somewhat overlapping, though less strongly than in some of the other species; ovisac band broad, a single row of quadriloculars along the inner (posterior) margin of the anterio-median section, no pores, but a very few clear disks along outer (anterior) margin of this section. Anal ring with inner margin of pore band of each half protruding and sharply angulate opposite the end setae as in related forms; anal ring setae around 200μ long.

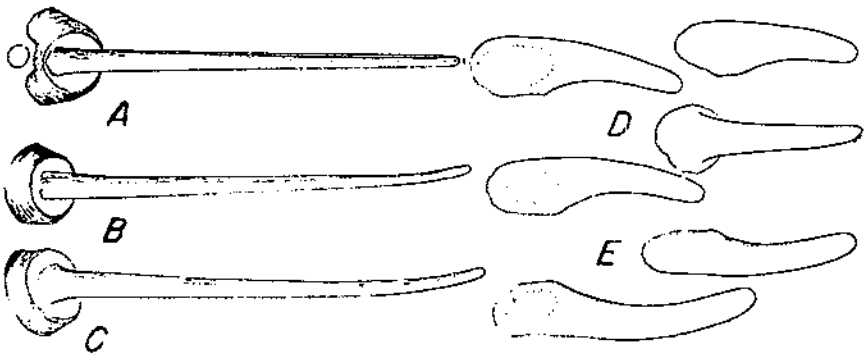


FIGURE 8.—*Orthezia graminicola*, adult female: *A*, Body seta from a spine band; *B*, same, from mid-ventral area; *C*, same from mid-dorsal area; *D* and *E*, spines from different parts of derm.

This insect has been described from a few specimens included in a single collection made at Gulfport, Miss., May 29, 1945, from Gramineae by George Rau (Division of Foreign Plant Quarantines special Survey No. 26212). It is believed that this is a native U. S. insect.

ORTHEZIA GRAMINIS Tinsley

An additional record for this species is from Parma, Idaho, received from C. Wakeland, Aug. 23, 1927 (Idaho 973), on unstated host.

ORTHEZIA GUATEMALENSIS, New Species

(Fig. 9; pl. 1, *F*)

ADULT FEMALE.—Dried body stout ovoid, length with secretion up to 2.55 mm., total with ovisac up to 4 mm., width up to 2 mm.; cephalic dorsal tufts each narrow, strongly arcuate anterior to middle and slanting outwards, remaining

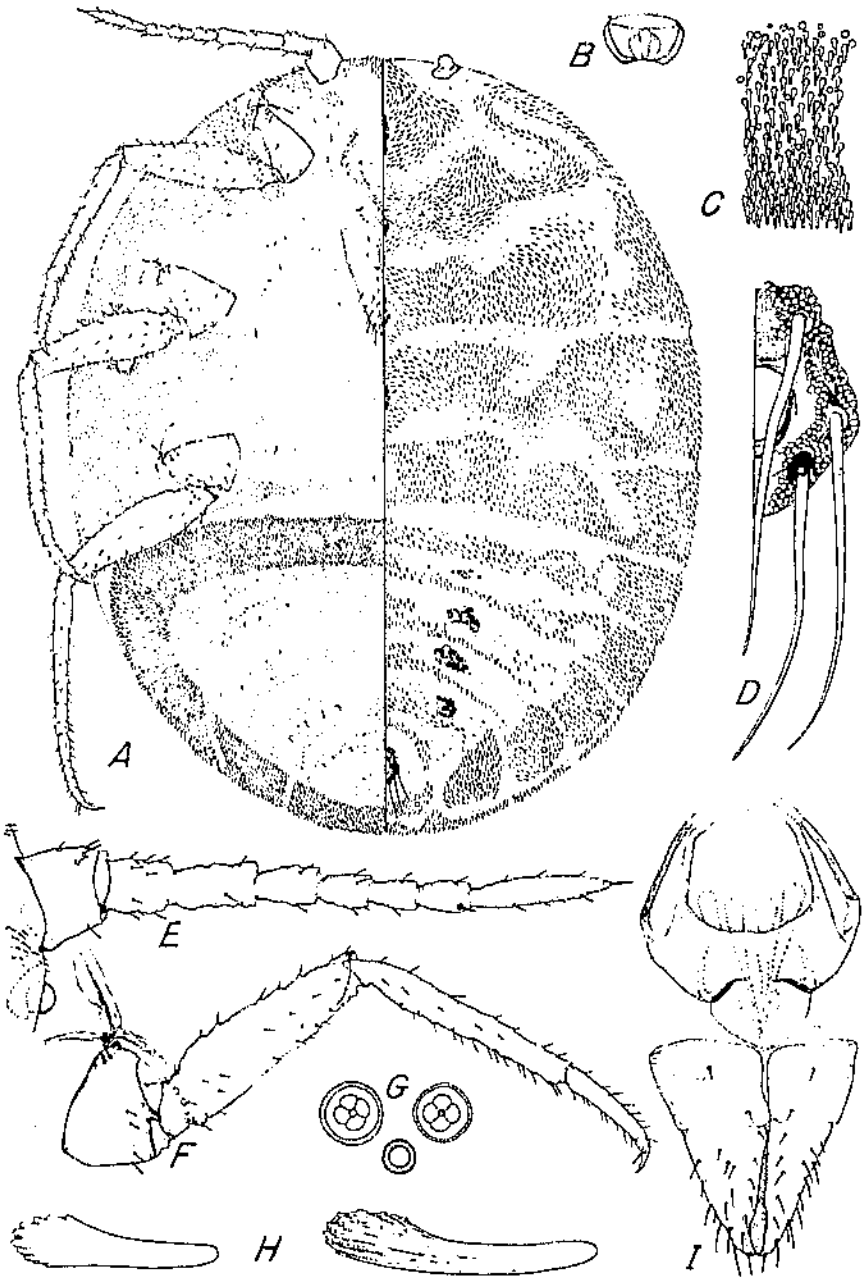


FIGURE 9.—*Orthezia guatemalensis*, adult female: *A*, Body, dorsal and ventral; *B*, disk pore, profile; *C*, ovisac band, anterior median section; *D*, anal ring, right half; *E*, antenna and adjacent eyestalk; *F*, posterior leg; *G*, quadrilocular and small clear pores, surface view; *H*, body spines; *I*, mouthparts.

dorsal tufts each in two sections, a fairly high, but short, portion adjacent to the midline, all slanting posteriorly and overlapping, and a low, transverse continuation to margin, so narrow as to leave bare or lightly wax-coated interspaces on the sides of the thoracic and abdominal segments; marginal wax tufts flattened, and more or less distinctly fluted, each increasingly longer and more strongly curved posteriorly up to the two apical, maximum observed length (posterior) 1.8 mm.; ovisac distinctly fluted dorsally, somewhat upcurved at apex.

As mounted, stout elliptical, 2.5 mm. long by 2.1 mm. wide; membranous, except for 1 dorsally elongate cephalic, 3 small, irregular, sclerotized plates down the midline on the thoracic segments and 4 pairs of irregular plates on the abdominal segments, in a line about half way between midline and margin on each side, these plates anterior to and not interrupting the associated spine band on each segment. Antennae not unusual, lengths of segments of one, in microns: I, 134; II, 110; III, 134; IV, 95; V, 79; VI, 71; VII, 83; VIII, 205; spine 32. Eye-stalk about 75μ long, asymmetrically expanded basally, with the apical half, bearing the eye, almost cylindrical. Legs not unusual, lengths of parts of a posterior leg, in microns: Trochanter-femur 556, tibia 514, tarsus 220, claw 63; the subapical denticle on claw relatively strong, the second one only slightly developed. Beak stout conical, narrowly rounded at tip, length 316μ, width at base practically the same. Each thoracic spiracle in a shallow pocket, the opening in a large spine cluster, the spines around it forming a tight circle with some distinctly shortened, not characteristic of the normal type; abdominal spiracles in 7 pairs, the tubes shorter and stouter than with some other species. Quadrilocular disk type of derm pore numerous both dorsally and ventrally, though crowded only in the area within the ovisac band, here in wide transverse segmental bands; elsewhere, bordering the spine clusters and intermingled with the spines in the clusters, and, ventrally, abundant, though not in obvious pattern in the spine-free area outlined by the 6 coxae; with small clear rings or disks decidedly smaller than the quadriloculars, and much less numerous, likewise present on both surfaces. Minute short tubular ducts noted, but apparently not abundant. Body setae inconspicuous among the spines, slender, acute, length up to 34μ observed, those in vulvar area definitely differentiated and much shorter, about 12 to 16μ, stout, often blunted at apices. Spines numerous, in bands and clusters; dorsally a large cephalic cluster, 3 wide but irregular thoracic bands, continuous to marginal clusters, except for interruption on midline by sclerotized plates, then 2 wide and complete abdominal bands without obvious midline interruption, then 4 bands, enlarged on each side of indicated midline, then narrowed to near margin and again more or less enlarged, the narrow portion passing behind the sclerotized plate on each half of each segment involved, finally with a narrow band, strongly interrupted medially, arching over the anal ring; marginal spine clusters large, only narrowly separated, in the usual number for *Orthezia*, cephalic, caudal, and 9 on each side between these recognizable; 3 thoracic clusters continued ventrally between the coxae; ovisac band about 19 spines wide in anterior median portion, with a loose row of quadriloculars and tiny clear disks along outer (anterior) margin, a few quadriloculars and a very few setae scattered through the band, and some quadriloculars, pretty much concealed by the spines, along the inner margin; apparently without any spines in the area enclosed by ovisac band. Anal ring not unusual, the 6 setae about 19μ long, bluntly rounded apically.

This insect has been described from a few adult females collected on an unknown host at Quezaltenango, Guatemala, May 18, 1945, by E. J. Hambleton (No. 35).

ORTHEZIA GYMNOLOMIAE, New Species

(Fig. 10; pl. 1, *G*)

ADULT FEMALE.—Dried body with secretion around 2.6 mm. long and 2.2 mm. wide, total length with ovisac 4.5 mm. or more; with 2 wedge-shaped tufts protruding anteriorly and upcurved from the cephalic margin of body, a series of comparatively small marginal tufts, gradually longer posteriorly, a submedian row of small, nearly erect tufts on each side of bare median line and a row of thin flat plates extending perhaps half way to the body margin from this submedian row of tufts; dorsal plates of ovisac strongly ridged and fluted; a bare lanceolate area dorsally on the midline between the submedian tuft rows, and a bare band

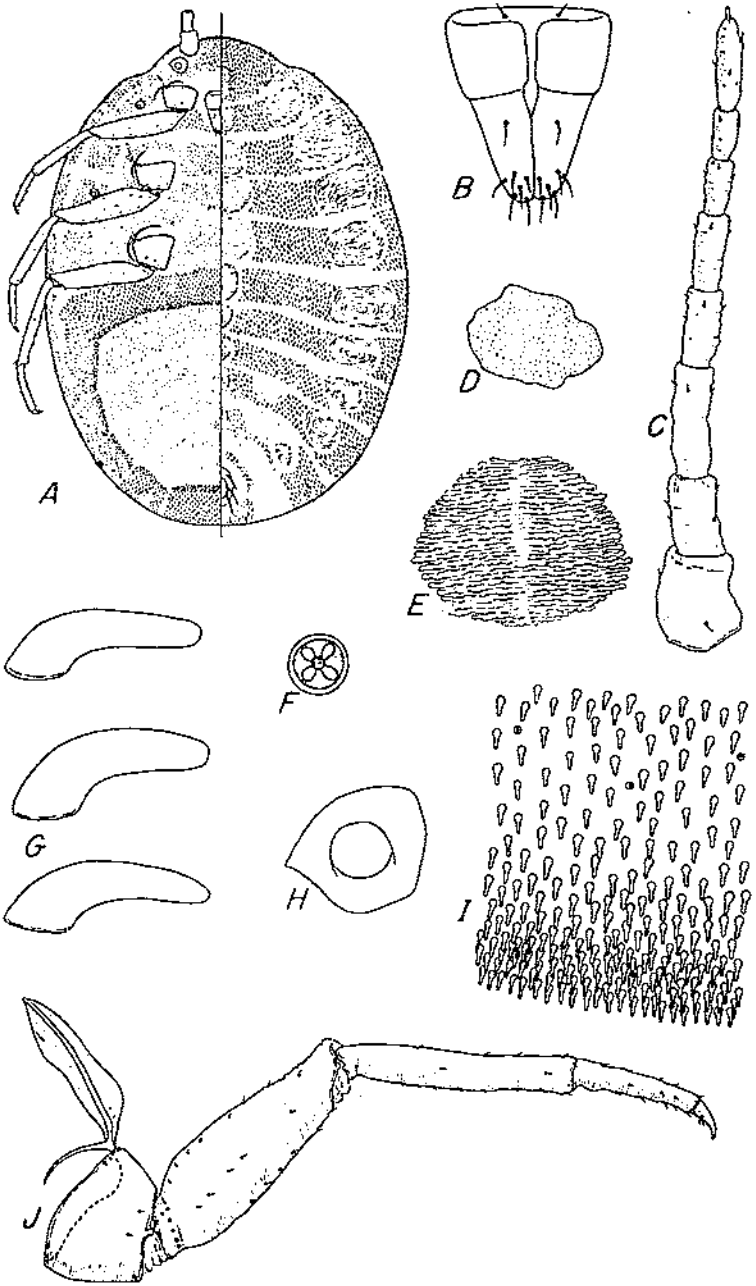


FIGURE 10.—*Orthezia gymnolomiae*, adult female: *A*, Body, dorsal and ventral; *B*, beak; *C*, antenna; *D*, posterior intermediate sclerotized plate; *E*, median sclerotized plate; *F*, quadrilocular pore; *G*, body spines, ventral, ovisac band, and dorsal, in vertical sequence; *H*, eyestalk; *I*, ovisac band, anterior median section; *J*, posterior leg.

laterally on each side between the thin flat plates and the body margin, color of exposed areas dull brown.

Body as mounted, stout elliptical, average length 2.75 mm., width 2.25 mm., but varying a little between specimens; with 3 rows of conspicuous, sclerotized, more or less oval dorsal plates, one, of 9 plates, down the midline from cephalic margin to penultimate abdominal segment, and one, of 10 plates, submarginally on each side of body; in addition with 1 to 2 intermediate pairs of plates on the apical abdominal segments (see figure). Antennae strongly sclerotized, length varying somewhat; lengths of segments of one, in microns: I, 126; II, 134; III, 166; IV, 142; V, 134; VI, 103; VII, 95; VIII, 181; total length 1082; antennal setae small, average about 12μ, stiff, tapering, blunted at apices. Eyestalk flat conical, with broadly rounded apex, base essentially triangular in outline, with corners rounded and an extended ligulate posterior extension. Legs heavy and not so long in proportion to body size as in many other species; lengths of parts of a hind leg, in microns: Trochanter-femur 640, tibia 580, tarsus 300, claw 96, claw digitule uncertain; setae on upper portions of leg parts small—about 12μ long, slender, blunted apically and comparatively few; claw with 2 strong, well-separated denticles towards apex. Beak stout, around 315μ long by 290μ wide at base, slightly constricted near base but no obvious suggestion of a joint here. Thoracic spiracles not unusual, each opening in the middle of a cluster of spines, with the spines immediately adjacent to the opening a little smaller and showing a slight tendency to cluster; abdominal spiracles in 7 pairs, the tube up to 40μ long. Disk pores not unusual, relatively few dorsally, scattered between spine bands, more abundant ventrally, especially in transverse bands across the area enclosed by the ovisac band. Body spines abundant, bands or clusters, with allowance for interspaces, occupying the areas not covered by the sclerotized plates; individual spines small, around 18μ long, not very strongly curved nor enlarged at base nor tapering; spines in ovisac band, specifically those of the anterior median section distinctly stouter, especially at base, and more strongly tapering, about 12μ long, those in posterior portion of band more elongate to 16μ long; no disk pores closely associated with either margin of the anterior median section of the ovisac band, this band completely interrupted 4 times on the posterior half of each side by narrow spineless areas. Anal ring somewhat elongate oval; length of one 192μ, width 116μ, and of a ring seta 200μ; ring pores in 2 bands, the inner one not appreciably produced inwardly opposite the anterior and posterior setae on each side; 2 loose clusters of hemispherical tubercles on the derm on each side of the ring.

This species has been described from several slide preparations and one unmounted adult female from *Gymnolomia tenuifolia*, Chisos Mountains, Tex., collected in 1921 (T–2543) (holotype), and from a composite, Mount Franklin, El Paso, Tex., June 1921, both collected by G. F. Ferris. The holotype and some paratypes have been returned to Professor Ferris at Stanford University

ORTHEZIA HAMBLETONI, New Species

(Fig. 11)

ADULT FEMALE.—Nothing available on unmounted condition. As mounted, stout ovoid, widest opposite anterior section of ovisac band, length 2.2 mm., width 1.66 mm. Derm membranous except for certain conspicuous sclerotized areas down the middle, those including a large, roughly quadrate, cephalic plate with anterior tongue extending between antennal bases onto the lower surface of the head, a transverse plate, somewhat constricted medially, immediately behind this, then 4 paired plates each made up of a solidly sclerotized part in anterior portion and a mottled, partly sclerotized, partly membranous area in the posterior portion, then 1 more pairs of plates, these located outside of paired spine clusters, and sometimes with small sclerotized areas between the 2 spine clusters of a pair (see figure); size and shape of these sclerotic areas variable from specimen to specimen. Antennae 8-segmented, not unusual, lengths of segments of one, in microns: I, 158; II, 126; III, 182; IV, 110; V, 115; VI, 103; VII, 95; VIII, 190; spine 16. Eyestalk short, strongly asymmetrically conical, about 87μ high. Legs strongly sclerotized, not unusual, length of parts of one posterior leg, in microns: Trochanter-femur 670, tibia 670, tarsus 385, claw 80; 2, or rarely 3, small denticles towards tip of claw. Beak short and wide, 235μ long

by 285μ wide at base, triangular in outline with broadly rounded tip, hardly any hint of a joint. Thoracic spiracles each with spines clustered around the opening, the spine pattern showing some variability; 7 pairs of abdominal spiracles present, each opening in a cluster of spines. Derm pores including the usual quadrilocular type, somewhat larger and more heavily sclerotized dorsally, and

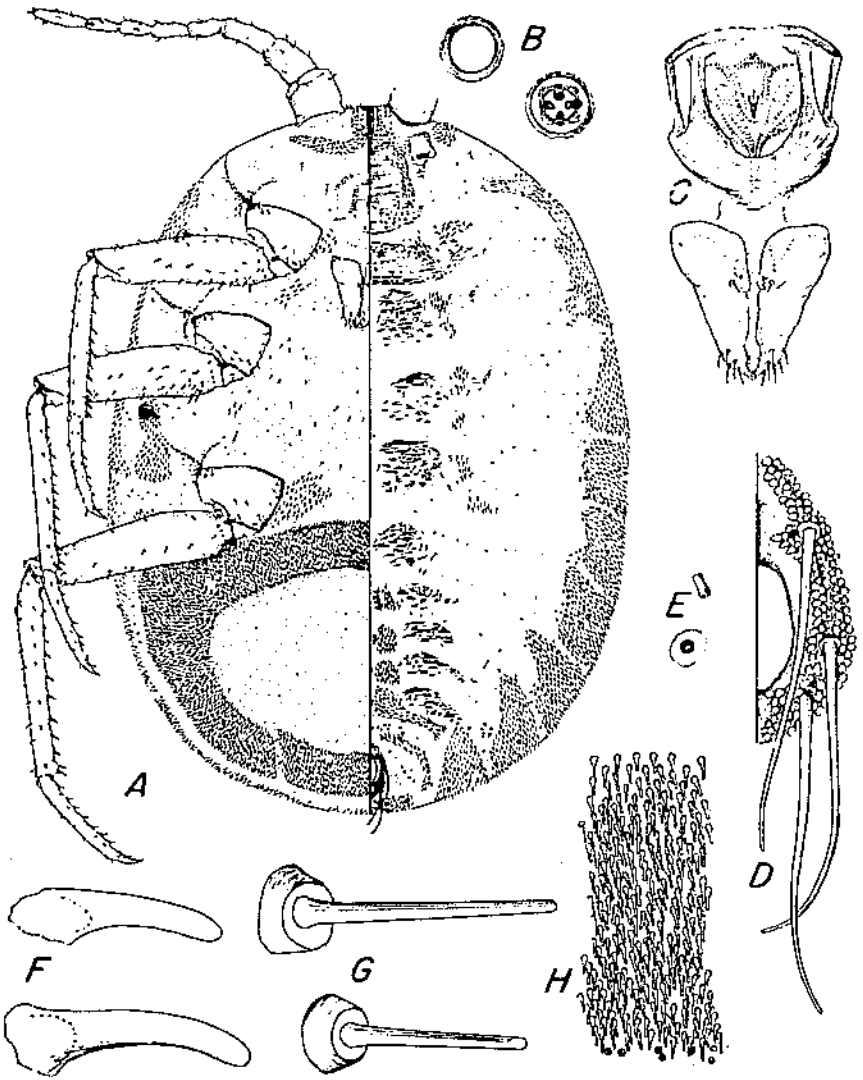


FIGURE 11.—*Orthezia hambletoni*, adult female: *A*, Body, dorsal and ventral; *B*, quadrilocular disk and simple pores, surface view; *C*, mouth parts; *D*, anal ring, right half; *E*, tiny tubular duct, surface and profile; *F*, body spines; *G*, body setae; *H*, ovisac band, anterior median section.

the small simple rings suggesting tiny cicatrices; in addition, dorsally near the midline at least, with groups of structures suggesting very tiny tubular ducts; quadrilocular pores and clear disks very few and mostly scattered dorsally, much more numerous ventrally and crowded in the vulvar area. Body setae all rather short and slender, inconspicuous, the longest noted about 24μ, very few

dorsally, more ventrally, with clusters in the vulvar area. Spines more numerous than in *pinicola* but still absent over most of dorsal surface, dorsally with an elongate cluster on each side between cephalic plate and eyestalk, small irregular clusters, sometimes of only a few spines, outside the ends of the next 5 sclerotic plates, then the remaining 4 clusters inside the associated sclerotic plates, the first with a small plate inside it, the next 2 close to the midline, then each cluster of the posterior pair with a narrow diagonal extension running to the margin behind the sclerotic plate on each side, and finally with an additional narrow band curving from near the midline to the margin on each side just above the anal ring; with 10 marginal spine clusters on each side including the joined posterior ones beneath the anal ring, ventrally with a band of spines below antennal base, a circular tuft below each eye, a cluster around each thoracic spiracle, with those in the posterior ones extended in both directions and forming a band widened posteriorly, a quadrate cluster behind and outside each posterior coxa, and another inside, these just in front of the ovisac band, and a few spines, hardly enough to call a cluster, between fore and mid coxae and mid and hind coxae on each side; ovisac band wide and conspicuous, the spines densely crowded, no row of pores immediately adjacent to outer (anterior) margin, but with a loose row close to posterior margin; no transverse rows or bands of spines on the area enclosed by the ovisac band, only quadrilocular and simple disks as described. Anal ring characteristic for genus, the setae about 190μ, bluntly rounded apically.

This species has been described from two mounted adult females collected on *Pinus oocarpa* at Quezaltenango, Guatemala, by E. J. Hambleton, July 10, 1944 (No. 19).

ORTHEZIA INSIGNIS Browne

(Fig. 17, *B*)

This insect has gone under the authorship of J. W. Douglas almost exclusively since its first description, but Lindinger (*30, p. 141*) in 1935 called attention to the fact that Browne's (*5, p. 169*) notes and illustrations on the species constituted a description and appeared in print before the Douglas description of it as new. Zimmerman (*45, p. 657*) has discussed this matter of authorship in some detail, reaching the same conclusion.

