The Moths of America North of Mexico

FASCICLE 15.4

PYRALOIDEA

Pyralidae (Part)

H. H. NEUNZIG

1997

THE WEDGE ENTOMOLOGICAL RESEARCH FOUNDATION

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Check List of the Lepidoptera of America North of Mexico
30 May 1983

THE MOTHS OF AMERICA NORTH OF MEXICO

The Moths of America North of Mexico

INCLUDING GREENLAND

FASCICLE 15.4

PYRALOIDEA
PYRALIDAE (PART)
PHYCITINAE (PART)

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ABSTRACT

Twenty-five genera of phycitines are treated, including the new taxon *Echinocereta.* Information on adult morphology and, if known, descriptions of the immature stages and notes on the biology are included for each genus. Figures are provided of the male and female genitalia of representative species of all genera. Palpi, wing venation, antennae, eggs, and larvae are figured. Of 90 species described and illustrated, the following are new: *Laetilia cinerosella, Laetilia bellivorella, Baphala phaeolella, Melitara texana, Alberada californiensis, Alberada candida, Alberada franclemonti, Rumatha jacumba, Mescinia texanica, Homoeosoma nanophasma.* New combinations proposed are *Dakruma pallida,* included by recent authors in *Laetilia,* placed in *Baphala*; *Ozamia multistriatella* is transferred to *Zophodia*; and *Euzophera strigalis,* included by recent authors in *Cactobrosis,* is placed in *Echinocereta.*

CONTENTS

PREFACE

Heinrich in 1939, and in his monumental revision of 1956, recognized that the phycitine species feeding as larvae on cactus constituted a natural group of genera within the subfamily. He also included the genus *Zophodia,* a non-cactus feeder, in the assemblage and, furthermore, was aware that other genera, for the most part not associated with the Cactaceae such as *Laetilia* and *Homoeosoma,* were allied. This third fascicle on the Phycitinae treats these cactus-feeding groups as well as other genera, whose morphological features, especially their genitalia, support linking them together. In males the enlarged and frequently bilobed apical part of the gnathos is a unifying feature. In females the genitalia are rather simple, usually with the corpus bursae unsclerotized and with small signa.

The biology of the larvae of the included species is rather diverse although all can be considered borers. The cactus phycitines mainly infest the stems (cladodes) of the hosts, but some species feed within fruits, and a few, usually as small larvae, occur in flowers. Larvae of the genus *Zophodia* feed in the fruit of gooseberries and currants. Members of the genera *Laetilia, Rostrolaetilia,* and *Baphala* are almost always predators, chiefly of scale insects. Some *Laetilia* are associated with scale insects on cactus. The remaining genera, including *Homoeosoma,* mostly feed within developing seeds; many are associated with the large plant family Asteraceae.

Some of the generic names included in this fascicle were first published in volume 8 of *Mémoires sur les Lépidoptères,* a work prepared in manuscript form by E. L. Ragonot, and published in 1901 by G. F. Hampson following Ragonot's death. Most subsequent workers have attributed the genera to Ragonot, despite the fact that Hampson made the names nomenclaturally available. Fletcher and Nye (1984) gave credit for some, but, inexplicably, not all, of the genera to Hampson; for example *Ozamia* and *Patagonia* are considered by Fletcher and Nye to be Hampsonian genera, but *Cactoblastis* and *Yosemitia* are attributed to Ragonot. I attribute these generic names, as well as other new generic taxa in the 1901 publication, to Ragonot. If the names had been published without the associated "Ragonot," an assignment to Hampson would be logical, but it appears that Hampson intended Ragonot to be their author. Most authors have attributed the generic names to Ragonot.

Heinrich's publications (1939, 1956) on the cactus phycitines, with figures of genitalia, provided a very useful means of identifying species within the group. However, Heinrich did not include complete habitus figures of the adults. Hopefully, the color plates in the present fascicle will make up for this deficiency and make identification easier. Also, this fascicle contains more detailed accounts of the life history of many of the cactus phycitines. This information was published by Mann in 1969 and much of it was not available to Heinrich. In addition, many specimens, mostly collected in the past few decades, have made possible a more complete coverage of the cactus group in America north of Mexico. Several new species within the genera *Melitara, Alberada,* and *Rumatha* are included.

AUTHOR'S ACKNOWLEDGEMENTS

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The information on *Rostrolaetilia* has been taken almost entirely from Blanchard and Ferguson's 1975 publication, and the coverage of *Homoeosoma* and *Patagonia* is the result in large measure of the efforts of my former graduate student, R. L. Goodson.

I thank L. L. Deitz (North Carolina State University, Raleigh) for checking the names of the Coccoidea (Homoptera) included in the fascicle, and, yet again, thank J. W. Hardin (North Carolina State University, Raleigh) for making sure the host plant names are correct. Also, three anonymous reviewers made valuable suggestions for the improvement of the publication.

THE MOTHS OF AMERICA NORTH OF MEXICO

SUPERFAMILY
PYRALOIDEA (continued)

FAMILY
PYRALIDAE (continued)

SUBFAMILY
Phycitinae Ragonot (continued)

The moths of the genera included in this fascicle possess the following combination of character states: Male antenna usually simple, never with the basal segments of the shaft produced apically into a series of short spines, and never with a tuft of scales at the base of the shaft that frequently covers the spines (a few antennae with scape enlarged, base of shaft notched, base of shaft with sensilla, or shaft bipectinate or serrate). Forewing with nine–eleven veins, hindwing with six–seven veins (1A, 2A, and 3A of hindwing together treated as one vein). Male genitalia with uncus usually subtriangular, sometimes spoon shaped or with apical half narrow and elongate; apex of gnathos almost always distinctly enlarged, developed as paired lobes or a more or less triangular plate; valva usually simple (valva never narrowly elongate or with sacculus greatly produced); transtilla incomplete; juxta a U- or V-shaped plate; aedoeagus simple, sometimes in part sclerotized (vesica of aedoeagus never with one or more strongly developed, large, spinelike cornuti). Female genitalia with ductus bursae usually membranous and corpus bursae membranous (ductus bursae never spiraled, and corpus bursae never with numerous very large spines or spinous processes (*Phycitodes* with two conspicuous clusters of relatively large spines) and never with inner walls extensively covered or matted with spines or granulate patches or bearing large densely spined, round plates).

KEY TO GENERA (ADULTS)

1. Males 2
— Females 26

2. Antenna bipectinate (plate C, figures 1, 3, 4) 3
— Antenna not bipectinate 5

3. Antenna with cluster of scalelike sensilla in sinus near base of shaft (plate C, figures 1, 2); maxillary palpus with distal scales not flared ..... *Cactobrosis* p. 44
— Antenna without sensilla in sinus near base of shaft; maxillary palpus with distal scales flared 4

4. Hindwing with M_{2+3} and CuA_1 connate (text figures 21 *a*, 25 *a*); distal part of gnathos with lobes approximate (text figures 21 *b*, 25 *b*) .. .. *Melitara* p. 49
— Hindwing with M_{2+3} and CuA_1 distinctly stalked (text figure 26 *a*); distal part of gnathos consisting of two well-separated lobes (text figures 26 *b*, 27 *a*, 28 *a*, 29 *a*) ..... *Alberada* p. 58

5. Antenna with scape enlarged (text figure 20 *b*); head with concavity between antennae, and with tubercle projecting from frons ..... *Bema* p. 92
— Antenna without enlarged scape; head without concavity and tubercle 6

6. Antenna with shaft notched at base (text figure 55 *b*; plate D, figure 2) 7
— Antenna with shaft entire at base 10

7. Distal part of gnathos small, teardrop shaped (text figures 54 *a*, 57 *a*) 8
— Distal part of gnathos larger, broadly triangular to subrectangular *or* subtriangular and strongly lobed anteriorly (text figures 48 *a*, 49 *a*, 50 *a*, 55 *c*, 56 *a*) 9

8. Aedoeagus with comb of strong spines (text figure 57 *b*) ..... *Phycitodes* p. 116
— Aedoeagus without comb of spines (text figure 54 *b*) ..... *Patagonia* p. 111

9. Distal part of gnathos broadly triangular (text figures 48 *a*, 49 *a*, 50 *a*); forewing usually with ten veins ..... *Homoeosoma* p. 95
— Distal part of gnathos subrectangular (text figure 56 *a*) *or* subtriangular and strongly lobed anteriorly (text figure 55 *c*); forewing with nine veins ..... *Unadilla* p. 113

10. Antenna with spinelike sensilla along shaft (text figure 20 *c*) 11
— Antenna without spinelike sensilla along shaft 12

11. Costa of forewing notched (text figure 42 *a*) ..... *Cassiana* p. 86
— Costa of forewing not notched (text figure 43 *a*) ..... *Mescinia* p. 86

12. Antenna with cluster of scalelike sensilla in sinus near base of shaft (plate A, figures 1–4; plate B, figures 1–4) 13
— Antenna without sensilla in sinus near base of shaft 15

13. Basal segments of antenna distinctly serrate (text figure 16 *b*) ..... *Ozamia* p. 40
— Basal segment of antenna not distinctly serrate 14

14. Distal elements of gnathos large, with anterior part well separated into two lobes (text figure 13 *a, d*) ..... *Zophodia* p. 35
— Distal elements of gnathos relatively small, anterior part more shallowly bifid (text figures 10 *b*, 11 *a*) ..... *Baphala* p. 32

15. Uncus tapering from broad base to narrow distal part (text figures 41 *c*, 45 *a*) 16
— Uncus only slightly constricted distally 17

16. Forewing with nine veins; distal part of gnathos entire (text figure 45 *a*) ..... *Barberia* p. 92
— Forewing with 11 veins (text figure 41 *a*); distal part of gnathos bifid anteriorly and posteriorly (text figure 41 *c*) ..... *Anderida* p. 84

17. Distal part of gnathos distinctly lobed anteriorly (text figures 1 *b*, 3 *a*, 4 *a*, 5 *a*, 6 *a, d*, 8 *a, d*, 9 *b*, 19 *b*, 37 *b*, 38 *b*, 39 *b*, 40 *a*) 20
— Distal part of gnathos entire or only shallowly lobed anteriorly (text figures 31 *b*, 33 *b*, 35 *a, c*) 18

18. Distal part of gnathos entire posteriorly, produced into a single point (text figure 35 *a, c*) ..... *Rumatha* p. 73
— Distal part of gnathos bifid posteriorly (text figures 31 *b*, 33 *b*) 19

19. Distal part of gnathos very shallowly bifid posteriorly (text figure 33 *b*) ..... *Cahela* p. 70
— Distal part of gnathos more distinctly bifid posteriorly (text figure 31 *b*) ..... *Cactoblastis* p. 66

20. Maxillary palpus rather distinct, with scales arranged fanlike ..... *Yosemitia* p. 76
— Maxillary palpus inconspicuous, scales more compactly arranged 21

21. Base of juxta broad, strongly developed (text figure 38 *b*) ..... *Eremberga* p. 78
— Base of juxta less well developed (text figures 1 *b*, 3 *a*, 4 *a*, 5 *a*, 6 *a, d*, 8 *a, d*, 19 *b*, 39 *b*, 40 *a*) 22

22. Antenna serrate (text figure 20 *a*) ..... *Echinocereta* p. 47
— Antenna simple 23

23. Haustellum well developed, easily visible between labial palpi 24
— Haustellum absent *or* weakly developed, very thin if visible between labial palpi 25

24. Labial palpus porrect (text figure 34 *a*) ... *Rhagea* p. 81
— Labial palpus oblique to upturned ..... *Laetilia* p. 17

25. Haustellum absent ..... *Rostrolaetilia* p. 26
— Haustellum present, but very thin ..... *Welderella* p. 31

26. Antenna bipectinate ..... *Melitara* p. 49
— Antenna simple 27

27. Ductus seminalis attached to anterior ⅓ of corpus bursae 28
— Ductus seminalis attached to posterior ⅔ of corpus bursae (sometimes appearing attached to ductus bursae) 38

28. Signum absent 29
— Signum present 32

29. Forewing almost entirely white (plate 4, figure 11) ..... *Anderida,* part (*peorinella*) p. 84
— Forewing darker, abundantly covered with fuscous scales 30

30. Ductus bursae long (text figure 17 *d*) .. *Cactobrosis* p. 44
— Ductus bursae shorter (text figures 19 *d,* 39 *d,* 40 *c*) 31

31. Forewing with strongly developed black longitudinal lines (plate 3, figures 6, 7) .. *Echinocereta* p. 47
— Forewing without strongly developed black longitudinal lines (plate 2, figure 17; plate 4, figures 7, 8) ..... *Rhagea* p. 81

32. Ductus bursae with lamella antevaginalis (text figures 1 *d,* 3 *c,* 4 *c,* 5 *d,* 6 *c,* 10 *d,* 11 *c,* 41 *e,* 42 *d,* 43 *d,* 44 *c*) 33
— Ductus bursae without lamella antevaginalis (sometimes with one or two dorsal plates, text figure 13 *c, e*) 37

33. Lamella antevaginalis of ductus bursae weakly developed (text figures 41 *e,* 42 *d,* 43 *d,* 44 *c*) 34
— Lamella antevaginalis of ductus bursae more strongly developed, forming a distinct plate (text figures 1 *d,* 3 *c,* 4 *c,* 5 *d,* 6 *c,* 10 *d,* 11 *c*) 36

34. Signum a group of a few (up to about eight) fused or separate blunt platelets (text figures 41 *e,* 42 *e*) (signum sometimes a single blunt platelet) 35
— Signum a patch of many platelets (text figures 43 *e,* 44 *d*) ..... *Mescinia* p. 86

35. Platelets forming signum fused (text figure 41 *e*) ..... *Anderida,* part (*sonorella*) p. 84
— Platelets forming signum separate (text figure 42 *e*) ..... *Cassiana* p. 86

36. Signum a cluster of platelets (text figures 10 *d,* 11 *c*) ..... *Baphala* p. 32
— Signum an elongate, transverse plate, *or* a multispined oval plate (text figures 1 *d,* 3 *c,* 4 *c,* 5 *d,* 6 *c*) ..... *Laetilia* p. 17

37. Ductus bursae with one or two dorsal plates (text figure 13 *c, e*) ..... *Zophodia* p. 35
— Ductus bursae without dorsal plates (text figure 46 *c*) ..... *Bema* p. 92

38. Ductus seminalis attached to corpus bursae near signum 39
— Ductus seminalis not attached to corpus bursae near signum (usually attached near junction of ductus bursae and corpus bursae; if signum absent, always attached near junction of ductus bursae and corpus bursae) 43

39. Haustellum absent ..... *Rostrolaetilia* p. 26
— Haustellum present (sometimes very small) ... 40

40. Ductus bursae with lamella antevaginalis (text figure 9 *d*) ..... *Welderella* p. 31
— Ductus bursae without lamella antevaginalis 41

41. Signum a fused cluster of thornlike spines (text figure 15 *d*) ..... *Ozamia* p. 40
— Signum a plate, sometimes with a few, enlarged, associated scobinations (text figures 27 *c,* 28 *c,* 29 *c,* 33 *d*) 42

42. Forewing with strongly developed, black longitudinal lines; no discal spot (plate 3, figures

35, 36) ..... *Cahela* p. 70

— Forewing without strongly developed, black longitudinal lines; discal spot present (plate 2, figure 9; plate 3, figures 21–30) ..... *Alberada* p. 58

43. Forewing with 11 veins (text figures 31 *a*, 36, 37 *a*, 38 *a*) 44

— Forewing with nine or ten veins (text figures 51 *a*, *b*, 55 *a*, 58) 47

44. Signum absent (text figure 38 *d*) ..... *Eremberga* p. 78

— Signum present (text figures 31 *d*, 35 *e*, 37 *d*) 45

45. Signum a single plate, or cup with many small scobinations or spines (text figures 35 *e*, 37 *d*) 46

— Signum a series of small, more or less fused, plates (text figure 31 *d*) ..... *Cactoblastis* p. 66

46. Signum platelike (text figure 35 *e*) ..... *Rumatha* p. 73

— Signum a spinose cup (text figure 37 *d*) . *Yosemitia* p. 76

47. Signum absent 48

— Signum present 49

48. Papillae anales with setal alveoli enlarged (text figure 54 *c*) ..... *Patagonia* p. 111

— Papillae anales with setal alveoli small .... *Unadilla,* part (*maturella*) p. 113

49. Signum either a single cluster of platelets (text figures 48 *d*, 49 *d*, 50 *d*) *or* a single plate (text figure 45 *c*) 50

— Signum two opposed plates (text figure 57 *c*) *or* a girdle of many small plates (text figure 55 *e*) 51

50. Signum a single cluster of platelets (text figures 48 *d*, 49 *d*, 50 *d*) ..... *Homoeosoma* p. 95

— Signum a weakly developed crescent-shaped plate (text figure 45 *c*) ..... *Barberia* p. 92

51. Signum two opposed, spined plates (text figure 57 *c*) ..... *Phycitodes* p. 116

— Signum a girdle of many small, narrow, serrate plates (text figure 55 *e*) .. *Unadilla,* part (*erronella*) p. 113

The larger larvae of many of the cactus-feeding phycitines are impressive in appearance. Many are an attractive blue, and some are bright orange or red. The key is based on living, or recently killed, specimens.

KEY TO GENERA OF CACTUS-FEEDING PHYCITINAE (LAST STAGE LARVAE)

NOTE—Key should be used with caution because the larvae of many species are still unknown. Also, *Laetilia,* although occasionally found feeding on cactus flowers, is excluded from the key; it is almost always a predator of Coccoidea.

1. Larva white to dark gray 2

— Larva blue, green, orange, pink, red, reddish purple, or purplish black with or without transverse bands or distinct pinacula *or* white with broad purple or black transverse bands 5

2. Host cholla cactus (*Opuntia* (*Cylindropuntia*)) 3

— Host hedgehog cactus (*Echinocereus*) *or* cereus cactus (*Cereus*) 4

3. Host desert Christmas cactus (*Opuntia leptocaulis*) ..... *Rumatha* p. 73

— Host cholla cactus (*Opuntia* (*Cylindropuntia*)), other than desert Christmas cactus .. *Cahela* p. 70

4. Host hedgehog cactus (*Echinocereus*) .. *Eremberga* p. 78

— Host cereus cactus (*Cereus*) .... *Ozamia,* part (*lucidalis*) p. 40

5. Larva feeding in fruit ..... *Ozamia,* part p. 40

— Larva feeding in stems 6

6. Hosts prickly-pear cactus (*Opuntia* (*Opuntia*)) and cholla cactus (*Opuntia* (*Cylindropuntia*)) 7

— Hosts barrel cactus (*Ferocactus*), fishhook cactus (*Mammillaria*), horse crippler or devil's head (*Echinocactus*), hedgehog cactus

(*Echinocereus*) (and possibly saguaro (*Carnegiea*)) .... *Cactobrosis, Echinocereta, Yosemitia* p. 44, 47, 76

7. Larva blue, without transverse bands of enlarged dark pinacula, or white with purple or black transverse bands on caudal margins of segments; 3 SV setae on abdominal segments seven and eight 8
— Larva orange or red, with transverse bands of enlarged dark pinacula; 2 SV setae on abdominal segments seven and eight ..... *Cactoblastis* p. 66

8. Host prickly-pear cactus (*Opuntia* (*Opuntia*)) .....*Melitara* p. 49
— Host cholla cactus (*Opuntia* (*Cylindropuntia*)) ..... *Alberada* p. 58

GENUS
Laetilia Ragonot

Laetilia Ragonot, 1889, *Ent. Americana,* **5**: 116. Type species: *Dakruma coccidivora* Comstock, 1879. Designated by Ragonot, 1890, *Ann. Soc. ent. France,* **59**(6)10(Bull.): viii.

Laosticha Hulst, 1902, *Bull. U.S. Natl. Mus.,* **52**: 431.
Type species: *Dakruma ephestiella* Ragonot, 1887. Original Designation.

Laetilia appears to be strictly an American genus. Roesler (1973) included the name in his treatment of Palearctic phycitines; but this was based on specimens of *loxograma* (Staudinger), a species known only from females, occurring in the Canary Islands and southern Spain, whose genitalia, based on his figure, do not resemble those of a *Laetilia.* In the Americas, the genus occurs from approximately the southern half of the United States south to central Argentina. The number of species in America north of Mexico cannot be determined at this time. I have included nine in the present treatment, including two new species, but additional taxa appear to be in our fauna, particularly in Florida. Insufficient material and biological information are available to resolve this matter. More collecting and some rearing studies are needed. As interpreted by Heinrich (1956), and as presently understood, *Laetilia* is a composite group. Some species, such as *coccidivora,* have the male genitalia short with the lateral elements of the tegumen enlarged and strongly convex like those of *Rostrolaetila* and *Welderella,* whereas the male genitalia of others in *Laetilia* are generally like most other phycitines and in some ways resemble those of *Baphala* and its relatives.

Antenna of male and female simple. Sensilla trichodea (cilia) of antenna of male abundant and, at base of shaft, about ¼–½ as long as basal diameter of shaft. Frons rounded, somewhat roughly scaled, with some scales produced forward. Labial palpus of both sexes oblique to upturned. Maxillary palpus small, simple. Haustellum short, to moderately long, greatly reduced in *melanostathma* (Meyrick) and *glomis* (Dyar). Ocellus present. Basal ½ of costa of forewing of male slightly convex (text figure 1 *a*); undersurface without sex-scaling or costal fold. Forewing smooth; with 11 veins; R_2 from cell; R_{3+4} and R_5 stalked for more than ½ their lengths; M_1 more or less straight; M_2 and M_3 stalked for less than ½ their lengths; CuA_1 and CuA_2 separate at base; CuA_2 from near lower angle of cell. Hindwing (text figure 1 *a*) with seven veins; Sc + R_1 and Rs fused for over ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for about ½ their lengths; CuA_2 from near lower outer angle of cell; cell less than ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figures 1 *b, c,* 3 *a, b, d,* 4 *a, b,* 5 *a, b,* 6 *a, b, d, e*) with uncus subtriangular, sometimes spatulate; apical process of gnathos a pair of large lobes fused and hooked posteriorly; transtilla incomplete; juxta usually well developed with short, to rather long, lateral arms; valva simple; aedoeagus simple, robust; tegumen sometimes with lateral arms enlarged and strongly convex (particularly evident in *coccidivora* and other closely related species); vinculum shorter or longer than greatest width. Female genitalia (text figures 1 *d,* 3 *c,* 4 *c,* 5 *d,* 6 *c*) with corpus bursae membranous; ductus bursae membranous with scobinate lamella antevaginalis; signum a simple, transverse, elongate plate or a multispined oval plate; ductus seminalis from anterior, or near anterior part, of corpus bursae.

Last stage larvae (*coccidivora*) (text figure 2) robust, with well-defined, dark pinaculum rings at base of SD1 on mesothorax and abdominal segment eight. Head slightly roughened. Body without stripes. Mandibles simple. Larvae are usually predators of various scale insects and mealybugs (Coccoidea). *Laetilia* also has been observed feeding on the flowers of plants infested with scales.

KEY TO SPECIES OF *LAETILIA*

1. Male genitalia short, compact, with lateral elements of tegumen enlarged and strongly con-

vex (text figure 1 *b*); signum a single, rather large, elongate plate (text figure 1 *d*) 2

— Male genitalia more elongate, lateral elements of tegumen not enlarged (text figures 3 *a*, 4 *a*, 5 *a*, 6 *a*, *d*); signum a multispined oval plate (text figures 3 *c*, 4 *c*, 5 *d*, 6 *c*) 4

2. Forewing with brownish-red scales; eastern United States (migrant to western Texas) ... . *coccidivora* p. 18

— Forewing with pale-brown or ochre scales; western United States (and northern Mexico) 3

3. Patch of scales on forewing just distad of antemedial line mostly ochre; hindwing white, with no dark scales (plate 1, figure 6) ..... *hulstii* p. 21

— Patch of scales on forewing just distad of antemedial line completely or mostly black in costal half and mostly pale brown in posterior half; hindwing darker (plate 1, figures 3–5) .. .. *dilatifasciella* p. 20

4. Eastern United States 5

— Western United States (and northern Mexico) 8

5. Apical process of gnathos with anterior lobes broadly rounded (text figures 5 *a*, 6 *a*, *d*); ductus bursae very elongate (text figures 5 *d*, 6 *c*) 6

— Apical process of gnathos with anterior lobes angulate (text figure 4 *a*); ductus bursae shorter (text figure 4 *c*) ..... *myersella* p. 22

6. Forewing with much of costal half strongly dusted with white and distinctly contrasting with posterior half; apical process of gnathos with lobes rather long (text figure 6 *d*) .. *bellivorella* p. 26

— Forewing with costal half not distinctly contrasting with posterior half; apical process of gnathos with lobes shorter (text figures 5 *a*, 6 *a*) 7

7. Forewings pale (plate 1, figures 14, 15); central Florida ..... *cinerosella* p. 23

— Forewings strongly suffused with fuscous or black (plate 1, figures 12, 13); southwestern North Carolina to eastern Texas ..... *fiskeella* p. 22

8. Transverse lines of forewing rather distinct (plate 1, figures 7, 8); uncus broad apically (text figure 3 *a*) ..... *zamacrella* p. 22

— Transverse lines of forewing indistinct (plate 1, figure 9); uncus narrow apically ..... *ephestiella* p. 22

Laetilia coccidivora (Comstock)

PL. 1, FIGS. 1, 2. TEXT FIGS. 1 *a–d*, 2 (RWH 5949, part).

Dakruma coccidivora Comstock 1879, *North Amer. Ent.*, **1**: 26.

Type locality: Washington, DC. [USNM]

NOTE—Comstock's description of *coccidivora* was based on 18 males and 16 females. The lectotype, ♂, present designation bears the following labels: 1. "No. 95° Leg: July 16/79"; 2. "♂"; 3. "*Dakruma coccidivora* Comstock Type"; 4. "genitalia slide 3230 HHN"; 5. "LECTOTYPE *coccidivora* Comstock by H. H. Neunzig."

Laetilia coccidivora moths are easily recognized by the rather abundant, scattered brownish-red scales on the forewing, the compact male genitalia (text figure 1 *b*), and the single, narrow, platelike signum of the female genitalia (text figure 1 *d*). Wing length 5.0–8.5 mm.

Last stage larva (text figure 2) 8.0–12.0 mm long; head reddish brown to brown, darker at mouth parts, with dark brown to black at lateroposterior aspect (head in some specimens appearing entirely black); thoracic shield mostly dark brown to black, sometimes paler toward meson and posterior to XD2; body mostly brown to dark brown and granulate; SD1 pinaculum ring on mesothorax dark brown to black; SD1 pinaculum ring on abdominal segment 8 dark brown to black. Pupa not examined.

Comstock (1879) provided the first information on the host insects of the larvae of *coccidivora*. His type series was reared from cottony maple scale (*Pulvinaria innumerabilis* (Rathvon)). Heinrich in 1956 brought together most of the subsequent host information; his list included the following groups of Homoptera: Cerococcidae—ornate pit scale (*Cerococcus quercus* Comstock); Coccidae—brown soft scale (*Coccus hesperidum* L.); magnolia scale (*Neolecanium cornuparvum* (Thro)); pine tortoise scale (*Toumeyella parvicornis* (Cockerell)); Eriococcidae—oak felt scale (*Eriococcus quercus* (Comstock)); Kermesidae—gall-like scales (*Kermes* spp.); Lecanodiaspididae—false pit scale (*Lecanodiaspis* sp.); Pseudococcidae—mealybugs (*Pseudococcus* spp.).

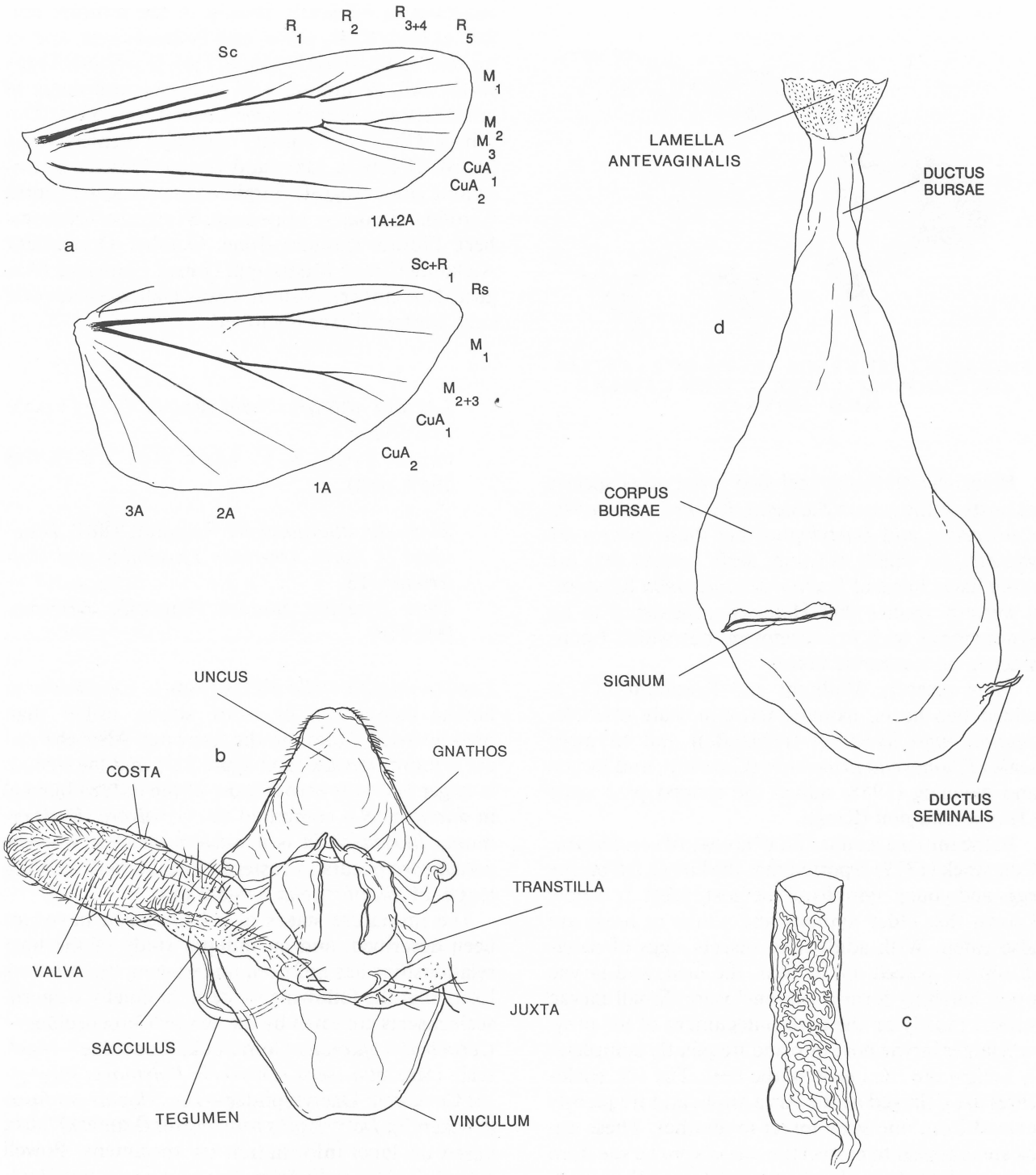

FIGURE 1: VENATION AND GENITALIA OF *LAETILIA COCCIDIVORA*

a. Male forewing and hindwing. *b.* Male genitalia, lectotype (most of right valva and aedoeagus omitted) (HHN 3230). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3231).

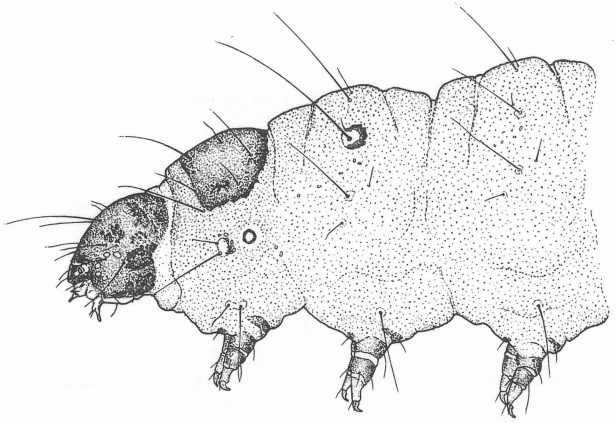

FIGURE 2: LAST STAGE LARVA OF *LAETILIA COCCIDIVORA* (LATERAL VIEW OF HEAD AND THORAX).

Heinrich (1956) also included seven other species as hosts in the genera *Saissetia, Kermes, Pulvinaria, Cerococcus,* and *Dactylopius*; but these species are western, or chiefly western, scale insects that are more likely hosts of *Laetilia dilatifasciella* Ragonot, a western species that Heinrich considered to be synonymous with *L. coccidivora,* but which I consider to be a separate taxon.

More recently, Williams and Kosztarab (1972) added two hosts, namely, terrapin scale (*Mesolecanium nigrofasciatum* (Pergande)) and tuliptree scale (*Toumeyella liriodendri* (Gmelin)), and Drooz and Neunzig (1988) added the striped pine scale (*Toumeyella pini* (King)).

In the initial account of the biology of *coccidivora,* Comstock (1879) reported that the larvae fed on the eggs and young nymphs of the host insect. It is now known that older nymphs and adults of hosts are also eaten. With adult scale insects, eggs of *coccidivora* are placed on, or near, the host; and larvae upon hatching form a silk enclosure. Small larvae subsist mostly on the outer integument of the prey, and larger larvae bore into and frequently completely hollow out the inside of the host. The silk enclosures are enlarged as the larva grows and frequently extend from one scale insect to another. These enclosures appear to protect the *coccidivora* larvae from ants tending the scale insects and from other predators. Some frass is usually mixed in with the silk. Pupation occurs in silk cases formed next to the hosts; sometimes pupal cases are incorporated into the silk larval enclosure. Several generations occur each year.

Laetilia coccidivora is found in the eastern United States, chiefly in the Southeast, but adults have been collected as far north, mostly in the summer and fall, as New York, Ohio, and Pennsylvania, and as far west as Big Bend National Park in western Texas in the fall. A summary of locations and dates of adult captures is as follows: Central New York (October); Ohio (November); southern Pennsylvania (April, October); Maryland (June); District of Columbia (July, August); Virginia (July, August); North Carolina (January, May–July, September–November); Florida (January–June, October–December); Alabama (June); Mississippi (June); Louisiana (August, November); eastern Texas (January–November); western Texas (October).

Laetilia dilatifasciella (Ragonot), REVISED STATUS

PL. 1, FIGS. 3–5. TEXT FIG. 3 *d* (RWH 5949, part).

Zophodia dilatifasciella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 13.

Type locality: Sonora (Senora), Arizona. [MNHP]

Laetilia dilatifasciella differs from *L. coccidivora* in having pale-brown or ochre scales, rather than brownish-red scales, on the forewing. Also, the uncus is more elongate (text figure 3 *d*), and the signum is larger (extends across most of the corpus bursae) in *dilatifasciella* compared to *coccidivora.* Furthermore, *dilatifasciella* is a western species, whereas *coccidivora* occurs in eastern North America. Wing length of *dilatifasciella* 6.0–8.0 mm.

The immature stages of *dilatifasciella* have not been described, and an indepth study of the host relationships has not been undertaken, but it seems likely that the following western, or chiefly western, scale insects are eaten by the larvae: Cerococcidae—*Cerococcus quercus* Comstock; Coccidae—black scale (*Saissetia oleae* (Olivier)); *Pulvinaria bigeloviae* Cockerell; Dactylopiidae—*Dactylopius confusus* (Cockerell); *Dactylopius tomentosus* (Lamark) (also, based on label information on specimens, Powell reared *dilatifasciella* from *Dactylopius* sp. on *Opuntia* sp. growing on Santa Cruz Island, California); Kermesidae—*Kermes arizonensis* King.

Heinrich (1956) considered *dilatifasciella* to be a synonym of *Laetilia coccidivora.* I have reinstated *dilatifasciella* because of the differences in color of the forewing and the differences in the genitalia mentioned earlier.

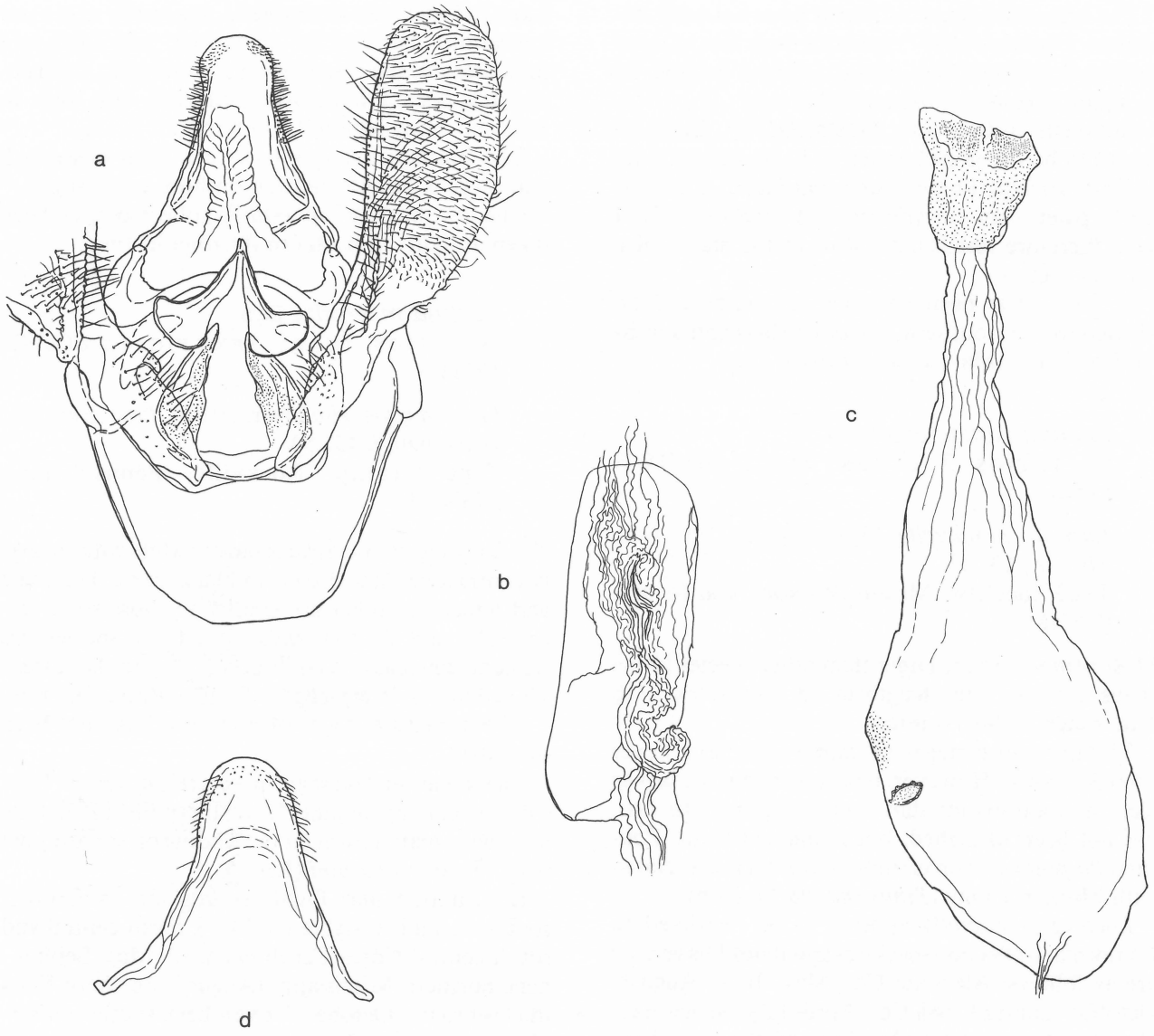

FIGURE 3: GENITALIA OF *LAETILIA ZAMACRELLA* AND *LAETILIA DILATIFASCIELLA*

a. L. zamacrella, male genitalia (most of left valva and aedoeagus omitted) (HHN 2607). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2611). *d. L. dilatifasciella,* uncus (HHN 706).

I have seen specimens of *dilatifasciella* from the following localities: southern New Mexico (June); southern Arizona (March, June, July, September–November); southern Nevada (August); southern California (March, June, August–November).

Laetilia hulstii Cockerell, REVISED STATUS PL. 1, FIG. 6 (RWH 5949, part; 5949a).

Laetilia coccidivora hulstii Cockerell, 1897, *Amer. Naturalist,* **31**: 588.
Type locality: Las Cruces, New Mexico. [AMNH]

Atascosa quadricolorella Dyar, 1904a. *Proc. Ent. Soc. Washington,* **6**: 116.
Type locality: Las Cruces, New Mexico. [USNM]

Laetilia hulstii has male and female genitalia similar to those of both *L. coccidivora* and *L. dilatifasciella,* but *hulstii* is generally paler than the other two species; most of the brown, dark-brown, or black marks on the forewing of *coccidivora* and *dilatifasciella* are ochre in *hulstii,* and the thorax of *hulstii* is mostly ochre. Also, the hindwing of *hulstii* is white and without dark scales. Wing length 5.5–6.0 mm.

The immature stages of *hulstii* have not been described. Cockerell (1897) reared it from *Icerya rileyi* Cockerell (Homoptera: Margarodidae) feeding on mesquite (*Prosopis glandulosa* Torrey).

Although *hulstii* was considered by Heinrich (1956) to be the same species as *L. coccidivora* and *L. dilatifasciella,* I have found that *hulstii* is consistently paler than *coccidivora* and *dilatifasciella.* I have therefore reinstated *hulstii* to the status of a discrete species.

L. hulstii has been collected in southern New Mexico (May), southern Arizona (May) and southern California (May, June, August).

Laetilia zamacrella Dyar
PL. 1, FIGS. 7, 8. TEXT FIG. 3 *a–c* (RWH 5950).

Laetilia zamacrella Dyar, 1925a, *Ins. Insc. Menstr.,* **13**: 12.
Type locality: Mount Wilson, California. [USNM]

Most *zamacrella* are larger than other species in the genus (average wing length of 75 specimens, 10.8 mm; range, 7.0–13.0 mm.)

The immature stages of *zamacrella* have never been described. However, it is known that the larvae feed on scale insects that occur on pine. The host has not been identified, but is thought to be *Toumeyella pinicola* Ferris; most have been associated with Monterey pine (*Pinus radiata* D. Don).

Laetilia zamacrella appears to be restricted to California. Collection localities and dates I have seen are as follows: Alameda Co., May, June, August–October; Contra Costa Co., April–July, September, October; Los Angeles Co., July; Marin Co., April (larvae); Riverside Co., June; San Bernardino Co., July; San Luis Obispo Co., March (larvae), May; San Mateo Co., May (larvae), June; Santa Barbara Co., June; Santa Clara Co., April, May; Tuolumne Co., July.

Laetilia ephestiella (Ragonot)
PL. 1, FIG. 9 (RWH 5952).

Dakruma ephestiella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 13.
Type locality: Arizona. [MNHP]

Maricopa lustrella Dyar, 1903, *Proc. Ent. Soc. Washington,* **5**: 227.
Type locality: Williams, Arizona. [USNM]

Laetilia ephestiella resembles *L. myersella* in general appearance but has the transverse pale lines and dark areas of the forewing less contrasted. The species has been infrequently collected, and only in Arizona. Wing length 9.0–9.5 mm.

The immature stages have not been described, and there is no information on host associations.

The few moths of *ephestiella* collected have been taken at lights in northern Arizona in June.

Laetilia myersella Dyar
PL. 1, FIGS. 10, 11. TEXT FIG. 4 *a–c* (RWH 5951).

Laetilia myersella Dyar, 1910b, *Proc. Ent. Soc. Washington,* **12**: 54.
Type locality: Rockville, Pennsylvania. [USNM]

The forewing of *myersella* is mostly white with strongly contrasting dark-brown to black areas. The male and female genitalia are similar to those of *L. zamacrella* and *L. ephestiella,* but these species are western, whereas *myersella* occurs only in the eastern United States. Wing length of *myersella* 5.5–8.5 mm.

The immature stages of *myersella* have not been described.

The larvae feed on scale insects (Homoptera: Coccidae) occurring on pine. In northern Florida, adults have been reared from larvae feeding on striped pine scale (*Toumeyella pini* (King)).

Distribution and flight records are as follows: south-central Pennsylvania (May); north-central and south-central North Carolina (April, May, September); northern Mississippi (August); northern Florida (February, October, November); southern Florida (January, April).

Laetilia fiskeella Dyar
PL. 1, FIGS. 12, 13. TEXT FIG. 5 *a–d* (RWH 5953).

Laetilia fiskeella Dyar, 1904b, *Proc. Ent. Soc. Washington,* **6**: 221.
Type locality: Tryon, North Carolina. [USNM]
NOTE—misspelled as *fiskella* by Heinrich (1956) and Munroe (1983).

Adults of *fiskeella* are somewhat similar in appearance and size to those of *L. myersella,* but in *fiskeella* the forewings are generally darker, with the fuscous or black more widespread and not contrasting as much with the paler areas of the wing. The male genitalia of *fiskeella* have the anterior lobes of the

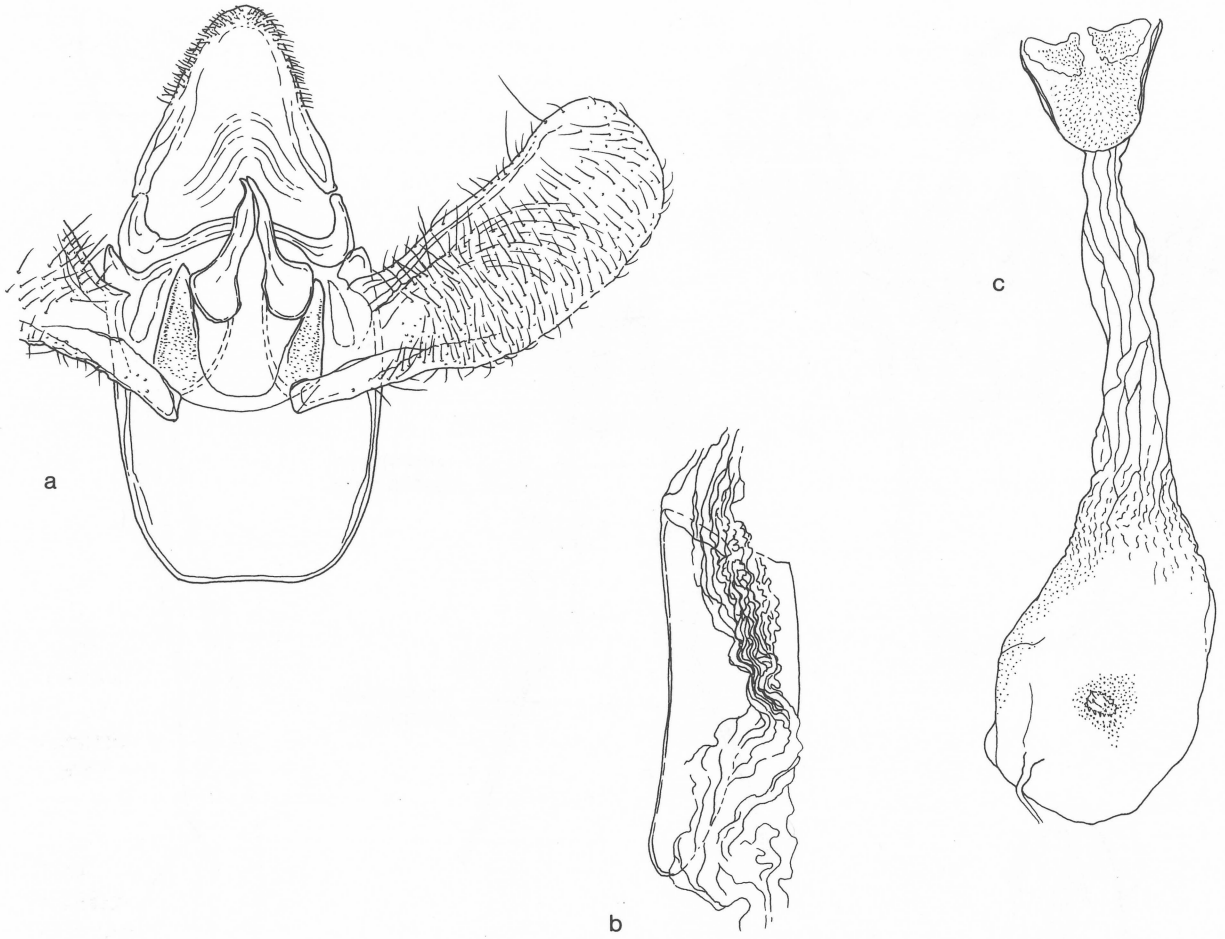

FIGURE 4: GENITALIA OF *LAETILIA MYERSELLA*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 1402). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2472).

apical process of the gnathos broadly rounded; these lobes are angulate in *myersella.* The ductus bursae of *fiskeella* is very long. Wing length of *fiskeella* 5.5–9.5 mm.

The immature stages are unknown. Presumably, they feed on scale insects.

I have seen moths of *fiskeella* collected in southwestern North Carolina in May, northern Mississippi in March through July and in November, and in eastern Texas in February, April, and May.

Laetilia cinerosella Neunzig, NEW SPECIES
PL. 1, FIGS. 14, 15. TEXT FIG. 6 *a–c.*

Laetilia cinerosella Neunzig.
Type locality: Ocala National Forest, Marion Co., Florida. [USNM]

DIAGNOSIS. *Laetilia cinerosella* is a small (wing length 6.0–6.5 mm), pale species. Its male and female genitalia (text figure 6 *a–c*) are like those of *L. fiskeella,* but *fiskeella* is much darker.

DESCRIPTION. Head: frons and vertex pale brown to brown and white (sometimes completely white); labial palpus pale brown and white, with basal half mostly white. Thorax: collar and dorsum brown, pale brown, and white. Forewing: ground color brown heavily dusted with white; antemedial line white, obscure; dark patch distad of antemedial line; postmedial line white, obscure, bordered by dark patches basally and distally; discal spots small, fuscous to black, moderately distinct; some obscure, pale reddish-brown scales in basal posterior half and associated with posterior part of dark patch distad of antemedial line. Hindwing: pale fuscous, darker at apex and along costal margins. Male genitalia

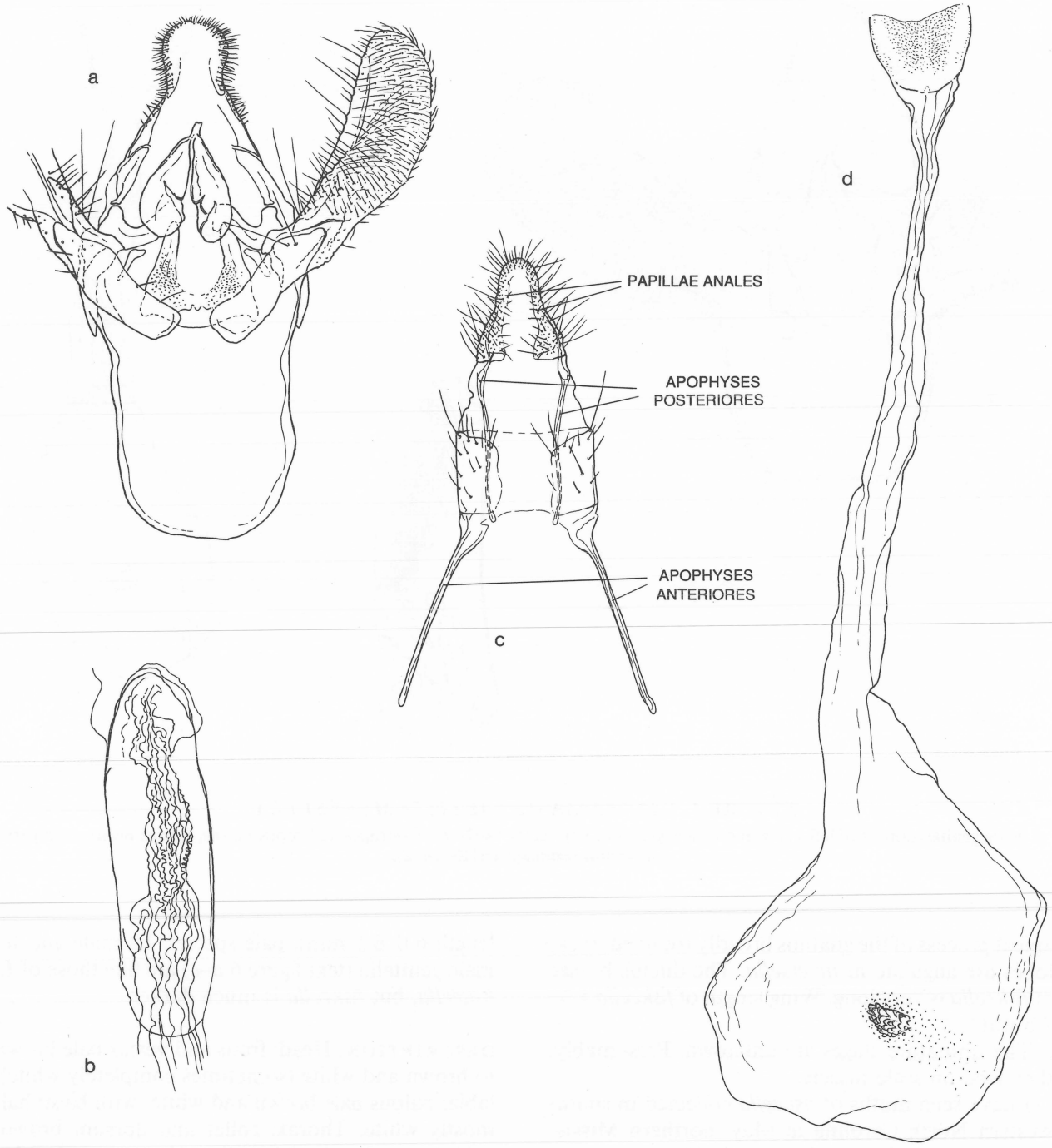

FIGURE 5: GENITALIA OF *LAETILIA FISKEELLA*

a. Male genitalia (most of left valva and aedoeagus omitted (HHN 2471). *b.* Aedoeagus. *c.* Posterior part of female genitalia (HHN 3269b). *d.* Corpus bursae and ductus bursae (HHN 3269b).

(text figure 6 *a, b*): rather elongate overall, with lateral elements of tegumen only slightly enlarged; gnathos with apical lobes broadly rounded; juxta with moderately long lateral arms; valva slender; aedoeagus slender; vinculum slightly longer than greatest width. Female genitalia (text figure 6 *c*): ductus bursae long (over 2 × as long as corpus bursae), slender, with ventral plate near genital opening extending only slightly over $\frac{1}{10}$ length of ductus bursae; corpus bursae membranous; signum a multi-

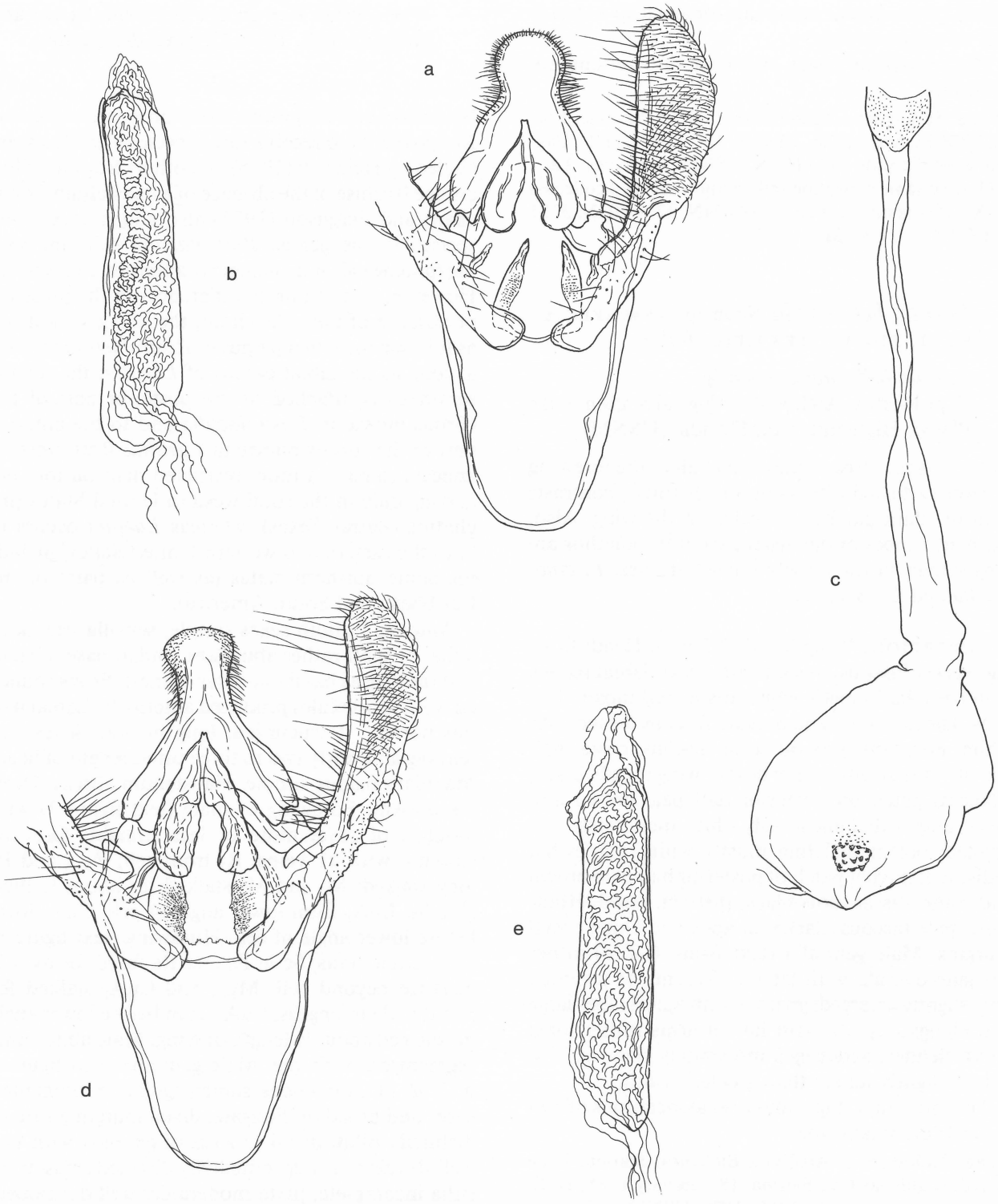

FIGURE 6: GENITALIA OF *LAETILIA CINEROSELLA* AND *LAETILIA BELLIVORELLA*

a. L. cinerosella, male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 3320). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3299). *d. L. bellivorella,* male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 1255). *e.* Aedoeagus.

spined plate; ductus seminalis attached to anterior part of corpus bursae.

The immature stages and host associations are unknown.

TYPES. Holotype: ♂. Lake Delancy, Ocala National Forest, NFR 75, Marion Co., Florida, 18-X-1990, H. D. Baggett; genitalia slide 3320 HHN. USNM. Paratypes: 2 ♂, 1 ♀. Florida: same collection information except ♀ collected 16-X-1990; genitalia slides 3298 HHN, 3299 HHN, 3321 HHN. NCSU, USNM.

Laetilia bellivorella Neunzig, NEW SPECIES
PL. 1, FIG 16. TEXT FIG. 6 *d, e*

Laetilia bellivorella Neunzig.
Type locality: Archbold Biological Station, Lake Placid, Highlands Co., Florida. [USNM]

DIAGNOSIS. Most of the costal half of the forewing is strongly dusted with white and distinctly contrasts with the dark patches of scales on the wing. Also, the paired lobes of the distal part of the gnathos are longer than in the closely related species, *L. cinerosella* and *L. fiskeella.*

DESCRIPTION. Wing length 7.5 mm. Head: frons and vertex fuscous, dusted with white; labial palpus with basal half mostly white, distal half mostly fuscous. Thorax: collar and dorsum fuscous dusted with white. Forewing: ground color fuscous; costal half heavily dusted with white; base of wing mostly black; subbasal patch on posterior half pale brown and black; antemedial line mostly white, moderately well defined; postmedial line mostly white, somewhat indistinct; medial patch of posterior half pale brown and black; discal spots black, distinct, fused. Hindwing: pale fuscous, darker at apex and along costal margins. Male genitalia (text figure 6 *d, e*) rather elongate overall, with lateral elements of tegumen only slightly enlarged; gnathos with apical lobes large and elongate; juxta with lateral arms rather long; valva slender; aedoeagus moderately slender; vinculum slightly longer than greatest width.

The immature stages and host associations of *bellivorella* are unknown.

TYPE. Holotype: ♂, Archbold Biological Station, Lake Placid, Highlands Co., Florida, 18 February 1985, D. C. Ferguson; genitalia slide 1255 HHN. USNM.

GENUS
Rostrolaetilia Blanchard and Ferguson

Rostrolaetilia Blanchard and Ferguson, 1975, *Jour. Lep. Soc.,* **29**: 131.

Type species: *Parramatta placidella* Barnes and McDunnough, 1918. Original designation.

Blanchard and Ferguson (1975) proposed the genus *Rostrolaetilia* to receive three species previously excluded by Heinrich (1956) and others from the Phycitinae because of the absence of a haustellum. Blanchard and Ferguson (1975) also added seven new species to the genus. *Rostrolaetilia* exhibits both morphological and biological affinities to *Laetilia.* However, in addition to differences in the presence or absence of the haustellum, the two genera differ as follows: the labial palpus of *Rostrolaetilia* is twice as long as the labial palpus of *Laetilia*; the ductus seminalis is attached to the posterior part of the corpus bursae in *Rostrolaetilia* and to the anterior part of the corpus bursae in *Laetilia*; *Rostrolaetilia* appears to have a more restricted distribution, occurring only in the southwestern United States (including central Texas), whereas *Laetilia* occurs in both the eastern and western United States, including some northern states (as well as parts of the Caribbean and South America).

Antenna of both sexes simple, sensilla trichodea (cilia) of shaft rather abundant, and at base of shaft ¼–⅓ as long as basal diameter of shaft. Frons rounded, with most scales produced anteriorly. Labial palpus porrect, downcurved, long in both sexes, extending anteriorly two to three times length of head. Maxillary palpus simple. Haustellum absent. Ocellus present. Forewing of male (text figure 7) with basal ½ of costa more or less straight; forewing smooth, with 11 veins; R_2 from cell; R_{3+4} and R_5 long stalked; M_2 and M_3 stalked for about ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 7) with seven veins; Sc + R_1 and Rs fused for over ½ distance beyond cell; M_{2+3} and CuA_1 stalked for about ½ their lengths; CuA_2 from before lower angle of cell; cell about ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figure 8 *a, b, d, e*) with uncus subtriangular to triangular, short and broad or elongate, distal margin entire or distinctly bifid; distal process of gnathos with two well-developed, anteromedially directed arms; transtilla incomplete; juxta moderately well developed, sometimes with short lateral arms; valva simple; aedoeagus simple or with numerous small cornuti; tegumen with lateral arms enlarged and strongly convex; vinculum shorter than greatest width. Female genitalia (text figure 8 *c*) with corpus bursae membranous; ductus bursae membranous or scler-

otized; signum an elongate plate; ductus seminalis from near signum.

The immature stages of *Rostrolaetilia* have not been described. According to Blanchard and Ferguson (1975), the larvae feed on scale insects.

KEY TO SPECIES OF *ROSTROLAETILIA*
(Adapted from Blanchard and Ferguson, 1975)

NOTE—Males of *utahensis* and *coloradella* and females of *pinalensis* are unknown.

