

A REVISION OF THE MOTH  
GENERA *NEPTEROTAEA* AND  
*CHESIADODES* (LEPIDOPTERA,  
GEOMETRIDAE)

FREDERICK H. RINDGE

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## ABSTRACT

THE GEOMETRID MOTHS heretofore assigned to the genera *Nepterotaea* McDunnough, *Chesiadodes* Hulst, and *Morina* Grossbeck (with its synonym *Jenana* Clarke) have been studied. The results indicate that only two generic categories are represented; *Morina* is therefore placed as a junior synonym of *Chesiadodes*.

Both genera were revised. *Nepterotaea* now includes seven species, three of which are described as new; *Chesiadodes* contains 13, seven of which are new. These moths are found primarily in the semiarid southwestern United States, from western Texas to southeastern California. A few species occur outside of this area extending the range onto the Ozark Plateau in

Missouri and Arkansas, and north in the Great Basin to central Oregon. Both genera are represented in northern Mexico, with records from Chihuahua and the peninsula of Baja California; the distribution is probably greater than this but not enough collecting has been done as yet in that country to give us the needed data.

Both genera and all species, including their genitalia, are described; distributional information and time of flight are given for all species insofar as known. Keys are given for all species. The adults and their genitalia are illustrated.

## INTRODUCTION

THE PRESENT PAPER is another in a continuing series of revisionary studies of the New World Ennominae. The moths assigned to the genera *Nepterotaea* McDunnough, *Chesiadodes* Hulst, and *Morina* Grossbeck (with its synonym *Jenana* Clarke) were studied. The results indicate that only two closely allied generic categories are represented; *Morina* is therefore placed as a junior synonym of *Chesiadodes*.

No one has heretofore done a revisionary study of these genera. McDunnough (1920, p. 38) included two species in *Nepterotaea* when he proposed that generic name, and included figures of the venation and male genitalia of one of the two; the adults of both species had been previously illustrated. *Chesiadodes* and *Morina* have never been revised; in fact, they were so poorly known that Clarke (1939) proposed *Jenana* to include *simularia* Barnes and McDunnough, a species very closely allied to *morosata* Hulst, the type species of *Chesiadodes*. In the present paper I attempt to revise taxonomically all the moths known to be included in this group, to illustrate all the species and their genitalia, and try to answer some of the questions pertaining to the systematics and distribution of the group.

The tribal placement of *Nepterotaea* and *Chesiadodes* is uncertain at the present time. The basic subdivisions and tribes of this subfamily have been defined by Forbes (1948) primarily on the basis of the pupa; none of the life histories of the species included in this study is known.

McDunnough (1920), when erecting *Nepterotaea*, treated it as being allied to the Cleorini. It appears to me that the two genera studied for this revision are indeed so related and should be placed in this tribe until evidence to the contrary is produced.

In some characters the adults of *Chesiadodes* are similar to those of *Synglochis* Hulst, *Eubarnesia* Cockerell, and *Paraglaucina* Rindge, three genera of the Glaucinini (Rindge, 1959). The venation, fore tibia with apical spine, and the tendency for the tongue to become obsolescent are similar in some species of the two groups. As both occur in the same semiarid portion of the southwestern United States, it is assumed that the modifications of the fore tibia and tongue are parallel variations that have arisen independently in the two groups as a result of their living in the same environment. The similarity of venation is not necessarily considered significant; the use of the veins in delimiting genera, at least in many of the geometrids, has been greatly overemphasized by most of the early workers in this family. The members of the Glaucinini can be recognized easily by the female genitalia, and by most of the genera having but a single spine on the hind tibia.

The present study includes seven species in *Nepterotaea*, with three of them being described as new; *Chesiadodes* contains 13, seven of which are new. The moths of these two genera are found primarily in the semiarid southwestern United States, from western Texas to south-

eastern California; six are known from Texas, seven from New Mexico, nine from Arizona, and five from California. Other, single species extend the range onto the Ozark Plateau in Missouri and Arkansas, and north in the Great Basin to central Oregon. Both genera are represented in northern Mexico, with records from Chihuahua (one species of *Nepterotaea*) and the peninsula of Baja California (two of *Chesiadodes*). The distribution is probably greater than this in Mexico, but not enough collecting has been done as yet in that country to give us the needed data.

The species of *Nepterotaea* and *Chesiadodes* are poorly represented in many collections. Some species occur in areas and in seasons that have been relatively well collected, but only a few individuals have been taken. This seems to indicate that these moths occur at a comparatively low population density, or else collecting techniques need to be improved. Other species occur in localities in which collections are made less frequently, or the moths are on the wing when most collectors are inactive; several species of *Chesiadodes*, for example, fly in desert areas only in mid-winter.

During the course of this study, some 782 moths were examined; 492 belonged in *Nepterotaea* and only 290 in *Chesiadodes*, which has almost twice the number of species of the former genus. About 70 percent of these specimens are to be found in two collections; 284 are in the American Museum of Natural History and 256 in the Natural History Museum of Los Angeles County, with the next highest representation being the 93 moths in the Museum of Comparative Zoology. In addition to these adults, 42 slides of antennae and legs, and more than 150 genitalic dissections were examined. Most of these preparations were made by the author and are in the collection of the American Museum of Natural History; additional slides were studied from the collections of the other institutions and from A. Blanchard.

#### MATERIALS AND METHODS

The present revision is based on a study of the collections of the American Museum of Natural History, the California Academy of Sciences, the Canadian National Collection, the California Insect Survey collection of the University of California, Berkeley, the Museum of Comparative Zoology, the National Museum of Natural History, Smithsonian Institution, and the

Natural History Museum of Los Angeles County. Material from the private collections of several individuals has also been examined; these are referred to specifically under Acknowledgments.

All specimens studied by the author at the American Museum of Natural History during the preparation of this paper have had either identification or type labels affixed. All too often such labeling has not been done in the past, so that the question invariably arises as to whether certain specimens were examined by a reviser.

All photographs have been taken by the author. Various magnifications were used with the genitalia of both sexes, but this is not specifically noted on the figures. The moths photographed for this revision bear a typewritten "photo" label. In general, the adults and genitalia figured have been taken from the collection of the American Museum of Natural History. When such a procedure was not practical, the fact is specifically noted.

The following abbreviations have been used:

AMNH, the American Museum of Natural History  
CM, Carnegie Museum, Pittsburgh, Pennsylvania  
LAC, Natural History Museum of Los Angeles County  
MCZ, Museum of Comparative Zoology, Harvard University  
USNM, National Museum of Natural History, Smithsonian Institution.

#### ACKNOWLEDGMENTS

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## SYSTEMATIC DESCRIPTIONS

### GENUS *NEPTEROTAEA* McDUNNOUGH

*Nepterotaea* McDUNNOUGH, 1920, p. 38; 1938, p. 165.

**DIAGNOSIS:** The moths of this genus can be recognized by having their heads with a flat front; by the antennal pectinations of the male numbering from 35 to 38 segments, arising from the basal half of the segments; by having the forelegs in both sexes without a terminal spine or claw; and by the forewings having 11 veins, a single areole, and lacking a fovea. The genitalia, particularly of the male, are distinctive in the armament of the valves, and in having a simple, tubelike aedeagus.

**ADULTS:** Head, eyes large, as large as or slightly larger than width of front; front flat; tongue well developed; palpi very small, scarcely exceeding front; antennae of male with about 35 to 38 segments, bipectinate, pectinations arising in basal half of segments, from two to four times as long as their basal segments, with terminal one to six segments simple, each pectination with two rows of setae ventrally, without terminal seta; antennae of female varying from median segments weakly bipectinate to pectinate for almost entire length, pectinations 1.5 to 2.0 times as long as their basal segments. Thorax without tufts; legs with fore tibia slender, unarmed, process of male one-third to four-fifths length of tibia, with hair pencil, of female about equal in size or slightly smaller; hind tibia slender, with two pairs of spurs, without groove or hair pencil in male. Abdomen without tufts; ventral surface of third segment of male without row of setae and last segment without plate; tympanum normal in size, not reduced.

Forewings elongate, alike in both sexes; 11 veins present; areole usually present;  $R_{1+2}$  with branch at or before  $R_5$  to form areole,  $R_5$  from stalk before  $R_{3+4}$ ;  $M_1$  from upper angle, with dc rather weak;  $Cu_1$  from lower angle; fovea absent. Hind wings elongate or rather broad, outer margin tending to be weakly concave between veins; frenulum strong in both sexes; Sc approximate to R between about one-sixth and one-half length of cell; R and  $M_1$  from before upper angle;  $M_3$  from lower angle; cell elongate, extending about half length of wing;  $Cu_1$  from about one-third of distance between angle and  $Cu_2$ .

Upper surface of wings varying from pale gray to brownish gray; forewings with maculation varying from straight, clearly defined cross lines to having cross lines obsolescent; hind wings concolorous with forewings, and having similar, but reduced, pattern. Under surface of wings gray or brownish gray, immaculate in most specimens.

**MALE GENITALIA:** Uncus triangular, apex rounded or pointed, terminating in single spine; socius absent; gnathos strongly developed, smoothly sclerotized median enlargement rounded or truncate apically; valves extending beyond uncus, very broad, symmetrical, with costa broadly sclerotized and apically setose, sacculus sclerotized, extending across anterior half of valve at base, extending distally into center of valve, terminating in sclerotized ridge or swelling, and having terminal, ventral, rounded process with variable number of spines; transtilla absent; anellus elongate, straplike, swollen anteriorly; cristae absent or obsolescent, inconspicuous when present; furca absent; tegumen broad, rounded; saccus narrower, tapering anteriorly; aedeagus shorter than combined lengths of uncus, tegumen and saccus, straight, slender to moderately wide; vesica unarmed or with one spine.

**FEMALE GENITALIA:** Sterigma sclerotized, rounded or elliptical medially, with more or less sclerotized lateral areas; intersegmental area anterior of ostium membranous or sclerotized; ductus bursae relatively small, roughly square or elliptical in outline, weakly sclerotized; ductus seminalis arising on right side of corpus bursae and extending ventrally; corpus bursae membranous, posterior portion usually slender, with enlarged anterior end; signum rounded or elliptical, with more heavily sclerotized, transverse, narrow strip or inwardly pointing ridge. Papillae anales very weakly sclerotized, elongate; apophyses posteriores 1.2 to 1.4 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANTS:** Unknown.

**TYPE SPECIES:** *Pterotaea obliviscata* Barnes and McDunnough; by original designation.

**DISTRIBUTION:** The Ozark Plateau of Missouri and Arkansas; western Texas to southern Arizona; Chihuahua.

Seven species are included in *Nepterotaea*. The first three included in my revision form a compact species group, characterized by the upper surface of the forewings having a prominent, black, and almost straight t. p. line for most of the length of the wing. The next two species apparently are less closely related to each other, but they have the same basic type of maculation. The last two species form another compact group, characterized by the pectinate antennae of the females; all the preceding five (although the female of one is still unknown) have females in which the antennae are weakly serrate medially.

### KEY TO SPECIES

#### BASED ON MACULATION AND DISTRIBUTION

1. Upper surface of wings pale gray, with forewings having prominent, black, almost straight t. p. line for most of length of wing. 2  
Upper surface of wings darker gray, brownish gray, or olivaceous gray; t. p. line of forewings not as above, variously curved, represented by venular dots, or obsolescent . . . 4
- 2(1). Forewings with t. a. and t. p. lines tending to be somewhat divergent toward costa, producing broad median area; Missouri and Arkansas . . . . . *ozarkensis*  
Forewings with t. a. and t. p. lines tending to be parallel, forming narrower median area; western Texas to southeastern Arizona . . . 3
- 3(2). Hind wings with upper surface having complete, well-defined extradiscal line; Arizona and New Mexico . . . . . *marjorae*  
Hind wings with upper surface having extradiscal line in lower portion of wing only; western Texas and New Mexico. . . *diagonalis*
- 4(1). Forewings even gray or grayish brown; female antennae weakly serrate medially . . . . . 5  
Forewings mottled brownish or ochreous gray; female antennae pectinate . . . . . 6
- 5(4). Forewings gray, with prominent, black, smoothly bisinuate t. p. line . . . . . *furva*  
Forewings grayish brown, with t. p. line tending to be weakly defined, outwardly dentate or thickened on veins . . . . . *dorotheata*

- 6(4). Upper surface of wings ochreous; t. p. and median lines tending to converge near inner margin; s. t. line and area obsolescent . . . . . *memoriata*  
Upper surface of wings brownish gray; t. p. and median lines weakly represented or obsolescent; s. t. line and area tending to be completely represented . . . . . *obliviscata*