The insect continues to attract attention, and to spread through the world, as evidenced by the following records, additional to those given in 1925, which nearly double the number of areas from which its occurrence has been reported, or from which it has now been identified: Argentina, Australia, Austria, Azores, Bahamas, Belgian Congo, British Honduras, Canada, Canary Islands, Colombia, Denmark, Dutch Guiana, Egypt, El Salvador, Formosa, Germany, Haiti, Honduras, Hungary, India, Japan, Kenya, Morocco, Paraguay, Portugal, Réunion, South Africa, Southern Rhodesia, Switzerland, Tanganyika, Trinidad, Uganda, U. S. S. R., Venezuela, Virgin Islands (British). Within the United States the following States have been added to the previously reported distribution: Arizona, Florida, Michigan, Missouri, Tennessee, Utah, Washington, Wisconsin. The species already has shown such wide host adaptability that no attempt is made here to give the additional hosts that have been reported in recent years.

An appreciable amount of variation is present in the various lots of material that in the past have been placed as *insignis*, and a restudy of the available specimens shows that a group from Mexico can be differentiated rather sharply from the greenhouse and tropical insular specimens, chiefly through the conspicuously greater development of

the dorsal cephalic midline sclerotized areas, and the larger body size. In the available greenhouse material, assumed to be characteristic for the species as it was originally described, this sclerotic area is restricted in its development, appearing as a more or less elongate elliptical, cephalic midline plate, usually with a more or less rounded sclerotic spot on the segment behind this and occasionally with some small lateral accessory areas. In this form also, the cephalic clusters of spines are approximately long triangular, each broadening posteriorly from an origin between eyestalk and antenna base on each side. In contrast, as is discussed under the name *pseudinsignis*, the sclerotized areas in the segregated Mexican material are much larger and more conspicuous, the average size is definitely larger and the cephalic spine clusters are narrow bands somewhat expanded at the posterior ends. A few specimens from Mexico seem to be rather intermediate in their structure but approach most closely to *pseudinsignis*.

ORTHEZIA JAPONICA Kuwana

This species, described in 1917 (*25, p. 155*) in Japanese, was tentatively synonymized with *urticae* in 1925 (*37, p. 130*), but a restudy of available Japanese specimens belonging in this complex has led to the conclusion that all of the material examined can be assigned to the species *yasushii*, which Kuwana (*26, p. 58*) described rather fully in 1923, and has thrown open to question the correctness of the synonymy tentatively indicated for *japonica*. Until new topotype collections of *japonica* can be made and studied, it seems necessary to allow it to stand as an unrecognizable form along with Shinji's *argrimoniae*. Additional comment on *japonica* is made in the discussion of *urticae* and *yasushii*.

ORTHEZIA JUNIPERI, New Species

(Fig. 12; pl. 1, *H*)

ADULT FEMALE.—Body small, maximum length in the dried and somewhat shriveled condition up to 1.3 mm., maximum width up to 1.6 mm., maximum length of body with secretion and ovisac up to 5 mm.; with a single short digitate, white, wax tuft protruding directly forward from the head; dorsal and marginal tufts of secretion little more than flat plates or ridges, the color of these tufts mostly not white but off shades ranging from pale yellow through gray to an olive green somewhat resembling the color of the host; the narrow, strongly protruding tufts surrounding the anal ring usually pure white and the posterior abdominal marginal tufts lighter to sometimes white; ovisac straight or a very little upcurved apically, tapering a little towards apex, slightly ribbed dorsally.

Body of female very stout ovate broadened posteriorly, observed length as mounted not exceeding 1.6 mm., width up to 1.45 mm.; no cephalic or other special sclerotic areas in derm, this membranous throughout. Antenna normally 8-segmented, lengths of segments of largest examined, in microns: I, 95; II, 95; III, 142; IV, 83; V, 79; VI, 75; VII, 79; VIII, 170, total 810; of average, I, 79; II, 71; III, 106; IV, 48; V, 48; VI, 55; VII, 48; VIII, 130, total 582, spur 16; setae on antennae few, small, 7μ or less, tapering, with a stout sensory seta up to 15μ long, towards the apex of the segment VIII and one close to the apex of VII. Eyestalk, in profile, a rather strongly protruding, strongly asymmetrical curved cone with rounded apex, basal length of one 74μ, perpendicular height 66μ. Legs moderate in length, not conspicuously protruding beyond the body margin, lengths of parts of a posterior leg, in microns: Trochanter-femur 350, tibia 355, tarsus 235, claw 60, claw digitule 8; leg setae small conical, acute, the ventral setae strikingly larger and stouter than the dorsal even on the femur (lengths 8 and 4.5μ), but not conspicuous as in many species; claw with 2 small, well separated denticles on outer half. Beak unusually stout, about 137μ long; no

clear suggestion of a joint. Thoracic spiracles not unusual, each opening in the middle of a spine cluster, but the spines around the opening not grouped or modified in any way; abdominal spiracles in 8 pairs, tube length about 20μ, diameter of spiracle proper about 7μ. Disk pores of the usual type, not abundant, most numerous in narrow transverse bands within the area enclosed by the ovisac band, elsewhere sparsely scattered between the spine bands, small circular disks and tiny, apparently tubular ducts present, but scattered, not abundant. Body spines short, an average dorsal spine less than 20μ, relatively stout, definitely curved; dorsal and marginal spine bands complete, the spines rather closely set, the dorsal cephalic and thoracic bands wide with narrow interspaces, the abdominal bands narrower with wider interspaces; ventrally within ovisac band with 5 loose bands of somewhat smaller and more slender spines. Ovisac band spines closely crowded, curved, short and stout, the anterior median section about 130μ wide, without disk pores along the outer (anterior) margin but with

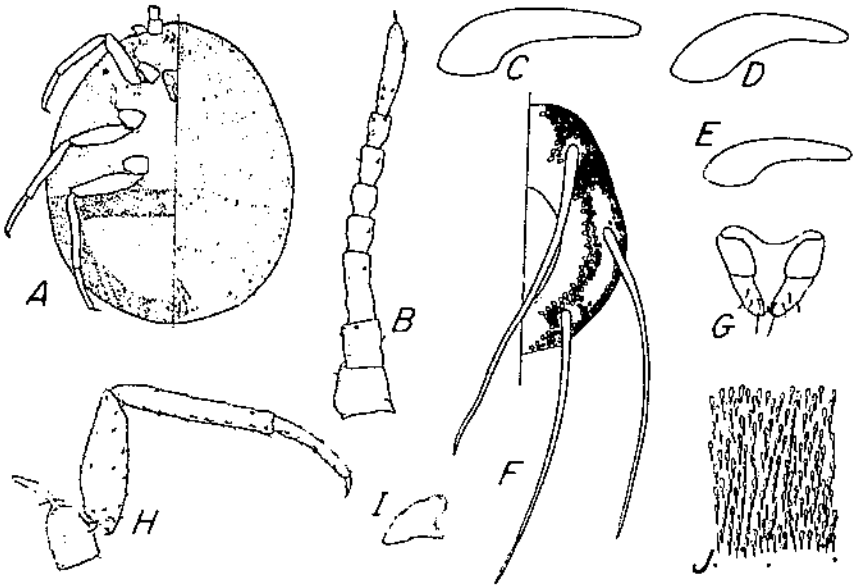


FIGURE 12.—*Orthezia juniperi*, Adult female: *A*, Body dorsal and ventral; *B*, antenna; *C*, dorsal body spine; *D*, ovisac band spine; *E*, ventral body spine; *F*, anal ring, right half; *G*, beak; *H*, posterior leg; *I*, eyestalk; *J*, ovisac band, anterior median section.

a very few along the inner (posterior) margin. Anal ring varying somewhat in shape and size, elliptical, an average size, 133μ long by 110μ wide; associated ring setae about 156μ long; with inner and outer rows of pores, the inner strongly produced internally opposite the anterior and posterior seta pairs.

This description has been prepared from several mounted specimens of the adult female stage derived from two lots collected by G. F. Ferris, one from Datil, N. Mex., on *Juniperus pachyphloea*, July 1, 1918 (holotype), the other from Chiricahua Mt., Ariz., July 10, 1940. The species in life must be rather striking on account of the contrast of the coloration of most of the dorsal body secretion with the few pure white tufts and ovisac. Microscopically it offers no prominent morphological characters to distinguish it from related forms. The holotype and paratypes are with Professor Ferris in the Stanford University collection.

ORTHEZIA LASIORUM Cockerell

Although Cockerell (*9, p. 427*), as early as 1910, reported that this species was common at Boulder, Colo., and Bucker (*8, p. 161*) announced its discovery at Geneva Park, Boulder, on roots of *Poa* sp. in nests of *Lasius niger americanus* Emery, no specimens, beyond the single mutilated type, that could possibly be assigned as this species had ever become available for study until the following material was received from Professor Ferris. Mounted specimens from "Meadow Valley, North Mexico, altitude 7,300 feet, on roots of grass collected by Townsend" [no date] are accepted as sufficiently close to the type to be regarded as conspecific. These specimens are definitely larger than the type example, with the body about one-fourth longer and the antennae and legs proportionately even longer. The sclerotized wings attached to each side of the anal ring, while recognizable, are less prominent than with the type, the inner pore band on each side of the ring is more strongly protruding—angulate opposite the anterior and posterior setae, and the small spines just outside the ring on each side are somewhat more numerous and are variously shaped, not all simple conical. In other structural details these specimens seem to be practically identical with the type example. Examination of more material, especially from the type locality, might result in a different interpretation, but for the present these are considered to be within the probable variation limits of *lasiorum*.

ORTHEZIA MOLINARII, New Species

(Fig. 13; pl. 1, *I*)

ADULT FEMALE.—Dried body length with secretionary tufts 2 mm., width 1.75 mm.; dorsal tufts of secretion only moderately elevated, those of the abdominal segments, though short, transversely lamellate and somewhat overlapping; a distinct oval bare area present on midline between cephalic plates, and the midline indicated by a depressed area between the remaining plates; a wide curved depressed bandlike area, between the median and lateral tufts on each half of body, covered with powdery wax secretion in perfect specimens, but this apparently easily detached leaving the derm bare in many examples; anterior marginal tufts short, thoracic and abdominal directed and curved posteriorly and increasingly longer, with apical 4 to 6 tufts up to 0.8 mm. long. Ovisac plainly fluted dorsally, straight to slightly up-curved.

Body as mounted very stout ovoid, up to 2 mm. long by 1.8 mm. wide; derm membranous, except for the cephalic median dorsal sclerotic area, this characteristically irregularly margined, broader posteriorly and narrowed towards the anterior apex. Antennae (only one available) 8-segmented, intermediate in stoutness and length, lengths of segments in microns: I, 118 (x 142 width); II, 95; III, 150; IV, 111; V, 111; VI, 103; VII, 97; VIII, 166; spur 16, total length just under 1 mm.; setae few, small, about 8μ, stiff. Eyestalk strongly conical, somewhat asymmetrical, nearly circular at base with a triangular sclerotized posterior projection, basal diameter about 80μ, approximate length 88μ. Legs moderately stout, the setae small, lengths of parts of a posterior one, in microns: Trochanter-femur 600, tibia 610, tarsus 328, claw 88, claw digitules 22; tibia more or less arcuate in all individuals observed; 2 small, but distinct claw denticles. Beak conical with rounded tip, about 200μ long by 230μ wide. Spiracles not unusual, thoracic opening in a spine cluster with a few more than the average around the opening, diameter about 60μ; abdominal spiracles in 7 pairs, length of one about 24μ. Derm pores of the usual quadrilocular disk type, varying appreciably in diameter, rather restricted in distribution dorsally, here present along the posterior margins of the cephalic and thoracic spine clusters, limited chiefly to the midline area on the abdomen, more numerous and more widely dis-

tributed ventrally; with small clear disks associated throughout, although in considerably smaller numbers and with more restricted distribution. Spines in bands and clusters, the dorsal transverse bands, except the 2 posterior abdominal pairs, short, the anterior abdominal bands occupying less than half the space between midline and marginal cluster on each side, the full-width portion of each of the thoracic bands likewise short, but each characteristically continued from the posterior edge in a narrowed strip to the corresponding marginal band; the individual spine shape characteristic of the genus; body setae few, slender, inconspicuous. Ventral ovisac band enclosing 5 narrow, transverse rows of spines, the 2 posterior short. Anterior median section of ovisac band with a band of pores about 5 wide thickly distributed along and through the inner (posterior)

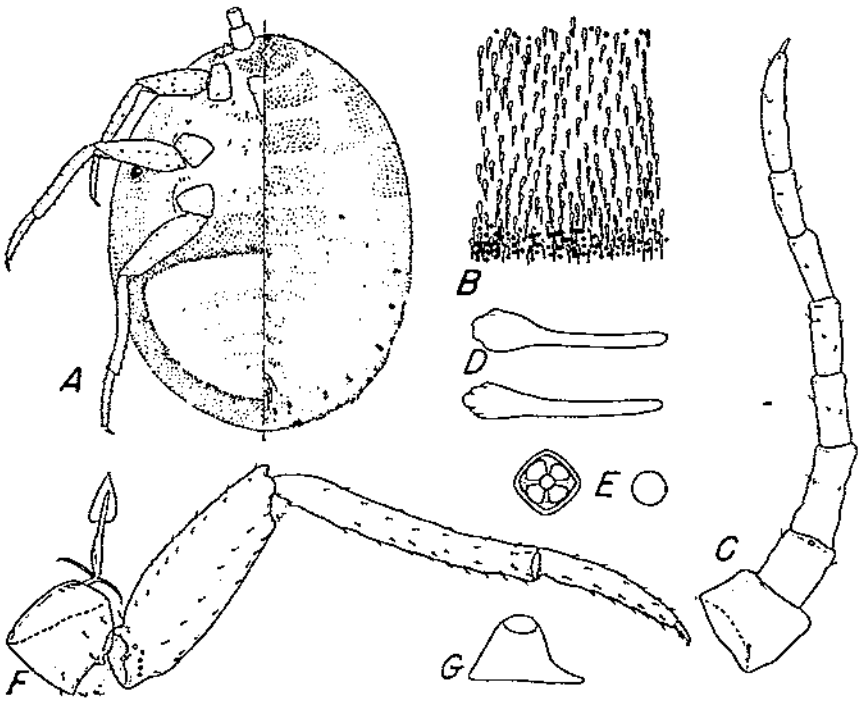


FIGURE 13. *Orthezia molinarii*, adult female: *A*, Body, dorsal and ventral; *B*, ovisac band, anterior median section; *C*, antenna; *D*, body spines, from ovisac band above, from dorsum, below; *E*, quadrilocular and simple disk pores; *F*, posterior leg; *G*, eyestalk.

margin, and a single, scattered, row along the outer (anterior) margin. Anal ring of the usual pattern, but weakly sclerotized, the inner pore band only somewhat bulged, not protruding in a sharp angle, opposite the anterior and posterior ring setae; length of ring about 144μ, width about 100μ, ring setae length about 165μ.

This insect has been described from four slide-mounted and several unmounted, adult females submitted for identification by O. Chiesa Molinari with a letter of April 22, 1944 (No. 1), and collected at Cordoba, Argentina, on "*Eriger*um" sp. (*Eriger*on of much current usage). Plainly, it is related to other species from this general area of South America, such as *parkeri*, described later, and *longipes* Hempel.

ORTHEZIA NEWCOMERI, New Species

(Fig. 22, *C* and *H*; pl. 1, *J*)

ADULT FEMALE.—Dried body length with secretionary tufts 3.5 mm., width 2.6 mm., length with ovisac 5 mm.; body with secretion stout elliptical; dorsally fully covered by white secretionary tufts, the pattern essentially as with related species, with segmental rows of tufts on each side of the midline, the cephalic pair flattened, conical, and strongly protruding anteriorly, the second median pair likewise anteriorly directed, but much shorter, the remaining dorsal median pairs directed posteriorly and overlapping, these tufts occupying about half the dorsal area, the remaining areas to margin on each side occupied by flattened, somewhat scalelike plates; anterior marginal tufts short, concealed by the protruding first dorsal tufts, remaining lateral tufts flattened, each succeeding one curved more and more posteriorly, the abdominal tufts narrow, digitate; ovisac strongly fluted dorsally.

Well-distended individual, as mounted, up to 3 mm. long by 2.6 mm. wide; membranous throughout. Lengths of antennal segments, in microns, as follows: I, 174; II, 134; III, 174; IV, 87; V, 103; VI, 95; VII, 98; VIII, 182; spine 22; antennal segments moderately stout, the setae inconspicuous. Eyestalk with a short almost cylindrical middle section on a moderately expanded base, and with rounded tip, length about 75μ, maximum basal expansion about 87μ. Legs not unusual, rather stout, lengths of parts of a posterior leg, in microns: Trochanter-femur 774, tibia 670, tarsus 418, claw 102; 2 small denticles towards claw apex, the outer only a little larger than the inner. Beak conical, rounded apically, length about 300μ, flattened width at base about 250μ–300μ; a rather strong suggestion of a joint towards base. Thoracic spiracles with a strongly sclerotized band, narrowed on inner side, around opening of each, this bearing closely clustered spines, some reduced in size, though not much modified in shape; abdominal spiracles in 8 pairs, the individual tubes slender, 63 to 79μ long, outside diameter at opening about 15 μ. Quadrilocular pores numerous only in the bands across the ventral abdominal and thoracic areas, but present also in the interspaces between spine clusters elsewhere on the body. Body heavily covered with spine bands and clusters, the pattern seemingly almost identical with that of *urticae* and *solidaginis;* anterior median section of ovisac band with an irregularly double band of quadrilocular pores along inner (posterior) margin and a scattered single row along, but well separated from, outer (anterior) margin. Anal ring practically identical with that of these species, length of one ring seta about 225μ.

This insect has been described from several mounted and unmounted specimens collected by E. J. Newcomer in the Cascade Mountains, Yakima County, Wash., on *Penstemon*, Aug. 10, 1930 (paratypes), and Yakima County, Wash., 550 feet elevation on *Penstemon*, Sept. 19, 1932 (holotype and paratypes).

As was pointed out elsewhere (see under *urticae*), this insect is closely related to *urticae* and *solidaginis*, but in the limited material that is available for study it can be distinguished by differences in eyestalk and ovisac band as emphasized in the key to species.

ORTHEZIA OLIVACEA Cockerell

A single new identification record for this species comes from collections made by the Division of Truck Crop and Garden Insect Investigations of the Bureau of Entomology and Plant Quarantine on grass and weeds at Moscow, Idaho, 1937 (T. C. 9864, vial 64). A new published record was given by Bueker (*8, p. 171*), who reports the species as common near Boulder, Colo., in nests of *Lasius*, with specific collections reported from Geneva Park in 1929 and 1930. Cockerell (*9, p. 425*) had previously reported that the species was common in Boulder.

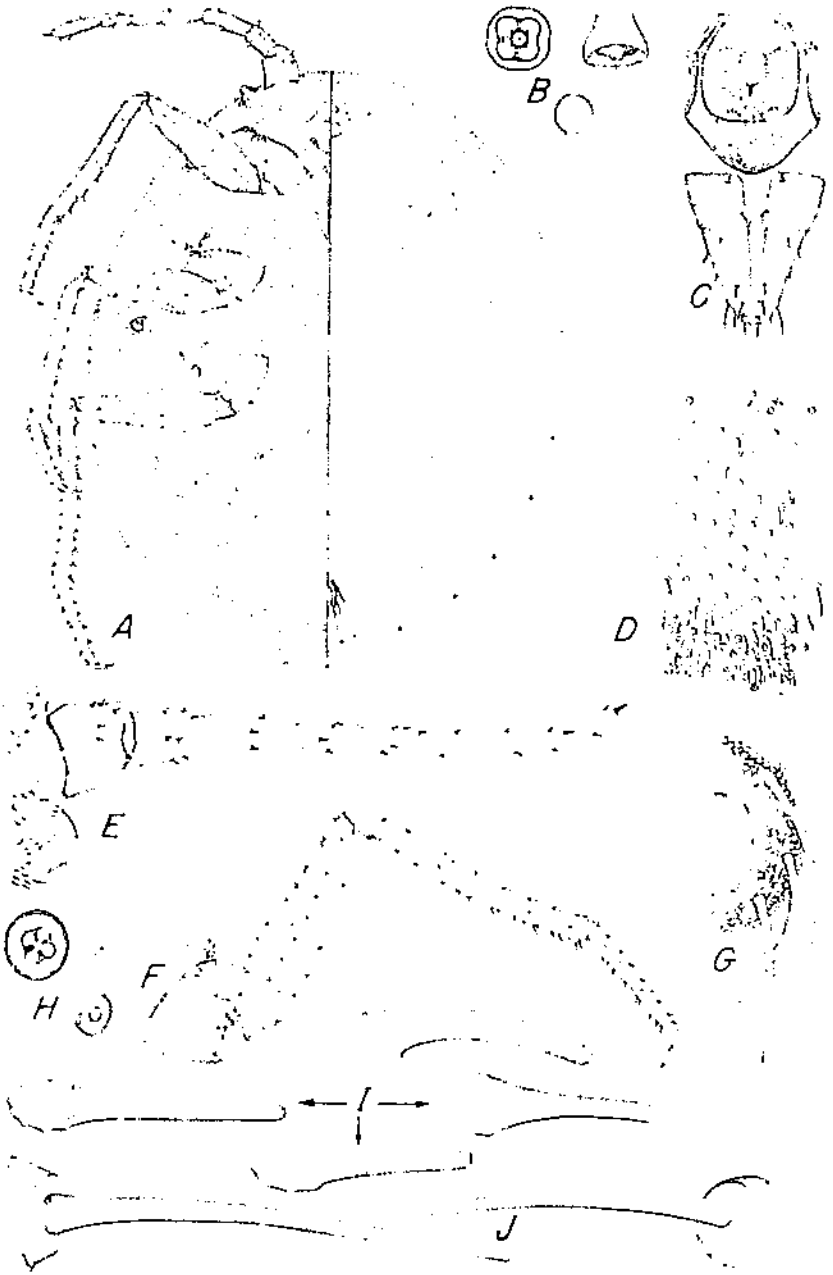


FIGURE 14.—*Orthezia parkeri*, adult female: *A*, Body, dorsal and ventral; *B*, ventral quadrilocular and simple disk pores; *C*, mouth parts; *D*, ovisac band, anterior median section; *E*, antenna and adjacent eyestalk; *F*, posterior leg; *G*, anal ring, right half; *H*, dorsal quadrilocular and simple disk pores; *I*, body spines; *J*, body setae.

ORTHEZIA PARKERI, New Species

(Fig. 14; pl. 1, *K*)

ADULT FEMALE.—Secretion imperfect in all available specimens, but appearance very much as in *molinarii*, with the dorsal tufts short and incomplete and a fairly wide curved submarginal band on each side either carrying loose secretion or bare. Dried body length with secretion 2.3 mm., width about 2mm., observed length with ovisac up to 4.6 mm.; ovisac straight, somewhat fluted dorsally.