1. Males 2
— Females 9

2. Sacculus distinctly longer than ½ length of valva 3
— Sacculus about as long as, or less than, ½ length of valva (text figure 8 *a, d*) 5

3. Uncus longer than width at base 4
— Uncus shorter than width at base .... *placidissima* p. 28

4. Arizona and New Mexico ..... *nigromaculella* p. 30
— Texas ..... *ardiferella* p. 30

5. Uncus pointed (text figure 8 *a*) *or* elongate distally 7
— Uncus broadly rounded distally (text figure 8 *d*) 6

6. Distal elements of gnathos with many anterior, small processes (text figure 8 *d*) ..... *minimella* p. 28
— Distal elements of gnathos without processes ..... *eureka* p. 30

7. Uncus with single point distally (text figure 8 *a*) ..... *placidella* p. 28
— Uncus bifid distally 8

8. Distal part of uncus large, tapered, its width greater than ½ length of sacculus, and bluntly pointed ..... *texanella* p. 30
— Distal part of uncus small, its sides almost parallel, its width distinctly less than ½ length of sacculus, and sharply pointed ..... *pinalensis* p. 31

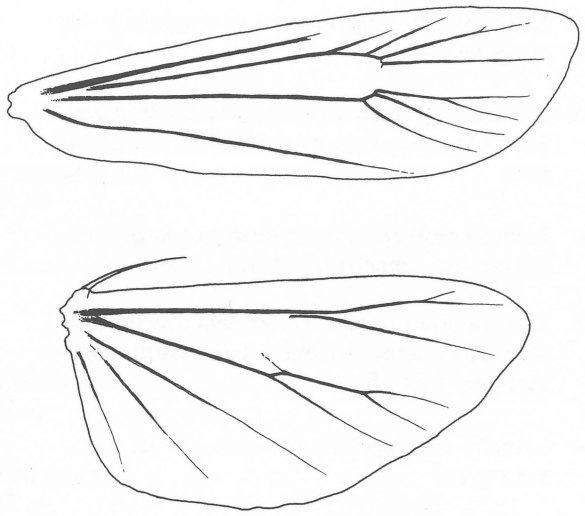

FIGURE 7: VENATION OF MALE *ROSTROLAETILIA TEXANELLA.*

9. Ductus bursae partly or completely sclerotized 10
— Ductus bursae membranous ..... *eureka* p. 30

10. Ductus bursae as long as, or longer than, corpus bursae, completely sclerotized, straplike and convoluted ..... *texanella* p. 30
— Ductus bursae usually shorter than corpus bursae, completely or partly sclerotized, if straplike, short and more or less straight 11

11. Ductus bursae fully sclerotized, or nearly so, appearing flattened, nearly straight 12
— Ductus bursae partially sclerotized, less regular in form 13

12. Lamella postvaginalis distinctly tripartite, less than 2 × as wide as ductus bursae .....*coloradella* p. 30
— Lamella postvaginalis not distinctly tripartite, about 2 × as wide as ductus bursae ..... *utahensis* p. 28

13. Ductus bursae only sclerotized along left margin ..... *placidissima* p. 28
— Ductus bursae more completely sclerotized ... 14

14. Lamellae antevaginalis and postvaginalis fused into a single plate with very distinct, somewhat circular opening surrounding ostium bursae ..... *ardiferella* p. 30

— Lamellae antevaginalis and postvaginalis not as above 15

15. Lamella postvaginalis a large, well-sclerotized, funnel-shaped ostial plate fused to rim of ostium ..... *nigromaculella* p. 30

— Lamella postvaginalis not forming a large, well-sclerotized, funnel-shaped ostial plate 16

16. Lamella antevaginalis not present (ductus bursae partly sclerotized, but not near ostium bursae) (text figure 8 *c*) ..... *placidella* p. 28

— Lamella antevaginalis present as long, transverse plate ..... *minimella* p. 28

Rostrolaetilia placidella (Barnes and McDunnough)
PL. 1, FIG. 17. TEXT FIG. 8 *a–c* (RWH 5954).

Parramatta placidella Barnes and McDunnough, 1918, *Contrib. Nat. Hist. Lep. N. Am.*, **4**: 177.
Type locality: Olancha, Inyo Co., California. [USNM]
NOTE—Shaffer (1968) designated a lectotype.

Rostrolaetilia placidella resembles *R. minimella* and *R. placidissima* in being mostly white; other species in the genus, although somewhat pale, are darker with more black and ochreous scales. The uncus of the male is well developed and bears a single point distally (text figure 8 *a*). Female genitalia with ductus bursae nearly completely sclerotized but without lamella antevaginalis. Wing length 8.5–10.5 mm.

The immature stages of *placidella* are unknown.

Rostrolaetilia placidella has been collected only in southern California: Inyo County (June); Los Angeles County, Pasadena (no date); San Bernardino County, Victorville (May); Ventura County (May, September).

Rostrolaetilia minimella Blanchard and Ferguson
PL. 1, FIG. 18. TEXT FIG. 8 *d, e* (RWH 5955).

Rostrolaetilia minimella Blanchard and Ferguson, 1975, *Jour. Lep. Soc.*, **29**: 137.
Type locality: Olancha, Inyo Co., California. [USNM]

Wing length of *minimella* is only 4.5–6.0 mm. The male genitalia provide a good means of identification in that the uncus is very short and the distal elements of the gnathos have many, anterior, small processes (text figure 8 *d*).

The immature stages of *minimella* have not been described. Blanchard and Ferguson (1975) mention that the larvae possibly feed on scales of the genus *Orthezia* Bosc d'Antic (Homoptera: Ortheziidae).

Rostrolaetilia minimella is known from southern California (Inyo Co.—April–June; San Bernardino Co.—June) and northwestern Nevada (Humboldt Co.—June).

Rostrolaetilia placidissima Blanchard and Ferguson
PL. 1, FIG. 19 (RWH 5956).

Rostrolaetilia placidissima Blanchard and Ferguson, 1975, *Jour. Lep. Soc.*, **29**: 138.
Type locality: Stockton, Utah. [USNM]

The best way to separate *placidissima* from the very similar *placidella* and *minimella* is by looking at the male genitalia. The sacculus is distinctly longer than ½ the length of the valva in *placidissima* (see Blanchard and Ferguson, 1975: figure 17), whereas the sacculus of *placidella* and *minimella* is less than ½ the length of the valva. Wing length of *placidissima* 7.0–10.0 mm.

The immature stages are unknown.

The type series was obtained in Utah. Other specimens in collections are from California (Mono and Inyo Counties). *R. placidissima* flies from May through September.

Rostrolaetilia utahensis Blanchard and Ferguson
PL. 1, FIG. 20 (RWH 5957).

Rostrolaetilia utahensis Blanchard and Ferguson, 1975, *Jour. Lep. Soc.*, **29**: 139.
Type locality: Richfield, Utah. [USNM]

Rostrolaetilia utahensis is known only from two females from the type locality. The key to *Rostrolaetilia* species includes differences seen by Blanchard and Ferguson (1975: figure 26) in the female genitalia between it and other species. Additional material, particularly males, is needed to clarify the status of *utahensis*. Wing length 9.0–10.0 mm. Date of capture of both females is mid-June.

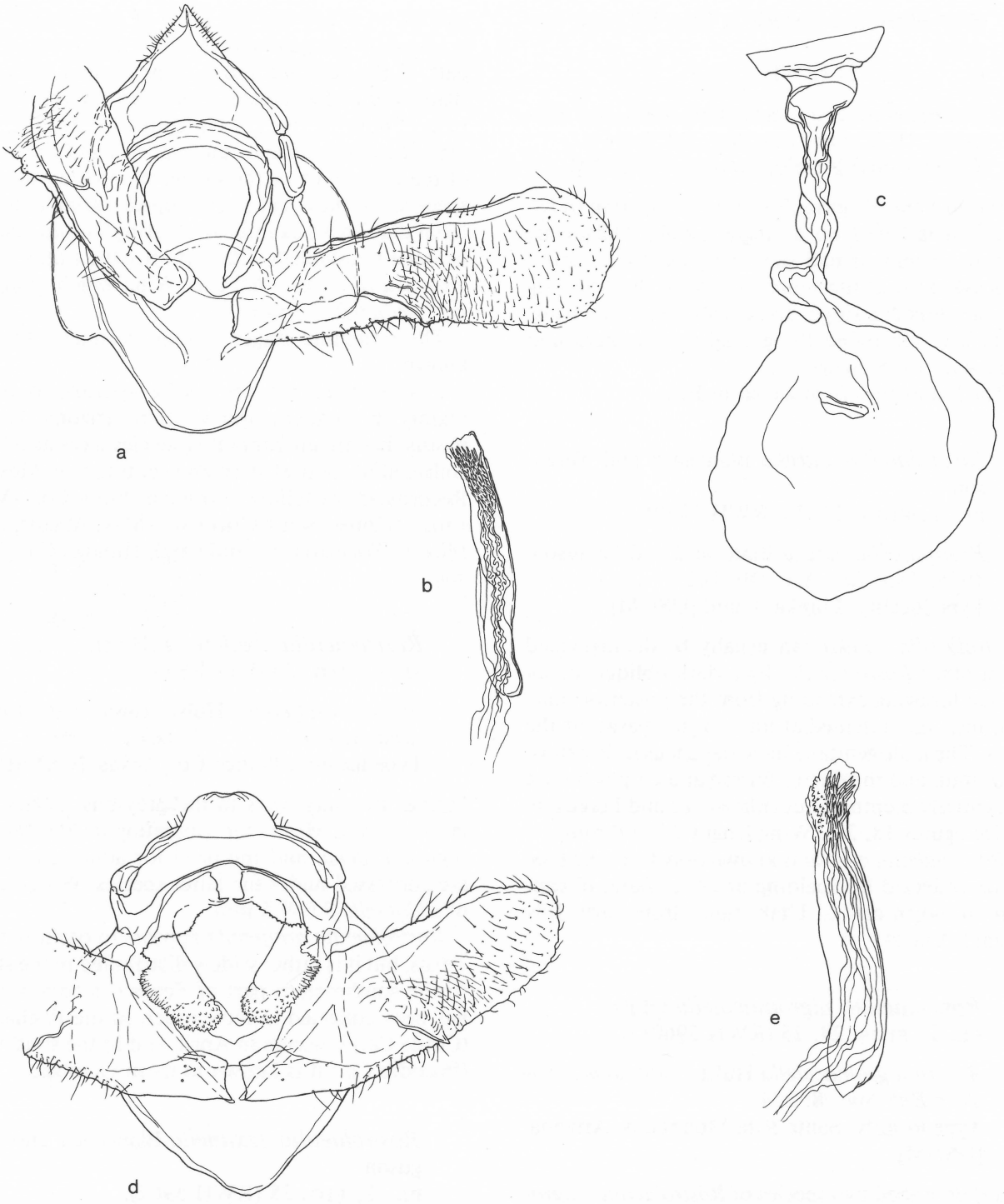

FIGURE 8: GENITALIA OF *ROSTROLAETILIA* SPECIES

a. R. placidella, male genitalia (most of left valva and aedoeagus omitted) (HHN 3275). *b.* Aedoeagus. *c.* Corpus bursae and ductus bursae (JAP 3278). *d. R. minimella,* male genitalia (most of left valva and aedoeagus omitted) (HHN 2613 and 3245[uncus]). *e.* Aedoeagus.

Rostrolaetilia coloradella Blanchard and Ferguson
PL. 1, FIG. 21 (RWH 5958).

Rostrolaetilia coloradella Blanchard and Ferguson, 1975, *Jour. Lep. Soc.*, **29**: 142.
Type locality: Pueblo, Colorado. [USNM]

Blanchard and Ferguson's (1975) description of *coloradella* is based on a single female. Diagnostic features include: small size (wing length 7.0 mm); subbasal spot at the inner margin of the forewing not developed; a single discal spot on the forewing. They also illustrated the genitalia (Blanchard and Ferguson, 1975: figure 27).

The holotype was collected in July.

Rostrolaetilia eureka Blanchard and Ferguson
PL. 1, FIGS. 22, 23 (RWH 5959).

Rostrolaetilia eureka Blanchard and Ferguson, 1975, *Jour. Lep. Soc.*, **29**: 142.
Type locality: Eureka, Utah. [USNM]

Rostrolaetilia eureka can usually be distinguished from other *Rostrolaetilia* by a dark oblique streak on the forewing extending from the posterior margin, near the antemedial line, to just basad of the apex. The male genitalia have the uncus rather short and stout, and the ductus bursae and corpus bursae are entirely membranous (Blanchard and Ferguson, 1975: figures 18, 28). Wing length 7.0–8.0 mm.

Rostrolaetilia eureka is known only from the type series collected by Spalding in 1911. Dates of capture, in north central Utah, range from early July to mid-August.

Rostrolaetilia nigromaculella (Hulst)
PL. 1, FIGS. 24, 25 (RWH 5960).

Aurora nigromaculella Hulst, 1900, *Jour. New York Ent. Soc.*, **8**: 224.
Type locality: Santa Rita Mountains, Arizona. [USNM]

Hulst described two species of *Rostrolaetilia, nigromaculella* from southern Arizona and *ardiferella* from central Texas. Both are similar in general appearance, and both have the sacculus of the male distinctly longer than ½ the length of the valva. Among the few specimens of both species I have seen, the male genitalia of *nigromaculella* have the posterior half rather broad with the basal arms of the gnathos, and the bases of the uncus, widely spaced; in *ardiferella* the arms of the gnathos and the bases of the gnathos are closer together and this part of the genitalia more compact and rounded. Blanchard and Ferguson illustrated the male genitalia of both species (1975: figures 19, 21, 36), and used the appearance of the sacculus and the shape of the distal part of the uncus to separate the two species, but these structures appear variable in material that I have examined. Rearing studies need to be done to establish with certainty the status of *nigromaculella* and *ardiferella.* Wing length of *nigromaculella* 6.0–7.5 mm.

The immature stages of *nigromaculella* are unknown.

Rostrolaetilia nigromaculella appears to occur mainly in southern and western Arizona. A few moths that are probably this species have also been collected in southwestern and central New Mexico. Records are as follows: Arizona: Pima Co.—May, June, October; Santa Cruz Co.—May, August; New Mexico: Socorro Co.—(no date); Hidalgo Co.—August.

Rostrolaetilia ardiferella (Hulst)
PL. 1, FIG. 26 (RWH 5961).

Altoona ardiferella Hulst, 1888, *Ent. Americana,* **4**: 118.
Type locality: Blanco Co., Texas. [USNM]

Similar in many ways to the previous species, *nigromaculella.* Means for separating *ardiferella* and *nigromaculella,* and the need for additional study are addressed under the latter species. Wing length of *ardiferella* 7.0–9.5 mm.

Rostrolaetilia ardiferella appears to occur only in Texas, but it is rather widely distributed in the state. In the southeastern part of Texas (La Salle Co.) it has been collected in November, in the Panhandle (Cottle Co.) it occurs in April, and in the southwest (Presidio Co.) it is known to fly in October.

Rostrolaetilia texanella Blanchard and Ferguson
PL. 1, FIG. 28 (RWH 5962).

Rostrolaetilia texanella Blanchard and Ferguson, 1975, *Jour. Lep. Soc.*, **29**: 147.
Type locality: Mt. Locke, Davis Mountains, Jeff Davis Co., Texas. [USNM]

Superficially, *texanella* most closely resembles *ardiferella,* but the genitalia of the two species are quite different. The male genitalia of *texanella* have the

sacculus only about as long as ½ the length of the valva, and the apex of the uncus strongly bifid; whereas the male genitalia of *ardiferella* have the sacculus distinctly longer than ½ the length of the valva, and the apex of the uncus entire. The female genitalia have the ductus bursae entirely sclerotized in *texanella,* whereas the ductus bursae of *ardiferella* is mostly membranous. Blanchard and Ferguson (1975: figures 20, 34, 35, 37) illustrated the male and female genitalia of *texanella.* Wing length of *texanella* is 8.0–10.0 mm.

The immature stages of *texanella* are unknown.

Rostrolaetilia texanella has been collected mostly in southwestern Texas (March, May–October), but a few specimens are known from southern Arizona (August).

Rostrolaetilia pinalensis Blanchard and Ferguson
PL. 1, FIG. 27 (RWH 5963).

Rostrolaetilia pinalensis Blanchard and Ferguson, 1975, *Jour. Lep. Soc.,* **29**: 149.
Type locality: Pinal Mountains, 5,000′, Arizona. [USNM]

Rostrolaetilia pinalensis is readily distinguished from its congeners on the basis of the appearance of the forewing, which has a very diffuse subbasal spot, and has the lower discal spot developed into a thin, dark streak. The uncus is well developed and strongly bifid distally. Blanchard and Ferguson (1975: figure 22) illustrated the genitalia. The female is unknown. Wing length 7.0 mm.

The holotype, collected in southern Arizona in April, is the only known specimen.

GENUS
Welderella Blanchard

Welderella Blanchard, 1978, *Jour. Lep. Soc.,* **32**: 103.
Type species: *Ollia parvella* Dyar, 1906. Original designation.

Welderella, a monobasic genus, appears to be limited to Texas. On the basis of the male genitalia, the genus is related to *Laetilia* and *Rostrolaetilia.* However, the longitudinal wing pattern readily distinguishes *Welderella* from species of these allied genera. More significant diagnostic features of *Welderella* include a very small, thin haustellum and lack of ocelli.

Antenna of both sexes simple, sensilla trichodea (cilia) of shaft of male moderately abundant and at base of shaft about ¼ as long as basal diameter of shaft. Frons rounded, scales directed somewhat anteriorly. Labial palpus of both sexes porrect, downcurved, extending anteriorly about 3 × eye diameter. Maxillary palpus simple, squamous. Haustellum strongly reduced, thin. Ocellus absent. Forewing of male (text figure 9 *a*) with costa slightly convex in basal ½; without sex-scales or costal fold. Forewing smooth scaled; with 10–11 veins; R_{3+4} and R_5 usually completely fused (R_{3+4} sometimes a short spur from R_5); M_1 from below upper angle of cell; M_2 and M_3 stalked for about ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 9 *a*) with seven veins; Sc + R_1 and Rs fused for over ⅔ of their lengths beyond cell; M_{2+3} and CuA_1 stalked for about ½ their lengths; CuA_2 from near lower angle of cell; cell about ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figure 9 *b, c*) with uncus subtriangular, distal margin rounded; gnathos with two rather large, distal, anteromedially directed arms; transtilla incomplete; juxta moderately well developed; valva simple; aedoeagus simple; tegumen with lateral arms enlarged and convex; vinculum shorter than greatest width. Female genitalia (text figure 9 *d*) with corpus bursae membranous; ductus bursae with sclerotized and setose lamella antevaginalis; signum a rather large, irregular, ridged, longitudinally oriented plate; ductus seminalis from near signum.

The immature stages of *Welderella* are unknown.

Welderella parvella (Dyar)
PL. 1, FIGS. 29, 30. TEXT FIG. 9 *a–d* (RWH 5964).

Ollia parvella Dyar, 1906, *Jour. New York Ent. Soc.,* **14**: 31.
Type locality: Brownsville, Texas. [USNM]

The moth of *parvella* is small (wing length 5.0–6.0 mm) and has the forewing with the costal ½ mostly white, the posterior ½ mostly pale ochreous, and the veins overlaid with pale brown. The hindwings of the male are distinctly darker in the distal ½ than the hindwings of the female. Although similar in size and habitus to *Barberia affinitella* Dyar, the male genitalia of the two species, particularly the shape of the uncus (text figures 9 *b,* 45 *a*), are diagnostic.

The immature stages are unknown.

The only moths of *parvella* that I have seen are from southeastern Texas (Cameron, Neuces and San Patricio Counties) collected in May–July.

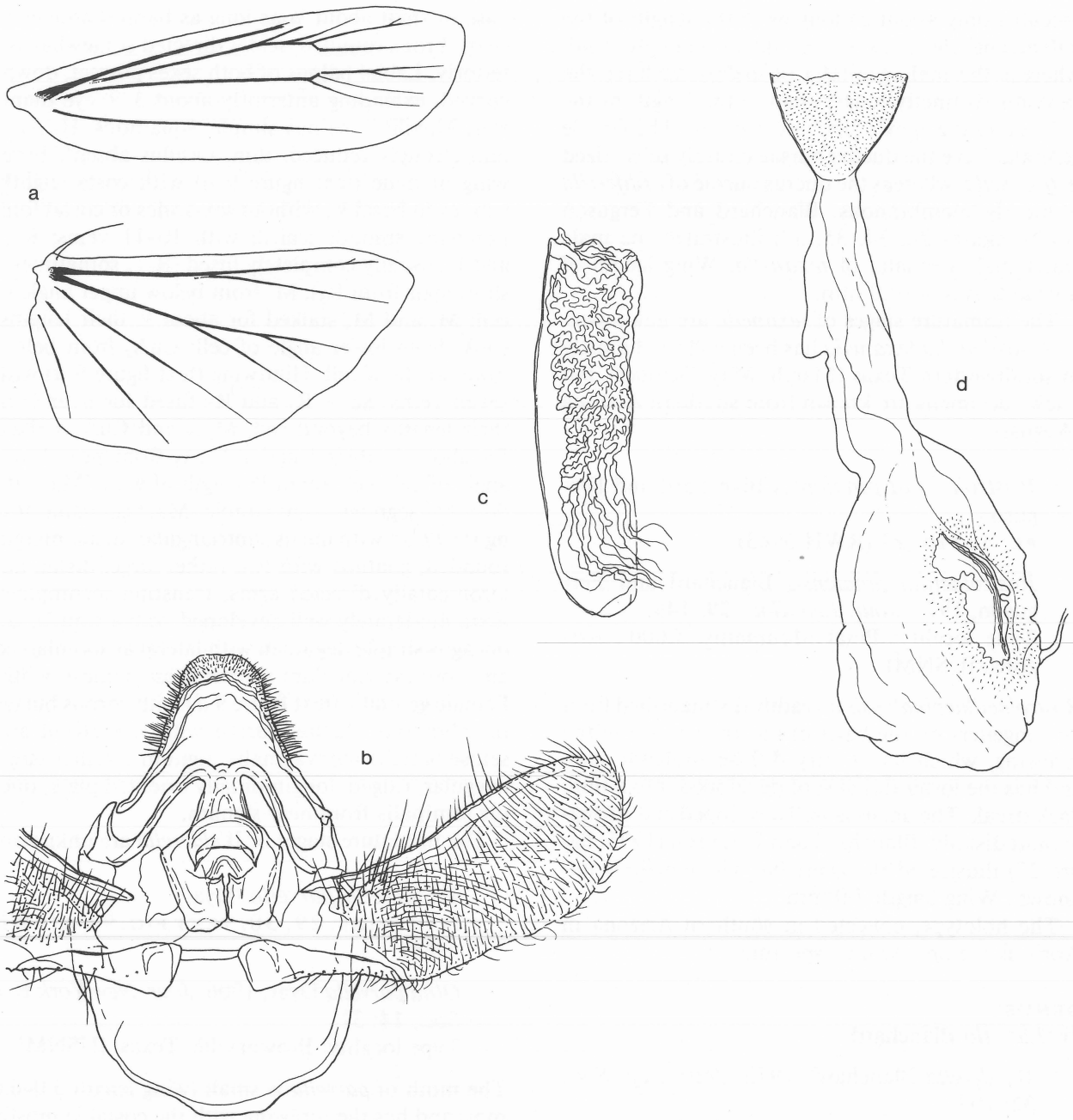

FIGURE 9: VENATION AND GENITALIA OF *WELDERELLA PARVELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 3243). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3244).

GENUS

Baphala Heinrich

Baphala Heinrich, 1956, *U.S. Natl. Mus. Bull.*, **207**: 235.

Type species: *Euzophera homoeosomella* Zeller, 1881. Original designation.

Adults of *Baphala* are very similar to those of *Laetilia* in general appearance and with regard to the behavior of their larvae (species of both genera are chiefly predators of scale insects). Also, both the male and female genitalia of at least some species of *Laetilia* closely resemble those of *Baphala* species. However, the genitalia of *Baphala* (text figures

10 *b, c,* 11 *a, b*) also show an affinity with *Zophodia* and some of the cactus-feeding phycitines, and the male antennae of *Baphala, Zophodia, Ozamia,* and *Cactobrosis,* with their basal clusters of scalelike sensilla, provide strong evidence for at least informally grouping these four genera. Heinrich (1956) recognized six species and one subspecies (race) of *Baphala* in his revision. The genus is mainly tropical American, but three species occur in the southern part of our area.

Antenna of male with elongate, shallow sinus at basal segments of shaft; six to seven clusters of scalelike sensilla within sinus; clusters very closely arranged, superficially appearing as a single group (plate A, figures 1–3). Sensilla trichodea (cilia) of antenna of both sexes very abundant, and, at base of shaft, about ⅛ as long as basal diameter of shaft (sensilla trichodea of male of *pallida* heavily overlaid with scales). Frons rounded, smoothly to somewhat roughly scaled, most scales directed forward. Labial palpus of both sexes oblique to upturned. Maxillary palpus small, simple. Haustellum moderately well, to well developed. Ocellus present. Basal ½ of costa of forewing of male slightly convex to straight (text figure 10 *a*); undersurface without sex-scaling or costal fold. Forewing smooth, without transverse ridges of raised scales or patches of raised scales; with 11 veins; R_2 from cell; R_{3+4} and R_5 stalked; M_1 straight; M_2 and M_3 stalked; CuA_1 and CuA_2 well separated at base; CuA_2 from before lower angle of cell. Hindwing (text figure 10 *a*) with six–seven veins; Sc + R_1 and Rs usually fused for most of their lengths beyond cell (Sc + R_1 usually forming a short spur, but sometimes completely fused with Rs); M_{2+3} and CuA_1 stalked for about ⅓ their lengths; cell less than ½ length of wing. Lateral metathoracic sclerite with small scale penicillus. Male abdominal segment eight with paired ventrolateral scale tufts, each tuft a single fascicle of simple, thin, more or less straight scales. Transverse, sclerotized bar associated with scale tufts. Male genitalia (text figures 10 *b, c,* 11 *a, b*) with uncus subtriangular, constricted near middle, apex somewhat narrow, rounded; apical process of gnathos a pair of moderately large lobes fused and hooked posteriorly; transtilla incomplete, reduced to small lateral sclerites; juxta well developed, with relatively long lateral arms; valva simple; aedoeagus simple, robust or slender; vinculum longer than greatest width. Female genitalia (text figures 10 *d,* 11 *c*) with corpus bursae membranous, sometimes with small scobinations; ductus bursae membranous with sclerotized and scobinate, ventral lamella antevaginalis; signum a cluster of blunt spines; ductus seminalis from anterior part of corpus bursae.

There is little information on the appearance of *Baphala* larvae. Comstock (1880: 244) described *pallida* as "light-gray color above, and white beneath; the head is brown, sometimes varying to reddish." They feed on scale insects of the families Kermesidae (*Kermes* Boitard), and Coccidae (*Ceroplastes* Gray, *Saissetia* Déplanche, *Toumeyella* Cockerell).

KEY TO SPECIES OF *BAPHALA* (MALES)

1. Forewing generally suffused with black or fuscous; northeastern North Carolina ..... *phaeolella* p. 35
— Forewing paler; southeastern South Carolina, Florida to Texas, and western United States 2

2. Sensilla trichodea (cilia) of shaft of antenna heavily overlaid with scales (plate A, figure 1) (scales particularly abundant near base of shaft, but extending length of shaft); Florida and southeastern South Carolina to central Texas ..... *pallida* p. 33
— Sensilla trichodea (cilia) of shaft of antenna with few to no associated scales; north central Utah to California ..... *eremiella* p. 35

Baphala pallida (Comstock), NEW COMBINATION, REVISED STATUS
PL. 1, FIGS. 31–35; PL. A, FIGS. 1–3. TEXT FIG. 10 *a–d* (RWH 5949, part; RWH 5965, part).

Dakruma pallida Comstock, 1880, *Rept. Commissioner Agric., 1879,* 243.
Type locality: Florida [? Sanford]. [USNM]

NOTE—Described from two males and four females. The lectotype, ♂, present designation, bears the following labels: 1. "No. 417a. Leg. May 15.80"; 2. "Type No. 1410 U.S.N.M."; 3. "*Dakruma pallida* Comst. Type": 4. "genitalia slide HHN 3319"; 5. "LECTOTYPE *pallida* Comstock by H. H. Neunzig."

Vitula basimaculatella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 15. NEW SYNONYMY.
Type locality: United States. [MNHP]

The abundant scales overlaying the sensilla trichodea (cilia) on the antennal shaft of the male (plate

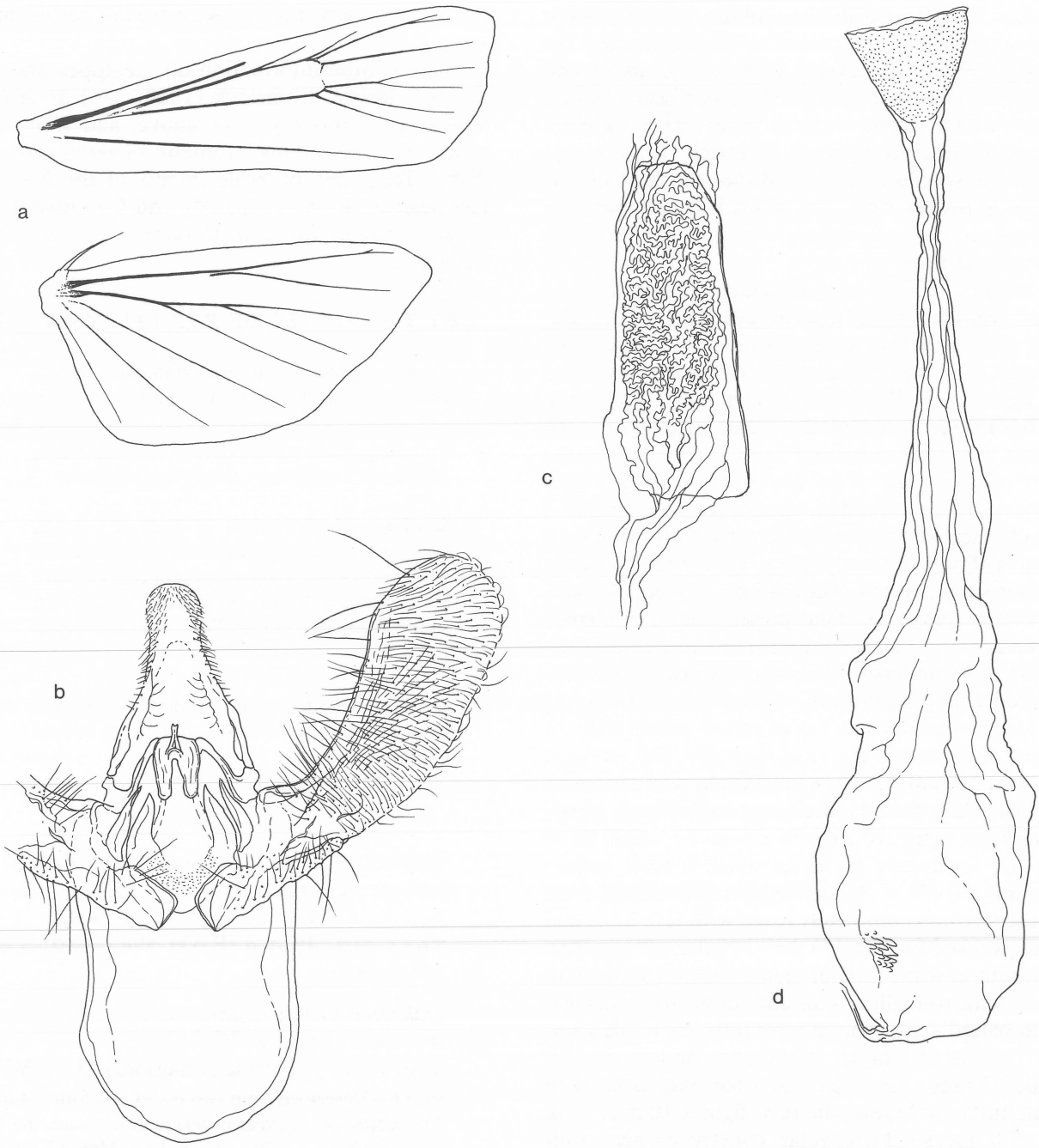

FIGURE 10: VENATION AND GENITALIA OF *BAPHALA PALLIDA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 3135). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3283).

A, figure 1) are diagnostic for *pallida. B. fumiella* and *B. eremiella* have few to no scales covering the sensilla trichodea of the shaft. Wing length of *pallida* 6.5–8.5 mm.

Comstock (1880) observed larvae of *pallida* feeding on the eggs of *Kermes* sp. (Homoptera: Kermesidae). Based on the catholic feeding habits of other *Baphala,* scale insects in other genera and families are also probably hosts.

Baphala pallida occurs in the southeastern United States (including central Texas and southern Oklahoma). I have seen specimens from the following

localities: southern Florida (January, March, April, November); southeastern South Carolina (The Wedge) (August); southern Oklahoma (July); east and central Texas (August, September).

Heinrich (1956: 230) made Comstock's *pallida* a synonym of *Laetilia coccidivora.* This appears to have been done without carefully studying the type series of *pallida.* The males of Comstock's material have a basal cluster of scalelike sensilla on the antenna that do not occur in *Laetilia,* but are found in *Baphala,* and the genitalia are not short and compact as in *Laetilia coccidivora.* I have been unable to find any evidence that Heinrich made genital slides of *pallida.*

Baphala eremiella (Dyar), REVISED STATUS
PL. 1, FIGS. 36, 37 (RWH 5965, part).

Laetilia eremiella Dyar, 1910b, *Proc. Ent. Soc. Washington,* **12**: 54.
Type locality: Stockton, Utah. [USNM]

Very similar to *B. pallida* in color and wing maculation, but the male antenna have only a few scales partially covering the sensilla trichodea (cilia). Wing length 6.5–9.0 mm. Larvae are presumably predaceous, feeding on scale insects.

The type series of *eremiella* was collected in July and August in north central Utah. I have seen several other moths belonging to this species from California (Yuba and Santa Barbara Counties) caught in May and June.

Heinrich (1956) placed *eremiella* in synonymy under *pallida* (*basimaculatella*). Apparently, he overlooked the difference in the male antennae of the two species.

Baphala phaeolella Neunzig, NEW SPECIES
PL. 1, FIGS. 38, 39. TEXT FIG. 11 *a–c.*

Baphala phaeolella Neunzig.
Type locality: North Harlowe, Craven Co., North Carolina. [USNM]

DIAGNOSIS. The adult of *phaeolella* has the forewing generally suffused with fuscous or black, resulting in little contrast between the pale and dark areas of the wing. The genitalia decisively separate *phaeolella* from other congeneric species. In the male the aedoeagus is slender (text figure 11 *b*) (about 1/6 as wide as long), whereas in other *Baphala* (*pallida, eremiella, goyensis* (Ragonot), *glabrella* (Dyar), *haywardi* Heinrich, *homoeosomella* (Zeller)) the aedoeagus is broad (text figure 10 *c*; Heinrich, 1956: figures 513a, 514a, 515a, 516a, 517a) (about 1/3–1/4 as wide as long). The lamella antevaginalis of the female ductus bursae is strongly developed in *phaeolella* (text figure 11 *c*) being about twice as large as in other *Baphala* (text figure 10 *d*; Heinrich, 1956: figures 1006, 1007, 1010, 1011h).

DESCRIPTION. Wing length 7.0–8.5 mm. Head: frons brownish white; vertex brownish white to fuscous; labial palpus mostly fuscous, paler basally. Thorax: collar and dorsum with white-tipped brown scales suffused with fuscous or black. Forewing: ground color fuscous; costal half dusted with white; antemedial line rather indistinct, a mixture of white and fuscous near costa becoming brownish gray in posterior half; rather broad black or fuscous patch distad of antemedial line (patch becoming less dark and more diffuse in posterior half); postmedial line indistinct, a mixture of white and fuscous; discal spots black, moderately distinct. Hindwing: pale fuscous, dark at apex and along costal margin. Male genitalia (text figure 11 *a, b*): gnathos with posterior hook of distal process slender; valva rather broad throughout its length; aedoeagus slender. Female genitalia (text figure 11 *c*): ductus bursae with large lamella antevaginalis (plate extending about 1/3 length of ductus); corpus bursae membranous; signum a cluster of small, pointed, short, partially fused spines.

The immature stages and host associations are unknown.

TYPES. Holotype: ♂, North Harlowe, Craven Co., North Carolina, June 21, 1990, J. Bolling Sullivan; genitalia slide 3286 HHN. USNM. Paratypes: 1♂, 1♀. North Carolina: same locality and collector as for holotype, Aug. 10, 1990 (♂), Oct. 8, 1990 (♀); genitalia slide 3287 HHN. NCSU, USNM.

GENUS
Zophodia Hübner

Zophodia Hübner, 1825, *Verzeichniss bekannter Schmettlinge* [sic], 370.
Type species: Hulst (1890) designated *Tinea convolutella* (Denis and Schiffermüller) sensu Hübner, 1796, as type species. However, the type is presently provisionally considered to be *Tinea grossulariella* Hübner, [1809]. Subsequent designation.

NOTE—Fletcher and Nye (1984) have shown that Hulst's designation of *Tinea convolutella* as type species was based on a misidentification by Hübner. Under Article 70b of the 3rd Edition of the International Code of Zoological Nomenclature, cases involving type species designations known to be based on misidentified specimens need to be referred to the

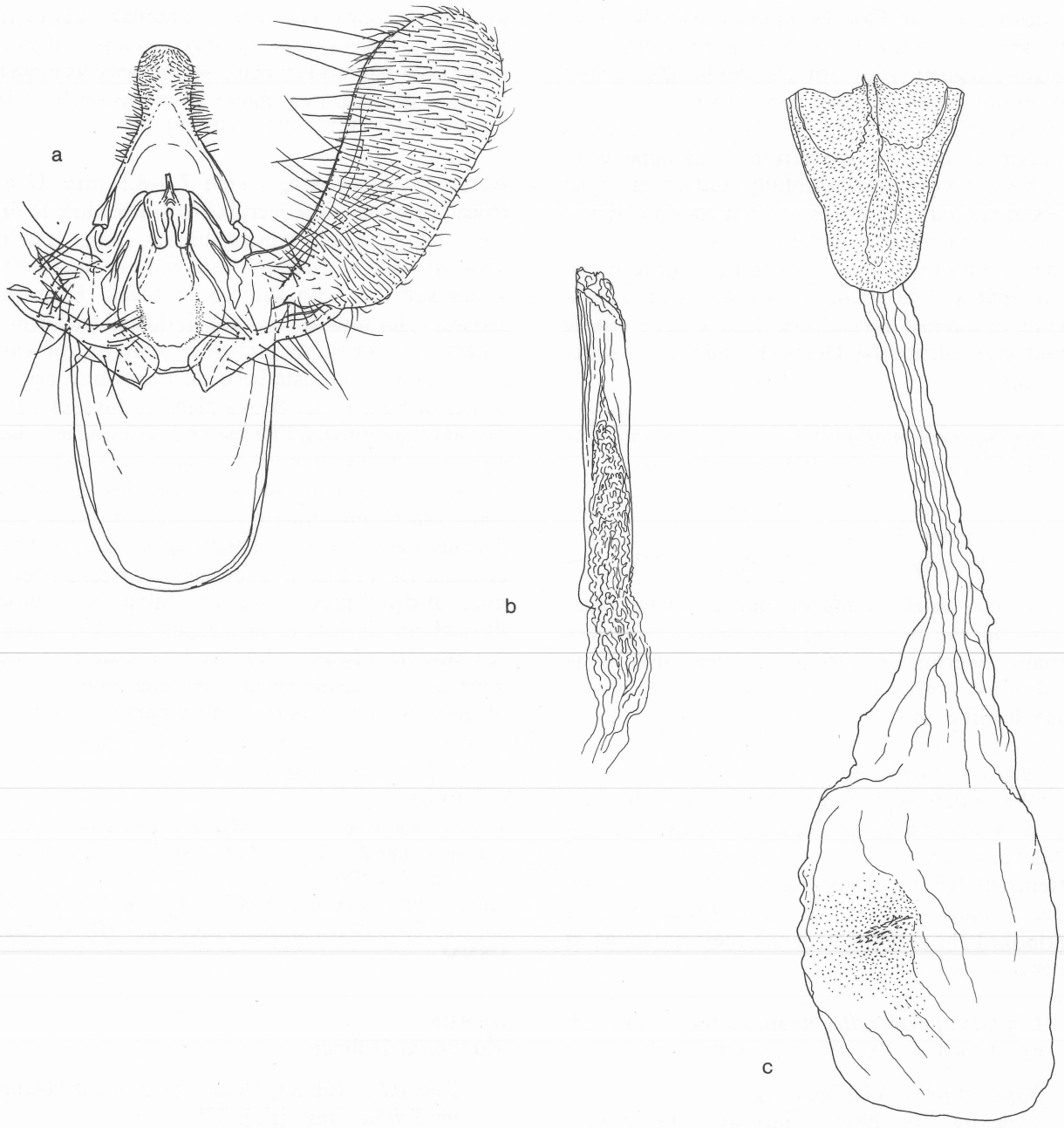

FIGURE 11: GENITALIA OF *BAPHALA PHAEOLELLA*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 3286). *b.* Aedoeagus. *c.* Corpus bursae and ductus bursae (HHN 3287).

Commission to select a type species that would insure nomenclatural stability. Fletcher and Nye in their catalog have provisionally chosen *Tinea grossulariella,* the nominal species actually involved as type species, and I have followed their designation.

Dakruma Grote, 1878, *Bull. U. S. Geol. Geog. Surv. Terr.,* **4**: 702.

Type species: *Dakruma turbatella* Grote, 1878. Monotypy.

Zophodia, along with the preceding genus, *Baphala,* and the next two genera, *Ozamia* and *Cactobrosis,* appear to be closely related on the basis of similar male and female genitalia and the form of the male antenna in which a series of clusters of scalelike

sensilla are present near the inner base of the shaft. Also, the known larvae of *Zophodia, Ozamia,* and *Cactobrosis* (larvae of *Baphala* known only superficially) have two SV setae on abdominal segments seven and eight. In general appearance, the adult of *Zophodia* is most similar to the cactus-feeders *Ozamia* and *Cactobrosis.* The following helps to separate the genera: *Zophodia* has a small, simple filiform maxillary palpus, and, in the male, except for the clusters of scalelike sensilla, the antenna is simple, whereas *Ozamia* has the maxillary palpus larger and squamous and the male antenna broadly serrate basally and with sensilla; *Cactobrosis* has the maxillary palpus like *Zophodia,* but the male antenna is pectinate or strongly serrate throughout in addition to having clusters of scalelike sensilla. The fact that *Zophodia* larvae feed on Grossulariaceae, and *Ozamia* and *Cactobrosis* utilize Cactaceae as larval food, also appears to be diagnostic. There are two species of *Zophodia: grossulariella* (Hübner) is holarctic, and *multistriatella* (Blanchard and Knudson) occurs in the southwestern United States.

Antenna of male with shallow sinus at base of shaft; six to eight clusters of dark scalelike sensilla within sinus; sensilla clusters rather closely grouped (plate B, figures 1, 2); antenna of female simple; sensilla trichodea (cilia) of antenna relatively abundant and, in male, at base of shaft, about ½ basal diameter of shaft. Frons rounded, somewhat roughly scaled. Labial palpus oblique in male, porrect in female. Maxillary palpus simple, filiform. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing of male slightly convex (text figure 12); undersurface of costal area without sex-scaling or costal fold. Forewing smooth, with 11 veins; R_{3+4} and R_5 stalked for over ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for less than ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 12) with seven veins; Sc + R_1 and Rs stalked for over ½ their lengths beyond cell; M_{2+3} and CuA_1 connate or short stalked; CuA_2 from before lower angle of cell; cell about ½ length of wing. Male abdominal segment eight with pair of weak ventrolateral scale tufts; each tuft composed of a cluster of narrow, relatively long and straight scales. Transverse, sclerotized bar associated with scale tufts. Male genitalia (text figure 13 *a, b, d*) with uncus broadly triangular, constricted in distal ⅓; apical process of gnathos bifid, large; transtilla incomplete, consisting of elongate lateral sclerites; juxta with base narrowly sclerotized, lateral arms moderately long, slender; valva simple with apex rounded; aedoeagus moderately long and robust; vinculum longer than greatest width. Female genitalia (text figure 13 *c, e*) with one or two rather large sclerotized, dorsal plates in ductus bursae dorsad of ostium bursae, and with some weak scobinations anteriorly; corpus bursae membranous, weakly scobinate, with small signum composed of plate with inwardly projecting process; ductus seminalis from corpus bursae near signum.

Last stage larva (*grossulariella*) (text figure 14) moderately stout, with weakly sclerotized and pigmented pinaculum rings at base of SD1 on the mesothorax and abdominal segment eight. Head only slightly roughened. Body with or without stripes (stripes when present not very distinct). Two SV setae on abdominal segments seven and eight. Mandible simple. Known larval hosts are members of the Grossulariaceae.

Roesler (1973) placed in synonymy under *Zophodia* most cactus-feeding genera recognized earlier by Heinrich (1939, 1956). Roesler's action appears to have been based almost entirely on similarities in the genitalia, structures that are rather simple, except for the gnathos, in all groups involved. Obvious differences in other features, particularly the antennae, and the morphology and biology of the immatures make Roesler's synonymy untenable. More detailed reasons for recognizing the genera as discrete are given under each genus involved.

KEY TO SPECIES OF *ZOPHODIA* (ADULTS)

1. Dark scales associated with antemedial line of forewing forming a slender, strongly angled line; distal lobes of gnathos only slightly constricted near middle (text figure 13 *d*); ductus bursae with sclerotized shield dorsad of ostium bursae weakly formed, with straight lateral margins and not separated into two distinct plates (text figure 13 *e*); Texas and Arizona ..... *multistriatella* p. 40

— Dark scales associated with antemedial line of forewing usually forming a broad, less angled line or patch; distal lobes of gnathos distinctly constricted near middle (text figure 13 *a*); ductus bursae with sclerotized shield dorsad of ostium bursae distinct, rounded at margins and separated into two distinct plates (text figure 13 *c*); southern Canada and northern United States ..... *grossulariella* p. 37

Zophodia grossulariella (Hübner) (Gooseberry Fruitworm*; Pyrale des Groseilles, f. Fr.)

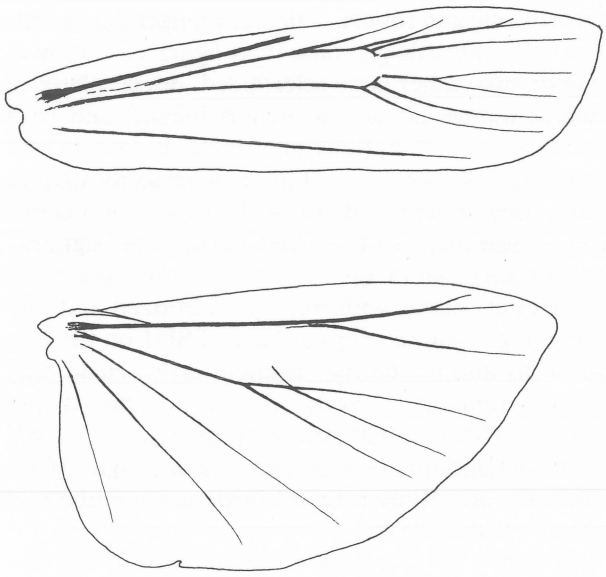

FIGURE 12: VENATION OF MALE *ZOPHODIA GROSSULARIELLA.*

PL. 2, FIGS. 1–2; PL. A, FIG. 4; PL. B, FIGS. 1, 2. TEXT FIGS. 12, 13 *a–c,* 14, 18 *a* (RWH 5968).

Tinea grossulariella Hübner, [1809], *Geschichte Europäischer Schmetterlinge,* pl. 476, figs. 2 a–c.
Type locality: Germany. [lost]

NOTE—In most of the literature on the gooseberry fruitworm this is the species referred to as *Zophodia convolutella* (Hübner). See note under generic description of *Zophodia* justifying the use of *grossulariella* rather than *convolutella.*

Zophodia grossularialis Hübner, [1825], *Verzeichniss bekannter Schmettlinge* [sic], 370.
Type locality: Germany. [lost]

NOTE—*Zophodia grossularialis* Hübner, [1825] is an unjustified emendation for *Tinea grossulariella* Hübner, [1809].

Pempelia grossulariae Riley, 1869. *First Annual Rept. noxious, beneficial and other insects of the state of Missouri,* 140.
Type locality: Missouri. [lost]

Dakruma turbatella Grote, 1878, *Bull. U. S. Geol. Geog. Surv. Terr.,* **4**: 702.
Type locality: Oldtown, Maine. [BMNH]

Euzophera franconiella Hulst, 1890, *Trans. Amer. Ent. Soc.,* **17**: 177.
Type locality: Franconia, New Hampshire. [AMNH]

Zophodia bella Hulst, 1892, *Can. Ent.,* **24**: 61.
Type locality: Massachusetts. [AMNH]

Zophodia grossulariae ihouna Dyar, 1925b, *Ins. Insc. Mens.,* **13**: 221.
Type locality: Utah. [USNM]

Zophodia grossulariae dilativitta Dyar, 1925b, *Ins. Insc. Mens.,* **13**: 222.
Type locality: ?San Diego, California. [USNM]

NOTE—I have examined the type of *Z. grossulariae dilativitta,* and I agree with Heinrich that it is *grossulariella* (*convolutella* of Heinrich). I have seen no other *grossulariella* from southern California (or elsewhere in the southern United States) and it is possible that the specimen was from a more northern locality and incorrectly labeled.

Zophodia grossulariae magnificans Dyar, 1925b, *Ins. Insc. Mens.,* **13**: 222.
Type locality: Seattle, Washington. [USNM]

The adult of *grossulariella* has the forewing fuscous dusted with white, with varying amounts of black associated with obscure, pale antemedial and postmedial lines and also forming about six, thin, incomplete longitudinal lines. The antenna of the male has clusters of scalelike sensilla on the basal segments of the shaft (plate A, figure 4; plate B, figures 1, 2). Wing length 11.0–16.0 mm.

Larvae feed on the fruit of gooseberries and currants (*Ribes* spp.), including the garden gooseberry (*Ribes uva-crispa* L. = *Ribes grossularia* L.) and black currant (*Ribes nigrum* L.) (Grossulariaceae). Last stage larva (text figure 14) 17.0–19.0 mm long. Head pale brown, darker near stemmata. Thoracic shield pale brown. Body usually green, sometimes with slightly darker longitudinal stripes. Prepupa purplish green. Most pinacula hyaline. SD1 pinaculum rings on mesothorax and eighth abdominal segment brown.

According to Heinrich (1939, 1956) and Allyson (1980), *grossulariella* has one generation each year. It overwinters in debris near its hosts. Adults first appear usually in mid-April in the United States and slightly later in southern Canada. Eggs are deposited singly in open blossoms. Small larvae feed within developing fruit. Large larvae tie several berries, and sometimes a few leaves, together with silk to form a protective enclosure in which to continue to feed in the fruit. In June and July larvae complete their development and leave the plants to form loose cases on the soil under debris. *Z. grossulariella* is usually a pest of minor economic importance, but occasionally serious local infestations occur.

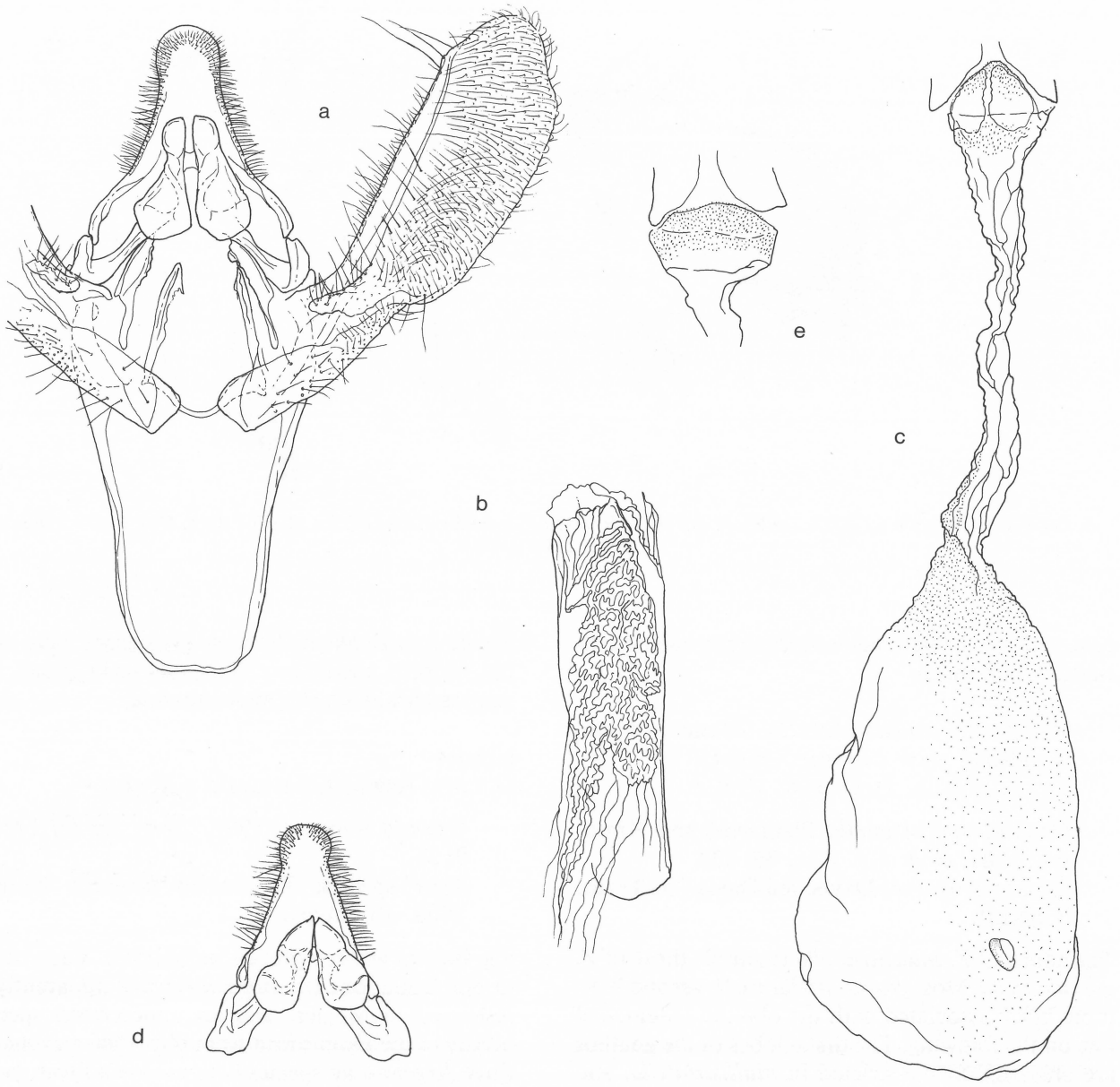

FIGURE 13: GENITALIA OF *ZOPHODIA* SPECIES

a. Z. grossulariella, male genitalia (most of left valva and aedoeagus omitted) (HHN 2418). *b.* Aedoeagus. *c.* Anterior part of collar, ductus bursae with dorsal plates, and corpus bursae (HHN 2419). *d. Z. multistriatella,* uncus and gnathos (HHN 3148). *e.* Anterior part of collar and posterior part of ductus bursae with dorsal plate (HHN 3149).

Zophodia grossulariella is generally distributed over southern Canada and the northern United States. The species also occurs in Europe (Goater, 1986; Palm, 1986; Roesler, 1973). Adults have been collected in Canada and the United States as follows: southern Québec (May, June); southern British Columbia (mid-May); northcentral New York (late April–mid-May); west central Illinois (mid-April–mid-June); central Missouri (late April); southeastern North Dakota (late May); central Utah (mid to late April); northern Idaho (mid-May–early June); northern California (early June).

Although first described in Europe, it is conceivable that *grossulariella* is an American species, and that it was taken to the Old World in nursery stock. Roesler (1973) stated that the species has no close relatives in the Palearctic Region. In the Nearctic Region, however, *Zophodia multistriatella* also oc-

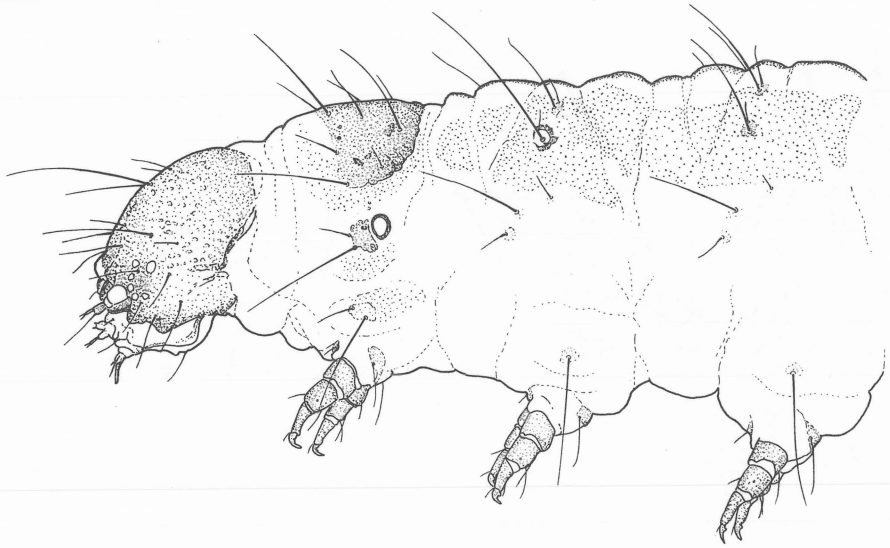

FIGURE 14: LAST STAGE LARVA OF *ZOPHODIA GROSSULARIELLA* (LATERAL VIEW OF HEAD AND THORAX).

curs, and many allied cactus-feeding genera and species are indigenous.

Zophodia multistriatella (Blanchard and Knudson), NEW COMBINATION
PL. 2, FIG. 3. TEXT FIG. 13 *d, e.*

Ozamia multistriatella Blanchard and Knudson, 1981, *Jour. Lep. Soc.,* **35**: 233.
Type locality: Fort Davis, Jeff Davis Co., Texas. [USNM]

The adults of *Z. multistriatella* resemble those of *Z. grossulariella.* Most *grossulariella* are larger and have more black associated with the obscure antemedial line on the forewing. The distal lobes of the gnathos are only slightly constricted in *multistriatella,* and the female genitalia have the sclerotized shield dorsad of the genital opening only weakly formed and not separated into two distinct plates. Wing length of *multistriatella* 10.5–12.0 mm.

The immature stages and hosts of *multistriatella* are unknown. Based on the habits of *grossulariella,* the larval host is probably *Ribes.* Wild species of *Ribes* occur in Texas and Arizona, and the fruit of one or more is (are) in all likelihood eaten by the larvae.

Zophodia multistriatella is known from western Texas and south-central and southwestern Arizona. It has been collected in March, April, and May in Texas and March and April in Arizona.

I have removed *multistriatella* from *Ozamia* and placed it in *Zophodia* because the species has a simple, filiform maxillary palpus, and lacks broad serrations basally on the male antenna.

GENUS
Ozamia Ragonot, REVISED STATUS

Ozamia Ragonot, 1901, *Mem. sur les Lépid.,* **8**: 34.
Type species: *Trachonitis lucidalis* Walker, 1863. Monotypy.

Six species are recognized in *Ozamia.* Four occur in our fauna; one (*immorella* (Dyar)) apparently is restricted to Mexico, and an undescribed species occurs in the Dominican Republic. I have excluded three Argentinian species (*stigmaferella* Dyar, *hemilutella* Dyar and *punicans* Heinrich) that Heinrich (1939, 1956) included in the genus. The South American species differ from those of North America with regard to the appearance of the male antenna and female genitalia (Heinrich, 1956: 257). The larvae of *Ozamia* are associated with cactus, feeding usually in the fruit. Features useful in separating *Ozamia* adults from other closely related cactus-feeding phycitines are discussed under *Zophodia.*

Antenna of male with base of shaft broadly serrate with associated scale tufts and shallow sinus; six to seven clusters of scalelike sensilla within sinus; each cluster composed of only a few sensilla and, in some species, well separated by bare integument (plate B,

figure 4); antenna of female simple. Sensilla trichodea (cilia) of antenna relatively abundant in male, and near base of shaft length of sensilla about ½ basal diameter of shaft. Frons rounded, somewhat roughly scaled. Labial palpus obliquely ascending in male, obliquely ascending to porrect in female. Maxillary palpus squamous. Haustellum well developed. Ocellus present. Basal ⅓ of costa of forewing of male slightly convex to straight (text figure 15 *a*); undersurface of costal area without fold or sex-scaling. Forewing smooth, without transverse ridge or tufts of scaling; with 11 veins; R_{3+4} and R_5 stalked for over ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for less than ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 15 *a*) with seven veins; Sc + R_1 and Rs fused for about ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for slightly less than ½ their lengths; CuA_2 from well before lower angle of cell; cell slightly less than ½ length of wing. Male abdominal segment eight with pair of ventrolateral scale tufts; male genitalia (text figure 15 *b, c*) with uncus subtriangular, somewhat elongate, constricted near middle or distal ⅓; apical process of gnathos small to moderately large, bifid; transtilla incomplete; juxta U-shaped with well-developed, rather narrow lateral arms; valva simple with apex oblique; aedoeagus moderately stout and simple; vinculum distinctly longer than greatest width. Female genitalia (text figure 15 *d*) with ductus bursae and corpus bursae membranous; ductus bursae long or moderately long, scobinate near corpus bursae; signum present and weakly sclerotized and, usually an elongate fused cluster of thornlike spines or absent (*lucidalis*); corpus bursae in part minutely scobinate; ductus seminalis attached to corpus bursae near signum.

Last stage larvae dark gray, pink to reddish or purplish black, without transverse bands or enlarged and heavily pigmented pinacula. Two SV setae on abdominal segments seven and eight. Mandible simple.

Hosts are members of the genera *Opuntia* and *Cereus* (Cactaceae).

Despite Roesler's (1973) placement of *Ozamia* as a synonym of *Zophodia,* I consider the genera to be discrete, for the following reasons: 1. *Ozamia* has the male antenna broadly serrate basally, whereas, *Zophodia* has the male antenna narrow basally; 2. the maxillary palpus of *Ozamia* is rather large and squamous, whereas, the maxillary palpus of *Zophodia* is small and filiform; 3. the male genitalia of *Ozamia* are overall distinctly more slender than those of *Zophodia*; 4. larvae of *Ozamia* feed on Cactaceae, whereas, larvae of *Zophodia* are associated with Grossulariaceae.

KEY TO SPECIES OF *OZAMIA*

1. Forewing mostly fuscous overall, *or* with large patches of reddish brown (plate 2, figures 4, 7) 2
— Forewing paler, without large, reddish-brown patches (plate 2, figures 5, 6) 3

2. Forewing mostly fuscous overall (plate 2, figure 4) ..... *thalassophila* p. 42
— Forewing distinctly white near costa and with large patches of fuscous and reddish brown (plate 2, figure 7) ..... *lucidalis* p. 41

3. Forewing with area adjacent to posterior margin suffused with pale greenish gray (plate 2, figure 5) (green most apparent in recently killed specimens); southeastern Texas ..... *clarefacta* p. 42
— Forewing with area adjacent to posterior margin without greenish-gray suffusions (plate 2, figure 6); California ..... *fuscomaculella* p. 42

Ozamia lucidalis (Walker)

PL. 2, FIG. 7.

Trachonitis lucidalis Walker, 1863, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum,* **27**: 39.
Type locality: Santo Domingo, Dominican Republic. [BMNH]

Ozamia lucidalis has reddish-brown patches on the posterior half of the forewing (The female has more reddish brown than the male.). Furthermore, the female does not have a signum in the corpus bursae. Heinrich (1956: figures 556, 1042) illustrated the genitalia of both sexes. *O. lucidalis* occurs chiefly on islands in the Caribbean, including Cuba, Hispaniola, Jamaica, and Puerto Rico. In 1990, Habeck and Bennett reported the species from southern Florida. Wing length of *lucidalis* 9.5–11.0 mm.

In Florida, the larvae have been collected from *Cereus* spp. Mann (1969) stated that the prickly-pears, *Opuntia* (*Opuntia*) *spinosissima* (Martyn) P. Miller and *Opuntia* (*Opuntia*) *Dillenii* (Ker-Gawler) Haworth are hosts in the Caribbean. Larvae are white

to dark gray. They lack any large dark spots or transverse bands.

Ozamia lucidalis appears to be multivoltine. In southern Florida, adults have been reared from immatures in early January, and adults have been caught in light traps in mid-June.

Ozamia thalassophila Dyar
PL. 2, FIG. 4 (RWH 5988).

Ozamia thalassophila Dyar, 1925a, *Ins. Insc. Mens.*, **13**: 15.
Type locality: Oceanside, California. [USNM]

Ozamia thalassophila is known only from the female type. The moth is similar in general appearance to *clarefacta* and *fuscomaculella* but darker. Wing length of *thalassophila* is 12.0 mm.

The type was supposedly reared in August from cholla (*Opuntia* (*Cylindropuntia*) (Heinrich, 1956); no other species of *Ozamia* have been reared from cholla. There is a distinct possiblity that the name *thalassophila* merely represents a dark, abnormally reared form of *fuscomaculella.*

Ozamia fuscomaculella (Wright)
PL. 2, FIG. 6 (RWH 5987).

Euzophera fuscomaculella Wright, 1916, *Ent. News,* **27**: 27.
Type locality: San Diego, California. [SDNH]

Ozamia heliophila Dyar, 1925b, *Ins. Insc. Mens.*, **13**: 222.
Type locality: Los Angeles, California. [USNM]

Ozamia fuscomaculella and the next species, *O. clarefacta* Dyar, are nearly identical in appearance. However, *fuscomaculella* lacks the greenish-gray, somewhat obscure, suffusion on the thorax and near the posterior margin of the forewing. *O. fuscomaculella* occurs in southern California; *clarefacta* is a southeastern Texas and eastern Mexican species. Wing length of *fuscomaculella* is 10.5–12.0 mm.

The immature stages have not been described.

The larval host is prickly-pear (*Opuntia* (*Opuntia*) *littoralis* (Engelmann) Cockerell). The flowers and fruit are eaten.