#### BASED ON MALE GENITALIA

1. Valves with terminal process of sacculus having about 24 to 30 spines . . . . . *obliviscata*  
Valves with terminal process of sacculus having from two to 10 spines . . . . . 2
- 2(1). Valves with outer margin of sacculus dentate . 3  
Valves with outer margin of sacculus smoothly rounded . . . . . 5
- 3(2). Valves with outer end of sacculus swollen, forming large, flattened process; process of sacculus with from six to 10 spines . . . . . *ozarkensis*  
Valves with outer end of sacculus not enlarged; process of sacculus with from four to six spines . . . . . 4
- 4(3). Gnathos with median enlargement broadly swollen, evenly rounded . . . . . *diagonalis*  
Gnathos with median enlargement tapering to blunt point . . . . . *marjorae*
- 5(2). Gnathos with width of median enlargement one-half width of base of uncus . . . . . *furva*  
Gnathos with width of median enlargement about as wide as base of uncus . . . . . 6
- 6(5). Valves with sacculus having terminal process situated at slender distal end . . . *memoriata*  
Valves with sacculus having terminal process situated basodorsally of broad, heavily sclerotized distal end . . . . . *dorotheata*

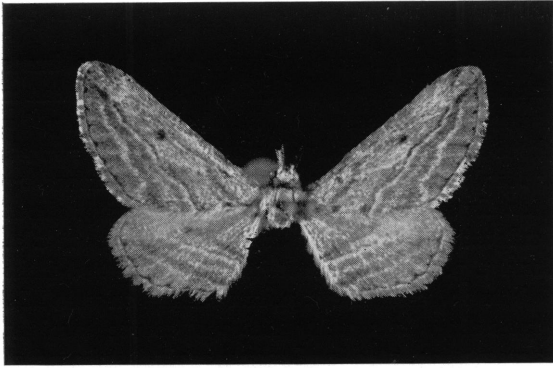
#### BASED ON FEMALE GENITALIA<sup>1</sup>

1. Ductus bursae about as long as wide . . . . . 2  
Ductus bursae about twice as long as wide . 5
- 2(1). Ductus bursae of equal width for its entire length . . . . . *marjorae*  
Ductus bursae with one end larger than other. 3
- 3(2). Ductus bursae widest anteriorly . . . *obliviscata*

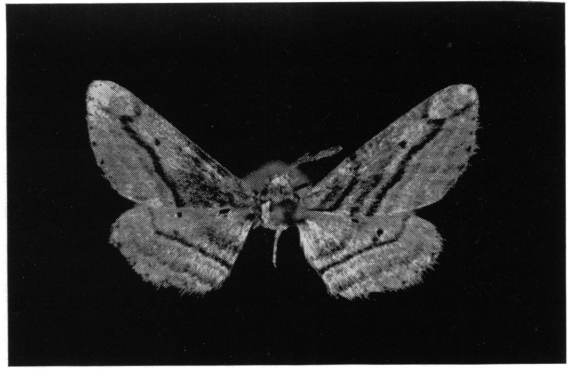
<sup>1</sup> The female of *furva* is unknown.

FIGS. 1-8. Adults of *Nepterotaea*. 1. *N. diagonalis* Cassino, holotype male, Alpine, Texas (MCZ). 2. *N. marjorae*, new species, holotype male, Southwestern Research Station of the American Museum of Natural History, Arizona, July 20, 1958 (M. Cazier; AMNH). 3. *N. ozarkensis*, new species, holotype male, 4 miles NW of Warsaw, Missouri, July 17, 1966 (J. R. Heitzman; AMNH). 4, 5. *N. dorotheata* Sperry. 4. Paratype male, Madera Canyon, Arizona, August 3, 1947 (Comstock and Martin; AMNH). 5. Male, Bear Trap Camp, New Mexico, July 5, 1965 (F. P., and M. Rindge; AMNH). 6. *N. furva*, new species, holotype male, Sierra Diablo wildlife management area, Texas, July 11, 1971 (A. and M. E. Blanchard; AMNH). 7. *N. memoriata* (Pearsall), holotype female, Palmerlee, Arizona, August (USNM). 8. *N. obliviscata* (Barnes and McDunnough), lectotype male, Paradise, Arizona, May 1-15 (USNM). All figures  $\times 2$ .

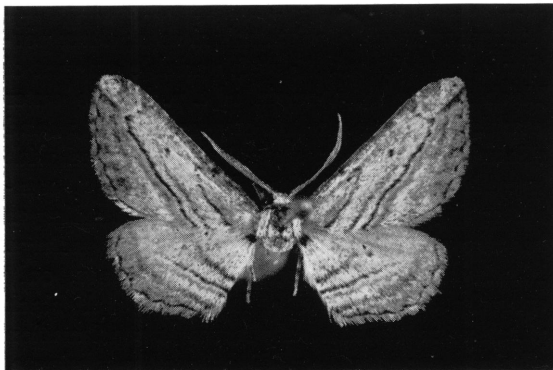




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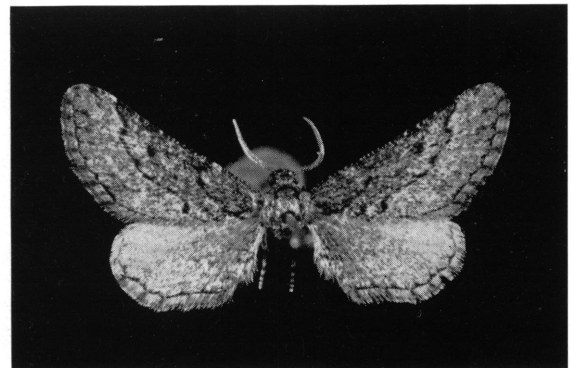
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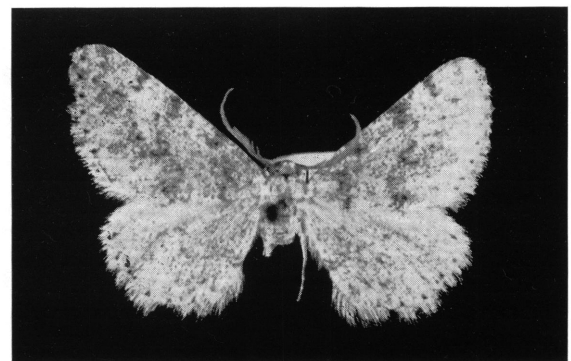
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6



7



8

- Ductus bursae widest posteriorly . . . . . 4  
 4(3). Corpus bursae more slender and smaller, about  
     1.6 mm. in length . . . . . *diagonalis*  
     Corpus bursae broader and larger, about 2.0 to  
     2.1 mm. in length . . . . . *ozarkensis*  
 5(1). Intersegmental area anterior of ostium evenly  
     and broadly concave, curved, smoothly  
     sclerotized . . . . . *dorotheata*  
     Intersegmental area anterior of ostium narrow-  
     ly sclerotized, rugose . . . . . *memoriata*

*Nepterota diagonalis* Cassino

Figures 1, 9, 15, 21

*Nepterota [sic] diagonalis* CASSINO, 1927, p. 78.

*Nepterota diagonalis*: McDUNNOUGH, 1938, p. 165.

**DIAGNOSIS:** This species has the upper surface of the forewings pale gray, with prominent, black, almost parallel t. a. and t. p. lines, forming a narrow, median area of almost equal width for the length of the wing.

**MALE:** Head, vertex with mixture of white and grayish black scales, with latter tending to form band between antennal bases; front grayish black, with ventral margin white; palpi gray or grayish black, below long scaled, black; antennae with longest pectinations 3.5 times as long as their basal segments, terminal six segments not pectinate. Thorax above white or grayish white, with transverse bands of grayish black scales anteriorly, across middle of patagia, posterior of patagia, and along posterior margin; below grayish white; legs grayish white, with variable amount of dark grayish or grayish black scaling, tending to be concentrated on outer portion of legs. Abdomen above white or grayish white, with dark brown and black scales forming bands on segments, increasing in length posteriorly; below grayish white.

**UPPER SURFACE OF WINGS:** Forewings white or grayish white, with variable amount of grayish brown and grayish black scaling except in median area; cross lines usually distinct, narrow, black or grayish black; t. a. line arising as vague costal spot three-tenths of distance from base, obsolescent in cell, reappearing on cubital vein

opposite costal spot, running straight to inner margin slightly more than one-tenth of distance from base, tending to be shaded basally by broad brown band; discal spot black, round, prominent; median shade band extending basally on line from discal spot, beginning about cubital vein, running straight, parallel with t. a. and t. p. lines, to meet inner margin two-fifths distance from base; t. p. line arising on vein  $M_1$ , extending in weakly sinuous course straight across wing, meeting inner margin just basad of middle, having narrow white band posteriorly, followed by broader grayish brown shade band occupying much of subterminal area; outer portion of wing in cell  $R_5$  with variable amount of black scaling from origin of t. p. line to outer margin; s. t. line a white or grayish white band of variable width; terminal area suffused with grayish brown scales; terminal line black, complete; fringe concolorous with wing, tending to have some white scaling opposite vein endings. Hind wings concolorous with forewings, only sparsely dark scaled anteriorly; basal black patch present near anal margin as continuation of t. a. line; intradiscal line broadly geminate, not reaching smaller grayish black discal spot; median shade band and extradiscal line rather broad, somewhat diffuse, not attaining anterior margin; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** Forewings pale gray with many gray scales, and with costa having brown scaling; hind wings white with evenly scattered grayish brown scales; all wings without maculation except for discal spots, more prominently represented on fore than on hind wings, and for narrow dark gray terminal line; fringes white, slightly darkened at vein endings and terminally.

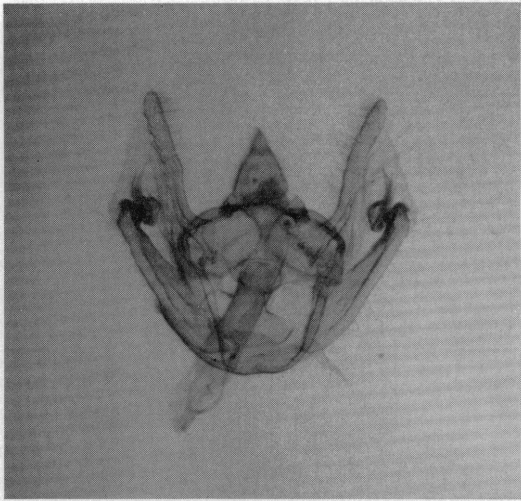
**LENGTH OF FOREWING:** 10 to 13 mm.

**FEMALE:** Similar to male but tending to have maculation less strongly represented; antennae weakly serrate medially.

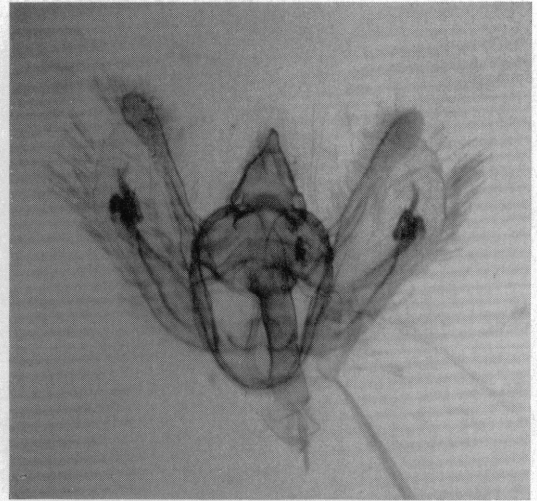
**LENGTH OF FOREWING:** 10 to 12 mm.

**MALE GENITALIA:** Uncus broad, tending to

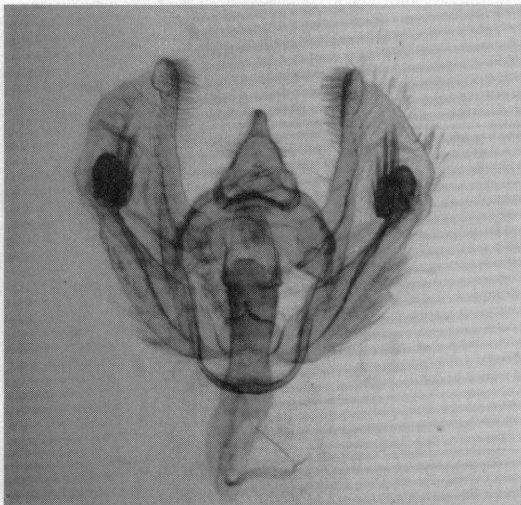
FIGS. 9-14. Male genitalia of *Nepterota*. 9. *N. diagonalis* Cassino, K-Bar Research Station, Big Bend National Park, Texas, May 4, 1972 (A. and M. E. Blanchard; AMNH). 10. *N. marjorae*, new species, paratype, Sitting Bull Falls, New Mexico, June 26, 1964 (F., P., and M. Rindge; AMNH). 11, 12. *N. ozarkensis*, new species. 11. Paratype, near Warsaw, Missouri, July 24, 1965 (J. R. Heitzman; AMNH). 12. Holotype, 4 miles NW of Warsaw, Missouri, July 17, 1966 (J. R. Heitzman; AMNH). 13. *N. dorotheata* Sperry, paratype, Madera Canyon, Arizona, August 24, 1946 (Comstock and Martin; AMNH). 14. *N. furva*, new species, holotype, Sierra Diablo wildlife management area, Texas, July 11, 1971 (A. and M. E. Blanchard; AMNH).