Body as mounted very stout ovoid, length up to 2.1 mm., width to 1.75 mm.; membranous except for cephalic dorsal sclerotic area, this variable but usually elongate, with irregular but roughly parallel sides and anteriorly projecting tongue; sometimes with a smaller, irregular area on the midline behind the elongate one. Antennae 8-segmented, of intermediate stoutness, length of segments of a larger example, in microns: I, 126; II, 95; III, 158; IV, 103; V, 95; VI, 81; VII, 79; VIII, 142; spur 18; setae few, small (up to 10μ), digitate with rounded apices. Eyestalk somewhat variable, flattened conical with the eye more or less protruding beyond the cone, height up to 63μ, cone with long basal diameter up to 125μ, without an obvious posteriorly directed triangular extension. Legs intermediate, the setae, except those on lower faces of tibia and tarsus small, up to about 12μ, digitate to somewhat tapering, with blunted apices; lengths of parts of one posterior leg in microns: Trochanter-femur 590; tibia 610; tarsus 310; claw 80; claw digitule 20; claw with 2 distinct denticles; tibia more or less arcuate (perhaps owing to effects of preservation or preparation technique). Beak conical with rounded apex, length about 220μ, basal width about 180μ or more, depending on pressure. Thoracic spiracles stout elliptical, long diameter up to 60μ, opening into a cluster of spines, but without any obvious grouping of these about the opening; abdominal spiracles in 7 pairs, length of one about 21μ. Derm pores of the usual quadrilocular type, varying appreciably in size, only a few present dorsally, chiefly scattered along the midline between the ends of the dorsal spine bands; most abundant in loose clusters below the thoracic marginal clusters, along and through the inner edge of the ovisac band, and across the ventral abdominal area, with the greatest density in the vulvar area; small circular clear disks also present, scattered with the disk pores but not so numerous. Body setae few and inconspicuous, those next to midline on abdomen up to 36μ. Body spines in the usual clusters and bands, the dorsal bands with the cephalic and thoracic extending close to the corresponding marginal clusters, the anterior abdominal somewhat variable, from broad toward margin to narrowed and irregular, the intermediate 2 abdominal pairs, usually, though sometimes only the antepenultimate, short, extending halfway or less to the margin, the last 2 narrow, but extending nearly to the margin; inner ends of the 2 halves of the posterior bands with one to several spines definitely shorter than the average. Ovisac band rather wide, anterior median section up to 150 to 200μ in well-distended specimens, a few, widely scattered disk pores along the outer (anterior) margin of the anterio-median section, and a crowded band 6 to 7 pores wide along and through the inner (posterior) margin; body spines up to 21μ long, straight or definitely curved according to the angle of examination. Anal ring up to 110μ long by 92μ wide; the inner pore bands not sharply angulate internally opposite the end setae, but with many of the innermost row of pores with long axis transverse so that they protrude conspicuously from the line of pores; normally with 6 anal ring setae, up to 180μ long.

This species has been described from six mounted adult females and several unmounted specimens collected at Colonia Suiza, Uruguay, on *Eupatorium* sp. (chilca) by H. L. Parker (No. 869.4); specimens received in 1914. It has been named for the collector, who secured these and other interesting coccid specimens during his stay in South America.

The relationships of this species appear clearly to be with the other species now known from the same general area, including *molinarii*, already described here, *longipes* Hempel, *varipes* Leon., and *ultima* Ckll.

ORTHEZIA PINI, New Species

(Fig. 15)

ADULT FEMALE.—No unmounted specimens available for examination. Very close to *pinicola*, but showing constant minor differences on the basis of the material available for examination. Length averaging 3.25 mm.; dorsal derm plate pattern constantly different, as shown in figure 15, the transverse thoracic plates either strongly constricted on the midline or divided into 2 well separated halves; with 5 pairs of large and conspicuous abdominal plates rather than 4. Antennae and antennal setae somewhat longer. Eyestalk about same

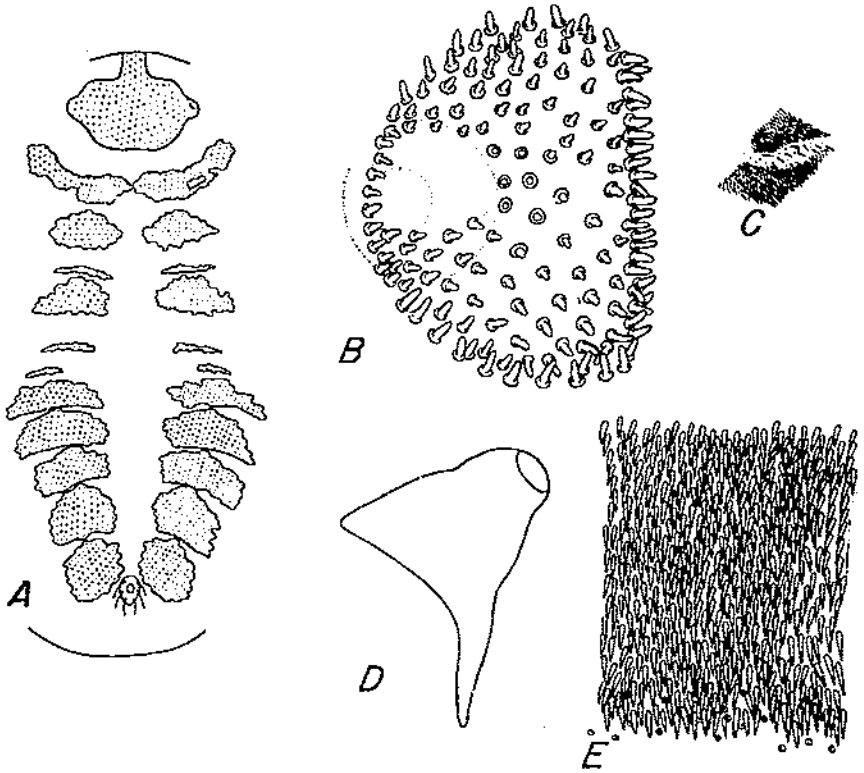


FIGURE 15.—*Orthezia pini*, adult female: *A*, Pattern of dorsal sclerotic plates; *B*, cluster of spines around one thoracic spiracle; *C*, ovisac band, detail of one break in lateral margin; *D*, eyestalk; *E*, ovisac band, anterior median section.

length but more constricted and slender towards apex. Legs, beak, and thoracic spiracles apparently identical with or extremely close to those structures in *pinicola*, the leg setae a little longer. Abdominal spiracles with not more than the 2 anterior pairs opening in the derm outside the associated marginal spine cluster; ovisac band with the anterior median section not so wide as in *pinicola* and lacking pores of any sort along its outer (anterior) margin; posterior-lateral interruptions of ovisac band relatively very wide and conspicuous.

This insect has been described from six mounted specimens, three labeled "On Pine, Mexico," one "on Pine, La Providencia, Mex.," and two "on Pine, La Providencia, near Acapulco, Mex., alt. 2100 ft. Mar.

18, 1926," (holotype) all collected by G. F. Ferris. The holotype and paratypes have been returned to Professor Ferris.

The species obviously is very close to *pinicola*, but such differences as those in the dorsal plate pattern, the point of opening of abdominal spiracles, and in the condition of the ovisac band seem constant in the six specimens studied as against the single example of *pinicola*.

ORTHEZIA PINICOLA, New Species

(Fig. 16)

ADULT FEMALE.—Ovoid, broadest across anterior section of ovisac band, length, as mounted, about 2.5 mm., width 1.6 mm. Derm membranous, except for large and conspicuous sclerotized plates down the midline; anterior plate quadrate with anterior median projection from cephalic apex laterally to encompass eye bases and posteriorly to a point opposite fore coxal attachments, second strongly transverse, with some constriction and irregularity on midline, third also transverse, with midline constriction, but much smaller, fourth still smaller, without median constriction, next still smaller and with very irregular margins, remaining 4 much larger, strongly paired, the 2 halves of each widely separated, each half of the posterior one more elongate than transverse. Antennae (1 only available) 8-segmented, heavily sclerotized, spines on segments small, slender, not quite acute at apices; lengths of segments, in microns: I, 190; II, 160; III, 182; IV, 134; V, 166; VI, 142; VII, 150; VIII, 276; apical spine 24. Eyestalk short, asymmetrically rounded conical, heavily sclerotized, length about 110μ. Legs strongly protruding, heavily sclerotized, conspicuous, lengths of parts of one posterior leg, in microns: Trochanter-femur 930, tibia 960, tarsus 480, claw 104; normally two small denticles on inner face of claw, digitules slender, nearly acute, approximately 40μ long, leg setae spinelike, but apparently rather delicate structurally. Beak short, stout, bluntly rounded apically, except for a small half-conical protruding point on each side of groove at extreme apex, no special fringe of setae at apex, length 285μ, width at base approximately the same, with incomplete indication of a joint towards base on posterior side. Each thoracic spiracle placed at the bottom of a short cylindrical pocket with the opening surrounded by a small cluster of closely set spines, shorter than those making up the marginal bands, no other spine bands close to these small clusters; abdominal spiracles in 7 pairs, structure not unusual, each placed near the upper edge of or, in the 4 first pairs, above the associated marginal spine cluster. Derm pores of the usual quadrilocular type, apparently present ventrally only, larger and quite numerous in the vulvar area; accompanied by small clear disks varying in size, but approximating the quadrilocular, having somewhat the appearance of numerous tiny ventral cicatrices. Body setae all short and stiff, often bluntly pointed, few dorsally but rather numerous and larger ventrally, maximum length around 25μ. Spine clusters much reduced, anterior portion of body without spines, except for a tiny cluster at cephalic apex between antennal bases and the small clusters around thoracic spiracles already mentioned; posterior part of body with 6 pairs of marginal clusters, the last two joined across the midline to form a solid cluster below the anal ring, a narrow band extending dorsally on each side of anal ring but not joined above it, a few spines in front of each anterior marginal cluster and a few more just inside each posterior coxa, in front of ovisac band; ovisac band very wide and heavy, the spines densely crowded, a row of well separated quadrilocular pores along inner (posterior) margin of anterior section. Anal ring not unusual, except for 4 setae on one-half and 3 on the other, these slender, around 186μ long and bluntly rounded at apices.

Described from a single adult female taken from Arnold Arboretum herbarium material of *Pinus ponderosa* var. *macrophylla* obtained in Durango, Mexico, by E. Palmer in 1896 (No. 776). Three small larval specimens believed to represent this species were secured in the same Herbarium from *Pinus montezumae* collected above Cuernevaca, Mexico, by C. G. Pringle.

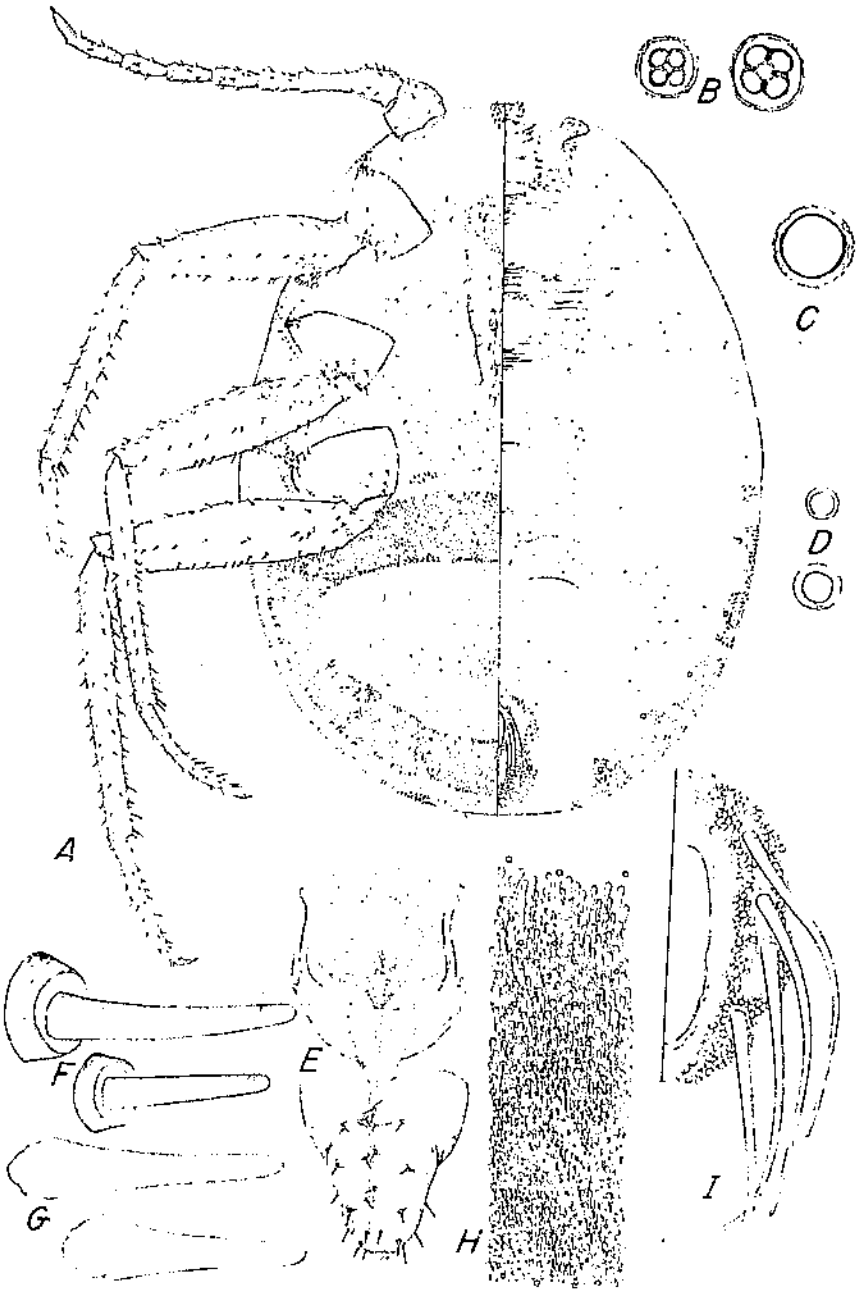


FIGURE 16.—*Orthezia pinicola*, adult female: *A*, Body, dorsal and ventral; *B*, ventral quadrilocular disk pores; *C*, ventral clear pore; *D*, dorsal clear pores; *E*, mouth parts; *F*, body setae; *G*, body spines; *H*, ovisac band, anterior median section; *I*, anal ring, right half, also showing abnormal extra seta.

ORTHEZIA PRAELONGA Douglas

The taxonomic treatment that is given here to the specimens that have been associated under this name is not fully satisfactory, but is believed to be the best possible on the available evidence. A fair number of specimens, collected since the prior discussion of the species in 1925, have been available for examination and have been found to display evidence of rather wide minor structural variation if they actually represent a single species. At the same time, no pronounced lines of demarcation within this range of structural variation have been recognized. The apparent variability includes, at least, a marked range in body size in presumably mature individuals, marked differences in the extent and shape of the dorsal cephalic midline sclerotization, variation in the width of the anterior median section of the ovisac band and in the numbers and the density of distribution of the pores along both margins of this, and dimensional differences among the specimens in such structures, for example, as the eyestalk and the lengths and widths of corresponding antennal segments.

There is a tendency towards relatively small size at maturity, small and simple cephalic sclerotization, reduced ovisac band width, with a single row of associated disk pores, shorter and stouter antennal segments, and smaller spine bands dorsally, in the material from the islands of the Caribbean chain from Puerto Rico to Trinidad; and towards definitely larger size, sometimes widened cephalic sclerotization, wider ovisac band with more associated disk pores, longer and larger appendages, and so on, with collections from continential localities. Conceivably, a natural distribution pattern, in which these differences represent biological segregates of some sort, has been disrupted by the introduction by man of insular forms to continental areas or the reverse. Certainly there appears to have been multiple redistribution of various coccid species, especially of known introductions, in the area where *praelonga* is recognized.

Additional locality records, beyond those listed in 1925, for the occurrence of this insect, based on material examined, include Colombia, Peru, Puerto Rico, Santa Lucia, St. Thomas, St. Vincent, and Venezuela. Two associated quarantine interceptions at the port of New York, in 1938, gave Germany as the origin of the material, but these have not been supported by further collections or reports from this source, and it is possible that the collections could have come from a cruise ship that had visited West Indian or South American ports. New localities, reported in literature, for which no specimens have been examined, include Argentina and the island of Carriacou in the Lesser Antilles chain.

Additional host reports based on identified specimens include *Acalypha* (Euphorbiaceae), *Achyranthes* (Amarantaceae), *Besleria* (Generaceae), *Bougainvillea* (Nyctaginaceae), *Cajanus* (Leguminosae), *Malviscus* (Malvaceae), *Pentas* (Rubiaceae), *Phyllanthus* (Euphorbiaceae), *Thunbergia* (Acanthaceae). Reports in literature add *Baccharis* (Compositae), *Coccoloba* (Polygonaceae), *Fortunella* (Rutaceae), *Mangifera* (Anacardiaceae), *Pisonia* (Nyctaginaceae), and *Vernonia* (Compositae) as hosts for this insect.

ORTHEZIA PSEUDINSIGNIS, New Species

(Fig. 17, *A*; pl. 1, *L*)

ADULT FEMALE.—Very close structurally to *insignis*, differing strikingly, however, in the large and conspicuous irregular transverse sclerotic plates on the head and thorax in place of the narrower elongated plates of *insignis* (see illustrations); body usually somewhat larger at maturity and appendages slightly longer than with *insignis*; dorsal spine cluster pattern essentially identical, except for minor details as suggested by the cephalic clusters shown in the figures.

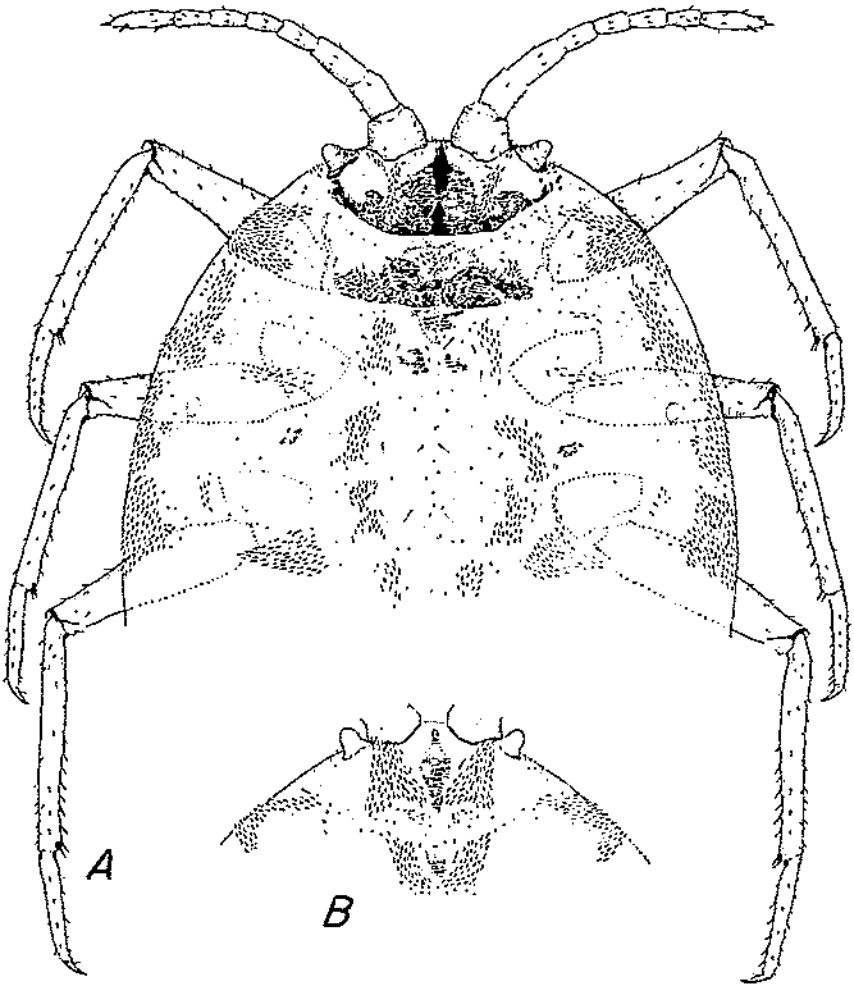


FIGURE 17.—*A*, *Orthezia pseudinsignis*, adult female, anterior dorsal portion of body, showing cephalic sclerotic pattern, spine bands and other structures; *B*, *Orthezia insignis*, adult female, anterior dorsal portion of body, showing sclerotic pattern.

Specimens now considered to represent this species, most of them previously assigned to *insignis*, include the following: Mexico, Aguas Calientes, on lime (*Citrus aurantium*), collected Oct. 11, 1894, by C. H. T. Townsend (No. 5232–9); Cordoba, Vera Cruz, on *Solanum*

torvum, Apr. 21, 1908, by F. Knab; Sagula, Jalisco, on lemon twigs (*Citrus limonia*), Nov. 21, 1923, by W. M. Mann; at quarantine, Brownsville, Tex., on *Gardenia*, Apr. 18, 1935, by C. W. Shockley (Br. 1221); Apr. 24, 1935, by C. W. Shockley (Br. 1231); Feb. 10, 1936, by E. R. Reagan (Br. 1929); Feb. 17, 1936, by V. L. Pearson (Br. 1990); Mar. 19, 1936, by C. W. Shockley (Br. 2408); Mar. 12, 1936, by R. B. Haller (Br. 2256); Mar. 21, 1936, by C. W. Shockley (Br. 2455); Mar. 22, 1936, by G. F. Callaghan (Br. 2521); Apr. 5, 1936, by E. P. Reagan (Br. 3169); Apr. 10, 1936, by C. W. Shockley (Br. 3586); Apr. 25, 1936, by J. P. Williamson (Br. 4919); Mar. 5, 1939, by C. L. Parnell (Br. 29120); Dec. 24, 1939, by C. L. Parnell (Br. 36956); Jan. 8, 1946, by Smith (Br. 60193); at El Paso, Tex., Oct. 31, 1939, by R. A. Alexander (E. P. 11945); from Vera Cruz, Feb. 23, 1940, by B. R. Anderson (E. P. 13321 and 13324); Aug. 1, 1940, by R. A. Alexander (E. P. 16879); from Vera Cruz, Aug. 3, 1940, by C. F. Haller (E. P. 16964); May 17, 1941, by C. F. Haller (E. P. 25651); from Vera Cruz, July 4, 1942, by A. K. Pettit (E. P. 34270); at Laredo, Tex., Mar. 18, 1941, by C. P. Trotter (Laredo 25504) (holotype); Feb. 13, 1945, by Pearson (Laredo 35762); on orchid, Aug. 12, 1946, by Ragsdale (Laredo 40536); on medicinal herbs, Oct. 25, 1948, by Jackson (Laredo 47473); at New Orleans, La., on gardenia, Oct. 9, 1935, by G. C. Martin (N. O. 14176); at Nogales, Ariz., from Nogales, Sonora, on walnut leaf, Nov. 15, 1938, by Root (Nogales 27854); at Barcena, Guatemala, on *Duranta repens* (Verbenaceae), June 28, 1945, by E. J. Hambleton (No. 41); and at Finca El Naranjo, Chicacae, on unknown host, July 6, 1945, by E. J. Hambleton (No. 53); and at Pisquio, Peru, on native plants, June 22, 1948, by E. J. Hambleton (No. 6).

The holotype specimen has been indicated above. The specimens represented by the remaining Mexican collections should be considered as paratypes, but it seems best to exclude the Guatemalan and Peruvian specimens from this category. Besides the specimens above recorded the following Mexican lots, all collected by Professor Ferris, have been studied in relation to *insignis*, and are likewise listed as paratypes: On ?, Puerto (No. 63); on ?, Hacienda de Barron, Mazatlan (No. 66); on ?, Barranca at Tonila, Colima (No. 75); on menthaceous shrub, Volcan de Colima, Dec. 17, 1926 (No. 76); on vine, Hacienda de Barron, Mazatlan (No. 205); on *Capsicum*, La Paz, Baja California, August 1919.

ORTHEZIA QUADRUA Ferris

Orthezia quadrua has been described recently by G. F. Ferris (*12, p. 13*) on the basis of specimens that he collected near Kunming, Yunnan Province, China, on *Ambrosia* sp., May 2, 1949. It belongs, obviously, in the group of closely related species around *urticae*, but, on the basis of its description, seems definitely different from any of these in certain structural details, as indicated in the key to species.