Ozamia fuscomaculella is restricted to coastal California in the vicinity of Los Angeles and San Diego, and including San Clemente, Santa Catalina and Santa Cruz Islands. Flight occurs as follows: Orange Co. (October); San Clemente Island, Los Angeles Co. (April, August, November, December); Santa Catalina Island, Los Angeles Co. (March, May, September, October, November); Santa Cruz Island, Santa Barbara Co. (May, August, September).

Ozamia clarefacta Dyar, REVISED STATUS
PL. 2, FIG. 5; PL. B, FIGS. 3, 4. TEXT FIGS. 15 *a–d*; 16 *a, b* (RWH 5987a).

Ozamia clarefacta Dyar, 1919, *Ins. Insc. Mens.*, 7: 55.
Type locality: Orizaba, Mexico. [USNM]

Ozamia clarefacta is very much like *O. fuscomaculella.* The key to species of *Ozamia,* and the diagnosis under *fuscomaculella,* give the best diagnostic features. Wing length of *clarefacta* is 10.5–11.5 mm.

Last stage larvae of the first generation are pink, reddish purple or dark reddish purple (almost black). Last stage larvae of subsequent generations are usually pink.

The larval host is Lindheimer's or Texas prickly-pear (*Opuntia* (*Opuntia*) *Lindheimeri* Engelmann var. *Lindheimeri*). Eggs are deposited singly on spicules of stems or near the base of flowers or fruit. The larvae feed exclusively on the flowers and fruits of the host. It has been determined (Mann, 1969) that there are five generations each year. Larvae of the first generation usually feed initially within the flowers, mainly boring into the style. In later instars the larvae almost always leave the flowers and crawl to the base of developing fruit where they bore into the fruit and construct a silk and frass cover over the entrance hole. Most larvae, when they complete development, leave the host and pupate in the litter or soil; a few remain in the injured fruit to pupate. The cocoons are loosely constructed and possess pink globules resembling air bubbles mixed with silk. Second generation larvae feed to some extent on late flowers of the host; however, most eat well-developed, but still green, fruit. The larvae of the third generation also occur mostly in the green fruit. Subsequent generations only have ripe fruit within which to feed.

In the United States *clarefacta* occurs in Texas, mostly along the Rio Grande River from Brownsville to Del Rio. A few moths have been taken as far north as San Antonio. In Mexico, larvae and adults have been collected in the states of Coahuila, Nuevo León, Tamaulipas, and Vera Cruz. Dates of capture of moths in the United States are as follows: Bexar Co. (September); Cameron Co. (April, May, July, August); Hidalgo Co. (March, April, May, July, August, October, November).

Heinrich (1956) considered *clarefacta* to be a "va-

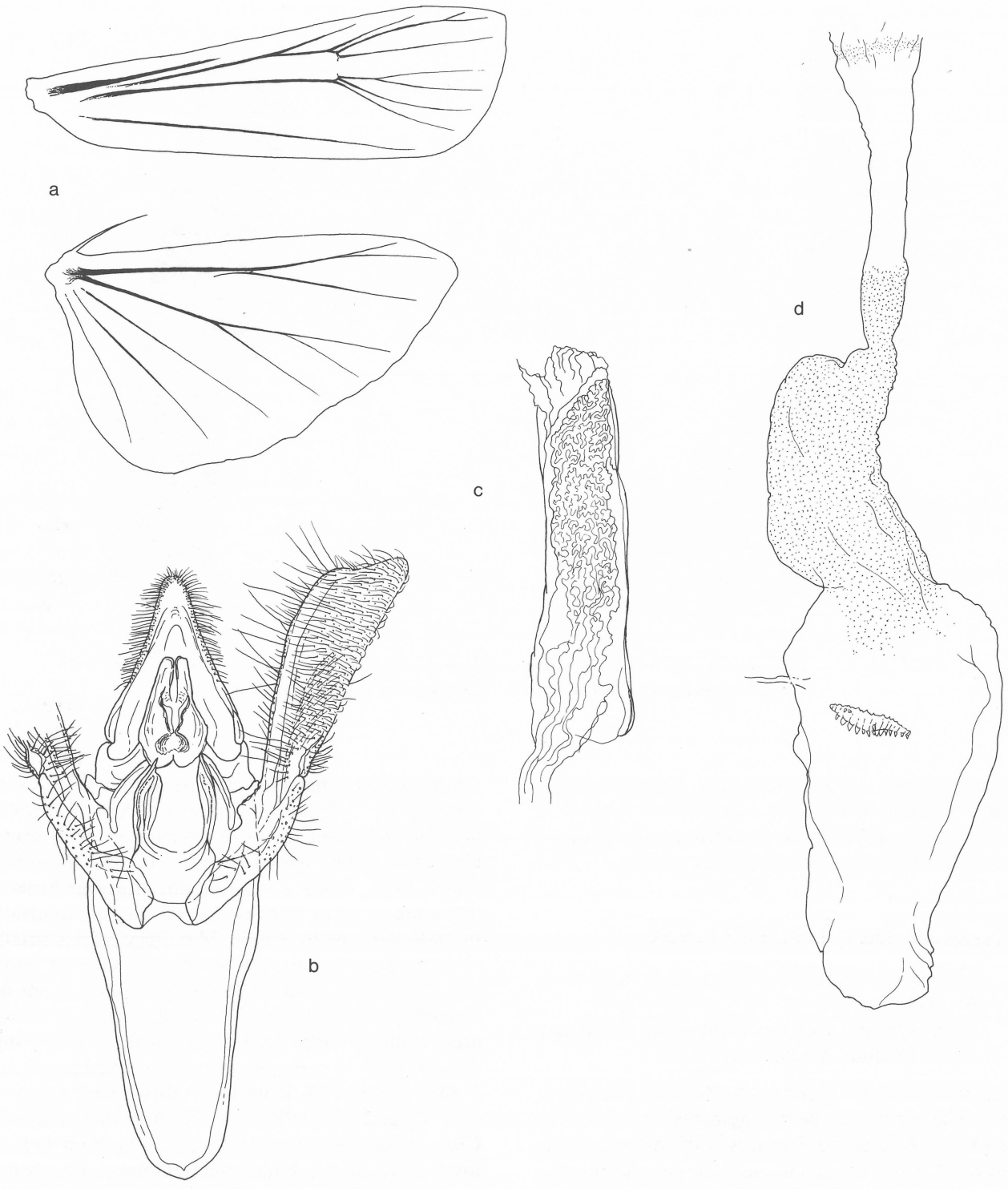

FIGURE 15: VENATION AND GENITALIA OF *OZAMIA CLAREFACTA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 2447). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3187).

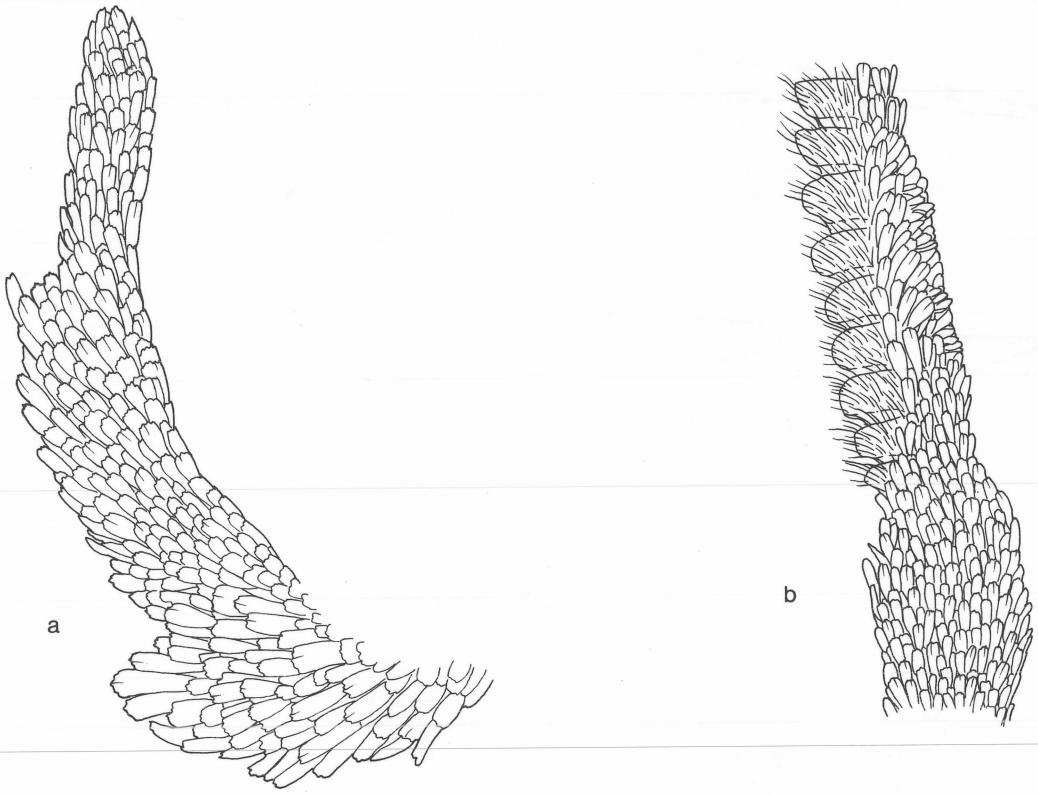

FIGURE 16: LABIAL PALPUS (LEFT SIDE) AND ANTENNA OF *OZAMIA CLAREFACTA*
a. Male labial palpus, lateral view. *b.* Male scape and basal part of shaft.

riety (or race)" of *fuscomaculella.* Although differences are slight between the southeastern Texas (and eastern Mexican) and the California populations, I have elevated *clarefacta* to species status.

GENUS
Cactobrosis Dyar, REVISED STATUS

Cactobrosis Dyar, 1914b, *Proc. U.S. Natl. Mus.*, **47**: 406.
Type species: *Moodna elongatella* Hampson, 1901. Original designation.

Cactobrosis is closely related to *Zophodia* and *Ozamia.* The genera can be distinguished from one another on the basis of differences in the male antenna, details of which are given under the generic description of *Zophodia.* The genus *Cactobrosis* is common in Mexico. Of the four nominal species, three are known from Mexico, and one occurs in Mexico and the southwestern United States.

Antenna of male bipectinate, pectinate, or strongly serrate and with very shallow basal sinus; eight to 13 clusters of scalelike sensilla, mostly within sinus; clusters discrete, well separated from each other (plate C, figure 1). Antenna of female simple. Sensilla trichodea (cilia) of antenna of both sexes abundant. Frons rounded, more or less smoothly scaled, with scales projecting anteriorly to form a low cone in some species. Labial palpus upturned in male, oblique in female. Maxillary palpus small, filiform. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing of male more or less straight (text figure 17 *a*); undersurface of costal area without costal fold or sex-scaling. Forewing smooth with 11 veins; R_{3+4} and R_5 stalked for about ⅔ their lengths; M_1 from well below upper angle of cell; M_2 and M_3 stalked for about ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 17 *a*) with seven veins; Sc + R_1 and Rs fused for about ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for about ⅓ their lengths; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight with a pair of strongly developed ventrolateral scale tufts; each tuft composed of a cluster of many, more or less straight, simple scales.

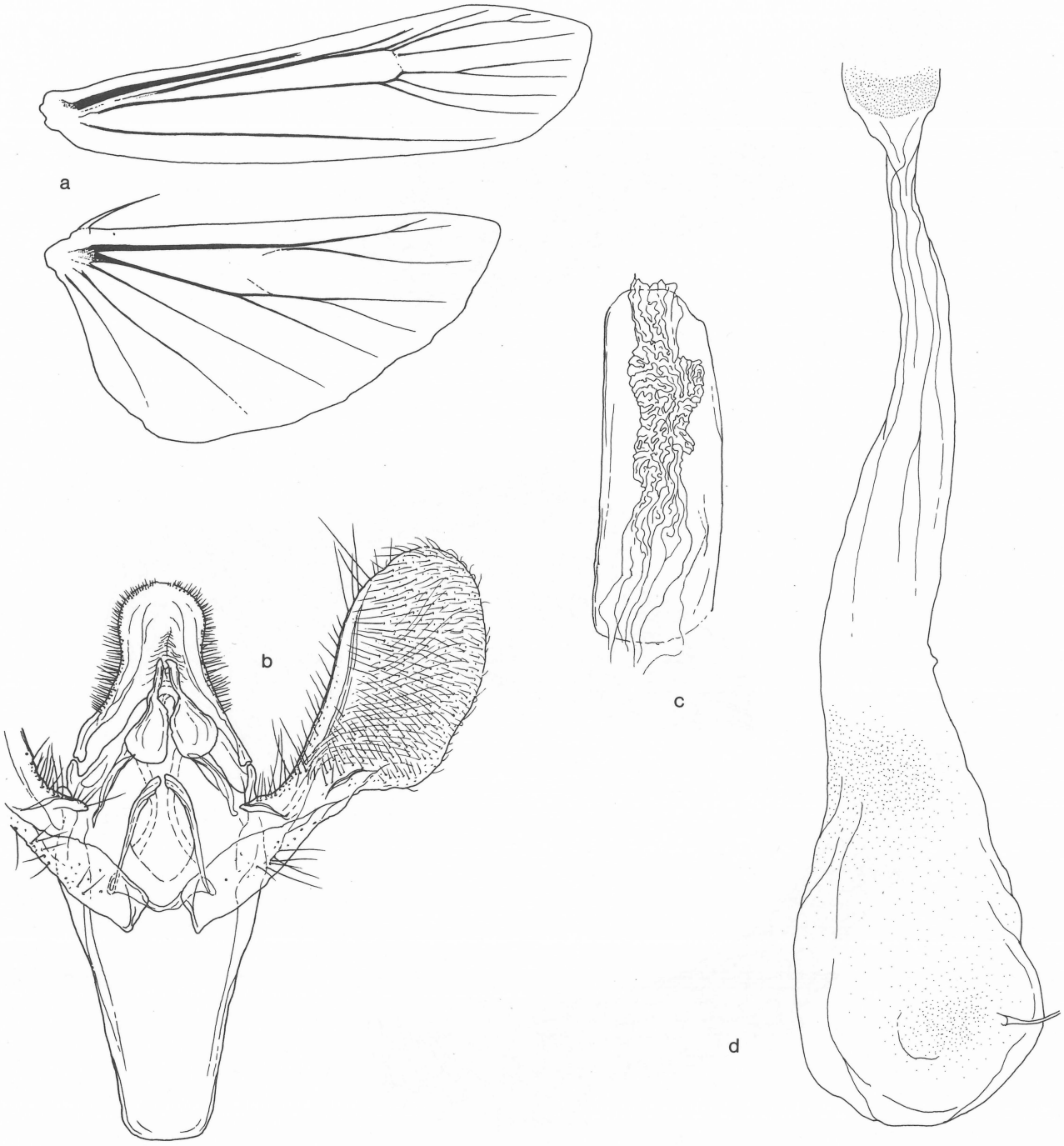

FIGURE 17: VENATION AND GENITALIA OF *CACTOBROSIS FERNALDIALIS*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 200). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3166).

Male genitalia (text figure 17 *b, c*) with uncus subtriangular, constricted near middle, broadly rounded at apex; apical process of gnathos large, bifid; transtilla incomplete; juxta with relatively long, slender, slightly twisted lateral arms; valva simple with apex evenly rounded; aedoeagus simple, stout; vinculum distinctly longer than greatest width. Female genitalia (text figure 17 *d*) with ductus bursae

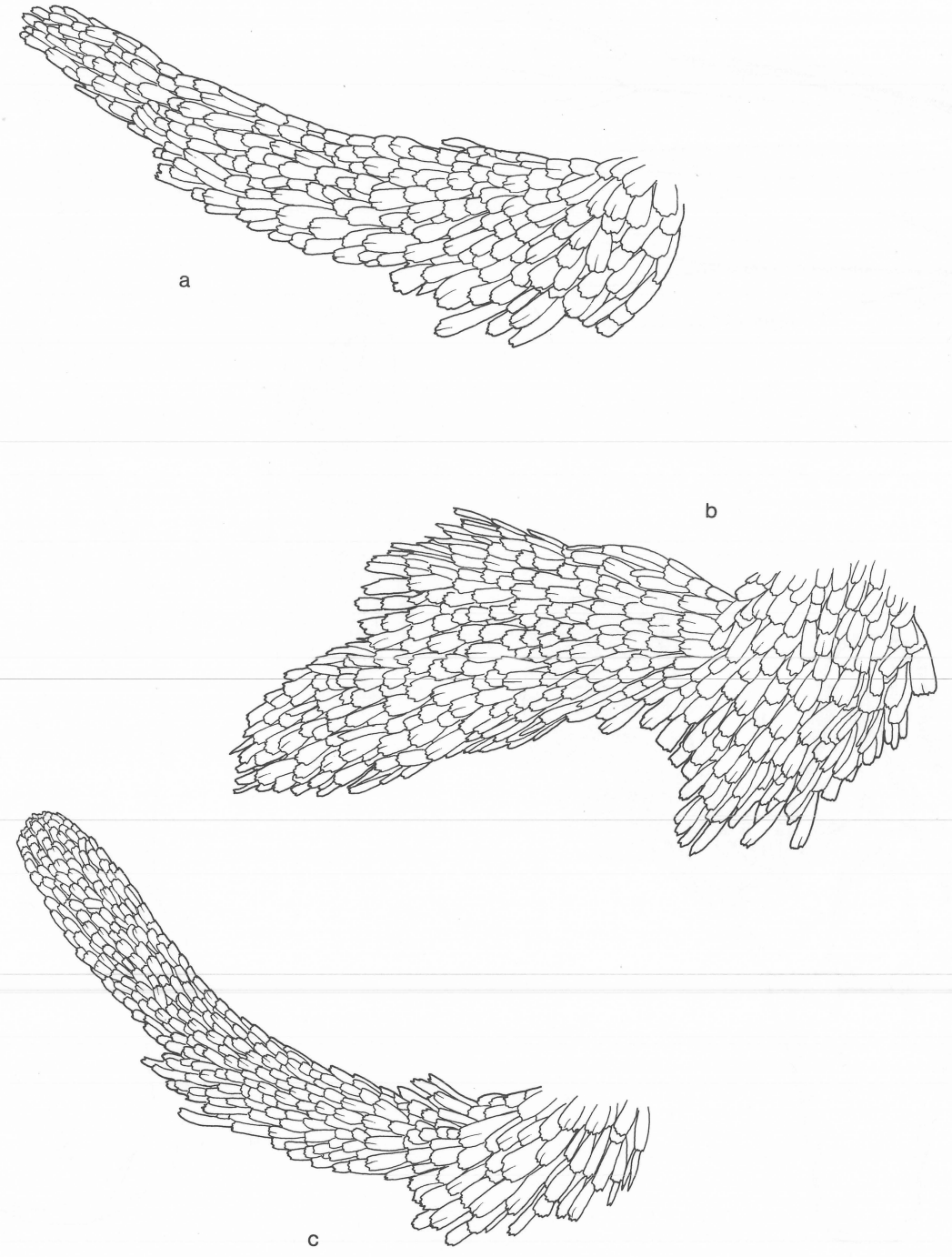

FIGURE 18: LABIAL PALPUS (LEFT SIDE) OF MALE *ZOPHODIA, MELITARA,* AND *CACTOBROSIS*
a. Zophodia grossulariella. b. Melitara prodenialis. c. Cactobrosis fernaldialis.

and corpus bursae membranous; ductus bursae long with scobinations and two small, sclerotized dorsal plates, and one ventral plate, near genital opening; corpus bursae large without signum; ductus seminalis attached to corpus bursae near anterior part of corpus bursae.

Last stage larva blue, without transverse bands or enlarged and heavily pigmented pinacula. Two SV

setae on abdominal segments seven and eight. Mandible simple.

Cactobrosis larvae have been reared from barrel cactus (*Ferocactus* spp.) (Cactaceae). Hubbard (1895) and Heinrich (1939, 1956) also mentioned saguaro (*Carnegiea gigantea* (Engelmann) Britton and Rose = *Cereus giganteus* Englemann (Cactaceae)) as a host, but these records need verification (Mann, 1969). Horse crippler or devil's head (*Echinocactus texensis* Hopffer) (as *Homalocephala texensis* (Hopffer) Britton and Rose (Cactaceae)) has also been included by Heinrich (1956) as a food plant, but this record is also questionable.

Munroe (1983) included *Cactobrosis longipennella* (Hampson) in the checklist for America north of Mexico. I have seen no specimens of *longipennella* from our fauna; this species is seemingly restricted to central Mexico. Also, Heinrich (1939, 1956), with reservations, placed *strigalis* (Barnes and McDunnough) in *Cactobrosis.* I have removed *strigalis* from *Cactobrosis* and placed it in a new genus.

Roesler (1973) made *Cactobrosis* a junior synonym of *Zophodia.* I have not followed this arrangement for the following reasons: 1. Although the male antennae of both genera possess a cluster of scalelike sensilla in a sinus near the base of the shaft, the antennae of *Cactobrosis* are bipectinate, whereas those of *Zophodia* lack pectinations; 2. *Cactobrosis* larvae feed within the stems of cactus, those of *Zophodia* consume the fruit of gooseberries and currants.

Cactobrosis fernaldialis (Hulst)
PL. 3, FIGS. 1–4; PL. C, FIGS. 1, 2. TEXT FIGS. 17 *a–d*; 18 *c* (RWH 5989).

Megaphycis fernaldialis Hulst, 1886, *Trans. Amer. Ent. Soc.,* **13**: 163.
Type locality: Arizona. [AMNH]

Euzophera gigantella Ragonot, 1888, *Nouveaux Genres et Espèces de Phycitidae & Galleriidae,* 32.
Type locality: Mexico. [MNHP]

Honora cinerella Hulst, 1990b, *Jour. New York Ent. Soc.,* **8**: 223.
Type locality: Santa Rita Mts., Arizona. [USNM]

Cactobrosis fernaldialis is most similar to *Cactobrosis longipennella* (Hampson). The male antenna can be used to separate the two species in that the pectinations of *longipennella* are only about ½ the length of those of *fernaldialis* (see pectinations of *fernaldialis* plate C, figure 1). Also, the paired pectinations at the middle of the male antenna of *fernaldialis* are approximate, but separate, where they join the shaft, whereas those of *longipennella* share a common base that distinctly projects from the shaft.

The color and markings of *fernaldialis* are somewhat variable (plate 3, figures 1–4). Most noticeably, males frequently have a black streak, in some specimens with an associated patch of pale scales, in the midfold of the forewing; a few have the base of the forewing, to as far as the antemedial line, entirely suffused with black. Wing length 14.5–20.5 mm.

Last stage larva as in description of genus. The larval host is barrel cactus (*Ferocactus Wislizenii* (Engelmann) Britton and Rose), probably other species of *Ferocactus,* and possibly species of other genera of cactus. With *F. Wislizenii,* the larvae feed gregariously within the stems. Frass is discharged through small openings to the outside of the plant, and the infested parts become yellow externally. Pupation occurs beneath the plant or in nearby debris. There appear to be several generations each year in the southwestern United States.

Cactobrosis fernaldialis occurs in the southwestern United States (including, at times, southeastern Texas) and northern Mexico. In the United States it is known from southern Arizona (late March–August, November); southern California (April, July, August, October); southern Texas (late March, April, May, August, September, October).

GENUS
Echinocereta Neunzig, NEW GENUS

Gender: Feminine.
Type species: *Euzophera strigalis* Barnes and McDunnough, 1912.

Echinocereta is proposed for *strigalis* Barnes and McDunnough, a species placed for many years in *Cactobrosis* (Heinrich, 1939, 1956; Munroe, 1983). Heinrich (1939: 401; 1956: 262) recognized that "In a number of respects (its shorter vinculum and ductus bursae, its weak abdominal tufts, and its partially scobinate bursa copulatrix) this species fits badly into *Cactobrosis.*" I have removed it from *Cactobrosis* partially because of the reasons given by Heinrich, but more importantly because of the lack of scalelike sensilla on the male antenna, an important character state apparently overlooked by previous workers. Another feature that separates *Echinocereta* and *Cactobrosis* is a sclerotized pocket and associated setiferous lobe on the male valva of *Echin-*

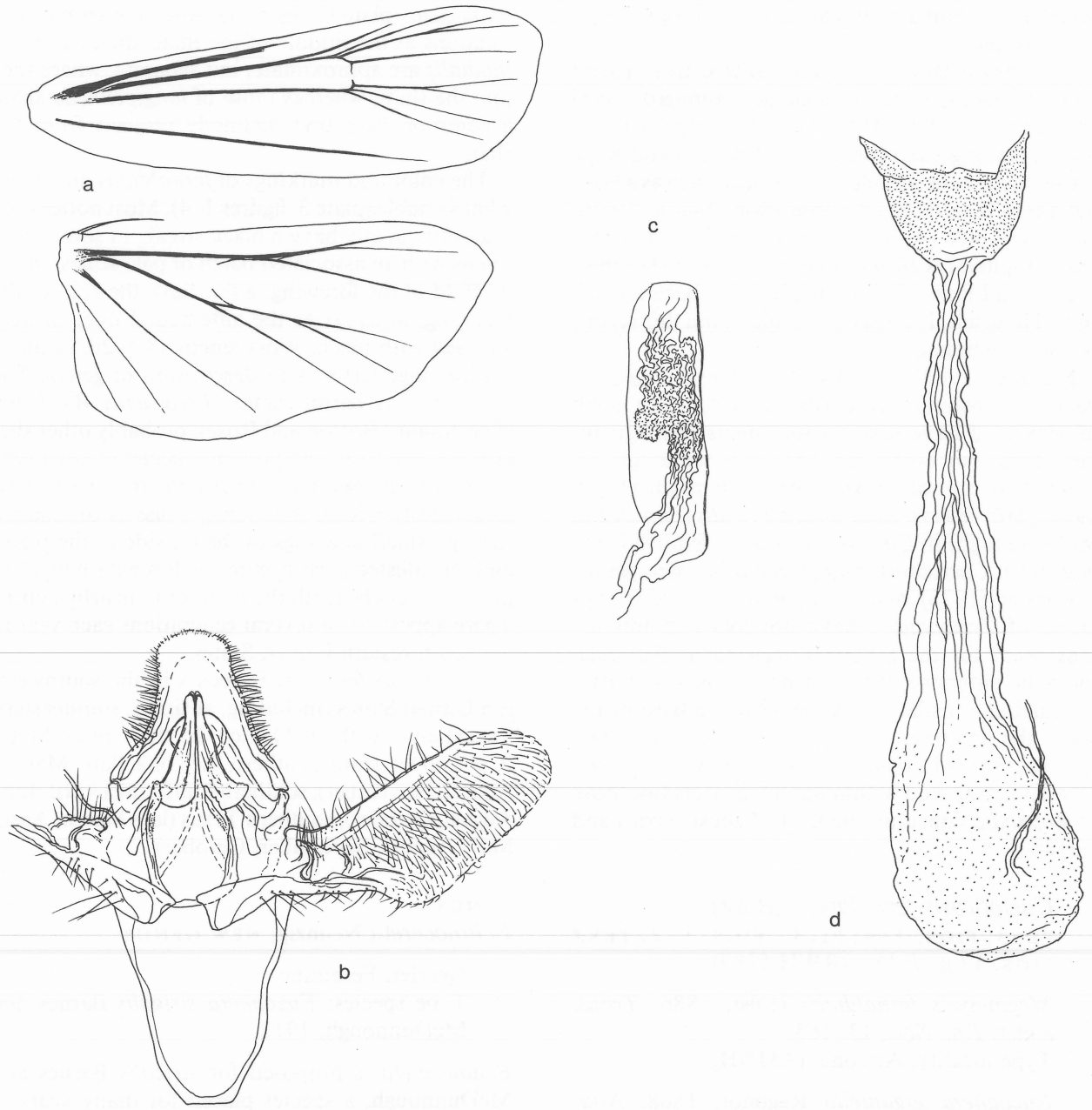

FIGURE 19: VENATION AND GENITALIA OF *ECHINOCERETA STRIGALIS*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 3144). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3145).

ocereta. Also, larvae of *Echinocereta* feed on *Echinocereus,* and larvae of *Cactobrosis* are associated with *Ferocactus* (and possibly *Cereus* and *Echinocactus*).

Antenna of male serrate with sensilla trichodea (cilia) of shaft moderately abundant (scalelike sensilla absent). Frons weakly rounded and more or less smoothly scaled (some scales projecting anteriorly). Labial palpus upturned in male, oblique to porrect in female. Maxillary palpus small, filiform. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing of male more or less straight (text figure 19 *a*); undersurface of costal area without costal fold or sex-scaling. Forewing smooth with 11 veins; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked

for about ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 19 *a*) with seven veins; Sc + R_1 and Rs fused for less than ½ their length beyond cell; M_{2+3} and CuA_1 stalked for about ⅓ their lengths; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight with ventral scale tuft and pair of ventrolateral scale tufts; tufts weakly developed, composed of relatively few, simple, more or less straight, slender scales. Male genitalia (text figure 19 *b, c*) with uncus subtriangular, constricted near middle; apical process of gnathos large, bifid; transtilla incomplete; juxta with relatively long, narrow, lateral arms; valva with inner basal sclerotized pocket and setiferous lobe and with apex evenly rounded; aedoeagus robust; vinculum slightly longer than greatest width. Female genitalia (text figure 19 *d*) with ductus bursae mostly membranous, inflated and slightly sclerotized near genital opening; corpus bursae membranous with few scobinations, without signum; ductus seminalis attached to corpus bursae near anterior part of bursae.

Last stage larvae are blue. Larval host is hedgehog cactus (*Echinocereus*) (Cactaceae).

Echinocereta strigalis (Barnes and McDunnough), NEW COMBINATION
PL. 3, FIGS. 6, 7. TEXT FIGS. 19 *a–d*; 20 *a* (RWH 5991).

Euzophera strigalis Barnes and McDunnough, 1912, *Can. Ent.*, **44**: 127.
Type locality: Eureka, Utah. [USNM]

Echinocereta strigalis is one of several cactus-feeding phycitines that have black longitudinal lines on the forewing. It is very similar in general appearance to *Eremberga leuconips* (Dyar). However, in *leuconips* the black longitudinal line along the lower vein of the cell is much more strongly developed than the other lines, whereas in *strigalis* the black longitudinal line along the top of the cell and vein M_1 is dominant. Wing length of *strigalis* 15.0–19.5 mm.

Echinocereta strigalis adults have been reared from larvae feeding on rainbow cactus (*Echinocereus pectinatus* (Scheidweiler) Engelmann var. *rigidissimus* (Engelmann) Engelmann ex Rümpler). The larvae are gregarious, feeding in the stems of the host. Apparently there is more than one generation each year. Pupation occurs usually in debris beneath the host.

Specimens of *strigalis* have been collected in the southwestern United States and central Mexico. Dates of capture of adults in the United States are as follows: central Utah (August, September); southern Arizona (April, July); southern California (April, July); southern Texas (March, April, June, August, September, October).

GENUS
Melitara Walker, REVISED STATUS

Melitara Walker, 1863, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum,* **27**: 136.
Type species: *Melitara prodenialis* Walker, 1863. Monotypy.

Megaphycis Grote, 1882, *Can. Ent.*, **14**: 30.
Type species: *Zophodia bollii* Zeller, 1872, considered to be a synonym of *Melitara prodenialis* Walker, 1863. Original designation.

Olycella Dyar, 1928, *Proc. Ent. Soc. Washington,* **30**: 134. NEW SYNONYMY
Type species: *Melitara junctolineella* Hulst, 1900. Designated by Heinrich, 1939. *Proc. U.S. Natl. Mus.*, **86**: 343.

Melitara can be recognized by the following features: antenna bipectinate (plate C, figure 3) in both sexes; labial palpus porrect or obliquely ascending; hindwing with veins M_{2+3} and CuA_1 usually connate (or very shortly stalked); male genitalia with uncus large, rather broad, and vinculum short, giving the genitalia an overall short and compact appearance; eggs laid in form of long "chains" or "sticks;" larvae with three SV setae on abdominal segments seven and eight. The genus occurs in southwestern Canada, the United States and northern Mexico and includes seven species.

Male antenna (plate C, figure 3) bipectinate, female antenna shortly bipectinate; sensilla trichodea (cilia) of shaft relatively abundant, slightly shorter to about twice as long as width of pectinations. Frons weakly rounded, somewhat irregularly scaled. Labial palpus of both sexes porrect (text figure 18 *b*) or obliquely ascending (text figure 30 *a*). Maxillary palpus squamous. Haustellum short. Ocellus present. Basal ⅓ of costa of forewing of male slightly convex (text figures 21 *a*; 25 *a*); undersurface of costal area without costal fold or sex-scales. Forewing smooth (a few groups of scales very slightly raised in some species), with 11 veins; R_2 from cell; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 from below upper angle of cell, slightly curved; M_2 and M_3 stalked for about ½ their lengths; CuA_1 from angle of cell. Hindwing (text figures 21 *a*; 25 *a*) with

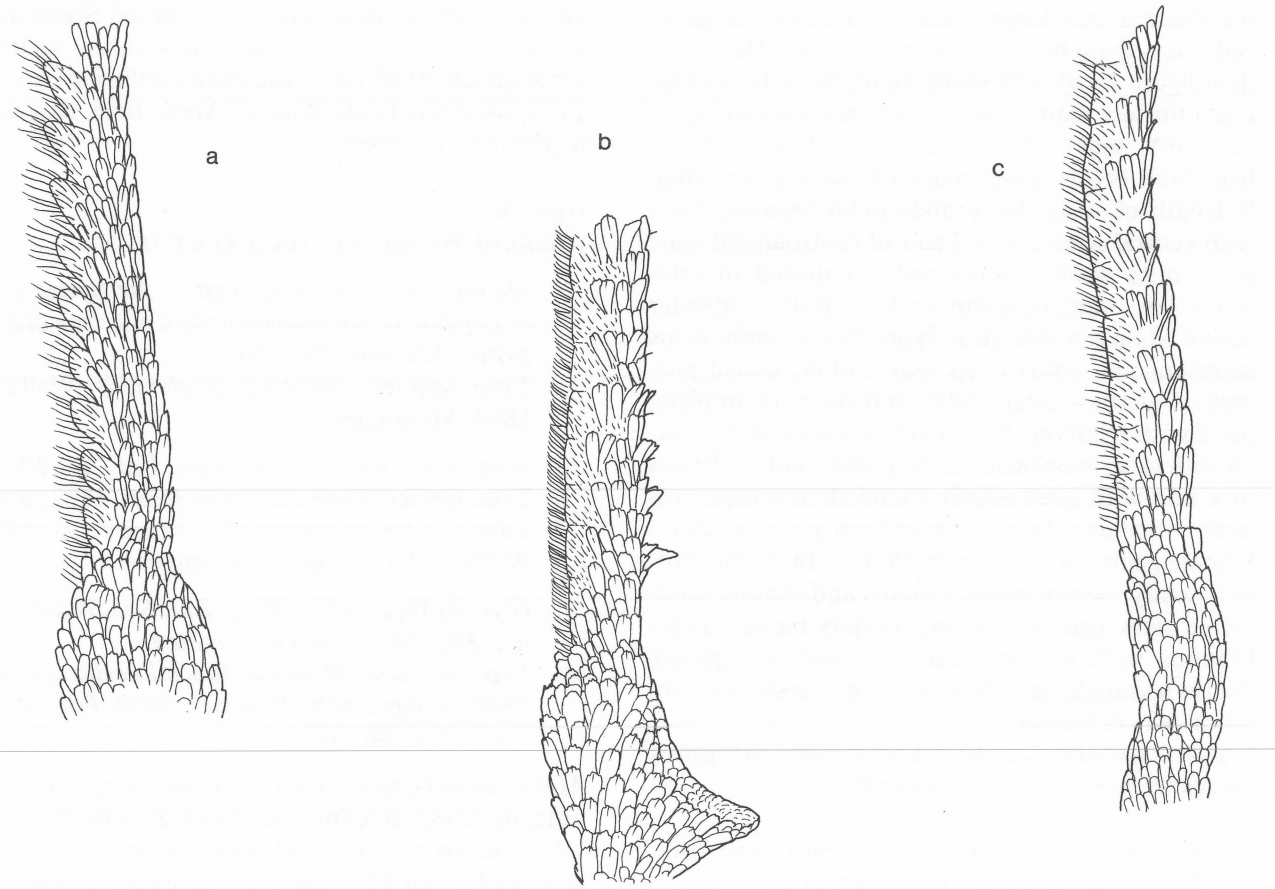

FIGURE 20: ANTENNA OF MALE *ECHINOCERETA, BEMA,* AND *CASSIANA*

a. Echinocereta strigalis, scape and basal part of shaft. *b. Bema neuricella,* scape and basal part of shaft. *c. Cassiana malacella,* scape and basal part of shaft.

seven veins; Sc + R_1 and Rs approximate, or stalked for short distance beyond cell; M_{2+3} and CuA_1 connate (occasionally very shortly stalked); CuA_2 from well before lower outer angle of cell; cell less than ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figures 21 *b, c*; 24 *a, b*; 25 *b, c*) with uncus large, subtriangular, broad, somewhat constricted near distal ⅓; gnathos with apical processes close together; transtilla incomplete; juxta with well-developed lateral arms and base narrowly sclerotized; valva simple with apex broadly rounded; aedoeagus stout, vinculum shorter than its greatest width. Female genitalia (text figures 21 *d*; 24 *c*; 25 *d*) with corpus bursae membranous; ductus bursae membranous, sometimes (*junctolineella, subumbrella*) with pair of small sclerotized plates near genital opening; signum absent or consisting of a small ridged plate (*junctolineella, subumbrella*); ductus seminalis attached to posterior half of corpus bursae.

Last stage larvae (text figure 23) (*apicigrammella* unknown) robust, with diffuse and sometimes indistinct pinaculum rings at base of SD1 on mesothorax and abdominal segment eight. Head only slightly roughened with relatively distinct tonofibrillary platelets. Body light grayish blue to blackish blue, sometimes (*junctolineella, subumbrella*) white with dark-blue, purple or bluish-black transverse dorsal bands on the caudal margins of segments. Three SV setae on abdominal segments seven and eight. Mandibles simple. Pupa robust. Thoracic spiracles present. Gibba absent. Cremastral setae relatively short, slender, hooked.

Larval host plants are prickly-pears (*Opuntia* (*Opuntia*) spp.) (Cactaceae). Most feeding is done within the stems. Eggs are laid in clusters (eggsticks) (text figure 22). Larvae are gregarious throughout their development, or some species gregarious in the early stages and solitary in late instars.

As mentioned under *Zophodia,* Roesler (1973)

synonymized *Melitara* with *Zophodia.* I have not accepted this synonymy for the following reasons: In *Melitara* (including *Olycella,* that I have kept with *Melitara* because the only features separating the two groups are slight differences in the male labial palpus, presence or absence of a signum in the corpus bursae, and in pigmentation and behavior of the larvae) the antenna of both sexes are bipectinate, the male genitalia compact, and the larva has three SV setae on abdominal segments seven and eight; *Zophodia* has a non-pectinate antenna, with, in the male, six to eight clusters of scalelike sensilla at the base of the shaft, the male genitalia are more elongate, and the larva has two SV setae on abdominal segments seven and eight. Furthermore, there are marked biological differences between *Melitara* and *Zophodia,* including oviposition behavior and host association.

KEY TO SPECIES OF *MELITARA*

1. Labial palpus of male porrect (text figure 18 *b*); corpus bursae without signum (text figures 21 *d*; 24 *c*) 2
— Labial palpus of male obliquely ascending (text figure 30 *a*); corpus bursae with signum (text figure 25 *d*) 6

2. Terminal area of forewing with series of short black, longitudinal lines (plate 2, figure 8) .. .. *apicigrammella* p. 56
— Terminal area of forewing without series of short black lines 3

3. Postmedial line of forewing shallowly angulate (plate 3, figures 8–10); eastern United States ..... *prodenialis* p. 51
— Postmedial line of forewing deeply angulate (plate 3, figures 11–16); western United States 4

4. Forewing with extensive dark-brown or black suffusions in posterior half (plate 3, figure 16) ..... *doddalis* p. 56
— Forewing without extensive dark-brown or black suffusions in posterior half (plate 3, figures 11–15) 5

5. Restricted to southern Texas (in the San Antonio—Uvalde—Rio Grande sector) and adjacent Mexico; vinculum less than ½ as long as greatest width (text figure 24 *a*); corpus bursae shorter than ductus bursae (text figure 24 *c*) ..... *texana* p. 54
— More broadly distributed, ranging from northwestern Texas and the plateau of northern Arizona northward to southeastern Alberta; vinculum about as long as greatest width; corpus bursae longer than ductus bursae ..... *dentata* p. 53

6. Forewing ochreous fuscous (plate 3, figures 17, 18) ..... *junctolineella* p. 56
— Forewing gray fuscous (plate 3, figures 19, 20, 34) ..... *subumbrella* p. 58

Melitara prodenialis Walker (Blue Cactus Caterpillar)

PL. 3, FIGS. 8–10; PL. C, FIG 3. TEXT FIGS. 18 *b*; 21 *a–d*; 22; 23 (RWH 5970).

Melitara prodenialis Walker, 1863, *List of Specimens of Lepidopterous Insects in the Collection of the British Museum,* **27**: 137.
Type locality: United States. [BMNH]

Zophodia bollii Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien,* **22**: 550.
Type locality: Texas. [?lost]

Melitara prodenialis is the cactus phycitine that occurs in the eastern United States. Wing length 14.0–21.0 mm.

Last stage larva (text figure 23) 25.0–38.0 mm long; head yellowish brown, with dark reddish brown or black near mouthparts and at stemmata, and with pale reddish-brown tonofibrillary platelets; thoracic shield mostly dark brown to black; body mostly dark blue; SD1 pinaculum ring on mesothorax brown to dark brown, somewhat diffuse; SD1 pinaculum ring on eighth abdominal segment dark brown; spiracular peritreme black. Pupa 14.0–19.0 mm long; reddish brown; six, hooked, relatively stout setae on 10th segment.

The larval host plants include: eastern prickly-pear (*Opuntia* (*Opuntia*) *humifusa* var. *ammophila* (Small) L. Benson, and *Opuntia* (*Opuntia*) *humifusa* var. *austrina* (Small) Dressler); plains prickly-pear (*Opuntia* (*Opuntia*) *macrorhiza* Engelmann var. *macrorhiza*); prickly-pear (*Opuntia* (*Opuntia*) *pusilla* (Haworth) Nuttall); southern spineless prickly-pear (*Opuntia* (*Opuntia*) *Dillenii* (Ker-Gawler) Haworth, and *Opuntia* (*Opuntia*) *stricta* (Haworth)

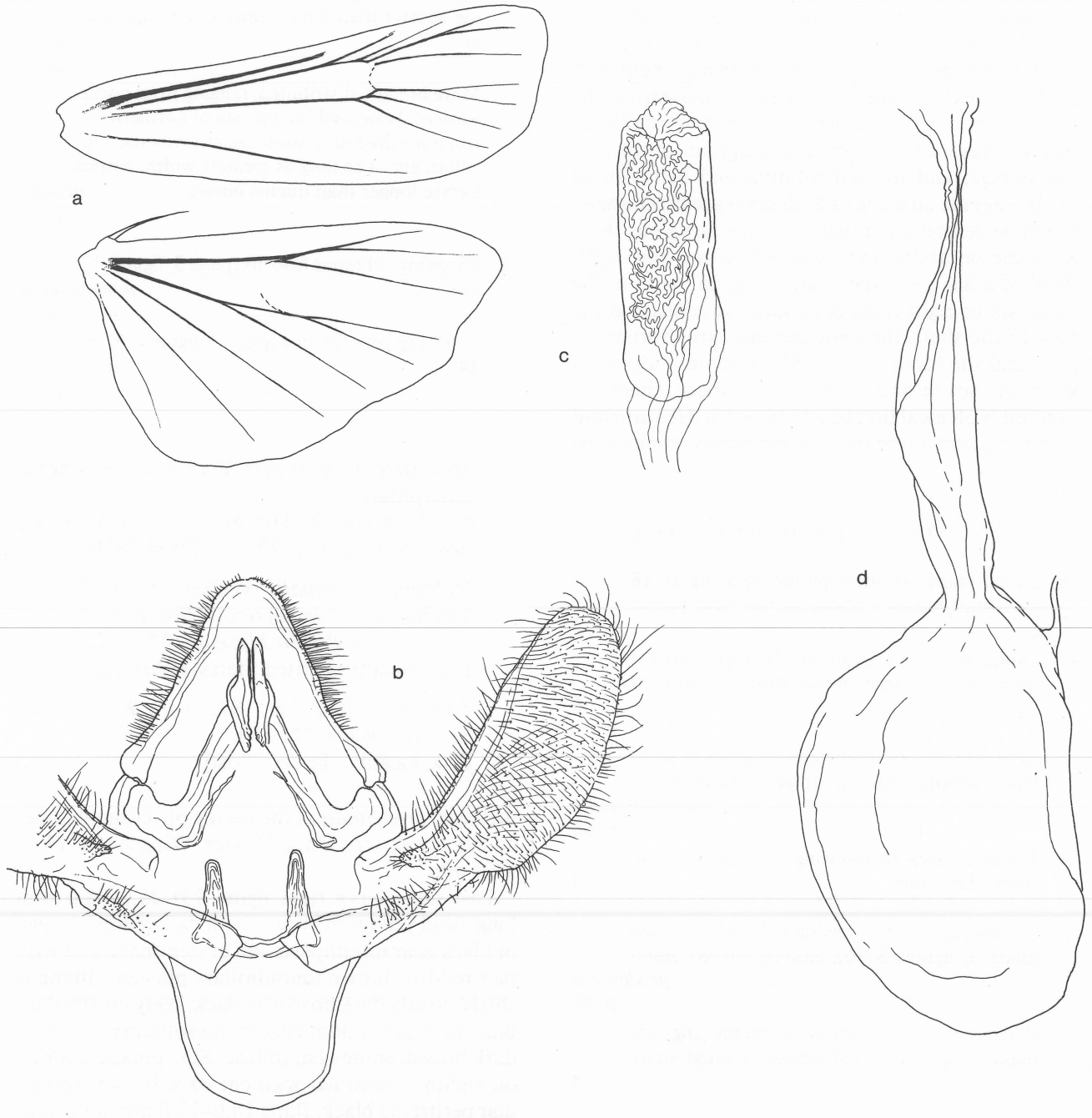

FIGURE 21: VENATION AND GENITALIA OF *MELITARA PRODENIALIS*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 2420). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2827).

Haworth var. *stricta*); Lindheimer's or Texas prickly-pear (*Opuntia* (*Opuntia*) *Lindheimeri* Engelmann var. *Lindheimeri*).

Females deposit their eggs in the form of an eggstick. The first egg laid is glued to the host and subsequent eggs are fastened to each previously laid egg in a linear fashion. The completed eggstick (text figure 22) is composed of about 30 eggs and projects in a slightly curved manner from the plant surface. An average of two eggsticks are produced by each moth. Females developing from overwintering individuals usually place their eggsticks on the floral

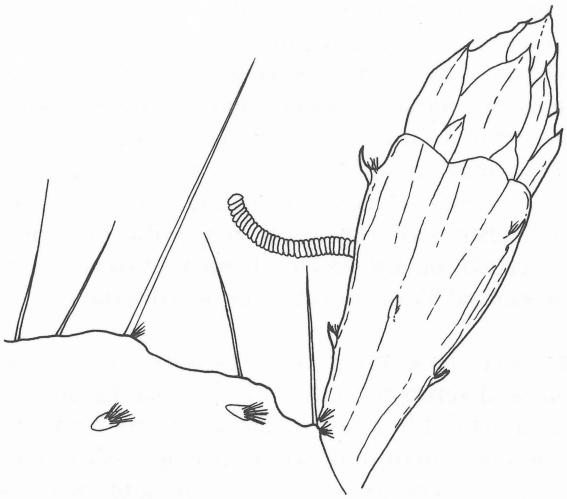

FIGURE 22: EGG STICK OF *MELITARA PRODENIALIS* ATTACHED TO BASE OF DEVELOPING CACTUS FLOWER.

tubes, or the spines of the host. Larvae upon hatching bore into the softer parts of the plant (in the spring, frequently the floral tubes). Stems are shallowly excavated as the larvae grow. The injured area becomes tan or brown externally, and small amounts of frass and silk and yellowish plant exudate are evident. Larvae remain gregarious as they grow and feed in several stems. The interior of infested stems are frequently completely eaten, and partially filled with frass. The dead tan or brown stems sharply contrast with the green living stems, and are easily detected in the field. Pupation occurs in a silken enclosure formed usually on the surface of the soil under a dead stem. It has been established that there are two generations each year over most of the range of *prodenialis* (three generations each year in Florida) (Mann, 1969).

Melitara prodenialis is most common in the southeastern coastal plain region of the United States from North Carolina to Texas. It also occurs as far north as southeastern New York (Heinrich, 1956), central and western Missouri (Heitzman and Heitzman, 1987), northern Oklahoma (Heinrich, 1956) and north-central Texas (Mann, 1969). I have seen occasional specimens from south-central Texas. Moths have been collected as follows: southeastern New York, July; southeastern New Jersey, September; eastern Delaware, July; southeastern North Carolina, May, June, September; southeastern Georgia, May; Florida, March, April, June, August, September, October; central and western Missouri, May, June, September; northern and eastern Oklahoma, June; north-central and southeastern Texas, April, May, June, August, September, October.

Melitara dentata (Grote)
PL. 3, FIGS. 11–13 (RWH 5971).

Zophodia dentata Grote, 1876, *Can. Ent.*, **8**: 158.
Type locality: Clear Creek Canyon, Colorado. [BMNH]

The strongly dentate condition of the postmedial line is a useful feature to identify the species ten-

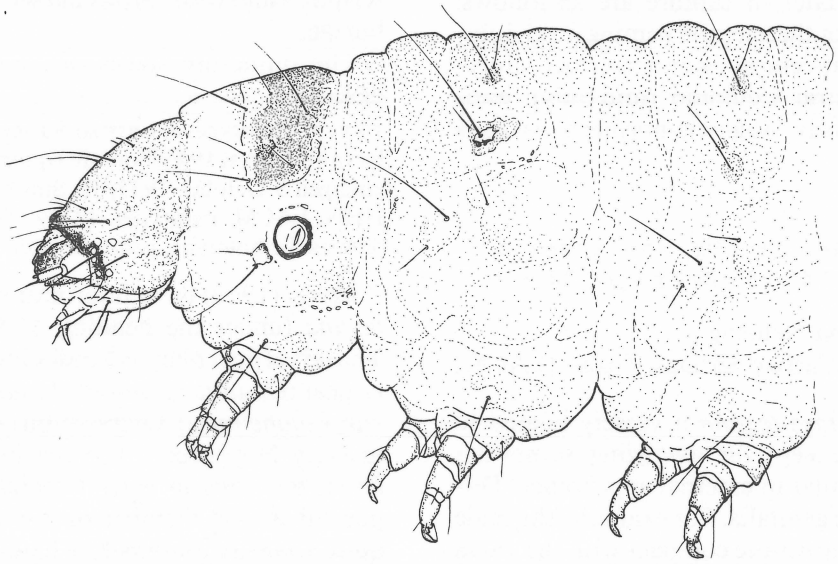

FIGURE 23: LAST STAGE LARVA (LATERAL VIEW OF HEAD AND THORAX) OF *MELITARA PRODENIALIS*.

tatively; however, *M. doddalis* and *M. texana* have similar strongly dentate postmedial lines (See key for features separating the three species.). The forewing color of *dentata* varies with some individuals appearing more gray than others (compare plate 3, figures 11 and 12 with 13). Wing length 15.0–23.0 mm.

I have not studied the morphology of the immatures of *dentata,* but based on the literature (Kellogg, 1892; Heinrich, 1939, 1956) the larva and pupa are like those of *M. prodenialis.*

The following have been recorded as larval hosts: brittle prickly-pear (*Opuntia* (*Opuntia*) *fragilis* (Nuttall) Haworth); plains prickly-pear (*Opuntia* (*Opuntia*) *macrorhiza* Engelmann var. *macrorhiza*); prickly-pear (*Opuntia* (*Opuntia*) *polyacantha* Haworth).

The oviposition behavior of the adult and the behavior of the larva are similar to that seen in *M. prodenialis* with the following differences: the egg-stick generally contains more eggs (average 35); as the larvae develop they become less gregarious and form smaller groups (it is not unusual to find only two or three last stage larvae in a damaged stem); upon completing development, the larvae travel considerable distances before pupating; the silk cases formed just prior to pupation are more robust and more densely woven.

There is one generation each year of *M. dentata,* and the species is distributed from southeastern Alberta south to the plateau of northern Arizona and the panhandle of Texas (I have seen a few specimens that appear to be this species from west-central Texas (Kerr County)). Some collection sites for adults and approximate dates of capture are as follows: northwestern and southeastern Wyoming (mid-July–mid-August); south-central Montana (early July–early August); central Colorado (mid-July); east-central Nevada (early August); northern Arizona (mid-August).

Melitara texana Neunzig, NEW SPECIES
PL. 3, FIGS. 14, 15. TEXT FIG. 24 *a–c.*

Melitara texana Neunzig.
Type locality: Carrizo Springs, Texas. [LACM]

DIAGNOSIS. *Melitara texana* is closely related to *M. dentata* and, except for averaging somewhat smaller, is very similar in external appearance. Differences exist in the genitalia. For example, the male genitalia of *texana* are more compact with the valva shorter and more rounded, and the vinculum less than ½ as long as its greatest width; in *dentata* the valva is more elongate, and the vinculum is about as long as its greatest width. Also, the corpus bursae is shorter than the ductus bursae in *texana,* whereas the corpus bursae is longer than the ductus bursae in *dentata. M. texana* has a limited distribution occurring only in southern Texas (in the San Antonio—Uvalde—Rio Grande sector) and in a similarly sized, restricted area south of the Rio Grande in Mexico. *M. dentata* occurs from southwestern and west-central Texas north as far as Alberta.

DESCRIPTION. Wing length 14.0–16.0 mm. Head: frons and vertex brownish white; labial palpus with ventral half of first two segments mostly white, rest of palpus a mixture of white, pale grayish fuscous, and black. Thorax: collar and dorsum brownish white and pale grayish fuscous interspersed with black along posterior part of dorsum. Forewing ground color pale grayish fuscous dusted with white mostly in costal half; antemedial line obscure, its position delineated by distinct black dentate line; postmedial line white, obscure, distinctly bordered proximally throughout its length by black and bordered distally by black near costa, and strongly dentate (black angulations between M_1 and M_2 reaching cell); fuscous smudge in posterior half between transverse lines; discal spots fused. Hindwing: mostly white with some fuscous shading at apex and along costal margin. Male genitalia (text figure 24 *a, b*): apical process of gnathos bifid; valva rather short and broadly rounded; aedoeagus short, simple; vinculum less than ½ as long as greatest width. Female genitalia (text figure 24 *c*): as in generic description and with corpus bursae shorter than ductus bursae.

The immature stages of *texana* have not been described.

TYPES. Holotype: ♂. Carrizo Springs, Texas, collected as larva 10 August 1945, borer in *Opuntia Lindheimeri,* adult emerged 9 October 1945, H. Smith; genitalia slide 2824 HHN. LACM. Paratypes: 1♂, 1♀. Texas: same collection data as for holotype; genitalia slide 2825 HHN. LACM.

Mann (1969) gave information on the biology of *texana* (under the heading *Melitara* Walker, sp.). The larval host plant is Lindheimer's or Texas prickly-pear (*Opuntia* (*Opuntia*) *Lindheimeri* Engelmann var. *Lindheimeri*). Oviposition occurs from October to early November. The egg incubation period is about ten days in early October, but for eggs deposited in late October or November the eggs require about a month before hatching. Newly eclosed larvae hollow out a small cell of one to two centimeters under the epidermis near the margin of a

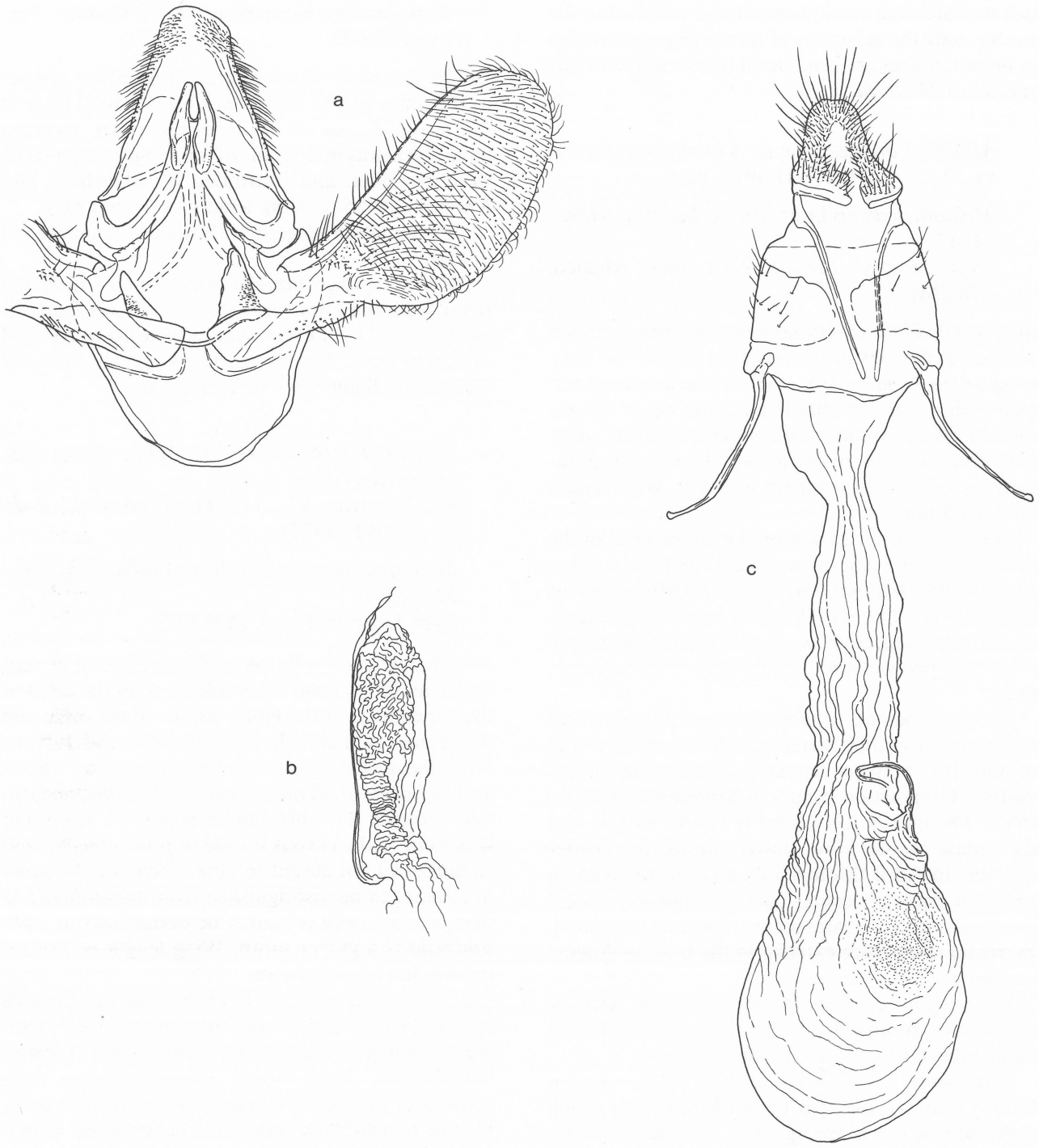

FIGURE 24: GENITALIA OF *MELITARA TEXANA*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 2824). *b.* Aedoeagus. *c.* Female genitalia (HHN 2825).

stem. Larvae remain in this cell relatively inactive and small through the winter months. In April some tunneling farther into the stem occurs, but larval growth is still slow; larvae are only about one-half grown in July. The most rapid growth occurs during the latter part of July and August. Pupation occurs in late August and September within hollow stems. Mann (1969) pointed out that the habit of small

larvae remaining semiquiescent in a cell during the winter, and the selection of larval feeding cavities as pupation sites are behavioral traits unique to this species of *Melitara.*

Melitara doddalis Dyar, REVISED STATUS
PL. 3, FIG. 16 (RWH 5971, part).

Melitara doddalis Dyar, 1925a, *Ins. Insc. Mens.*, **13**: 13.
Type locality: Mesilla Park, New Mexico. [USNM]

Melitara doddalis adults have extensive dark-brown or black suffusions in the posterior half of the forewing (plate 3, figure 16), and the black line associated with the antemedial line is missing, or weakly formed. Most common in southern Arizona, *doddalis* also occurs in southern New Mexico and southwestern Texas (and northern Mexico). Wing length 18.0–19.5 mm.

There is no information on the appearance of the immature stages. Larval host plants include: Indian-fig (*Opuntia* (*Opuntia*) *ficus-indica* (L.) Miller); plains prickly-pear (*Opuntia* (*Opuntia*) *macrorhiza* Engelmann var. *macrorhiza*; prickly-pear (*Opuntia* (*Opuntia*) *phaeacantha* Engelmann var. *phaeacantha*).

Melitara doddalis inhabits some of the more arid regions of the United States and Mexico with rainfall of only 10–15 inches annually. The species is univoltine. Oviposition occurs in September and October. The incubation period is 12 to 19 days, and the young larvae grow slowly during the winter months. In April through July most of the feeding and host damage occurs. Larvae frequently tunnel downward into the basal segments killing the plants. Pupation takes place exterior to the host, in August and September.

Moth flight occurs as follows: southern Arizona (September to early October); southern New Mexico (September); western Texas (September).

Large series of *Melitara* collected in the western United States show that the dark-brown or black suffusions of the forewing are a consistent feature of some populations. I have, therefore, removed *doddalis* from synonymy with *dentata.*

Melitara apicigrammella Blanchard and Knudson
PL. 2, FIG. 8.

Melitara apicigrammella Blanchard and Knudson, 1985a, *Proc. Ent. Soc. Washington,* **87**: 233.
Type locality: Sanderson, Terrell County, Texas. [USNM]

Adults are easily distinguished from other species in the genus by the short black longitudinal lines in the terminal area of the forewing; other *Melitara* have black dots in this part of the wing. The genitalia were described and illustrated by Blanchard and Knudson (1985a). Wing length 14.0–16.0 mm.

The immature stages and hosts of the larvae are unknown.

Melitara apicigrammella is known only from Big Bend National Park, Brewster Co., Texas, and adjacent Terrell Co., Texas. Adults have been collected at light in April, May, June, and August in Brewster Co., and in September in Terrell Co.

Melitara junctolineella Hulst, REVISED COMBINATION
PL. 3, FIGS. 17, 18. TEXT FIGS. 25 *a–d*; 30 *a* (RWH 5972).

Melitara junctolineella Hulst, 1900a, *Can. Ent.*, **32**: 173.
Type locality: Texas. [AMNH]

Melitara junctolineella and *subumbrella* can be separated as adults from other *Melitara* on the basis of the appearance of the labial palpus of the male and the female genitalia. In *junctolineella* and *subumbrella* the male palpus is obliquely ascending, whereas in *prodenialis, dentata, texana, doddalis,* and *apicigrammella* the labial palpus is porrect. A signum is present in the corpus bursae of *junctolineella* and *subumbrella* but absent in other *Melitara. M. junctolineella* can be distinguished from *subumbrella* in that *junctolineella* is mainly ochreous fuscous; *subumbrella* is a grayer moth. Wing length of *junctolineella* is 16.0–24.0 mm.