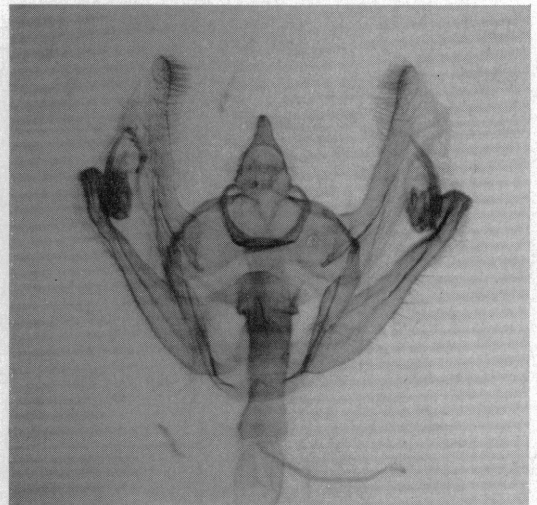
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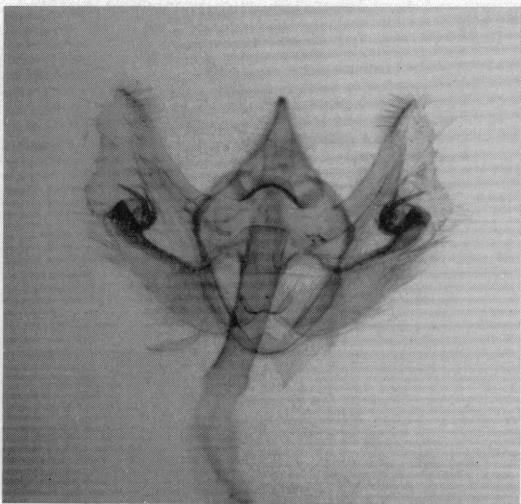
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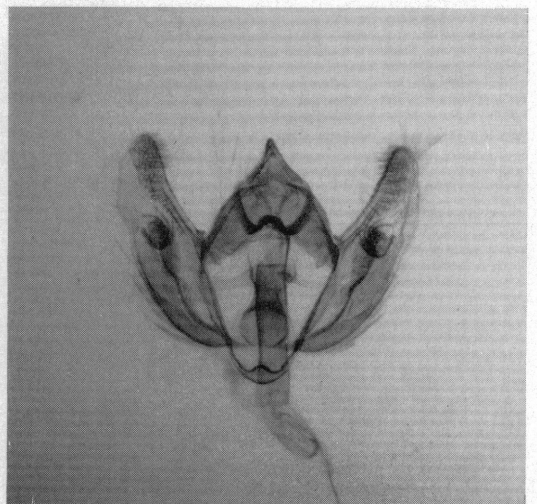
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13



14



have lateral margins outwardly swollen medially, apical region rounded, with ventrally projecting apex; gnathos with elongate, rounded median enlargement equal in width to base of uncus; valves with sclerotized costal region of equal width for entire length; sacculus very broad basally, one-half width of base of valve, sclerotized, tapering distally, with anterior ridge, apically finely dentate ventrally; process of sacculus rounded, with four to six curved spines ventrally in row, with one slightly thinner spine basad of most anterior spines in many specimens; anellus widest anteriorly, posterior margin rounded, with elongate, narrow median extension; aedeagus 0.9 mm. in length, slender; vesica unarmed.

**FEMALE GENITALIA:** Sterigma weakly sclerotized, median area rounded, with larger, smooth lateral areas; intersegmental area weakly rugose; ductus bursae widest posteriorly, evenly tapering anteriorly; corpus bursae with elongate, gently swollen anterior portion; signum rather poorly defined except for transverse, indented ridge. Apophyses posteriores 1.4 mm. in length.

**TYPES:** According to the original description *diagonalis* was described from the following specimens: "Holotype ♂ Alpine, Texas, Apr. 1–15. Allotype ♀ Paradise, Ariz. Paratypes 3♀ 2♂ Alpine, Texas, 1♂ Paradise, Ariz. Taken by Mr. O. C. Poling." In the collection of the Museum of Comparative Zoology there are the following seven specimens bearing *diagonalis* type labels: the holotype, allotype, and five paratypes. In addition, the National Museum of Natural History collection contains three specimens, an allotype and two male paratypes; the Canadian National Collection also has a male paratype. The original description stated that the type series consisted of eight specimens; I have examined 11 specimens with *diagonalis* type labels.

The original description gave Alpine, Texas, as the locality of the holotype; in addition five of the paratypes were said to be from that locality. All 11 specimens bearing *diagonalis* type labels

are marked as being from Arizona. The holotype and the Museum of Comparative Zoology paratypes, the National Museum of Natural History allotype and one paratype, and the Canadian National Collection paratype are from Paradise, Arizona; all the remaining specimens are from "So. Arizona." Ten of the 11 are probably correctly labeled as to the state in which they were captured; they are properly placed as members of the following species. The only specimen that is not conspecific with the above is the one bearing the holotype label. This moth had its genitalia mounted on Cassino's slide 3762, and the slide label has "Alpine, Tex., Apr. 1–15." The genitalia are poorly mounted, being very flattened, but they definitely belong to the species that is found in Texas.

Consequently, it is assumed that the specimen bearing Cassino's holotype label is probably the actual type, but that incorrect locality data were placed on the pin label; the genitalic slide is correctly labeled. The holotype, as well as the other "type" specimens in the Museum of Comparative Zoology, is MCZ Type 16892. It is not known what happened to the other Texas specimens mentioned in Cassino's original description; none has been found in the course of this study.

**TYPE LOCALITY:** Alpine, Brewster County, western Texas.

**DISTRIBUTION:** Western Texas and southern New Mexico (see fig. 21).

**TIME OF FLIGHT:** From late March into October.

**REMARKS:** Forty-one specimens (36 males and five females) and seven genitalic dissections (five males and two females), including the holotype and its genitalia, have been examined.

### *Nepterota marjorae*, new species

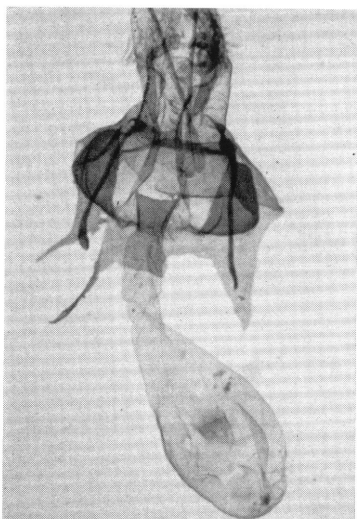
Figures 2, 10, 16, 21

*Nepteroptaea* [sic] *diagonalis* CASSINO, 1927, p. 78 (in part).

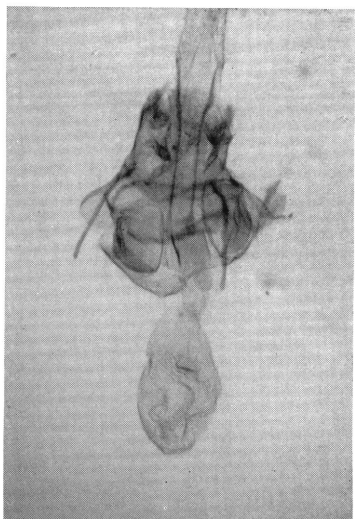
**DIAGNOSIS:** This species looks very much like

FIGS. 15–20. Female genitalia of *Nepterota*. 15. *N. diagonalis* Cassino, Sitting Bull Falls, New Mexico, June 28, 1964 (F., P., and M. Rindge; AMNH). 16. *N. marjorae*, new species, allotype, Southwestern Research Station of the American Museum of Natural History, July 26, 1957 (M. Statham; AMNH). 17. *N. ozarkensis*, new species, allotype, 4 miles NW of Warsaw, Missouri, July 1, 1971 (J. R. Heitzman; AMNH). 18. *N. dorotheata* Sperry, paratype, Madera Canyon, Arizona, August 25, 1946 (Comstock and Martin; AMNH). 19. *N. memoriata* (Pearsall), Madera Canyon, Arizona, August 19, 1949 (L. M. Martin; AMNH). 20. *N. obliviscata* (Barnes and McDunnough), Southwestern Research Station of the American Museum of Natural History, July 26, 1957 (M. Statham; AMNH).

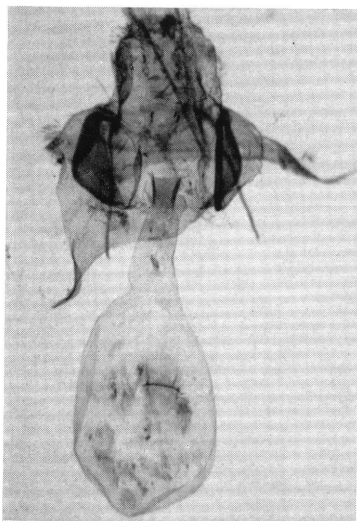
15



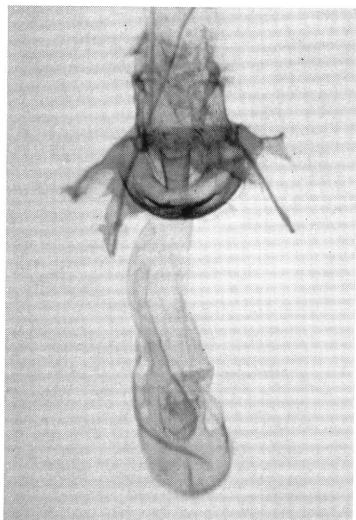
16



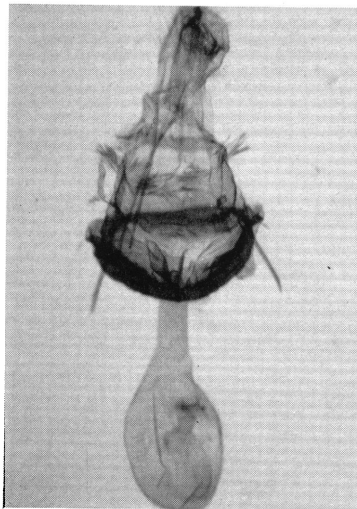
17



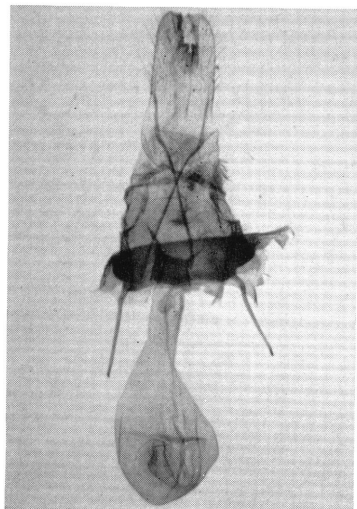
18



19



20



*diagonalis* but can be recognized from the upper side by the more strongly represented t. p. and extradiscal lines, with the former line extending to the costa in a deeply concave curve. The genitalia of both sexes differ from the preceding species; see the keys for details.

**MALE:** Head with vertex and front similar to those of *diagonalis*, but vertex having fewer dark scales and lacking band between antennal bases, and front slightly paler, with much narrower whitish vertical margin; palpi gray scaled below; antennae with longest pectinations almost four times as long as their basal segments, terminal two to six segments not pectinate. Thorax above with mixture of white, grayish brown, and gray scales, without definite transverse banding; below, and legs, similar to those of *diagonalis*, but with legs having fewer dark scales. Abdomen above mainly grayish brown, tending to become slightly darker posteriorly on each segment, with posterior margins of segments narrowly white; below grayish white.

**UPPER SURFACE OF WINGS:** Forewings white or grayish white, with variable amount of grayish brown and grayish black scales, and having median area tending to be concolorous with, or only slightly paler than, adjacent wing areas; cross lines distinct, black, similar in course to those of *diagonalis*, except t. a. line tending to be complete, curved through cell, and t. p. line tending to be connected to costa by sharply concave curve; terminal line tending to be obsolescent but with black intravenular spots; fringe tending to be darkened opposite vein endings. Hind wings similar to those of *diagonalis* but with extradiscal line tending to be complete, extending straight across wing from anal margin to vein  $M_1$ , then curving anteriorly to upper margin; terminal line more strongly represented than on forewings, with small or obsolescent intravenular dots; fringe similar to that of forewings.

**UNDER SURFACE OF WINGS:** Similar to that of *diagonalis* but with faint trace of t. p. and extradiscal lines present.

**LENGTH OF FOREWING:** 9 to 11 mm.; holotype, 11 mm.

**FEMALE:** Similar to male but with upper surface of wings tending to be more heavily and evenly suffused with dark scales, and with maculation less clearly represented; antennae weakly serrate medially.