ORTHEZIA SARCOBATI, New Species

(Fig. 18; pl. 1, *M*)

ADULT FEMALE.—Length of dried body with secretion up to 2.5 mm., total length with ovisac up to 5.5 mm., width of body with secretion up to 2 mm.; anterior median pair of tufts relatively short and stout, directed only slightly forward, second tufts similar, almost vertical; remaining dorsal tufts thin, almost scale-

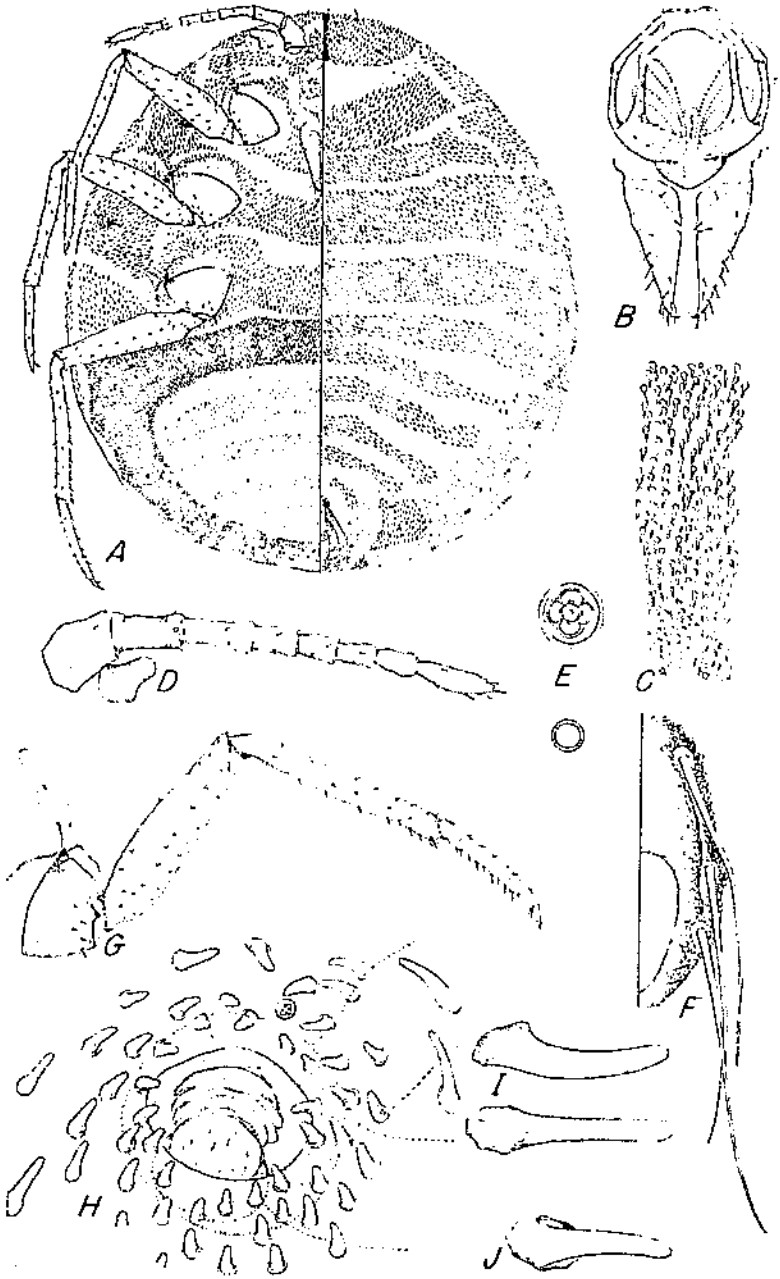


FIGURE 18.—*Orthezia sarcobati*, adult female: *A*, Body, dorsal and ventral; *B*, mouth parts; *C*, ovisac band, anterior median section; *D*, antenna and associated eyestalk; *E*, quadrilocular and simple disk pores; *F*, anal ring, right half; *G*, posterior leg; *H*, thoracic spiracle and spines adjacent to its opening; *I*, dorsal body spines; *J*, ovisac band spine.

like, directed strongly backwards and strongly overlapping; lateral areas of dorsal surface covered by small thin plates, sometimes entire for a segment, sometimes 2 or 3 tiny plates to each segment; marginal tufts not large, flattened, sometimes broken up into smaller units, the posterior somewhat curved backwards, the last abdominal of median length and flattened, not digitate; ovisac curved upward towards tip, almost circular in cross section, not fluted dorsally although with the lines bounding the secretion plates more or less evident.

As mounted very stout elliptical, for example, 2.55 mm. long by 2.32 mm. wide. Derm membranous except for a narrow, irregularly margined, cephalic dorsal median sclerotic stripe, this sometimes faint. Antennae 8-segmented, measurements evidently variable but lengths of segments of one, in microns: I, 142; II, 105; III, 150; IV, 91; V, 87; VI, 79; VII, 67; VIII, 158; spine 24; antennal setae small and inconspicuous. Eyestalk conical, rounded apically, length around 87μ, width at base around 103μ, but dimensions varying considerably with specimen and profile. Leg not unusual, except perhaps for the relatively small size of the setae, lengths of the parts of one hind leg, in microns: Trochanter-femur 616, tibia 522, tarsus 308, claw 87, the last with indications of 3 denticles in perfectly developed claws, all small, but the apical largest. Beak conical, with strongly rounded tip, in 1 specimen 276μ long by 237μ wide at base, with traces of an incomplete joint towards base. Thoracic spiracles with the openings surrounded by a spine collar including numerous short conical spines strikingly different from the usual body type; abdominal spiracles in 8 pairs, tube length around 24μ. Quadrilocular disk pores present both dorsally and ventrally, the ventral pores averaging somewhat larger than the dorsal, abundant only in the vulvar area, elsewhere in rows of scattered pores between the spine clusters, with an occasional pore within the borders of a spine cluster. Small clear circles present in ventral abdominal area and occasionally elsewhere, not abundant; small tubular ducts very tiny, scattered through spine clusters, at least anteriorly. Body setae few, slender, inconspicuous, maximum observed length 42μ. Spine bands and clusters large, covering most of the body, but the dorsal abdominal bands somewhat narrowed, and sometimes fading out shortly before reaching the corresponding marginal cluster. Ovisac band broad throughout, about 25 spines wide in the anterior median section, an occasional small clear circle along anterior margin and a row of scattered quadriloculars along posterior. Anal ring with the margin of the inner pore band of each half very irregular owing to numerous protruding pores, but not strongly angulate opposite the end setae; anal ring setae about 150μ long.

Described from mounted and unmounted adult females and other stages collected in Utah on *Sarcobatus vermiculatus* (greasewood) as follows: Kanesville, Sept. 17, 1938, collected by G. F. Knowlton (holotype and paratypes); Hooper, July 7, 1939, Aug. 26, 1939, Sept. 5, 1939, collected by Knowlton and K. Nye; Hooper and Roy, Sept. 22, 1939, collected by Knowlton and Harmston; White Valley, Millard County, Aug. 14, 1939, collected by R. W. Fantin (No. 167F); same locality and collector, Apr. 24, 1940 (No. 311a), May 4, 1940 (No. 360), July 13 (No. 733), July 22 (No. 754), July 29, 1940 (No. 764); Joseph, July 13, 1946, collected by G. F. Knowlton. Larval specimens on sage from Carlyle, Mont., collected July 10, 1941, are believed to represent this same species.

Additional specimens, all on the same host, received from Professor Ferris and included among the paratypes, are from Malheur Lake, Oreg., Aug. 23, 1922, collected by E. Bethel; from Moab, Utah, Aug. 1, 1934, collected by D. E. Beck (No. 46); and on road to Rough Rock, Ariz., 1940, collected by G. F. Ferris.

ORTHEZIA SCLEROTICA, New Species

(Fig. 19; pl. 1, *N*)

ADULT FEMALE.—Of the usual appearance; length of body with secretion 2.15 mm., contrasted to 2.4 mm. distended, width 1.17 mm. and 1.25 mm., full body with ovisac up to 8.5 mm.

Body, as mounted, elliptical, maximum dimensions noted 1.7 mm. long by 1.2 mm. wide; dorsal derm moderately but definitely sclerotized over most of the dorsal surface and strongly transversely infolded segmentally in the abdominal area. Antennae 8-segmented, rather weakly sclerotized compared with many

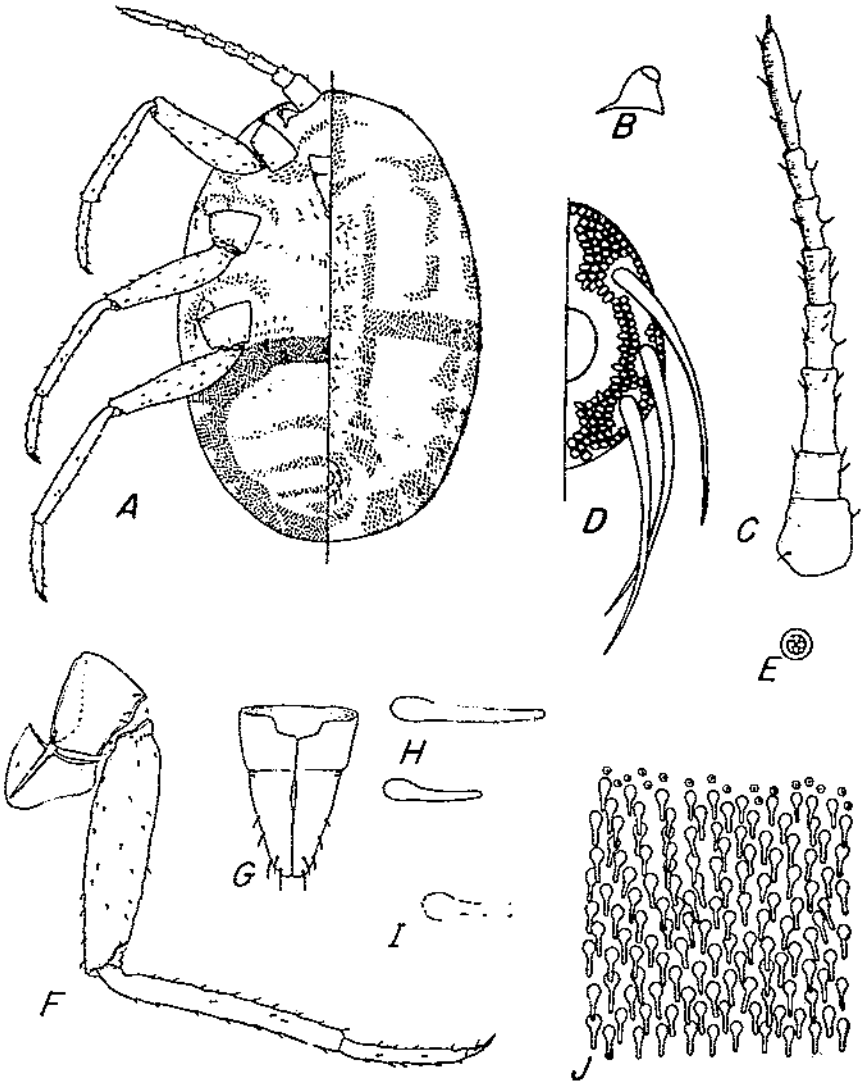


FIGURE 19.—*Orthezia sclerotica*, Adult female: *A*, Body, dorsal and ventral (figure does not bring out the characteristic sclerotization of the dorsum); *B*, eyestalk; *C*, antenna; *D*, anal ring, right half; *E*, disk pore; *F*, posterior leg; *G*, beak; *H*, dorsal spines; *I*, ventral ovisac band spine; *J*, ovisac band, anterior median section.

other species, lengths of segments of one, in microns, as follows: I, 111; II, 79; III, 126; IV, 103; V, 83; VI, 79; VII, 87; VIII, 190; spine 24; basal segment definitely gibbous internally at base, the single seta on inner margin towards apex about 24μ long; all segments with few setae, and most of these slender, tapering to acute apices; the single cylindrical sensory spine on VII about 47μ long, that on VIII around 60μ. Eyestalk large and conspicuous, continuous with

and protruding from the large sclerotized dorsal cephalic plates covering practically all of the head, base expanded, approximating 190μ in long diameter, but not separated from the sclerotic plate; the eyestalk more or less strongly asymmetrically constricted from base to narrowed, rounded apex, with maximum height likewise up to 170 to 190μ. Legs not unusual, setae on parts relatively few, all slender, tapering to acute tips, claw with a single denticle, lengths of parts of one hind leg, in microns: Trochanter-femur 512, tibia 528, tarsus 272, claw 65. Beak elongate, averaging about 253μ long by 182μ wide, tapering nearly uniformly to a rounded tip, with only a faint suggestion of a joint near base. Thoracic spiracles not unusual, not strongly developed, opening of each more or less surrounded by spines, but without any distinct cluster; abdominal spiracles in 8 pairs, not appearing distinctive, distended tube length as much as 24μ, opening of each characteristically within border of associated marginal spine cluster. Quadrilocular disk pores relatively few both dorsally and ventrally, most abundant across the ventral abdominal area, some across the ventral thoracic area and a few associated with some of the dorsal and marginal spine clusters. Dorsal and marginal body spines only slightly swollen at base and only gradually tapering to apices, dorsal spines, at least, showing rather obvious size variation, though much less striking than with *caudata*, ventral spines, especially in the ovisac band and the ventral abdominal area, more characteristic, with the base more strongly swollen and the taper more pronounced; dorsal spines in a cephalic midline narrow band, broadened posteriorly, in irregular, and unevenly developed paired bands across the midline on the remaining body segments, leaving most of the dorsal surface up to the marginal clusters exposed and moderately sclerotized; much of the ventral area of head and thorax devoid of spines; ovisac band moderate in width, its spines relatively short, around 14μ long, a single or occasionally irregularly double scattered row of disk pores along the outer (anterior) margin, no pores associated with it near the inner (posterior) margin of the anterior median section; 4 narrow rows of spines across the area enclosed by the ovisac band. Anal ring stout, about 115μ long by 95μ wide, the 6 ring setae up to 148μ long; inner and outer pore bands separated by an elongated clear area opposite the intermediate seta, elsewhere confluent; the 2 halves at the ends not forming obviously diamond-shaped free areas on the mid-line.

This species has been described from a single collection from Pisuquio, Peru, on Melanostomaceae, E. J. Hambleton collector, June 23, 1948 (No. 7). It is a striking species owing to the wide sclerotization of the dorsal surface.

ORTHEZIA SELAGINELLAE, New Species

(Fig. 20)

ADULT FEMALE. Body dorsally completely and heavily covered with flat overlapping secretion plates tending to give an irregularly shingled appearance; marginal and cephalic tufts short and stout, the abdominal somewhat elongated (perhaps not fully formed); ovisac uncertain, not developed.

Body as mounted very stout elliptical, only slightly narrowed anteriorly, length 3.6 mm., width 3.25 mm.; derm membranous, except on head and prothorax, here dorsally and to a lesser extent ventrally with a roughly circular sclerotized disk surrounding the base of each spine, these disks tending to enlarge and flow together in some small areas; many, and perhaps most, of the remaining body spines appearing as if expanded at base, due apparently to the presence of a very narrow sclerotized collar. Antennae 8-segmented, lengths of segments of one, in microns: I, 238; II, 142; III, 166; IV, 103; V, 103; VI, 87; VII, 103; VIII, 201; spur 16; total length as mnt 1.12 mm.; most antennal segments with multiple constrictions, the appearance as if unevenly corrugated, the few setae almost cylindrical and blunt-tipped, around 12μ long. Eyestalk strongly protruding, semidigitate on a slightly expanded asymmetrical base, up to 130μ in long diameter, height up to 128μ. Posterior legs absent, 1 mid-leg with trochanter-femur 800μ long, tibia 640μ, tarsus 352μ, and claw 95μ; claw with a single denticle close to apex; leg setae few, slender, stiff, blunt-tipped, those on under side of tibia and tarsus much stouter, also blunt-tipped. Beak 416μ long by 272μ wide at base, indication of a joint uncertain, but probably present near base. Thoracic spiracles not unusual, with the spines somewhat bunched and whorled around the opening; abdominal spiracles in 8 pairs, rather slender,

tube up to as much as 72μ long, the last 2 pairs less than half the size of the others. Derm pores small, scattered, not distinctive, most abundant in the posterior ventral abdominal area; even fewer clear disks, definitely smaller than the quadrilocular pores, also widely scattered. Body spines numerous, in broad, fully developed bands and clusters over both surfaces, shape characteristic, as in *cheilanthi*, nearly cylindrical for most of length, then slightly enlarged at apex; abdominal ventral area enclosed by ovisac band with 3 broad and 1 narrow transverse spine bands. Anterior median section of ovisac band, so far as can be determined, with a few pores and simple clear discs scattered along the outer (anterior) margin, but nothing along the inner margin. Anal ring small, 240μ long by 208μ wide, rather heavily sclerotized, the pores small and numerous, the inner bands protruding to form an angulate margin opposite the end setae, but the area enclosed at each end by the 2 bands not diamond-shaped, irregular instead; the 6 anal ring setae around 160μ long.

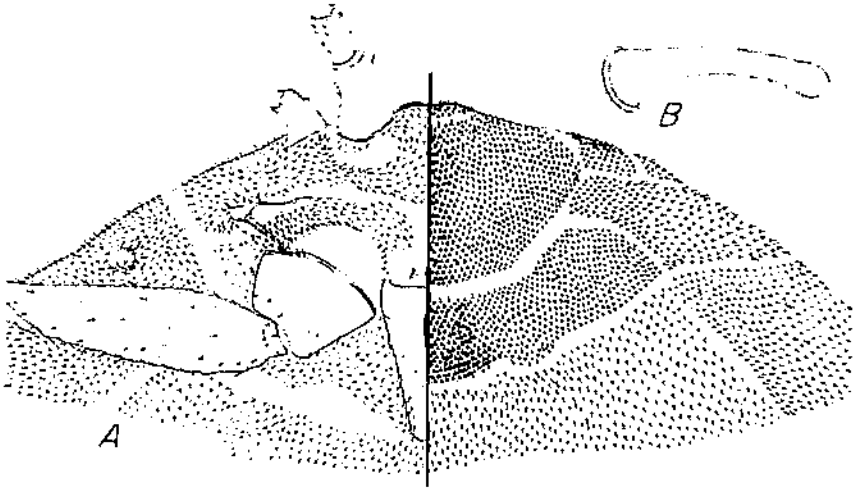


FIGURE 20.—*Orthezia selaginellae*, adult female: *A*, Anterior portion of body, dorsal and ventral, showing dorsal sclerotization; *B*, dorsal body spine.

This new form has been described from a single adult female from Golondrinas, Mexico, on *Selaginella* sp., collected at quarantine, Laredo, Tex., Feb. 9, 1949, by Chapman (Laredo 48269). An intermediate larval specimen from Guanajuato, Mexico, on the same host, collected at Laredo, Nov. 19, 1948, by Chapman (Laredo 47584) appears to be specifically identical.

This insect is very closely related to *cheilanthi* Tinsley, but appears to differ positively in those characteristics compared in the key to species.

ORTHEZIA SMYTHII, New Species

(Fig. 21)

ADULT FEMALE.—Nothing available on unmounted appearance, but obviously much like *insignis*. As mounted, small, about 1.77 mm. long by 1.44 mm. wide, ovoid, narrowed anteriorly; identical with *insignis* in respect to absence of spine rows or bands across the ventral abdominal area enclosed by the ovisac band and in having much of the dorsal surface without spines; dorsal spine clusters not following precisely the *insignis* pattern, however, the pairs on the thorax and anterior abdominal segments not narrow and well separated but each instead definitely wider than long and together nearly contiguous at the midline.

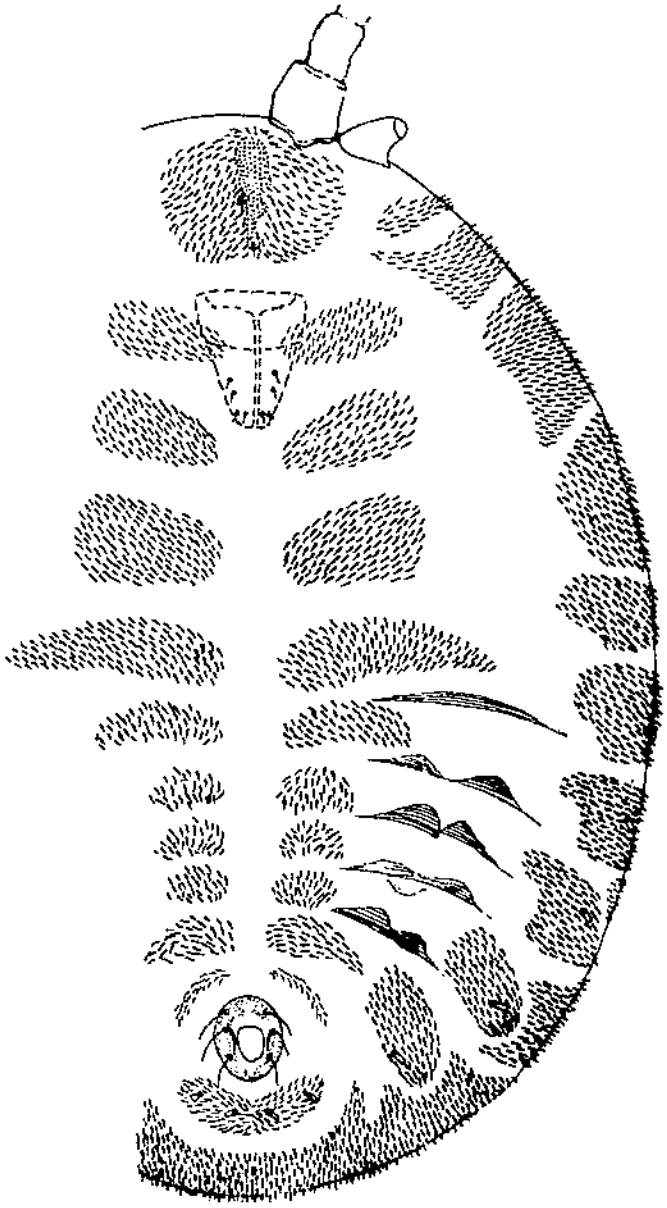


FIGURE 21.—*Orthezia smythi*, adult female: Part of dorsal aspect, showing spine band pattern.

This species has been described from a single mounted adult female collected at Xochimilco, Mexico, on cultivated bean, Aug. 27, 1922, by E. G. Smyth.

ORTHEZIA SOLIDAGINIS Sanders

(Fig. 22, *F*)

No new material of *Orthezia solidaginis* has been received for examination in recent years, but published information has added Illinois, New York, and Pennsylvania to the previously known State distribution and a considerable assortment of new hosts to the few previously reported.

The available material has been restudied in relation to closely related species and some changes have been made in the key separating these species.

ORTHEZIA TILLANDSIAE Morrison

Additional specimens of this insect were collected at plant quarantine, Washington, D. C., on Spanish moss from Houma, La., by W. B. Wood, Aug. 26, 1926 (F. H. B. No. 95123).

ORTHEZIA TILLANDSICOLA, New Species

(Pl. 1, *O*)

ADULT FEMALE.—Very close to *balloui*, but differing sharply in the abdominal dorsal sclerotic plate arrangement, as described in the key to species; antennae, on the basis of the limited material available for examination, definitely longer than with *balloui*, this difference appearing clearly in the basal segments; legs somewhat shorter than with *balloui*; most other structures similar to those of *balloui*, as far as can be determined.