Last stage larva 30.0–50.0 mm long; head brown to dark brown, darker near mouthparts, near stemmata and in genal region, with reddish-brown platelets; thoracic shield mostly yellowish brown, dark brown along posterior margin; body white with dark-blue or bluish-black transverse bands along dorso-posterior region of each segment; SD1 pinaculum ring on mesothorax and abdominal segment eight very weakly pigmented; peritreme of spiracle black. Pupa 14.5–20.0 mm long, similar to pupa of *prodenialis.*

Larval hosts in the United States include: blind prickly-pear (*Opuntia* (*Opuntia*) *rufida* Engelmann); plains prickly-pear (*Opuntia* (*Opuntia*) *macrorhiza* Engelmann var. *macrorhiza*); southern spineless

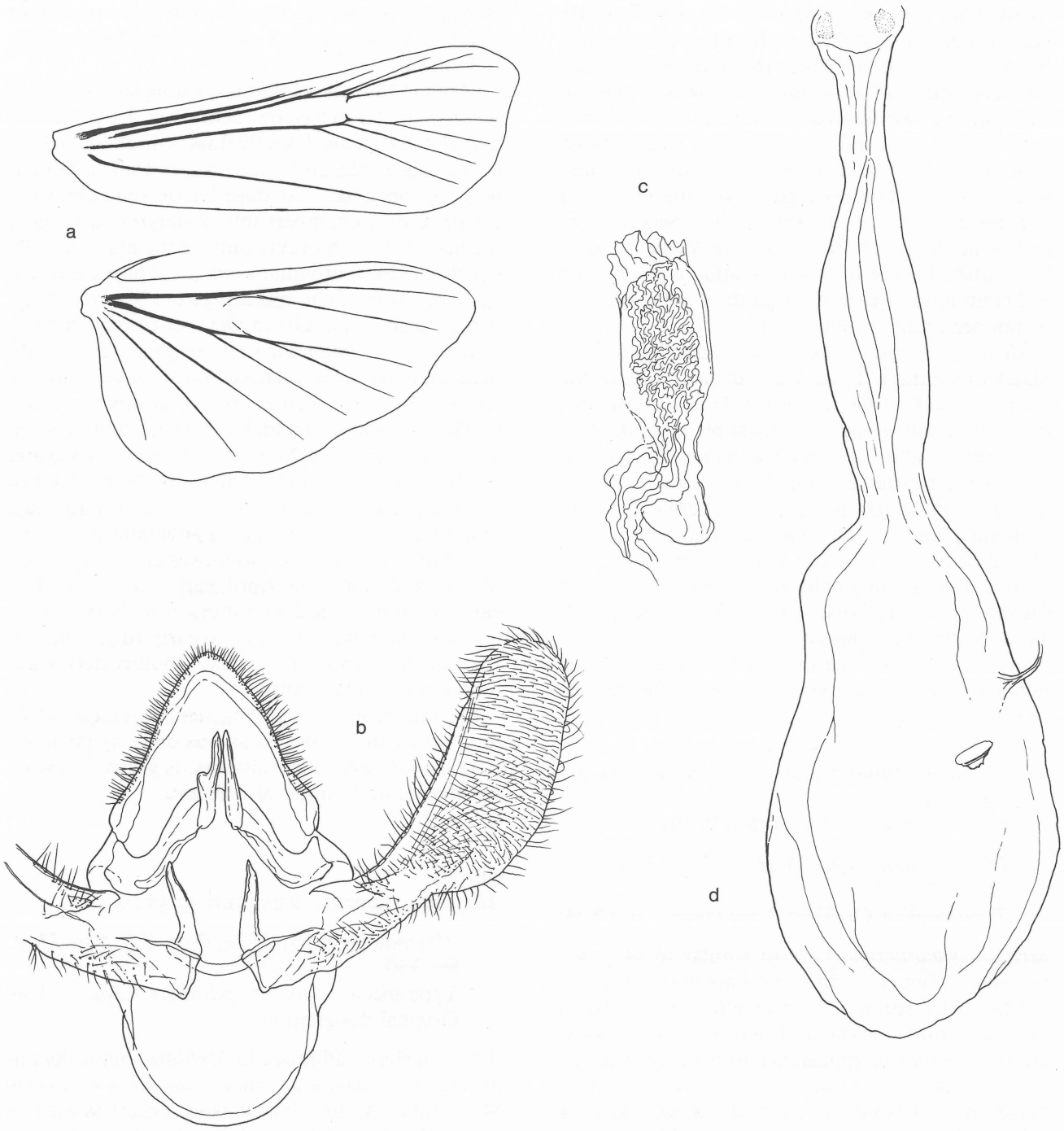

FIGURE 25: VENATION AND GENITALIA OF *MELITARA JUNCTOLINEELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 2422). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2825b).

prickly-pear *Opuntia* (*Opuntia*) *stricta* (Haworth) Haworth var. *stricta*); Lindheimer's or Texas prickly-pear *Opuntia* (*Opuntia*) *Lindheimeri* Engelmann var. *Lindheimeri. Lindheimer's* prickly-pear appears to be the most common host.

According to Mann (1969), the overwintering generation moths appear from mid-January to May, and eggsticks, usually consisting of 10–12 eggs, are attached to the spines or spicules of the host cactus. Larvae of the first generation bore into young host

stems. They feed as a group, and the stems quickly become necrotic and filled with rotting black tissue. Following this initial feeding, the larvae become solitary and attack older stems, entering near the top and boring down through the center. The entrance to the tunnel, and the tunnel itself, is usually filled with frass, and the stem swells characteristically where injured. The prepupa leaves the stem and pupates in debris on the soil surface. Second generation adults are in flight from late August to early November. Larvae of this generation actively feed and continuously grow through the winter with pupation beginning in January.

Melitara junctolineella is restricted in the United States to southern Texas from Brownsville on the Gulf coast to Presidio in western Texas. In Mexico, it occurs chiefly along the coastal plain south from the border to about Tampico, and does not seem to inhabit the central plateau. I have seen moths of *junctolineella* caught in Cameron County, Texas in mid-April, and in Cameron and Hidalgo Counties in mid-September through mid-November.

Hulst (1900a) originally placed *junctolineella* in *Melitara.* Other authors, including Heinrich in 1939 and 1956, used the binomial *Olycella junctolineella* for the species. My reasons for returning *junctolineella* to *Melitara* are given following the generic description of *Melitara.*

Melitara subumbrella (Dyar), NEW COMBINATION
PL. 3, FIGS. 19, 20, 34 (RWH 5973).

Olyca subumbrella Dyar, 1925a, *Ins. Insc. Mens.,* **13**: 14.
Type locality: Carlsbad, New Mexico. [USNM]

Melitara subumbrella is most similar to *M. junctolineella*; adult color differences are mentioned under the latter species. Wing length of *subumbrella* 17.0–24.0 mm. Larvae and pupae of *subumbrella* are very similar in appearance to those of *junctolineella.* According to Mann (1969), the transverse dorsoposterior bands on the body of the larva are pale purple in *subumbrella* rather than blue, or bluish black, as in *junctolineella.*

Larval food plants include: beavertail cactus (*Opuntia* (*Opuntia*) *basilaris* Engelmann and Bigelow); Indian-fig (*Opuntia* (*Opuntia*) *ficus-indica* (L.) Miller); plains prickly-pear (*Opuntia* (*Opuntia*) *macrorhiza* Engelmann var. *macrorhiza*); prickly-pear (*Opuntia* (*Opuntia*) *atrispina* Griffiths); prickly-pear (*Opuntia* (*Opuntia*) *phaeacantha* Engelmann); prickly-pear (*Opuntia* (*Opuntia*) *polyacantha* Haworth); purple prickly-pear (*Opuntia* (*Opuntia*) *violaceae* Engelmann var. *macrocentra* (Engelmann) L. Benson).

Mann (1969) stated that the young larvae of *subumbrella* prefer to feed on cactus fruit. Larger larvae tunnel in the stems. Usually frass is discharged from the entrance hole, and some frass and silk is evident near this opening. Last stage larvae sometimes excavate feeding chambers into underground parts of the host. Pupation occurs outside the plant, usually in debris. Most individuals remain as pupae through the winter with adults appearing from March to May. A few emerge as adults in October or November.

Melitara subumbrella is more generally distributed than its close relative *junctolineella*; in the United States the former species occurs from Nebraska, Wyoming, and Idaho in the north to western Texas, southern New Mexico, southern Arizona and southeastern California in the south. Some dates of adult capture are as follows: Colorado, late May, mid-June; Utah, mid-June; Panhandle of Texas, mid-April; central and southwestern Texas, late March, mid-April, late April, early May, mid-May, early October, mid-October, mid-November; northern Arizona, mid-June to early July; southern Arizona, late April to late May; southeastern California, mid- to late April.

My rationale for including *subumbrella* in *Melitara,* rather than *Olycella* as was done by Heinrich (1939, 1956) and other authors, is given following the generic description of *Melitara.*

GENUS
Alberada Heinrich, REVISED STATUS

Alberada Heinrich, 1939, *Proc. U.S. Natl. Mus.,* **86**: 350.
Type species: *Melitara parabates* Dyar, 1913b. Original designation.

Alberada shows affinities to *Melitara,* but differs in having simple female antennae, hindwings with veins M_{2+3} and CuA_1 distinctly stalked, a gnathos with its apical elements rather widely separated, eggs laid singly or in groups of only twos or threes, and larvae that feed in chollas. I recognize five species in the southwestern United States; most have also been collected in adjacent Mexico.

Male antenna (plate C, figure 4) bipectinate, female antenna simple; sensilla trichodea (cilia) of shaft of male relatively abundant and most about twice as long as width of pectinations. Frons rounded with most scales produced forward. Labial palpus

rather long and porrect (text figure 30 *b*), extending anteriorly about 1½ times length of head in male, and over twice the length of head in female. Maxillary palpus squamous. Haustellum short. Ocellus present. Forewing of male (text figure 26 *a*) with costa slightly concave in basal ½; without sex-scaling or costal fold. Forewing smooth scaled, with 11 veins; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for slightly less than ½ their lengths; CuA_1 from lower angle of cell. Hindwing (text figure 26 *a*) with seven veins; Sc + R_1 and Rs approximate or fused for about ½ distance beyond cell; M_{2+3} and CuA_1 stalked; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figures 26 *b, c*; 27 *a, b*; 28 *a, b*; 29 *a, b*) with uncus subtriangular, constricted near distal ⅓; apical process of gnathos a pair of well-developed lobes; transtilla incomplete, reduced to narrow lateral sclerites; juxta well developed, with relatively long lateral arms; valva simple, with apex rounded, and with ventral margin of sclerotized costal band in *parabates* distinctly bowed at about midlength; aedeoagus strongly sclerotized ventrally; vesica usually simple (armed with short spines in *candida*); vinculum rather short, about ⅔ as long as greatest width. Female genitalia (text figures 27 *c*; 28 *c*; 29 *c*) with ductus bursae membranous, wrinkled and with microspines near genital opening; corpus bursae membranous, scobinate, strongly so near signum; signum a spined plate; ductus seminalis attached just posterior to signum.

According to Mann (1969), last stage larvae are blue or greenish blue without pigmented bands. The pupae of *Alberada* have not been described.

Larval host plants are chollas (*Opuntia* (*Cylindropuntia*) spp.) (Cactaceae).

Roesler (1973) considered *Alberada* to be a junior subjective synonym of *Zophodia*. I believe that sufficient differences exist with regard to the structure of the antennae and genitalia of the adults, and host relationships of the larvae, to merit the recognition of two separate genera.

KEY TO SPECIES OF *ALBERADA*

1. Forewing and thorax mostly pale, strongly dusted with white (plate 3, figure 24); vesica with two clusters of short spines (text figure 29 *b*) ..... *candida* p. 66

— Forewing and thorax darker (plate 2, figure 9; plate 3, figures 21–23, 25–30); vesica simple (text figures 26 *c*, 27 *b*, 28 *b*) 2

2. Wing length 10.0–13.0 mm ..... *bidentella* p. 61

— Wing length 16.0–24.0 mm 3

3. Forewing contrastingly marked, with distinct dark smudge in medial area, and with postmedial line moderately dentate (plate 3, figures 28–30) ..... *franclemonti* p. 62

— Forewing with less contrast, without distinct dark smudge in medial area and with postmedial line strongly dentate (angulations between M_1 and M_2 reaching almost to cell) (plate 3, figures 21–23, 25–27) 4

4. Southwestern Texas, southern New Mexico, and southern Arizona; male valva with ventral margin of sclerotized costal band distinctly bowed at about midlength (text figure 26 *b*) ..... *parabates* p. 59

— Southwestern California; male valva with ventral margin of sclerotized costal band not distinctly bowed at about midlength (text figure 27 *a*) ..... *californiensis* p. 61

Alberada parabates (Dyar)

PL. 3, FIGS. 21–23. TEXT FIGS. 26 *a–c*; 30 *b* (RWH 5974, part).

Melitara parabates Dyar, 1913b, *Proc. U.S. Natl. Mus.*, **44**: 322.
Type locality: Cerritos, San Luis Potosí, Mexico. [USNM]

Wing length 18.0–23.0 mm. The forewing appears generally gray to fuscous, and usually has a light dusting of white in the costal region. The antemedial and postmedial lines are strongly dentate, with angulations between M_1 and M_2 reaching almost to cell. Males have the ventral margin of the sclerotized costal band of the valva distinctly bowed at about midlength (text figure 26 *b*; Heinrich, 1956: figure 533). The distal boundary of this enlarged area is usually clearly marked by a line extending to the costa. Other species in the genus lack this pronounced convexity of the sclerotized costal band of the valva. Heinrich (1939, 1956) and Mann (1969) included under *parabates* two populations described here as new species. Mann, particularly, was aware that, with some species, differences in color and maculation were correlated with geographical distribution. Features of the male genitalia, as mentioned above, as well as color and maculation dif-

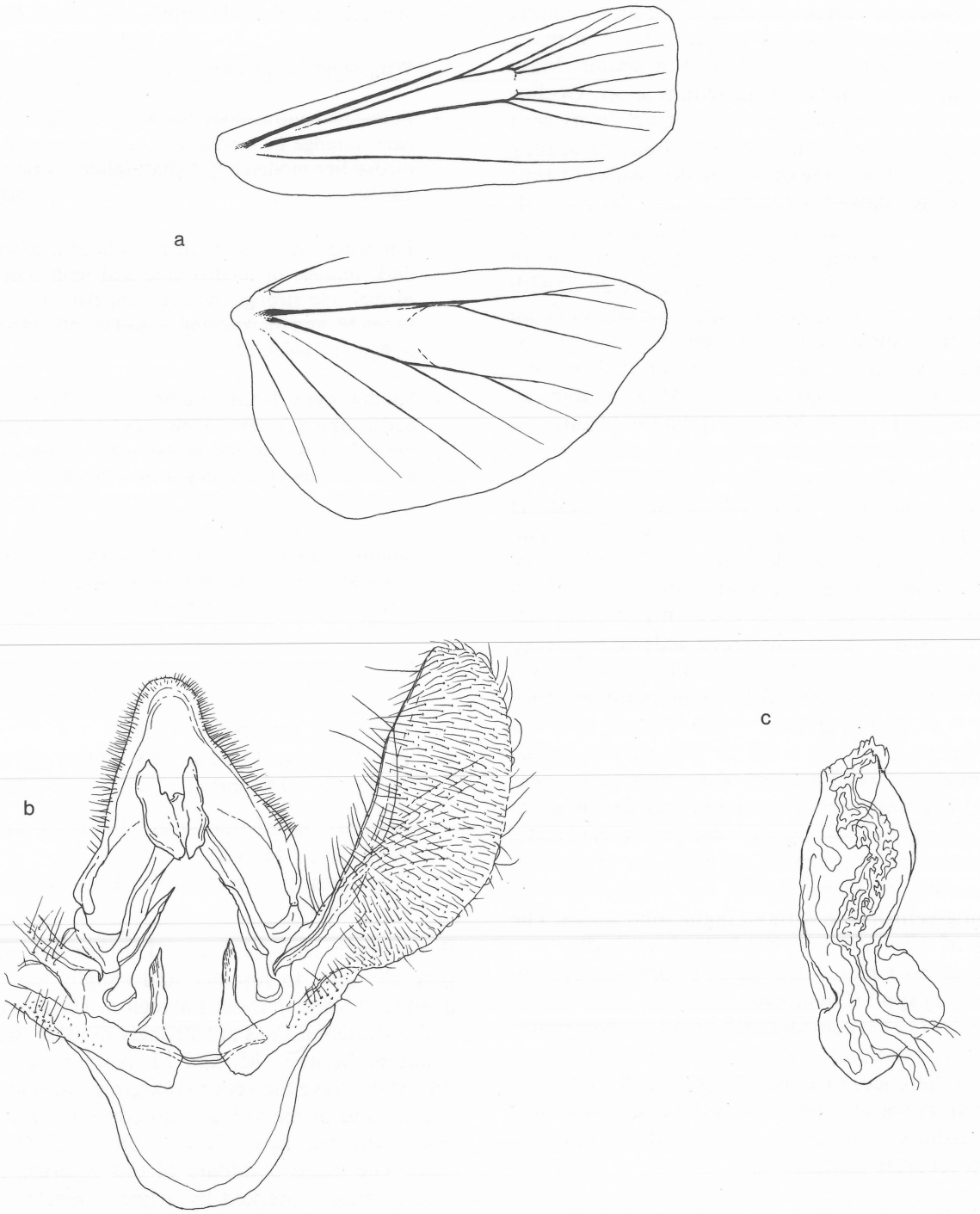

FIGURE 26: VENATION AND GENITALIA OF MALE *ALBERADA PARABATES*
a. Forewing and hindwing. *b.* Genitalia (most of left valva and aedoeagus omitted) (HHN 2145). *c.* Aedoeagus.

ferences made more evident by reference to larger series of moths, clearly point to the *parabates* of Heinrich and Mann as a complex of species.

Larvae of *parabates* are blue and have been reared from tree cholla or cayonstole (*Opuntia* (*Cylindropuntia*) *imbricata* (Haworth) de Candolle.

Adults of *parabates* have been collected in the United States in southern Arizona in May, June,

and August; in southern New Mexico in August; and in southwestern Texas in May and August.

Alberada bidentella (Dyar)
PL. 2, FIG. 9 (RWH 5975, 5976).

Zophodia bidentella Dyar, 1908, *Proc. Ent. Soc. Washington,* **10**: 114.
Type locality: San Antonio, Texas. [USNM]

Zophodia holochlora Dyar, 1925a, *Ins. Insc. Menstr.,* **13**: 15. NEW SYNONYMY
Type locality: Uvalde, Texas. [USNM]

Alberada bidentella is a rather small moth. The wing length is only 10.0–13.0 mm, averaging only slightly over ½ as large as most other *Alberada* species. The forewing has narrow dark lines associated with the antemedial and postmedial lines. The antemedial and postmedial lines are shallowly dentate.

A comparison of several series of *Alberada* recently collected in the vicinity of San Antonio and Uvalde, Texas with the types of *bidentella* and *holochlora* confirms Heinrich's (1939, 1956) suspicion that the name *holochlora* is a synonym of *bidentella.*

According to Heinrich (1939, 1956) and Mann (1969), the larvae are dark blue and are solitary in the late instars. The host plant is desert Christmas cactus (*Opuntia* (*Cylindropuntia*) *leptocaulis* de Candolle).

I have seen specimens of *bidentella* only from southern Texas. The species is in flight from June through October.

Alberada californiensis Neunzig, NEW SPECIES
PL. 3, FIGS. 25–27; PL. C, FIG 4. TEXT FIG. 27 *a–c* (RWH 5974, part).

Alberada californiensis Neunzig.
Type locality: Juniper Hills, Mojave Desert, 3600′, Los Angeles County, California. [LACM]

DIAGNOSIS. The adult of *californiensis* resembles that of *A. parabates* in size, color, and maculation. However, *californiensis* is more heavily dusted with white in the costal half of the forewing, and lacks most of the ochre or pale reddish brown in the posterior half of the wing. The male genitalia of *californiensis* differ from those of *parabates* in that in *californiensis* the ventral margin of the costal band of the valva is not distinctly bowed at about midlength. *A. californiensis* has been collected only in arid coastal and desert areas of California. It probably also occurs in Baja California, Mexico.

DESCRIPTION. Wing length 16.0–22.0 mm. Head: frons and vertex with white-tipped, pale-brown to fuscous scales; labial palpus with basal segment mostly white, other segments with a few completely white scales but mostly pale brown to black dusted with white. Thorax: collar mostly pale brown dusted with white, with a few black scales; dorsum with tegula similar to collar, and mesial area whiter. Forewing: ground color fuscous; costal half heavily dusted with white, particularly near costal margin (usually this part of wing almost pure white with some obscure, pale reddish-brown scales); antemedial line strongly dentate, white, bordered on inner and outer margins with black, except near costa, distinct in posterior half of wing; postmedial line strongly dentate, white, usually rather distinct in costal half and somewhat obscure in posterior half; medial area mostly white in costal half with obscure dark smudge on inner half; discal spots black, usually distinct. Hindwing white with costal margin and termen bordered with fuscous. Male genitalia (text figure 27 *a, b*): apical processes of gnathos slender, valva somewhat uniformly broad throughout its length with costa not distinctly broadened and bowed; juxta with lateral arms slender; aedoeagus relatively straight, sclerotized ventrally, vesica simple; vinculum about ⅔ as long as greatest width. Female genitalia (text figure 27 *c*) as in generic description.

Alberada californiensis has been previously confused with *A. parabates*; thus, no information in the literature on the appearance of the immature stages can be solely attributed to *californiensis.* However, in America north of Mexico, because *californiensis* appears to be restricted to coastal and desert areas of California, where only two species of chollas occur, the host plant relationships can be established with relative certainty. Mann (1969) included coastal cholla (*Opuntia* (*Cylindropuntia*) *prolifera* Engelmann) as a host of *Alberada* in coastal California, and, based on the distribution of collected adults of *californiensis,* the larvae possibly also use cane cholla (*Opuntia* (*Cylindropuntia*) *Parryi* Engelmann) as a host. Mann mentioned that with coastal cholla, larval feeding within the terminal segment of the host results in a swelling of that segment.

TYPES. Holotype: ♂. Juniper Hills, Mojave Desert, 3,600′, Los Angeles Co., California, 10-3-61, Chris Henne; genitalia slide 2656 HHN. LACM. Paratypes: 11♂, 5♀. California: Juniper Hills, Mojave Desert, Los Angeles Co., el. 3500′, VI-4-1972, C. Henne (1♀). San Jacinto Mts., Pinyon Flat, Riverside Co., July 14, 1970, J.W. Johnson; genitalia slide 3594 HHN (1♂). Juniper Hills, 3500 ft., 2 mi S. Pearblossom, Los Angeles Co., VII-29-1967, C. Henne; genitalia slide 3160 HHN (1♀). Sierra Pelona Valley, LA

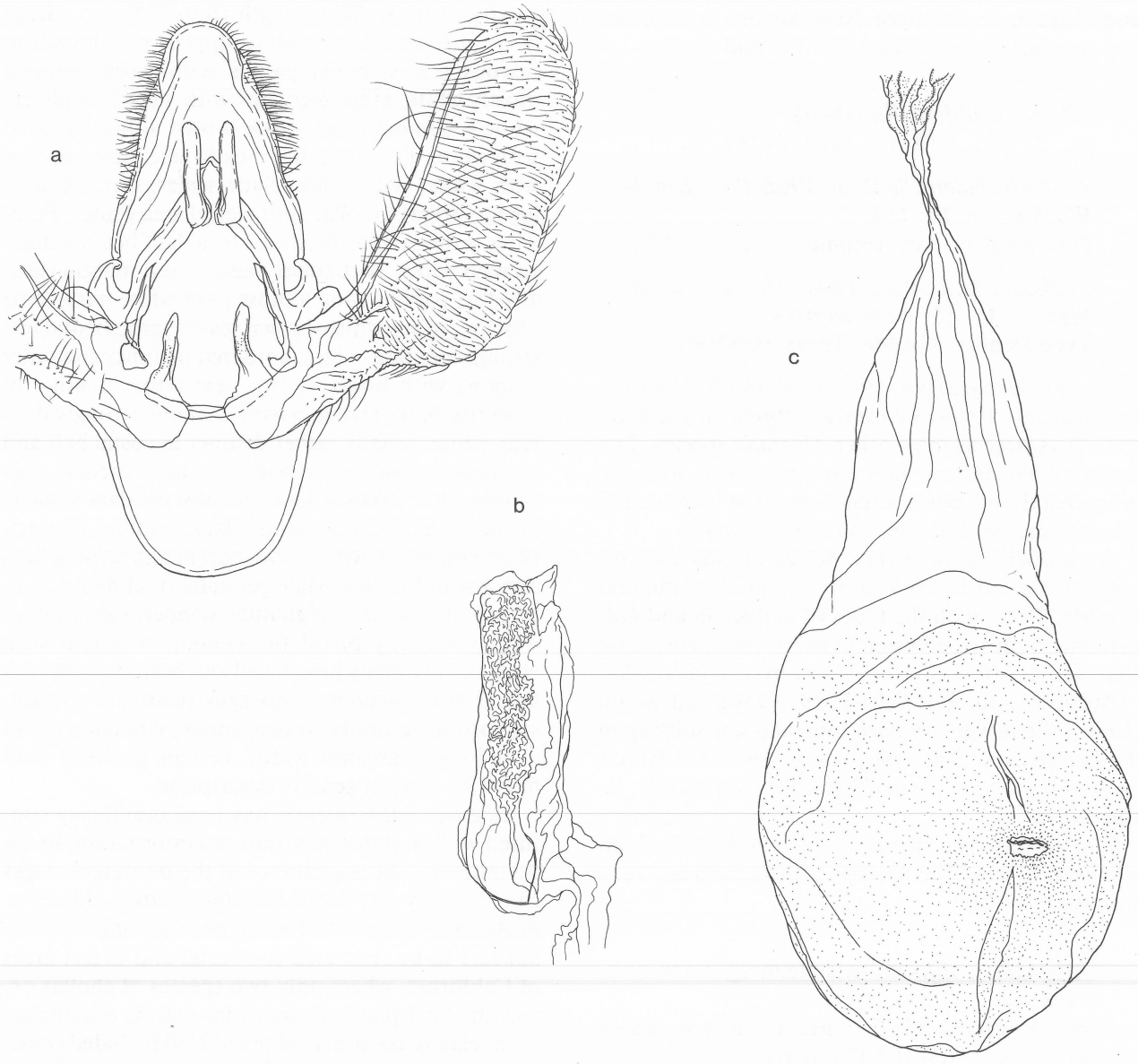

FIGURE 27: GENITALIA OF *ALBERADA CALIFORNIENSIS*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 2656). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3160).

Co., 10-7-50, Chris Henne (1♂). Littlerock, X-10-1961, R. P. Allen; genitalia slide 2800 HHN (1♂). Palm Sprs., Riv. Co., 4-12-36, Chris Henne (1♂). San Jacinto Mts., Pinyon Flat, Riverside Co., July 14, 1970, J.W. Johnson; genitalia slide 3594 HHN (1♂). Palm Springs, Oct 22–27 (1♂). Borrego, S. Diego Co., V-3-1956, J. Powell; genitalia slides 2641, 2642 HHN (3♂, 2♀). Borrego, San Diego Co., IV-21–60, J. Powell, genitalia slide 2651 HHN (1♀). Borego [sic], San Diego Co., IV-25-55, M. Wasbauer (1♂). La Jolla, San Diego Co., VI-16-63, Tina Bolton (1♂). LACM, UCB, USNM.

Alberada franclemonti Neunzig, NEW SPECIES

PL. 3, FIGS. 28–30. TEXT FIG. 28 *a–c* (RWH 5974, part).

Alberada franclemonti Neunzig.
Type locality: Madera Canyon, Pima County, Arizona. [USNM]

DIAGNOSIS. The forewing of *franclemonti* is contrastingly marked. The medial area of the wing is

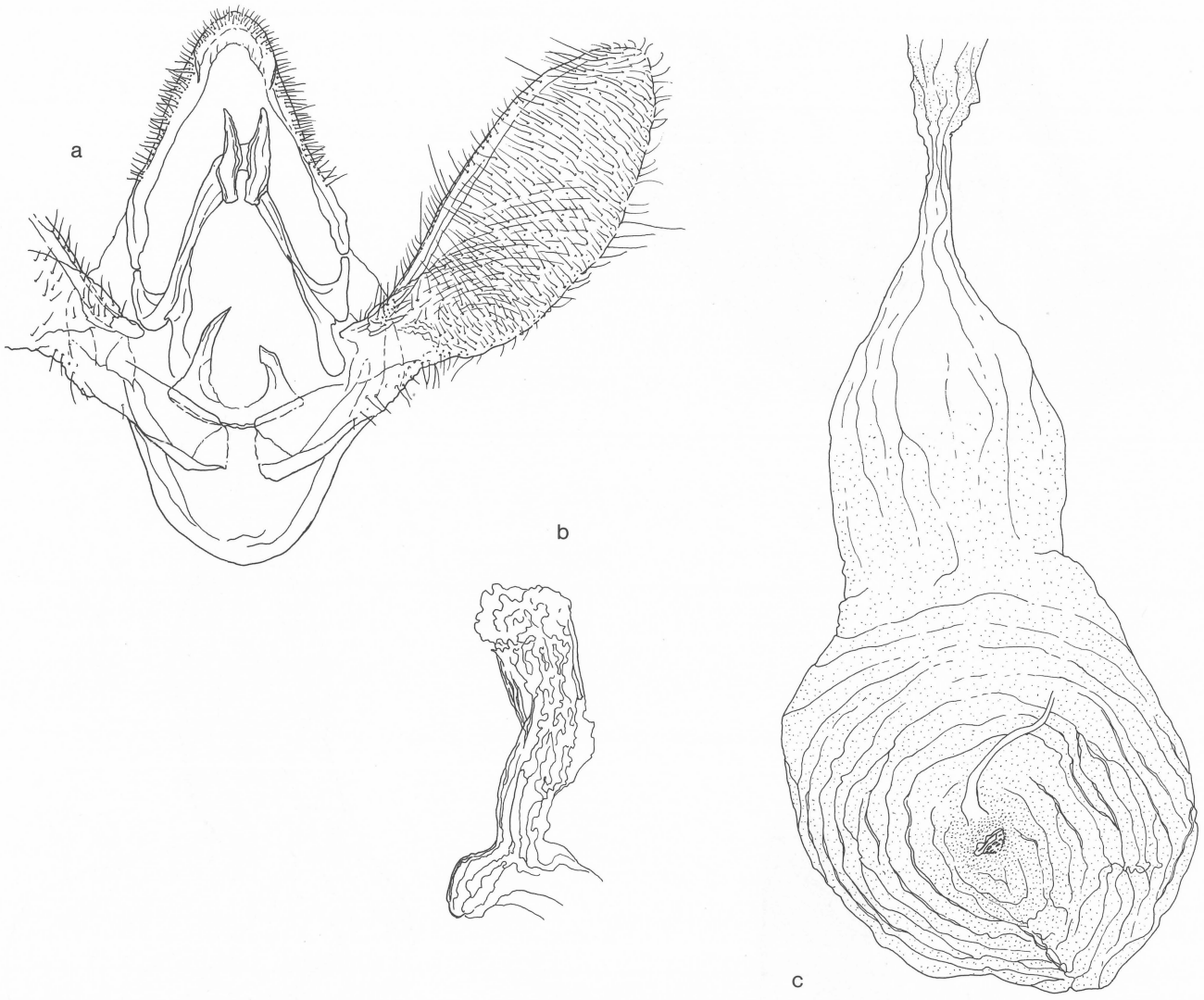

FIGURE 28: GENITALIA OF *ALBERADA FRANCLEMONTI*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 2143). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2439).

mostly white on the costal half, and pale with a distinct dark smudge on the inner half. The antemedial and postmedial lines of *franclemonti* are rather shallowly dentate. The angulation of the postmedial line between M_1 and M_2 reaches almost to the cell in *Alberada parabates* and *Alberada californiensis*; this angulation is distinctly less deep in *franclemonti.* The male genitalia are similar to those of *A. bidentella, A. californiensis,* and *A. candida* in that the ventral margin of the sclerotized costal band of the valva is not distinctly bowed. *A. franclemonti* appears to be restricted to south-central Arizona and adjacent Mexico.

DESCRIPTION. Wing length 15.0–18.0 mm. Head: frons and vertex ochre, pale brown or whitish ochre, suffused with fuscous or black; labial palpus white, pale brown or ochre, and fuscous. Thorax: collar and dorsum mostly pale brown or ochre suffused with fuscous or black. Forewing: ground color ochre; base with black patch, subbasal area dusted with white and with some black scales, particularly at inner margin; antemedial line moderately dentate, white or whitish ochre, relatively distinct, in part bordered with black (black heaviest along outer margin in costal half); postmedial line moderately dentate, relatively distinct, white, whitish ochre or

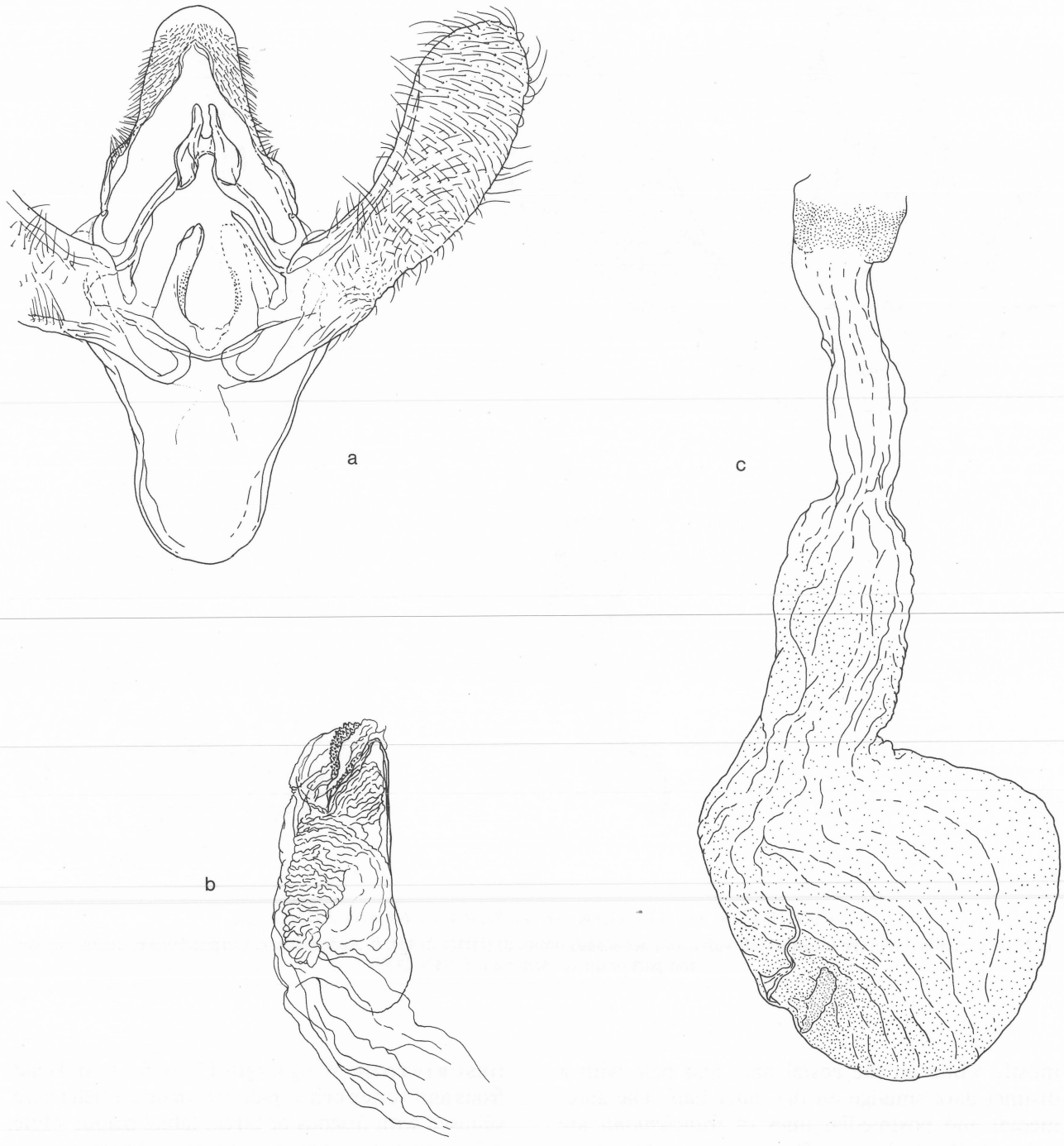

FIGURE 29: GENITALIA OF *ALBERADA CANDIDA*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 3982). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2829).

ochre; medial area mostly white in costal half with a distinct black smudge in inner half; discal spots black, distinct; terminal area dusted with white and with strong black apical streak in costal half. Hindwing: mostly white with costal margin and termen bordered with fuscous. Male genitalia (text figure 28 *a, b*): apical processes of gnathos relatively slender, sharply pointed; valva with sclerotized costal band

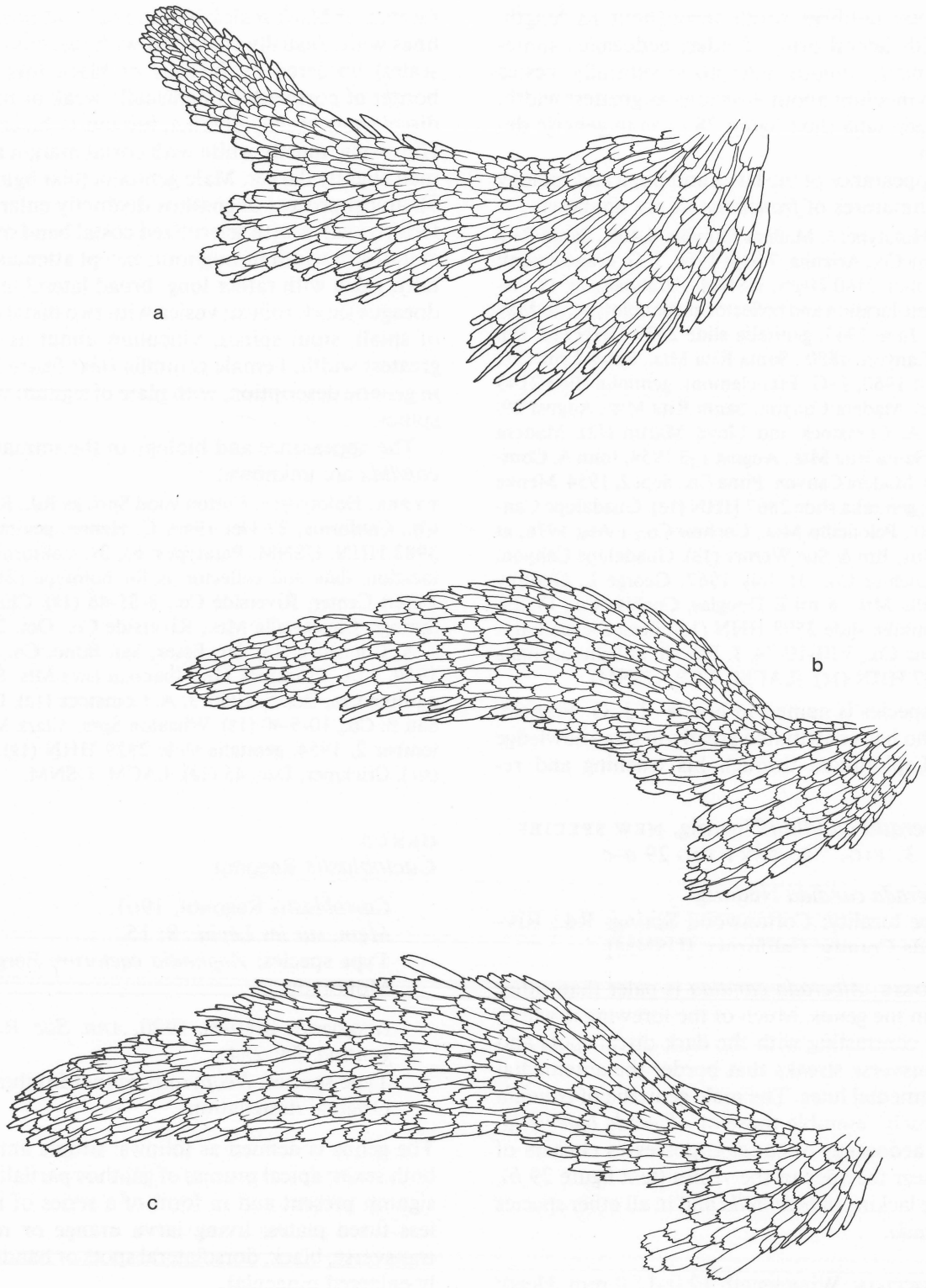

FIGURE 30: LABIAL PALPUS (LEFT SIDE) OF MALE *MELITARA*, *ALBERADA*, AND *RUMATHA*
a. Melitara junctolineella. b. Alberada parabates. c. Rumatha bihinda.

of a rather uniform width throughout its length; juxta with lateral arms slender; aedoeagus somewhat slender, sinuous, sclerotized ventrally, vesica simple; vinculum about ⅔ as long as greatest width. Female genitalia (text figure 28 *c*) as in generic description.

The appearance of the larva and pupa and biology of the immatures of *franclemonti* are unknown.

TYPES. Holotype: ♂. Madera Canyon, 4,400′, Santa Rita Mts., Pima Co., Arizona, 7 Sept 1960, J. G. Franclemont; genitalia slide 2140 HHN. USNM. Paratypes: 9♂, 1♀. Arizona: same location and collector as for holotype, 26 May 1963, 15 June 1963; genitalia slide 2439 HHN (1♂, 1♀). Madera Canyon, 4880′, Santa Rita Mts., Santa Cruz Co., 14 August 1960, J. G. Franclemont; genitalia slide 2143 HHN (1♂). Madera Canyon, Santa Rita Mts., August 29, 1946, J. A. Comstock and Lloyd Martin (1♂). Madera Canyon, Santa Rita Mts., August 1–3 1954, John A. Comstock (1♂). Madera Canyon, Pima Co., Sept 2, 1954, Menke & Stange; genitalia slide 2867 HHN (1♂). Guadalupe Canyon, 4250′, Peloncillo Mts., Cochise Co., 1 Aug 1976, at white lights, Jim & Sue Werner (1♂). Guadalupe Canyon, 4,200′, Cochise Co., 31 July 1967, George L. Godfrey (1♂). Perilla Mts., 8 mi E Douglas, Cochise Co., IV-29-1989; genitalia slide 3593 HHN (1♂). Pena Blanca Lake, Santa Cruz Co., VIII-10-74, J. Powell, at light; genitalia slide 2637 HHN (1♂). (LACM, UCB, USNM).

This species is named in honor of J. G. Franclemont who has contributed greatly to our knowledge of the Lepidoptera through his teaching and research.

Alberada candida Neunzig, NEW SPECIES
PL. 3, FIG. 24. TEXT FIG 29 *a–c.*

Alberada candida Neunzig
Type locality: Cottonwood Springs Rd., Riverside County, California. [USNM]

DIAGNOSIS. *Alberada candida* is paler than other species in the genus. Much of the forewing is white, strongly contrasting with the dark discal spots and dark transverse streaks that border the antemedial and postmedial lines. The male genitalia of *candida* most closely resemble those of *Alberada bidentella,* but the aedoeagus of *candida* possesses clusters of spines near the apex of the vesica (text figure 29 *b*), a feature lacking in *bidentella* and in all other species of *Alberada.*

DESCRIPTION: Wing length 12.0–17.0 mm. Head: frons and vertex mostly white with a few partially fuscous or black scales; labial palpus white with few to many brown, fuscous, or black scales. Thorax: collar and dorsum white washed with fuscous or black. Forewing: white and ochre sprinkled with fuscous or black scales; antemedial and postmedial lines white (usually sprinkled with fuscous or black scales) bordered by fuscous or black (distal dark border of postmedial line usually weak or missing); discal spots usually distinct, fuscous or black, fused. Hindwing: mostly white with costal margin and termen slightly darker. Male genitalia (text figure 29 *a, b*): apical process of gnathos distinctly enlarged anteriorly; valva with sclerotized costal band of a rather uniform width throughout, except attenuated distally; juxta with rather long, broad lateral arms; aedoeagus short, robust; vesica with two distal clusters of small, stout spines; vinculum about as long as greatest width. Female genitalia (text figure 29 *c*) as in generic description, with plate of signum with few spines.

The appearance and biology of the immatures of *candida* are unknown.

TYPES. Holotype: ♂. Cottonwood Springs Rd., Riverside Co., California, 27 Oct 1940, C. Henne; genitalia slide 3982 HHN. USNM. Paratypes: 6♂, 3♀. California: same location, date and collector as for holotype (2♂). N. of Desert Center, Riverside Co., 8-31-46 (1♀). Chuckwalla Springs, Chuckwalla Mts., Riverside Co., Oct. 26 1940, J. A. Comstock (1♂). Nr. Essex, San Bdno. Co., Oct. 30 1939, J. A. Comstock (1♂). Ibanpah (*sic*) Mts. San Bernardino Co., Oct. 5, 1940, J. A. Comstock (1♂). Ivanpah, San B. Co., 10-5-40 (1♂). Wheaton Sprs., Clark Mt., September 2, 1954; genitalia slide 2829 HHN (1♀). Borego (*sic*), Crickmer, Dec. 45 (1♂). LACM, USNM.

GENUS
Cactoblastis Ragonot

Cactoblastis Ragonot, 1901,
Mem. sur les Lépid., **8**: 15.
Type species: *Zophodia cactorum* Berg, 1885.
Monotypy.

Neopyralis Brèthes, 1920, *Ann. Soc. Rural Argentina,* **54**: 284.
Type species: *Neopyralis ronnai* Brèthes, 1920.
Original designation.

The genus is defined as follows: simple antenna in both sexes; apical process of gnathos partially fused; signum present and in form of a series of more or less fused plates; living larva orange or red with transverse, black, dorsolateral spots or bands (greatly enlarged pinacula).

Four to five species are recognized in the genus (Heinrich, 1939, 1956; Mann, 1969), all indigenous to South America south of the equator. The type species (*cactorum*) has been intentionally introduced, as a biological control agent of cactus, into

several parts of the world including Australia, South Africa, Hawaii, Mauritius, and some of the Leeward Islands of the West Indies. Recently, *cactorum* has been collected in southern Florida, apparently spreading north from populations established in the Caribbean.

Sensilla trichodea (cilia) of male antenna moderately abundant and at base of shaft about as long as basal diameter of shaft. Frons rounded, somewhat roughly scaled. Labial palpus of male upturned, of female longer and porrect. Maxillary palpus squamous. Haustellum reduced. Ocellus present. Basal ½ of costa of forewing slightly concave (text figure 31 *a*); forewing smooth, with 11 veins; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for about ⅓ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 31 *a*) with seven veins; Sc + R_1 and Rs shortly fused beyond cell; M_{2+3} and CuA_1 stalked for ⅓ to ½ of their lengths; CuA_2 from before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figure 31 *b, c*) with uncus subtriangular; apical processes of gnathos partially fused anteriorly; transtilla incomplete; juxta with lateral elements moderately long, usually finely serrate on outer edges toward apices; valva simple, with apex evenly rounded; aedoeagus stout, moderately long. Female genitalia (text figure 31 *d*) with ductus bursae membranous; corpus bursae weakly scobinate; signum present, consisting of a series of small, more or less fused plates; ductus seminalis from corpus bursae at junction of ductus bursae and corpus bursae.

Last stage larvae (text figure 32) have the body pale orange, orangish red or red with distinct, large, transverse black spots or dorsolateral bands. Abdominal segments seven and eight with two SV setae. Mandibles simple.

Larval host plants belong to the Cactaceae and are mostly species of prickly-pear (*Opuntia* (*Opuntia*) spp.), but closed cactus (*Cleistocactus* Lemaire), threadlike torch cactus (*Trichocereus* (Berger) Riccobono), hedgehog cactus (*Echinopsis* Zuccarini) and *Denmoza* Britton and Rose are also included as hosts of some *Cactoblastis* by Mann (1969). Eggs are deposited as rather long chains or sticks; the larvae are gregarious.

Cactoblastis cactorum (Berg) (Cactus Moth)
PL. 3, FIG. 33. TEXT FIGS. 31 *a–d*; 32.

Cactoblastis cactorum Berg, 1885, *Anales Soc. Científica Argentina,* **19**: 276.
Type locality: Argentina. [? type lost]

The effectiveness of this species as a biological control agent is well known. By the introduction of *cactorum,* dense stands of prickly-pear on agricultural and range lands have been eliminated or greatly reduced in size in some parts of the world, particularly in Australia. The adult resembles several other cactus moths occurring in America north of Mexico, but *cactorum* can be identified by reference to the male genitalia in which the bipartite apex of the gnathos is partly fused (text figure 31 *b*); other male cactus moths have the apex of the gnathos either with its elements clearly divided into two separate lobes, or, in a few, the apex of the gnathos is fused into a single element. The appearance of the series of fused plates constituting the signum in the corpus bursae (text figure 31 *d*) is also a useful feature to refer to in identifying this species. Wing length 11.0–17.0 mm.

The larva (text figure 32) is unlike any other cactus larva in our fauna; its body is mostly orange or red. Overall length of last stage about 35 mm; head dark reddish brown to almost black; thoracic shield mostly dark reddish brown to almost black; metathorax and abdomen with large, transverse dark brown to black spots or dorsolateral bands; SD1 pinaculum ring on mesothorax dark brown to black, incomplete; SD1 pinaculum ring on eighth abdominal segment dark brown to black, obscured by large dark spot or band.

Cactoblastis cactorum is indigenous to the northern provinces of Argentina, to Uruguay and Paraguay, and to the southern parts of Brazil. The species was brought to the islands of Nevis, Antigua and Montserrat in the West Indies as a biological control agent in 1957 and again in 1960 (Simmonds and Bennett, 1966). Subsequently, it has been collected in the U.S. Virgin Islands and Puerto Rico (Garcia Tudurí, et al., 1971). It presently occurs in southern Florida (Habeck and Bennett, 1990).

Larval hosts of *cactorum* in South America include: closed cactus (*Cleistocactus* sp.); Indian-fig (*Opuntia* (*Opuntia*) *ficus-indica* (L.) Miller); narrow-jointed prickly-pear (*Opuntia* (*Opuntia*) *aurantiaca* Lindley), (*Opuntia* (*Opuntia*) *discolor* Britton and Rose), (*Opuntia* (*Opuntia*) *stenarthra* Schumann = *O. retrorsa* Spegazzini), (*Opuntia* (*Opuntia*) *salmiana* Parmentier), (*Opuntia* (*Opuntia*) *utkilio* Spegazzini); prickly-pear (*Opuntia* (*Opuntia*) *bonarensis* Spegazzini), (*Opuntia* (*Opuntia*) *brunnescens* Britton and Rose), (*Opuntia* (*Opuntia*) *Canterai* Are-

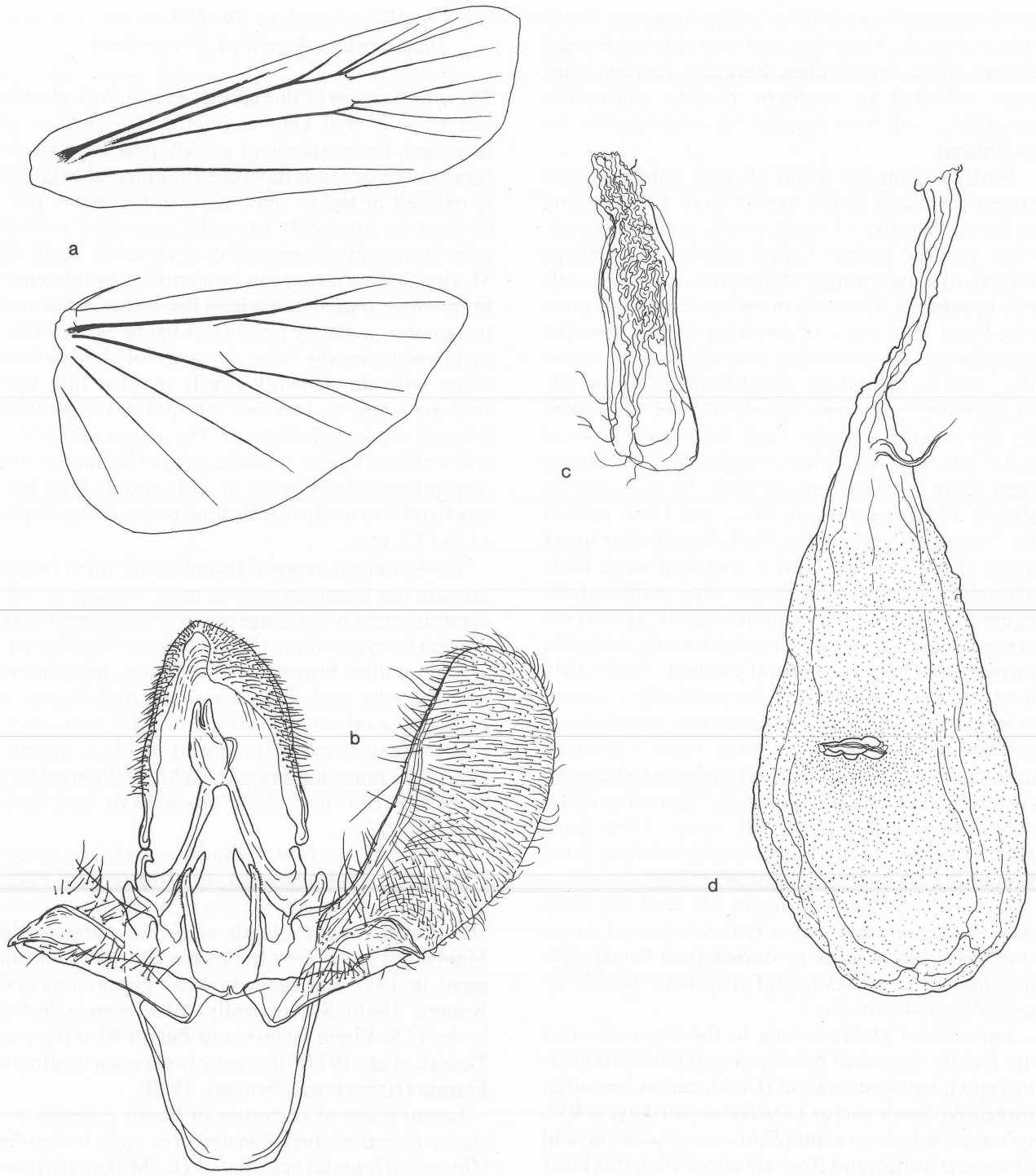

FIGURE 31: VENATION AND GENITALIA OF *CACTOBLASTIS CACTORUM*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 3141). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3142).

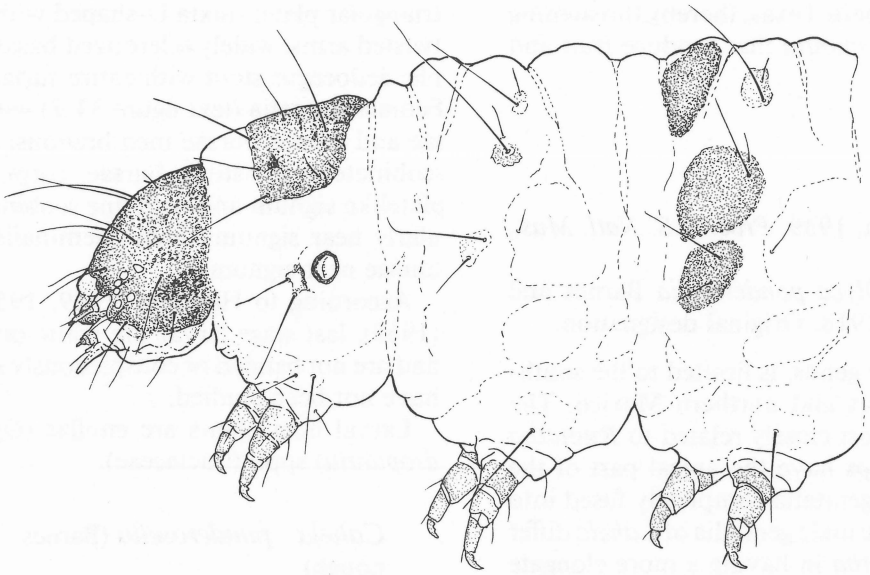

FIGURE 32: LAST STAGE LARVA OF *CACTOBLASTIS CACTORUM* (LATERAL VIEW OF HEAD AND THORAX).

charaleta), (*Opuntia* (*Opuntia*) *cordobensis* Spegazzini), (*Opuntia* (*Opuntia*) *delaetiana* Weber), (*Opuntia* (*Opuntia*) *vulgaris* Miller); quimilo (*Opuntia* (*Opuntia*) *quimilo* Schumann) (young plants only).

In the Caribbean larvae feed on Indian-fig and prickly-pear (*Opuntia* (*Opuntia*) *antillana* Britton and Rose), (*Opuntia* (*Opuntia*) *Dillenii* (Ker-Gawler) Haworth), (*Opuntia* (*Opuntia*) *moniliformis* (L.) Haworth), (*Opuntia* (*Opuntia*) *repens* Bello), (*Opuntia* (*Opuntia*) *rubescens* Salm-Dyck), (*Opuntia* (*Opuntia*) *triacantha* (Willdenow) Sweet) (Simmonds and Bennett, 1966; Garcia Tunduri, et al. 1971).

In the United States *cactorum* has only been reported as occurring on southern spineless prickly-pear (*Opuntia* (*Opuntia*) *stricta* (Haworth) Haworth var. *stricta*). However, there are other (*Opuntia*) in the southern United states that are probably suitable hosts for this phycitine.

According to Mann (1969), the number of eggsticks produced by each female is usually three or four, and the average eggstick contains about 80 eggs. Small larvae hatching from an eggstick feed together hollowing out a segment of the stem. After this, the larvae either penetrate into another segment adjoining the fed-upon stem, or, more typically, they vacate the damaged stem, crawl on the surface of the host, and bore into another segment. Some division of the group usually occurs as the larvae grow, and eventually the siblings divide into several small groups. When full-grown, the larvae leave the host and pupate in debris at the base of the plant, inside dried, eaten-out stems, under stems or the bark of trees, or shallowly in the soil. There are two or more generations each year.

Mann (1969: 45) gave the following account of the remarkable success of *cactorum* in eradicating or restricting weed populations of prickly-pear: "This insect has won worldwide fame because of its role in the control of the prickly pears *Opuntia inermis* and *O. stricta* in Australia. First introduced into Australia by The Prickly Pear Travelling Commission in April 1913, it failed to become established. It was reintroduced in small numbers in May 1925, and then reared and distributed in great quantity. Within twelve years it solved this great weed problem of Queensland and New South Wales. In approximately 30 million acres that had been completely occupied by dense prickly pear, the pest was destroyed by this insect, and in another 30 million acres of more scattered infestations the pest was brought under control. The reclaimed land, hitherto virtually valueless, has now been brought into agricultural and pastoral production."

Despite its past history as primarily a beneficial insect, the recent appearance of *cactorum* in Florida has elicited concern rather than elation. Rare endemic cacti in southern Florida and cacti grown as ornamentals in the state are at risk. The potential also exists for *cactorum* to spread to Mexico via the

Gulf States and southern Texas, thereby threatening species of Mexican *Opuntia* that produce fruit and fodder.

GENUS
Cahela Heinrich

Cahela Heinrich, 1939, *Proc. U.S. Natl. Mus.*, **86**: 361.
Type species: *Olyca ponderosella* Barnes and McDunnough, 1918. Original designation.

Cahela, a monobasic genus, is limited to the southwestern United States and northern Mexico. The genus is probably most closely related to *Rumatha* Heinrich. Both groups have the apical part of the gnathos of the male genitalia completely fused into a single structure. The male genitalia of *Cahela* differ from those of *Rumatha* in having a more elongate uncus, in lacking a subbasal sclerotized concavity on the valva, and in having a moderately long aedoeagus. Both sexes of *Cahela* differ from moths of *Rumatha* in having distinctive black longitudinal lines between the veins of the forewing.

Antenna of both sexes simple, male antenna more robust, sensilla trichodea (cilia) of shaft of male moderately abundant and at base of shaft about ¾ as long as basal diameter of shaft. Frons rounded, more or less smoothly scaled. Labial palpus of male obliquely upturned, of female porrect; labial palpus of male not extending above middle of frons and with third segment appearing much shorter than second segment (this because scales of second segment project anteriorly over base of third segment, and not because of very short third segment). Maxillary palpus small, squamous. Haustellum well developed. Ocellus present. Forewing of male (text figure 33 *a*) with costa more or less straight in basal ⅓; without sex-scaling or costal fold. Forewing: smooth scaled, with 11 veins; R_{3+4} and R_5 stalked for slightly less than ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for about ¼ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 33 *a*) with seven veins; Sc + R_1 and Rs fused slightly less than ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for about ⅓ their lengths; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figure 33 *b, c*) with uncus subtriangular, somewhat elongate, constricted near distal ⅓; gnathos with apical part a single, distinctly longer than wide structure; transtilla incomplete, represented by pair of separate, more or less elongate, triangular plates; juxta U-shaped with long, slightly twisted arms, widely sclerotized basally; valva simple; aedoeagus stout with entire surface sclerotized. Female genitalia (text figure 33 *d*) with ductus bursae and corpus bursae membranous; ductus bursae scobinate near ostium bursae; corpus bursae with platelike signum and with fine scobinations, particularly near signum; ductus seminalis from corpus bursae near signum.

According to Heinrich (1939, 1956) and Mann (1969), last stage larvae are white or grayish white and are not banded or conspicuously spotted. Pupae have not been studied.

Larval host plants are chollas (*Opuntia* (*Cylindropuntia*) spp.) (Cactaceae).

Cahela ponderosella (Barnes and McDunnough)
PL. 3. FIGS. 35, 36. TEXT FIGS. 33 *a–d*; 34 *b* (RWH 5977).

Olyca ponderosella Barnes and McDunnough, 1918, *Contrib. Nat. Hist. Lep. N. A.*, **4**: 175.
Type locality: Palm Springs, California. [USNM]

Zophodia purgatoria Dyar, 1925b, *Ins. Insc. Mens.*, **13**: 222.
Type locality: Colorado Desert, Yuma Co., Arizona. [USNM]

Cactobrosis interstitialis Dyar, 1925b, *Ins. Insc. Mens.*, **13**: 223.
Type locality: Presidio, Texas. [USNM]

Cactobrosis phoenicis Dyar, 1925b, *Ins. Insc. Mens.*, **13**: 223.
Type locality: Palm Springs, California. [USNM]

Adults of *ponderosella* can be recognized by the conspicuous, longitudinal, black lines between the veins on the forewings. A few other cactus-feeding phycitines also have black longitudinal lines on the forewing, but in these species the lines are on the veins rather than between them. *C. ponderosella* is quite variable in size with a wing length of 11.0 to 20.5 mm.

Larval hosts are various chollas (*Opuntia* (*Cylindropuntia*) spp.) including: buckhorn cholla (*Opuntia* (*Cylindropuntia*) *acanthocarpa* Engelmann and Bigelow), cane cholla (*Opuntia* (*Cylindropuntia*) *Parryi* Engelmann), cane cholla (*Opuntia* (*Cylindropuntia*) *spinosior* (Engelmann) Toumey), pencil cholla (*Opuntia* (*Cylindropuntia*) *arbuscula* Engel-

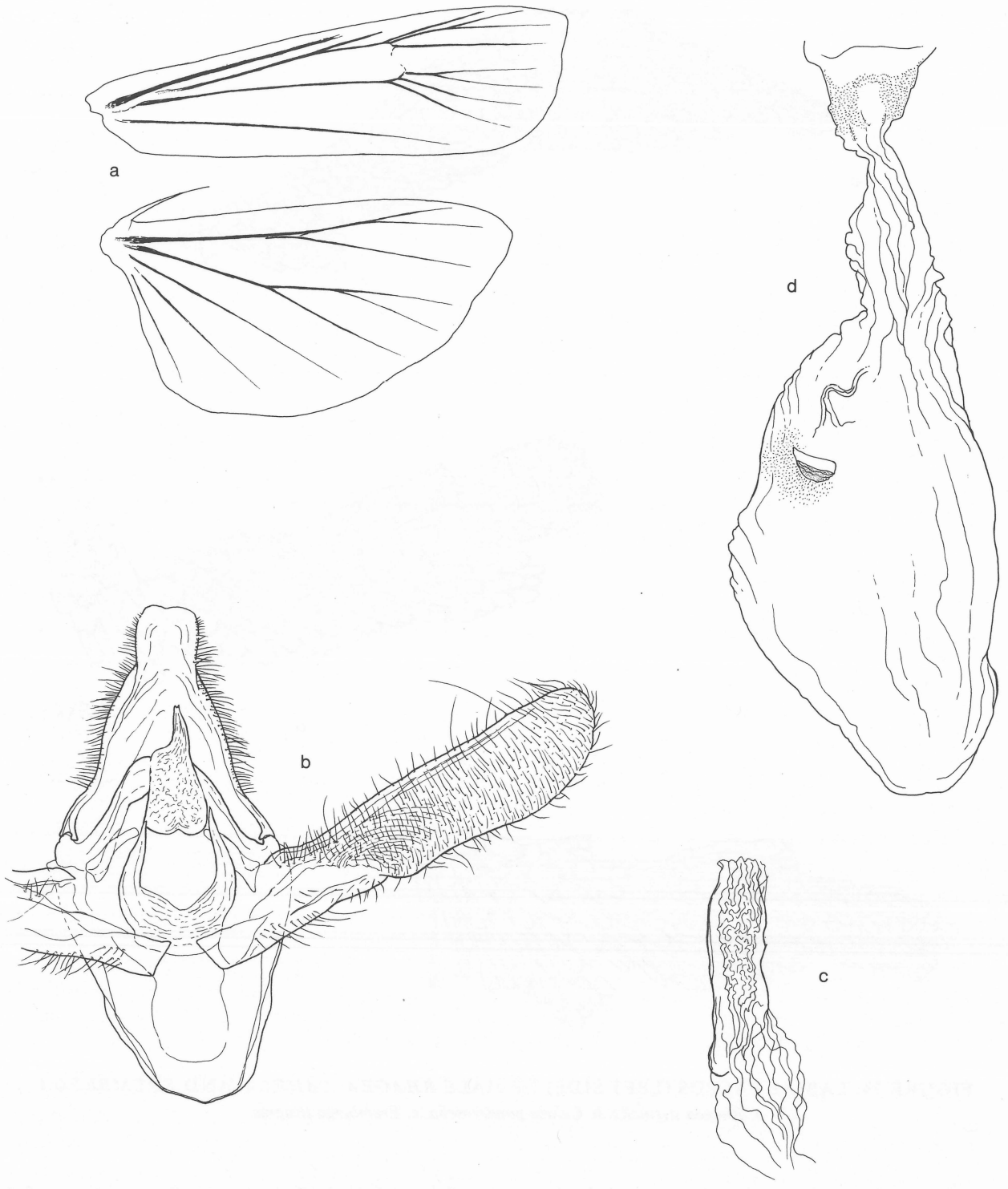

FIGURE 33: VENATION AND GENITALIA OF *CAHELA PONDEROSELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 2440). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3227).