**LENGTH OF FOREWING:** 10 to 11 mm.; allotype, 11 mm.

**MALE GENITALIA:** Similar to those of *diagonalis*, differing mainly as follows: gnathos tending to have more slender, tapering median enlargement; valves with costa weakly angulate medially; sacculus with anterodistal margin more rounded, producing narrower sclerotized structure, apically with smaller teeth; process of sacculus with from four to six curved spines ventrally in row, right process of some specimens tending to have single thinner spine basad of most anterior spine; anellus variable, tending to be somewhat narrower and longer; aedeagus 0.8 to 0.9 mm. in length.

**FEMALE GENITALIA:** Similar to those of *diagonalis*, differing mainly as follows: sterigma with small median area, more heavily sclerotized posteriorly, slightly narrower than ductus bursae, with very large, weakly sclerotized lateral areas; intersegmental area scarcely differentiated; ductus bursae slightly longer than wide, with parallel sides; corpus bursae shorter, with longer, slender posterior region; signum in form of indented narrowly V-shaped ridge. Apophyses posteriores 1.0 to 1.3 mm. in length.

**TYPES:** Holotype, male, Southwestern Research Station of the American Museum of Natural History, 5 miles west of Portal, Cochise County, Arizona, elevation 5400 feet, July 20, 1958 (M. A. Cazier); allotype, female, same locality, July 26, 1957 (M. Statham). The genitalia of the holotype are mounted on slide FHR 16726, and of the allotype on 16809. Paratypes: *Arizona*: same data as types, August 4, 1956 (E. Ordway), one female, August 11, 13, 15, 16, 18, 21, 1957 (C. W. Kirkwood), four males and three females, July 11, 1958 (M. A. Cazier), one male; Paradise, [Cochise County], July, August, one male, one female, August and August, 1920 (O. C. Duffner), two males, October 1–15 (O. C. Poling, according to the original description of *diagonalis*, but not indicated on the labels), three males (all the above bearing *diagonalis* allotype or paratype labels), June, 1940, one male; "So. Arizona," October 1–15 (O. C. Poling, according to the original description of *diagonalis*, but not indicated on the labels), two males and one female (these three specimens also bearing *diagonalis* allotype or paratype labels; see discussion and explanation under Types of that species). *New Mexico*: Sitting Bull Falls, 42 miles southwest of Carlsbad, Eddy County, elevation 4800 feet, June 27, 1964 (F., P., and M. Rindge), one male; White[s]



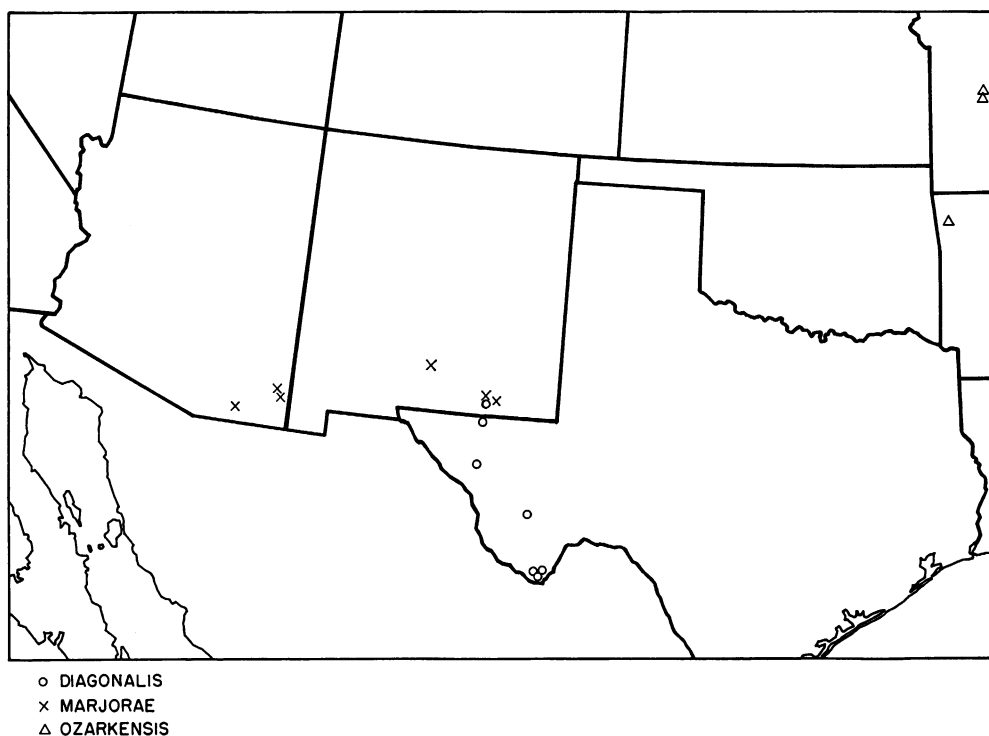


FIG. 21. The distribution of *Nepterotaea diagonalis* Cassino, *N. marjorae*, new species, and *N. ozarkensis*, new species.

City, Eddy County, May 14, 16, 1950 (E. C. Johnston), three males, one female; Alamo-gordo, Otero County, May 10, 1950 (E. C. Johnston), one female.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the Canadian National Collection, of the Museum of Comparative Zoology, of the National Museum of Natural History, and of the Natural History Museum of Los Angeles County.

**DISTRIBUTION:** The Chiricahua Mountains in Cochise County, southeastern Arizona, and southern New Mexico (see fig. 21).

**TIME OF FLIGHT:** From late June until mid-August, and in the first half of October.

**REMARKS:** Twenty-seven specimens (19 males and eight females) and 10 genitalic dissections (seven males and three females) have been examined.

The upper surface of the wings of *marjorae* tends to be a slightly paler gray, with less brown scaling, than that of *diagonalis*.

**ETYMOLOGY:** This species is named in honor of Marjorie Statham Favreau, of the Department of Entomology, the American Museum of Natural History, who collected part of the type series.

#### *Nepterotaea ozarkensis*, new species

Figures 3, 11, 12, 17, 21

**DIAGNOSIS:** This species is similar to the two preceding ones in color and maculation, but it may be recognized by the broader forewings and by the more divergent courses of the t. a. and t. p. lines. These lines produce a median area tending to be wider in the costal area of the wing than that found in the preceding species. The genitalia are distinctive; see the keys for details.

**MALE:** Head with vertex, front, and palpi similar to those of *diagonalis*, but with much narrower pale ventral margin to front; antennae similar to those of *diagonalis* but with pectinations slightly thicker. Thorax above similar to that of *diagonalis* but with grayish brown or grayish black anteriorly, posteriorly, and across

patagia and middle of thorax; below, and legs, similar to those of *diagonalis*, but legs tending to have more gray scaling. Abdomen similar to that of *diagonalis* but tending to have fewer dark scales.

UPPER SURFACE OF WINGS: Forewings broader but similar to those of *diagonalis* in color and basic pattern, but with wider basal and median areas; t. a. line complete, curving across cell, then more weakly curved to meet inner margin one-fifth of distance from base; discal dot smaller than that of *diagonalis*; t. p. line complete, more like that of *marjorae* but with more rounded apical extension to costa; terminal line and fringe similar to those of *diagonalis*. Hind wings similar to those of *diagonalis* but with broadly geminate intradiscal line becoming divergent in center of wing on each side of small or obsolescent discal spot.

UNDER SURFACE OF WINGS: Similar to those of *diagonalis* but with discal dots tending to be smaller and more weakly represented, and with faint trace of t. p. line.

LENGTH OF FOREWING: 9 to 12 mm.; holotype, 10 mm.

FEMALE: Similar to male but tending to have maculation less strongly represented, and to have forewings more unicolorous; antennae weakly serrate medially.

LENGTH OF FOREWING: 10 to 13 mm.; allotype, 11 mm.

MALE GENITALIA: Similar to those of *diagonalis*, differing mainly as follows: larger; uncus with apical region tending to be slightly broader; gnathos with median enlargement more rounded; valves with sacculus having rounded antero-medial margin, producing narrower sclerotized structure, terminally swollen, with dentate posterior margin; process of sacculus varying from rounded to rectangular, with more and longer spines, varying from six to 10, arranged as in preceding species or in double rows; anellus tending to be larger, more elliptical; aedeagus 0.9 to 1.0 mm. in length, wider.

FEMALE GENITALIA: Similar to those of *diagonalis*, differing mainly as follows: sterigma slightly larger, roughly triangular in outline, wider than ductus bursae, and with lateral areas larger; ductus bursae more heavily sclerotized; corpus bursae wider and longer, about 2.0 to 2.1 mm. in length; signum larger, longer than wide.

TYPES: Holotype, male, 4 miles northwest of

Warsaw along Missouri state road UU, Benton County, Missouri, July 17, 1966 (J. R. Heitzman); allotype, same data but July 1, 1971; both specimens are from the collection of J. Richard Heitzman. The genitalia of the holotype are mounted on slide FHR 16786, and of the allotype on 16843. Paratypes: same data as types, April 22, 1972, May 7, 1965, May 21, 1966, May 26, 1972, June 30, 1962, July 21, 1963, July 26, 1964, July 24, 1965, July 17, 1966, July 29, 1972, August 25, 1962, August 7, 1966 (J. R. Heitzman), 16 males and three females; same data, July 17, 1966 (Roger L. Heitzman), one male; same data, April 22, 1972, July 17, 1966, July 29, 1972 (Robert L. Heitzman), eight males and one female; near Warsaw, Benton County, Missouri, July 24, 1965 (J. R. Heitzman), one male; Warsaw, Benton County, Missouri, May 28, 1961 (W. H. Howe), July 21, 1963 (J. R. Heitzman), two males; Blue Springs camp area, Beaver Lake, Washington County, Arkansas, May 27, 1967 (J. R. Heitzman), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, J. R. Heitzman, Roger L. Heitzman, Robert L. Heitzman, and the University of Missouri.

DISTRIBUTION: The Ozark Plateau of Missouri and Arkansas. (See fig. 21.)

TIME OF FLIGHT: From mid-April until late August.

REMARKS: Thirty-five specimens (30 males and five females) and six genitalic dissections (four males and two females) have been examined. This species is relatively easy to distinguish from the two preceding ones, even though all three have the same type of maculation. In the present species the median area of the forewings above tends not only to be wider but paler and, in general, the entire upper surface is slightly lighter in color.

The genitalia are also distinctive in *ozarkensis*. The terminal portion of the sacculus is larger than that of either of the preceding species. The valves, particularly the sacculus, may appear rather variable, depending upon the amount and degree that they are flattened. When partially flattened, the terminal portion is ventrad of the process of the sacculus and appear semicircular in outline; when completely flattened, the sacculus extends as far as the posterior

portion of its process, and the rounded portion extends dorsally. These two aspects are illustrated in figures 11 and 12.

**ETYMOLOGY:** This species is known only from the Ozark Plateau; the geographical name has been used as an adjective.

*Nepterotaea dorotheata* Sperry

Figures 4, 5, 13, 18, 22

*Nepterotae* [sic] *dorotheata* SPERRY, 1949, p. 8.

**DIAGNOSIS:** This species has the same basic pattern on the upper surface of the wings as do the preceding species but the cross lines are much more weakly indicated. *Nepterotaea dorotheata* tends to be slightly larger and to have the wings a more brownish gray than any of the first three species.

**MALE:** Head with vertex, front, and palpi similar to those of *marjorae*; antennae with longest pectinations four times as long as their basal segments, and with terminal four or five segments not pectinate. Thorax above pale gray, with brownish gray collar and base of patagia, some specimens with grayish black scales across middle of patagia; below, and legs, similar to those of *diagonalis*. Abdomen similar to that of *diagonalis*.

**UPPER SURFACE OF WINGS:** Forewings pale gray, more or less evenly suffused with grayish brown and grayish black scales; cross lines weakly defined in most specimens, varying from being complete to represented by dots on veins only; t. a. line arising on costa one-third of distance from base, crossing cell and then curved basally, meeting inner margin one-fifth distance from base, some specimens with shading basad of this line; discal spot black, prominent but rather small; median shade line obsolescent; t. p. line arising on costa three-fourths to four-fifths distance from base, variable in strength and course, having slight concave loop below costa, then proceeding in a straight line to more or less S-shaped curve to meet inner margin about two-thirds of distance from base; with the line sometimes having an incomplete distal shade band or appearing geminate in lower portion of wing; s. t. line obsolescent or weakly indicated by vague whitish gray spots in lower part of wing; terminal line varying from complete to partially represented, interrupted by veins, and having intravenular dots; fringe colorous with wings, somewhat darkened oppo-

site vein endings. Hind wings slightly paler than forewings, only sparsely dark scaled anteriorly; basal black patch present near anal margin; intradiscal line fading out before reaching small black discal dot; extradiscal line arising on anal margin near intradiscal line, varying in course from almost straight to curved, passing near discal dot, and tending to fade out in most specimens before reaching anterior margin; outer portion of wing similar to that of forewing but with terminal line more strongly represented.