This species is established on two mounted adult female specimens and a little additional unmounted material collected from *Tillandsia fasciculata* at El Retiro, Sierra Rangel, Pinar del Rio, Cuba, on Jan. 12, 1935, by A. R. Otero and J. Acuna (E. E. A. Cuba Ent. No. 1049-1).

ORTHEZIA URTICAE (L.)

(Fig. 22, *D*)

A restudy of the various lots of material that had been considered to represent the species *urticae* indicates that some revision of assignments is necessary. Much more material should be examined if the conclusions here presented are to be supported properly, but at present it is believed that Japanese material collected by Professor Cockerell at Tsuruga and previously recorded as *urticae* is instead *yasushii* Kuwana, and that the known distribution of *urticae* does not extend east of central Asia. The status of *O. japonica* Kuw., tentatively synonymized with *urticae* in 1925, is thrown open to question as is discussed in more detail under *yasushii*.

A comparative study of two specimens of *O. arenariae* Vays., one forwarded by the describer and the other received from Dr. Balachowsky, has disclosed no morphological basis on which to segregate it positively from *urticae*. Hence it is here regarded as a synonym of this species, although it has been accepted as distinct in recent European literature. Possibly a study of a large sample might disclose valid differences not observed in the two specimens examined.

New collection records for *urticae* include a specimen from Ireland on *Pyrus falconeri* (perhaps originally in packing material) collected

at quarantine, Apr. 22, 1929, by W. B. Wood (P. Q. & C. A. No. A5350) (preadult only), and one from Italy on *Vitis* sp., collected at San Francisco, Mar. 3, 1939, by R. Clemens (S. F. No. 16187).

The rather extensive discussion of this species in recent European literature has resulted in the addition of several countries or areas to the distribution reported in 1925, as follows: Hebrides Islands, Iran, Iraq, Ireland, Palestine, Poland, Portugal, Rhodes, Rumania, Spain, and U. S. S. R. (many localities).

ORTHEZIA YASUSHII Kuwana

(Fig. 22, *E* and *O*)

Through the courtesy of its describer, a few specimens of *Orthezia yasushii* from the type locality, but collected in 1925, have been available for examination. On the basis of these specimens it is concluded that these and other Japanese and Korean collections that have been examined are distinct from *urticae*, although, as is evident from the key, no really striking basis for such separation has been discovered. At the same time the previous tentative assignment of *Orthezia japonica* Kuw. to synonymy under *urticae* is brought very much into question, since no Japanese material assignable to *urticae*, as now restricted, has been seen, and there is no reason to suppose that *urticae*, as restricted, really occurs in Japan. Probably the Kuwana specimens of *japonica* no longer exist, since so much of his material was destroyed in the 1923 earthquake, so any further opinion as to its status as a species may depend on the discovery of topotype specimens that fit the original description satisfactorily. As a guess, it is more logical to suppose that *japonica* is based on unusually large specimens of the species here called *yasushii* than that it is true *urticae*.

On the basis of this regrouping, specimens from Oita-ken, Kiushiu, Japan, collected by I. Kuwana on *Artemisia vulgaris indica* (Compositae), June 25, 1925 (identified by Kuwana as this species); from Tsuruga, Japan, collected by T. D. A. Cockerell on *Medicago denticulata* (Leguminosae), June 23, 1923 (previously placed as *urticae*); from Suigen, Korea, collected by S. Nakayama on *Chrysanthemum sibericum* (Compositae), Nov. 13, 1928; and the same on weeds collected June 9, 1928, are all placed as *yasushii* Kuwana.

Japanese entomological literature has added additional records from Japan proper and new records from Formosa and the Sakhalin Peninsula to the previously known distribution.

Genus ARCTORTHEZIA Cockerell

As indicated in the introductory discussion, it has seemed best to advance the classification unit called *Arctorthezia* from subgeneric to generic standing. In addition to the previously recognized differences between this group and characteristic *Orthezia*, which were presented in the original paper on the Ortheziinae, it has now been noted that the species of *Arctorthezia* exhibit a further difference in that each thoracic spiracle has within its atrium a circle or band of multilocular disk pores. This condition has not been observed in species of *Orthezia*. The nearest known approach, *O. caudata*, has a circle of disk pores in the surface derm close to the opening of the

spiracular atrium. With most *Orthezia* species spines only are present in this area.

A restudy of the available material in this genus has induced the conclusion that the North American material which has gone under the name *occidentalis* actually represents at least two distinct forms, morphologically separated by the presence or absence of some curious circular glandular areas at the upper anterior corners of most of the marginal spine clusters, as brought out in detail in the subsequent discussion.

KEY TO SPECIES OF ARCTORTHEZIA

a. Anterior dorsal corner of most marginal spine clusters displaced by a striking circular cluster of disk pores (see figure 22); a similar cluster ventrally just outside of each coxa; normally with 8 pairs of abdominal spiracles ..... *pseudoccidentalis*, new species, p. 55

aa. No such pore clusters at upper corners of marginal spine bands, at most a single pair of clusters ventrally, 1 outside each posterior coxa, in one species.

b. Normally with 7 pairs of abdominal spiracles (an eighth spiracle occasionally present on one side); thoracic mid-dorsal triangular spine groups relatively large, extending across the spine band and completely isolating its halves on each segment; corresponding secretionary plates large, overlapping; usually a single circular group of disk pores ventrally, just outside of each posterior coxa ..... *occidentalis* Dougl., p. 55

bb. Normally with 8 pairs of abdominal spiracles; thoracic mid-dorsal triangular spine groups relatively small, narrow triangular, usually not fully isolating the halves of each dorsal band; corresponding secretionary plates of a perfect insect likewise small, not overlapping ..... *cataphracta* (Olaf.), p. 54

ARCTORTHEZIA CATAPHRACTA (Olafsen)

In recent years several writers have used the author name Olafsen in association with the species name *cataphracta*, rather than the much more frequently applied name Shaw. The first such usage that has been located thus far is by Breddin in 1902 (*4, p. 544*), and appears to be based on publication of the name *Pediculus cataphractus* by Olafsen in 1772 (*37, p. 610* according to Breddin). Although this paper is not available there seems to be no valid reason to question the correctness of the association indicated by Breddin, so for this discussion Olafsen has been accepted as the author of the name *cataphracta*.

Definite records continue to accumulate, enlarging the known range of this insect and further establishing its circumpolar distribution. Since 1925, actual specimens have been examined from Alaska, England, Greenland, Ireland, Norway, Scotland, Spitzbergen, and Switzerland, most of them accumulated through plant quarantine interceptions. The Alaska specimens represent several collection lots from moss or lichens, taken at and near Anchorage by R. I. Sailer and K. Sommerman in 1948 through use of Berlese funnel traps. Although most of these specimens represent larval stages, there seems no doubt of their identity. Also since 1925 several new general localities have been added to this distributional picture through literature reports, including Belgium, Faroes Islands, Finland, France, Hebrides Islands, Iceland, Kamchatka Peninsula, Poland, and U. S. S. R.

From the more recent additions to the collections a better knowledge of the anatomy of the species has been obtained, and the following modifications of the previous description should be made:

Antennae, while normally 8-segmented, occasionally showing 7 and rarely 6 segments. Thoracic spiracles differing from those of *Orthezia* species in the possession of an irregular, fairly wide band of disk pores just within the atrium; abdominal spiracles present in 8 pairs, rather than 7 as previously stated, the posterior apical marginal spine cluster enclosing 3 spiracles on each side, rather than 2 as previously indicated. Ovisac band with the anterior median section provided through its middle one-fourth with a few small, widely scattered quadrilocular pores, each with a heavy rim and with a scattered row of pores in advance of the anterior margin, but sufficiently close to be considered as positively associated with it.

ARCTORTHEZIA OCCIDENTALIS Douglas

(Fig. 22, *B*)

The following additions to the records of specimens examined as listed in 1925 are presented: Sifted from moss, Puyallup, Wash., Feb. 24, 1929 (received from Entomology Department, Western Washington Experiment Station); from thick grass and fir duff and grass, Moscow, Idaho, March or April 1937, collector T. H. Brindley (Truck Crop No. 9882, vial 82) (representing larval stages); on *Rubus* sp. roots from Canada in cargo, collected Dec. 3, 1937, at quarantine, Honolulu (No. 12248); on strawberry from Whatcom Co., Wash., collected June 24, 1944, by Forsell (Spec. Surv. No. 17179); under stones at Haines, Alaska, collector J. C. Chamberlin, Aug. 24, 1945 (No. 2); from Ladysmith, Vancouver, received from W. A. Ross with letter of Nov. 9, 1945; on *Grossularia* from Canada, collected at Seattle, Mar. 12, 1947, by D. M. Pike (larval only) (Seattle 11277); and on apple roots, Big Fork, Mont., collected by W. S. Regan, Nov. 1949 (Q. 33396). New published distribution records include one by Bueker (*8, p. 152*) from Boulder, Colo., on grasses; by Fleury (*13, p. 77*) from Washington State on *Fragraria*, intercepted in Alameda Co., Calif.; and by Schuh and Mote (*39, p. 35*) from Oregon on roots of apple nursery stock.

With this insect, as with the following one, an occasional specimen exhibits 7-segmented antennae rather than the normal 8, and there are a few instances where there is present a single one of the abdominal spiracles that occur normally opposite the hind coxae in the following species, representing the eighth or anterior pair.

Perhaps it should be noted that the single microscopic preparation, identified as *californica* (Ehrh.), that has been available for examination shows no trace of the ventral circular pore clusters outside the hind coxae, which are present in the specimens from other localities. While this does not seem to provide any firm basis on which to question Ferris' synonymyzing of *californica* with *occidentalis* (*11, p. 13*), it does suggest the desirability of the critical study of additional material from California when it becomes available.

ARCTORTHEZIA PSEUDOCCIDENTALIS, New Species

(Fig. 22, *A*)

ADULT FEMALE.—Strikingly close to *occidentalis*, the only positive differences observed residing in apparently normal presence of 8 pairs of abdominal spiracles and the circular pore clusters located at and displacing the spines in,

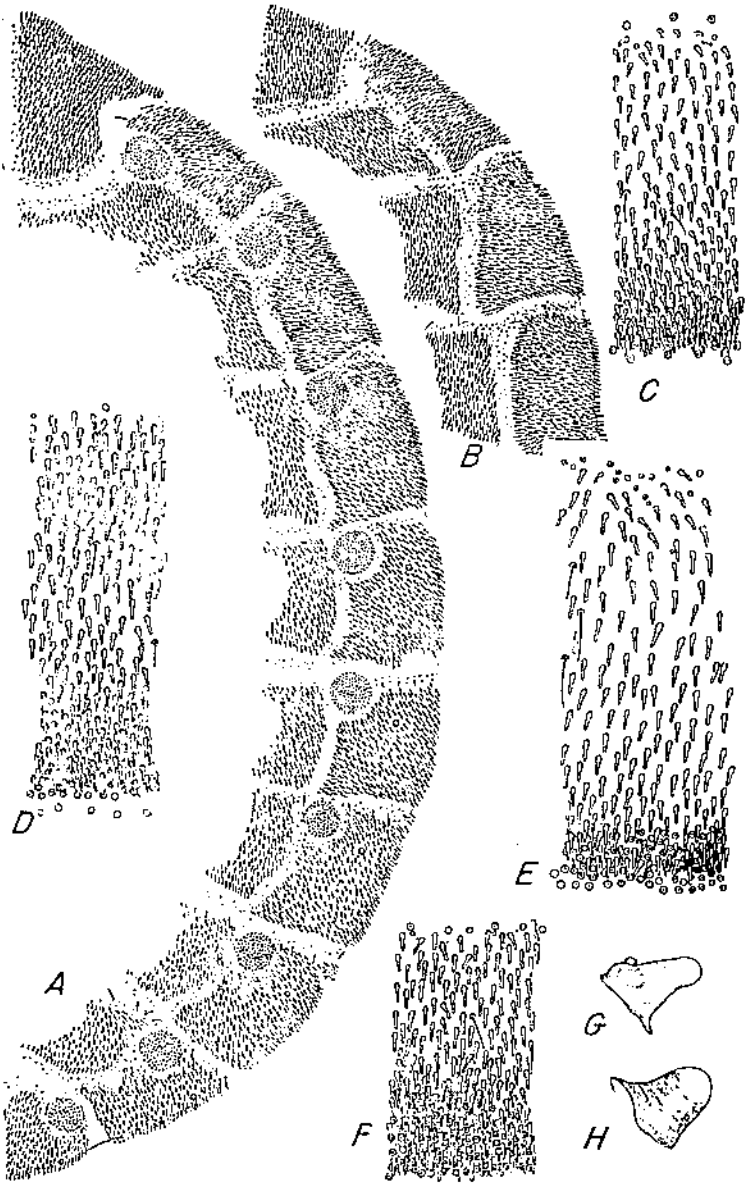


FIGURE 22.—*A*, *Arctorthezia pseudoccidentalis*, adult female, portion of dorsal derm showing circular clusters of pores at upper corners of marginal spine clusters; *B*, *Arctorthezia occidentalis*, adult female, anterior portion of same dermal area, showing absence of these pore clusters; *C*, *Orthezia newcomeri*, adult female, ovisac band, anterior median section; *D*, *O. urticae*, adult female, ovisac band, anterior median section; *E*, *O. yasushii*, adult female, ovisac band, anterior median section; *F*, *O. solidaginis*, adult female, ovisac band, anterior median section; *G*, *O. yasushii*, adult female, eyestalk; *H*, *O. newcomeri*, adult female, eyestalk.

the upper interior corners of the marginal spine clusters, a total of 8 to 9 pairs of these present in the specimens examined, with the posterior dropping out if reduction occurs; these pore clusters varying appreciably in size, with the anterior largest and a gradual reduction posteriorly; maximum size varying also between individual specimens; similar but much smaller disks of pores appearing at the anterior angles of the dorsal triangular spine patches lying across the midline on the thoracic segments, and more or less obviously on the midline of at least the first one or two of the abdominal segments. The unmounted insect, from limited material, appearing identical with *occidentalis*, except for tiny circular holes in the heavy secretion marking the points of occurrence of the circular pore plates, these holes obscured by overlapping secretion in older specimens.

This species is based on very limited material as follows: On *Berberis aquifolium*, Yakima Co., Wash., collector E. J. Newcomer, Oct. 22, 1923 (Q14,200); on unstated host, Forks of Salmon River, Calif., collector R. C. Cramer, 1937; in duff beneath various trees, including pine, fir, spruce, balsam, beneath snowberry, perhaps associated with grasses and weeds, at Moscow, Idaho, collected by T. H. Brindley, March and April 1937 (including Truck Crop Nos. 9809, vial 9 (holotype); 9111, vial 11; 9813, vial 13; 9817, vial 17; 9829, vial 29; 9851, vial 51; 9865, vial 65; 9867, vial 67; on apple sprouts, Yakima, Wash., collected April 7 and Sept. 8, 1942, by J. W. Carlson (Q. 32852). The record for *occidentalis* published by Hatch (*24, p. 179*) in 1938, from Yakima Co., Wash., plainly is based on the Newcomer collection cited above, so should be transferred to this species.

It will be obvious that the known distribution range of *occidentalis*, as here accepted, not only surrounds that of *pseudoccidentalis* but coincides with it in one area—Moscow, Idaho—if immature stages of the two forms have been correctly placed. Add to this the close resemblance of the two and it may be questionable whether they deserve separation as distinct species. Within the limited numbers of specimens available for comparison, the morphological differences noted are rather striking and, except for the partial break-down in the numbers of abdominal spiracles, appear to be clear cut. On present limited knowledge of this group, complete specific segregation seems the only practical treatment.

Genus NEWSTEADIA Green

Since 1925 there has been much greater taxonomic activity in this genus than in any other in the Ortheziidae. In that year two definitely recognizable species, based on adult females, and a third, based on the preadult stage, were assigned here. Since that time five additional species have been described. In this discussion one of these is placed in synonymy, the adult female of the third species of the earlier discussion is recognized, and four new species are presented, bringing the current inclusions in the genus to eleven.

In 1947 Mamet (*34*) discussed the distribution of the genus *Newsteadia*, but the additional species included herein have a distribution pattern that probably will induce some changes in his conclusions.

KEY TO SPECIES OF NEWSTEADIA

a. Normal antenna with 6 to 7 segments.

b. Beak short, almost as wide at base as long to wider than long as mounted; combined lengths of antennal segments I and II not exceeding two-fifths of total antennal length in a normal antenna.

c. Antennal setae other than sensory relatively long, slender, blunt-tipped; at least the basal leg setae (femoral and tibial) likewise elongate and slender.

d. Antennae normally 7-segmented, III short, little more than one-third the length of II; with 5 oval to elongate clusters of pores ventrally, near fore and mid coxae and across the area between the hind coxae ..... *waeri* Strickland, p. 64

dd. Antennae normally 6-segmented, III long, approaching II in length; no ventral pore clusters.

e. All leg setae, except the terminal tarsal setae, slender, elongate; with a few scattered setae within the ovisac band ventrally in addition to the transverse band anterior to the vulvar opening; anal ring setae barely longer than the anal ring diameter ..... *montana* Mamet, p. 62

ee. Only the femoral and tibial leg setae slender, those on tarsal portion of tibio-tarsal segment shorter, relatively stout, spine like, acute apically; only the band or cluster of setae just anterior to the vulvar opening on the ventral area enclosed by the ovisac band.

f. Dorsal pore bands complete, continued in full width to corresponding marginal clusters on each side; anal ring setae strikingly longer than anal ring diameter ..... *zimmermani*, new species, p. 60

ff. Posterior abdominal dorsal spine bands obviously reduced leaving much bare derm between and at the ends of the spine bands; anal ring setae shorter than ring diameter ..... *guadalcanalia*, new species, p. 60

cc. Antennal (except sensory) and leg setae all stouter and shorter, lanceolate to conical with acute apices.

g. Spines along posterior margin of the antero-median section of the ovisac band tapering from basal third to a very slender, threadlike diameter; claw digitules very short, about one-fifth as long as the claw itself ..... *myersi* Green, p. 63

gg. Spines along posterior margin of the antero-median section of the ovisac band slender, but not threadlike; claw digitules longer, at least one-third length of claw.

h. Claw digitules strikingly elongate, up to more than half the claw length; dorsal transverse spine bands on the intermediate abdominal segments narrow laterally, but strongly swollen near the midline, with the spine group here forming a pair of prominent, anteriorly protruding lobes ..... *samoana*, new species, p. 63

hh. Claw digitules shorter, about one-third length of claw; dorsal spine bands on the intermediate segments of approximately uniform width throughout, or narrowed across the midline ..... *mauritiana* Mamet, p. 60

bb. Beak relatively long, length-basal width ratio approximating 3–2 or even greater; combined lengths of antennal segments I and II one-half or even more of the total length of a normal antenna.

i. With a transversely elongated sclerotized area ventrally, lying across the midline at the posterior end of the body, just within the ovisac band; dorsal abdominal spine bands almost to definitely interrupted on the midline.

j. This transverse thickening conspicuous, narrowly rectangular, rectangular, or with rounded ends; no setae along outer (anterior) border of anterior median section of ovisac band; antennae normally 7-segmented, large, length over 2.5 mm.....*americana* Morr., p. 59

jj. The transverse thickening narrow, sometimes almost linear, often irregular or even broken, not conspicuous; with setae in the outer (anterior) margin of the anterior median section of the ovisac band; antennae normally 6-segmented; small, length probably never much exceeding 1 mm.....*minima* Morrison, new species, p. 61

ii. No such transversely elongated sclerotized area developed in the posterior ventral area; antennae normally 6-segmented; dorsal abdominal spine bands somewhat narrowed but not interrupted on the midline.....*floccosa* de Geer, p. 59

aa. Antennae normally 3-segmented .....*tristani* Silv., p. 64

NEWSTEADIA AMERICANA Morrison

Collections of this species not previously reported include larval stages only from *Helianthus* roots, Anderson, S. C., Aug. 18, 1939, collected by H. S. McConnell (No. 22); in *Pinus strobus* litter, Enfield State Park, Va., received from Floyd Andre, Oct. 5, 1944. Trimble (*44, p. 42–43*) has also reported the species from the State of Pennsylvania.

NEWSTEADIA FLOCCOSA De Geer

In 1947 Ghesquiere (*17, p. 295*) indicated that *Newsteadia collarti* Ghesq., which he first described in 1934 (*15, p. 27*), although it had been mentioned in print the year previously but as a *nomen nudum*, was to be considered a synonym of *N. floccosa* de Geer. Subsequently, in correspondence, he confirmed this assignment.

Records based on specimens examined, in addition to those reported in 1925, include: From Camberly, Surrey, England, under moss, Apr. 12, 1914, collected by E. E. Green; from Liverpool, England, in soil of potted plant, at quarantine, Philadelphia, Pa. (No. 924) Nov. 4, 1922, collected by Kisliuk and Davis; from Tunbridge, England, on *Iris*, at quarantine, Washington, D. C., May 1, 1923, E. I. Smith, collector (F. H. B. No. 83703); Sweden on blueberries, at quarantine, New York City (No. 2217), Aug. 3, 1933, Irving Schiller, collector; from England on moss, at quarantine, Washington, D. C., Apr. 16, 1924, L. J. Bottimer, collector (F. H. B. 85830); Camberly, Surrey, England, among moss and dead grass, Sept. 2, 1925, E. E. Green, collector; from England in sphagnum packing around *Aspidistra* at quarantine, Philadelphia, Pa. (No. 6714), Nov. 25, 1927, collected by C. S. Albright; from Germany, on *Acer*, *Populus*, and *Crataegus*, collected at quarantine, Washington, D. C., (P. Q. & C. A. No. A8525) on Mar. 14, 1930, by R. G. Cogswell; from Czechoslovakia in packing material for rose plants, at quarantine, Washington, D. C. (B. P. Q. No. A20402), Dec. 5, collected by W. I. Whiton and Dec. 9, 1932

collected by Gouldman and Woods; and from Denmark in forest-litter packing material, at quarantine, Washington, D. C. (E. Q. No. A51640), Jan. 13, 1939, collected by Smith.

In addition, the species has been mentioned in the literature with sufficient frequency to add the following countries to the known distribution: Austria, Belgium, Denmark, Ireland, Poland, Rumania, Spain, U. S. S. R.

NEWSTEADIA GUADALCANALIA, New Species

ADULT FEMALE (one imperfect mounted specimen).—Nearly elliptical, but the posterior apex protruding slightly, 1.12 mm. long by 0.8 mm. wide. Derm membranous throughout. Antennae 6-segmented, characteristic for the genus, the 2 basal segments enlarged but with the second tapering from broad base to narrow tip, the remaining segments elongate, slender; lengths of segments, in microns: I, 118; II, 158; III, 103; IV, 67; V, 55; VI, 182; spur 69; nonsensory antennal setae few, stiff, tapering, but slightly knobbed apically, longest about 32μ. Eyestalk strongly pollicate, basal diameter about 32μ, total length 60μ; eyespot occupying the apical one-fourth to one-fifth. Legs elongate, slender, though with basal half of femur swollen, lengths of parts of a hind leg, in microns: Trochanter-femur 420, tibia (to slight constriction indicating end) 245, tarsus 316, claw 35, claw digitules 9; no claw denticles; leg setae few, femoral and most tibial, like antennal, elongate, tapering, slightly knobbed apically; apical leg setae the usual conical type. Beak very short and stout, length 102μ, width about 130μ; a few rather long (up to 30μ) setae near apex. Thoracic spiracles obscured, apparently not unusual; abdominal spiracles characteristic, the usual 5 anterior pairs present. Derm pores weakly sclerotized, internal structure uncertain, even with oil, but presumed to be the usual quadrilocular type; only a few dorsally, those scattered in the interspaces, fairly abundant in the interspaces around the marginal spine clusters and across the area enclosed by the ovisac band, fewer ventrally in front of the ovisac band. Body setae few, long, slender, a mid-dorsal seta about 32μ long; a transverse cluster of about 16 ventrally just before the vulva. Body spines elongate, slender, rather weakly sclerotized, mid-dorsal about 16μ long, marginal more elongate, about 21μ, ovisac band still longer, as much as 24μ; anterior dorsal spine bands complete to margins, but with wide interspaces down midline between halves, between bands, and between ends and marginal clusters; dorsal intermediate abdominal bands reduced to a few spines to each half, leaving large interspaces, the two posterior heavier and not interrupted medially; marginal clusters better developed, the intermediate abdominal forming a continuous band with deeply scalloped upper margin; no spines across area enclosed by ovisac band. Ovisac band comprised of almost threadlike spines, the anterior median section narrow and with a loose band of disk pores across the area in front of it and fairly definitely associated with it, though not as a tight row or band; ovisac band incomplete laterally, the sides tapering to a narrow end opposite each fourth spiracle. Anal ring about 60μ long, width approximately the same, the outline roughly hexagonal; the inner pore band on each side strongly protruding opposite each anterior and posterior spiracle, but outlining rectangular areas on the midline at each end, rather than diamond-shaped ones as in some *Orthezia* species; ring setae short, stout but tapering to bluntly rounded apices, length of one 40μ.