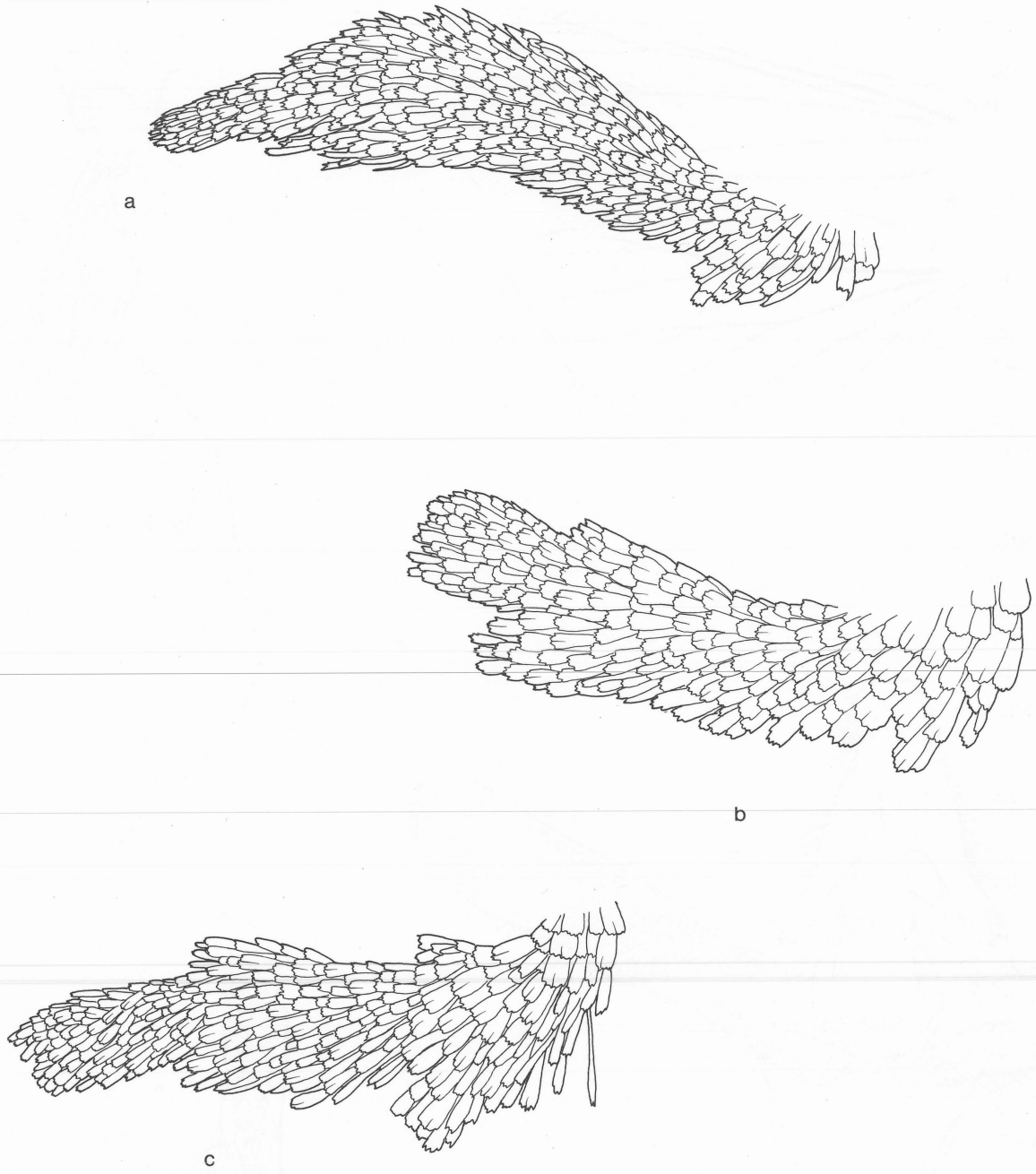

FIGURE 34: LABIAL PALPUS (LEFT SIDE) OF MALE *RHAGEA, CAHELA,* AND *EREMBERGA*
a. Rhagea stigmella. b. Cahela ponderosella. c. Eremberga insignis.

mann), silver or golden cholla (*Opuntia* (*Cylindropuntia*) *echinocarpa* Engelmann and Bigelow), tree cholla (*Opuntia* (*Cylindropuntia*) *imbricata* (Haworth) de Candolle), Whipple's cholla (*Opuntia* (*Cylindropuntia*) *Whipplei* Engelmann and Bigelow).

Mann (1969) reported that the eggs of *ponderosella* are deposited singly usually on spines of the host. The first stage larvae are thought to feed frequently on flowers and then usually tunnel into fruit. The entrance hole is closed with a dark plug by the larva. Discoloration of the fruit is apparent as the larva feeds, and, in time, the larva bores through the base of the fruit and enters the segment bearing

the fruit. In the absence of fruit, small larvae bore directly into terminal stems. Pupation takes place within the plant. A complete cocoon is not constructed, but a small amount of silk is usually fashioned into a partial protective structure near the head.

I have seen moths of this species from southwestern Texas (Brewster, Culberson, Jeff Davis, Presidio Cos.) (March–May), southern Arizona (Cochise, Gila, Maricopa, Mohave, Pima, Yavapai, Yuma Cos. (April–August), southwestern Utah (Washington Co.) (May, June), southeastern Nevada (Clark Co.) (April–July), southern California (San Bernardino, Imperial, Riverside, San Diego Cos.) (April, May, July, August), and Nuevo Leon, Mexico (May).

GENUS

Rumatha Heinrich

Rumatha Heinrich, 1939, *Proc. U.S. Natl. Mus.*, **86**: 363.
Type species: *Zophodia bihinda* Dyar, 1922. Original designation.

The genus is closely related to *Cahela.* Major differences between *Rumatha* and *Cahela* have been given under *Cahela.* At present, four species are recognized in *Rumatha.* All occur in the southwestern United States. Some have also been collected in northern Mexico.

Antenna of male very slightly serrate, of female simple; sensilla trichodea (cilia) of shaft moderately abundant, at base of shaft about ¾ as long as basal diameter of shaft in male, and about ¼ as long as basal diameter of shaft in female. Frons weakly convex, more or less smoothly scaled. Labial palpus porrect in both sexes. Maxillary palpus simple. Haustellum well developed. Ocellus present. Forewing of male (text figure 36) with basal ⅓ of costa slightly convex; forewing smooth, with 11 veins; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for about ⅓ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 36) with seven veins; Sc + R_1 and Rs fused for over ½ distance beyond cell; M_{2+3} and CuA_1 stalked for about ¼ to ⅓ their lengths; CuA_2 from before lower angle of cell; cell about ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figure 35 *a–d*) with uncus subtriangular, about as long as basal width, slightly constricted near middle; gnathos with apical part a single, about as long as wide, structure (longer than wide in *jacumba*); transtilla incomplete; juxta U-shaped with broad twisted arms; valva simple with an inner subbasal concavity or pocket; aedoeagus short, stout, sclerotized on ventral surface; entire genitalia with characteristic squat appearance. Female genitalia (text figure 35 *e*) with ductus bursae and corpus bursae membranous, ductus bursae scobinate, and with a pair of more or less defined, sclerotized plates at genital opening; corpus bursae with platelike signum and finely scobinate, particularly near signum; ductus seminalis from corpus bursae near signum.

The larva of only one species (*glaucatella*) has been studied. Heinrich (1939, 1956) and Mann (1969) described it as whitish and not banded or conspicuously spotted. The pupa has not been described.

Larval hosts (based on *glaucatella*) are chollas (*Opuntia* (*Cylindropuntia*) spp.) (Cactaceae).

KEY TO SPECIES OF *RUMATHA*

1. Forewing with ground color white (plate 4, figure 6); wing length 7.0–9.0 mm ..... *glaucatella* p. 73
— Forewing with ground color fuscous or black (plate 2, figures 10–12; plate 3, figures 31, 32); wing length 11.0–16.5 mm 2

2. Postmedial line of forewing deeply indented, particularly between veins M_1 and M_2 (plate 2, figures 10–12) 3
— Postmedial line of forewing shallowly indented (plate 3, figures 31, 32) ..... *polingella* p. 75

3. White costal area of forewing with few or no reddish-brown scales; male valva rather broad (text figure 35 *a*) ..... *bihinda* p. 75
— White costal area of forewing with many reddish-brown scales; male valva more narrow (text figure 35 *c*) ..... *jacumba* p. 75

Rumatha glaucatella (Hulst)

PL. 4, FIG. 6 (RWH 5978).

Honora glaucatella Hulst, 1888, *Ent. Americana,* **4**: 117.
Type locality: Texas. [AMNH]

Rumatha glaucatella moths are mostly white and rather small (wing length 7.0–9.0 mm). The species

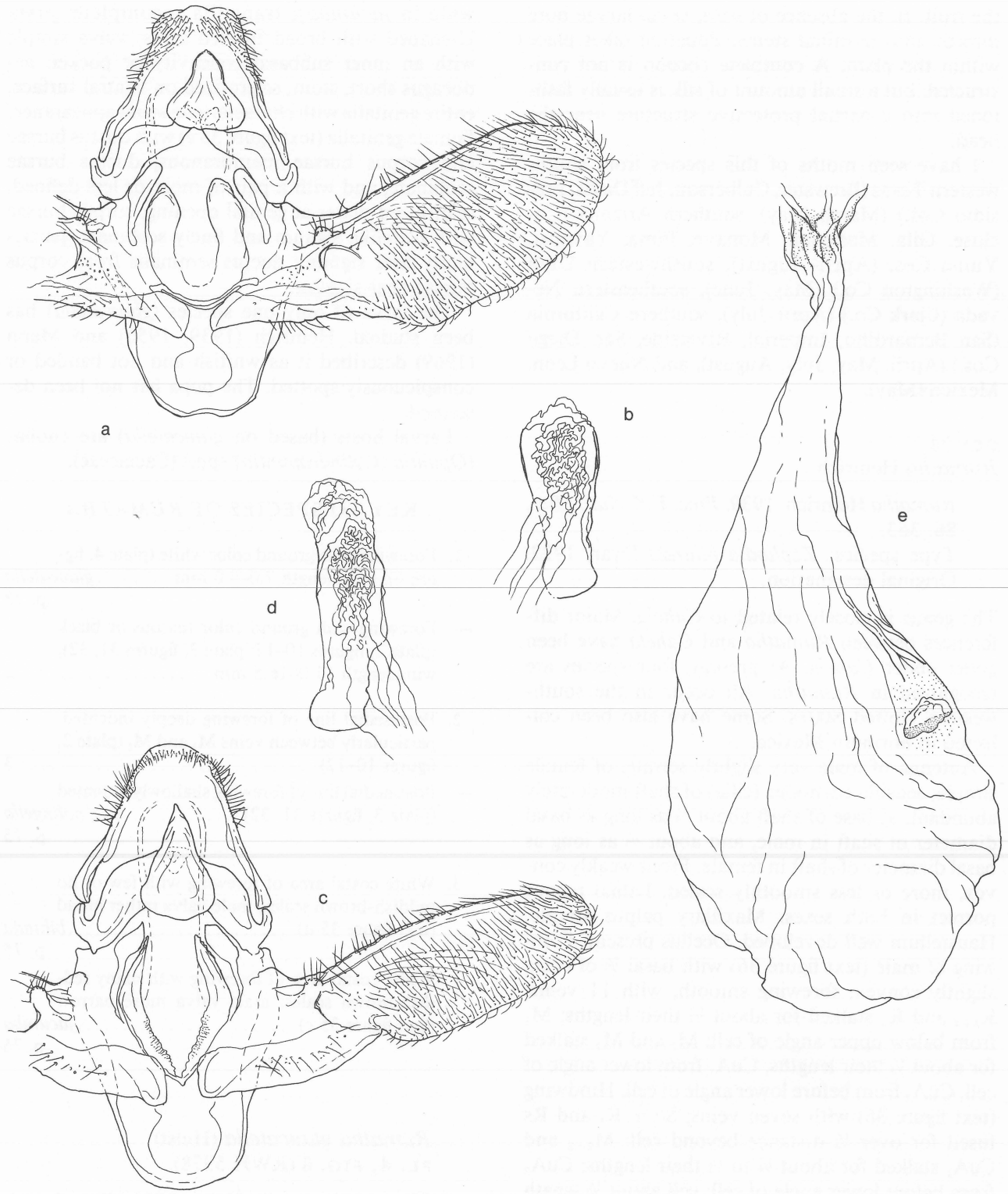

FIGURE 35: GENITALIA OF *RUMATHA* SPECIES

a. R. bihinda, male genitalia (most of left valva and aedoeagus omitted) (HHN 316). *b.* Aedoeagus. *c. R. jacumba,* male genitalia, holotype (most of left valva and aedoeagus omitted (HHN 2831). *d.* Aedoeagus. *e.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2832).

has only been collected in south Texas, but it must also occur in northern Mexico adjacent to Texas.

Poorly known, the larva of *glaucatella* is briefly described in the generic description. Desert Christmas cactus, also known as pencil cholla, tasajillo, or tesajo, (*Opuntia* (*Cylindropuntia*) *Leptocaulis* de Candolle) is the larval host. Larvae feed singly usually in the terminal segments of the plant. Pupation occurs within the feeding tunnels.

In south Texas *glaucatella* is found from the southeastern coastal region of the state west to Big Bend National Park. I have seen the species from the following counties; Bexar (August); Brewster (May, August); Cameron (May–August); Duval (May); Gonzalez (May); Hidalgo (May); Neuces (September); Travis (June); Wells (July).

Rumatha polingella (Dyar)
PL. 3, FIGS. 31, 32. TEXT FIG. 36 (RWH 5980).

Zophodia polingella Dyar, 1906, *Jour. New York Ent. Soc.*, **14**: 31.
Type locality: southern Arizona. [USNM]

Rumatha polingella is similar in size (wing length 11.0–16.5 mm) and general color to *Rumatha jacumba* but differs in having the postmedial line of the forewing shallowly, rather than deeply, indented between M_1 and M_2. The shallow angulation of the postmedial line is a character state shared with the much smaller and paler species *R. glaucatella.*

The immature stages and hosts of *polingella* are unknown.

Rumatha polingella occurs in southwestern Texas (April–June, August), southern New Mexico (June, July), southeastern Arizona (May–August), and northern Chihuahua, Mexico (July).

Rumatha bihinda (Dyar)
PL. 2, FIG. 10; PL. D, FIG. 1. TEXT FIGS. 30 *c*; 35 *a, b* (RWH 5979).

Zophodia bihinda Dyar, 1922, *Ins. Insc. Mens.*, **10**: 173.
Type locality: Jemez Springs, New Mexico. [USNM]

The adult of *bihinda* has the postmedial line of the forewing deeply indented like that of *R. jacumba.* Differences between the two species are given in the species key and in the diagnosis for *jacumba.* Wing length of *bihinda* 14.5–16.0 mm.

Larval hosts are unknown, but probably are chollas (*Opuntia* (*Cylindropuntia*) spp.).

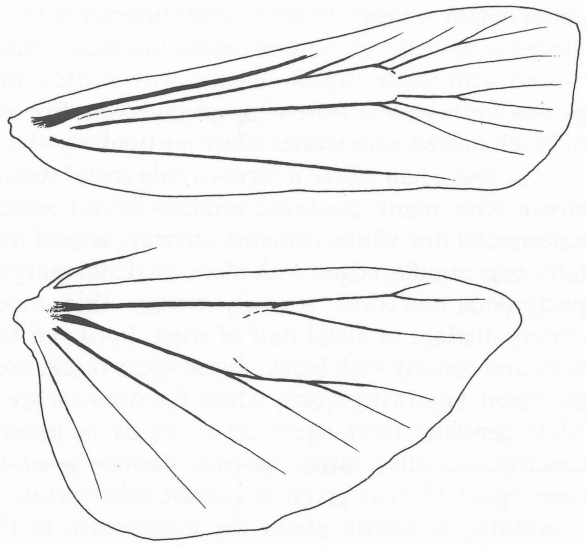

FIGURE 36: VENATION OF MALE *RUMATHA POLINGELLA*

Rumatha bihinda occurs from southwestern Texas to southeastern California. Moths in Texas have been collected in April, June and August; in southern New Mexico in June and July; in southern Arizona and southwestern Nevada in March, April, and May; and in California in May.

Rumatha jacumba Neunzig, NEW SPECIES
PL. 2, FIGS. 11, 12. TEXT FIG. 35 *c–e.*

Rumatha jacumba Neunzig.
Type locality: Jacumba Mts., 800′, Imperial County, California. [LACM]

DIAGNOSIS. *Rumatha jacumba* is similar to *bihinda,* particularly with regard to the strongly dentate condition of the postmedial line. *R. jacumba,* has the length of the labial palpus of the male equal to the length of the head, the white costal streak of the forewing without black, longitudinal lines and with many reddish-brown scales, and the male valva rather narrow, whereas *bihinda* has the length of the labial palpus of the male 1½ times the length of the head, the white costal streak of the forewing with faint, thin, black longitudinal lines and few to no reddish-brown scales, and the male valva broad.

DESCRIPTION. Wing length 11.5–15.0 mm. Head: frons and vertex with white-tipped fuscous or black scales laterally (sometimes scales completely fuscous or black) and with white scales mesially; labial palpus fuscous or black dusted with white (basal segment usually mostly white), in male, palpus extends forward beyond head for distance equal to

about length of head. Thorax: collar fuscous or black dusted with white; dorsum of thorax fuscous or black dusted with white (tegula usually with some completely white scales). Forewing: ground color fuscous or black dusted with white; white particularly abundant in costal half where it forms a pale costal streak; streak with many scattered reddish-brown scales; antemedial line white, obscure, strongly angled distally near middle, edged with black on distal margin; postmedial line white, strongly dentate, thin, moderately distinct in distal half of wing, bordered basally and distally with black; discal spots black, usually fused. Hindwing mostly white, fuscous near apex. Male genitalia (text figure 35 *c, d*) as in generic description; valva rather narrow. Female genitalia (text figure 35 *e*) as given in generic description.

Nothing is known about the appearance of the immature stages of *jacumba.* The larval host plant is probably one or more species of cholla (*Opuntia* (*Cylindropuntia*) spp.).

TYPES. Holotype: ♂. Jacumba Mts., 800′, Imperial Co., California; 20 Mar. 1988; J. P. & K. E. S. Donahue; genitalia slide 2831 HHN. LACM. Paratypes: 17 ♂, 4 ♀. California: same label information as for holotype, genitalia slide 2832 HHN (13 ♂, 3 ♀). Indian Wells, Riverside Co., March 25, 1939, L. M. Martin (1 ♂). Red Rock Cyn. S. P., Ricardo Camgr., el 2,700′, Kern Co., 15 Apr. 1989, J. P. & K. E. S. Donahue, genitalia slide 2864 HHN (1 ♂). Nr. Cove Spring, 3,900′, SE side Granite Mts., S. Bdno. Co.; J. P. and K. E. S. Donahue (1 ♀). 9 air mi S Baker, Zzyzx Sprs., San Bern. Co., 11-21-77, Powell, bl. lite trap, genitalia slide 2646 HHN (1 ♂). Tuttle Creek, 2 mi SW Lone Pine, Inyo Co., V-9-69, J. Powell, genitalia slide 2647 HHN (1 ♂). LACM, UCB.

GENUS
Yosemitia Ragonot, REVISED STATUS

Yosemitia Ragonot, 1901, *Mem. sur les. Lép.,* **8**: 17.
Type species: *Spermatophthora graciella* Hulst, 1887. Monotypy.

Yosemitia is most easily recognized by the rather large fan-shaped maxillary palpus that is held vertically against the frons. As well as I can establish, there are two species of *Yosemitia* in America north of Mexico. One has a rather broad range extending from central Texas to southern California; the other appears to be confined to southern California, and possibly adjacent Arizona.

Antenna very slightly serrate in male, simple in female, sensilla trichodea (cilia) of male moderately abundant and about ⅓–½ as long as basal diameter of shaft. Frons convex, with anteriorly projecting scales. Labial palpus of both sexes obliquely porrect. Maxillary palpus with scales arranged in fanlike manner. Haustellum well developed. Ocellus present. Basal ½ of costa of male (text figure 37 *a*) slightly convex; undersurface without sex-scaling or costal fold. Forewing smooth scaled with 11 veins; R_2 from before upper angle of cell; R_{3+4} and R_5 stalked for slightly over ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for about ¼ to ⅓ their lengths; CuA_1 from near lower angle of cell; CuA_2 from slightly before angle of cell. Hindwing (text figure 37 *a*) with seven veins; Sc + R_1 and Rs stalked for about ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for slightly less than ½ their lengths; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight with an inconspicuous dorsolateral scale tuft; each tuft a cluster of about 20 simple, more or less straight, slightly spatulate, scales. Male genitalia (text figure 37 *b, c*) with uncus subtriangular, constricted near middle, apically rounded; apical process of gnathos bifid; transtilla incomplete, reduced to small lateral sclerites; juxta well developed, stout with broad, short arms; valva simple; aedoeagus slender, simple; vinculum shorter or longer than greatest width. Female genitalia (text figure 37 *d*) with ductus bursae short and membranous; corpus bursae membranous, finely scobinate, particularly near signum; signum a spinose plate; ductus seminalis joined to corpus bursae near junction with ductus bursae.

Larvae are blue and not banded or spotted with black or fuscous. Food plants are species of low growing, cylindroid cacti (*Echinocactus, Echinocereus, Ferocactus, Mammillaria*) (Cactaceae).

KEY TO SPECIES OF *YOSEMITIA*

1. Forewing heavily dusted with white (plate 2, figure 14); vinculum shorter than greatest width ..... *fieldiella* p. 78

— Forewing darker (plate 2, figure 15); vinculum about as long as, or longer than, greatest width (text figure 37 *b*) ..... *graciella* p. 77

Reasons for not including *Yosemitia* under *Zophodia,* as was done by Roesler (1973), are 1. Male antenna of *Yosemitia* lacks the cluster of scalelike sensilla and concavity found on antenna of *Zophodia*; 2. Female genitalia of *Yosemitia* have a rather short ductus bursae and corpus bursae, whereas these structures are long in *Zophodia*; 3. In *Yosemitia* the

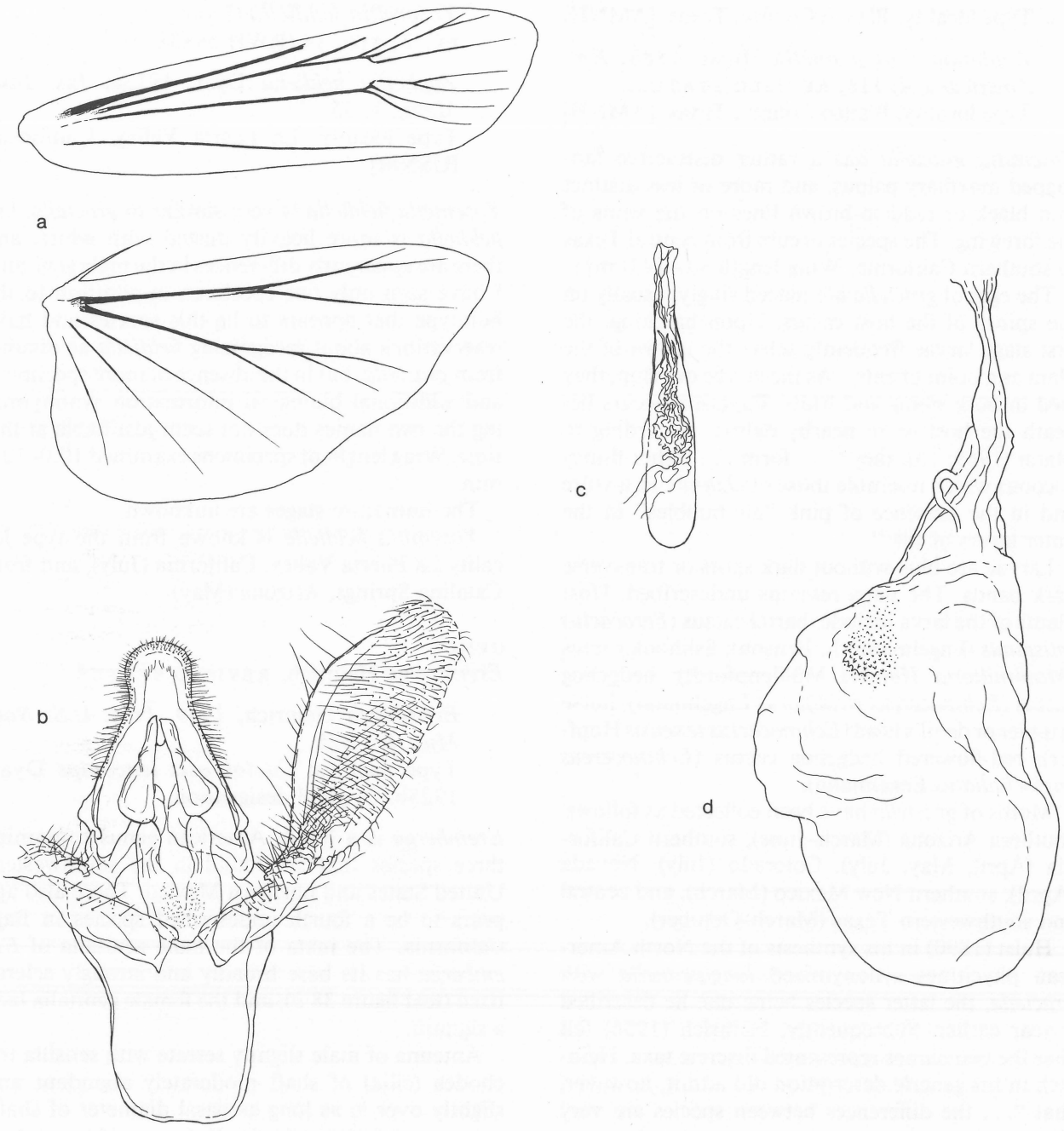

FIGURE 37: VENATION AND GENITALIA OF *YOSEMITIA GRACIELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 2944). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2445).

ductus seminalis is attached to the corpus bursae near the junction of the ductus bursae and the corpus bursae, but in *Zophodia* it is joined to the corpus bursae more anteriorly, near the signum; 4. *Yosemitia* larvae feed on cactus, and *Zophodia* larvae eat gooseberries and currants.

Yosemitia graciella (Hulst)

PL. 2, FIG. 15; TEXT FIG. 37 *a–d* (RWH 5981, 5982).

Spermatophthora graciella Hulst, 1887, *Ent. Americana,* **3**: 134.

Type locality: Blanco County, Texas. [AMNH]

Zophodia longipennella Hulst, 1888, *Ent. Americana,* **4**: 118, REVISED STATUS.
Type locality: Blanco County, Texas. [AMNH]

Yosemitia graciella has a rather distinctive fan-shaped maxillary palpus, and more or less distinct thin black or reddish-brown lines on the veins of the forewing. The species occurs from central Texas to southern California. Wing length 9.0–14.0 mm.

The eggs of *graciella* are placed singly, usually on the spines of the host cactus. Upon hatching, the first stage larvae frequently select the crown of the plant as a point of entry. As the larvae develop, they feed in both stems and fruits. Pupation occurs beneath the host or in nearby debris. According to Mann (1969: 55), they ". . . form . . . rather flimsy cocoons which resemble those of *Ozamia* in texture and in the presence of pink "air bubbles" in the outer layers of silk."

Larvae are blue without dark spots or transverse dark bands. The pupa remains undescribed. Host plants of the larva include: barrel cactus (*Ferocactus setispinus* (Engelmann) L. Benson); fishhook cactus (*Mammillaria Heyderi* Mühlenpfordt); hedgehog cactus (*Echinocereus viridiflorus* Engelmann); horse crippler or devil's head (*Echinocactus texensis* Hopffer); red-flowered hedgehog cactus (*Echinocereus triglochidiatus* Engelmann).

Moths of *graciella* have been collected as follows: southern Arizona (March–June), southern California (April, May, July), Colorado (July), Nevada (April), southern New Mexico (March), and central and southwestern Texas (March–October).

Hulst (1890) in his synthesis of the North American phycitines synonymized *longipennella* with *graciella,* the latter species being one he described a year earlier. Subsequently, Heinrich (1956) felt that the two names represented discrete taxa. Heinrich in his generic description did admit, however, that ". . . the differences between species are very slight and not altogether trustworthy, hardly more than might be expected within specific limits" (p. 250). My examination of the types, and other specimens available within the genus, leads me to believe that Hulst (1890) was correct in deciding that his types, both from Blanco County, Texas, represented a single species. Heinrich separated *longipennella* from *graciella* according to the amount of black on the forewing forming transverse and longitudinal lines. This feature varies from moth to moth, even in series collected the same night, at the same locality.

Yosemitia fieldiella (Dyar)
PL. 2, FIG. 14 (RWH 5983).

Zophodia fieldiella Dyar, 1913a, *Ins. Insc. Mens.,* **1**: 35.
Type locality: La Puerta Valley, California. [USNM]

Yosemetia fieldiella is very similar to *graciella,* but *fieldiella* is more heavily dusted with white, and there are apparently differences in the male genitalia. I have seen only one specimen in addition to the holotype that appears to be this species and have reservations about recognizing *fieldiella* as distinct from *graciella,* but in the absence of more specimens and additional biological information synonymizing the two names does not seem justifiable at this time. Wing length of specimens examined 10.0–10.5 mm.

The immature stages are unknown.

Yosemitia fieldiella is known from the type locality La Puerta Valley, California (July), and from Catalina Springs, Arizona (May).

GENUS
Eremberga Heinrich, REVISED STATUS

Eremberga Heinrich, 1939, *Proc. U.S. Natl. Mus.,* **86**: 375.
Type species: *Cactobrosis leuconips* Dyar, 1925b. Original designation.

Eremberga is a North American genus containing three species that are found in the southwestern United States and northern Mexico. There also appears to be a fourth undescribed species in Baja California. The juxta of the male genitalia of *Eremberga* has its base broadly and strongly sclerotized (text figure 38 *b*), and the female genitalia lack a signum.

Antenna of male slightly serrate with sensilla trichodea (cilia) of shaft moderately abundant and slightly over ½ as long as basal diameter of shaft; antenna of female simple. Frons weakly rounded, with scales slightly produced anteriorly. Labial palpus upturned in male, obliquely porrect in female. Maxillary palpus squamous. Haustellum weakly developed. Ocellus present. Basal ⅓ of costa of forewing of male slightly convex (text figure 38 *a*). Forewing smooth, with 11 veins; R_2 from before upper angle of cell; R_{3+4} and R_5 stalked for about ½ their, lengths, M_1 from slightly below angle of cell; M_2 and M_3 stalked for about ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from before lower angle of cell. Hindwing (text figure 38 *a*) with seven veins;

Sc + R_1 and Rs stalked for about ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for about ⅓ their length; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight with a weak dorsolateral scale tuft. Male genitalia (text figure 38 *b, c*) with uncus subtriangular, constricted near middle or distal ⅓; apical process of gnathos bifid; transtilla incomplete; juxta with base broadly and strongly sclerotized and with well-developed lateral arms; valva simple with apex evenly rounded; aedoeagus moderately long, sclerotized throughout and with a distinct cluster of microspines at its apex. Female genitalia (text figure 38 *d*) with ductus bursae membranous, with or without scobinations near genital opening; corpus bursae membranous with few to many weakly developed scobinations, and without signum (site of attachment of ductus seminalis to remainder of genitalia impossible to determine because there is no distinct demarcation between the corpus bursae and ductus bursae, and the ductus seminalis is attached at a point near where these structures usually join each other; Heinrich (1939, 1956) stated that the ductus seminalis was joined to the ductus bursae, but this would be a major departure from the condition in other cactus phycitines).

Known larvae of *Eremberga* (*leuconips*) are white with large dark spots forming incomplete transverse bands. Two SV setae are on abdominal segments seven and eight. Mandible simple.

Eremberga larvae (*leuconips*) have been reared from hedgehog cactus (*Echinocereus*) (Cactaceae).

Roesler (1973) synonymized *Eremberga* with *Zophodia.* I feel that sufficient differences exist with regard to the male antenna (with basal cluster of sensilla in *Zophodia,* without sensilla in *Eremberga*), the male genitalia (juxta with base membranous in *Zophodia,* base broadly sclerotized in *Eremberga*), the female genitalia (ductus seminalis attached near anterior end of corpus bursae in *Zophodia,* attached near (or to) ductus bursae in *Eremberga*), and larval hosts (*Zophodia* larvae feed in the fruits of gooseberries and currants, those of *Eremberga* bore in hedgehog cactus) to maintain the genera as discrete taxa.

KEY TO SPECIES OF *EREMBERGA*

1. Forewing with conspicuous dark discal spot and dark transverse lines (plate 3, figure 5) ..... *insignis* p. 80

— Forewing without conspicuous dark discal spot and dark transverse lines (plate 2, figures 13, 16) 2

2. Forewing mostly gray with distinct, dark longitudinal lines (plate 2, figure 13) ..... *leuconips* p. 79

— Forewing chiefly white with some pale reddish brown in posterior half, and weakly developed, dark, longitudinal lines (plate 2, figure 16) .. .. *creabates* p. 79

Eremberga leuconips (Dyar)

PL. 2, FIG. 13 (RWH 5984).

Cactobrosis leuconips Dyar, 1925b, *Ins. Insc. Mens.,* **13**: 224.
Type locality: Baboquivari Mountains, Arizona. [USNM]

The presence of distinct, black, longitudinal lines on the veins of the forewing is a useful feature in identifying this moth. *Echinocereta strigalis* has similarly marked forewings, but the amount of black covering the various veins differs with these two species. This difference is given in detail under the diagnosis of *E. strigalis.* Wing length of *leuconips* 15.0–17.0 mm.

Larvae have been reared from red-flowered hedgehog cactus (*Echinocereus triglochidiatus* Engelmann). Some brief information on the appearance of the larva is given under the generic description.

Heinrich (1939, 1956) recorded *leuconips* only from several places in southern Arizona, mostly mountainous sites. The few additional moths of this species that I have seen also have been collected in southern Arizona. Flight occurs in July, August, and September.

Eremberga creabates (Dyar)

PL. 2, FIG. 16 (RWH 5985).

Olyca creabates Dyar, 1923, *Ins. Insc. Mens.,* **11**: 29.
Type locality: San Diego, California. [USNM]

Eremberga creabates is the palest species in the genus. The forewings are mostly white with some pale reddish brown in the posterior half of the wing, and with thin, weakly formed, dark longitudinal lines. Apparently, few specimens have been collected.

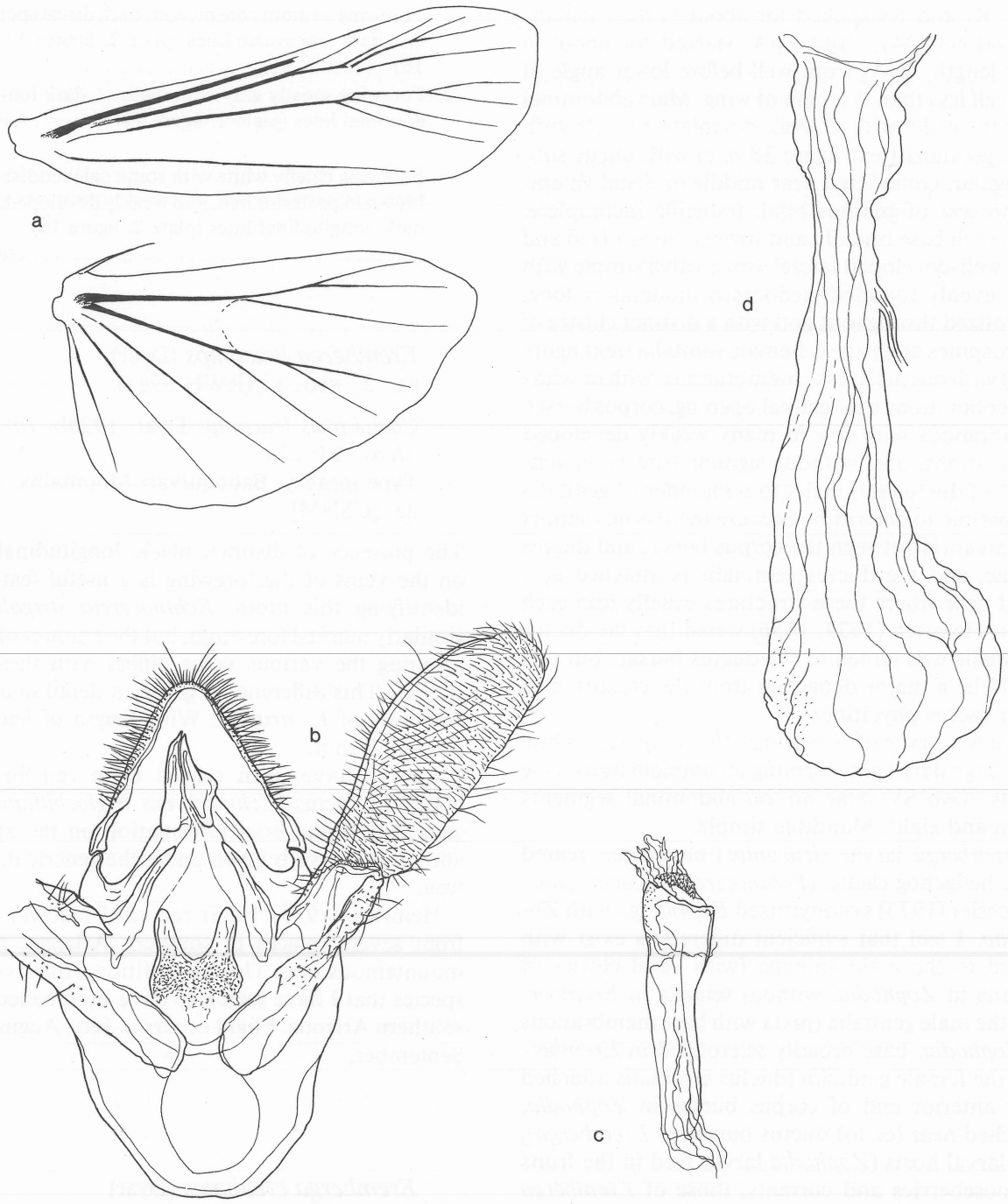

FIGURE 38: VENATION AND GENITALIA OF *EREMBERGA INSIGNIS*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 2446). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3229).

Those I have seen are all from San Diego County, California. Wing length 16.0–17.0 mm.

Nothing is known about the immature stages and larval hosts of *creabates.* Collection dates include May for Borrego and July for San Diego.

Eremberga insignis Heinrich

PL. 3, FIG. 5. TEXT FIGS. 34 *c*; 38 *a–d* (RWH 5986).

Eremberga insignis Heinrich, 1939, *Proc. U.S.*

Natl. Mus., **86**: 378.
Type locality: San Luis Potosí, Mexico. [USNM]

Eremberga insignis is the only species in the genus with dark transverse lines and a distinct discal spot on the forewing. Wing length 12.0–16.0 mm. Heinrich (1939) described the species from San Luis Potosí, Mexico. Blanchard (1970), collecting in Big Bend National Park (Brewster Co., Texas) found that *insignis* is relatively common in the Park, and Knudson has collected several specimens from Culberson County, Texas.

The immature stages and larval hosts are unknown.

Heinrich (1939) reported July as the probable time of the flight for the species in Mexico; subsequent to Heinrich's publication, Mexican *insignis* have been caught in Nuevo León in July. In western Texas, adults have been collected in May, September, and October.

GENUS
Rhagea Heinrich

Rhagea Heinrich, 1956, *U.S. Natl. Mus. Bull.*, **207**: 237.
Type species: *Zophodia packardella* Ragonot, 1887. Original designation.

Adults of *Rhagea* have the following combination of character states: antenna simple in both sexes; labial palpus porrect in both sexes; distal part of gnathos distinctly lobed anteriorly; female genitalia with ductus bursae short, corpus bursae without signum, and ductus seminalis attached to anterior part of corpus bursae. The larvae feed on plants belonging to the Crassulaceae, Lennoaceae, and Orobanchaceae. There are two species in the genus. Both occur in the western United States, and one (*stigmella*) also is found in northern Baja California, Mexico.

Sensilla trichodea (cilia) of antenna of both sexes abundant and, at base of shaft, about ¼ to ⅔ as long as basal diameter of shaft. Frons slightly rounded, with some scales produced forward. Labial palpus extending anteriorly beyond eye two to three × diameter of eye. Maxillary palpus small, simple. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing slightly convex to straight (text figure 39 *a*); undersurface without sex-scaling or costal fold. Forewing smooth, without transverse ridges of raised scales or patches of raised scales; with 11 veins; R_2 from cell; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 slightly curved; M_2 and M_3 stalked for about ⅓ their lengths; CuA_1 and CuA_2 well separated at base; CuA_2 from before lower angle of cell. Hindwing (text figure 39 *a*) with seven veins; Sc + R_1 and Rs fused for over ½ their lengths beyond cell; M_{2+3} and CuA_1 fused for about ½ their lengths; cell less then ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figures 39 *b, c,* 40 *a, b*) with uncus broad, constricted near middle; apical process of gnathos bipartite or with two elements fused, but always lobed anteriorly; transtilla incomplete; juxta with rather long, convergent lateral arms; valva simple; aedoeagus simple; vinculum about as long as greatest width. Female genitalia (text figures 39 *d,* 40 *c*) with ductus bursae short and with a weakly sclerotized semicircular plate or a patch of microspines near genital opening; corpus bursae membranous with weakly developed scobinations posteriorly, and without signum; ductus seminalis attached to anterior end of corpus bursae.

According to Heinrich (1956), larvae of *Rhagea stigmella* lack the pinaculum rings around the SD1 setae of the mesothorax and abdominal segment eight that are characteristic of most phycitine larvae.

KEY TO SPECIES OF *RHAGEA*

1. Apical part of gnathos greatly enlarged anteriorly (text figure 39 *b*); ductus bursae scobinate near genital opening but without sclerotized plate; wing length 7.5–10.0 mm ..... *packardella* p. 82
— Apical part of gnathos narrow anteriorly (text figure 40 *a*); ductus bursae with weakly developed sclerotized plate near genital opening; wing length 11.0–17.0 mm ..... *stigmella* p. 83

Rhagea packardella (Ragonot)
PL. 4, FIGS. 7–8. TEXT FIG. 39 *a–d* (RWH 5966).

Zophodia packardella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 12.
Type locality: California. [MNHP]

Zophodia orobanchella Dyar, 1904a. *Proc. Ent. Soc. Washington,* **6**: 111.
Type locality: Wawawai, Washington. [USNM]

Rhagea packardella usually can be recognized by the large, single, dark discal spot on the forewing (plate 4, figures 7, 8). Most specimens also have an abundance of white, and dark, longitudinal lines

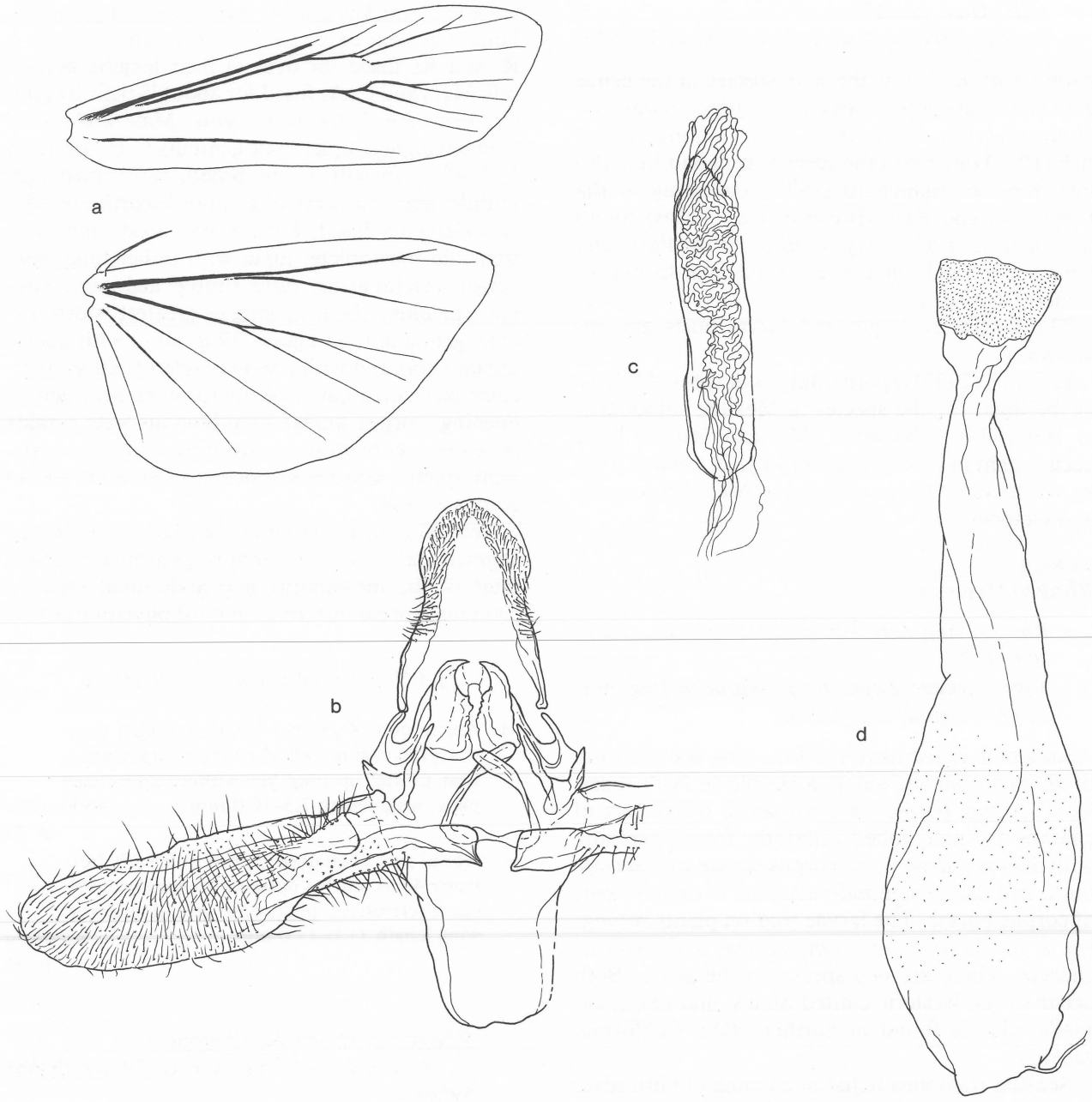

FIGURE 39: VENATION AND GENITALIA OF *RHAGEA PACKARDELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of right valva and aedoeagus omitted) (JAP 5736). *c.* Aedoeagus. *d.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 2293).

overlying the veins on the costal half of the forewing. *R. packardella* is a smaller species (wing length 7.5–10.0 mm) than *Rhagea stigmella.* Also, despite *stigmella*'s trivial name, the discal spot on the forewing of *packardella* is usually more obvious than in *stigmella.*

As far as I am aware, the immature stages of *packardella* have not been described.

The larval hosts are broomrape (*Orobanche ludoviciana* Nuttall (Orobanchaceae)) and *Pholisma* (Lennoaceae). Adults have been reared from larvae feeding in the flowers of broomrape in Washington (Dyar, 1904), and from the fleshy stems of *Pholisma* in the Mojave Desert by Powell (unpublished).

Rhagea packardella is present in much of the western United States. I have seen adult specimens

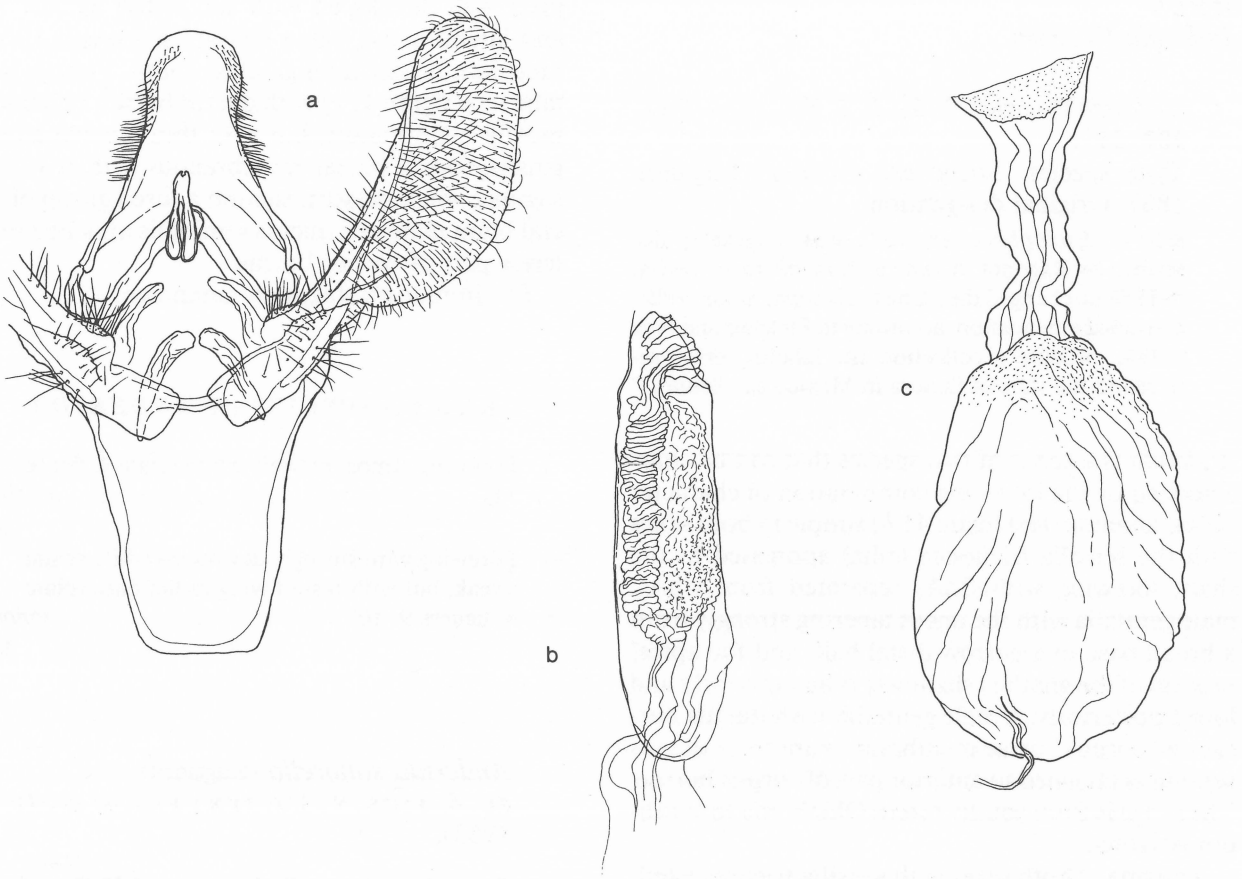

FIGURE 40: GENITALIA OF *RHAGEA STIGMELLA*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 2034). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3185).

from the following localities: north-central Colorado (September); southwestern Texas (May–September); central Utah (July); south-central Arizona (March); southeastern Washington (August); Mojave Desert and Channel Islands in California (April–June).

Rhagea stigmella (Dyar)

PL. 2, FIG. 17. TEXT FIGS. 34 *a*; 40 *a–c* (RWH 5967).

Zophodia stigmella Dyar, 1910a, *Pomona College Jour. Ent.*, **2**: 378.
Type locality: San Diego, California. [USNM]

Yosemitia maculicula Dyar, 1913a, *Ins. Insc. Mens.*, **1**: 34.
Type locality: La Puerta, California. [USNM]

Differences between *stigmella* and *packardella* are given in the species key and under *packardella*. Wing length of *stigmella* 11.0–17.0 mm.

The only information on the appearance of the larva of *stigmella* is that it lacks pinaculum rings around SD1 on the mesothorax and the eighth abdominal segment (Heinrich, 1956).

Host plants are species of live-forever (*Dudleya caespitosa* (Haworth) Britton and Rose, *Dudleya cymosa* (Lemaire) Britton and Rose, *Dudleya lanceolata* (Nuttall) Britton and Rose, and *Dudleya multicaulis* (Rose) Moran (Crassulaceae)). Larvae bore into the roots of the plants.

Rhagea stigmella has been collected only in coastal and desert regions of California and Baja California. In coastal California adults are in flight from late April to July and again in September and October. The few moths I have seen from Mexico were all obtained at lights in June.

GENUS
Anderida Heinrich

Anderida Heinrich, 1956, *U.S. Natl. Mus. Bull.*, **207**: 211.
Type species: *Euzophera sonorella* Ragonot, 1887. Original designation.

NOTE—*Euzophera sonorella* was originally described by Ragonot in 1887 as *Euzophera senorella*; in 1888 he changed the name to *Euzophera sonorella,* a justified emendation, according to Fletcher and Nye (1984), because a collection site labeling error referred to the state of Sonora in Mexico as "Senora."

Anderida is a genus of two species that can be characterized by the following combination of character states: antenna (text figure 41 *b*) simple in both sexes with the sensilla trichodea (cilia) appressed to the shaft; forewing with CuA_1 separated from CuA_2; male genitalia with the uncus tapering strongly from a broad base to a narrow distal half, and the apical process of the gnathos shallowly bifid anteriorly and lobed posteriorly; female genitalia with ductus bursae and corpus bursae membranous and with ductus seminalis attached to anterior part of corpus bursae. The range is from southwestern Oklahoma to southern Arizona.

Antenna of both sexes with sensilla trichodea (cilia) of shaft moderately abundant, short and closely appressed to shaft. Frons rounded, with scales directed somewhat anteriorly. Labial palpus obliquely upturned. Maxillary palpus small, squamous. Haustellum well to moderately well developed. Ocellus present. Basal ½ of costa slightly convex (text figure 41 *a*); forewing smooth, without transverse ridge or tufts of scales, with 11 veins; R_2 from cell, separate from stalk of R_{3+4} and R_5; R_{3+4} and R_5 stalked for about ½ their lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for less than ½ their lengths; CuA_1 and CuA_2 separate. Hindwing (text figure 41 *a*) with seven veins; Sc + R_1 and Rs fused for about ½ their lengths beyond cell; M_{2+3} and CuA_1 stalked for less than ½ their lengths; CuA_2 from well before lower angle of cell; cell about ½ length of wing. Male abdominal segment eight with paired ventrolateral scale tufts; each tuft a fascicle of many simple, thin, more or less straight scales. Strongly developed, broadly U-shaped bar associated with tufts. Male genitalia (text figure 41 *c, d*) with uncus subtriangular, tapering from broad base to narrow distal part; apical process of gnathos shallowly bifid anteriorly and lobed posteriorly; transtilla incomplete, reduced to small lateral sclerites; juxta well developed with somewhat narrow base and lateral arms; valva simple; aedoeagus simple; vinculum longer than greatest width. Female genitalia (text figure 41 *e*) with ductus bursae rather long, mostly membranous but with thin lamella antevaginalis; corpus bursae membranous with or without signum; when present, signum a fused group of several blunt platelets; ductus seminalis attached to anterior part of corpus bursae.

The immature stages are unknown.

KEY TO SPECIES OF *ANDERIDA*

1. Forewing almost entirely white (plate 4, figure 11) ..... *peorinella* p. 85
— Forewing with strongly developed white costal streak, but with rest of wing rather dark (plate 4, figures 9, 10) ..... *sonorella* p. 84

Anderida sonorella (Ragonot)

PL. 4, FIGS. 9, 10. TEXT FIG. 41 *a–e* (RWH 5933).

Euzophera senorella [sic] (see NOTE under genus) Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 14.
Type locality: Sonora, Mexico. [MNHP]

Euzophera placidella Dyar, 1908, *Proc. Ent. Soc. Washington,* **10**: 115.
Type locality: Yuma County, Arizona. [USNM]

Anderida sonorella has the ground color of the forewing fuscous with the costal area mainly white. Dark transverse patches are usually associated with the antemedial and postmedial lines, but some specimens lack this banding. The appearance of the antenna (text figure 41 *b*) with the sensilla trichodea (cilia) very short and barely projecting from the shaft, in conjunction with the elongate condition of the distal half of the uncus of the male genitalia are the most useful diagnostic features of the genus. Wing length 6.5–10.0 mm.

The immature stages and larval hosts are unknown.

I have seen *sonorella* moths collected in southern Arizona in May, in southwestern Oklahoma in July, and in central and western Texas in May, June, August and September.

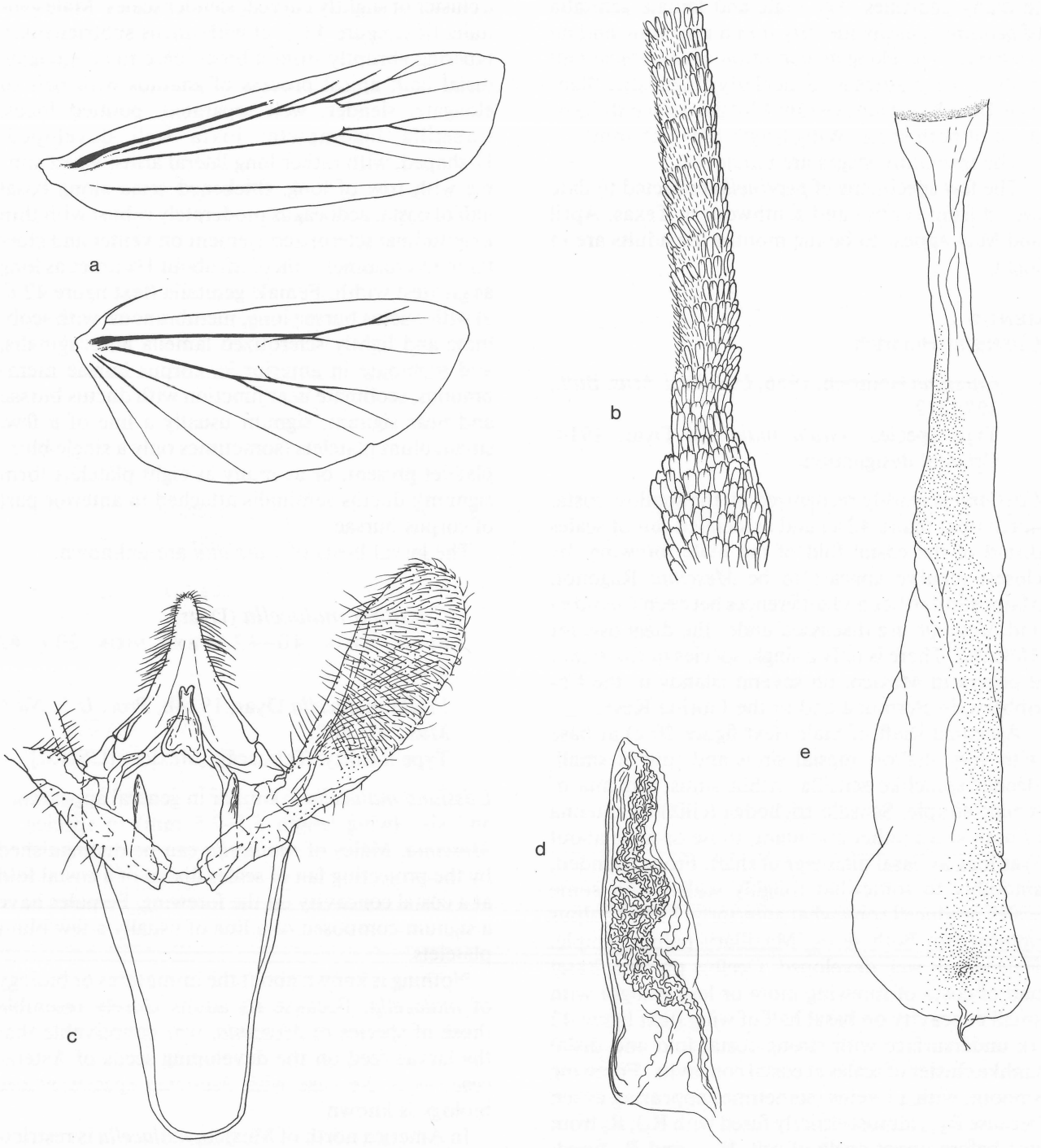

FIGURE 41: VENATION, ANTENNA, AND GENITALIA OF *ANDERIDA SONORELLA*

a. Male forewing and hindwing. *b.* Male antenna, scape, and basal part of shaft. *c.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 1284). *d.* Aedoeagus. *e.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 1285).

Anderida peorinella Blanchard and Knudson
PL. 4, FIG. 11.

Anderida peorinella Blanchard and Knudson, 1985b, *Proc. Ent. Soc. Washington,* **87**: 477.

Type locality: Lake Tawakoni, Wind Point Park, Hunt County, Texas. [USNM]

Adults of *peorinella* are very similar in general appearance (mostly pale, mostly unmarked forewings)

to many peoriines. The male and female genitalia of *peorinella* easily identify it as a phycitine and an *Anderida.* The elongate condition of the apical half of the male gnathos is particularly diagnostic. Blanchard and Knudson (1985b: 478) illustrated the genitalia of both sexes. Wing length 8.0–12.5 mm.

The immature stages are unknown.

The few specimens of *peorinella* collected to date are all from central and southwestern Texas. April and May appear to be the months the adults are in flight.

GENUS
Cassiana Heinrich

Cassiana Heinrich, 1956, *U.S. Natl. Mus. Bull.*, **207**: 212.
Type species: *Vitula malacella* Dyar, 1914. Original designation.

Cassiana is readily recognized by the shallow costal notch (text figure 42 *a*) and associated fan of scales distad of the costal fold of the male forewing. Its closest relative appears to be *Mescinia* Ragonot. Major similarities and differences between *Cassiana* and *Mescinia* are discussed under the diagnosis for *Mescinia.* There is only a single species of *Cassiana*; it occurs in Mexico, on several islands in the Caribbean, in Bermuda and in the Florida Keys.

Antennal shaft of male (text figure 20 *c*) at base with very shallow mesial sinus and row of small, slender spinelike sensilla within sinus; antenna of female simple. Sensilla trichodea (cilia) of antenna of both sexes rather abundant, those of male about ⅓ as long as basal diameter of shaft. Frons rounded, smoothly to somewhat roughly scaled with some scales produced somewhat anteriorly. Labial palpus upturned in both sexes. Maxillary palpus simple. Haustellum well developed. Ocellus present. Basal half of costa of forewing more or less straight with small concavity on basal half of wing (text figure 42 *a*); undersurface with strong costal fold and distal fanlike cluster of scales at costal concavity. Forewing smooth, with 11 veins (sometimes appearing as ten because R_{3+4} almost entirely fused with R_5); R_2 from just before upper angle of cell; R_{3+4} and R_5 fused, with R_{3+4} a very short distal spur; M_2 and M_3 stalked for about ½ their lengths; CuA_1 and CuA_2 separate. Hindwing (text figure 42 *a*) with six or seven veins; Sc + R_1 and Rs completely fused, or with Sc a small spur; M_{2+3} and CuA_1 fused for about ⅓ their lengths; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight with pair of ventrolateral scale tufts; each tuft a cluster of slightly curved, slender scales. Male genitalia (text figure 42 *b, c*) with uncus subtriangular, tapering abruptly from a broad base to an elongate distal half; apical process of gnathos with pair of elongate, slender, well separated, pointed lobes; transtilla incomplete; juxta well developed, U-shaped, with rather long lateral arms; valva simple with row of long, thickened setae along basal half of costa; aedoeagus moderately robust with thin longitudinal sclerotized element on venter and cluster of microspines; vinculum about 1¼ times as long as greatest width. Female genitalia (text figure 42 *d, e*) with ductus bursae long, membranous, with scobinate and lightly sclerotized lamella antevaginalis, and scobinate in anterior ⅔; corpus bursae membranous, scobinate near junction with ductus bursae and near signum; signum usually a line of a few, small, blunt platelets (sometimes only a single blunt platelet present, or as many as eight platelets form signum); ductus seminalis attached to anterior part of corpus bursae.

The larval hosts of *Cassiana* are unknown.