**UNDER SURFACE OF WINGS:** Similar to that of *diagonalis*.

**LENGTH OF FOREWING:** 11 to 13 mm.

**FEMALE:** Similar to male but with upper surface more heavily and evenly suffused with grayish black scales, mostly obliterating maculation except for discal dots; under surface also darker than that of male; antennae weakly serrate medially.

**LENGTH OF FOREWING:** 10 to 13 mm.

**MALE GENITALIA:** Similar to those of *diagonalis*, differing mainly as follows: uncus with concave sides and slender apical region; gnathos with median enlargement tending to be more truncate or flatly rounded; valves with costa wider, tending to have more definite apical setose area; sacculus smoothly sclerotized, without anterior ridge, posterior margin thickened, well sclerotized, smoothly swollen distally, without apical teeth; process of sacculus rounded apically, enlarged basally, roughly triangular in outline, with three or four curved spines ventrally, some specimens with up to three, thinner additional spines; anellus tapering anteriorly, with anteroventral margins projecting ventrally, becoming wider posteriorly; aedeagus 1.0 to 1.2 mm. in length.

**FEMALE GENITALIA:** Similar to those of *diagonalis*, differing mainly as follows: sterigma with small median area, narrower than ductus bursae, sclerotized, rather irregular in outline but tending to be longer than wide, and without lateral plates; intersegmental area sclerotized, strongly developed, U-shaped, with anterior margin on each side raised in form of slender ridge; ductus bursae elongate, posterior end slightly wider than anterior end; corpus bursae longer, with anterior portion gently swollen; signum oval or elliptical, flat, with narrow transverse ridge. Apophyses posteriores 1.2 to 1.3 mm. in length.

**TYPES:** The holotype, male, is in the collec-



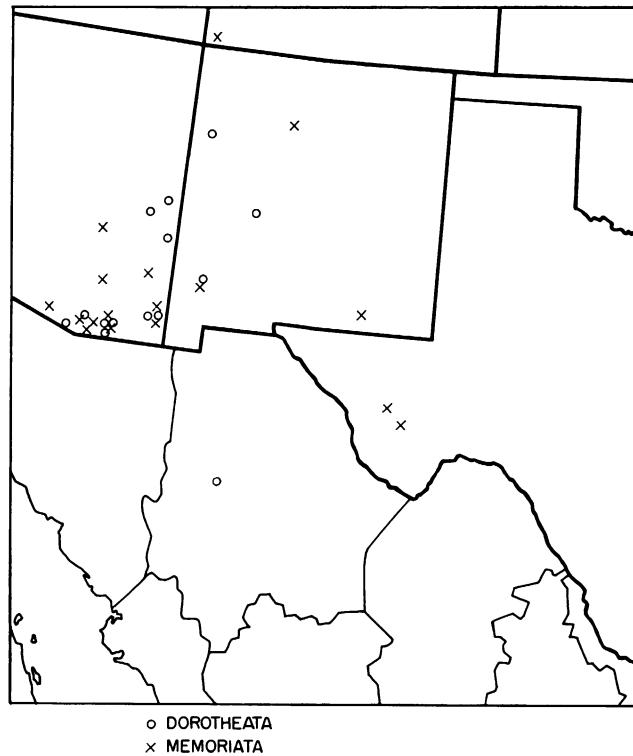


FIG. 22. The distribution of *Nepterotaea dorotheata* Sperry and *N. memoriata* (Pearsall).

tion of the Natural History Museum of Los Angeles County; the allotype, female, is in the American Museum of Natural History.

**TYPE LOCALITY:** Madera Canyon, Santa Rita Mountains, southern Arizona.

**DISTRIBUTION:** Southern and eastern Arizona, western New Mexico (see fig. 22), and Chihuahua. Those labels that have elevation data indicate that this species has been caught between 5000 and 8500 feet.

**TIME OF FLIGHT:** From mid-April until late August.

**REMARKS:** One hundred seventy-four specimens (106 males and 68 females) and 15 genitalic dissections (10 males and five females) have been examined. There appears to be some geographic variation within this species. The type locality is at the western end of the range; specimens from Santa Cruz County tend to be relatively small and to have clearly defined maculation (see fig. 4). Moths from Cochise County, Arizona (Huachuca and Chiricahua mountains) tend to have the pattern slightly less clearly

indicated. Examples from the White Mountains, Arizona, and from New Mexico tend to be larger, slightly grayer, and to have the maculation even more reduced (see fig. 5). The four specimens from Chihuahua (Metachic, elevation 6000 feet) are slightly larger, and tend to be rather variable in maculation. In general, a discussion of the comparative colors has been purposely avoided. Specimens caught in the 1940s (the type series and the Chihuahua examples, for instance) have the upper surface of the wings more of a pale brown color than do more recently caught examples. It is assumed that the color of this species fades, apparently rather rapidly, with age.

***Nepterotaea furva*, new species**

Figures 6, 14, 23

**DIAGNOSIS:** This distinctive species has dark gray, elongate forewings with a prominent t. p. line running down the middle of the wing. The maculation and color are similar to those of the

preceding species but the male genitalia are more like the ones that follow.

**MALE:** Head, vertex dull black around bases of antennae, paler between; front with mixture of grayish brown and grayish black scales dorsally, broadly whitish gray ventrally; palpi dark gray, with dull black, long scaling below and terminally; antennae with longest pectinations 2.5 times as long as their basal segments, terminal five segments not pectinate. Thorax above with mixture of gray, grayish black, and grayish brown scales, collar and posterior margin with some black scaling; below grayish white; legs with mixture of grayish white and dull black scales.

**UPPER SURFACE OF WINGS:** Forewings grayish white, heavily and evenly suffused with grayish black scales; veins faintly brownish; cross lines varying from obsolescent to strongly represented, black; t. a. line weakly represented, arising on costa one-fourth of distance from base, curving outwardly in cell, then becoming obsolescent, apparently nearly paralleling costa, meeting inner margin about one-fifth of distance from base; discal spot not prominent; median line absent; t. p. line prominent, complete, arising on costa four-fifths of distance from base, running sharply basad, angled across end of cell, then proceeding parallel with outer margin to fold, crossing anal vein at right angle, then swinging basally again, meeting inner margin just basad of middle, with line shaded distally by narrow white band having some yellowish brown scales; s. t. line obsolescent; terminal line black, prominent, narrowly interrupted by veins, with small intravenular swellings; fringe narrowly white at base, otherwise concolorous with wing. Hind wings paler than forewings, having fewer dark scales; basal black patch very small; intradiscal line present in lower portion of wing, obsolescent anteriorly; discal dot absent; extradiscal line obsolescent; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** Forewings pale gray, evenly suffused with grayish brown or grayish black scales, and with costa having black scaling; hind wings white, with numerous black and grayish black scales, especially basally; wings with traces of t. p. and intradiscal lines anteriorly, and forewings with discal dots; terminal line black, narrow; fringe concolorous with wings, darkened opposite vein endings.

**LENGTH OF FOREWING:** 9 to 11 mm.; holotype, 11 mm.

**FEMALE:** Unknown.

**MALE GENITALIA:** Similar to that of *dorotheata*, differing mainly as follows: uncus longer and more slender; gnathos longer, with median enlargement produced, narrower, only half of width of base of uncus; valves with costa enlarged apically; sacculus with very narrow base, sclerotized portion only one-seventh width of base of valve, enlarging into center of valve, with raised, slender ridge leading to process; process of sacculus roughly elliptical in outline, with from three to five curved spines from inner margin; anellus rounded anteriorly; aedeagus 0.9 to 1.0 mm. in length, more slender than that of *dorotheata*.

**TYPE:** Holotype, male, Sierra Diablo wildlife management area, Culberson County, Texas, elevation 6000 feet, July 11, 1971 (A. and M. E. Blanchard); from the collection of Mr. Blanchard. The genitalia of the holotype are mounted on slide FHR 16838. Paratypes: same data as the holotype, June 22–23, 1965, July 11, 12, 1971, July 14, 1969 (A. and M. E. Blanchard), six males.

The holotype is in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of A. Blanchard.

**DISTRIBUTION:** This species is known only from the type locality in the mountains of western Texas. (See fig. 23.)

**TIME OF FLIGHT:** June and July.

**REMARKS:** Seven specimens (all males) and two genitalic dissections have been examined. This species is easily recognized as the maculation is distinctive. Although the color and pattern are basically similar to the preceding species, the male genitalia are more like those of the following species.

**ETYMOLOGY:** The specific name is from the Latin *furvus*, meaning dark-colored.

### *Nepterotaea memoriata* (Pearsall)

Figures 7, 19, 22, 37

*Pterotaea memoriata* PEARSALL, 1906, p. 217. BARNES AND McDUNNOUGH, 1917, p. 116; 1918, p. 152, pl. 21, fig. 18 (male).

*Nepterotaea memoriata*: McDUNNOUGH, 1920, p. 38, pl. 6, fig. 3 (male genitalia), pl. 11, fig. 5 (venation of forewing); 1938, p. 165.

**DIAGNOSIS:** This species differs from all the preceding ones by the ochreous gray color of the

upper surface of the wings, and by the obscure maculation. The present species tends to have a more or less clearly defined median area of the forewings. The female differs from all the preceding species by having pectinate antennae.

**MALE:** Head, vertex pale gray or ochreous gray; front dark gray or dull grayish black; palpi dark gray; antennae with longest pectinations three times as long as their basal segments, terminal one or two segments not pectinate. Thorax above pale gray, with ochreous scaling on collar, base of patagia, and posteriorly; below pale gray; legs pale gray, with variable amount of dark gray scaling on outer portion of all legs. Abdomen above pale gray, varying from immaculate to having variable amounts of brown and grayish black scaling posteriorly to form two dorsal spots posteriorly on most segments; below grayish white.

**UPPER SURFACE OF WINGS:** Forewings pale gray or whitish gray, more or less heavily covered with ochreous, ochreous gray, and grayish brown scales; pattern tending to be indistinct and poorly defined, although median area may be indicated; t. a. line represented by darkened area on costa, by dark scales on cubital and anal veins only; median shade line tending to be broad, arising on costa as wide dark gray spot two-fifths distance from base, crossing cell and then proceeding more or less straight to inner margin just distad of middle; discal spot obsolescent; t. p. line arising on costa as large spot about two-thirds distance from base, swinging outward, more or less obsolescent, then paralleling outer margin, strongly concave in fold, meeting inner margin near median shade line; outer portion of wing with area of more or less clear ground color from t. p. line to outer margin in cell  $M_3$ , with apical and tornal areas suffused with dark scales; s. t. line weakly and incompletely indicated; terminal line absent; fringe pale gray, darkened opposite veins. Hind wings whitish gray, with variable amount of dark scaling distally; basal patch indicated by a few dark scales on veins; intradiscal line geminate, not reaching anterior margin in most specimens; discal dot small or obsolescent; extradiscal and s. t. lines obsolescent; terminal line and fringe similar to those of forewing.

**UNDER SURFACE OF WINGS:** All wings grayish white; forewings with costa and apical area having some ochreous or grayish brown scales; without maculation, or with faint traces of

thicker cross lines of upper surface; terminal line absent; fringe concolorous with wing, darkened opposite vein endings.

**LENGTH OF FOREWING:** 10 to 12 mm.

**FEMALE:** Similar to male; antennae pectinate, with longest pectinations 1.5 times as long as basal segments.

**LENGTH OF FOREWING:** 11 to 13 mm.

**MALE GENITALIA:** Similar to those of *dorotheata*, differing mainly as follows: gnathos with larger median enlargement tending to be more truncate; valves with costa having more elongate apical setose region; sacculus with sclerotized area occupying more than half width of base of valve, with partial or complete longitudinal ridge, terminating in raised, variably dentate peak, connected posteromedially with posterior margin of sacculus, latter becoming heavily sclerotized in middle of valve; process of sacculus variable in shape, roughly elliptical, with three (rarely four) curved spines ventrally; anellus widest medially, with anteroventral margins projecting medially; aedeagus 0.9 to 1.0 mm. in length, slightly narrowed medially.

**FEMALE GENITALIA:** Similar to those of *diagonalis*, differing mainly as follows: sterigma with sclerotized median area widest and truncate posteriorly, with broad, smooth lateral plates; intersegmental area narrowly U-shaped, posterior margin a complete, sclerotized narrow ridge, with small, lateral sclerotized areas at base of area; ductus bursae narrow, elongate, with parallel sides; corpus bursae with narrow posterior region and swollen anterior end; signum transverse, with slightly inverted transverse ridge. Apophyses posteriores 1.2 to 1.3 mm. in length.

**TYPE:** Pearsall described *memoriata* from a single female; this specimen is in the collection of the National Museum of Natural History.