This coccid has been described from a single, somewhat imperfect, slide-mounted specimen collected on North Guadalcanal in the Solomon Island group in 1944 by L. Liporsky. Among the known species it seems most closely related to the species *samoana*, here described as new.

NEWSTEADIA MAURITIANA Mamet

Mamet's extended description and numerous figures (*32, p. 117*) provide an ample basis for the recognition and assignment of *Newsteadia mauritiana*, described from Cocotte Mt., Mauritius, on moss

on rotting wood, Dec. 27, 1941, and Jan. 24, 1942, collected by the describer. No specimens of the insect have been examined by the writer.

NEWSTEADIA MINIMA, New Species

(Fig. 23)

ADULT FEMALE.—As mounted, elliptical, length 1.05 mm., width 0.81 mm.; membranous throughout. Antennae 5- to 7-segmented, more often with 6 segments, variable in lengths; lengths of segments of one, in microns: I, 151; II, 117; III, 39; IV, 31; V, 39; VI, 31; VII, 148; spine 70; of a second: I, 151; II, 117; III, 45; IV, 35; V, 47; VI, 140; spine 55; always with the 2 first segments conspicuously enlarged, together approximating half the total antennal length; antennal setae blunt-tipped, only slightly tapering, but set on prominent protruding bases. Eyestalk placed close to base of antenna, elongate, somewhat tapering to the eye, usually more or less curved. Legs characteristic for the genus, lengths of parts of one posterior leg: Trochanter-femur 335μ, tibia-tarsus 436μ, a slight constriction of diameter before the middle of the latter suggesting the remnant of the tibio-tarsal joint, claw 30μ, without denticles; claw digitules stout, short spines; leg setae (actually spines) stout, blunted apically on coxa and femur, gradually sharper towards tip of tarsus, here acute. Beak stout, 148μ long by 93μ wide at base, gradually constricted to middle, with an obscure or incomplete division near base, then nearly cylindrical to blunted apex. No obviously clustered spines associated with the stout thoracic spiracles, and the usual easily observed 5 anterior pairs of simple tubular abdominal spiracles, but 2 or 3 disk pores associated with most of them. Derm pores consisting of the flat quadrilocular type only, with relatively wide margin, some scattered dorsally, but many more in transverse bands ventrally in the abdominal area and in diagonal bands anteriorly, the pores of the latter mostly at the bottoms of short tubes; also with numerous very tiny, apparently simple, tubular ducts interminglied in the spine clusters and interspaces, more abundant dorsally. Body setae present, scattered among the spine bands but inconspicuous in these, many around 24μ, all apparently blunt-tipped; body spines as follows: Ten marginal bands or clusters, the 10th very small, the 6th to 9th running together to make a solid band with scallops above; in the 10 mid-dorsal clusters or bands, with the anterior 4 uninterrupted and complete, the posterior 2 quite small, likewise uninterrupted, the remaining 4 definitely interrupted on the midline, divided into right and left halves; ventrally with a pattern of narrow spine bands on anterior portion of body as shown in figure; with the transverse anterior section of the ovisac band well developed, but with the lateral sections incomplete, reduced to a series of spine clusters toward the end of the body; the normal spine type enlarged and more or less distinctly scalloped at base, tapering strongly and curved, then nearly cylindrical to a bluntly rounded apex, but interspersed among these clusters of normal spines, and not nearly so numerous, an unusual type, not enlarged at base, cylindrical or a little constricted near middle and again enlarged at apex, apical structure uncertain, but appearing as if toothed, and also a few short stout rounded conical spines. Anal ring not unusual, the 6 setae subequal in length, about 43μ, all with bluntly rounded apices. With a posterior abdominal thickening comparable to that of *americana*, but narrow, almost transversely linear, and with irregular margins.

PREADULT STAGE.—Of interest chiefly because of a rather conspicuous ventral transverse sclerotized area near the posterior apex, comparable to that present in the adult female of *N. americana*.

This interesting little species, the second to be reported from the United States, has been described from several mounted and unmounted specimens, collected by A. S. Pearse in the Duke Forest, Durham, N. C., as follows: In pine litter on clay, Sept. 8, 1944 (No. 16); Nov. 11, 1944 (No. 112) (holotype); Feb. 17, 1945 (No. 268) (preadult stage); Mar. 3, 1945 (No. 292), June 30, 1945 (No. 472); July 21, 1945 (No. 508); in pine litter on sand, Dec. 2, 1944 (No. 154) (adult female) and (No. 166) (larval stage); Jan. 20, 1945 (No. 226); Feb. 10, 1945 (No. 262) (preadult).

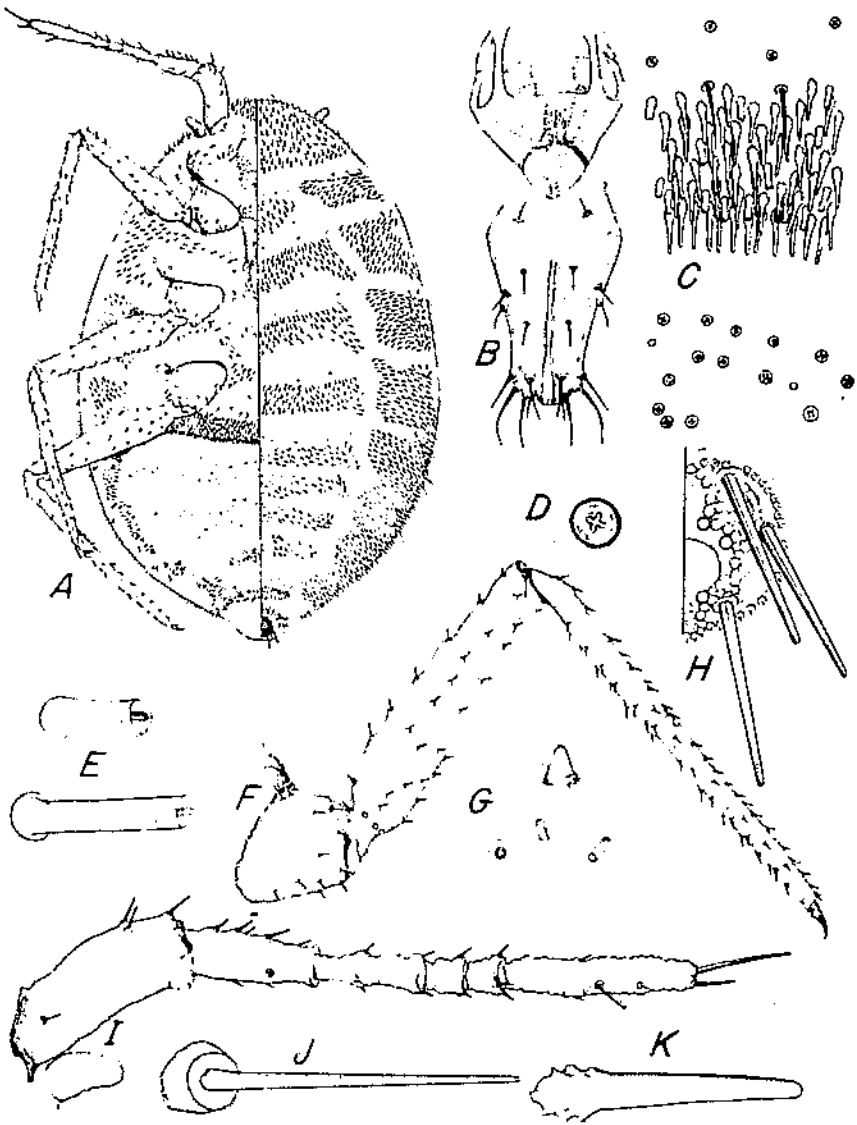


FIGURE 23.—*Newsteadia minima*, adult female: *A*, Body, dorsal and ventral; *B*, mouth parts; *C*, ovisac band, anterior median section; *D*, quadrilocular type disk pore, surface view; *E*, peculiar body spines; *F*, posterior leg; *G*, short conical tubercles (above), and tiny tubular ducts, surface and profile (below); *H*, anal ring, right half; *I*, antenna and adjacent eye stalk; *J*, body seta; *K*, body spine.

NEWSTEADIA MONTANA Mamet

This new species was well described and illustrated by Mamet in 1947 (*33, p. 31*), although originally mentioned by him as a *nomen nudum* in 1943 (*32*). No specimens have been examined.

NEWSTEADIA MYERSI Green

Green (*22, p. 372*) described this insect in 1929 from Ohakuna, New Zealand, where it had been collected by J. G. Myers in leaf mold. No specimens have been seen, and the description and figures presented are not so detailed as they should be for positive assignment in the key. No reports of its rediscovery have been noted.

NEWSTEADIA SAMOANA, New Species

ADULT FEMALE (from alcoholic material).—Wax plates (from fragments) heavy; a large, median, flat conical cephalic plate protruding from the front of the head; apparently 5 large flattened marginal plates on each side of the body, the 2 anterior curved forward, the intermediate directed outward and the 2 posterior backwards, the last obviously made up of coalesced bundles of wax filaments, the others showing more or less striation; thoracic dorsal plates entire, abdominal in pairs, one pair to a segment, flattened, inverted wedge-shaped, directed anteriorly, and strongly overlapping the plate in front; ventrally with thin plates over the cephalic and thoracic area and a well-formed ovisac, probably about as long as body; secretion pure white in early adults, more or less blue-green in old fully matured adults, perhaps owing to contamination of some sort.

Body as mounted elliptical, length up to 2.25 mm., width up to 1.60 mm., most of dorsal surface moderately sclerotized, and much of the abdominal dorsal area not bearing spine bands; with numerous posteriorly directed comb-scale markings; in addition, with conspicuous, heavily sclerotized internal bodies in 5 pairs, originating apparently in the intersegmental areas between the intermediate abdominal segments and 1 to each side of each segment, placed at the outer end of the dorsal spine bands. Antennae appearing slender, normally 6-segmented, lengths of segments of an average one, in microns: I, 150; II, 182; III, 205; IV, 71; V, 59; VI, 210; apical spine 63; antennal setae other than apical and subapical sensory all slender conical to somewhat lanceolate spines, largest about 16μ. Eyestalk strongly protruding, rounded apically, about 99μ long by extreme basal width of 55μ. Legs not unusual, average lengths of parts of posterior leg, in microns: Trochanter-femur 630, tibia-tarsus 790, claw 63, claw digitule 32; with all setae, except a slender, blunted one at apex of tibia, relatively stout, tapering to acute apices. Beak stout, a constriction about one-third of length from base suggesting a joint; length about 182μ, maximum basal width uncertain but more than 140μ. Thoracic spiracles not unusual, a ring of disk pores and a few tiny stiff setae or conical projections at the opening of the atrium of each spiracle; abdominal spiracles in the usual 5 pairs, long cylindrical, each opening adjacent to, though not obviously associated with, an elongate cluster of weakly developed disk pores. Derm disk pores small, well distributed over both surfaces and through the spine bands, of the usual quadrilocular type, with the loculi quite obscure, pores definitely grouped or clustered in many of the interspace areas between the spine bands, especially laterally, and in the ventral abdominal area. Body spines in wide bands or clusters, with 11 paired bands dorsally, including the fused cephalic cluster, 10 laterally, again including the cephalic cluster with the 4 intermediate abdominal lateral clusters fused into a single band with segmentally notched margins; dorsal spines a little stouter, usually rather strongly curved, length up to about 20μ, lateral more slender, especially towards the ventral edge of the bands, length 20 to 26μ; ovisac band spines varying from stout, about 20μ long and tapering, in middle of band, to very slender, about 28μ long, almost cylindrical except for expanded base, along inner margin; ovisac band very wide across the abdomen, tapering off in a wedge along each side of the abdomen. A few setae dorsally up to 32μ, and clusters ventrally in front of and behind the vulvar opening and scattered elsewhere about half this length. Anal ring small, approximately circular, with wide pore bands, diameter about 60μ, with 6 tapering bluntly pointed setae, longest about 80μ.

This species has been described from a number of unmounted and mounted specimens collected at Tiavi, Upolu, Samoa, June 21, 1940, at 2,000 feet by Elwood Zimmerman (No. 101). An additional specimen, from Pica, Tutuila, Samoa, Aug. 29, 1940, at 1,700 feet, also

collected by Mr. Zimmerman, differs from the specimens on which the description is based in having a smaller body with length about 1.55 mm., somewhat longer antennae, legs and anal ring setae and the intermediate dorsal abdominal spine bands with the anteriorly protruding lobes next to the median line less obviously developed. If ever additional collections can be made and these bear out the differences that have been noted, then this situation will provide one of the very few instances among the coccids, in the experience of the writer, in which there appears to be some legitimate ground for the establishment of a subspecific or varietal category within a species. However, it does not appear that such action should be taken formally here on the evidence provided by the single specimen examined. The holotype and some paratypes have been returned to the Bishop Museum, Honolulu.

NEWSTEADIA TRISTANI Silvestri

This species, described from a preadult female, was included in *Newsteadia* in 1925 (*35, p. 151*) on the basis of spiracular and other morphological characters that obviously fitted the generic pattern, and in spite of the striking difference in the antennal segments, of which there are 3 instead of the characteristic 6 to 7.

A single adult female, collected at quarantine at Laredo, Tex., from Tuxtla Gutierrez, Mexico, on an orchid, Aug. 16, 1948, by Chapman (Laredo 47062) is accepted as an example of this species. It is slightly larger, 1.2 mm. long as mounted; the lengths and proportions of the antennal segments and leg parts are different, the pattern of spine bands is likewise somewhat different, with the dorsal bands more definitely delimited and with the abdominal bands narrowed and composed of comparatively few spines. Such differences between preadult and adult fit the pattern exhibited in the few species of the family where preadult stages have been available for examination. The antennae in this adult are 3-segmented, as with Silvestri's specimen—a condition so striking, on our present knowledge of this group, that it alone justifies the association.

NEWSTEADIA WACRI Strickland

This morphologically interesting species was described by Strickland (*43, p. 518*) from Tafo, Eastern Province, Gold Coast, on *Theobroma cacao*, and was later found at the same locality on *Terminalia superba* and *Triplochiton scleroxylon*. It has been included in the key to species on the basis of the description and of specimens forwarded by its describer.

NEWSTEADIA ZIMMERMANI, New Species

ADULT FEMALE.—Two alcoholic specimens; nothing available on character of secretion. Body elliptical, length 1.6 to 2 mm., width 1.2 to 1.36 mm. Derm lightly, but not definitely, sclerotized except for the paired invaginated thickenings on the abdomen, as in *samoana*. Antennae slender, 6-segmented, III sometimes with an imperfect joint partially dividing it, lengths of segments, in microns: I, 134; II, 134 to 160; III, 126 to 260; IV, 45 to 63; V, 45 to 63; VI, 213 to 230; spine 71; all antennal setae slender, gradually tapering and with blunted apices, 14 to 40μ long, setae on apical segment reduced to 2 including 1 sensory. Eyestalk short digitate with expanded base, length 47 to 55μ, extreme basal width 40 to 55μ. Legs not unusual in shape or appearance, except for the presence on femur

and tibia of slender setae only, a few acute, but mostly only slightly tapering and bluntly rounded apically, 20 to 40μ long, these also in place of the usual stout, spinelike type of most species of the genus; tarsus bearing the customary spinelike setae, less stout than in some other species; lengths of parts of posterior leg, in microns: Trochanter-femur 490 to 550μ, tibia-tarsus 616 to 694μ, claw 55 to 59μ, claw digitule 16 to 24μ. Beak short and stout, about 175μ long by 157μ wide, definitely tapering and showing a constriction about one-third length from base. Thoracic spiracles not unusual, no pores in derm around opening, but a loose circle within atrium; abdominal in the usual 5 pairs, cylindrical, a small cluster of disk pores closely associated with the opening of each. Derm pores of the usual quadrilocular disk type, but small, weakly developed, most abundant through the interspaces between the spine bands and in bands across the underside of the abdomen, some, more heavily sclerotized, scattered through the spine bands. Derm spines in large clusters and bands covering most of the body except the area within the ovisac bands; with 11 bands dorsally, including the large cephalic cluster, the thoracic hardly interrupted medially, 3 intermediate abdominal with a wide and deep notch from the anterior margin on the midline, the last 2 abdominal small; with 10 marginal spine clusters, again including the cephalic, with the 4 intermediate abdominal clusters partially fused; most of ventral surface of head and thorax covered by wide spine bands; dorsal and lateral spines nearly uniform, swollen basally, usually curved and tapering to bluntly rounded apices, about 15 to 17μ long, all ventral, including most in ovisac band, slightly more slender but about as long, a single row along inner margin of ovisac band distinctly longer, 25 to 28μ, and more slender, nearly cylindrical for most of length; ovisac band about 12 spines wide in anterior median section, a very few disk pores scattered through it and an irregular band up to 4 wide in front of this section, but no pores closely associated with either margin. Anal ring small, nearly circular, a little extended at each end, pore bands wide, cross diameter about 71μ; the 6 setae long compared with other species, up to 110μ.

This insect has been described from two specimens collected at Nandarivatu, Viti Levu, Fiji, by Elwood Zimmerman, one at 2,700 feet, Sept. 7, 1938 (No. 3), the other at 2,600 feet, Sept. 9, 1938 (No. 1). No information respecting the normal appearance of the secretion can be supplied, but it must be very similar to that of *samoana*. One of the two specimens studied is plainly larger—perhaps 20 percent—than the other, but the details of structure seem to be nearly identical in other respects. The holotype has been returned to the Bishop Museum, Honolulu.

Genus MIXORTHEZIA Morrison

A study of specimens received from various sources in recent years indicates that this genus should be expanded to include certain species previously assigned elsewhere, as well as two previously undescribed species.

Although the description is not fully adequate, it seems reasonably certain that the species described as *Ortheziola fodiens* Giard (*18, p. 583*) should be assigned here. A similar assignment is also indicated for *Orthezinella neotropicalis* Silvestri (*43, p. 172*) rather than one to *Nipponorthezia* as was previously suggested (*45, p. 154*) and for *Ortheziopa reynei* Laing (*28, p. 383*), which its author has already suggested (in litt.) should be transferred to *Orthezinella*.

KEY TO SPECIES OF MIXORTHEZIA

a. Described as having dorsal wax plates as in *Ortheziola vejdovskyi*, that is, with a large, oval, mid-dorsal area of the derm naked and exposed, and hence without wax plates and the underlying spine clusters or bands.. ... ----------*fodiens* (Giard), p. 68

aa. With secretion and paired spine clusters or bands of various sizes down the dorsal midline of the body.

b. Dorsal spine bands on each half of body complete and wide on both abdomen and thorax, at most with some of these a little narrowed in middle; antennae (preadult only) relatively very stout.....*cubana* Morrison, p. 66

bb. Dorsal spine bands on each half of body varying from complete but definitely narrowed medially to almost obsolete, reduced to small triangular or linear patches; antennae plainly more slender.

c. All dorsal spine clusters, excepting only a narrow, medially interrupted band on the antepenultimate abdominal segment, reduced to tiny submedian and submarginal groups of spines, leaving most of dorsal surface without spines.....*ecuadorensis*, new species, p. 66

cc. Some, at least, of the dorsal abdominal spine bands entire, though narrowed near middle, and all segments with the spine clusters larger.

d. Anterior median area of head dorsally (space between antennal bases) devoid of spines, except for a narrow band close to each antennal base.....*myersi*, new species, p. 68

dd. Anterior median area of head dorsally (space between antennal bases) crowded with spines to form a normal cluster, at most interrupted on median line by a single line of pores.

e. Thoracic dorsal spine bands, although strongly constricted near middle, continuous or nearly so, at most only narrowly interrupted at the mid-point.....*reynei* (Laing), p. 70

ee. Thoracic dorsal spine bands strongly interrupted, each actually reduced to an elongate narrow cluster close to the midline, plus a much smaller cluster of variable shape close to the corresponding marginal spine cluster.....*neotropicalis* (Silv.), p. 70

MIXORTHEZIA CUBANA Morrison

No additional material of *Mixorthezia cubana* has been seen and our knowledge of it continues to be based on the imperfect specimens used for the original description.

MIXORTHEZIA ECUADORENSIS, New Species

(Fig. 24)

ADULT FEMALE.—Described from a single mounted specimen, no notes on superficial appearance available. Obviously, however, with lateral and small middorsal paired tufts of secretion in life.