Cassiana malacella (Dyar)
PL. 1, FIGS. 40–42. TEXT FIGS. 20 *c*; 42 *a–e.*

Vitula malacella Dyar, 1914b, *Proc. U.S. Natl. Mus.*, **47**: 408.
Type locality: Tehuacán, Mexico. [USNM]

Cassiana malacella is similar in general appearance and size (wing length 5.5–7.5 mm) to species of *Mescinia.* Males of *malacella* can be distinguished by the projecting fan of scales distad of a costal fold at a costal concavity on the forewing. Females have a signum composed of a line of usually a few blunt platelets.

Nothing is known about the immatures or biology of *malacella.* Because its adults closely resemble those of species of *Mescinia,* it is conceivable that the larvae feed on the developing seeds of Asteraceae, as is the case with *Mescinia* species whose biology is known.

In America north of Mexico, *malacella* is restricted to the Florida Keys. Moths have been collected as follows: Upper Key Largo and Bahia Honda State Recreation Area, Monroe Co. (February).

GENUS
Mescinia Ragonot

Mescinia Ragonot, 1901, *Mem. sur les Lépid.*, **8**: 83.

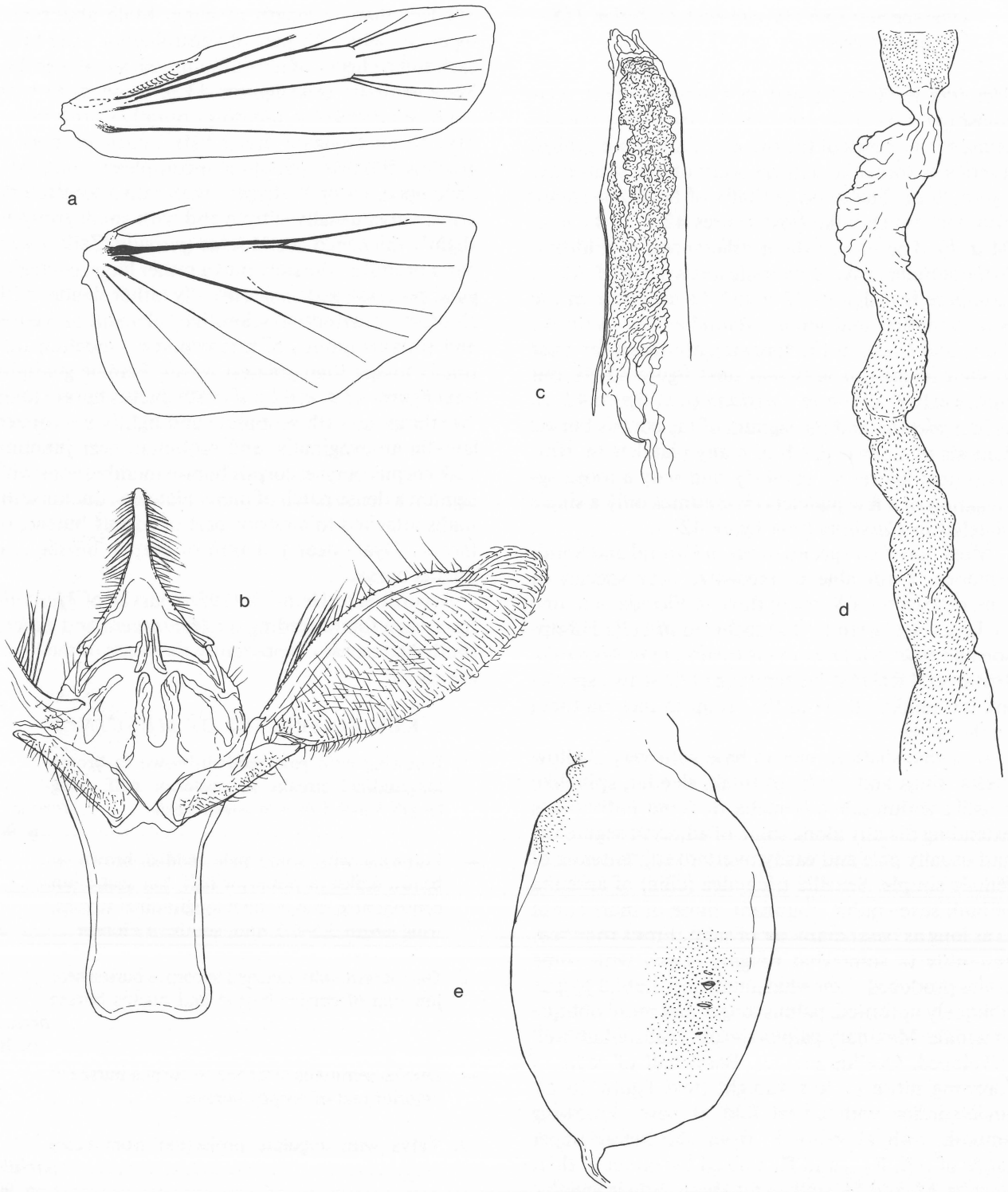

FIGURE 42: VENATION AND GENITALIA OF *CASSIANA MALACELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 3173). *c.* Aedoeagus. *d.* Ductus bursae (HHN 3312). *e.* Corpus bursae and part of ductus seminalis (HHN 3312).

Type species: *Ephestia commatella* Zeller, 1881. Original designation.

Mescinia is closely allied to *Cassiana.* This relationship is especially apparent in comparing the antenna of the males of the two genera. In both groups a series of spinelike sensilla occur on the shaft (text figure 20 *c*). The male genitalia of both genera are also very much alike (text figures 42 *b, c*; 43 *b, c*; 44 *a, b*). The more salient differences, in addition to the simpler costa of the male forewing of *Mescinia* (compare text figures 42 *a* and 43 *a*), occur in the wing venation and female genitalia. For example, CuA_1 and CuA_2 in the forewing are fused for over ½ their lengths in *Mescinia* (text figure 43 *a*), but completely separate in *Cassiana* (text figure 42 *a*), as in *Anderida,* and the signum of the corpus bursae consists of a dense patch of many platelets in *Mescinia* (text figures 43 *e*; 44 *d*), and only a loose aggregation of a few platelets (sometimes only a single platelet) in *Cassiana* (text figure 42 *e*).

Most *Mescinia* species occur in Central and South America. I am able to recognize four species in America north of Mexico; three in Florida, and one in Texas. Heinrich (1956) included *discella* Hampson and *indecora* Dyar in his treatment of *Mescinia.* However, I feel that the genitalia of these two species are too unlike others in the group to include them in the genus.

Antennal shaft of male at base with very shallow mesial sinus and row(s) of small, slender, spinelike sensilla within sinus (sensilla in some individuals extending distally along some of adjacent segments, and usually pale and easily overlooked); antenna of female simple. Sensilla trichodea (cilia) of antenna of both sexes rather abundant, those of male about ⅓ as long as basal diameter of shaft. Frons rounded, smoothly to somewhat roughly scaled with some scales produced somewhat anteriorly. Labial palpus obliquely upturned, palpus longer and more oblique in female. Maxillary palpus simple. Haustellum well developed. Ocellus present. Basal half of costa of forewing more or less straight (text figure 43 *a*); undersurface with costal fold at base. Forewing smooth, with 11 veins; R_2 from well before upper angle of cell; R_{3+4} and R_5 stalked for about ½ their lengths; M_2 and M_3 stalked for about ½ their lengths; CuA_1 and CuA_2 from lower angle of cell, stalked for about ½–⅔ their lengths. Hindwing (text figure 43 *a*) with six or seven veins; Sc + R_1 and Rs usually completely fused (Sc + R_1 sometimes a small spur); M_{2+3} separate from CuA_1; CuA_1 from lower angle of cell; CuA_2 from well before lower angle of cell; cell less than ½ length of wing. Male abdominal segment eight with pair of ventrolateral scale tufts; each tuft a cluster of mesially curved, slender scales. Male genitalia (text figures 43 *b, c*; 44 *a, b*) with uncus subtriangular, tapering abruptly from a broad base to an elongate distal half; apical process of gnathos bilobed; transtilla incomplete; juxta well developed, U- or V-shaped, with rather long lateral arms; valva usually simple and with small group of slightly thickened costal setae (*parvula* (Zeller) with costa produced dorsally into a rather large, subtriangular process); aedoeagus usually rather slender with elongate, longitudinal sclerotized element on venter and sinuous groups of microspines; vinculum distinctly longer than greatest width. Female genitalia (text figures 43 *d, e*; 44 *c, d*) with ductus bursae long, membranous with scobinate and lightly sclerotized lamella antevaginalis, and scobinate near junction with corpus bursae; corpus bursae membranous with signum a dense patch of many platelets; ductus seminalis attached to anterior part of corpus bursae, or (*berosa* Dyar) near junction of corpus bursae and ductus bursae.

According to Heinrich (1956), larvae of *Mescinia* have been found feeding on *Melanthera* and *Bidens* (both Asteraceae). Apparently the seeds of the hosts are eaten.

KEY TO SPECIES OF *MESCINIA*

1. Forewing with pale reddish-brown to brown longitudinal streaks in posterior half; wing length 6.5–9.5 mm; western Texas ..... *texanica* p. 90

— Forewing with some pale reddish-brown or brown scales in posterior half, but scales not consolidated into distinct longitudinal streaks; wing length 5.5–6.5 mm; southern Florida 2

2. Ductus seminalis attached to corpus bursae near junction of corpus bursae and ductus bursae ..... *berosa* p. 90

— Ductus seminalis attached to corpus bursae at anterior end of corpus bursae 3

3. Valva with angulate projection from costa ..... *parvula* p. 90

— Costa of valva simple ..... *estrella* p. 88

Mescinia estrella Barnes and McDunnough
PL. 4, FIG. 1. TEXT FIG. 43 *a–e* (RWH 5934).

Mescinia estrella Barnes and McDunnough,

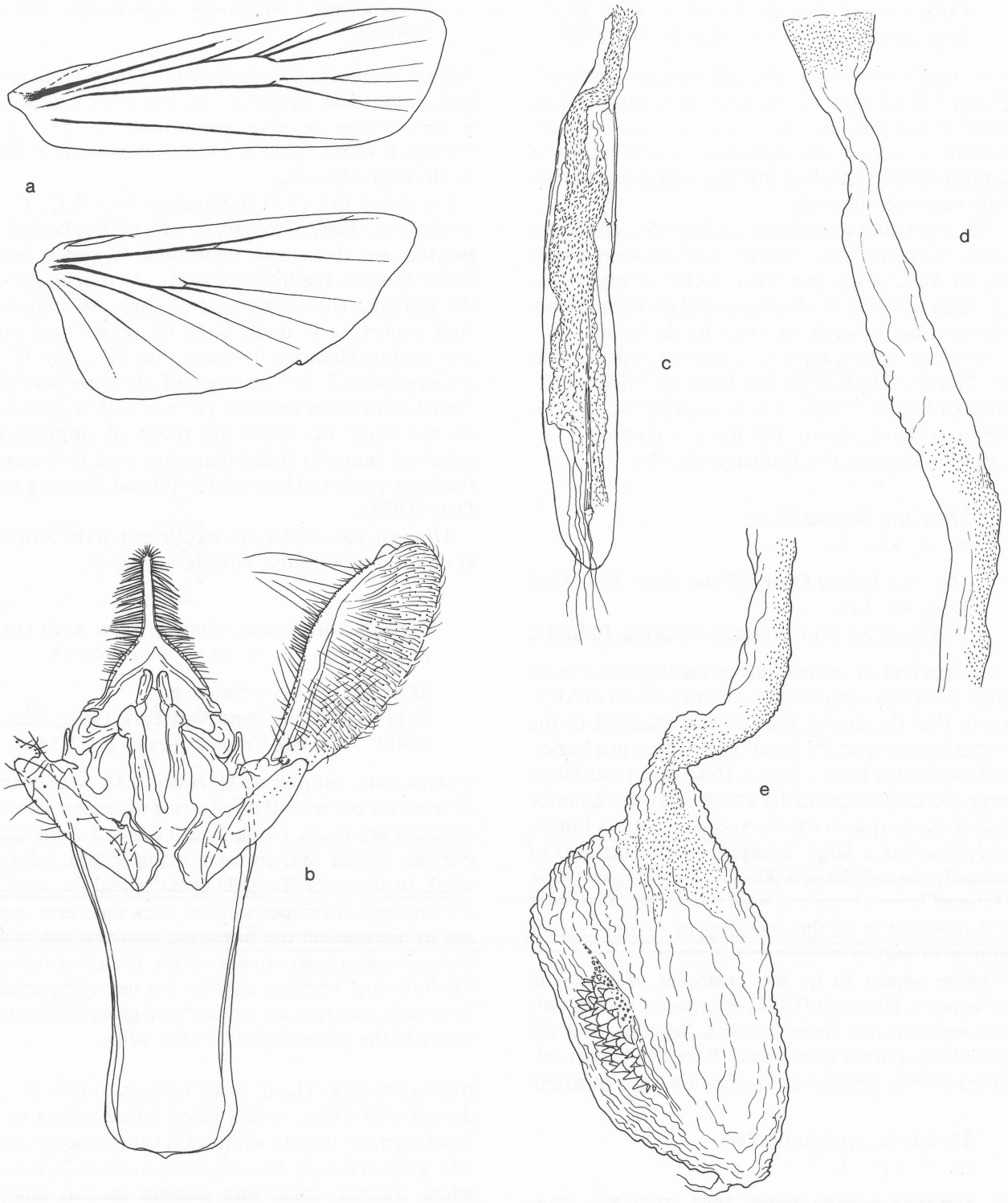

FIGURE 43: VENATION AND GENITALIA OF *MESCINIA ESTRELLA*

a. Male forewing and hindwing. *b.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 1786). *c.* Aedoeagus. *d.* Ductus bursae, posterior part (CH 3088). *e.* Corpus bursae, anterior part of ductus bursae, and part of ductus seminalis (CH 3088).

1913, *Contrib. Nat. Hist. Lep. N. A.,* **2**: 182.
Type locality: Everglade, Florida. [USNM]

Mescinia estrella is a small moth with a wing length of only 5.5–6.5 mm. The contrast between the white costal streak and the black lines and spots of the forewing is usually obvious, and the pale brown or reddish-brown scales on the forewing are generally distributed on the wing.

The immature stages have not been described, but adults of *estrella* have been reared from larvae feeding on *Melanthera parvifolia* (*radiata*) Small (Asteraceae) and *Bidens* (Asteraceae) (Heinrich, 1956). The developing seeds are eaten by the larvae.

Mescinia estrella appears to be restricted to southern Florida. Moth flight has been recorded as follows: Collier Co. (May); Lee Co. (December); Monroe Co. (March, April); Pinellas Co. (October, December); Sarasota Co. (January–March).

Mescinia berosa Dyar
PL. 4, FIG. 2.

Mescinia berosa Dyar, 1914a, *Proc. U.S. Natl. Mus.,* **47**: 341.
Type locality: Rio Trinidad, Panamá. [USNM]

The female of *M. berosa* can be distinguished from other *Mescinia* occurring in America north of Mexico in that the ductus seminalis is attached to the corpus bursae near the junction of the corpus bursae and the ductus bursae (other *Mescinia* in our fauna have the ductus seminalis attached at the anterior end of the corpus bursae). Also, the corpus bursae of *berosa* has a large, elongate patch (signum) of uniquely shaped platelets (Heinrich 1956: figure 966). Males of *berosa* have not been described. The color and maculation of the forewing of *berosa* is very similar to that of *estrella* and *parvula.*

There appear to be few examples of *berosa* in collections. Heinrich (1956) mentioned seeing only two females; one from Panamá (March), and the other from Puerto Rico (May). Recently Dickel collected several females in the Florida Keys (March).

Mescinia parvula (Zeller)
PL. 4, FIG. 3.

Ephestia parvula Zeller, 1881, *Hor. Soc. Ent. Ross.,* **16**: 249.
Type locality: Honda, Colombia. [BMNH]

Mescinia neoparvula Neunzig and Dow, 1993, *North Carolina Agric. Res. Service Technical Bull.,* **34**: 10. NEW SYNONYMY
Type locality: Mountain Pine Ridge, Belize. [USNM]

The most reliable means of identifying *parvula* is to look at the male genitalia. The valva of *parvula* has a pronounced angulate projection on the costa (Heinrich 1956: figure 471). This feature is absent in all other *Mescinia.*

Following my 1993 publication with L.C. Dow on the phycitines of Belize, in which *Mescinia neoparvula* was described, additional *Mescinia* from Belize became available for study. A comparison of the genitalia slides prepared of this new material with a previously made slide by myself and one prepared by Heinrich indicates that the name *Mescinia neoparvula* is a synonym of *Mescinia parvula.* Stated differences between *parvula* and *neoparvula* do not exist, but were the result of improperly mounted genitalia slides that were used to prepare the figures in both Heinrich (1956) and Neunzig and Dow (1993).

Mescinia parvula has been collected in the Florida keys, Monroe County, Florida in March.

Mescinia texanica Neunzig, NEW SPECIES
PL. 4, FIGS. 4, 5. TEXT FIG. 44 *a–d.*

Mescinia texanica Neunzig.
Type locality: Big Bend Natl. Park, Green Gulch, 5,400′, Brewster County, Texas. [USNM]

DIAGNOSIS. Similar to *M. estrella, M. berosa,* and *M. parvula* but with the following differences: most *texanica* are larger (wing length 6.5–9.5 mm) than *estrella, berosa* and *parvula* (wing length 5.5–6.5 mm); in *texanica* the pale costal streak is usually less strongly developed and the dark lines and spots not as obvious on the forewing; *texanica* has pale-brown longitudinal streaks in the posterior half of the forewing, whereas *estrella, berosa,* and *parvula* have only scattered unconsolidated groups of brown scales in the posterior half of the wing.

DESCRIPTION. Head: frons fuscous, more or less dusted with white, vertex paler; labial palpus with basal segment mostly white with some fuscous, distal segments mostly fuscous, sometimes dusted with white. Thorax: collar and dorsum fuscous dusted with white. Forewing: ground color fuscous dusted with white in costal half; antemedial line white, obscure, sharply angled inwardly at costa, more or less delineated distally by a black dentate line; postmedial line white, rather distinct, bordered basally and distally by black; posterior half with two pale

FIGURE 44: GENITALIA OF *MESCINIA TEXANICA*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 3215). *b.* Aedoeagus. *c.* Ductus bursae, posterior part (HHN 3169). *d.* Corpus bursae, anterior part of ductus bursae and part of ductus seminalis (HHN 3169).

reddish-brown or brown longitudinal streaks (streak adjacent to posterior margin of wing most strongly and uniformly developed); discal spots black, rather distinct. Hindwing pale fuscous with some fuscous shading at apex and along costal margin. Male genitalia (text figure 44 *a, b*): gnathos apically with pair of short, well-separated lobes; valva simple with cluster of short, thickened setae about midway on costa; juxta V-shaped with rather long, robust lateral arms; aedoeagus slender, with thin, longitudinal

sclerotized element on venter and internal group of sinuous microspines; vinculum about 1½ times as long as greatest width. Female genitalia (text figure 44 *c, d*) as in generic description.

The immature stages and host associations are unknown.

TYPES. Holotype: ♂. Big Bend Natl. Park, Green Gulch, 5,400′, Brewster Co., Texas, 2–4-VI-86, E. C. Knudson; genitalia slide 3215 HHN. USNM. Paratypes: (3 ♂, 12 ♀). Texas: same collection data as for holotype; genitalia slide 3216 HHN (1 ♀). Big Bend Natl. Park, Oak Springs, 4,500′, 4-VI-86, E. C. Knudson (1 ♀). McKittrick Canyon, Guadalupe Mts. N. P., Culberson Co., 17–19-V-90, E. C. Knudson (1 ♀). Dog Canyon Campgr., Guadalupe Mts. N. P., Culberson Co., 22-VI-90, E. C. Knudson (1 ♀). Tom Mays Park, El Paso. 28-VI-85, E. Knudson; genitalia slide 1202 ECK (1 ♀). Ft. Davis, 28-IV-1974, H. H. Neunzig, light trap; genitalia slides 326, 336, 345, 3168, 3169, 3170 HHN (3 ♂, 7 ♀). ECK, NCSU, USNM.

GENUS
Barberia Dyar

Barberia Dyar, 1905, *Proc. Ent. Soc. Washington,* 7: 39.
Type species: *Barberia affinitella* Dyar, 1905. Monotypy.

Shaffer (1968) demonstrated that *Barberia* belonged with the Phycitinae, despite its reduced haustellum, and he suggested, particularly on the basis of male genitalia, that the genus is closely allied with *Anderida.* The most obvious difference separating *Barberia* and *Anderida* is that the former genus has nine veins in the forewing while the latter group has 11 veins in the forewing. *Barberia* also shows some affinity to *Cassiana, Mescinia,* and *Bema* Dyar, but the male antenna of *Barberia* is simple, whereas *Cassiana, Mescinia,* and *Bema* have complex male antennae. There is a single species in *Barberia*; it occurs from southeastern Texas to southeastern Arizona.

Antenna of both sexes simple; sensilla trichodea (cilia) of shaft relatively abundant, very short and mostly obscured by scales. Frons rounded, with some scales produced anteriorly. Labial palpus upturned, slender. Maxillary palpus simple. Haustellum reduced. Ocellus present. Forewing of male with costa slightly convex in basal ½; without sex-scaling or costal fold. Forewing smoothly scaled, with nine veins; R_2 from near upper angle of cell; R_{3+4} and R_5 completely fused; M_1 rather straight; M_2 and M_3 completely fused; CuA_1 and CuA_2 from near lower angle of cell. Hindwing with seven veins; Sc + R_1 and Rs fused for most of their lengths beyond cell; M_2 and M_3 completely fused; CuA_1 from lower angle of cell; cell about ½ length of wing. Male abdominal segment eight without scale tufts. Male genitalia (text figure 45 *a, b*) with uncus rather broad in basal half, tapering abruptly distally into a narrow, elongate structure; apical process of gnathos elongate, slightly attenuated and blunt distally; transtilla incomplete; valva simple; aedoeagus simple; vinculum about as long as greatest width. Female genitalia (text figure 45 *c*) with ductus bursae membranous, narrow, scobinate near genital opening and near point of attachment to corpus bursae; corpus bursae membranous; signum a somewhat elongate, slightly crescent-shaped, sclerotized plate; a few scobinations in corpus bursae near point of attachment to ductus bursae and surrounding signum; ductus seminalis attached to corpus bursae near junction of corpus bursae and ductus bursae.

The immature stages are unknown.

Barberia affinitella Dyar

PL. 4, FIG. 12. TEXT FIG. 45 *a–c* (RWH 6036).

Barberia affinitella Dyar, 1905, *Proc. Ent. Soc. Washington,* 7: 39.
Type locality: Los Borregos, Brownsville, Texas. [USNM]

NOTE—Shaffer (1968) designated a lectotype.

The strongly tapered uncus together with small size (wing length 4.5–6.0 mm) and well-developed, pale costal band help to identify *affinitella.*

Adults of *affinitella* have been collected in the United States in southeastern Arizona in April and August–October, in southeastern Texas in March and June, and in southwestern Texas in May and November.

GENUS
Bema Dyar

Bema Dyar, 1914a, *Proc. U.S. Natl. Mus.,* **47**: 336.
Type species: *Bema myja* Dyar, 1914a. Original designation.

Relmis Dyar, 1914a, *Proc. U.S. Natl. Mus.,* **47**: 336.
Type species: *Relmis ydda* Dyar, 1914a. Original designation.

Males of *Bema* are easily recognized by the following combination of character states: antenna with scape enlarged, triangular (text figure 20 *b*); frons bearing

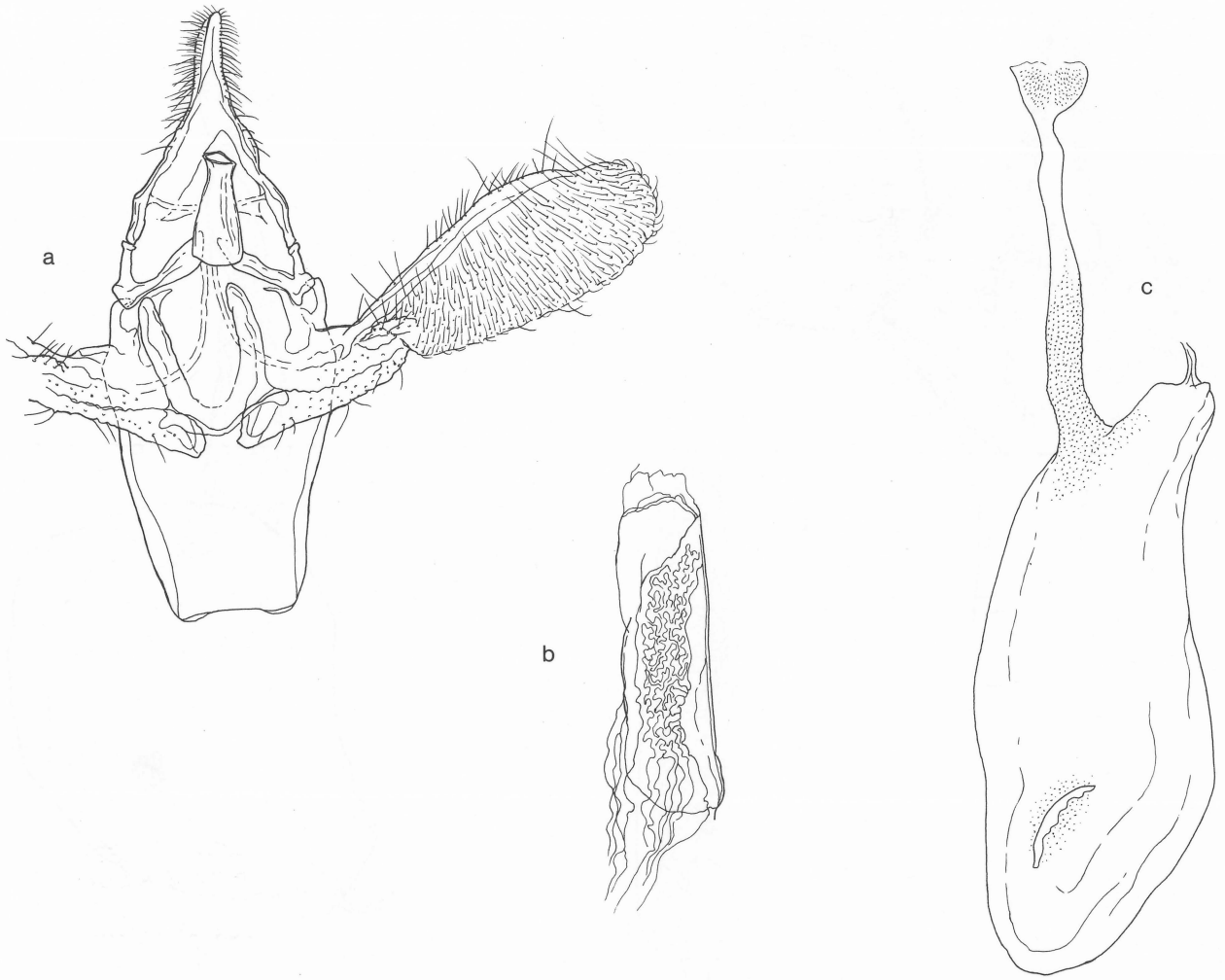

FIGURE 45: GENITALIA OF *BARBERIA AFFINITELLA*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 1576). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 3242).

a tubercle that projects upwards into a cavity between the antennae; mesothorax with two laterally located adjacent groups of sex-scales; valva of male broadly oval (text figure 46 *a*); corpus bursae asymmetrically and anterolaterally lobed with a digitate, disclike signum. *Bema* is chiefly Neotropical. Heinrich (1956) included five species in the genus, but a determination of the actual size of the genus will have to await future study. One species occurs in southern Florida.

Antenna of male with scape enlarged, triangular (text figure 20 *b*). Sensilla trichodea (cilia) of both sexes very abundant, and short, at base of shaft about 1/6 as long as basal diameter of shaft. Frons of male with dorsoposteriorly projecting tubercle. Vertex of male with concavity between antennae. Labial palpus upturned in both sexes. Maxillary palpus simple. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing of male slightly convex (text figure 47); undersurface with elongate costal fold. Forewing smooth, with nine–ten veins; R_2 from upper angle of cell; R_{3+4} and R_5 stalked for most of their lengths (R_{3+4} very short, sometimes missing); M_1 approximately straight; M_2 and M_3 completely fused; CuA_1 from lower outer angle of cell; CuA_2 from well before angle of cell. Hindwing (text figure 47) with six–seven veins; Sc + R_1 and Rs completely fused or Sc + R_1 a short spur from Rs; M_2 and M_3 completely fused; CuA_1 adjacent to M_2 and M_3 at base from lower angle of cell; cell about 1/3 as long as length of wing. Lateral mesothoracic sclerite with two adjacent groups of sex-scales (one group com-

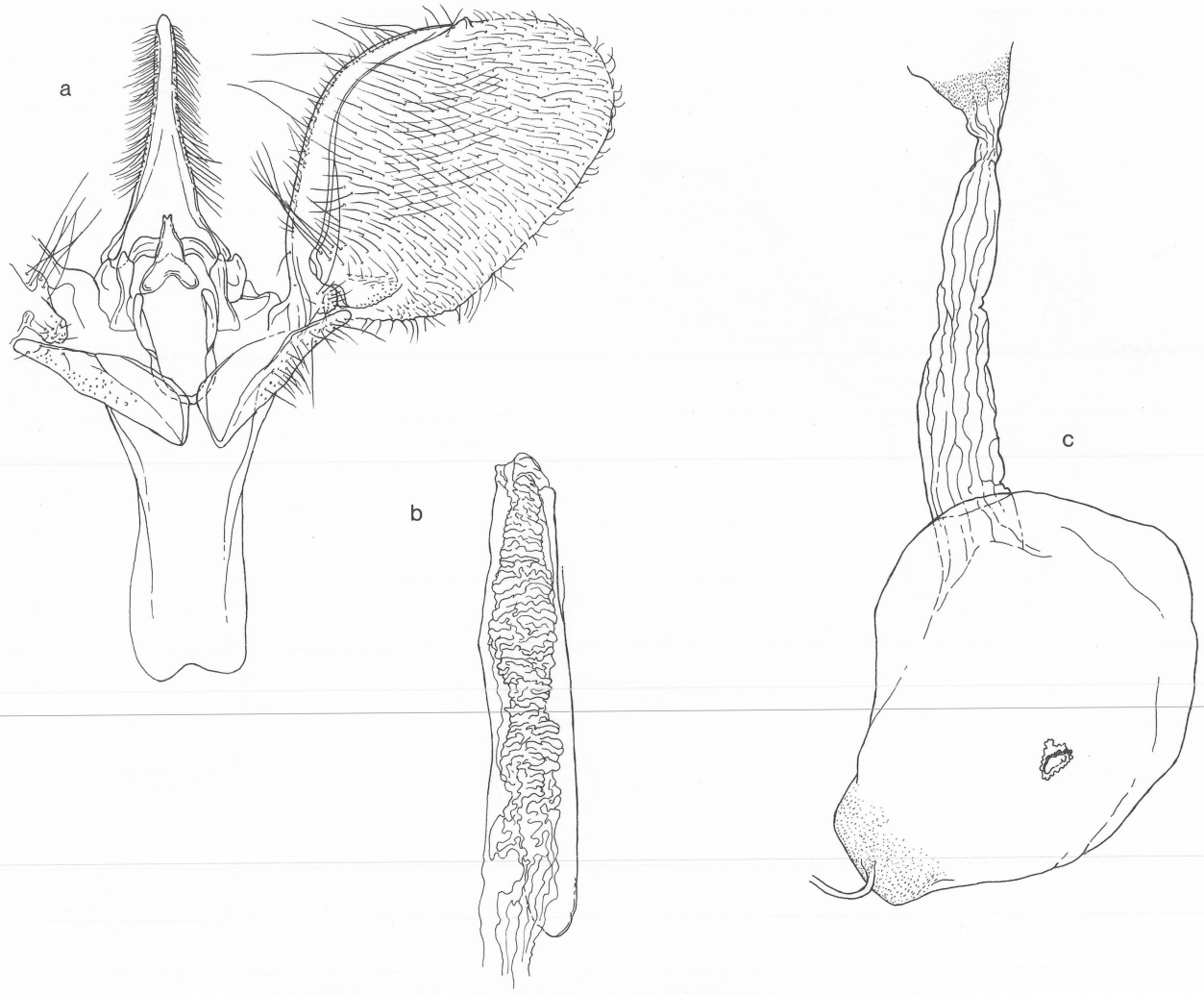

FIGURE 46: GENITALIA OF *BEMA NEURICELLA*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 3175). *b.* Aedoeagus. *c.* Corpus bursae, ductus bursae, and part of ductus seminalis (HHN 1375).

posed of many, short, white, compactly arranged scales, the other consisting of a fascicle of longer white scales); male abdominal segment eight with two pairs of dark, dorsolateral scale tufts and a more posterior group of white sex-scales that usually completely encircle the abdomen. Male genitalia (text figure 46 *a, b*) with uncus subtriangular, tapering from base to elongate, narrow distal half; apical process of gnathos subtriangular, shallowly notched posteriorly and bilobed anteriorly; transtilla incomplete; juxta U-shaped with slender lateral arms; valva broadly oval, costa strongly convex and terminating in a short spur; aedoeagus simple, somewhat elongate; vinculum about 1½–2× greatest width. Female genitalia (text figure 46 *c*) with ductus bursae membranous and rather long; corpus bursae membranous; signum a multipointed, irregular plate; ductus seminalis from anterior of corpus bursae.

Larvae of *Bema* have not been described. However, Heinrich (1956) reported that in *neuricella* the food plant is *Inga* Scopoli (Fabaceae).

Bema neuricella (Zeller)

PL. 2, FIG. 18. TEXT FIGS. 20 *b*; 46 *a–c*; 47.

Ephestia neuricella Zeller, 1848, *Isis Von Oken,* **41**: 862.

Type locality: St. Thomas, U.S. Virgin Islands. [HUMB]

As outlined in the generic description of *Bema,* the male of *neuricella* has the frons and vertex unusually modified, and these features along with the enlarged antennal scape make it easy to recognize. The female, although lacking these unique features, has a distinct enough wing pattern (plate 2, figure 18) to associate it, usually without too much difficulty, with the male. Wing length of *neuricella* 8.0–10.0 mm.

Heinrich (1956) mentioned that he had seen several moths of *neuricella* reared in Havana, Cuba, from larvae feeding on *Inga* sp., a member of the Fabaceae. Apparently the larvae bore into the developing seeds of the host.

I have examined small series of *Bema* in the USNM collection from the Caribbean, Central America, and Mexico identified as *neuricella,* as well as *Bema* from Florida. All of those in the USNM, including some recently collected, are generally smaller and distinctly paler than the moths from Florida. However, there appear to be no structural differences. Additional studies will be needed to establish with certainty the identity of the Florida moths as well as to clarify the status of Dyar's names included by Heinrich (1956) under *Bema.* Specimens from Florida were collected in the following counties: Lee Co. (November); Monroe Co. (January, February).

GENUS

Homoeosoma Curtis

> *Homoeosoma* Curtis, 1833, *Ent. Mag.,* **1**: 190. Type species: *Phycis gemina* Haworth, 1811, considered to be a synonym of *Tinea sinuella* Fabricius, 1794. Monotypy.
>
> *Phycidea* Zeller, 1839, *Isis von Oken,* **32**: 178. Type species: *Tinea sinuella* Fabricius, 1794. Designated by Heinrich, 1956, *Bull. U.S. Natl. Mus.,* **207**: 219.
>
> *Lotria* Gueneé, 1845, *Ann. Soc. ent. France,* **3**: 320.
> Type species: *Tinea sinuella* Fabricius, 1794. Designated by Desmarest, 1857, *Encylopédie d' Histoire Naturelle,* 255.

Homoeosoma, Patagonia, Unadilla, and *Phycitodes* in our fauna, and a few additional genera recognized by Roesler (1973) elsewhere in the world, form an easily recognized complex. All have the base of the antennal shaft of the male distinctly notched (plate D, figure 2), and all appear to be associated as larvae chiefly with the flowers and developing seeds of Asteraceae. In America north of Mexico, *Homoeosoma* differs from *Patagonia, Unadilla,* and *Phycitodes* in having the apical process of the gnathos rather large and subtriangular, and the signum of the corpus bursae a tightly formed cluster of sclerotized platelets. *Homoeosoma,* a genus of many species, is distributed throughout most of the world (Goodson and Neunzig, 1993; Heinrich, 1956; Janse, 1945; Neunzig and Goodson, 1992; Roesler, 1973; Turner, 1947). Most described species are in the temperate regions.

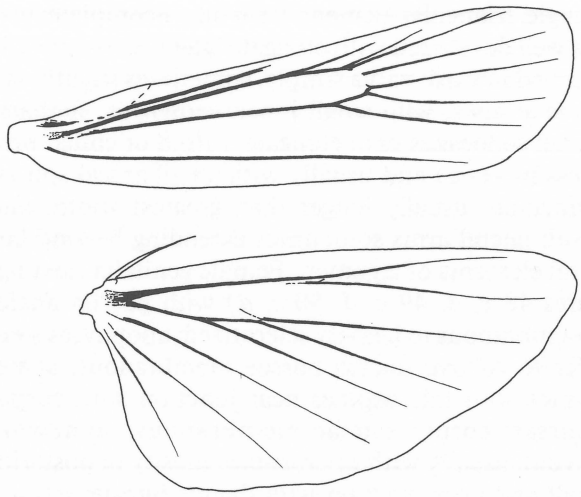

FIGURE 47: VENATION OF MALE *BEMA NEURICELLA.*

Sensilla trichodea (cilia) of male and female antennal shaft abundant and about ⅛ to ¼ as long as basal diameter of shaft. Frons rounded with many scales directed forward. Labial palpus upcurved to porrect. Maxillary palpus simple. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing slightly concave to slightly convex (text figure 51 *a*); undersurface with or without costal fold. Forewing smooth, usually with ten veins (nine in a few species); R_2 from before upper angle of cell; R_{3+4} and R_5 completely fused; M_2 and M_3 stalked for over ½ their lengths (sometimes completely fused); CuA_1 and CuA_2 well separated at base; CuA_2 from before lower angle of cell. Hindwing (text figure 51 *a*) with seven veins; Sc + R_1 and Rs stalked for most of their lengths beyond cell (Sc + R_1 usually only a short spur); M_2 + M_3 and CuA_1 separate at base; cell less than ½ length of wing. Male abdominal segment eight simple, *or* with ventral, median, thornlike process (text figure 51 *c–e*), *or* a pair of lateral scale tufts. Male genitalia (text figures 48 *a, b,* 49 *a, b,* 50 *a, b*) with uncus subtriangular, apex rounded (sometimes expanded laterally and somewhat spoon shaped); inner surface with patches of small setae; apical process of gnathos with enlarged,

single, triangular element; transtilla incomplete; juxta well developed with elongate lateral arms apically turned inward; valva simple, sometimes slightly falcate at apex, with small inner, setiferous, subbasal lobe; aedoeagus with elongate, ridged or coiled process in vesica and usually with small apical spines; vinculum usually longer than greatest width, and with lateral arms sometimes extending beyond lateral elements of tegumen. Female genitalia (text figures 48 *c, d,* 49 *c, d,* 50 *c, d*) with papilla anales membranous to heavily sclerotized; apophyses slender to robust; ductus bursae membranous, sometimes with microspines near junction with corpus bursae; corpus bursae membranous, somewhat ovoid, usually with microspines mostly in posterior half and near junction with ductus bursae; signum located near middle or near anterior of corpus bursae and formed of tight cluster of blunt or sharp toothlike platelets; ductus seminalis attached to corpus bursae near junction with ductus bursae.

Homoeosoma larvae (text figure 53 *a, b*) are of two kinds: relatively slender bodied with longitudinal stripes, and distinct, complete SD1 pinaculum rings on the mesothorax and abdominal segment eight; or, rather robust bodied with transverse bands, and indistinct, incomplete SD1 pinaculum rings on the mesothorax and eighth abdominal segment. Mandibles simple. Maxilla with simple sensilla trichodea. Pupa (based on *electellum* (Hulst) and *heinrichi* Pastrana) with thoracic spiracles present or absent. Gibba absent. Cremastral setae composed of four inner, posteriorly projecting, hooked setae and two outer, slightly longer, lateroposteriorly projecting hooked setae.

Larval host plants are mainly species of Asteraceae. Many *Homoeosoma* are associated with thistles (*Cirsium* spp.). Mostly, the developing seeds of the host are eaten.

KEY TO SPECIES OF *HOMOEOSOMA*
[After Goodson and Neunzig (1993)]

1. Males 2
— Females 21

2. Abdominal segment eight with well-formed ventral, posteriorly projecting thornlike process (text figure 51 *c, d*) 3
— Abdominal segment eight simple *or* with small, rudimentary, ventral, posteriorly projecting process (text figure 51 *e*) 12

3. Apex of valva slightly falcate 4
— Apex of valva rounded or slightly pointed 6

4. Arms of vinculum extending beyond lateral elements of tegumen (similar to text figures 48 *a,* 49 *a*); forewing with longitudinal, brownish-black lines, giving wing a striated appearance ..... *striatellum* p. 107
— Arms of vinculum not extending beyond lateral elements of tegumen, or only slightly so (similar to text figure 50 *a*); forewing usually with reddish-yellow or brownish-yellow scales scattered over posterior half of wing 5

5. Anterior margin of apical process of gnathos usually slightly concave, without distinct medial lobe ..... *albescentellum* p. 109
— Anterior margin of apical process of gnathos with distinct medial lobe ..... *impressale* p. 109

6. Arms of vinculum extending posteriorly beyond lateral elements of tegumen (similar to text figures 48 *a,* 49 *a*) 7
— Arms of vinculum not extending beyond lateral elements of tegumen (similar to text figure 50 *a*) 8

7. Forewing mostly white, without heavily contrasting, dark antemedial patch; forewing length 7.5–9.0 mm; California ..... *oxycercus* p. 108
— Forewing with heavily contrasting, dark antemedial patch; forewing length 6.5–7.0 mm; southern Texas ..... *parvalbum* p. 108

8. Forewing mostly white 9
— Forewing mostly dark brown or grayish brown 10

9. Forewing with broad, brownish-black and dark-brown antemedial patch, postmedial line with distinct, continuous brownish-black and dark-brown proximal border ..... *ardaloniphas* p. 111
— Forewing with weakly formed, discontinuous, brownish-black and dark-brown antemedial patch that often appears as three small spots, postmedial line with weakly formed, often faint, dark proximal border ..... *eremophasma* p. 111

10. Forewing chiefly brown and dark brown, with broad, dark antemedial patch, usually with well-developed white subcostal streak .... *deceptorium* p. 109
— Forewing chiefly gray and grayish brown with antemedial patch not as well developed, white

subcostal streak weakly developed or not evident 11

11. Forewing with dark borders of antemedial and postmedial lines rather complete; larva found in flower heads of *Cirsium repandum* ..... *ammonastes* p. 110

— Forewing with dark borders of antemedial and postmedial lines fragmented into several spots; larva found in flower heads of *Cirsium horridulum* ..... *pedionnastes* p. 110

12. Forewing length 6.0–7.0 mm ..... *nanophasma* p. 106

— Forewing length 7.5–13.0 mm 13

13. Arms of vinculum well developed and extending beyond lateral elements of tegumen (similar to text figures 48 *a*, 49 *a*) 14

— Arms of vinculum weakly developed and not extending beyond lateral elements of tegumen (similar to text figure 50 *a*) 16

14. Forewing rather uniformly dark without white subcostal streak; positions of antemedial and postmedial lines not evident, sometimes faintly indicated 15

— Forewing not uniformly dark, either partially dark or rather pale (ochreous) and uniform or with white subcostal streak; positions of antemedial and postmedial lines usually evident 17

15. Apical process of gnathos relatively large and irregularly shaped; forewing with veins M_2 and M_3 usually fused for their entire lengths ..... *oslarellum* p. 108

— Apical process of gnathos smaller, more uniform; forewing with veins M_2 and M_3 stalked ..... *phaeoboreas* p. 105

16. Forewing mostly white ..... *illuviellum* p. 108

— Forewing sprinkled with near equal mixture of white and dark brown or brownish black ..... *emendator* p. 109

17. Forewing largely dark brown with well-developed dark antemedial patch 18

— Forewing paler, almost totally ochreous to grayish brown, usually with white subcostal streak 19

18. Forewing length approximately 7.5–9.0 mm; south-central United States ..... *asylonnastes* p. 107

— Forewing length approximately 8.0–12.0 mm; northeastern and western United States and southern Canada 19

19. Anterior margin of apical process of gnathos rounded, without medial lobe, lateral arms of gnathos usually arching posteriorly at apical process; northeastern United States and southern Canada ..... *stypticellum* p. 107

— Anterior margin of apical process of gnathos with medial lobe, lateral arms of gnathos usually arching only slightly at apical process; western United States ..... *uncanale* p. 107

20. Forewing grayish brown to almost totally ochreous; grayish-brown specimens usually with white subcostal streak and position of antemedial line indicated, at most, by one or two small dark spots; southern, midwestern, and northwestern United States and southcentral and southwestern Canada ..... *electellum* p. 99

— Forewing brown, sprinkled with white, usually with white subcostal streak, position of antemedial line usually indicated by three dark-brown spots; northeastern United States and southeastern Canada ..... *inornatellum* p. 106

21. Papillae anales heavily sclerotized (sometimes distinctly mucronate) 22

— Papillae anales mostly membranous (text figure 48 *c*) 27

22. Papillae anales distinctly mucronate ..... *oxycercus* p. 108

— Papillae anales not distinctly mucronate 23

23. Forewing mostly white 24

— Forewing mostly dark brown or grayish brown 25

24. Forewing with broad, brownish-black and dark-brown antemedial patch, postmedial line with distinct, continuous brownish-black and dark-brown proximal border; apophysis posterioris about 2.8 × length of sclerotized collar ..... *ardaloniphas* p. 111

— Forewing with weakly formed, discontinuous, brownish-black, and dark-brown antemedial patch, postmedial line with faint dark border;

apophysis posterioris about 2.5 × length of sclerotized collar ..... *eremophasma* p. 111

25. Forewing chiefly brown and dark brown, with broad, dark antemedial patch; forewing usually with well-developed, white subcostal streak ..... *deceptorium* p. 109

— Forewing chiefly gray and grayish brown, antemedial patch not as well developed; white subcostal streak on forewing weakly developed or not evident 26

26. Forewing with dark borders of antemedial and postmedial lines rather complete; larva found in flower heads of *Cirsium repandum* .... *ammonastes* p. 110

— Forewing with dark borders of antemedial and postmedial lines fragmented into several spots or not evident; larva found in flower heads of *Cirsium horridulum* ..... *pedionnastes* p. 110

27. Signum near middle of corpus bursae (similar to text figure 50 *d*) or slightly anterior to middle of corpus bursae 28

— Signum near anterior end of corpus bursae (similar to text figures 48 *d*, 49 *d*) 35

28. Forewing with generous sprinkling of reddish-yellow or brownish-yellow scales in posterior half 29

— Forewing without, or with light sprinkling of reddish-yellow or brownish-yellow scales 30

29. Forewing heavily sprinkled with dark brown, with intense dark antemedial patch .... *albescentellum* p. 109

— Forewing largely white with antemedial patch often less intense near its middle ..... *impressale* p. 109

30. Forewing with dark longitudinal lines, giving wing a striated appearance ..... *striatellum* p. 107

— Forewing largely white to mostly dark brown or brownish black 31

31. Forewing mostly dark brown or brownish black 32

— Forewing mostly white to near equal mixture of white and dark brown or brownish black ... 33

32. Forewing mostly dark brown with antemedial and postmedial lines moderately distinct; south-central United States ..... *asylonnastes* p. 107

— Forewing mostly brownish black or dark brown, antemedial and postmedial lines rarely evident; western United States ..... *oslarellum* p. 108

33. Forewing with highly contrasting antemedial patch; relatively small in size, forewing length 6.5–7.0 mm; southern Texas ..... *parvalbum* p. 108

— Forewing mostly white to near equal mixture of white and dark brown and brownish black, without highly contrasting antemedial patch; larger in size, forewing length 9.5–13.0 mm; western United States 34

34. Forewing mostly white ..... *illuviellum* p. 108

— Forewing sprinkled with near equal mixture of white and dark brown or brownish black ... . *emendator* p. 109

35. Forewing length 6.5–7.0 mm ..... *nanophasma* p. 106

— Forewing length 7.5–12.0 mm 36

36. Forewing with contrasting dark antemedial patch 37

— Forewing without contrasting antemedial patch 38

37. Northeastern United States and southern Canada ..... *stypticellum* p. 107

— Western United States ..... *uncanale* p. 107

38. Forewing rather uniformly dark brown .... *phaeoboreas* p. 105

— Forewing mostly ochreous to grayish brown ... 39

39. Forewing grayish brown to almost totally ochreous, grayish-brown specimens usually with white subcostal streak and position of antemedial line indicated, at most, by one or two small, ark spots; southern, midwestern, and northwestern United States and south-central and southwestern Canada ..... *electellum* p. 99

— Forewing brown, sprinkled with white, usually with white subcostal streak, position of antemedial line usually indicated by three dark-

brown spots; northeastern United States and southeastern Canada ..... *inornatellum* p. 106

In the following treatment, species have been chiefly arranged based on several morphological features (mainly genital) within the genus. These are 1) the length of the lateral arms of the vinculum relative to the length of the lateral elements of the tegumen; 2) the presence or absence, and size, of the thornlike process on the eighth male abdominal segment; 3) the amount of sclerotization of the papillae anales and the development of the apophyses; and 4) the location of the signum in the corpus bursae. The first group of species (*electellum, phaeoboreas, inornatellum, nanophasma, uncanale, stypticellum, striatellum, asylonnastes, oslarellum, parvalbum, oxycercus*) has vinculum arms that extend beyond the lateral elements of the tegumen, lack a thornlike process on the male abdomen, have weakly sclerotized papillae anales and slender apophyses, and have a signum in the anterior part of the corpus bursae. *Homoeosoma illuviellum, emendator, albescentellum, impressale, deceptorium, ammonastes, pedionnastes, eremophasma,* and *ardaloniphas* show a tendency toward shorter vinculum arms, the development of a strong thornlike process on the male abdomen, more heavily sclerotized papillae anales, more robust apophyses, and a migration of the signum to the middle of the corpus bursae. Heinrich (1956) used some of these same character states to attempt to establish discrete groups within the genus. A clear cut division, however, seems impossible. Information on the immature stages is exceedingly limited, but those species considered first appear to have rather slender, longitudinally striped larvae, whereas some of the species taken up later are distinctly robust and transversely banded.

Homoeosoma electellum (Hulst) (Sunflower Moth*; Pyrale du Tournesol, f. Fr.)
PL. 4, FIGS. 13–17; PL. D, FIG. 2. TEXT FIGS. 48 *a–d*; 51 *a*; 52 *a*; 53 *a* (RWH 5935).

Anerastia electella Hulst, 1887, *Ent. Americana,* **3**: 137.
Type locality: Blanco Co., Texas. [AMNH]
NOTE—A lectotype was designated by Goodson and Neunzig (1993).

Ephestia opalescella Hulst, 1887, *Ent. Americana,* **3**: 138.
Type locality: California. [USNM]
NOTE—A lectotype was designated by Goodson and Neunzig (1993).

Homoeosoma texanella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 15.
Type locality: Texas. [MNHP]

Homoeosoma tenuipunctella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 15.
Type locality: California. [MNHP]

Homoeosoma differtella Barnes and McDunnough, 1913, *Contrib. Nat. Hist. Lep. N. Am.,* **2**: 184.
Type locality: Everglade, Florida. [USNM]
NOTE—Goodson and Neunzig (1993) designated a lectotype for *differtella.*

NOTE—The synonymy given for *electellum* is that of Heinrich (1956), Munroe (1983), and Goodson and Neunzig (1993). It is likely that more than one species is included, as suggested by the absence of a subcostal streak and a general ochreous color in some specimens. An examination of the genitalia has revealed no differences; nevertheless, rearing studies need to be done to establish the correct status of the names.

The vast majority of *electellum* adults are gray with a white subcostal streak. Some are ochreous (rather than gray) or lack a subcostal streak or have both of these character states. Specimens of *H. inornatellum* are sometimes confused with *electellum,* but *inornatellum* has three, small, dark patches of scales bordering the antemedial line of the forewing, whereas *electellum* has at most one or two dark patches at the same location. Also, *electellum* occurs in the south-central and southwestern parts of Canada and throughout the southern, midwestern, and northwestern United States; *inornatellum* is restricted to southeastern Canada and the northeastern United States. Wing length of *electellum* 7.5–12.0 mm.

Last stage larva (text figure 53 *a*) 13.0–20.0 mm long. Head brownish yellow, darker near mouthparts and usually with dark streak between lateroposterior margin and stemmata; sometimes with faint reddish-brown tonofibrillary platelets. Thoracic shield mostly brownish yellow with dark-brown lateroposterior margin. Body mostly yellowish to bluish green with purple or reddish-brown longitudinal stripes or patches. SD1 pinaculum rings on

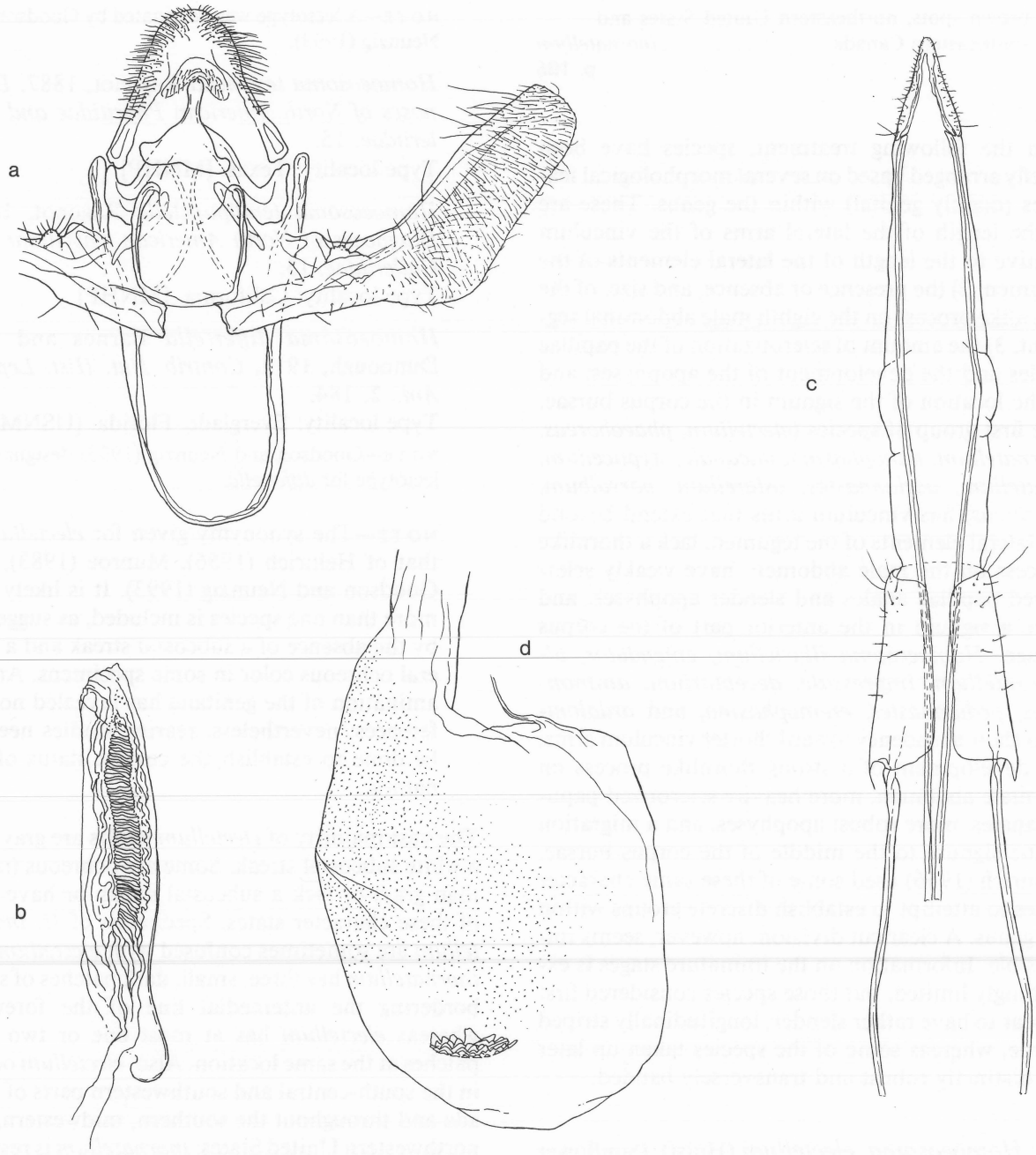

FIGURE 48: GENITALIA OF *HOMOEOSOMA ELECTELLUM*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 1235). *b.* Aedoeagus. *c.* Posterior part of female genitalia (HHN 1236). *d.* Corpus bursae, part of ductus bursae, and part of ductus seminalis (HHN 1234).

mesothorax and eighth abdominal segment well developed and dark brown. Pupa 9.0–13.0 mm long, yellowish brown. Thoracic spiracles present. Gibba absent. Six, hooked, slender setae on tenth segment.

Larvae of *electellum* are sometimes of major economic importance in the United States and Canada where sunflowers (*Helianthus annuus* L.) are commercially grown. Seed production as well as seed-oil quality can be significantly reduced. Oviposition occurs as soon as the host blooms. The eggs are placed singly or in small groups among or within the florets. The small larvae lay down silk partially

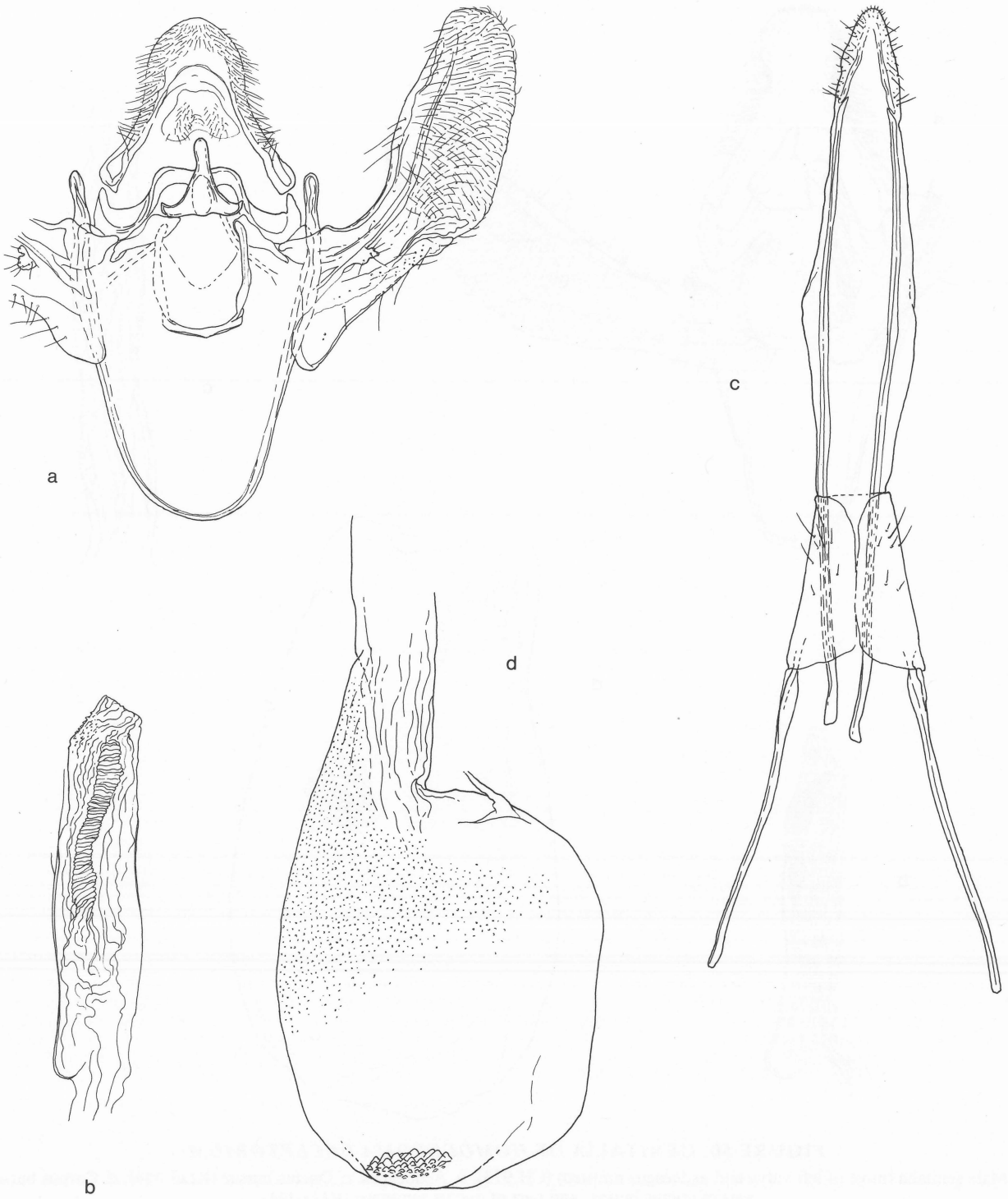

FIGURE 49: GENITALIA OF *HOMOEOSOMA NANOPHASMA*

a. Male genitalia, holotype (most of left valva and aedoeagus omitted) (HHN 3606). *b.* Aedoeagus. *c.* Posterior part of female genitalia (RLG 794). *d.* Corpus bursae, part of ductus bursae, and part of ductus seminalis (RLG 794).

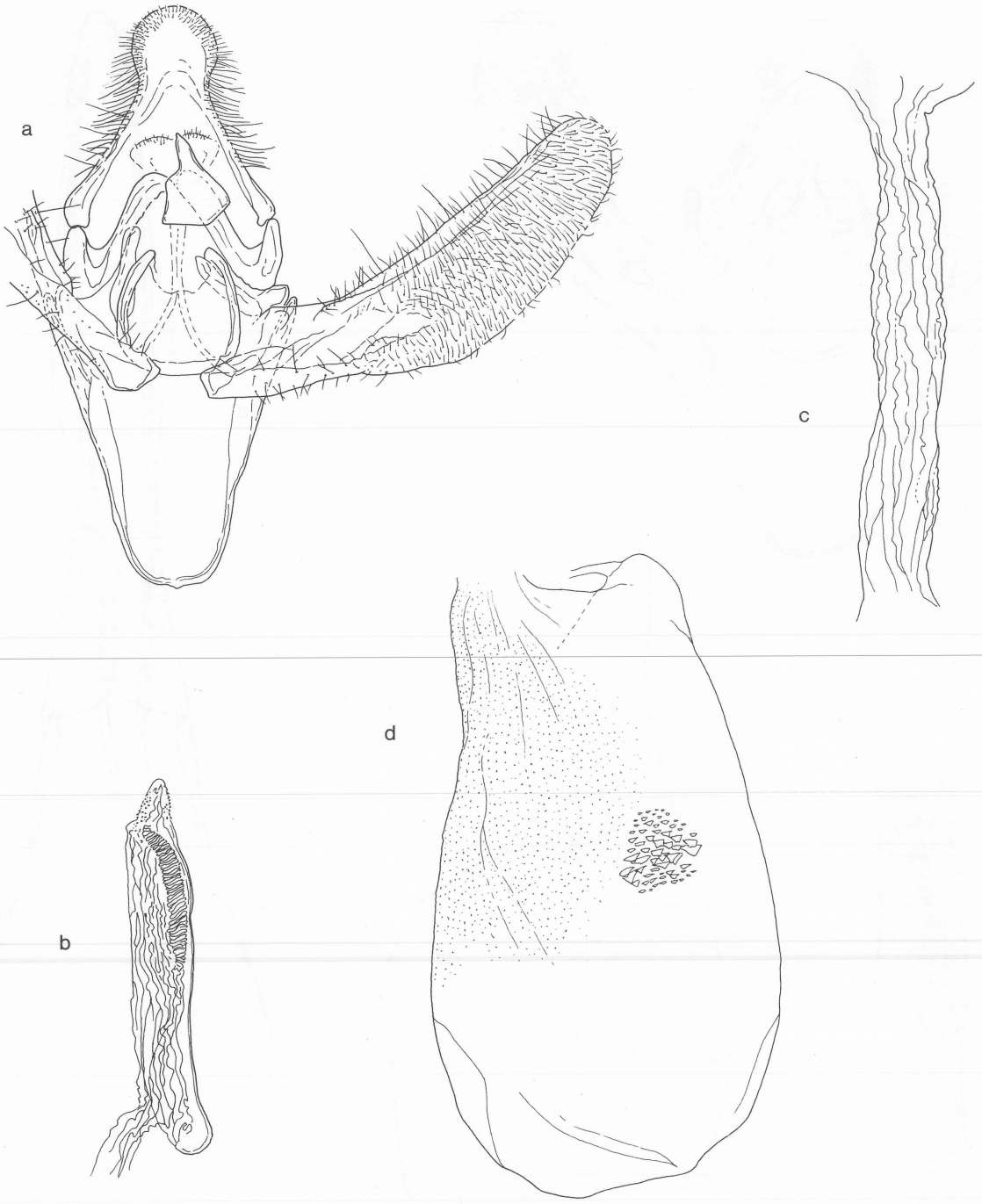

FIGURE 50: GENITALIA OF *HOMOEOSOMA DECEPTORIUM*

a. Male genitalia (most of left valva and aedoeagus omitted) (CH 973). *b.* Aedoeagus. *c.* Ductus bursae (RLG 344). *d.* Corpus bursae, part of ductus bursae, and part of ductus seminalis (RLG 344).

covering the florets. At this stage, most feed on flower parts, particularly pollen and corolla (Rogers, 1978). Eventually, larvae form a tube of silk usually adjacent to developing seeds. Larvae bore into seeds; large larvae sometimes tunnel into the receptacle and stalk beneath the receptacle. Pupation occurs frequently among the seeds, or within a seed, in a silken cocoon. Some pupate in debris or soil at or near the base of host plants.