**TYPE LOCALITY:** Palmerlee, Cochise County, Arizona.

**DISTRIBUTION:** Southern Arizona, southern New Mexico, southwestern Utah, and western Texas (see fig. 22). The species has been captured from about 4800 to 6800 feet in elevation. The Utah (St. George) and western Texas (Jeff Davis and Brewster counties) records are based on specimens from the Casino collection; they are mostly in the Museum of Comparative Zoology. Although no moths of this species have been collected in Texas in recent years, I am inclined to accept these specimens as being

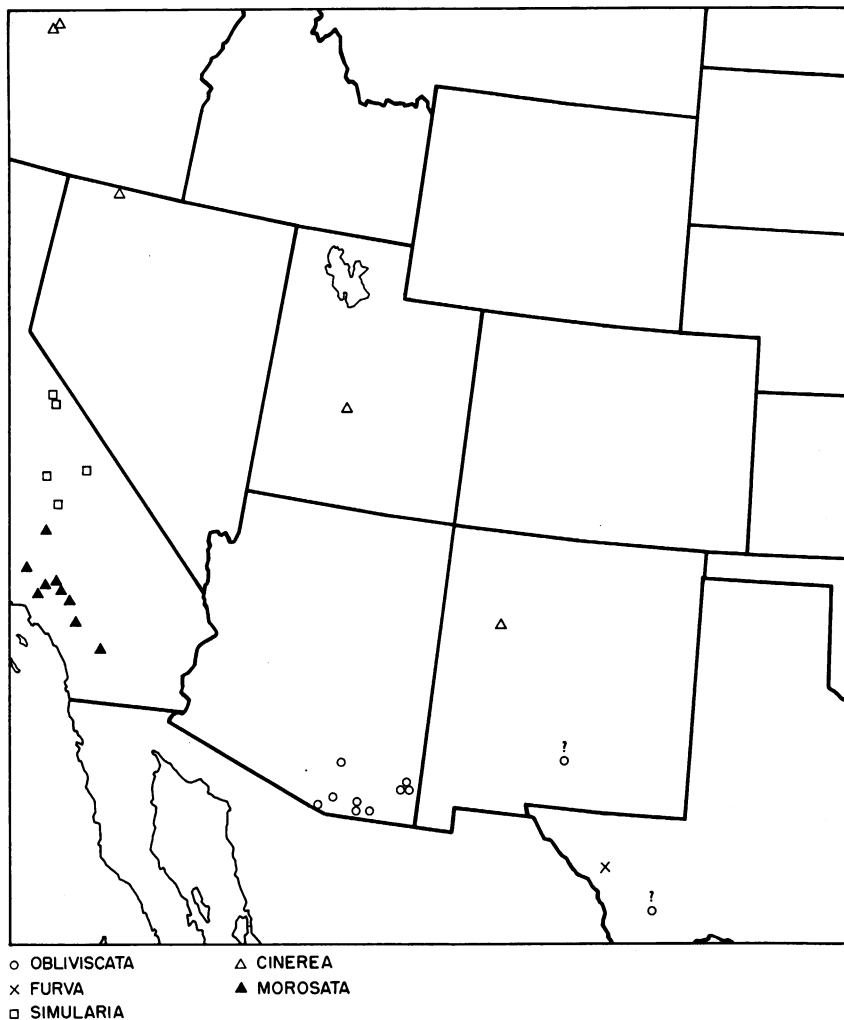


FIG. 23. The distribution of *Nepterotaea obliviscata* (Barnes and McDunnough), *N. furva*, new species, *Chesiadodes simularia* (Barnes and McDunnough), *C. cinerea*, new species, and *C. morosata* Hulst.

correctly labeled. The 35 examples bear three or four different types of labels, which might indicate that the moths were captured over a period of more than one year; none of the specimens has the year of capture.

**TIME OF FLIGHT:** From late April to late October.

**REMARKS:** Ninety-five specimens (75 males and 20 females, including the type) and 18 genitalic dissections (15 males and three females) have been studied. This and the following species differ markedly in color and pattern from all the preceding members of the genus, as well as the female having pectinate antennae. The

color and pattern of *memoriata* are similar to those of the following species; in case of doubt in identification a study of the genitalia will easily distinguish the two.

*Nepterotaea obliviscata* (Barnes and McDunnough)

Figures 8, 20, 23, 38

*Pterotaea obliviscata* BARNES AND MCDUNNOUGH, 1918, p. 152, pl. 21, fig. 21 (paratype male).

*Nepterotaea obliviscata*: MCDUNNOUGH, 1920, p. 38; 1938, p. 165.

**DIAGNOSIS:** This species is similar to *memoriata* but may be distinguished from it by the grayer



color of the upper surface of the wings, the more diffuse maculation, and by the outer portion of the forewing not having an elongate area of ground color in cell  $M_3$ . The genitalia, especially those of the male, are very distinctive.

**MALE:** Head with vertex, front, and palpi similar to those of *memoriata* but tending to be slightly paler; antennae with longest pectinations 3.5 times as long as their basal segments, terminal one or two segments not pectinate. Thorax, legs, and abdomen similar to those of *memoriata*.

**UPPER SURFACE OF WINGS:** Forewings pale gray, more or less heavily covered with dull brown and grayish brown scales, and having virtually no definite pattern; cross lines indicated mainly by three brown costal dots, and some specimens with small spots on inner margin for t. a. and t. p. lines; median shade line continued from costa to include obsolescent discal dot in some specimens; s. t. line weakly indicated, pale, outwardly swollen in cells, with convex areas filled with brown scales; terminal line represented by small brownish black intravenular dots; fringe concolorous with wing, darkened opposite vein endings. Hind wings slightly paler than forewings, with variable amount of dark scaling distally; most specimens without cross lines but with some dark scaling along anal margin to indicate presence of lines; small discal dot present; terminal line obsolescent, with small intravenular dots; fringe similar to that of forewings.

**UNDER SURFACE OF WINGS:** All wings grayish white; forewings having some pale gray scaling and with brown or grayish brown scaling on costa; all wings without maculation except for small discal dots and weakly represented terminal line; fringe as on upper surface.

**LENGTH OF FOREWING:** 10 to 12 mm.

**FEMALE:** Similar to male; antennae pectinate, with longest pectinations 1.5 times as long as basal segments.

**LENGTH OF FOREWING:** 10.5 to 12.0 mm.

**MALE GENITALIA:** Similar to those of *memoriata*, differing mainly as follows: uncus with apical region wider; gnathos with median enlargement more elongate, rounded, smaller, about half width of base of uncus; valves with costa slightly swollen apically; sacculus with longitudinal ridge terminating in larger, non-dentate swelling, with posterior margin sclerotized to base of valve; process of sacculus larger,

with approximately 25 to 30 curved spines in several rows ventrally; anellus slightly wider, posterolateral margins concave; aedeagus 0.9 to 1.0 mm. in length; vesica armed with single, small spine.

**FEMALE GENITALIA:** Similar to those of *diagonalis*, differing mainly as follows: sterigma with sclerotized, elliptical median area, slightly wider than ductus bursae, and with weakly rugose, rather poorly defined, weakly sclerotized lateral areas; intersegmental area scarcely differentiated; ductus bursae with length about equal to width, anterior margin being widest part; corpus bursae shorter and broader, with well-defined posterior portion; signum small, rather weakly represented except for transverse ridge. Apophyses posteriores 1.1 to 1.3 mm. in length.

**TYPES:** This species was described from a series of seven males and four females, without the designation of a type. The lectotype is hereby designated as the male bearing the original authors' "type ♂" label, with its genitalia mounted on slide WFGC 2113; it is in the collection of the National Museum of Natural History.

**TYPE LOCALITY:** Paradise, Chiricahua Mountains, Cochise County, Arizona.

**DISTRIBUTION:** Southeastern Arizona (see fig. 23). Specimens have also been examined from Otero County, New Mexico (one), and Brewster County (without additional locality, and from Alpine), western Texas (four); all of these are from the Cassino collection, and are mostly in the Museum of Comparative Zoology. No recently collected specimens from these two states have been seen; it is thought advisable to await the capture of new material before accepting the records from these two states.

**TIME OF FLIGHT:** From late March into September. Most of the specimens examined were captured in July and August.

**REMARKS:** One hundred thirteen specimens (64 males and 49 females) and 18 genitalic dissections (12 males and six females), including the type and its genitalia, have been studied. This species has the most distinctive male genitalia to be found in *Nepterota*.

#### GENUS *CHESIADODES* HULST

*Chesiadodes* HULST, 1896, p. 354. DYAR, "1902" [1903], p. 324. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917, p. 117. McDUNNOUGH, 1938, p. 163. RINDGE, 1956, p. 11.

*Morina* GROSSBECK, 1912, p. 397. BARNES AND McDUNNOUGH, 1917, p. 117. McDUNNOUGH, 1938, p. 162. New synonym.

*Jenana* CLARKE, 1939, p. 73. RINDGE, 1956, p. 11 (placed as synonym of *Chesiadodes*).

**DIAGNOSIS:** This genus can be separated from *Nepterotaea* by the male antennae, as the pectinations arise in the middle of the segments, by the raised, projecting front, and by the fore tibia of both sexes having a thick, terminal spine.

**ADULT:** Similar to those of *Nepterotaea*, differing mainly as follows: eyes larger; front raised, varying from swollen to having prominent, round or laterally flattened tubercle; tongue weakly developed or atrophied; antennae of male with about 37 to 42 segments, bipectinate, pectinations arising in middle of segments, being 1.5 to 3.5 times as long as their basal segments, with terminal two to nine segments simple; antennae of female simple, partially serrate, or shortly pectinate. Forelegs having tibia either long and slender or short and thick, both with spine at apex varying from small (about one-eighth of length of tibia) to thick, prominent, and long (two-thirds to three-fourths length of tibia); process of tibia in male varying from one-fourth to as long as tibia, with hair pencil, of female from one-third to as long as tibia. Abdomen with tympanum varying in size, females of some species with this structure very small.

Forewings varying from elongate to broad; fovea weakly represented or absent.

Upper surface of wings varying from pale gray to dark gray and dark grayish brown; forewings with maculation tending to be poorly defined, with cross lines varying from clearly defined to obsolete; hind wings paler than forewings, with reduced maculation. Under surface of wings gray or brownish gray, immaculate in most specimens.

**MALE GENITALIA:** Similar to those of *Nepterotaea*, differing primarily by aedeagus having anterior end swollen, and with posterodorsal surface of median enlargement of gnathos tending to be shagreened.

**FEMALE GENITALIA:** Similar to those of *Nepterotaea*.

**EARLY STAGES:** Unknown.

**FOOD PLANTS:** Unknown.

**TYPE SPECIES:** For *Chesiadodes*, *C. morosata* Hulst; for *Morina*, *M. coniferaria* Grossbeck; for *Jenana*, *Glaucina simularia* Barnes and McDunnough. All three were done by the original designation of their authors.

**DISTRIBUTION:** Primarily southwestern United States, from California and central Oregon to Utah and western Texas. Two species are known from Baja California, Mexico.

The genus *Morina* is placed as a junior synonym of *Chesiadodes* because its type species is placed as a member of the older genus.

Thirteen species are included in *Chesiadodes*. The more primitive species are basically similar to those found in *Nepterotaea*, but can be distinguished by the raised, rounded front, by the fore tibia of both sexes having a terminal spine, by their larger size, and by their dark gray or grayish brown color. The more highly developed species have a strongly developed frontal tubercle, a larger terminal spine on the shorter and thicker fore tibia, smaller size, and paler color. Four of the first five species included in the genus have, in addition to the first set of characters listed above, pectinate antennae in the female; the remaining species have either serrate or simple antennae. The first three species are closely related to one another, forming a compact group. The next three are less closely allied to one another. Both the *coniferaria* group (of two species) and the *curvata* group (of three species) can be recognized by their male genitalia. The last two species, isolated on the peninsula of Baja California, are much paler in color than are any of the other species; the more southerly of these two has the most highly developed genitalia in both sexes to be found in the genus.