Body as mounted elliptical, length 1 mm., width 0.8 mm. Derm membranous except for a number of small sclerotic plates as follows: Up to 8 down the midline of the body, more or less developed, but only those on posterior 4 segments conspicuous and well developed, the 2 before anal ring largest and most conspicuous; up to 5 or 6 on the margins of the posterior body segments, with the posterior largest (see fig. 24). Antennae, placed on an asymmetrical basal collar, narrowed above, widened below, 4-segmented, I stout, 60μ long; II, somewhat smaller, 53μ long; III, considerably smaller, nearly cylindrical, 85μ long and almost fused with IV, this 100μ long, to form a slender clavate club; apical seta 150μ long; antennal setae small but stiff, spinelike, 2 sensory setae toward apex of IV. Eyestalk digitate about 40μ long, placed immediately adjacent to edge of antennal basal collar, but apparently not fused with this. Legs characteristic, coxa triangular, posterior trochanter-femur 255μ; tibia and tarsus fused, with apparent division near base, tibia 85μ, tarsus 218μ, claw 44μ, tarsus tapering and slightly sinuate towards apex; leg setae short, stiff, many set on protruding bases; claw digitules small stiff setae, no claw denticles. Beak 1-segmented, elongate, tapering to a blunted apex; length 113μ, width at base 60μ, at apex 28μ; a circle of blunt-tipped setae at apex. Thoracic spiracles

small, placed at inner ends of small dermal invaginations, no spines associated, but the adjacent derm strongly, irregularly ridged; abdominal spiracles present, number uncertain. Derm pore types including small short tubular ducts or pores with width about 3μ, of uncertain internal structure, but apparently equal

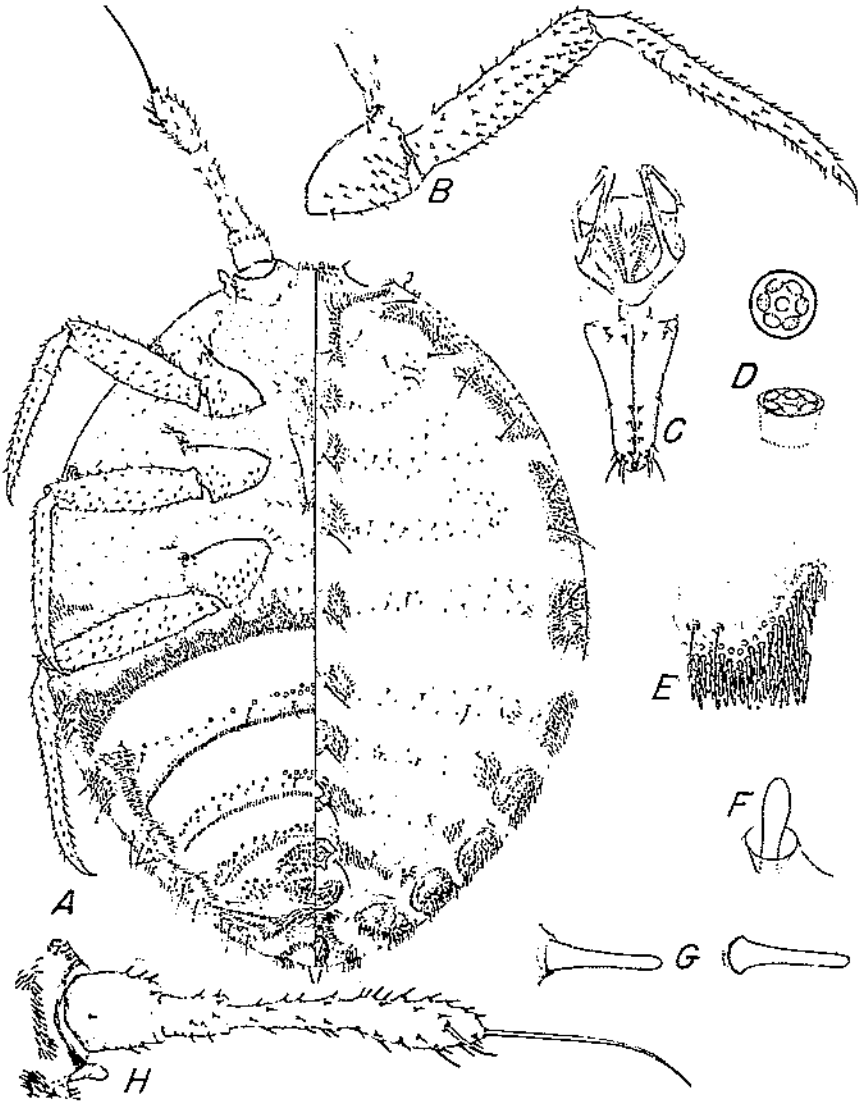


FIGURE 24.—*Mixorthezia ecuadorensis*, adult female: *A*, dorsal and ventral; *B*, posterior leg; *C*, mouthparts; *D*, multilocular disk pore, two views; *E*, ovisac band, anterior median section; *F*, clavate spine; *G*, normal body spines; *H*, antenna and associated eyestalk.

to the quadrilocular type of *Orthezia*, these widely scattered dorsally over the bare areas of the derm, closely bordering each small cluster of spines, and in compact rows ventrally bordering the anterior or outer margin of the ovisac band and the anterior margins of the ventral abdominal spine bands; multilocular disk pores with diameter around 5.2μ present ventrally in clusters

associated with setae in front of and behind the vaginal opening and in 3 transverse rows anterior to the 3 abdominal rows of spines, and a few dorsally just above the anal ring, all these usually with 6 to 7 loculi, sometimes apparently imperfectly developed. Setae scattered sparingly over body, but clustered in vaginal area, definitely more slender dorsally, observed length variation 12 to 45μ; a few distinctly elavate spines, mostly set in pits, near the body margins and in a small cluster on each side of the vaginal area; secretion-supporting spines not abundant, in 9 small paired clusters along the midline, flanking the midline sclerotized areas where present or a wrinkled dermal area on the anterior body segments; spine cluster shapes various, the anterior elongate, the posterior forming the halves of an interrupted transverse band, intermediate elliptical to triangular; lateral clusters rather complex, anterior elongate rectangular, or somewhat widened at ends, posterior (abdominal) characteristically made up of a small spine cluster above and separated from the marginal sclerotized plate, then a considerably larger irregular cluster intimately associated with the lower margin of the sclerotized area; spines in ovisac band closely crowded, the band narrow with uniform inner margin, but the outer (anterior) margin of the anterior median section more or less distinctly scalloped, with 2 especially evident anterior projections near the median line; lateral section of ovisac band interrupted, made up of 3 narrow overlapping spine bands, the posterior joining its opposite across the midline to form a continuous band. Anal ring with numerous pores, but structure obscure in specimen examined; the 6 anal ring setae short, blunt-tipped, about 45μ long, except the intermediate pair, these definitely shorter and more slender, about 31μ long.

This species has been based on a single individual collected at Pichilingue, Ecuador, on cacao roots by Edson J. Hambleton, Oct. 1, 1944 (No. 62). Its characteristics, especially the reduced spine pattern, separate it strikingly from the other species of the genus.

MIXORTHEZIA FODIENS (Ciard)

The identity of this species has remained obscure since its description in 1897 (*18, p. 284*). Its transfer to *Mixorthezia* is therefore little better than a guess as to its proper assignment but has been made after a restudy of the original description in comparison with specimens of other species of the genus taken from the roots of coffee and cacao elsewhere in the West Indies.

MIXORTHEZIA MYERSI, New Species

(Fig. 25; pl. 1, *P*.)

ADULT FEMALE.—Described from alcoholic and slide-mounted material, exact nature of secretion not established. As mounted, stout elliptical, length 1.3 mm., width 1.1 mm. Entire derm showing a tendency towards light sclerotization, with slightly heavier areas along the upper edges of marginal spine clusters, at least in the abdominal area, and a distinctly developed more heavily sclerotized narrow transverse plate ventrally just below the anal ring. Antennae normally 4-segmented, set on a basal collar, narrow above, much wider below, first and second segments stout, last 2 slender, separated by a rigid joint, sometimes obsolete, lengths of segments of one, in microns: I, 105; II, 69; III, 145; IV, 145; apical spine 180, a stiff seta. Eyestalk digitate, strongly protruding, wrinkled, placed close to antennal base on each side but not attached to this, length about 42μ. Legs not unusual, posterior trochanter-femur 367μ, tibia-tarsus 450μ, septum about 110μ from base of tibia-tarsus, claw 47μ, only slightly curved, no denticles. Beak elongate, 1-segmented, tapering sharply from base, then nearly cylindrical; length of one 140μ, width at base 80μ, at apex 39μ. Thoracic spiracles each circular, at inner end of a short membranous invagination; abdominal spiracles simple tubes, probably 8 pairs present, but this not fully verified. Quadrilocular type disk pores scattered dorsally and over the anterior portion of body ventrally, some forming definitely short invaginated tubular ducts, also with multilocular disk pores, usually with 6 loculi, in wide transverse bands in front of and behind the vulvar opening and in 3 irregular transverse rows in

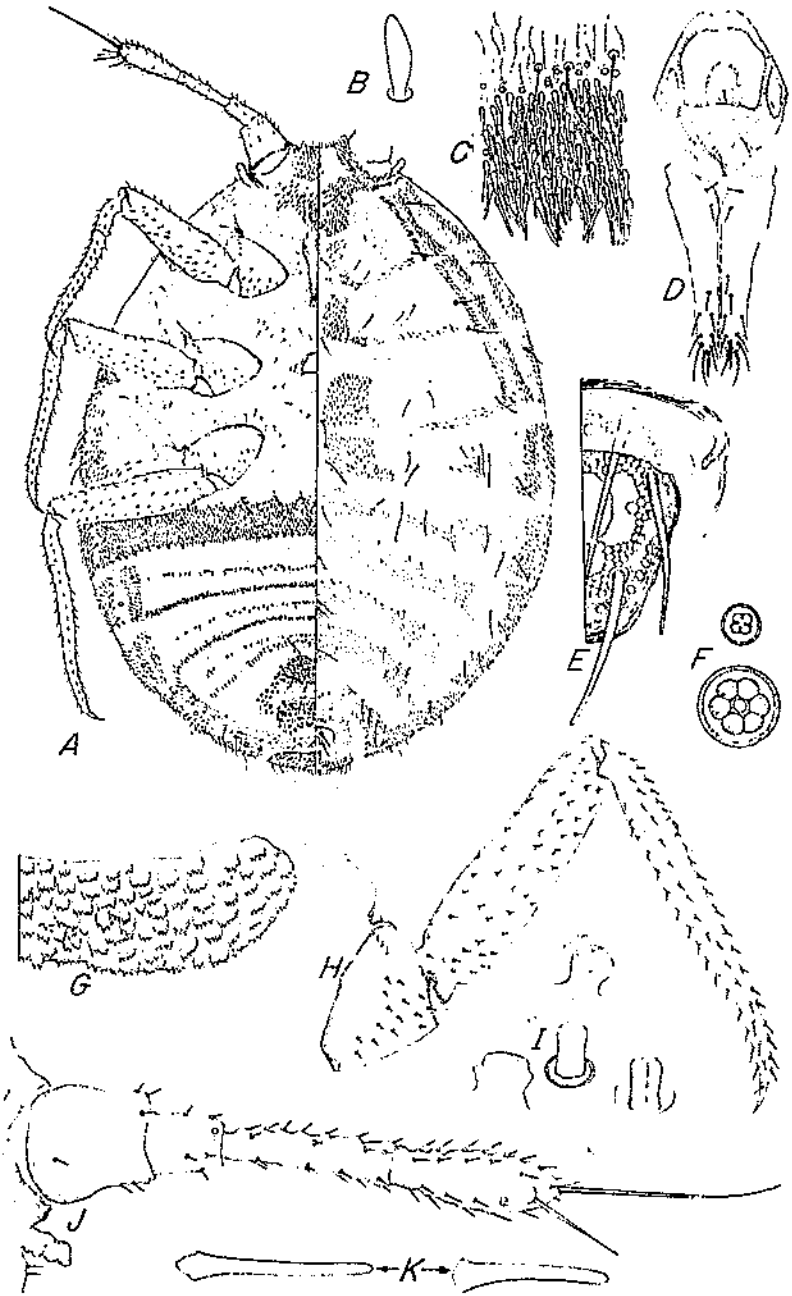


FIGURE 25.—*Microrthezia ingersi*, adult female: *A*, Body, dorsal and ventral; *B*, clavate spine; *C*, ovisac band, anterior median section; *D*, mouthparts; *E*, anal ring, right half; *F*, quadrilocular and multilocular disk pores; *G*, portion of sclerotized plate below anal ring; *H*, posterior leg; *I*, tubular ducts and other dermal developments of uncertain structure and function; *J*, antenna and adjacent eyestalk; *K*, body spines.

front of these clusters. A few elongate, slender setae dorsally and at margins, up to 87 μ long; a few bluntly lanceolate spines towards margins of area within ovisac band; body spines elongate slender, with enlarged bases and bluntly rounded apices; dorsal pattern of spine bands and clusters showing a large cluster behind each antennal base extending in almost to the midline, but leaving an exposed spineless area between antennal bases at the anterior apex dorsally (but not ventrally), then with 4 median, paired clusters, with the halves narrowly separated and the posterior lateral corners extending in incomplete narrow bands to marginal spine clusters, the interruptions usually most obvious close to the submedian clusters; the first of the 5 remaining bands interrupted about half way between midline and margin, the next 3 entire and at most only slightly narrowed; the apical cluster shaped somewhat like a flattened cross, not interrupted on midline and with an arm on each side extending diagonally cephalad to approach the apex of an extension of the posterior marginal band, and another curving diagonally caudad above the anal ring; marginal spine clusters, including the small one associated with each antennal base and the 2 small ones, joined medially below the anal ring, 11 in number on each side, each average cluster roughly rectangular and with the spines closely crowded along upper and lower margins, but rather scattered in the intermediate area; a strong cluster of spines ventrally at anterior margin, between antennal bases and posteriorly to the beak; elsewhere spines rather scattered on anterior portion of body; ovisac band with the anterior section well developed, the spines crowded, a few small quadriloculars intermingled and a single row along anterior border; lateral and posterior sections of ovisac band apparently represented in the abdominal area by the lower margins of the lateral clusters as described above; 3 transverse spine bands across the area enclosed by the ovisac band, the anterior one heaviest, the spines mostly closely crowded. Anal ring not unusual, the 6 setae approximately equal in length, around 43 μ, with bluntly rounded apices.

This species has been described from several specimens collected by the late J. G. Myers in Cuba, in ant nests, Trinidad Mountains, March 20, 1925 (No. 638), same, March 24, 1925 (Nos. 657 (holotype) and 659). The obvious difference separating it from *reynei* and *neotropicalis* is presented in the key. Much more material is needed to establish standards of variability within each of these closely related species and to determine whether the bases here used for differentiation are wholly valid.

MIXORTHEZIA NEOTROPICALIS (Silvestri)

From study of the accumulation of specimens already discussed, it seems certain that this species associates with the others in *Mixorthezia*, although no specimens of it have been seen, and there exists only the original record of its occurrence.

MIXORTHEZIA REYNEI (Laing)

(Fig. 26)

Through the courtesy of W. J. Hall, director of the Imperial Institute of Entomology, London, a specimen from the study material discussed here has been compared with type examples of *reynei* and is considered by Hall to be identical with these, although he points out that the ratio between the 2 terminal antennal segments as given by Laing (the terminal shorter than—or at least not exceeding—the third), is consistent through Laing's type material, whereas the specimen submitted to him had the terminal antennal segment definitely longer than the third. In this respect Laing's species is identical with *M. neotropicalis* (Silv.), which according to its description, also has these 2 segments equal in length. In 24 antennae examined,

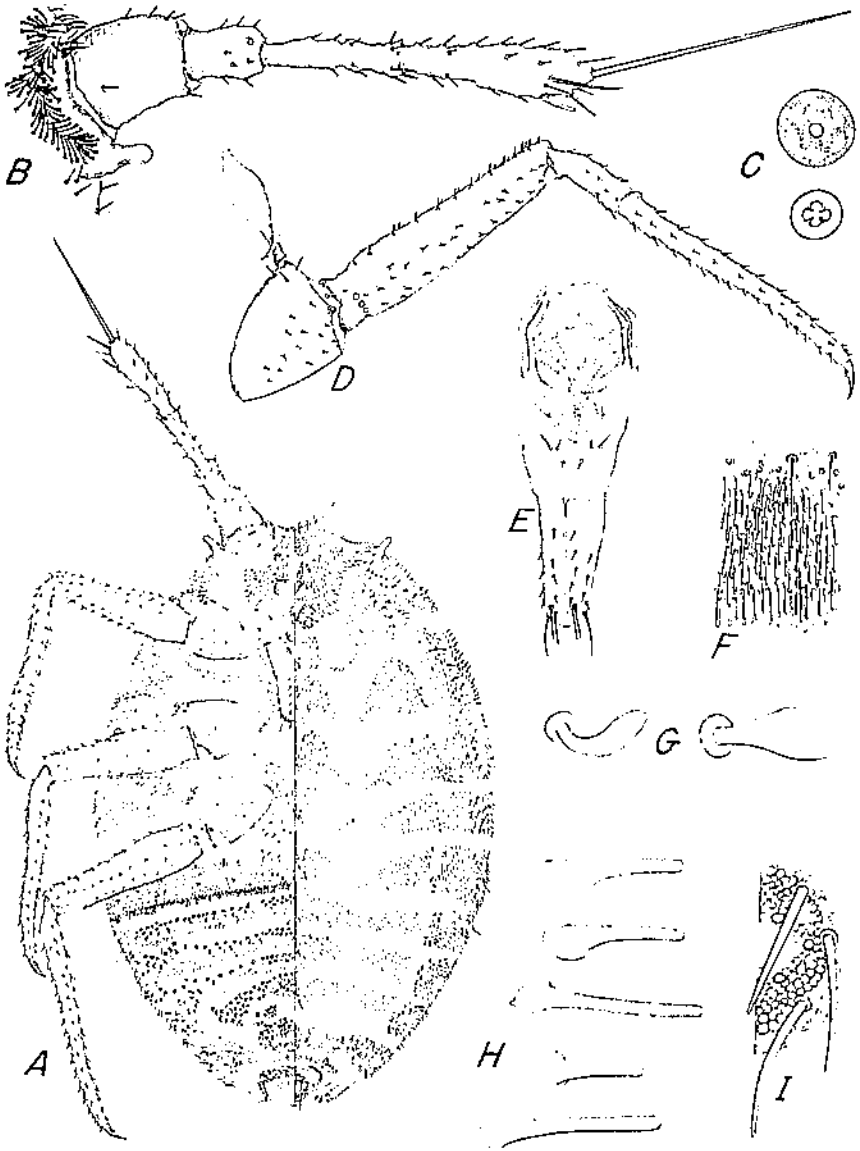


FIGURE 26.—*Mixorthezia reynei*, adult female: *A*, Body, dorsal and ventral; *B*, antenna; *C*, quadrilocular and multilocular disk pores, surface view; *D*, posterior leg; *E*, mouth parts; *F*, ovisac band, anterior median section; *G*, clavate spine; *H*, body spines; *I*, anal ring, right half.

segment IV averages just one-third longer than segment III, and in no instance does variation bring the 2 segments close to equality. Although this antennal difference may prove significant when more material is available for study, it seems best for the present to accept Dr. Hall's conclusions and to place the material here discussed as *reynei* (Laing).

As the figures accompanying the original description included only antennae, eyestalk, and part of a leg, a full set of illustrations, based on examples from Trinidad, is included.

Collection data on material examined are as follows: On cacao, Los Hermanos estate, Trinidad, B. W. I., collected by A. H. Strickland and received October 1943; on Arabica coffee roots, Los Hermanos Estate, Trinidad, collected by A. H. Strickland, March 9, 1944 (No. 1); on cacao roots, Los Hermanos Estate, Trinidad, June 5, 1944, collected by A. H. Strickland (No. 2); on cacao roots, Imperial College Experimental Plant Station, Augustine, Trinidad, Feb. 9 and 23, 1944, collected by A. H. Strickland (No. 5); on coffee roots, Non Pareil estate, Trinidad, March 3, 1944, collected by A. H. Strickland (No. 9); on *Xanthosoma helleborifolium*, San Andro, El Salvador, collected by E. J. Hambleton. There is some size variation among the specimens examined, but nothing striking or of evident significance. The El Salvador specimen departs most widely from the average condition in that the anterior (thoracic) dorsal spine bands on each side of the body are definitely, though not widely, interrupted at the middle.

Several references to this insect in the literature, under the generic name *Orthezioppa*, refer, with one exception, to the insect in the Dutch Guiana area from which it was described. The exception covers the Trinidad infestation for which collection records are given above.

Genus NIPPONORTHEZIA Kuwana

Further study of the available material belonging to this genus has led to the conclusion that the New World specimens identified as *ardisiae* in 1925 (*35, p. 153*) are distinct from the Japanese *ardisiae* and represent a new species, which is described below. A second new species, based on a single specimen from Guadalcanal, also is presented. Although the species cannot be included in the key on the basis of its description, this restudy has strengthened the earlier conviction that *Orthezinella hispanica* (*42, p. 170*) definitely belongs in this genus. A pre-adult specimen of the Nearctic form, obtained from Berlese trap collections from *Andropogon* sp., from Mount Vernon, Va., January 1945, by Floyd Andre, almost exactly matches Silvestri's description and figures of *hispanica*, even to the details of the spine pattern and the indication of the presence of a septum near the middle of the terminal antennal segment. Since this species is the genotype of *Orthezinella*, such evidence seems to be conclusive in the synonymizing of Silvestri's genus, despite the opinion expressed by Balachowsky (*3, p. 366*) that *hispanica* was based on an adult individual. This, of course, does not dispose of *hispanica* as a species, and adult specimens of it, when they are located, may prove to be identical with the Nearctic form now described as new.

KEY TO SPECIES OF NIPPONORTHEZIA

a. A single transverse row of spines across the anterior portion of the ventral abdominal area enclosed by the ovisac band..... *obscura*, new species p. 73

aa. No transverse spine row across this area.

b. Antennal and leg setae consistently short, stiff to stout conical..... *ardisiae* Kuw.

bb. Antennal and leg setae appearing as if conspicuously long flagellate, this condition apparently resulting from the protrusion of long slender setae from the ends of prominently protruding cylindrical basal tubercles ..... *guadalcanalia*, new *species*, p. 73

NIPPONORTHEZIA GUADALCANALIA, New Species

ADULT FEMALE.—Close to the genotype in shape, size, and dorsal spine cluster pattern; differs conspicuously in respect to the apparently long, flagellate setae on antennae and legs in contrast to the short, normally spinelike setae with acute apices found in *ardisiae*; this appearance, so far as can be ascertained, resulting from the development of strikingly elongate, cylindrical, basal tubercles on both antennae and legs, with a long, slender, usually curved, seta protruding from the end of each tubercle; in addition with the anterior middorsal spine clusters definitely wider than in the genotype.

Described from a single alcohol-preserved specimen collected on North Guadalcanal, Solomon Islands, August to November 1944, but without more detailed data, by L. Liporsky.

NIPPONORTHEZIA OBSCURA, New Species

(Fig. 27; pl. 1, Q)

ADULT FEMALE.—As may be seen from the accompanying illustrations, very close to the genotype *ardisiae* in appearance and in most of its anatomical details. Differing from the Japanese form, however, in at least two positive characteristics—with a single transverse row of spines across the ventral abdominal area near the anterior section of the ovisac band (i. e., a single spine band enclosed within the ovisac band), and with small clusters of invaginated, probably quadrilocular type pores of unequal size and variable shape just above, and, often, just below most of the marginal spine clusters; neither of these characters present in *ardisiae*.

The following collections of this insect have been studied: In ant nest, Rockville, Pa., Feb. 14, 1921, collected by F. M. Trimble (No. 0–105); on roots of *Lawsonia inermis*, Brookville, Fla., at quarantine, Washington, D. C., Mar. 27, 1924, collected by L. V. Bottimer (F. H. B. No. 49655) (these 2 previously reported as *ardisiae*); from Palatine, Ill., collected by Mr. Winter and received from W. M. Mann, Nov. 22, 1927, host association unstated; on *Leucothoe catesbaei*, Anderson, S. C., Aug. 28, 1939, collected by H. S. McConnell (No. 32); on *Andropogon*, south of Mt. Vernon, Va., Dec. 19, 1944 (holotype), J. C. Crawford and Floyd Andre, collectors; in *Andropogon* root clumps, Mt. Vernon, Va., December 1944 and January 1945, collected by Floyd Andre by use of Berlese funnel; on *Cymbopogon citralis*, Esquintly, Guatemala, June 7, 1945, collected by E. J. Hambleton (No. 33); and on Canna from Mexico collected in quarantine at Laredo, Tex., Mar. 7, 1950 by F. J. Danos (Laredo 49912 and 49913). Except the holotype noted, all of these specimens have been placed as paratypes. The example from Guatemala is about one-tenth larger than the Virginia specimens, but no other differences have been noted. All previous records for *N. ardisiae* from the United States, including those discussed in 1925 (*45, p. 154*) are, of course, transferred to this new species, and the 1925 discussion of the distribution of *ardisiae* should be ignored except for the Japanese record.