Other asteraceous hosts, in alphabetic order of

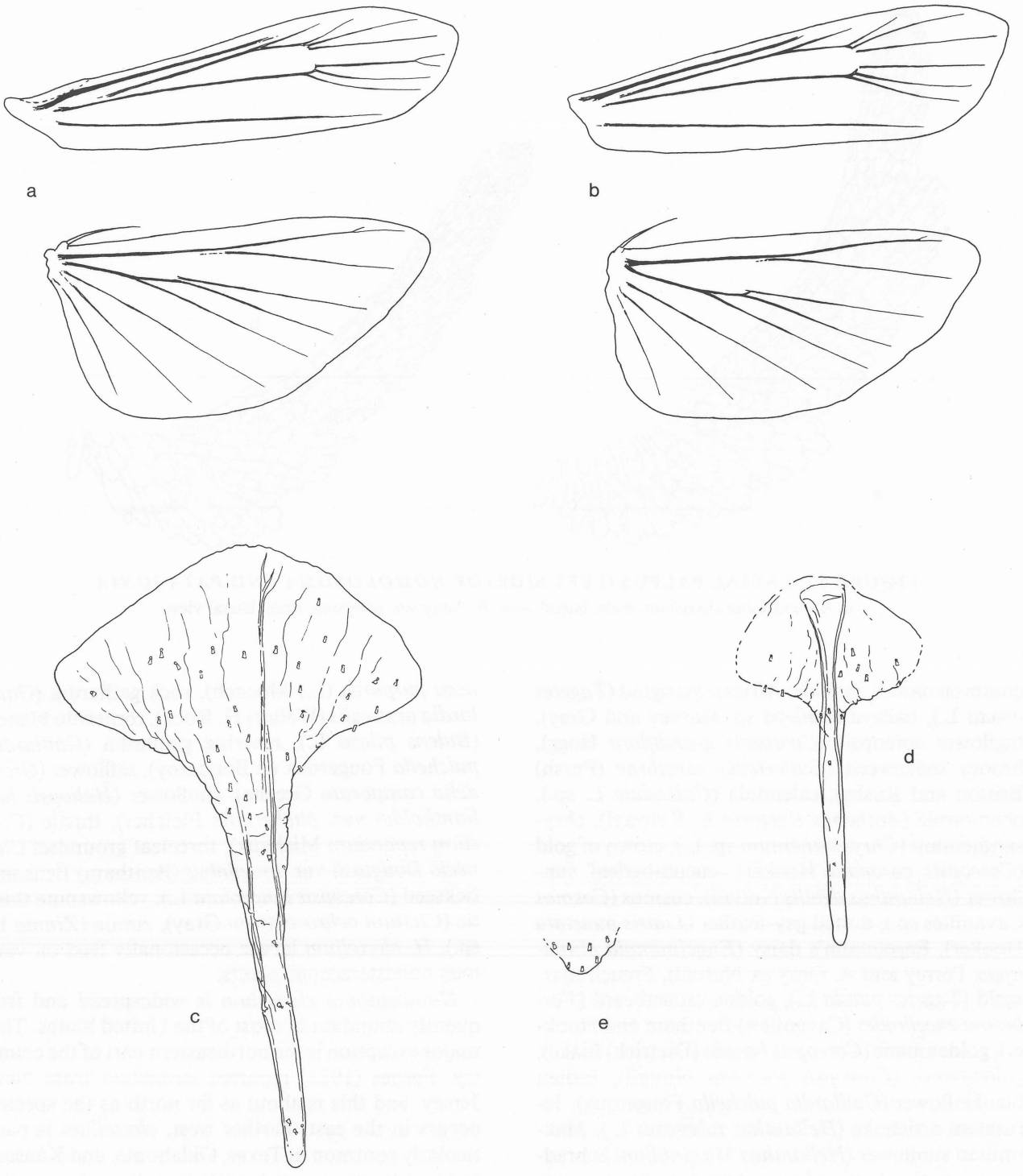

FIGURE 51: VENATION OF MALE *HOMOEOSOMA* AND MALE *PATAGONIA* AND MALE THORNLIKE ABDOMINAL PROCESS OF *HOMOEOSOMA*

a. Homoeosoma electellum. b. Patagonia peregrina. c. Homoeosoma deceptorium. d. Homoeosoma striatellum. e. Homoeosoma stypticellum.

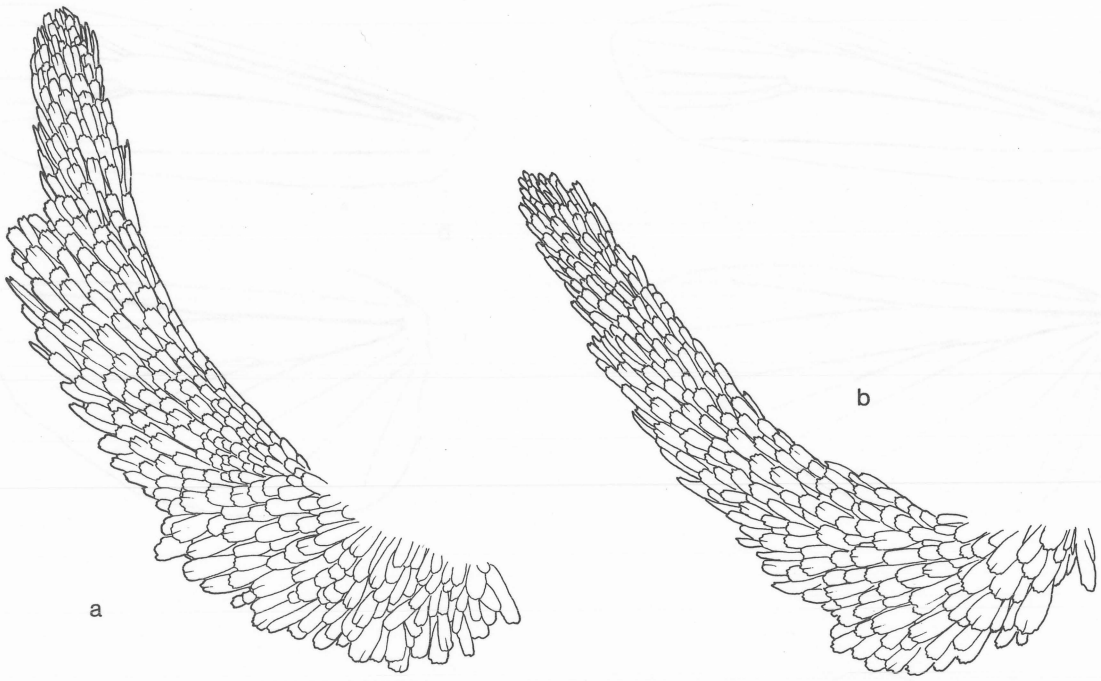

FIGURE 52: LABIAL PALPUS (LEFT SIDE) OF *HOMOEOSOMA* AND *PATAGONIA*
a. Homoeosoma electellum, male, lateral view. *b. Patagonia peregrina,* male, lateral view.

common names, include: African marigold (*Tagetes erecta* L.), baileya (*Baileya* sp. Harvey and Gray), bigflower coreopsis (*Coreopsis grandiflora* Hogg), broom snakeweed (*Gutierrezia sarothrae* (Pursh) Britton and Rusby), calendula (*Calendula* L. sp.), chamomile (*Anthemis tinctoria* L. Kelwayi), chrysanthemum (*Chrysanthemum* sp. L.), crown of gold (*Coreopsis coronata* Hooker), cucumberleaf sunflower (*Helianthus debilis* Nuttall), cosmos (*Cosmos* Cavanilles sp.), dotted gay-feather (*Liatris punctata* Hooker), Engelmann's daisy (*Engelmannia pinnatifida* Torrey and A. Gray ex Nuttall), French marigold (*Tagetes patula* L.), golden crownbeard (*Verbesina encelioides* (Cavanilles) Bentham and Hooker), goldenmane (*Coreopsis basalis* (Dietrich) Blake), goldenwave (*Coreopsis tinctoria* Nuttall), Indian blanketflower (*Gaillardia pulchella* Fougeroux), Jerusalem artichoke (*Helianthus tuberosus* L.), Maximilian sunflower (*Helianthus Maximiliani* Schrader), musk thistle (*Carduus nutans* L.), orange coneflower (*Rudbeckia fulgida* Aiton), palafoxia (*Palafoxia* Lagasca y Segura sp.), paleleaf goldenweed (*Haplopappus acradenius* subsp. *eremophilus* (Greene) Hall), plains sunflower (*Helianthus petiolaris* Nuttall), prairie coneflower (*Ratibida columnifera* (Nuttall) Wooton and Standley), prickly lettuce (*Lactuca serriola* L.), purple echinacea (*Echinacea purpurea* (L.) Moench), rock gaillardia (*Gaillardia aestivalis* (Walter) H. Rock), romerillo blanco (*Bidens pilosa* L.), rosering gaillardia (*Gaillardia pulchella* Fougeroux de Bondaroy), safflower (*Grindelia camporum* Greene), sunflower (*Heliopsis helianthoides* var. *pitcheriana* Fletcher), thistle (*Cirsium repandum* Michaux), threeleaf groundsel (*Senecio Douglasii* var. *longilobus* (Bentham) Benson), tickseed (*Coreopsis lanceolata* L.), yellowspine thistle (*Cirsium ochrocentrum* Gray), zinnia (*Zinnia* L. sp.). *H. electellum* larvae occasionally feed on various nonasteraceous plants.

Homoeosoma electellum is widespread and frequently abundant in most of the United States. The major exception is the northeastern part of the country. Forbes (1923) reported *electellum* from New Jersey, and this is about as far north as the species occurs in the east. Farther west, *electellum* is particularly common in Texas, Oklahoma, and Kansas. In Canada, specimens have been collected in southern Manitoba, southern Alberta, and southern British Columbia. *H. electellum* also occurs in northern and central Mexico, Bermuda and on some Caribbean islands, and in Central America. According to Arthur (1978), the species does not overwinter in the northern parts of its range, but undergoes annual broad dispersions. Winds apparently carry the moths

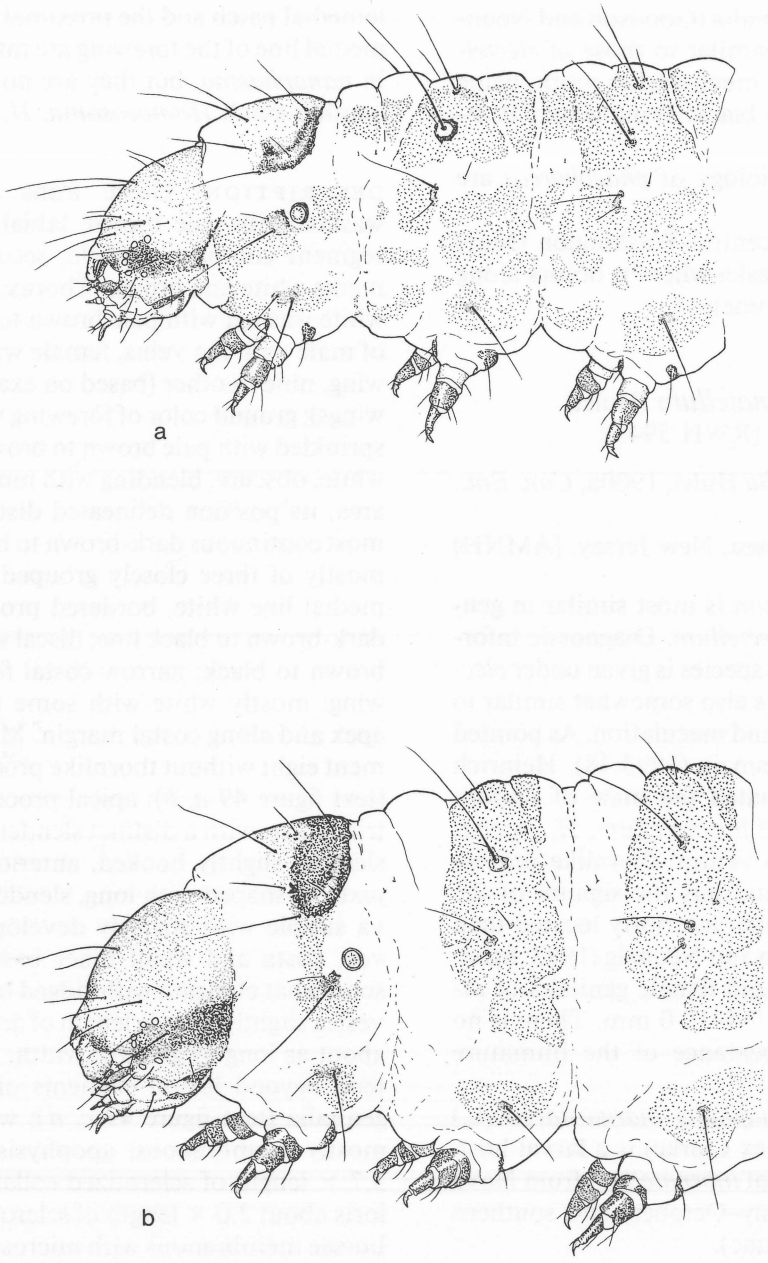

FIGURE 53: LAST STAGE LARVAE OF *HOMOEOSOMA* SPECIES (LATERAL VIEW OF HEAD AND THORAX)

a. H. electellum. b. H. pedionnastes.

northward (Arthur and Bauer, 1981). Also, Riemann (1986) demonstrated that the females are relatively long lived, thus increasing the chances of dispersed individuals finding flowering host material. *H. electellum* is multivoltine. It occurs throughout the year in the most southern parts of the United States. In the north, as the result of migration, adults are first present in late spring or early summer.

Homoeosoma phaeoboreas Goodson and Neunzig

PL. 4, FIG. 25.

Homoeosoma phaeoboreas Goodson and Neunzig, 1993, *North Carolina Agric. Res Service Technical Bull.*, **303**: 59.

Type locality: Dryden, Chelan County, Washington. [CNC]

The male and female genitalia (Goodson and Neunzig, 1993: figure 66) are similar to those of *electellum. H. phaeoboreas* is a much darker moth, being almost entirely brownish black. Wing length 10.0–10.5 mm.

The immatures and biology of *phaeoboreas* are unknown.

Distribution includes central Washington (May) north to southeastern Alaska where it occurs along the Tanana River (mid-June).

Homoeosoma inornatellum (Hulst)
PL. 4, FIGS. 19, 20 (RWH 5943).

Euzophera inornatella Hulst, 1900a, *Can. Ent.*, **32**: 173.
Type locality: Anglesea, New Jersey. [AMNH]

Homoeosoma inornatellum is most similar in general appearance to *H. electellum.* Diagnostic information regarding the two species is given under *electellum. H. inornatellum* is also somewhat similar to *H. pedionnastes* in color and maculation. As pointed out by Goodson and Neunzig (1993:48), Heinrich (1956) incorrectly associated the male of *pedionnastes* with the female of *inornatellum. H. inornatellum,* however, lacks a ventral thornlike process on the male abdomen and has the signum of the female corpus bursae more anteriorly located than in *pedionnastes.* Goodson and Neunzig (1993: figure 61) illustrated the male and female genitalia of *inornatellum.* Wing length 7.5–10.0 mm. There is no information on the appearance of the immature stages.

Pearly everlasting (*Anaphalis margaritacea* (L.) Bentham and Hooker f. ex Clarke) is a larval host.

I have seen specimens of *inornatellum* from Nova Scotia (Sable Island) (July–October) and southern New Jersey (late May, June).

Homoeosoma nanophasma Neunzig, NEW SPECIES
PL. 4, FIG. 18. TEXT FIG. 49 *a–d.*

Homoeosoma nanophasma Neunzig.
Type locality: Upper Key Largo, Monroe County, Florida. [USNM]

DIAGNOSIS. *H. nanophasma* is small for a *Homoeosoma* (wing length 6.5–7.0 mm). The male and female genitalia (text figure 49 *a–d*) are like those of *H. electellum.* In contrast to *electellum,* the antemedial patch and the proximal border of the postmedial line of the forewing are rather well developed in *nanophasma,* but they are not as complete as in another small *Homoeosoma, H. parvalbum.*

DESCRIPTION. Head: frons and vertex white washed with pale brown; labial palpus with basal segment completely white, second and third segments white and brown. Thorax: collar and dorsum white washed with pale brown to brown. Forewings of male with ten veins, female with ten veins in one wing, nine in other (based on examination of scaled wings); ground color of forewing white; most of wing sprinkled with pale brown to brown; antemedial line white, obscure, blending with mostly white subbasal area, its position delineated distally by curved, almost continuous dark-brown to black patch (formed mostly of three closely grouped dark spots); postmedial line white, bordered proximally by slanted dark-brown to black line; discal spots separate, dark brown to black; narrow costal fold in male. Hindwing: mostly white with some fuscous shading at apex and along costal margin. Male abdominal segment eight without thornlike process. Male genitalia (text figure 49 *a, b*): apical process of gnathos subtriangular, with a distinct slender posterior lobe and slender, slightly hooked, anterior lateral elements; juxta U-shaped with long, slender lateral arms; valva simple with strongly developed, medially convex, costa and small inner basal lobe; aedoeagus somewhat elongate with ridged or coiled element of vesica slightly over ½ length of aedoeagus; vinculum about as long as greatest width, with arms that extend beyond lateral elements of tegumen. Female genitalia (text figure 49 *c, d*); with papillae anales mostly membranous; apophysis posterioris about 3.7 × length of sclerotized collar; apophysis anterioris about 2.0 × length of sclerotized collar; ductus bursae membranous with microspines near junction with corpus bursae; corpus bursae membranous with microspines in posterior portion, including near junction with ductus bursae; signum at anterior end of corpus bursae, composed of a cluster of many triangular, sclerotized platelets; ductus seminalis attached to corpus bursae near junction with ductus bursae.

The immature stages and host associations are unknown.

TYPES. Holotype: ♂. Upper Key Largo, Monroe Co., Florida, May 19, 1990, Terhune S. Dickel, mercury vapor lamp; genitalia slide 3606 HHN. USNM. Paratype: ♀. Key Largo, Florida, 30 Aug. 86, Dow; genitalia slide 794 RLG. NCSU.

Homoeosoma uncanale (Hulst)
PL. 4, FIG. 26 (RWH 5936, part).

Nephopteryx [sic] *uncanalis* Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 162.
Type locality: Custer County, Colorado. [AMNH]

Homoeosoma uncanale has male and female genitalia (Goodson and Neunzig, 1993: figure 69) that resemble those of *H. electellum, H. phaeoboreas, H. inornatellum,* and *H. nanophasma.* The antemedial patch on the forewing of *uncanale* is more completely developed than in *electellum, phaeoboreas,* and *inornatellum* but is less complete than in *nanophasma.* Furthermore, a small rudimentary, ventral thornlike process on the male abdomen, lacking in the closely related species, is usually evident in *uncanale.* Wing length 9.0–12.0 mm.

The immature stages have not been described.

Adults of *uncanale* have been reared from larvae feeding in the flower heads of little sunflower (*Helianthella* Torrey and Gray).

Homoeosoma uncanale occurs at rather high elevations (7,000′–10,200′) in the central Rocky Mountains of the United States. I have seen moths collected as follows: western Colorado (May, July); north central Utah (July); southwestern Oregon (July).

Homoeosoma stypticellum Grote
PL. 4, FIG. 27. TEXT FIG. 51 *e* (RWH 5936, part).

Homeosoma [sic] *stypticella* Grote, 1878, *Bull. U.S. Geol. Geog. Surv. Terr.*, **4**: 703.
Type locality: Grote based the description of *stypticellum* on specimens collected in Maine, Massachusetts, and New York. [BMNH]

Homoeosoma stypticellum and *H. uncanale* are closely related. In fact, Heinrich (1956) included *uncanale* as a synonym of *stypticellum,* but Goodson and Neunzig (1993) recognized the two as discrete taxa. *H. stypticellum* has a more strongly developed antemedial patch in the forewing, lacks an anterior, medial lobe on the apical process of the gnathos that is present in *uncanale,* and has a more northern and eastern distribution than *uncanale.* Goodson and Neunzig (1993: figure 68) illustrated the genitalia of *stypticellum.* Wing length 8.0–12.0 mm.

Immature stages unknown.

Distributed from southern Newfoundland and New Jersey across the northeastern United States throughout southern Canada as far west as Alberta. Records include: southern Newfoundland (July); Nova Scotia (June–August); New Brunswick (July); southern Québec (June–August); southern Ontario (June–August); southern Manitoba (July); southern Alberta (June, July); Maine (June, July); New Hampshire (June, August, September); Massachusetts (June, August, September); New York (late May–September); Pennsylvania (August); New Jersey (July).

Homoeosoma striatellum Dyar
PL. 4, FIG. 28. TEXT FIG. 51 *d* (RWH 5937, 5938a, 5940).

Homoeosoma striatellum Dyar, 1905, *Proc. Ent. Soc. Washington,* **7**: 38.
Type locality: Phoenix, Arizona. [USNM]

Homoeosoma oslarellum breviplicitum Heinrich, 1956, *U.S. Natl. Mus. Bull.,* **207**: 221.
Type locality: San Diego, California. [USNM]

Homoeosoma imitator Heinrich, 1956, *U.S. Natl. Mus. Bull.,* **207**: 222.
Type locality: Palm Springs, Riverside County, California. [USNM]

The black, contrasting, longitudinal lines associated with some of the veins of the forewing facilitate the identification of *striatellum.* The male has a ventral, thornlike process, of varying lengths, on the abdomen (text figure 51 *d*). Goodson and Neunzig (1993: figure 67) illustrated the male and female genitalia. Wing length 8.5–11.5 mm.

The immature stages have not been described, but adults have been reared from larvae feeding on a composite (Asteraceae). The exact identity of the host is not known.

Homoeosoma striatellum has been collected in the southwestern United States and northwestern Mexico. Records are as follows: eastern Utah (May); Arizona (March–May); southern California (January–May, August) (the California data are based on many specimens collected at many sites, with most moths collected in March and April); northern Baja California (March, April).

Homoeosoma asylonnastes Goodson and Neunzig
PL. 4, FIGS. 21, 22.

Homoeosoma asylonnastes Goodson and Neunzig, 1993, *North Carolina Agric. Res. Service Tech. Bull.,* **303**: 23.

Type locality: St. Francois State Park, St. Francois County, Missouri. [USNM]

Based on the male genitalia *asylonnastes* is allied to *H. electellum* and its close relatives, but *asylonnastes* differs in that the signum in the corpus bursae of the female is distinctly more centrally located (Goodson and Neunzig, 1993: figure 54). Wing length 7.5–9.0 mm.

Immature stages unknown.

Homoeosoma asylonnastes is known only from southeastern Missouri and northwestern Arkansas. The adults have been caught at lights in June and July.

Homoeosoma oslarellum Dyar
PL. 4, FIG. 29 (RWH 5938, part).

Homoeosoma oslarellum Dyar, 1905, *Proc. Ent. Soc. Washington,* **7**: 38.
Type locality: Chimney Gulch, Golden, Jefferson County, Colorado. [USNM]

Homoeosoma oslarellum has the arms of the vinculum extending beyond the lateral elements of the tegumen and the signum of the corpus bursae rather large and somewhat centrally located in the corpus bursae (see Goodson and Neunzig, 1993: figure 62). A rather dark-brown moth, it somewhat resembles *H. phaeoboreas* but has more white scales on the forewing. Most *oslarellum* adults have veins M_2 and M_3 of the forewing completely fused. Wing length 8.0–10.0 mm.

Immature stages unknown.

Homoeosoma oslarellum has been collected in western Colorado (May–August), northeastern Nevada (August), western Washington (August), southwestern Oregon (July), and California (mostly northern) (May–July, September).

Homoeosoma parvalbum Blanchard and Knudson
PL. 4, FIG. 23.

Homoeosoma parvalbum Blanchard and Knudson, 1985a, *Proc. Ent. Soc. Washington,* **87**: 236.
Type locality: Hot Springs, Big Bend National Park, Brewster County, Texas. [USNM]

Homoeosoma parvalbum is a small species (wing length 6.5–7.0 mm) that is mostly white with strongly contrasting, dark, antemedial and postmedial patches on the forewing. Also, the forewings have only nine veins (M_2 and M_3 are completely fused). Blanchard and Knudson (1985a: figures 24, 25, 27, 28) and Goodson and Neunzig (1993: figure 64) illustrated the male and female genitalia.

Immature stages unknown.

Few *parvalbum* specimens have been collected. All have come from the Big Bend National Park, in southwestern Texas, in April or September. This species most likely also occurs in adjacent parts of northern Mexico.

Homoeosoma oxycercus Goodson and Neunzig
PL. 4, FIG. 24.

Homoeosoma oxycercus Goodson and Neunzig, 1993, *North Carolina Agric. Res. Service Tech. Bull.,* **303**: 52.
Type locality: 25 miles east of Indio, Riverside County, California. [LACM]

Homoeosoma oxycerus is best identified by the distinctly mucronate, and heavily sclerotized, condition of the female papillae anales (Goodson and Neunzig, 1993: figure 63). The species appears to be restricted to southern California. Wing length 7.0–9.0 mm.

Immatures unknown.

Homoeosoma oxycercus has been collected only in Riverside and San Bernardino Counties, from early March to late April.

Homoeosoma illuviellum Ragonot
PL. 2, FIG. 19 (RWH 5939).

Homoeosoma illuviella Ragonot, 1888, *Nouveaux Genres et Espèces de Phycitidae et Galleriidae,* 33.
Type locality: Sonora, Mexico. [MNHP]

Homoeosoma candidella Hulst, 1888, *Ent. Americana,* **4**: 118.
Type locality: Arizona. [AMNH]

The moth is mostly white with contrasting dark hindwings. The male genitalia cannot be confused with other species in the genus (except possibly *emendator,* but this species has the forewings gray) in that the apical process of the gnathos is greatly enlarged (Goodson and Neunzig, 1993: figure 59). *H. illuviellum* males also have vinculum arms that do not extend beyond the lateral elements of the tegumen, and they also lack thornlike processes on the venter of abdominal segment eight. Length of forewing 9.5–13.0 mm.

Immature stages unknown.

Homoeosoma illuviellum occurs in the southwestern United States and adjacent Mexico. It has been collected in America north of Mexico in central Colorado in June and in north-central Arizona in April–August.

Homoeosoma emendator Heinrich
PL. 2, FIG. 20 (RWH 5939a).

Homoeosoma illuviellum emendator Heinrich, 1956, *U.S. Natl. Mus. Bull.,* **207**: 222.
Type locality: Chimney Gulch, Golden, Jefferson County, Colorado. [USNM]

The male genitalia of *emendator* closely resemble those of *H. illuviellum* (See Goodson and Neunzig, 1993: figure 57). However, the forewings of *emendator* are rather dark; whereas those of *illuviellum* are mostly white. Wing length 11.0–13.0 mm.

Immatures unknown.

I have seen specimens of *emendator* only from western Colorado (May–July) and southeastern Nevada (April).

Homoeosoma albescentellum Ragonot
PL. 2, FIG. 21 (RWH 5941).

Homoeosoma albescentella Ragonot, 1887, *Diagnoses North American Phycitidae and Galleriidae,* 15.
Type locality: California. [MNHP]

Homoeosoma elongellum Dyar, 1903, *Proc. Ent. Soc. Washington,* **5**: 227.
Type locality: Williams, Coconino County, Arizona. [USNM]
NOTE—A lectotype was designated for *elongellum* by Goodson and Neunzig (1993).

Homoeosoma albescentellum is best identified by referring to the male genitalia (Goodson and Neunzig, 1993: figure 51). The apical process of the gnathos has its lateral elements elongate and similar in appearance to its posteriorly projecting element; the valva is relatively short, and the lateral arms of the vinculum do not extend beyond the lateral elements of the tegumen. Abdominal segment eight of the male with well-formed, ventral, posteriorly projecting, thornlike process. Wing length 8.0–12.0 mm.

Immature stages are unknown.

Homoeosoma albescentellum is widely distributed in the southwestern United States. It has been collected as follows: western Colorado (June–August); central and southern Utah (July, August); New Mexico (July, August); southern Nevada (July); Arizona (June, July); northern and southern California (April, May, September). At two collecting sites in Arizona and California (base of Tsaile Peak, Apache Co., Arizona, and Caruthera Canyon, San Bernardino Co., California) large series of what appear to be *albescentellum* have been obtained that are all smaller than the majority of *albescentellum* collected elsewhere in Arizona and California and in other states. I do not know whether these moths are *albescentellum,* reduced in size because of less nutritional host plants or other factors, or an undescribed species.

Homoeosoma impressale Hulst
PL. 2, FIG. 22 (RWH 5942).

Homeosoma [sic] *impressalis* Hulst, 1886, *Trans. Amer. Ent. Soc.,* **13**: 163.
Type locality: Nevada. [AMNH]

Homoeosoma impressale appears to be most closely allied with *H. albescentellum.* Both have similar maculation on the forewing (although *impressale* has a paler ground color), yellowish-red or yellowish-brown scales on the posterior half of the forewing, lateral arms of the vinculum that are about as long as the lateral elements of the tegumen, a valva that is slightly falcate, and a well-formed, ventral thornlike process on the eighth abdominal segment of the male. The male genitalia of *impressale* appear generally more slender than those of *albescentellum,* particularly the width of the uncus, the apical process of the gnathos, and the valva (compare in Goodson and Neunzig, 1993: figures 60 and 51). Wing length of *impressale* 12.5–15.0 mm.

The immature stages have not been described.

Adults of *impressale* have been reared from the seed heads of *Cirsium pastoris* Howell (Asteraceae).

Distribution and dates of moths captured are as follows: southwestern Colorado (June–August); Nevada (June, July); Arizona (August); California (mid-April–September).

Homoeosoma deceptorium Heinrich
PL. 2, FIGS. 23, 24. TEXT FIGS. 50 *a–d*; 51 *c* (RWH 5944).

Homoeosoma deceptorium Heinrich, 1956, *U.S. Natl. Mus. Bull.,* **207**: 223.
Type locality: New Brighton, Beaver County, Pennsylvania. [USNM]

Homoeosoma deceptorium, and several other species (*ammonastes, pedionnastes, eremophasma,* and

ardaloniphas) form a distinct complex within the genus *Homoeosoma.* All have almost identical male genitalia, a strongly developed thornlike process on the eighth abdominal segment of the male and heavily sclerotized papillae anales and robust apophyses in females. But, the species can be separated on the basis of the appearance of the forewings and distribution. The first three are predominately fuscous; the last two are mostly white. *H. deceptorium* differs from *ammonastes* and *pedionnastes* in having a more distinct pale costal streak and a larger antemedial patch on the forewing. *H. deceptorium, ammonastes,* and *pedionnastes* occur in eastern North America; *eremophasma* and *ardaloniphas* are western species. The distribution of *deceptorium* is chiefly northeastern North America, including Nova Scotia, Québec and Ontario, in Canada, and Maine west to Illinois and south to western North Carolina and southern Missouri, in the United States. *H. ammonastes* is known only from the Sandhills of south-central North Carolina, and *pedionnastes* is a coastal species occurring from southern New Jersey to southern Florida. Wing length of *deceptorium* 10.0–13.0 mm.

The immature stages of *deceptorium* have not been described.

Collection data for *deceptorium,* based on specimens I have seen, are as follows: Nova Scotia (June, July); southern Ontario (July); southern Québec (July); Maine (July); New Hampshire (July); Massachusetts (July, August); New York (July, August); Pennsylvania (July); Ohio (August); Michigan (July, August); northern Illinois (August); Missouri (July, August); western North Carolina (August).

Homoeosoma ammonastes Goodson and Neunzig
PL. 4, FIG. 30.

Homoeosoma ammonastes Goodson and Neunzig, 1993, *North Carolina Agric. Res. Service Tech. Bull.,* **303**: 18.
Type locality: Southern Pines, Moore County, North Carolina. [USNM]

Diagnostic features of *ammonastes* and closely related species are given under *H. deceptorium.* Goodson and Neunzig (1993: figure 52) illustrated the male and female genitalia. *H. ammonastes,* to date, has only been collected in south-central North Carolina at sites having dry, sandy soil, especially pine barrens. Wing length 7.5–10.0 mm.

Last stage larva 12.0–15.0 mm long. Head yellowish brown with indistinct to distinct reddish-brown genal patch. Thoracic shield brownish black posteriorly and mostly yellowish brown anteriorly. Thoracic legs brown to brownish black. Body dorsally bluish green with reddish-brown to purple transverse bands; venter greenish white. SD1 pinaculum rings on mesothorax and eighth abdominal segment weakly pigmented, often incomplete. The pupa has not been described.

Larvae feed mostly on the maturing seeds of thistle (*Cirsium repandum* Michaux) (Asteraceae). Small larvae frequently feed on the pappus, and large larvae occasionally bore into the receptacle holding the seeds. Late instar larvae form an interesting vertical tube of frass, silk, and discarded plant material that usually projects from the top of an infested mature flower head. After completing development, larvae tunnel into the debris or soil at or near the base of the host plant, and form a silken cocoon. Most individuals remain as prepupae in the cocoon until pupating the following year just prior to the blossoming of the host. Large larvae are present in the plants in July, and most adults fly the following year in June.

Homoeosoma pedionnastes Goodson and Neunzig
PL. 2, FIG. 25. TEXT FIG. 53 *b.*

Homoeosoma pedionnastes Goodson and Neunzig, 1993, *North Carolina Agric. Res. Service Tech. Bull.,* **303**: 56.
Type locality: South of Hertford, Perquimans County, North Carolina. [USNM]

Character states that separate *pedionnastes* from closely related species have been discussed under *H. deceptorium.* Also, the similarity in general appearance of *pedionnastes* and *H. inornatellum,* and differences separating the two species, have been mentioned earlier under *inornatellum.* Goodson and Neunzig (1993: figure 65) illustrated the male and female genitalia. Wing length of *pedionnastes* 9.0–12.5 mm.

The larva of *pedionnastes* (text figure 53 *b*) is very similar to the larva of *H. ammonastes* treated previously. The hosts differ, however. *H. pedionnastes* feeds on yellow thistle (*Cirsium horridulum* Michaux), an erect, tall, robust species found mostly in moist ditches along roadways (the host of *ammonastes* (*Cirsium repandum*) is a low-growing, small plant that occurs only in dry, sandy areas). Oviposition by *pedionnastes* in North Carolina is mostly in May. Larvae feed chiefly on the developing seeds, and only a single generation occurs each

year. The species appears to be associated with the Coastal Plain Region of the eastern United States, from southern New Jersey south to Florida. Adults have been collected in New Jersey in late May, in North Carolina in April and May, and in southern Florida from late February to mid–April.

Homoeosoma eremophasma Goodson and Neunzig
PL. 2, FIGS. 26, 27.

Homoeosoma eremophasma Goodson and Neunzig, 1993, *North Carolina Agric. Res. Service Tech. Bull.*, **303**: 40.
Type locality: Cave Creek Canyon, Chiricahua Mountains, Cochise County, Arizona. [USNM]

The adult of *eremophasma* is mostly white and resembles *H. ardaloniphas*. *H. eremophasma* is less strongly marked with black on the forewing; the dark patch associated with the postmedial line consists of only two or three small spots, but it is rather broad and more continuous in *ardaloniphas*; the black associated with the postmedial line is less obvious in *eremophasma*. *H. eremophasma* is known from Kansas, Colorado, Oklahoma, Texas, and Arizona. Goodson and Neunzig (1993: figure 58) illustrated the male and female genitalia of *eremophasma*. Wing length 10.0–12.0 mm.

The immature stages of *eremophasma* are unknown.

The species has been collected as adults at lights as follows: northwestern Kansas (no date); eastern Colorado (July); north-central Oklahoma (May); central and southeastern Texas (April, May, June, August); southeastern Arizona (April, June, July).

Homoeosoma ardaloniphas Goodson and Neunzig
PL. 2, FIG. 28.

Homoeosoma ardaloniphas Goodson and Neunzig, 1993, *North Carolina Agric. Res. Service Tech. Bull.*, **303**: 21.
Type locality: Karlsruhe Prairie, McHenry County, North Dakota. [NYSM]

The adult of *ardaloniphas* closely resembles that of *eremophasma* but has more distinct antemedial and postmedial marks on the forewings. Details have been mentioned under the diagnosis of *eremophasma*. Goodson and Neunzig (1993: figure 53) illustrated the male and female genitalia of *ardaloniphas*. *H. ardaloniphas* is a more northern species than *eremophasma*, occurring in south-central and southwestern Canada and in North Dakota. Wing length of *ardaloniphas* 10.0–12.0 mm.

The immatures are unknown.

Canadian records include southern Manitoba (mid-July); southern Saskatchewan (mid-July); southern Alberta (mid-July). In North Dakota the species has been collected from early to mid-July.

GENUS
Patagonia Ragonot

Patagonia Ragonot, 1901, *Mem. sur les Lépid.*, **8**: 226.
Type species: *Homoeosoma magellanella* Ragonot, 1888. Monotypy.

Adults of *Patagonia* differ from their nearest relatives, in the genus *Homoeosoma*, in having the distal part of the gnathos smaller and teardrop shaped, and in having the juxta semitubular (without distinct lateral arms). Furthermore, *Patagonia* has only a small, circular ridged or coiled process in the vesica of the aedoeagus, and the setal insertions of the papillae anales are enlarged. Species of *Patagonia* are most numerous in the Americas, particularly South America, but they occur in the Palearctic Region and possibly elsewhere in the world (Roesler, 1973). There is a single species of *Patagonia* in America north of Mexico.

Antenna of male with distinct notch at base of shaft. Female antenna simple. Sensilla trichodea (cilia) of male and female antennal shaft short and about ¼–⅓ times as long as basal diameter of shaft. Frons rounded, with most scales directed anteriorly. Labial palpus of both sexes oblique to upcurved (text figure 52 *b*). Maxillary palpus simple. Haustellum well developed. Ocellus present. Forewing of male (text figure 51 *b*) with costa slightly concave in basal ½; without costal fold. Forewing smooth scaled; with nine–ten veins; R_{3+4} and R_5 fused for their entire lengths; M_1 from below upper angle of cell; M_2 and M_3 stalked for about ½ their lengths, or completely fused; CuA_1 well separated from CuA_2. Hindwing (text figure 51 *b*) with seven veins; Sc + R_1 and Rs stalked for over ½ their lengths beyond cell; M_2 and M_3 completely fused; CuA_1 from lower, outer angle of cell; cell less than ½ length of wing. Male abdominal segment eight simple. Male genitalia (text figure 54 *a, b*) with uncus narrowly subtriangular, inner surface with microscales and microspines, distal margin rounded; gnathos with small, teardrop-shaped, distal element; transtilla incomplete; juxta semitubular, without well-developed lateral arms; valva simple; aedoeagus with small, somewhat cir-

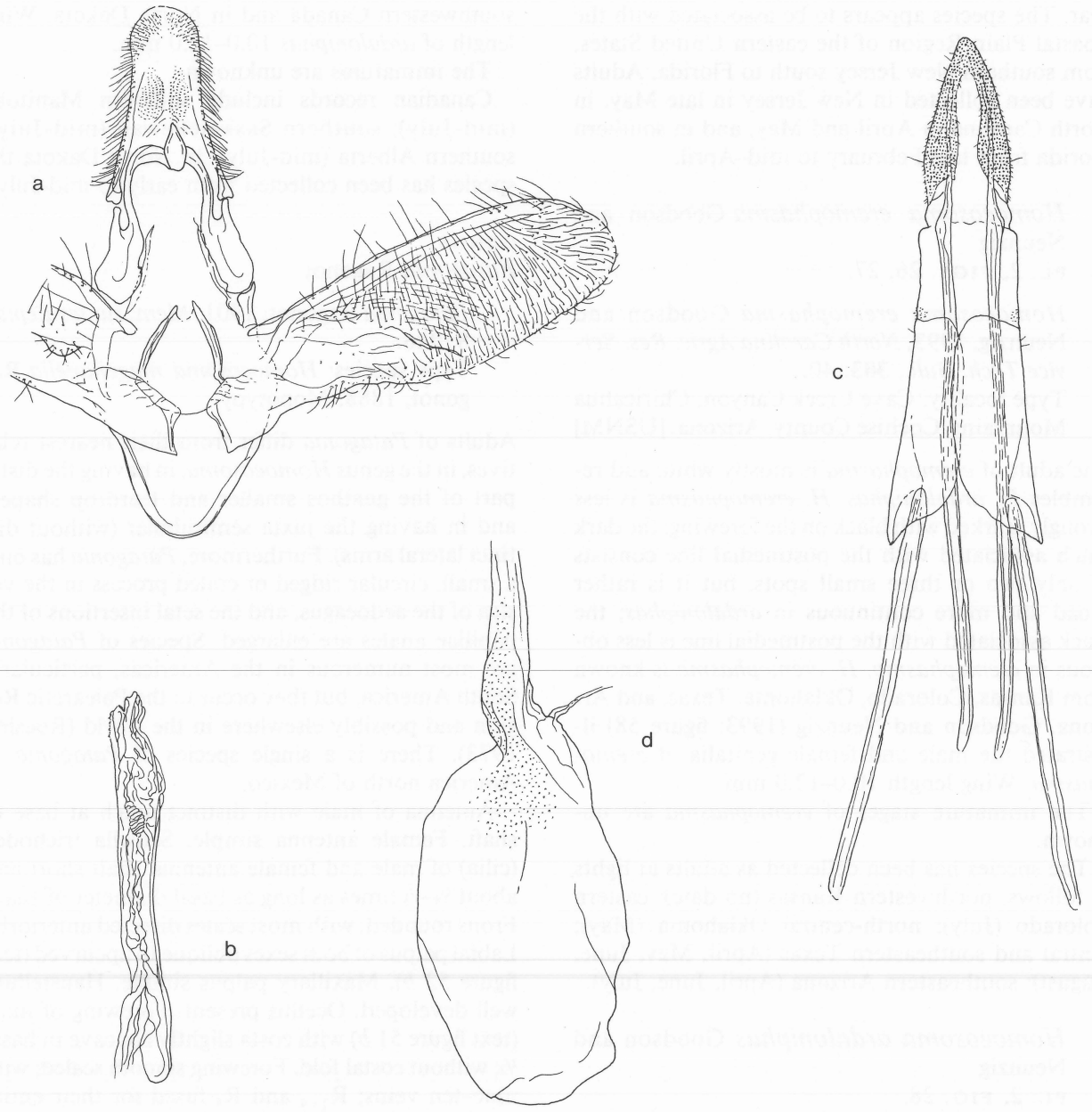

FIGURE 54: GENITALIA OF *PATAGONIA PEREGRINA*

a. Male genitalia (most of left valva and aedoeagus omitted) (RLG 1334). *b.* Aedoeagus. *c.* Posterior part of female genitalia (RLG 1351). *d.* Anterior part of ductus bursae, corpus bursae, and part of ductus seminalis (RLG 706).

cular, ridged or coiled, process in the vesica; vinculum shorter than greatest width. Female genitalia (text figure 54 *c, d*) with papillae anales strongly sclerotized and with setae arising from large alveoli; apophyses moderately robust; ductus bursae membranous with some scobinations, particularly near corpus bursae; corpus bursae membranous with scobinations near junction with ductus bursae, without signum; ductus seminalis attached to corpus bursae near junction with ductus bursae.

Larvae and pupae of *Patagonia* have not been described.

Larval hosts are members of the Asteraceae. Flowers and seeds are eaten.

Patagonia peregrina (Heinrich)

PL. 4, FIGS. 31, 32. TEXT FIGS. 51 *b*; 52 *b*; 54 *a–d* (RWH 5945).

Homoeosoma peregrinum Heinrich, 1956, *U.S. Natl. Mus. Bull.*, **207**: 224.
Type locality: Carmel, Monterey County, California. [USNM]

Although adults of *peregrina* closely resemble adults of species of *Homoeosoma, Phycitodes,* and *Unadilla,* a look at the genitalia will separate the taxa. The small, circular process of the vesica in the aedoeagus and the enlarged setal insertions of the papillae anales are diagnostic. Wing length of *peregrina* 5.5–8.0 mm.

Immature stages have not been described.

Known hosts of the larvae include pearly everlasting (*Anaphalis margaritacea* (L.) Bentham and Hooker f. ex Clarke) and cudweed (*Gnaphalium* L. sp.). Developing seeds are eaten.

Patagonia peregrina occurs in our fauna in central and southern California. It also has been collected in Mexico and Central America. In California, moths can be collected during most of the year, with the possible exception of January and February.

GENUS
Unadilla Hulst

Unadilla Hulst, 1890, *Trans. Amer. Ent. Soc.*, **17**: 197.
Type species: *Unadilla nasutella* Hulst, 1890. Considered to be a synonym of *Homoeosoma erronella* Zeller, 1881. Original designation.

Strymax Dyar, 1914a, *Proc. U.S. Natl. Mus.*, **47**: 344.
Type species: *Strymax dorae* Dyar, 1914a. Considered to be a synonym of *Homoeosoma erronella* Zeller, 1881. Original designation.

Heinrich (1956) separated *Unadilla* from *Homoeosoma* chiefly on the basis of number of veins in the forewing (nine in *Unadilla*; ten in *Homoeosoma*). Roesler (1973) and Goodson and Neunzig (1993), however, included a few species with nine veins in *Homoeosoma.* It is conceivable that species presently placed in *Unadilla* eventually will be accomodated in *Homoeosoma.* Pending future study, I have retained the genus *Unadilla* as a separate taxon because of the unique signum in the corpus bursae (*erronella*), or the unusual shape of the corpus bursae (*maturella*), of the species presently in *Unadilla,* and because the larvae, known to date, of the two groups, *Homoeosoma* and *Unadilla,* differ with regard to presence or absence of pinaculum rings.

The two species of *Unadilla* in America north of Mexico occur in the southern parts of the United States and in Mexico, Central America, the Caribbean, and northern South America.

Sensilla trichodea (cilia) of antenna of both sexes moderately abundant and, at base of shaft, about ⅓–½ as long as basal diameter of shaft (text figure 55 *b*). Frons rounded, somewhat roughly scaled with most scales directed anteriorly. Labial palpus of male upturned, oblique in female. Maxillary palpus small, simple. Haustellum well developed. Ocellus present. Basal ½ of costa of forewing of male slightly convex (text figure 55 *a*); undersurface with costal fold. Forewing smooth, without raised scales; with nine veins; R_2 from before upper angle of cell; R_{3+4} and R_5 completely fused; M_2 and M_3 completely fused; CuA_1 approximate to M_{2+3} at base; CuA_2 from before lower angle of cell. Hindwing (text figure 55 *a*) with six–seven veins; Sc + R_1 and Rs usually fused for most of their lengths beyond cell (Sc + R_1 sometimes forming a short spur); M_2 and M_3 completely fused, originating near, or at, lower angle of cell; M_{2+3} and CuA_1 approximate at base; cell less than ½ length of wing. Male abdominal segment eight with scale tuft. Male genitalia (text figures 55 *c, d*; 56 *a, b*) with uncus broad, constricted near middle, distally rounded; apical process of gnathos either mostly rectangular with very weakly developed anterior lobes or subtriangular and strongly lobed anteriorly; transtilla incomplete; juxta well developed with rather long lateral elements; valva simple (with small dorsally directed apical tooth in *erronella*); aedoeagus simple, with minute apical spines, and sometimes (*maturella*) disproportionately large; vinculum longer than greatest width. Female genitalia (text figures 55 *e*; 56 *c*) with corpus bursae membranous, posterior ½–⅔ scobinate; ductus bursae membranous, scobinate near junction with corpus bursae, signum present or absent (if present, a girdle of many small, narrow, serrate plates); ductus seminalis attached to corpus bursae near junction with ductus bursae.

Larvae (*maturella*), according to Heinrich (1956) (as *floridensis*), are similar in appearance to those of *Phycitodes* (*Rotruda*). Of particular note is the fact that pinaculum rings are not present on the mesothorax and abdominal segment eight. Pupae have not been studied.

Larval host plants are Asteraceae. The flowers and developing seeds are eaten.

KEY TO SPECIES OF *UNADILLA*

1. Gnathos with distal part subtriangular and strongly lobed anteriorly (text figure 55 *a*); cor-

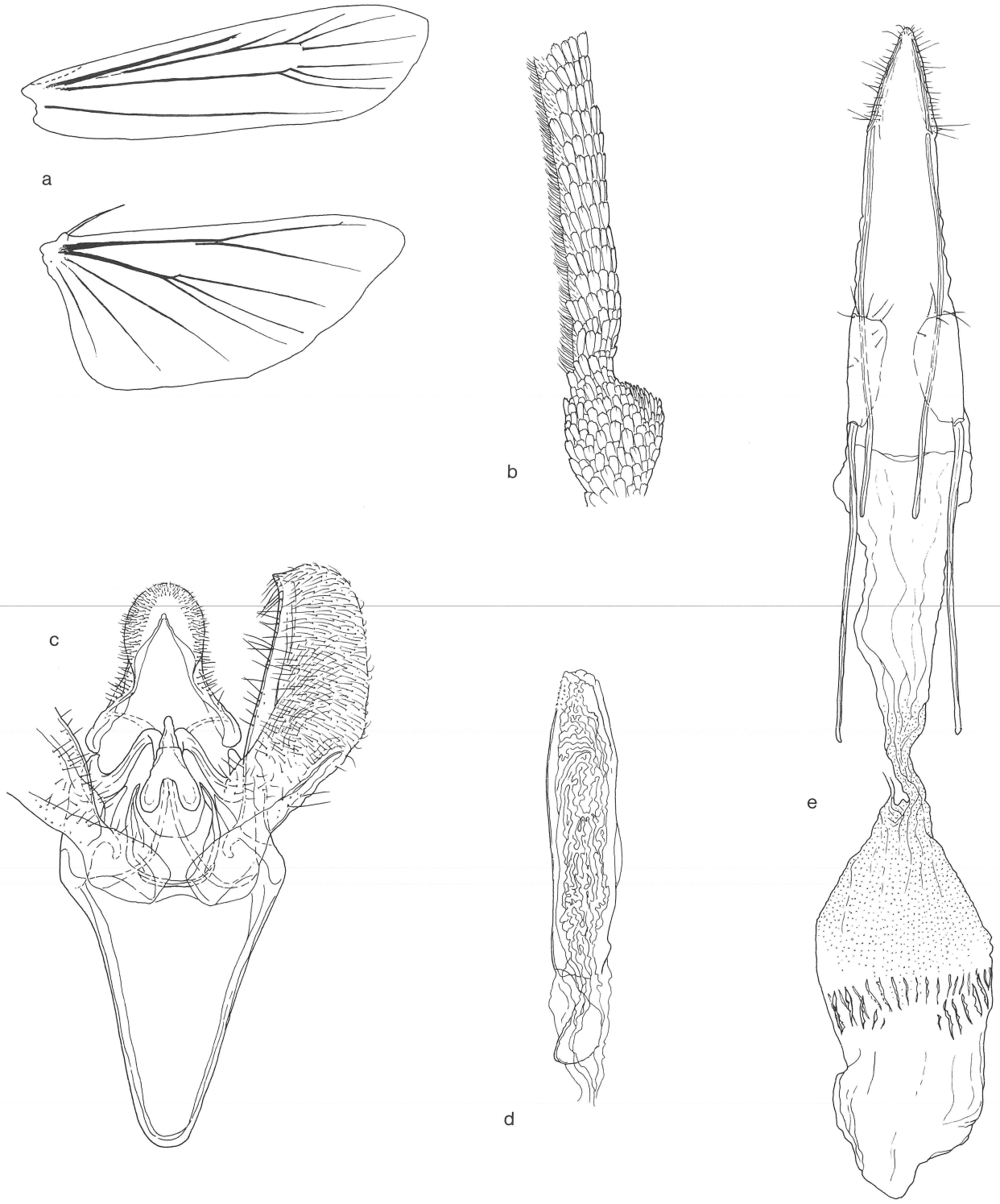

FIGURE 55: VENATION, ANTENNA, AND GENITALIA OF *UNADILLA ERRONELLA*

a. Male forewing and hindwing. *b.* Male antenna, scape and basal part of shaft. *c.* Male genitalia (most of left valva and aedoeagus omitted) (HHN 3290). *d.* Aedoeagus. *e.* Female genitalia (HHN 3294).

pus bursae with girdle of small plates, ovoid (text figure 55 *e*) ..... *erronella* p. 115

— Gnathos with distal part mostly rectangular and with very weakly developed anterior protuberances (text figure 56 *a*); corpus bursae without signum, kidney shaped (text figure 56 *c*) ..... *maturella* p. 115

Unadilla erronella (Zeller)

PL. 4, FIGS. 35, 36. TEXT FIG. 55 *a–e* (RWH 5948).

Homoeosoma erronella Zeller, 1881, *Hor. Soc. Ent. Ross.*, **16**: 238.
Type locality: Honda, Colombia. [BMNH]

Homoeosoma ubacensis Zeller, 1881, *Hor. Soc. Ent. Ross.*, **16**: 239.
Type locality: Ubaque, Colombia. [BMNH]

Unadilla nasutella Hulst, 1890, *Trans. Amer. Ent. Soc.*, **17**: 197.
Type locality: Hot Springs, New Mexico. [AMNH]

NOTE—Hampson (*in* Ragonot and Hampson, 1901) considered *nasutella* to be a synonym of *erronella.* But, Heinrich (1956), apparently because he was unable to locate examples of *erronella* from the western United States, regarded the synonymy as incorrect and treated *nasutella* as a discrete species. Since Heinrich's publication, many adults of *erronella* have been collected in southwestern Texas and southern California providing evidence that Hampson's decision was correct. I have examined the type (♂) of *nasutella,* and its antennae have the base of the shaft notched; they are not simple as stated by both Hulst (1890: 197) and Heinrich (1956: 227). As noted by Heinrich, the abdomen of the type is missing so the specific identity of the specimen is somewhat questionable. That *nasutella* was collected in New Mexico points to it being a synonym of *erronella*; *U. maturella* has an eastern distribution in North America.

Ephestia bipunctella Hampson, 1901, *Ann. Mag. Nat. Hist.*, (7) **7**: 255.
Type locality: Nassau, Bahamas. [BMNH]

Strymax dorae Dyar, 1914a, *Proc. U.S. Natl. Mus.*, **47**: 344.
Type locality: La Chorrera, Panamá. [USNM]

Strymax pyllis Dyar, 1914a, *Proc. U.S. Natl. Mus.*, **47**: 344.
Type locality: Porto Bello, Panamá. [USNM]

A combination of character states, including a notched male antenna, a relatively small size (wing length 5.0–8.0 mm), and a dark antemedial patch (patch usually incomplete, consisting of two–three groups of dark scales interspersed with inconspicuous reddish-brown scales) on the forewing, will usually tentatively identify *erronella.* The female genitalia with a girdle of small plates in the corpus bursae (text figure 55 *e*), are unique.

The larva and pupa have not been described.

Larvae of *erronella* feed on the flowers and developing seeds of Asteraceae. The only host that has been identified with certainty is American trixis (*Trixis californica* Kellogg). However, because *erronella* is widely distributed, it probably is associated with many composites.

Unadilla erronella is known from the southern parts of the United States and from Mexico, Central America, islands in the Caribbean, and northern South America. In the United States, it has been collected as follows: southern Florida (March, April, September); southeastern and southwestern Texas (October–December); southern New Mexico (September); southern California (Imperial Co. (March); Riverside Co. (January, March, November (reared specimens)); Santa Barbara Co. (May)).

Unadilla maturella (Zeller)

PL. 4. FIGS. 33, 34. TEXT FIG. 56 *a–c* (RWH 5947).

Homoeosoma maturella Zeller, 1881, *Hor. Soc. Ent. Ross.*, **16**: 240.
Type locality: Colombia. [BMNH]

Unadilla floridensis Heinrich, 1956, *U.S. Natl. Mus. Bull.*, **207**: 229. NEW SYNONYMY.
Type locality: Key West, Florida. [USNM]

Unadilla maturella is similar to *erronella* in general appearance, but usually is slightly larger (wing length 6.5–9.0 mm). The genitalia of the two species are quite different; The kidney-shaped corpus bursae of *maturella* is particularly diagnostic (text figure 56 *c*).

The limited information on the appearance of the larva has been given under the generic description. Larvae have been collected (Heinrich, 1956, as *floridensis*) from flowers and seeds of marsh fleabane (*Pluchea odorata* Cassini) and melanthera (*Melanthera parvifolia* Small).

Unadilla maturella appears to have a distribution somewhat similar to *erronella.* It apparently does not occur in our west. I have not seen any specimens

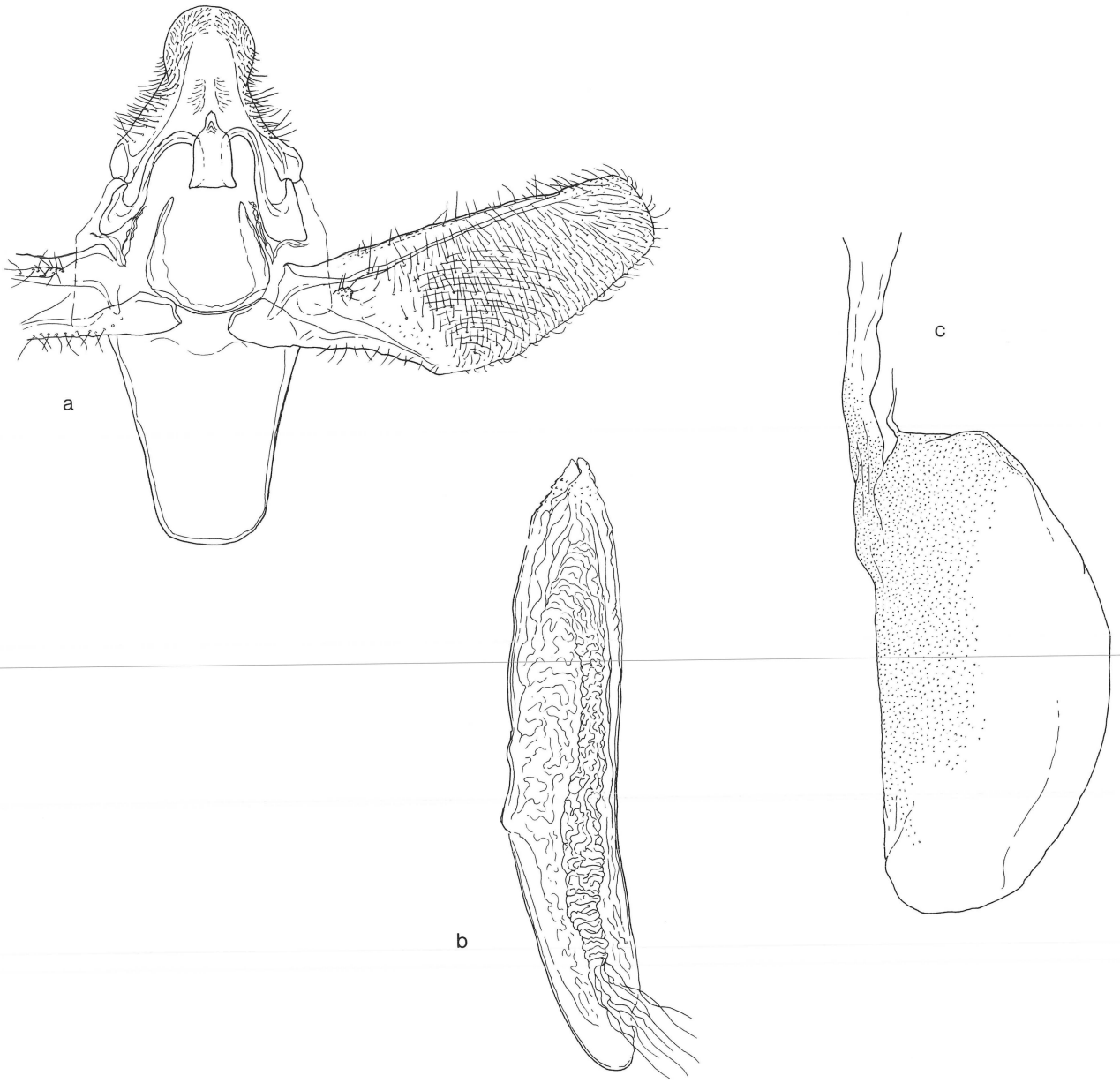

FIGURE 56: GENITALIA OF *UNADILLA MATURELLA*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 3289). *b.* Aedoeagus. *c.* Ductus bursae, corpus bursae, and part of ductus seminalis (HHN 2170).

of *maturella* from southern California or western Mexico, where *erronella* is common. In America, north of Mexico, *maturella* has been collected in southern Florida (February–April) and in southeastern Texas (June).

I have examined Heinrich's type series of *Unadilla floridensis*. Although some of the specimens are slightly darker and have the maculation on the forewing indistinct, others are paler and well marked and agree in appearance and maculation with many *maturella* recently collected in Florida and elsewhere.

GENUS

Phycitodes Hampson

Phycitodes Hampson, 1917, *Novit. Zoologicae,* **24**: 26.

Type species: *Phycitodes albistriata* Hampson, 1917. Original designation.

NOTE—According to Article 30(b) of the *International Code of Zoological Nomenclature* (Third edition), names with the suffix-odes are substantivized adjectives and are masculine. I have emended the specific names of North American *Phycitodes* accordingly.

Rotruda Heinrich, 1956. *U.S. Natl. Mus. Bull.,* **207**: 225.

Type species: *Homoeosoma mucidella* Ragonot, 1887. Original designation.

Phycitodes is closely related to *Homoeosoma* and its allies. Species in North America can be separated from similar genera by reference to male and female genitalia. In our species of *Phycitodes,* the comb of strong spines in the aedoeagus (text figure 57 *b*) and the large, multispined signa in the corpus bursae (text figure 57 *c*) are particularly diagnostic. Roesler (1973) included many species that are quite variable morphologically. In America north of Mexico, I recognize two species, rather than two subspecies as have Heinrich (1956) and other authors. Ragonot (1888) described another species, *Phycitodes* (*Homoeosoma*) *olivaceella,* from the Virgin Islands, and this species possibly occurs in Florida. An in depth study of Neotropical *Phycitodes* is needed.

Antenna of male with base of shaft distinctly notched. Sensilla trichodea (cilia) of both sexes moderately abundant and, near base of shaft, about ¼–⅓ as long as basal diameter of shaft. Frons rounded, most scales directed somewhat anteriorly. Labial palpus of both sexes oblique to upturned. Maxillary palpus small, simple. Haustellum well developed. Ocellus present. Basal half of costa of forewing of male slightly convex to straight (text figure 58); undersurface without costal fold. Forewing smooth, without raised scales; with ten veins; R_2 from cell; R_{3+4} and R_5 completely fused; M_1 straight; M_2 and M_3 stalked for about ½ their lengths; CuA_1 from lower angle of cell; CuA_2 from well before lower angle of cell. Hindwing (text figure 58) with six–seven veins; Sc + R_1 and Rs usually completely fused beyond cell (Sc + R_1 sometimes a short spur); M_{2+3} not fused with CuA_1, approximate at base; cell less than ½ length of wing. Male abdominal segment eight usually with small lateral scale tufts. Male genitalia (text figure 57 *a, b*) with uncus subrectangular, distally rounded; apical process of gnathos small, tear drop shaped; transtilla incomplete, reduced to lateral sclerites; juxta semitubular, usually with weakly developed lateral elements; valva simple; aedoeagus with vesica bearing one to many sclerotized spines that sometimes are rather large and usually arranged in a linear, longitudinal, comblike fashion; vinculum usually about as long as greatest width. Female genitalia (text figure 57 *c*) with ductus bursae usually membranous, sometimes sclerotized in posterior half; corpus bursae membranous, usually with a pair of large, opposite, multispined signa; ductus seminalis from ductus bursae.

Last stage larva (based on *reliquellus*) (text figure 59) somewhat slender, without pinaculum rings at base of SD1 on the mesothorax and abdominal segment eight. Head only slightly roughened. Body with granular integument, and longitudinal stripes. Mandible simple.

Pupa not studied.

Known larval hosts are members of the Asteraceae.