## KEY TO SPECIES

### BASED ON STRUCTURE, COLOR, AND DISTRIBUTION

1. Front raised, rounded, without tubercle; females with pectinate antennae . . . 2  
Front with elongate, prominent tubercle; females with serrate or simple antennae . . . 5
- 2(1). Length of fore tibia and terminal spine 1.4 to 1.9 mm. . . . . 3  
Length of fore tibia and terminal spine 1.2 mm. . . . . *polingi*
- 3(2). Forewings with upper surface dark gray, usually with subterminal area not differentiated, and t. p. line not enlarged on veins; fore tibia with longer spine, one-fifth to one-fourth length of tibia . . . . . 4  
Forewings with upper surface pale grayish brown, with subterminal area contrastingly white or grayish white, and with t. p. line enlarged on veins; fore tibia with very short spine, one-sixth length of tibia . . . . . *simularia*

- 4(3). Smaller species, with length of forewing 12 to 15 mm.; length of fore tibia and spine 1.4 to 1.5 mm. . . . . *cinerea*  
Larger species, with length of forewing 15 to 18 mm.; length of fore tibia and spine 1.6 to 1.8 mm. . . . . *morosata*
- 5(1). Larger species, with length of forewings 14 to 16 mm.; upper surface of wings brown, with hind wings only slightly paler than forewings . . . . . *tubercula*  
Smaller species, with length of forewings 9 to 15 mm.; upper surface of wings grayish white, gray or brown, with hind wings contrastingly paler than forewings . . . . . 6
- 6(5). Upper surface of all wings grayish white; Baja California . . . . . 7  
Upper surface of forewings dark gray or brown, with paler hind wings; United States . . . . . 8
- 7(6). Front with slender, round tubercle; discal spots large, prominent on all wings above . . . . . *daedalea*  
Front, with large elongate, ovate tubercle; discal spots smaller, those on hind wings minute . . . . . *pallens*
- 8(6). Forewings with upper surface having bi-concave t. p. line; tongue vestigial . . . 9  
Forewings with upper surface having weakly S-shaped t. p. line; tongue normal, apparently functional . . . . . 11
- 9(8). Forewings with upper surface an even pale gray or grayish brown; California and Arizona . . . . . 10  
Forewings with upper surface an even dull black medially, pale gray distad of t. p. line; western Texas . . . . . *bicolor*
- 10(9). Forewings with upper surface pale gray . . . . . *coniferaria*  
Forewings with upper surface dark gray to dark grayish brown or grayish black . . . . . *fusca*
- 11(8). Forewings with upper surface dark gray. . 12  
Forewings with upper surface dull black or dark grayish black . . . . . *dissimilis*
- 12(11). Forewings evenly colored, with maculation obscure; California . . . . . *curvata*  
Forewings with paler subterminal area, and with cross lines usually distinct; Utah . . . . . *longa*
- either elongate rectangular spinose area, a ridge bearing about two rows of closely set spines, or with fewer, more scattered spines . . . . . 7
- 2(1). Sacculus with ridge or swelling paralleling outer margin, and with posterior margin of sclerotized area not thickened and enlarged . . . . . 3  
Sacculus without outer ridge, with posterior margin thickened, being most prominent part of sacculus in center of valve . . . 6
- 3(2). Anellus with one or two longitudinal ridges in narrowed central portion . . . . . 4  
Anellus without any ridges . . . . . *morosata*
- 4(3). Anellus with two well separated longitudinal ridges; gnathos with median enlargement wider than base of uncus . . . . . *simularia*  
Anellus with one or with two ridges very close together; gnathos with median enlargement narrower than base of uncus . . 5
- 5(4). Anellus with single ridge in shape of inverted Y . . . . . *tubercula*  
Anellus with one or with two parallel ridges close together . . . . . *cinerea*
- 6(2). Vesica unarmed; sacculus with ventral surface of process having approximately six or seven thick, outwardly pointing spines . . . . . *polingi*  
Vesica with sclerotized strip; sacculus with ventral surface of process thickly covered with smaller, posteriorly pointing spines . . . . . *bicolor*
- 7(1). Valves with sacculus having large elongate rectangular area thickly covered with spines . . . . . 8  
Valves with sacculus not as above but having ridge with about two rows of spines or with fewer, more scattered spines. . . . . 9
- 8(7). Gnathos with median enlargement having parallel sides; sacculus with narrower spinose area situated near center of valve . . . . . *coniferaria*  
Gnathos with tapering sides; sacculus with wider spinose area situated near outer margin of valve . . . . . *fusca*
- 9(7). Aedeagus with posterior end bifurcate . . . . . *daedalea*  
Aedeagus a simple tube . . . . . 10
- 10(9). Sacculi with spinose ridges symmetrical . 11  
Sacculi with spinose ridges asymmetrical, one on right side 0.30 mm. long and bearing about nine spines, left side 0.35 mm. long and with about 12 spines . . . *dissimilis*
- 11(10). Sacculus with each ridge 0.2 mm. long, and bearing from seven to 11 spines . . . *curvata*  
Sacculus with each ridge 0.4 mm. long, and bearing from 16 to 19 spines . . . . . *longa*

# BASED ON MALE GENITALIA<sup>1</sup>

1. Valves with sacculus having sclerotized ridge enlarged distally, and with rounded or elliptical spinose process at or near end of ridge . . . . . 2
- Valves with sacculus not as above, having

<sup>1</sup>The male of *pallens* is unknown.

BASED ON FEMALE GENITALIA<sup>1</sup>

1. Ductus bursae very broad, with large swelling on left side posteriorly . . . . . *daedalea*  
Ductus bursae varying from square to elongate, without posterior swelling . . . . . 2
- 2(1). Apophyses posteriores 1.3 to 1.5 mm. in length . . . . . 3  
Apophyses posteriores 0.8 to 1.2 mm. in length . . . . . 7
- 3(2). Ductus bursae widest posteriorly . . . . . 4  
Ductus bursae with parallel sides . . . . . 6
- 4(3). Sterigma with sclerotized lateral areas; apophyses posteriores 1.3 to 1.4 mm. in length . . . . . 5  
Sterigma with membranous, finely denticulate lateral areas; apophyses posteriores 1.5 mm. in length . . . . . *morosata*
- 5(4). Sterigma with sclerotized median area elliptical or oval; ductus seminalis arising ventrally . . . . . *simularia*  
Sterigma with sclerotized median area rectangular; ductus seminalis arising on right side . . . . . *cinerea*
- 6(3). Sterigma with sclerotized median area triangular . . . . . *tubercula*  
Sterigma with sclerotized median area round, small . . . . . *polingi*
- 7(2). Ductus bursae very long and slender, with length four to five times greater than width . . . . . *pallens*  
Ductus bursae not more than twice as long as wide . . . . . 8
- 8(7). Sterigma with median area membranous . . . . . 9  
Sterigma with median area having sclerotized area . . . . . 10
- 9(8). Ductus bursae twice as long as wide, with dorsal and ventral surfaces of same length . . . . . *curvata*  
Ductus bursae slightly longer than wide on ventral surface, and with dorsal surface extended posteriorly for distance equal to remainder of ductus bursae . . . . . *dissimilis*
- 10(8). Sterigma with large lateral sclerotized areas, at least twice as wide as width of median area; apophyses posteriores 1.2 mm. in length . . . . . *bicolor*  
Sterigma with smaller lateral sclerotized areas, only slightly wider than width of median area; apophyses posteriores 0.8 to 1.0 mm. in length . . . . . 11
- 11(10). Ductus bursae twice as long as wide . . . . .  
 . . . . . *coniferaria*  
Ductus bursae only slightly longer than wide . . . . . *fusca*

<sup>1</sup> The female of *longa* is unknown.*Chesiadodes simularia* (Barnes and McDunnough)

Figures 23, 24, 39, 51

*Glaucina simularia* BARNES AND McDUNNOUGH, 1918, p. 152, pl. 21, fig. 14 (holotype female). McDUNNOUGH, 1938, p. 162.

*Jenana simularia*: CLARKE, 1939, p. 73, pl. 11, figs. 1 (venation of wings), 2 (lateral view of male head), 2a (male antennae), 3 (lateral view of female head), 3a (female antennae), 4-4c (male genitalia), 5 (female genitalia).

*Chesiadodes simularia*: RINDGE, 1956, p. 14, fig. 11 (male).

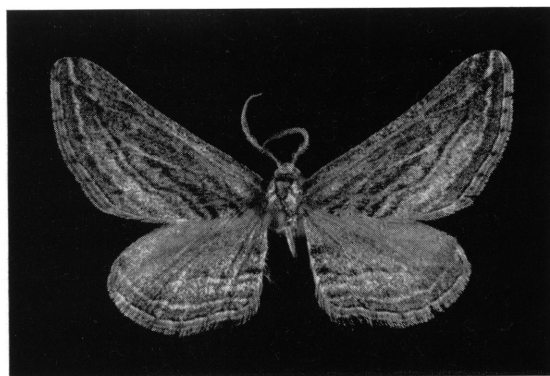
**DIAGNOSIS:** This large, broad-winged species has the upper surface of the forewings pale grayish brown, the t. p. line enlarged on the veins, and the subterminal area contrasting whitish gray. The spine on the end of the fore tibia is very small.

**Male:** Head with vertex and front gray or grayish brown, vertex having dull grayish black scales between bases of antennae; front swollen dorsomedially, extending one-fourth diameter of eye in front of eye, dorsolateral margins extended laterally and weakly raised, with small raised ventral rim, and with low, straight ridge below eye slightly enlarged at both ends; palpi almost attaining front; antennae with longest pectinations two times as long as their basal segments, terminal four to six segments not pectinate. Thorax above grayish white, with scattered brown scales, collar dull grayish black, patagia with some hairlike scales and narrow median dark band; below paler, legs slender, gray, with variable number of brown scales; foreleg with tibia having relatively short and inconspicuous apical spine, combined lengths of tibia and spine 1.5 to 1.9 mm., with spine not more than one-sixth length of tibia. Abdomen above pale gray, with paired brownish black spots posteriorly on each segment, these tending to become united near end of abdomen; below paler.

**UPPER SURFACE OF WINGS:** Forewings without fovea; uniformly pale gray with scattered brown and grayish black scales, having distinct t. p. line and contrasting whitish gray subterminal area; maculation rather indefinite and poorly defined except for t. p. line; t. a. line obsolescent, when present sharply angled outward in cell, then paralleling costa to inner margin; discal spot obsolescent or entirely absent; median shade band broad, nebulous; t. p. line weakly concave below apex, broadly curving across wing, with basal band in fold, crossing anal vein



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FIGS. 24–29. Adults of *Chesiadodes*. 24. *C. similaria* (Barnes and McDunnough), male, Inyo Mountains, California, May 11, 1936 (Andrews and Martin; AMNH). 25. *C. cinerea*, new species, holotype male, Elk Tank, New Mexico, June 13, 1965 (R. W. Holland; AMNH). 26. *C. morosata* Hulst, male, Anza, California, March 21, 1965 (R. H. Leuschner; AMNH). 27. *C. tubercula*, new species, holotype male, Tucson, Arizona, November 24, 1943 (A. H. Rindge; AMNH). 28. *C. polingi* (Cassino), male, Chihuahuan Desert, Big Bend National Park, Texas, October 9, 1966 (A. and M. E. Blanchard; AMNH). 29. *C. bicolor*, new species, holotype male, K-Bar Research Station, Big Bend National Park, Texas, September 22, 1971 (A. and M. E. Blanchard; AMNH). All figures  $\times 2$ .

nearly at right angle, then curving basad to meet inner margin, and with entire line tending to be enlarged on veins and shaded distally by brown band; subterminal area whitish gray,

more or less including concolorous s. t. line; latter white, parallel with outer margin, straight, strongly represented; terminal line black, either complete or narrowly interrupted



by veins; fringe concolorous with wing but narrowly white or grayish white at base and in middle. Hind wings gray, paler than forewings; cross lines weakly represented along anal margin, usually fading out in center of wing; without discal spot; with complete, prominent, pale s. t. line; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Forewings pale gray, hind wings whitish gray, both evenly covered with grayish brown scales; without maculation except for trace of t. p. line anteriorly on forewing, extradiscal line represented by venular dashes, a pale subterminal area on forewings, and more or less complete s. t. line on all wings; discal spots absent or weakly represented on forewings of some specimens.

LENGTH OF FOREWING: 14 to 18 mm.

FEMALE: Similar to male but with upper surface of wings more uniformly gray, with less distinct maculation, and with narrower and less distinct subterminal area of forewings; antennae shortly pectinate, with pectinations equal in length to their basal segments.

LENGTH OF FOREWING: 14 to 16 mm.

MALE GENITALIA: Uncus with sides weakly concave, apex curved ventrally; gnathos with large, rounded, shagreened median protuberance wider than base of uncus; valves with costa swollen apically, bearing numerous long setae; sacculus broadly sclerotized basally, occupying almost three-fourths of width of base of valve, with low ridge paralleling outer margin then turning posteriorly and forming inner margin of triangular, sclerotized area with curved apex; process of sacculus elongate, transverse, widest medially, with from five to seven thick, curved spines on dorsal surface and another two or three from inner margin; anellus rounded anteriorly, narrowed medially with two parallel longitudinal ridges; aedeagus dorsoventrally curved, narrowest portion slightly less than one-half width of gently swollen anterior end, with right side dorsally sclerotized and swollen apically, posterior end pointed, and with single terminal spine.

FEMALE GENITALIA: Sterigma with sclerotized, elliptical or oval median area, lateral areas having one or two longitudinal ridges; intersegmental area weakly sclerotized, feebly rugose, with outer margin finely denticulate; ductus bursae variable in shape, tapering anteriorly or constricted medially, with posterior end slightly larger than at junction with corpus bursae;

ductus seminalis arising ventrally at junction of ductus bursae and corpus bursae as rounded sac, with slender tube leading off from right side; corpus bursae membranous, posterior end tube-like, anterior end swollen; signum rather poorly defined except for straight, transverse, indented ridge. Apophyses posteriores 1.3 to 1.4 mm. in length.

TYPE: This species was described from a single female. The type is in the collection of the National Museum of Natural History.