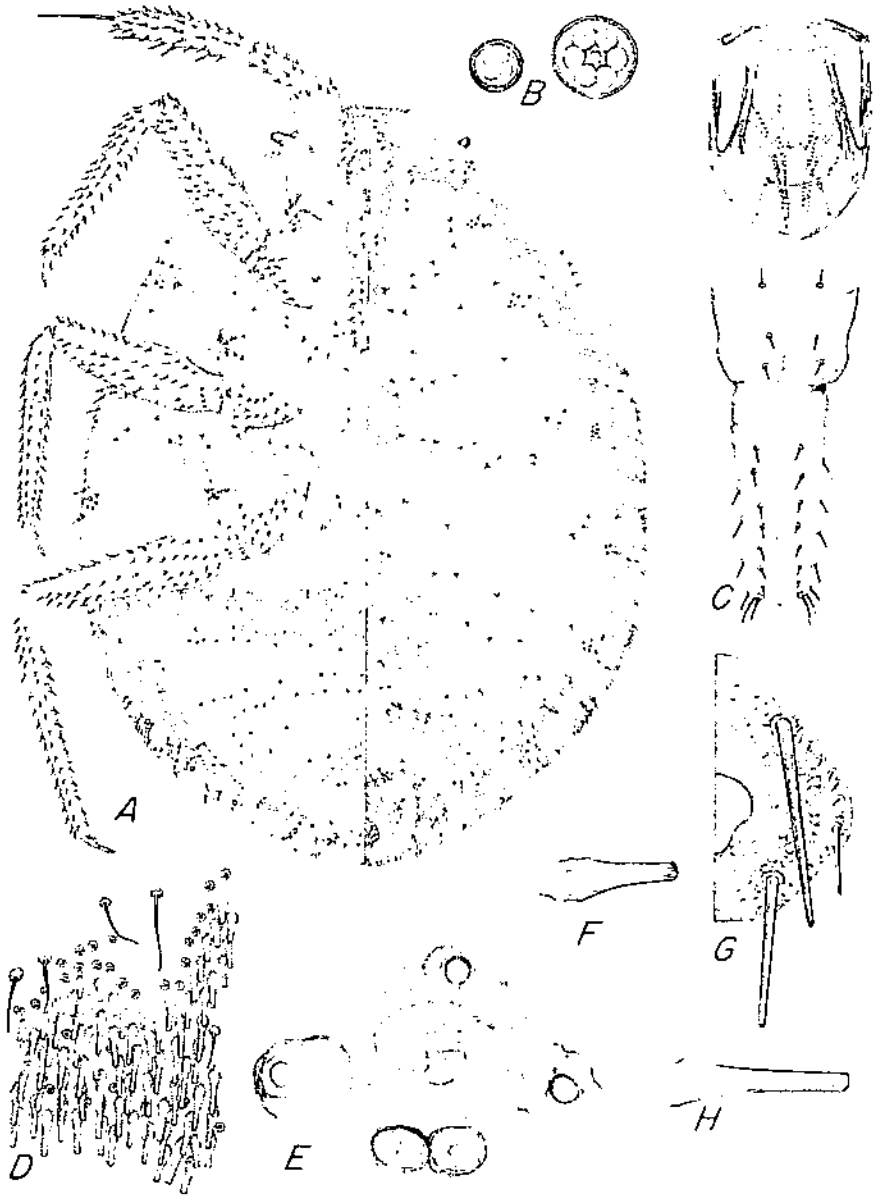


FIGURE 27.—*Nipponorthezia obscura*, adult female: *A*, Body, dorsal and ventral; *B*, quadrilocular and multilocular disk pores, surface view; *C*, mouth parts; *D*, ovisac band, anterior median section; *E*, pore and tubercle cluster above marginal spine cluster; *F*, dorsal body spine; *G*, anal ring, right half; *H*, ovisac band spine.

Genus ORTHEZIOLA Sulc

ORTHEZIOLA SIGNORETI (Haller)

The correct scientific name to be applied to this insect, which was so well described as *Ortheziola vejdovskyi* Sulc, has been discussed recently by Ghesquière (*16, p. 230*), with the result that he establishes the use of the combination given above. While this usage seems unavoidable under the Rules of Nomenclature, as pointed out by Ghesquière, it is unfortunate that recognition of the insect must now be based on a confused and incomplete running discussion of field collections, rather than on Sulc's critical, well-illustrated description.

From Haller's discussion (*23, p. 6*) it is obvious that he had at least two orthezиid species in the material that he examined. His references to Signoret's (*41*) earlier treatment of *Orthezia urticae* and especially to figure 1–*b* of Signoret's plate 11, and his discussion of the wax secretion in such fashion as to indicate complete coverage of the body dorsally surely can refer only to *Newsteadia floccosa* (de Geer). On the other hand, the mention of 4-segmented antennae probably, and of flask-shaped body spines almost certainly, indicates that he did examine specimens of a species of *Ortheziola*. Haller's proposal of the name *Orthezia signoreti* was a conditional one, and the first publication of the combination *Ortheziola signoreti* by Giard (*19, p. 11*) seems likewise to be conditional. It does not appear possible to accept Giard's statement (translation)—"If this *Ortheziola* [i. e. Haller's species] is distinct from *Ortheziola vejdovskyi* Sulc, then it is possible to give it the name *Ortheziola signoreti*"—as a definite indication of synonymy by him. The first positive indication of identity for these two names that has been encountered is that by Lindinger (*29, p. 221*), who chose *vejdovskyi* as the correct name to be used. The second such positive indication is that by Ghesquière (*16*), who calls the species *Ortheziola signoreti* (Haller).

So far as can be ascertained from the literature examined, there has never been any examination of Haller's specimens, or evidence that they still exist; so this synonymy rests primarily on the logical assumption that only one species in Europe displays the peculiar structural characteristics of this one.

Additional records for this insect that are based on specimens actually examined include the following: On Begonia from Austria, collected at quarantine, Boston, Mass., by O. A. Hardy, May 19, 1928 (Boston No. 4703); on rose from Trier, Germany, collected at quarantine, Washington, D. C., by W. I. Whiton, June 17, 1933 (B. P. Q. No. A20661); and on holly trees from England, collected at quarantine, New York City, by F. O. Dodd, Dec. 17, 1935 (N. Y. No. 50655). References in recent literature add a number of localities in Great Britain, including the Hebrides Islands, France, and Germany, to previously reported areas of occurrence.

UNDETERMINED SPECIES

DOUGLASIELLA CABALLEROI Gomez-Menor

Under the name *Douglasiella caballeroi*, J. Gomez-Menor in 1948 (*21, p. 114*) published the description of an interesting coccid which he assigned to the Ortheziidae. Upon a request for examples of the

species for microscopic study, he forwarded his type specimens. Upon careful examination it seems best to exclude this species from the Ortheziidae and to assign it instead to the mealybug group in close association with the genus *Puto*. On the basis of published descriptions, *Douglasiella caballeroi* seems to be similar to some European species—for example, *seurati* Vayssiére.

ORTHEZIOPA JUJUBAE (Buckton)

Lindinger in 1937 (*31, p. 192*), for some reason not explained, assigned the species *Rhizobius jujubae*, described as an aphid by Buckton, to the Ortheziidae and to the genus *Ortheziopa*. Laing had disposed of this problem in 1923 (*27, p. 247*) by stating that Buckton's slide, on examination, showed a very young and immature monophlebid coccid, so there seems to be no basis whatever for its suggested inclusion in the coccid group under consideration here. Buckton himself very seriously confused the identity of the species in his two publications on it. In the first one (*6, p. 181*) an 8-line description without illustrations was given of a form that was stated to be 1.52 mm. long. In the second, published in 1900 (*7, p. 277*), the name is presented as "*Rhizobius jujubae* n. sp.," and an insect is described and illustrated which is stated to be 16 mm. long and is plainly associated with the *Drosicha* group of monophlebine genera.

LITERATURE CITED

(1) BALACHOWSKY, A.
1927. CONTRIBUTION A L'ÉTUDE DES COCCIDES DE L'AFRIQUE MINEURE. Soc. Ent. de France Ann. 96: 175–207, illus.

(2) ———
1935. LES COCHENILLES DE L'ESPAGNE. Rev. de Path. Veg. et d'Ent. Agr. de France 22: 255–269.

(3) BODENHEIMER, F. S.
1934. STUDIES ON THE ZOOGEOGRAPHY AND ECOLOGY OF PALAEARCTIC COCCIDAE. I–III. Eos 10: 237–271.

(4) BREDDIN, GUSTAV
1902. DIE HEMIPTEREN UND SIPHUNCULATEN DES ARKTISCHEN GEBIETES. Fauna Arctica II: 529–580.

(5) BROWNE, E. T.
1887. NOTES ON A SPECIES OF ORTHEZIA FOUND IN KEW GARDENS. Quekett Micros. Club Jour. (ser. 2) 3: 169–172, illus.

(6) BUCKTON, GEORGE BOWDLER
1883. MONOGRAPH OF THE BRITISH APHIDES IV. London. Printed for the Ray Society, 228 pp., illus.

(7) ———
1900. NOTES ON TWO NEW SPECIES OF APHIDS. Indian Mus. Notes 4: 277–278, illus.

(8) BUEKER, ELMER D.
1931. MEALY-BUGS (COCCIDAE) OF NESTS OF ANTS (GASTUS). Colo. Univ. Studies 18: 151–162, illus.

(9) COCKERELL, T. D. A.
1910. THE COCCIDAE OF BOULDER COUNTY, COLORADO. Jour. Econ. Ent. 3: 425–430, illus.

(10) DOBZHANSKY, TH.
1941. BEETLES OF THE GENUS HYPERASPIS INHABITING THE UNITED STATES. Smithsn. Inst. Misc. Collect. 3042, 101: 10-94, illus.

(11) FERRIS, GORDON FLOYD
1920. SCALE INSECTS OF THE SANTA CRUZ PENINSULA. Stanford Univ., Pubs., Univ. Ser. Biol. Sci. 1: 1–57, illus.

(12) ———
1950. REPORT UPON SCALE INSECTS COLLECTED IN CHINA (HOMOPTERA: COCCOIDEA). Part I. Microentomology 15: 1–34, illus.

(13) FLEURY, A. C.
1938. REPORT OF INSECT AND OTHER ANIMAL AND PLANT DISEASE INTERCEPTIONS OF CALIFORNIA PLANT QUARANTINE INSPECTION POINTS FOR 1937. Calif. Dept. Agr., Spec. Pub. 161, 88 pp.

(14) GIESQUIÈRE, J.
1933. ASSEMBLEE MENSUELLE DU 7 OCTOBRE 1933. Soc. Ent. de Belg. Bul. et Ann. 73: 268.

(15) ———
1934. NEWSTEADIA COLLARTI N. SP. COCCIDE (ORTHEZIINE) RADICICOLE ET MYCOPHILE DE LA FORÊT DE SOIGNES. Soc. Ent. de Belg. Bul. et Ann. 74: 27–32, illus.

(16) ———
1946. SUR LA REDÉCOUVERTE EN BELGIQUE D'ORTHEZIOLA SIGNORETI (HALL.). Soc. Ent. de Belg. Bul. et Ann. 82: 236–238.

(17) ———
1947. [Communications.] Soc. Ent. de Belg. Bul et Ann. 83: 205, 346.

(18) GIARD, ALFRED
1897. SUR DEUX COCHENILLES NOUVELLES ORTHEZIOLA FODIENS NOV. SPEC. ET RHIZOECUS ELOTI NOV. SPEC., PARASITES DES RACINES DU CAFÉIER A LA GUADELOUPE. Soc. de Biol. [Paris] Compt. Rend. (10) 4: 583–585.

(19) ———
1898. SUR LES COCHENILLES DU GENRE ORTHEZIA BOSC. Soc. Ent. de France Bul. 65: 8–12.

(20) GÓMEZ-MENOR ORTEGA, JUAN
1937. CÓCCIDOS DE ESPAÑA. Inst. de Invest. Agron. Estac. de Fitopat. Agr. de Almeria. Madrid. 432 pp., illus.

(21) ———
1948. ADICIONES A LOS "COCCIDOS DE ESPAÑA." 2ª nota. Eos 24: 73–121, illus.

(22) GREEN, E. ERNEST
1929. SOME COCCIDAE COLLECTED BY DR. J. G. MYERS IN NEW ZEALAND. Bul. Ent. Res. 19: 369–389, illus.

(23) HALLER, G.
1880. ENTOMOLOGISCHE NOTIZEN. Schweiz. Ent. Gesell. Mitt. 6: 1–11.

(24) HATCH, MELVILLE H.
1938. A BIBLIOGRAPHICAL CATALOGUE OF THE INJURIOUS ARACHNIDS AND INSECTS OF WASHINGTON. Wash. Univ. [State] Pubs. Biol. 1: 165–223.

(25) KUWANA, I.
1917. NIPPON KAIKOKICHU-DI SETSU [COCCIDAE OF JAPAN] 2: 156, 919, illus.

(26) ———
1923. DESCRIPTIONS AND BIOLOGY OF NEW OR LITTLE-KNOWN COCCIDS FROM JAPAN. Imp. Cent. Agr. Expt. Sta., Japan, Bul. 3: 1–67, illus.

(27) LAING, F.
1923. APHIDOLOGICAL NOTES (HEMIPTERA-HOMOPTERA). Ent. Monthly Mag. 59: 238–247, illus.

(28) ———
1925. DESCRIPTIONS OF TWO SPECIES OF COCCIDAE FEEDING ON ROOTS OF COFFEE. Bul. Ent. Res. 15: 383–384, illus.

(29) LINDINGER, L.
1912. DIE SCHILDLÄUSE (COCCIDAE) EUROPAS, NORDAFRIKAS UND VORDERASIENS, EINSCHLIESSLICH DER AZOREN, DER KANAREN UND MADEIRAS. MIT ANLEITUNG ZUM SAMMELN, BESTIMMEN UND AUFBEWAHREN. Stuttgart. 388 pp., illus.

(30) ———
1935. DIE NUNMEHR GILTIGEN NAMEN DER ARTEN IN MEINEM "SCHILDLÄUSBUCH" UND IN DEN "SCHILDLÄUSEN DER MITTELEUROPÄISCHEN GEWÄCHSHÄUSER". Ent. Jahrb. 44: 127–149.

(31) ———
1937. VERZEICHNIS DER SCHILDLÄUS-GATTUNGEN. Ent. Jahrb. 46: 178–198.

(32) MAMET, R.
1943. NEW SPECIES OF COCCOIDEA (HOMOPTERA) FROM MAURITIUS. Bul. Ent. Res. 34: 117–128, illus.
(33) ———
1947. ANOTHER NEW SPECIES OF NEWSTEADIA GREEN (HOMOPTERA; COCCOIDEA) FROM MAURITIUS. Roy. Ent. Soc. London Proc. (ser. B) 16: 31–32, illus.
(34) ———
1947. ON THE PROBABLE CENTRE OF DISPERSION OF THE GENUS NEWSTEADIA GREEN (HOMOPTERA: COCCOIDEA). Roy. Ent. Soc. London, Proc. Ser. A: Gen. Ent. 22: 49–51.
(35) MORRISON, HAROLD
1925. CLASSIFICATION OF SCALE INSECTS OF THE SUBFAMILY ORTHEZIINAE. Jour. Agr. Res. 30: 97–154, illus.
(36) ———
1927. DESCRIPTIONS OF NEW GENERA AND SPECIES BELONGING TO THE COCCID FAMILY MARGARODIDAE. Wash. Biol. Soc. Proc. 40: 99–110.
(37) OLAFSEN, EGGERT
1772. REISE IGIENNEM ISLAND FORANSTALTET AF VIDESKABERNAS. Skelskab i Kiøbenhavn, Sorøe, pp. 610–611.
(38) RUNGS, CH.
1934. COCCIDAE DU MAROC (2nd note). Soc. d'Hist. Nat. de l'Afrique du Nord, Bul. 25: 21–25.
(39) SCHUH, JOE, and MOTE, DON C.
1948. INSECT PESTS OF NURSERY AND ORNAMENTAL TREES AND SHRUBS IN OREGON. Oreg. Agr. Expt. Sta., Sta. Bul. 449: 34–50, illus.
(40) SHINJI, ORIHAY
1936. A NEW SPECIES OF ORTHEZIA FROM JAPAN (HEMIPTERA-HOMOPTERA). Kontyu 10: 91–92, illus. [In Japanese.]
(41) SIGNORET, V.
1868 and 1875. ESSAI SUR LES COCHENILLES (HOMOPTÈRES-COCCIDES). Soc. Ent. de France Ann. 9(4): 97–104 [1868]: 515): 374–394 [1875], illus.
(42) SILVESTRI, F.
1924. DESCRIPCIÓN DE UN NUEVO GÉNERO Y TRES ESPECIES NUEVAS DE ORTHEZIINAE (HEMIPTERA-COCCIDAE), DE ESPAÑA Y DE COSTA RICA. Soc. Españ. de Hist. Nat. Bol. 24: 169–176, illus.
(43) STRICKLAND, A. H.
1947. COCCIDS ATTACKING CACAO (THEOBROMA CACAO L.) IN WEST AFRICA, WITH DESCRIPTIONS OF FIVE NEW SPECIES. Bul. Ent. Res. 38: 497–523, illus.
(44) TRIMBLE, F. M.
1928. SCALE INSECTS OF PENNSYLVANIA (HOMOPTERA: COCCIDAE). *Ent. News* 39: 42–47.
(45) ZIMMERMAN, ELWOOD C.
1946. BROWNE 1887, NOT DOUGLAS 1888, THE AUTHOR OF ORTHEZIA INSIGNIS (HOMOPTERA: COCCOIDEA). Hawaii. Ent. Soc. Proc. 12: 657–658.

AUG 2 1 1953

Dorsal aspect of representative species of plant bugs (Hemiptera-Heteroptera). A, *Orthezia insignis*. Body plates and wax removed. B, *O. lugubris*. Wax removed; body plates developed. C, *O. urticae*. Plates and wax removed. D, *O. cataphracta*. Body plates developed, wax removed. E, *O. cataphracta*. Wax removed. F, *O. cataphracta*. Body plates developed. G, *O. insignis*. Body plates developed. H, *O. insignis*. Body plates developed, wax removed. I, *O. insignis*. Body plates developed, wax removed. J, *O. insignis*. Body plates developed, wax removed. K, *O. insignis*. Body plates developed, wax removed. L, *O. insignis*. Body plates developed, wax removed. M, *O. insignis*. Body plates developed, wax removed. N, *O. insignis*. Body plates developed, wax removed. O, *Microthezia* sp. Body plates and wax removed. P, *Microthezia* sp. Body plates developed, wax removed. Q, *Microthezia* sp. Body plates developed, wax removed. R, *Microthezia* sp. Body plates developed, wax removed.

INSERTION. This plate was originally part of the bound copies of U. S. Department of Agriculture - Technical Bulletin 1052. Please insert after page 18

INDEX

	Page
acapulcoa Morrison, Orthezia	7, **11**
ambrosiae Lawson, Orthezia=solidaginis	14
ambrosicola Morrison, Orthezia	9, 13
americana Morrison, Newsteadia	**59**, 61
annae Cockerell, Orthezia	9, 14
Arctorthezia	2, 3, **53**
ardisiae Kuwana, Nipponorthezia	72, 73
arenariae Vayssiére, Orthezia	14, 52
argrimoniae Shinji=Orthezia uncertain	**15**, 33
artemisiae Cockerell, Orthezia	5, **15**
bahamensis Morrison, Orthezia	8, **15**
balloui Morrison, Orthezia	8, 52
boliviana Morrison, Orthezia	10
caballeroi Gomez-Menor, Douglasiella	75
cacticola Morrison, Orthezia	5, **17**
californica (Ehrhorn), Arctorthezia	55
cataphracta (Olafson), Arctorthezia	54
caudata Ferris, Orthezia	7, 53
cheilanthi Tinsley, Orthezia	10, 50
chisosi Morrison, Orthezia	6, **19**
collarti Ghesquiére, Newsteadia	59
costis Ghesquiére, Orthezia	20
cubana Morrison, Mixorthezia	66
Douglasiella	75
Drosicha	76
ecuadorensis Morrison, Mixorthezia	66
ferrisi Morrison, Orthezia	6, **20**
floccosa (de Geer), Newsteadia	**59**, 75
fodiens (Giard), Mixorthezia	65, **68**
galapagoensis Kuwana, Orthezia	6
garryae Cockerell, Orthezia	6
gigantea Morrison, Orthezia	7, **23**
graminicola Morrison, Orthezia	10, **24**
graminis Tinsley, Orthezia	9, **26**
graminis group	4, 8
grandis Hempel, Orthezia	10, 19
guadalcanalia Morrison, Newsteadia	58, **60**
guadalcanalia Morrison, Nipponorthezia	73
guatemalensis Morrison, Orthezia	4, **26**
gymnolomiae Morrison, Orthezia	5, **28**
hambletoni Morrison, Orthezia	4, **30**
hispanica Silvestri, Nipponorthezia	72
insignis Browne, Orthezia	5, 20, **32**, 44
insignis group	3, 4
japonica Kuwana, Orthezia	33, 52, **53**
jujubae (Buckton), Ortheziopa	76
juniperi Morrison, Orthezia	10, **33**
lasiorum Cockerell, Orthezia	10, **35**
longipes Hempel, Orthezia	6, 7, 36, **39**
mauritiana Mamet, Newsteadia	58, **60**
mexicana Morrison, Orthezia	5, 19
minima Morrison, Newsteadia	59, **61**
minor Morrison, Orthezia	8
Mixorthezia	2, 3, **65**
molinarii Morrison, Orthezia	7, **35**, 39
montana Mamet, Newsteadia	58, **62**
monticola Cockerell, Orthezia	8
myersi Morrison, Mixorthezia	66, **68**
myersi Green, Newsteadia	58, **63**
neotropicalis (Silvestri), Mixorthezia	65, 66, **70**
newcomeri Morrison, Orthezia	11, **37**
Newsteadia Green	3, **57**
nigrocincta Cockerell, Orthezia	7
Nipponorthezia Kuwana	3, 65, **72**
nuda Ferris, Orthezia	9
obscura Morrison, Nipponorthezia	72, **73**
occidentalis Douglas, Arctorthezia	54, **55**, 57
olivacea Cockerell, Orthezia	10, **37**
Orthezia Bose	3, 53
Orthezinella Silvestri	65, 72
Ortheziola Sule	3, **75**
Ortheziopa Laing	2, 65, 72, **76**
parkeri Morrison, Orthezia	6, **36**, 39
pini Morrison, Orthezia	4, **40**
pinicola Morrison, Orthezia	4, 40, **41**
praelonga Douglas, Orthezia	4, 7, 13, **43**
praelonga group	4, **5**
pseudinsignis Morrison, Orthezia	5, 33, **44**
pseudoccidentalis Morrison, Arctorthezia	54, **55**
pseudograminis Morrison, Orthezia	8
Puto	76
quadrua Ferris, Orthezia	11, **45**
reynei (Laing), Mixorthezia	65, 66, **70**
Rhizobius	76
samoana Morrison Newsteadia	58, 60, **63**, 64
sarcobati Morrison, Orthezia	7, **45**
sclerotica Morrison, Orthezia	7, **47**
selaginellae Morrison, Orthezia	9, **49**
seurati (Vayssiére), Puto	76

	Page
signoreti (Haller), Ortheziola	75
smythi Morrison, Orthezia	4, **50**
solidaginis Sanders, Orthezia	11, 14, 37, **52**
sonorensis Cockerell, Orthezia	9
tillandsiae Morrison, Orthezia	8, **52**
tillandsicola Morrison, Orthezia	8, **52**
tristani Silvestri, Newsteadia	59, **64**
ultima Cockerell, Orthezia	6, 39
urticae Linnaeus, Orthezia	11, 14, 33, 37, 45, **52**, 53, 75
urticae group	4, **9**
varipes Leonardi, Orthezia	5, 39
vejdovskyi Sule, Ortheziola	65, 75
waeri Strickland, Newsteadia	58, **64**
yasushii Kuwana, Orthezia	11, 33, 52, **53**
zimmermani Morrison, Newsteadia	58, **64**

END