KEY TO SPECIES OF PHYCITODES

1. Forewing heavily dusted with white, with sharply contrasting black scales; western United States and southwestern Canada .... *mucidellus* p. 117

— Forewing less white, with fuscous scales that do not sharply contrast with white scales; eastern United States and southeastern Canada ... . *reliquellus* p. 119

Phycitodes mucidellus (Ragonot), REVISED STATUS

PL. 4, FIG. 37. TEXT FIG. 57 *a–c* (RWH 5946a).

Homoeosoma mucidella Ragonot, 1887, *Diagnoses of North American Phycitidae and Galleriidae,* 15.

Type locality: California. [MNHP]

Phycitodes mucidellus is a western North American species, distinguished chiefly from its eastern counterpart (*reliquellus*) by its generally paler color and greater average size (wing length of *mucidellus* 6.5–10.0 mm).

Coquillett (1901) briefly described the larva as having a brown head and a mostly green body with minutely granulated integument and brown dorsal and subdorsal stripes. Heinrich (1956) listed only *Aster* as a larval host but indicated that *mucidellus* probably also has other composite hosts. More recently, *mucidellus* adults have been reared by Goeden and Ricker (1986a, b; 1987a, b) in California from western thistle (*Cirsium occidentale* (Nuttall) Jepson), *Cirsium mohavense* (Green) Petrak, *Cirsium neomexicanum* Gray, *Cirsium nidulum* (Jones)

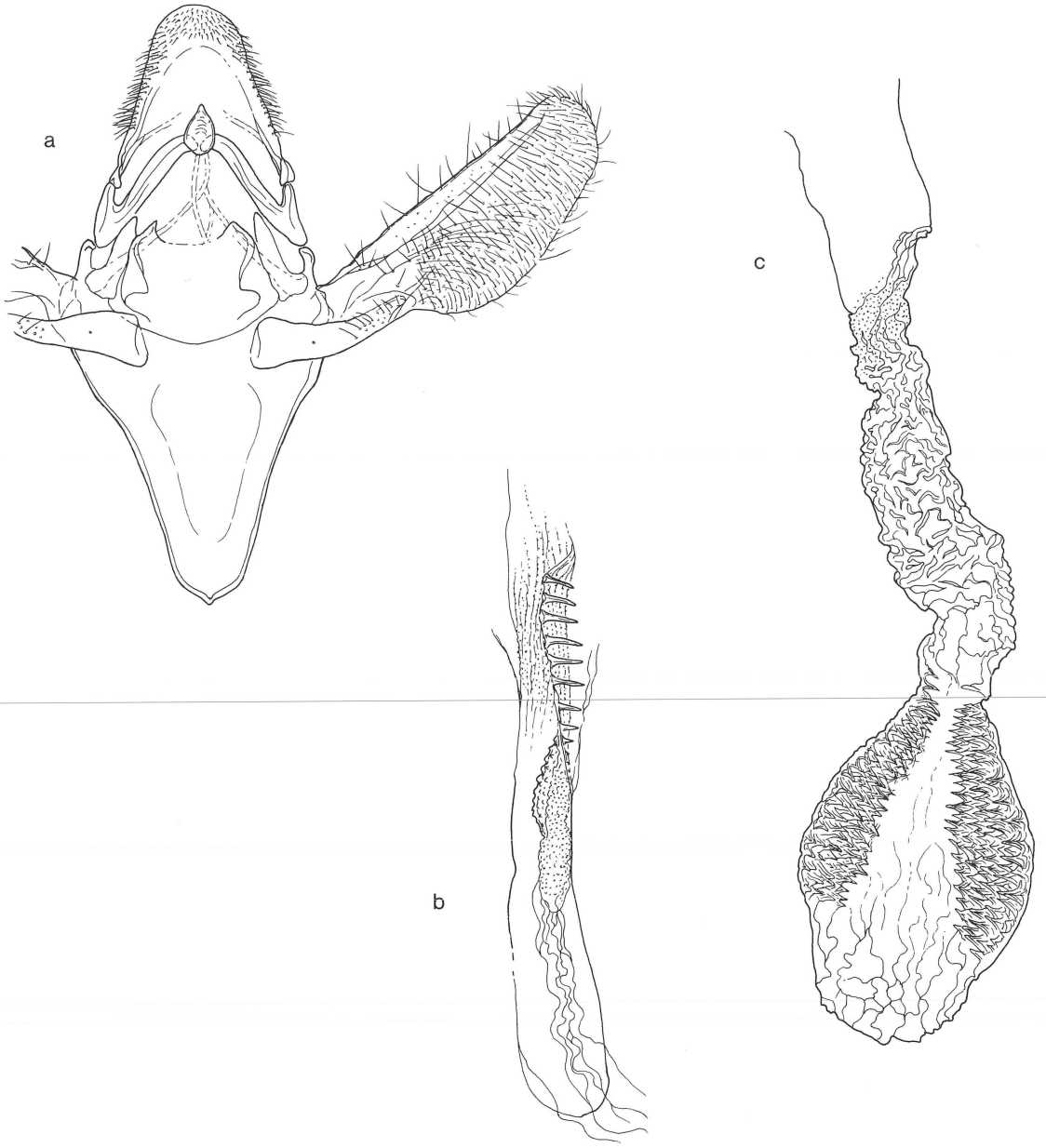

FIGURE 57: GENITALIA OF *PHYCITODES MUCIDELLUS*

a. Male genitalia (most of left valva and aedoeagus omitted) (HHN 1286). *b.* Aedoeagus. *c.* Ductus bursae and corpus bursae (HHN 1287).

Petrak, *Cirsium californicum* Gray, *Cirsium proteanum* J. T. Howell, bull thistle (*Cirsium vulgare* (Savi) Tenore), and yellowspine thistle (*Cirsium ochrocentrum* A. Gray). Also in California, based on labels on specimens of *mucidellus* (UCB), Powell has reared adults from larvae collected in the seed heads of lambstongue groundsel (*Senecio integerrimus* Nuttall) and *Senecio californicus* de Candolle, and from cudweed (*Gnaphalium bicolor* Bioletti) from San Clemente Island and in Monterey County. In Utah, larvae occur in the seed heads of curlycup gumweed (*Grindelia squarrosa* (Pursh) Dunal) and in Texas and Arizona threadleaf groundsel (*Senecio longilobus* Bentham) is a host.

Specimens of *mucidellus* have been collected in most of the western United States and to some extent in southwestern Canada. Dates of capture of adults are as follows: southern Alberta (June, Oc-

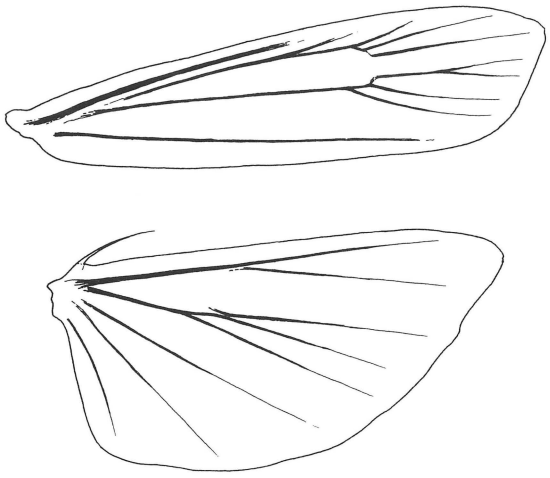

FIGURE 58: VENATION OF MALE *PHYCITODES RELIQUELLUS*.

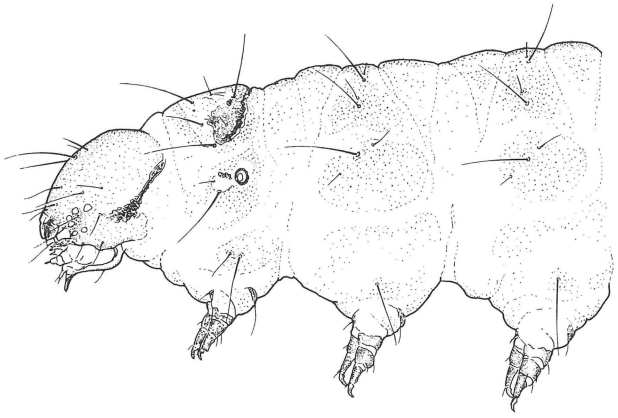

FIGURE 59: LAST STAGE LARVA OF *PHYCITODES RELIQUELLUS* (LATERAL VIEW OF HEAD AND THORAX).

tober); South Dakota (August); Wyoming (June, July); Idaho (July); Oregon (July); Utah (July, August); Nevada (June, August); California (throughout most of the state, including the Channel Islands) (March–October); western Texas (May–July); New Mexico (June, July); Arizona (southern mountains and northern plateau) (April–July, October, December).

Phycitodes reliquellus (Dyar), REVISED STATUS

PL. 4, FIGS. 38, 39. TEXT FIGS. 58, 59 (RWH 5946b).

Homoeosoma reliquellum Dyar, 1904a, *Proc. Ent. Soc. Washington,* **6**: 112.
Type locality: Center Harbor, New Hampshire. [USNM]

Phycitodes reliquellus is similar to *P. mucidellus* in general appearance, but there is less white on the forewing. *P. reliquellus* is also confined to eastern North America. Wing length of *reliquellus* 6.0–8.0 mm.

Last stage larva (text figure 59) 9.0–10.5 mm long; head yellowish brown with broad dark-brown to black genal streak and subgenal patch (tonofibrillary platelets not evident); thoracic shield pale yellowish brown anteriorly with dark-brown to black tonofibrillary platelets and broad dark-brown to black posterior and ventral margins; body granulate, pale translucent bluish white or greenish white with broad, distinct, complete reddish-purple dorsal and dorsolateral longitudinal stripes and less distinct, incomplete, reddish-purple, lateral longitudinal stripes; interstial areas yellowish white to pink; yellowish white around spiracles; enlarged pinaculum evident at SD1 on mesothorax, but not forming ring; no SD1 pinaculum ring on eighth abdominal segment; spiracular peritreme black. Pupa 6.0–7.2 mm long; yellowish brown; thoracic spiracles present; gibba absent; six, similar, hooked, spinelike setae on tenth segment.

Larval hosts include: aster (*Aster* spp.), yellow thistle (*Cirsium horridulum* Michaux), Carolina false dandelion (*Pyrrhopappus carolinianus* (Walter) de Candolle; sow thistle (*Sonchus asper* (L.) Hill and *Sonchus oleraceus* L.); lettuce (*Lactuca canadensis* L.). The larvae feed mostly on developing seeds.

There are two or more generations each year throughout its range. In northern Florida adults have been collected every month but January. Other locations (and months) are as follows: Ontario (June, September); Maine (July, August); New Hampshire (August); New York (May–July); Michigan (July, August); Illinois (May); New Jersey (May, July–October); Pennsylvania (May–July); Ohio (May, September); Missouri (May, June, September, November); North Carolina (May, September); South Carolina (March, April); Georgia (March); Alabama (June); Louisiana (June); Mississippi (May); Florida (May); eastern Texas (April, May).

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MONOCHROME PLATES

PLATE A: MALE ANTENNAE OF PHYCITINAE

1. *Baphala pallida* (Comstock), base of left antenna (caudal view); 2. Enlarged view of sensilla; 3. Enlarged view of sensilla (antenna turned 90 degrees). (p. 33). 4. *Zophodia grossulariella* (Hübner), base of right antenna (caudal view). (p. 37).

PLATE B: MALE ANTENNAE OF PHYCITINAE

1. *Zophodia grossulariella* (Hübner), enlarged view of sensilla, right antenna (caudal view); 2. Enlarged view of sensilla, left antenna (caudal view). (p. 37). 3. *Ozamia clarefacta* Dyar, base of left antenna (caudal view); 4. Enlarged view of sensilla. (p. 42).

PLATE C: MALE ANTENNAE OF PHYCITINAE

1. *Cactobrosis fernaldialis* (Hulst), base of left antenna (caudal view); 2. Enlarged view of sensilla. (p. 47). 3. *Melitara prodenialis* Walker, base of left antenna (caudal view). (p. 51). 4. *Alberada californiensis* Neunzig, base of right antenna (caudal view). (p. 61).

PLATE D: MALE ANTENNAE OF PHYCITINAE

1. *Rumatha bihinda* (Dyar), base of left antenna (caudal view). (p. 75). 2. *Homoeosoma electellum* (Hulst), base of right antenna (caudal view). (p. 99).

PLATE A: MALE ANTENNAE OF PHYCITINAE

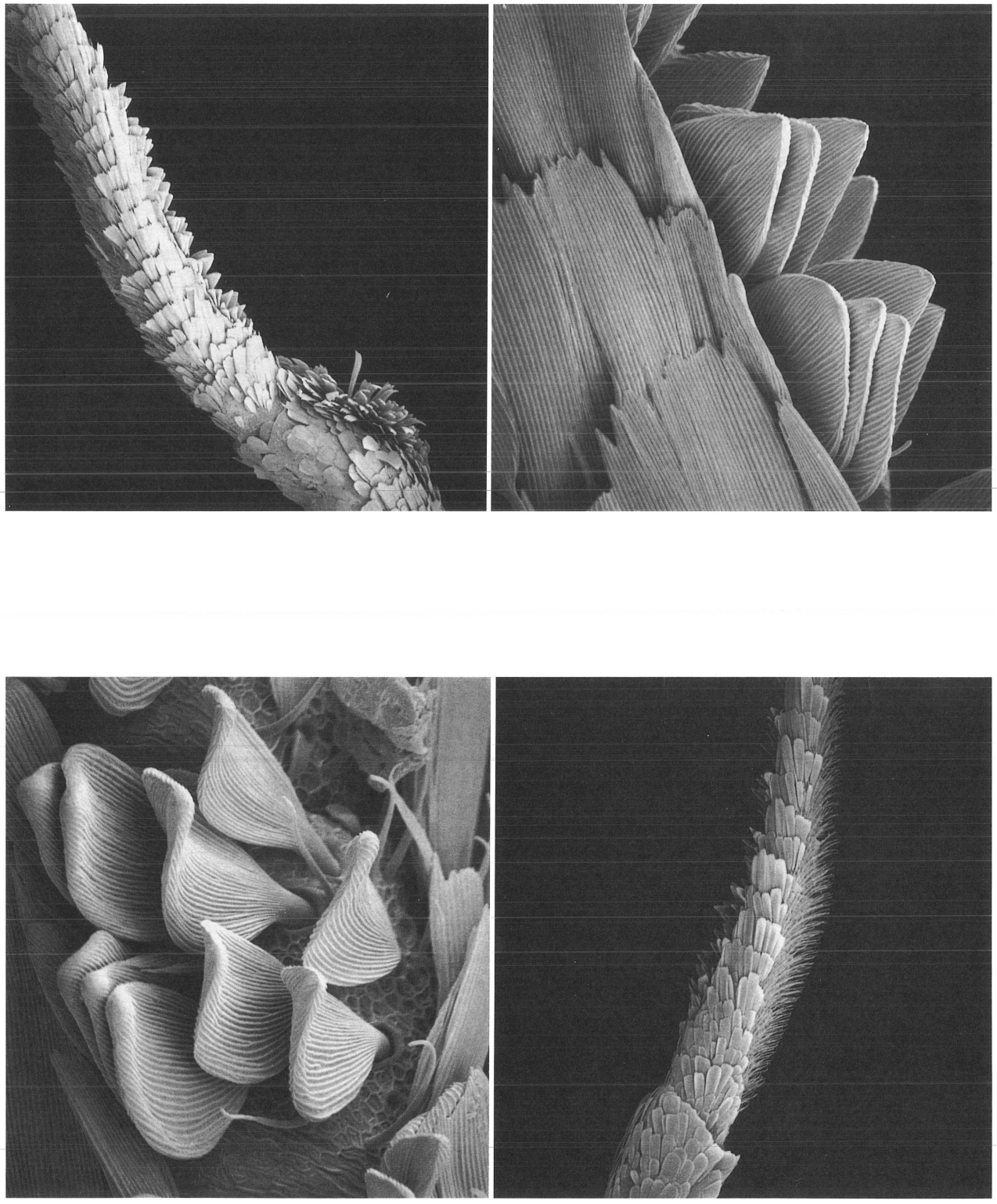


PLATE B: MALE ANTENNAE OF PHYCITINAE

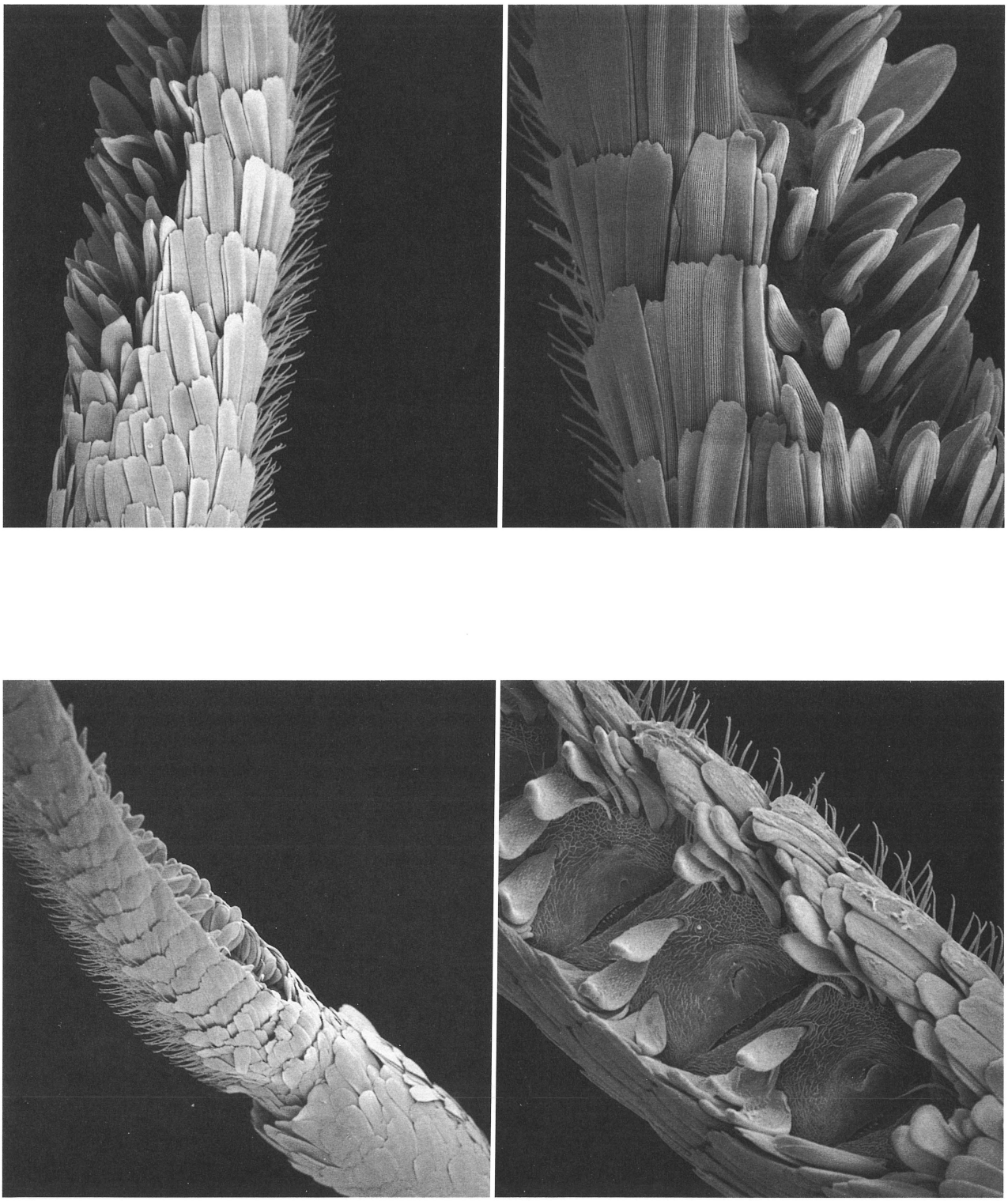


PLATE C: MALE ANTENNAE OF PHYCITINAE

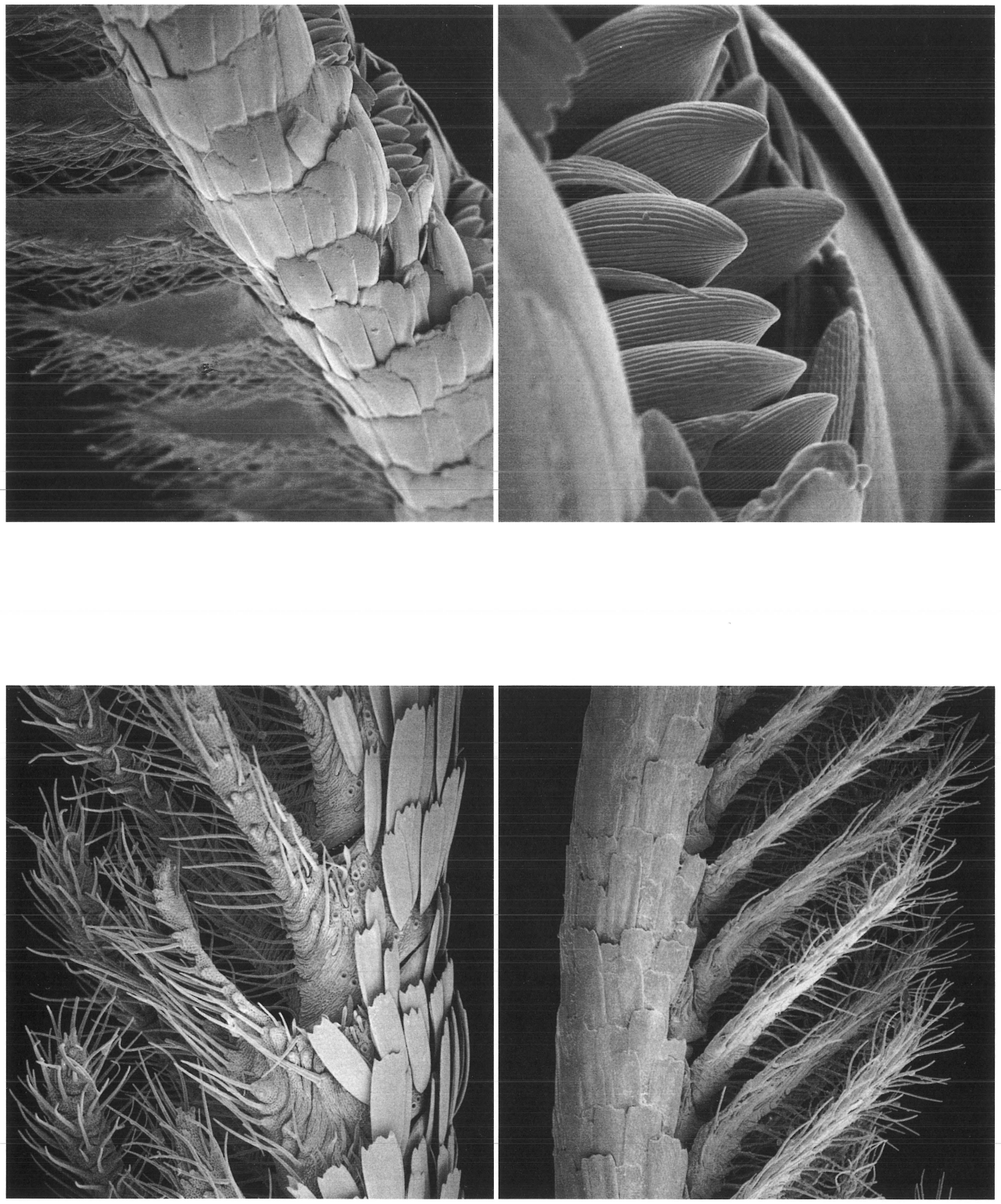
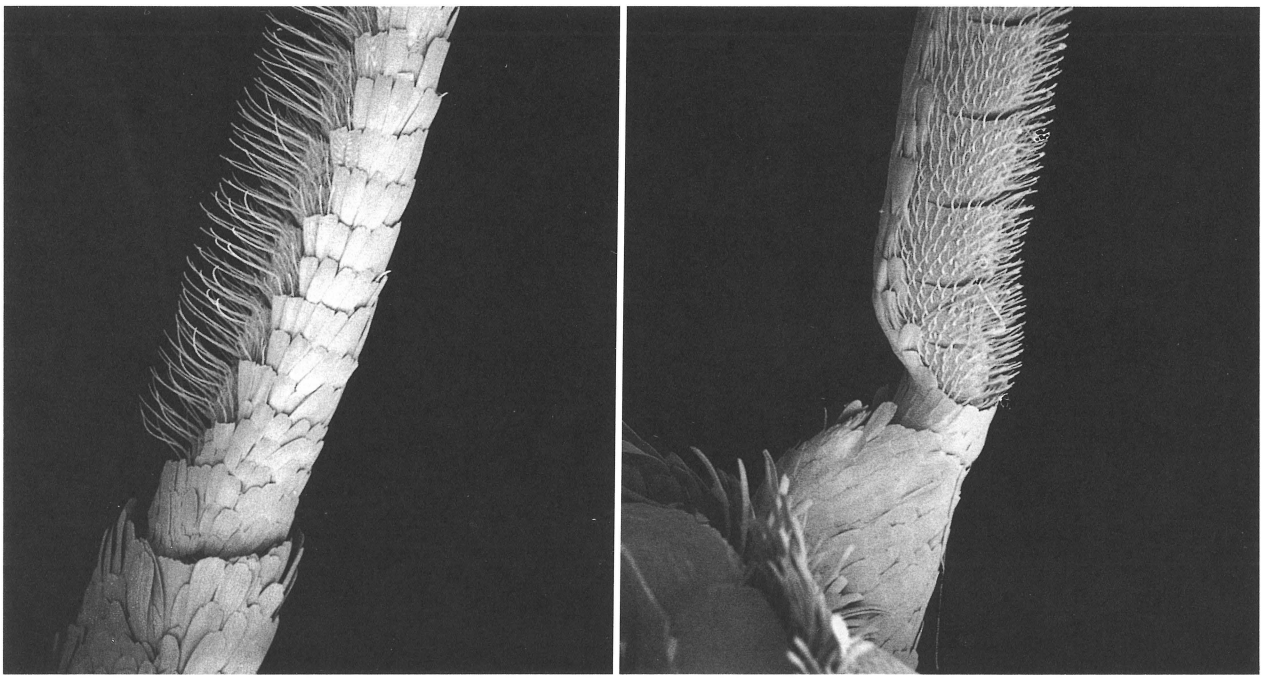


PLATE D: MALE ANTENNAE OF PHYCITINAE



COLOR PLATES

Pyraloidea

PLATE 1

Pyraloidea

PYRALIDAE

figs. 1–42

TWICE NATURAL SIZE 2:1

1. *Laetilia coccidivora* (Comst.), ♂. White Springs, Florida, larva feeding on *Toumeyella pini,* adult emerged 1 November 1986, A. T. Drooz (NCSU). (p. 18).
2. *Laetilia coccidivora* (Comst.), ♀. White Springs, Florida, larva feeding on *Toumeyella pini,* adult emerged 16 November 1986, A. T. Drooz (NCSU). (p. 18).
3. *Laetilia dilatifasciella* Rag., ♂. La Jolla, San Diego Co., California, 24 June 1963, at light, J. Powell (UCB). (p. 20).
4. *Laetilia dilatifasciella* Rag., ♀. Willows Cove, Santa Cruz Island, Santa Barbara Co., California, 28 September 1978, reared from cottony scale on *Opuntia,* J. Powell (UCB). (p. 20).
5. *Laetilia dilatifasciella* Rag. ♂. Central Valley, "Cascada," Santa Cruz Island, Santa Barbara Co., California, 27 September 1978, black light trap, J. Powell (UCB). (p. 20).
6. *Laetilia hulstii* CKLL., ♀ Fort Wingate, New Mexico, 8–15 May, Barnes Collection (USNM). (p. 21).
7. *Laetilia zamacrella* Dyar, ♂. Berkeley, Alameda Co., at light, 29 September 1986, J. Powell (UCB). (p. 22).
8. *Laetilia zamacrella* Dyar, ♀. Berkeley, Alameda Co., black light, 1–4 October 1986, J. Powell (UCB). (p. 22).
9. *Laetilia ephestiella* (Rag.), ♂. Holotype *Maricopa lustrella* Dyar. Williams, Arizona, 7 June (USNM). (p. 22).
10. *Laetilia myersella* Dyar, ♂. 6 mi SW Starkville, Oktibbeha Co., Mississippi, 9 August 1986, R. L. and B. B. Brown (MEM). (p. 22).
11. *Laetilia myersella* Dyar, ♀. Fuch's Hammock, near Homestead, Dade Co., Florida, 25 April 1981, T. S. Dickel (NCSU). (p. 22).
12. *Laetilia fiskeella* Dyar, ♂. T18N R14E, Sec. 23, Oktibbeha Co., Mississippi, 2 April 1986, R. L. and B. B. Brown (MEM). (p. 22).
13. *Laetilia fiskeella* Dyar, ♀. 6 mi SW Starkville, Oktibbeha Co., Mississippi, 15 April 1986, R. L. and B. B. Brown (MEM). (p. 22).
14. *Laetilia cinerosella* Neunzig, ♂. Holotype. Lake Delancy, Ocala National Forest, NFR 75, Marion Co., Florida, 18 October 1990, H. D. Baggett (USNM). (p. 23).
15. *Laetilia cinerosella* Neunzig, ♀. Paratype. Lake Delancy, Ocala National Forest, NFR 75, Marion Co., Florida, 18 October 1990, H. D. Baggett (USNM). (p. 23).
16. *Laetilia bellivorella* Neunzig, ♂. Holotype. Archbold Biological Station, Lake Placid, Highlands Co., Florida, 18 February 1985, D. C. Ferguson (USNM). (p. 26).
17. *Rostrolaetilia placidella* (B. & McD.), ♀. Paralectotype. Olancha, Inyo Co., California, 8–15 June, (USNM). (p. 28).
18. *Rostrolaetilia minimella* Blanchard & Ferguson, ♂. Dunes S of Zzyzx Spring, 9 air mi S Baker, San Bernardino Co., California, 30 June 1978, black light trap, J. Powell (UCB). (p. 28).
19. *Rostrolaetilia placidissima* Blanchard & Ferguson, ♀. Paratype. Stockton, Utah, 9 August 1904, T. Spalding (USNM). (p. 28).
20. *Rostrolaetilia utahensis* Blanchard & Ferguson, ♀. Holotype. Richfield, Utah, 15 June 1930, light trap (USNM). (p. 28).
21. *Rostrolaetilia coloradella* Blanchard & Ferguson, ♀. Holotype. Pueblo, Colorado, July (USNM). (p. 30).
22. *Rostrolaetilia eureka* Blanchard & Ferguson, ♀. Paratype. Eureka, Utah, 17 July 1911, T. Spalding (USNM). (p. 30).
23. *Rostrolaetilia eureka* Blanchard & Ferguson, ♀. Paratype. Eureka, Utah, 15 August 1911, T. Spalding (USNM). (p. 30).
24. *Rostrolaetilia nigromaculella* (Hulst), ♀. Baboquivari Mountains, Pima Co., Arizona, 1–15 May 1924, O. C. Poling (USNM). (p. 30).
25. *Rostrolaetilia nigromaculella* (Hulst), ♀. Madera Canyon, 4880′, Santa Rita Mountains, Santa Cruz Co., Arizona, 14 May 1963, J. G. Franclemont (USNM). (p. 30).
26. *Rostrolaetilia ardiferella* (Hulst), ♂. Shafter, Presidio Co., Texas, 18 October 1968, A. and M. E. Blanchard (USNM). (p. 30).
27. *Rostrolaetilia pinalensis* Blanchard & Ferguson, ♂. Holotype. Pinal Mountains, 5,000′, Arizona, 15–30 April 1925, O. C. Poling (USNM). (p. 31).
28. *Rostrolaetilia texanella* Blanchard & Ferguson, ♂. Paratype. Green Gulch, Big Bend National Park, Texas, 31 March 1971, A. and M. E. Blanchard (USNM). (p. 30).
29. *Welderella parvella* (Dyar), ♀. N Padre Island, Nueces Co., Texas, 7 June 1978, A. and M. E. Blanchard (USNM). (p. 31).
30. *Welderella parvella* (Dyar), ♂. Sinton. Welder Wildlife Refuge, Texas, 5 July 1975, A. and M. E. Blanchard (USNM). (p. 31).
31. *Baphala pallida* (J. H. Comstock), ♂. Fuch's Hammock, near Homestead, Dade Co., Florida, 30 November 1985, T. S. Dickel (NCSU). (p. 33).
32. *Baphala pallida* (J. H. Comstock), ♀. Fuch's Hammock, near Homestead, Dade Co., Florida, 24 December 1986, T. S. Dickel (NCSU). (p. 33).
33. *Baphala pallida* (J. H. Comstock), ♂. Lake Delancy, Ocala National Forest, NFR 75, Florida, 16 October 1990, H. D. Baggett (NCSU). (p. 33).
34. *Baphala pallida* (J. H. Comstock), ♂. 1 km W Turner Falls, Arbuckle Mountains, Murray Co., Oklahoma, 19–30 July 1984. D. and M. Davis (USNM). (p. 33).
35. *Baphala pallida* (J. H. Comstock), ♂. Deutschburg, Jackson Co., Texas, 7 October 1974, A. and M. E. Blanchard (USNM). (p. 33).
36. *Baphala eremiella* (Dyar), ♂. 3 mi north Smartville, Sierra Foothill Field Station, Yuba Co., California, 8 May 1980, blacklight trap, J. Powell (UCB). (p. 35).
37. *Baphala eremiella* (Dyar), ♂. W end Central Valley, "Cascada," Santa Cruz Island, Santa Barbara Co., California, blacklight trap, 22–24 May 1984, J. Powell (UCB). (p. 35).
38. *Baphala phaeolella* Neunzig, ♂. Holotype. North Harlowe, Craven Co., North Carolina, 21 June 1990, J. B. Sullivan (USNM). (p. 35).
39. *Baphala phaeolella* Neunzig, ♀. Paratype. North Harlowe, Craven Co., North Carolina, 8 October 1990, J. B. Sullivan (USNM). (p. 35).
40. *Cassiana malacella* (Dyar), ♂. Upper Key Largo, Monroe Co., Florida, 18 February 1990, T. S. Dickel (NCSU). (p. 86).
41. *Cassiana malacella* (Dyar), ♀. Bahia Honda State Recreation Area, Monroe Co., Florida, 21 February 1991, T. S. Dickel (NCSU). (p. 86).
42. *Cassiana malacella* (Dyar), ♀. Bahia Honda State Recreation Area, Monroe Co., Florida, 13 February 1991, T. S. Dickel (NCSU). (p. 36).


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PLATE 2

Pyraloidea

PYRALIDAE

figs. 1–28

ONE AND ONE-HALF NATURAL SIZE 1.5:1

1. *Zophodia grossulariella* (Hbn.), ♂. Six Mile Creek, Ithaca, New York, 13 May 1956, J. G. Franclemont (USNM). (p. 37).
2. *Zophodia grossulariella* (Hbn.), ♀. Holotype of *Zophodia grossulariae dilativitta* Dyar, (?) San Diego, California (no collection date) (USNM). (p. 37).
3. *Zophodia multistriatella* (Blanchard & Knudson), ♂. Holotype. Fort Davis, Jeff Davis Co., Texas, 25 March 1968, A. and M. E. Blanchard (USNM). (p. 40).
4. *Ozamia thalassophila* Dyar, ♀. Holotype. Oceanside, California, Ex. *Opuntia,* August 1924, A. P. Dodd (USNM). (p. 42).
5. *Ozamia clarefacta* Dyar, ♀. Santa Anna Refuge, Hidalgo Co., Texas, 5 March 1973, A. and M. E. Blanchard (USNM). (p. 42).
6. *Ozamia fuscomaculella* (Wright), ♀. Prisoner's Harbor Cr., Santa Cruz Island, Santa Barbara Co., California, 25 September 1978, black lite trap, J. Powell (UCB). (p. 42).
7. *Ozamia lucidalis* (Wlk.), ♂. Bosque Estatal de Guanica, Puerto Rico, 26–28 May 1987, L. C. Dow (NCSU). (p. 41).
8. *Melitara apicigrammella* Blanchard & Knudson, ♂. Chihuahuan Desert near Nugent Mountain, Big Bend National Park, Texas, 1 May 1972, A. and M. E. Blanchard (USNM). (p. 56).
9. *Alberada bidentella* (Dyar), ♀. 10 mi N of Van Horn, Culberson Co., Texas, 7 September 1979, E. Knudson (ECK). (p. 61).
10. *Rumatha bihinda* (Dyar), ♂. 12 mi SE Ivanpah, San Bernardino Co., California, 1 May 1956, J. Powell (UCB). (p. 75).
11. *Rumatha jacumba* Neunzig, ♀. Paratype. Jacumba Mountains, 800′, Imperial Co., California, 20 March 1988, J. P. and K. E. S. Donahue (LACM). (p. 75).
12. *Rumatha jacumba* Neunzig, ♂. Holotype. Jacumba Mountains, 800′, Imperial Co., California, 20 March 1988, J. P. and K. E. S. Donahue (LACM). (p. 75).
13. *Eremberga leuconips* (Dyar), ♂. 1 mi SW Portal, 4,800′, Cochise Co., Arizona, 2 August 1973, J. Powell (UCB). (p. 79).
14. *Yosemitia fieldiella* (Dyar), ♀. Holotype. La Puerta Valley, San Diego Co., California, 11 July, G. H. Field (USNM). (p. 78).
15. *Yosemitia graciella* (Hulst), ♀. K-Bar Research Station, Big Bend National Park, Brewster Co., Texas, 9 August 1983, E. Knudson (ECK). (p. 77).
16. *Eremberga creabates* (Dyar), ♂. Borrego, San Diego Co., California, 3 May 1956, J. Powell (UCB). (p. 79).
17. *Rhagea stigmella* (Dyar), ♀. San Bruno Mountains, San Mateo Co., California, 16 September 1983, R. L. Langston (UCB). (p. 83).
18. *Bema neuricella* (Zell.), ♀. Upper Key Largo, Monroe Co., Florida, 8 January 1988, T. S. Dickel (NCSU). (p. 94).
19. *Homoeosoma illuviellum* Rag., ♂. Fort Valley, 7,350′, 7½ mi NW Flagstaff, Coconino Co., Arizona, 13 July 1964, J. G. Franclemont (USNM). (p. 108).
20. *Homoeosoma emendator* Heinr., ♀. Charleston Mountains, Kyle Canyon, Clark Co., Nevada, 26 April 1950, E. C. Johnston (CNC). (p. 109).
21. *Homoeosoma albescentellum* Rag., ♀. Hart Prairie, 8,500′, 10 mi NNW Flagstaff, Coconino Co., Arizona, 30 June 1961, J. G. Franclemont (USNM). (p. 109).
22. *Homoeosoma impressale* Hulst, ♂. Great Sand Dunes National Monument, 8,200′, Alamosa Co., Colorado, 17 June 1982, D. C. Ferguson (USNM). (p. 109).
23. *Homoeosoma deceptorium* Heinr., ♂. Six Mile Creek, Ithaca, New York, 31 July 1953, J. G. Franclemont (USNM). (p. 109).
24. *Homoeosoma deceptorium* Heinr., ♀. McLean Bog Reserve, Tompkins Co., New York, 30 July 1953, J. G. Franclemont (USNM). (p. 109).
25. *Homoeosoma pedionnastes* Goodson & Neunzig, ♀. Paratype. Perquimans Co., North Carolina, larva collected 14 June 1981, thistle, L. R. Grimes (USNM). (p. 110).
26. *Homoeosoma eremophasma* Goodson & Neunzig, ♂. Holotype. Cave Creek Canyon, 4,800′, Chiricahua Mountains, Cochise Co., Arizona, 31 July 1967, J. G. Franclemont (USNM). (p. 111).
27. *Homoeosoma eremophasma* Goodson & Neunzig, ♀. Paratype. Cave Creek Canyon, 5,400′, Chiricahua Mountains, Cochise Co., Arizona, 19 June 1966, J. G. Franclemont (USNM). (p. 111).
28. *Homoeosoma ardaloniphas* Goodson & Neunzig, ♀. Paratype. Karlsruhe Prairie, McHenry Co., North Dakota, 11 July 1979, T. L. McCabe (NYSM). (p. 111).


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PLATE 3

Pyraloidea

PYRALIDAE

figs. 1–36

NATURAL SIZE 1:1

1. *Cactobrosis fernaldialis* (Hulst), ♂. Madera Canyon, 4,400′, Santa Rita Mountains, Pima Co., Arizona, 9 June 1963, J. G. Franclemont (USNM). (p. 47).
2. *Cactobrosis fernaldialis* (Hulst), ♂. Miller Canyon, 5,000′, Huachuca Mountains, Cochise Co., Arizona, 25 July 1974, J. G. Franclemont (USNM). (p. 47).
3. *Cactobrosis fernaldialis* (Hulst), ♂. Madera Canyon, 4,880′, Santa Rita Mountains, Santa Cruz Co., Arizona, 10 July 1959, J. G. Franclemont (USNM). (p. 47).
4. *Cactobrosis fernaldialis* (Hulst), ♀. Madera Canyon, 4,880′, Santa Rita Mountains, Santa Cruz Co., Arizona, 28 May 1963, J. G. Franclemont (USNM). (p. 47).
5. *Eremberga insignis* Heinr., ♂. K-Bar Research Station, Big Bend National Park, Texas, 25 September 1971, A. and M. E. Blanchard (USNM). (p. 80).
6. *Echinocereta strigalis* (B. & McD.), ♂. Fort Davis, Jeff Davis Co., Texas, 5 October 1969, A. and M. E. Blanchard (USNM). (p. 49).
7. *Echinocereta strigalis* (B. & McD.), ♂. K-Bar Research Station, Big Bend National Park, Texas, 23 March 1971, A. and M. E. Blanchard (USNM). (p. 49).
8. *Melitara prodenialis* Wlk., ♂. Okefenokee Refuge Headquarters, near Folkston, Georgia, 3 May 1981, D. C. Ferguson (USNM). (p. 51).
9. *Melitara prodenialis* Wlk., ♀. Oneco, Manatee Co., Florida, 24 March 1957, J. G. Franclemont (USNM). (p. 51).
10. *Melitara prodenialis* Wlk., ♀. Archbold Biological Station, Lake Placid, Highlands Co. Florida, 31 March 1959, J. G. Franclemont (USNM). (p. 51).
11. *Melitara dentata* (Grt.), ♂. Fourmile Creek, 8,500′ 4 mi N of Buena Vista, Chaffee Co., Colorado, 14 July 1982, D. C. Ferguson (USNM). (p. 53).
12. *Melitara dentata* (Grt.), ♀. Fourmile Creek, 8,500′, 4 mi N of Buena Vista, Chaffee Co., Colorado, 13 July 1982, D. C. Ferguson (USNM). (p. 53).
13. *Melitara dentata* (Grt.), ♀. 7¾ mi N of Big Timber near Big Timber Creek, Sweet Grass Co., Montana, 10 August 1969, J. G. Franclemont (USNM). (p. 53).
14. *Melitara texana* Neunzig, ♂. Holotype. Carrizo Springs, Texas. Emerged 9 October 1945 ex. larva collected 20 August 1945, borer in *Opuntia lindheimeri,* A. Smith (LACM). (p. 54).
15. *Melitara texana* Neunzig, ♀. Paratype. Carrizo Springs, Texas. Emerged 9 October 1945 ex. larva collected 10 August 1945, borer in *Opuntia lindheimeri,* H. Smith (LACM). (p. 54).
16. *Melitara doddalis* Dyar, ♀. Madera Canyon, 4,880′, Santa Rita Mountains, Santa Cruz Co., Arizona, 1 September 1960, J. G. Franclemont (USNM). (p. 56).
17. *Melitara junctolineella* Hulst, ♂. Laguna Atascosa, Cameron Co., Texas, 12 September 1974, A. and M. E. Blanchard (USNM). (p. 56).
18. *Melitara junctolineella* Hulst, ♂. Santa Anna Wildlife Refuge [Hidalgo Co.], Texas, 16 November 1965, A. and M. E. Blanchard (USNM). (p. 56).
19. *Melitara subumbrella* (Dyar), ♂. 2 mi S of Morrison, T5S, R70W, S11, 6,278′, Jefferson Co., Colorado, 17 June 1988, T. S. Dickel (NCSU). (p. 58).
20. *Melitara subumbrella* (Dyar), ♂. Hunter's Access Rd. to Black Ridge, adjacent to Colorado National Monument, T11S, R2W, S36, 6,479′, Mesa Co., Colorado, 27 May 1988, T. S. Dickel (NCSU). (p. 58).
21. *Alberada parabates* (Dyar), ♂. K-Bar Research Station, 3,400′, Big Bend National Park, Brewster Co. Texas, 1 May 1972, J. G. Franclemont (USNM). (p. 59).
22. *Alberada parabates* (Dyar), ♂. Dog Canyon, Guadalupe Mountains National Park, Culberson Co., Texas, 20 July 1990, E. C. Knudson (ECK). (p. 59).
23. *Alberada parabates* (Dyar), ♂. Sierra Diablo Wildlife Management Area, 6,400′, Culberson Co., Texas, 31 August 1970, J. G. Franclemont (USNM). (p. 59).
24. *Alberada candida* Neunzig, ♂. Holotype. Cottonwood Springs Rd., Riverside Co., California, 27 October 1940, C. Henne (USNM). (p. 66).
25. *Alberada californiensis* Neunzig, ♂. Holotype. Juniper Hills, Mojave Desert, Los Angeles Co., California, 3,600′, 3, October 1961, C. Henne (LACM). (p. 61).
26. *Alberada californiensis* Neunzig, ♀. Paratype. Juniper Hills, 3,500′, 2 mi S Pearblossom, Los Angeles Co., California, 29 July 1967, C. Henne (LACM). (p. 61).
27. *Alberada californiensis* Neunzig, ♂. Paratype. Little Rock, California, 10 October 1961, R. P. Allen (USNM). (p. 61).
28. *Alberada franclemonti* Neunzig, ♂. Holotype. Madera Canyon, 4,400′, Santa Rita Mountains, Pima Co., Arizona, 7 September 1960, J. G. Franclemont (USNM). (p. 62).
29. *Alberada franclemonti* Neunzig, ♀. Paratype. Madera Canyon, 4,400′, Santa Rita Mountains, Pima Co., Arizona, 26 May 1963, J. G. Franclemont (USNM). (p. 62).
30. *Alberada franclemonti* Neunzig, ♂. Paratype. Guadalupe Canyon, 4,250′, Peloncillo Mountains, Cochise Co., Arizona, 1 August 1976, C. J. and S. Werner (USNM). (p. 62).
31. *Rumatha polingella* (Dyar), ♀. Miller Canyon, 5,000′, Huachuca Mountains, Cochise Co., Arizona, 26 June 1974, J. G. Franclemont (USNM). (p. 75).
32. *Rumatha polingella* (Dyar), ♀. Davis Mountains State Park, Jeff Davis Co., Texas, 29 June 1985, E. C. Knudson (ECK). (p. 75).
33. *Cactoblastis cactorum* (Berg), ♀. Little Torch Key and West Summerland Key, Monroe Co., Florida, ex. larva in *Opuntia stricta,* 25 May 1990, T. S. Dickel (NCSU). (p. 67).
34. *Melitara subumbrella* (Dyar), ♂. Granite Mountains, NE of Fairview Valley, Mojave Desert, San Bernardino Co., California, at light, C. Henne (LACM). (p. 58).
35. *Cahela ponderosella* (B. & McD.), ♀. Jacumba Mountains, 800′, Imperial Co., California, 20 March 1988, J. P. and K. E. S. Donahue (LACM). (p. 70).
36. *Cahela ponderosella* (B. & McD.), ♂. Jacumba Mountains, 800′, Imperial Co., California, 20 March 1988, J. P. and K. E. S. Donahue (LACM). (p. 70).


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PLATE 4

Pyraloidea

PYRALIDAE

figs. 1–39

TWICE NATURAL SIZE 2:1

1. *Mescinia estrella* B. & McD., ♂. Long Key Recreation Area, Long Key, Monroe Co., Florida, 26 January 1995, T. S. Dickel (NCSU). (p. 88).
2. *Mescinia berosa* Dyar, ♀. Key Largo Hammocks State Botanical Site, Monroe Co., Florida, 20 March 1995, T. S. Dickel (NCSU). (p. 90).
3. *Mescinia parvula* (Zeller), ♂. Key Largo Hammocks State Botanical Site, Monroe Co., Florida, 20 March 1995, T. S. Dickel (NCSU). (p. 90).
4. *Mescinia texanica* Neunzig, ♂. Holotype. Green Gulch, 5,400′, Big Bend National Park, Brewster Co., Texas, 2–4 June 1986, E. C. Knudson (USNM). (p. 90).
5. *Mescinia texanica* Neunzig, ♀. Paratype. Dog Canyon Campground, Guadalupe Mountains National Park, Culberson Co., Texas, 22 June 1990, E. C. Knudson (USNM). (p. 90).
6. *Rumatha glaucatella* (Hulst), ♀. Lake Travis, Travis Co., Texas, 23 June 1979, E. C. Knudson (ECK). (p. 73).
7. *Rhagea packardella* (Rag)., ♀. Chihuahuan Desert near Nugent Mountain, Big Bend National Park, Texas, 1 May 1972, A. and M. E. Blanchard (USNM). (p. 82).
8. *Rhagea packardella* (Rag.), ♀. Red Rock Canyon, Kern Co., California, collected as larva 2 May 1968, on *Pholisma arvenarum,* adult emerged 14 June 1968, J. Powell (UCB). (p. 82).
9. *Anderida sonorella* (Rag.), ♂. Oak Spring, Big Bend National Park, 8 May 1972, A. and M. E. Blanchard (USNM). (p. 84).
10. *Anderida sonorella* (Rag.), ♂. The Narrows, Wichita Mountains National Wildlife Refuge, Comanche Co., Oklahoma, 10–18 July 1984, D. and M. Davis (USNM). (p. 84).
11. *Anderida peorinella* Blanchard & Knudson. ♂. Holotype. K-Bar Research Station, Big Bend National Park, Brewster Co., Texas, 1 April 1984, E. Knudson (USNM). (p. 85).
12. *Barberia affinitella* Dyar, ♂. Laguna Atascosa, Cameron Co., Texas, 22 November 1973, A. and M. E. Blanchard (USNM). (p. 92).
13. *Homoeosoma electellum* (Hulst), ♂. Kerrville State Park, Kerr Co., Texas, 16 May 1985, R. and B. Brown and D. Adamski (MEM). (p. 99).
14. *Homoeosoma electellum* (Hulst), ♀. Santa Anna Wildlife Refuge (Hidalgo), Texas, 6 May 1967, A. and M. E. Blanchard (USNM). (p. 99).
15. *Homoeosoma electellum* (Hulst), ♀. Oneco, Manatee Co., Florida, 22 March 1957, J. G. Franclemont (USNM). (p. 99).
16. *Homoeosoma electellum* (Hulst), ♂. Weaver Farm near Clayton, Johnston Co., North Carolina, larva collected 16 September 1988, sunflower, adult emerged 2 October 1988, R. L. Goodson (NCSU). (p. 99).
17. *Homoeosoma electellum* (Hulst), ♀. 4 mi SE Vacaville, Solano Co., California, reared from *Grindelia camporum,* adult emerged 12 September 1966, J. Powell (UCB). (p. 99).
18. *Homoeosoma nanophasma* Neunzig, ♂. Holotype. Upper Key Largo, Monroe Co., Florida, 19 May 1990, T. S. Dickel (USNM) (p. 106).
19. *Homoeosoma inornatellum* (Hulst), ♀. Sable Island, Nova Scotia, 25 July 1976, B. Wright (NSM). (p. 106).
20. *Homoeosoma inornatellum* (Hulst), ♂. Sable Island, Nova Scotia, 8–12 September 1977, B. Wright (NSM). (p. 106).
21. *Homoeosoma asylonnastes* Goodson & Neunzig, ♀. Paratype. Devil's Den State Park, Washington Co., Arkansas, 17 July 1966, R. W. Hodges (USNM). (p. 107).
22. *Homoeosoma asylonnastes* Goodson & Neunzig, ♀. Paratype. Devil's Den State Park, Washington Co., Arkansas, 5 June 1966, R. W. Hodges (USNM). (p. 107).
23. *Homoeosoma parvalbum* Blanchard & Knudson, ♂. Holotype. Hot Springs, Big Bend National Park, Brewster Co., Texas, 4 April 1984, E. Knudson (USNM). (p. 108).
24. *Homoeosoma oxycercus* Goodson & Neunzig, ♀. Aqueduct Road, S Side Cottonwood Mountains, 25 mi E Indio, 2.4 mi W Cottonwood Springs Road, 1,800′, Riverside Co., California, 18 April 1986, J. P. and K. E. S. Donahue (LACM). (p. 108).
25. *Homoeosoma phaeoboreas* Goodson & Neunzig, ♀. Paratype. Dryden, Washington, 15 May 1942, E. C. Johnston (CNC). (p. 105).
26. *Homoeosoma uncanale* (Hulst), ♀. 17 mi E Mayfield, Sanpete Co., Utah, 20 July 1960, 10,200′, F. P. and B. Rindge (AMNH). (p. 107).
27. *Homoeosoma stypticellum* Grt., ♀. Six Mile Creek, Ithaca, New York, 31 July, 1953, J. G. Franclemont (USNM). (p. 107).
28. *Homoeosoma striatellum* Dyar, ♂. Corn Springs Wash, 2 air mi W Corn Springs, T6S R16E SW ¼, 1,900′, Chuckwalla Mountains, Riverside Co., California, 15–16 February 1986, J. P. and K. E. S. Donahue (LACM). (p. 107).
29. *Homoeosoma oslarellum* Dyar, ♀. Syntype. Chimney Gulch, Golden, Colorado, Oslar (USNM). (p. 108).
30. *Homoeosoma ammonastes* Goodson & Neunzig, ♂. Holotype. Southern Pines, North Carolina, larva collected 8 July 1970, adult emerged 13 May 1971, H. H. Neunzig and J. D. Wellborn, *Cirsium repandum* (USNM). (p. 110).
31. *Patagonia peregrina* (Heinr.), ♂. Upper Central Valley, Santa Cruz Island, Santa Barbara Co., California, 24 May 1984, J. Powell (UCB). (p. 112).
32. *Patagonia peregrina* (Heinr.), ♀. Redwood Camp Trail, Big Creek Reserve (UCN LWR), 80 m, Monterey Co., California, 26–28 May 1987, J. Powell (UCB). (p. 112).
33. *Unadilla maturella* (Zell.), ♂. Santa Anna Refuge, Hidalgo Co., Texas, 1 June 1984, E. C. Knudson (ECK). (p. 115).
34. *Unadilla maturella* (Zell.), ♂. Syntype of *Unadilla floridensis.* Key West Florida, ex *Pluchea odorata,* Special Survey of Division of Foreign Plant Quarantine (USNM). (p. 115).
35. *Unadilla erronella* (Zell.), ♀. No Name Key, Monroe Co., Florida, 21 April 1987, T. S. Dickel (NCSU). (p. 115).
36. *Unadilla erronella* (Zell.), ♂. Chino Canyon, Riverside Co., California, T35 R4E S33, reared from flower head of *Trixis californica,* 1 November 1983, R. D. Goeden and D. W. Ricker (UCR). (p. 115).
37. *Phycitodes mucidellus* (Rag.), ♀. Fort Valley, 7,350′, 7½ mi NW Flagstaff, Coconino Co., Arizona, 8 July 1964, J. G. Franclemont (USNM). (p. 117).
38. *Phycitodes reliquellus* (Dyar), ♂. Six Mile Creek, Ithaca, New York, 6 July 1957, J. G. Franclemont (USNM). (p. 119).
39. *Phycitodes reliquellus* (Dyar), ♂. Palatka, Putnam Co., Florida, at MV/UV light, 21 July 1990, H. D. Baggett (NCSU). (p. 119).


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NOTES

1. ABBREVIATIONS FOR COLLECTORS AND COLLECTIONS

AMNH	American Museum of Natural History, New York
BMNH	The Natural History Museum, London
CNC	Canadian National Collection, Ottawa
ECK	Edward C. Knudson
HUMB	Museum Alexander Humboldt, Berlin
LACM	Natural History Museum, Los Angeles County, Los Angeles
MEM	Mississippi Entomological Museum, Mississippi State University
MNHP	Muséum National d'Histoire Naturelle, Paris
NCSU	North Carolina State University, Raleigh
NSM	Nova Scotia Museum, Halifax
NYSM	New York State Museum, Albany
SDNH	San Diego Natural History Museum, San Diego
UCB	University of California, Berkeley
UCR	University of California, Riverside
USNM	National Museum of Natural History, Washington, D.C.

2. COMMON NAMES

The use of an asterisk "*" in the text denotes a name listed in *Common Names of Insects & Related Organisms* 1989, published by the Entomological Society of America.

French-language common names have been taken from Benoit, P. et al., 1975, *French Names of Insects in Canada,* published for the Quebec Society for the Protection of Plants, Quebec. The abbreviation "m" after a name indicates that it is masculine, "f" that it is feminine.

3. CITATIONS OF AUTHORITIES

Authors' names without parentheses indicate that the specific name is associated with the genus in which it was described.

Authors' names in parentheses indicate that the specific name has been transferred from the genus in which it was described to another genus.

4. WING LENGTH

Wing length is the measurement in millimeters from the base to the apex of the forewing.

5. LOCATION OF TYPE SPECIMEN

The current location of the type specimen is given by the appropriate abbreviation in square brackets immediately following the type locality. The word "lost" indicates that it no longer exists.

6. NOMENCLATURE FOR LARVAL SETAE

Hinton's (*Trans. Royal Ent. Soc. London,* **97**: 1–37, 1946) terminology is used to refer to larval setae.

CHECK LIST

PHYCITINAE

LAETILIA Rag., 1889
LAOSTICHA Hulst, 1902
coccidivora (J. H. Comstock, 1879)
dilatifasciella (Rag., 1887)
hulstii Cockerell, 1897
quadricolorella (Dyar, 1904)
zamacrella Dyar, 1925
ephestiella (Rag., 1887)
lustrella (Dyar, 1903)
myersella Dyar, 1910
fiskeella Dyar, 1904
fiskella Heinr., 1956, missp.
cinerosella Neunzig, 1996
bellivorella Neunzig, 1996

ROSTROLAETILIA A. Blanch. & Fgn., 1975
placidella (B. & McD., 1918)
minimella A. Blanch. & Fgn., 1975
placidissima A. Blanch. & Fgn., 1975
utahensis A. Blanch. & Fgn., 1975
coloradella A. Blanch. & Fgn., 1975
eureka A. Blanch. & Fgn., 1975
nigromaculella (Hulst, 1900)
ardiferella (Hulst, 1888)
texanella A. Blanch. & Fgn., 1975
pinalensis A. Blanch. & Fgn., 1975

WELDERELLA A. Blanch., 1978
parvella (Dyar, 1906)

BAPHALA Heinr., 1956
pallida (J. H. Comstock, 1880)
basimaculatella (Rag., 1887)
eremiella (Dyar, 1910)
phaeolella Neunzig, 1996

ZOPHODIA Hbn., [1825]
DAKRUMA Grt., 1878
grossulariella (Hbn., [1809])
grossularialis Hbn., [1825], emend.
grossulariae (Riley, 1869)
turbatella (Grt., 1878)
franconiella (Hulst, 1890)
bella Hulst, 1892
ihouna Dyar, 1925
dilativitta Dyar, 1925
magnificans Dyar, 1925
multistriatella (A. Blanch. & Knudson, 1981)

OZAMIA Rag., 1901
lucidalis (Wlk., 1863)
thalassophila Dyar, 1925
fuscomaculella (W. S. Wright, 1916)
heliophila Dyar, 1925
clarefacta Dyar, 1919

CACTOBROSIS Dyar, 1914
fernaldialis (Hulst, 1886)
gigantella (Rag., 1888)
cinerella (Hulst, 1900)
fernaldalis (Dyar, 1905, missp.)

ECHINOCERETA Neunzig, 1996
strigalis (B. & McD., 1912)

MELITARA Wlk., 1863
MEGAPHYCIS Grt., 1882
OLYCELLA Dyar, 1928
prodenialis Wlk., 1863
bollii (Zell., 1872)
bolli (Grt., 1882, missp.)
dentata (Grt., 1876)
texana Neunzig, 1996
doddalis Dyar, 1925
apicigrammella A. Blanch. & Knudson, 1985
junctolineella Hulst, 1900
subumbrella (Dyar, 1925)

ALBERADA Heinr., 1939
parabates (Dyar, 1913)
bidentella (Dyar, 1908)
holochlora (Dyar, 1925)
californiensis Neunzig, 1996
franclemonti Neunzig, 1996
candida Neunzig, 1996

CACTOBLASTIS Rag., 1901
NEOPYRALIS Brèthes, 1920
cactorum (Berg, 1885)

CAHELA Heinr., 1939
ponderosella (B. & McD., 1918)
purgatoria (Dyar, 1925)
interstitialis (Dyar, 1925)
phoenicis (Dyar, 1925)

RUMATHA Heinr., 1939
glaucatella (Hulst, 1888)
polingella (Dyar, 1906)
bihinda (Dyar, 1922)
jacumba Neunzig, 1996

YOSEMITIA Rag., 1901
YOSEMETIA Hulst, 1903, missp.
graciella (Hulst, 1887)
longipennella (Hulst, 1888)
fieldiella (Dyar, 1913)

EREMBERGA Heinr., 1939
leuconips (Dyar, 1925)
creabates (Dyar, 1923)
insignis Heinr., 1939

RHAGEA Heinr., 1956
packardella (Rag., 1887)
orobanchella (Dyar, 1904)
stigmella (Dyar, 1910)
maculicula (Dyar, 1913)
maculiella (Dyar, 1925, missp.)

ANDERIDA Heinr., 1956
sonorella (Rag., 1887)
senorella (Rag., 1887, missp.)
placidella (Dyar, 1908)
peorinella A. Blanch. & Knudson, 1985

CASSIANA Heinr., 1956
malacella (Dyar, 1914)

MESCINIA Rag., 1901
estrella B. & McD., 1913
berosa Dyar, 1914
parvula (Zell., 1881)
neoparvula Neunzig & Dow, 1993
texanica Neunzig, 1996

BARBERIA Dyar, 1905
affinitella Dyar, 1905

BEMA Dyar, 1914
RELMIS Dyar, 1914
neuricella (Zell., 1848)

HOMOEOSOMA Curtis, 1833
PHYCIDEA Zell., 1839
LOTRIA Gn., 1845
electellum (Hulst, 1887)
electella (Hulst, 1887, orig. spell.)
opalescella (Hulst, 1887)
texanella Rag., 1887
tenuipunctella Rag., 1887
differtella B. & McD., 1913
phaeoboreas Goodson & Neunzig, 1993
inornatellum (Hulst, 1900)
nanophasma Neunzig, 1996
uncanale (Hulst, 1886)
uncanalis (Hulst, 1886, orig. spell.)
stypticellum Grt., 1878
stypticella Grt., 1878, orig. spell.)
striatellum Dyar, 1905
breviplicitum Heinr., 1956
imitator Heinr., 1956
asylonnastes Goodson & Neunzig, 1993
oslarellum Dyar, 1905
parvalbum A. Blanch. & Knudson, 1985
oxycercus Goodson & Neunzig, 1993
illuviellum Rag., 1888
illuviella Rag., 1888, orig. spell.
candidella Hulst, 1888
emendator Heinr., 1956
albescentellum Rag., 1887
albescentella Rag., 1887, orig. spell.
elongellum Dyar, 1903
impressale Hulst, 1886
impressalis Hulst, 1886, orig. spell.
deceptorium Heinr., 1956
ammonastes Goodson & Neunzig, 1993
pedionnastes Goodson & Neunzig, 1993
eremophasma Goodson & Neunzig, 1993
ardaloniphas Goodson & Neunzig, 1993

PATAGONIA Rag., 1901
peregrina (Heinr., 1956)
peregrinum (Heinr., 1956, orig. spell.)

UNADILLA Hulst, 1890
STRYMAX Dyar, 1914
erronella (Zell., 1881)
ubacensis (Zell., 1881)
nasutella Hulst, 1890
bipunctella (Hampson, 1901)
dorae (Dyar, 1914)
pyllis (Dyar, 1914)
maturella (Zell., 1881)
floridensis Heinr., 1956

PHYCITODES Hampson, 1917
ROTRUDA Heinr., 1956
mucidellus (Rag., 1887)
mucidella (Rag., 1887, orig. spell.)
reliquellus (Dyar, 1904)
reliquellum (Dyar, 1904, orig. spell.)

INDEX TO ANIMAL NAMES

Principal entries are given in **bold face.**
Plate references are given as (1:5).

Generic names cited only in combination with specific names, whether in synonymy, or text, are not given in the index. Look for such entries under the specific name. For example, *Homoeosoma electellum* will be found under *electellum,* but not under *Homoeosoma.*

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