TYPE LOCALITY: Monachee Meadows, Tulare County, California, elevation 8000 feet.

DISTRIBUTION: The mountains bordering the Owens Valley area of eastern California. Specimens are known from the eastern side of the Sierra Nevada Range from Mono County on the north to Tulare County on the south, and from the Inyo Mountains, Inyo County, to the east of Owens Valley. (See fig. 23.) This distribution corresponds to the Monoan division of the Great Basin Biotic Province (Schick, 1965, p. 24). Elevations of capture range from 7000 to 9000 feet. One specimen has been examined that is labeled "Verdugo, [Los Angeles County], Calif., June 15, 1917"; this locality is in error.

TIME OF FLIGHT: From mid-May until mid-July.

REMARKS: Fifty-eight specimens (54 males and four females, including the type) and 11 genitalic dissections (eight males and three females) have been studied. This species might be confused with the next two, but the characters given in the Diagnosis, plus its distribution, should serve to distinguish it.

### *Chesiadodes cinerea*, new species

Figures 23, 25, 40, 52

DIAGNOSIS: This species is smaller than *simularia*, and has the upper surface of the wings dark gray; the forewings have a straighter t.p. line and a less clearly defined subterminal area than are to be found in the preceding species.

MALE: Head with vertex and front similar to those of *simularia*; front extending one-third to one-half diameter of eye in front of eye, with low ridge below eye having slightly more prominent anterior projection. Thorax similar to that of *simularia* but tending to be darker gray above; foreleg with tibia having slightly longer apical spine, combined lengths of tibia and spine 1.3 to 1.7 mm., with spine one-fifth length of tibia.



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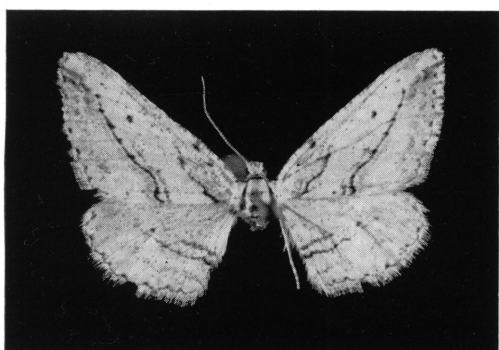
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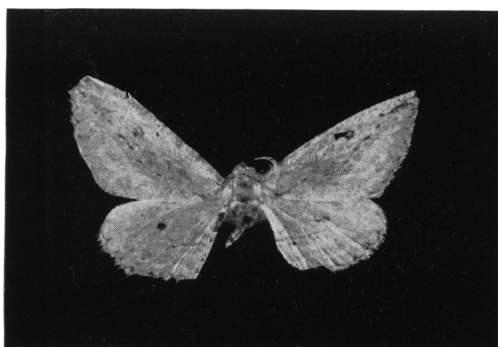
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Abdomen above dark gray or grayish brown, with black posterior band on each segment; below without bands.

**UPPER SURFACE OF WINGS:** Forewings with slight trace of fovea; uniformly dark gray with scattered grayish black scales, having obscure maculation, a narrow, incomplete pale subterminal area and complete white s. t. line; cross lines apparently similar in course to those of *simularia* but with straighter t. p. line shaded distally by narrow, dark gray or dark grayish brown band; subterminal area whitish gray, extending to about middle of wing; s. t. line white, complete, prominent; terminal line and fringe similar to those of *simularia*. Hind wings gray, paler than forewings, heavily and evenly suffused with dark gray scales; maculation similar to that of *simularia* but with s. t. line tending to be more prominent.

**UNDER SURFACE OF WINGS:** Forewings pale gray, hind wings whitish gray, both evenly and heavily covered with dark gray and brownish gray scales; without maculation except for trace of t. p. line anteriorly on forewings, and for indication of s. t. line on all wings, shaded on both sides with broad dark bands; discal dots weakly represented on all wings.

**LENGTH OF FOREWING:** 12 to 15 mm.; holotype, 14 mm.

**FEMALE:** Similar to male but with upper surface of wings more uniformly gray, with less distinct maculation, and with subterminal area only slightly indicated; antennae shortly pectinate, with pectinations equal in length to their basal segments.

**LENGTH OF FOREWING:** 11.5 mm. (allotype).

**MALE GENITALIA:** Similar to those of *simularia*, differing mainly as follows: uncus with more slender apex; gnathos with sides becoming slightly wider ventrally; valves with costa slightly shorter and broader; sacculus with less prominent low ridge paralleling outer margin, triangular sclerotized area variable in shape,

with inner side varying from straight (holotype) to convex (paratypes); process of sacculus smaller, elliptical, with from five to eight thick, curved spines on dorsal surface and another one to three from inner margin; anellus with either single or two parallel longitudinal ridges very close together.

**FEMALE GENITALIA:** Similar to those of *simularia*, differing mainly as follows: sterigma with sclerotized median area rectangular, lateral areas with single, higher longitudinal ridge; intersegmental area membranous; ductus bursae widest posteriorly, tapering anteriorly, slightly wider than long; ductus seminalis arising on right side; corpus bursae with tubelike posterior portion shorter, about one-third length of corpus bursae, with anterior portion evenly swollen; signum on right side. Apophyses posteriores 1.3 mm. in length.

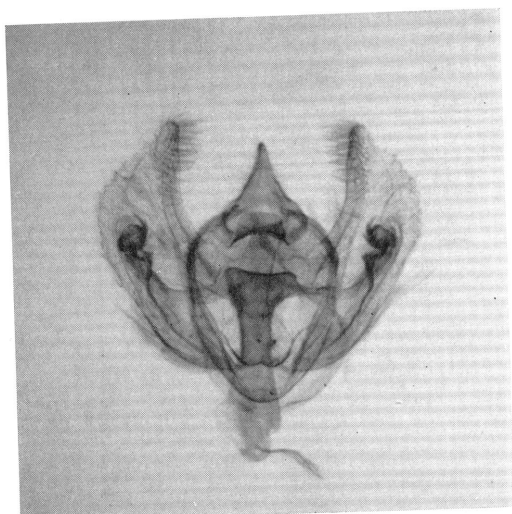
**TYPES:** Holotype, male, Elk Tank, Mt. Taylor, Valencia County, New Mexico, elevation 8800 feet, June 13, 1966 (R. W. Holland); allotype, female, Denio, [Humboldt County], Nevada, June 18, 1962. The genitalia of the holotype are mounted on slide FHR 16804, and of the allotype on 11252. Paratypes: same data as holotype, May 7, 21, 1966 (R. W. Holland, M. Toliver), five males; Richfield, [Sevier County], Utah, May 28, 1930, one male; Madras, Jefferson County, Oregon, May 5, 1960 (S. G. Jewett, Jr.), one male; Cove Palisades State Park, [Jefferson County], Oregon, May 14, 1954 (S. G. Jewett, Jr.), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the Natural History Museum of Los Angeles County, of the National Museum of Natural History, and of S. G. Jewett, Jr.

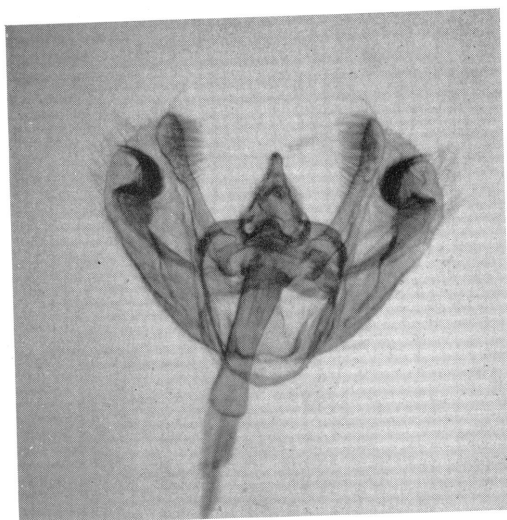
**DISTRIBUTION:** The five known localities for this species are more or less in a line running northwest from western New Mexico, through central Utah and northwest Nevada to central

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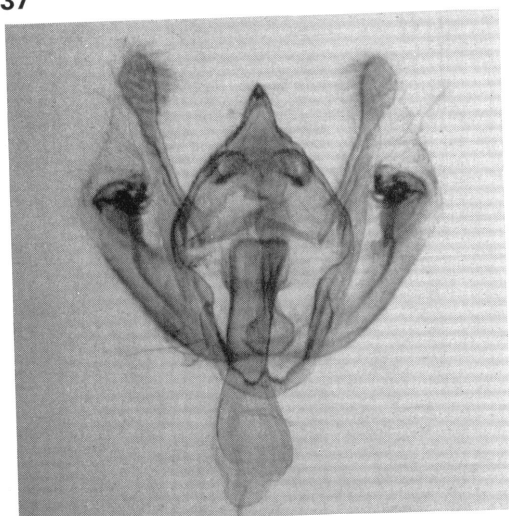
FIGS. 30–36. Adults of *Chesiadodes*. 30. *C. coniferaria* (Grossbeck), male, Kingston Mountains, California, April 17, 1937 (Andrews and Martin; LAC). 31. *C. fusca*, new species, holotype male, Madera Canyon, Arizona, September 1–5, 1957 (L. M. Martin; LAC). 32. *C. curvata* (Barnes and McDunnough), male, Vidal, California, October 26, 1948 (D. Weedmark; AMNH). 33. *C. longa*, new species, holotype male, Utah (AMNH). 34. *C. dissimilis*, new species, holotype male, Quartzsite, Arizona, January 29, 1971 (AMNH). 35. *C. pallens*, new species, holotype male, 2 miles east of San Simón, Baja California, September 8–9, 1955 (J. A. Comstock; LAC). 36. *C. daedalea* (Rindge), paratype male, La Paz, Baja California Sur, November 5, 1961 (Cary-Carnegie Museum Expedition; AMNH). All figures  $\times 2$ .



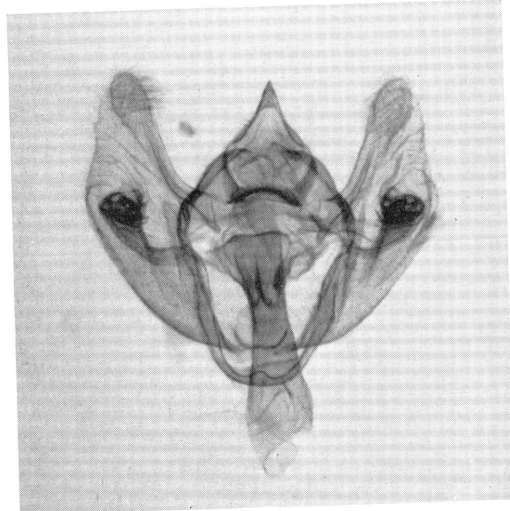
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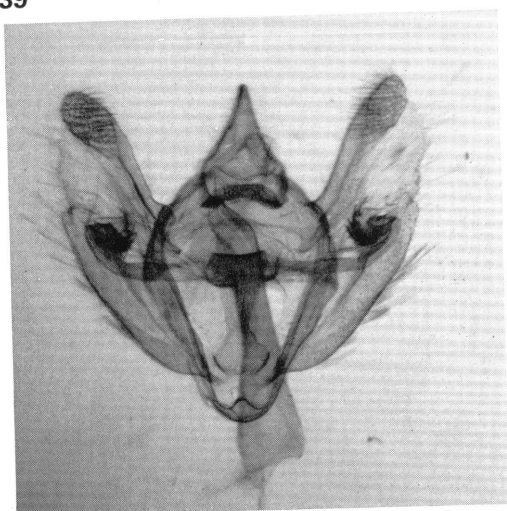
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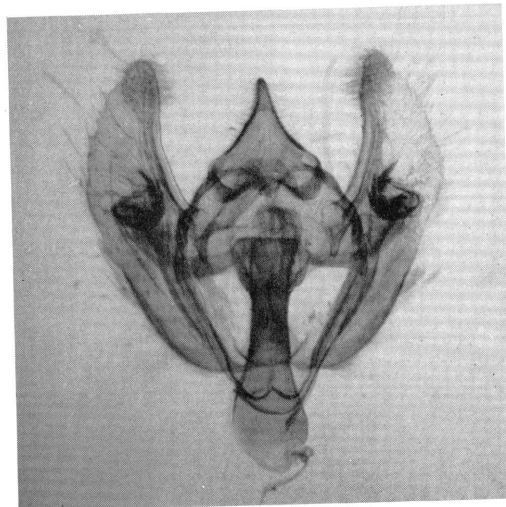
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Oregon. (See fig. 23.) Elevations of capture for this species range from 8800 feet, at the type locality and the southeastern end of its known range, to 2240 feet at Madras, Oregon, the northwestern end of the range.

TIME OF FLIGHT: May and June.

REMARKS: Ten specimens (nine males and one female) and five genitalic dissections (four males and one female) have been studied.

Clarke (1939, p. 74) mentioned a male specimen from Eureka, Juab County, Utah, June 4, 1921 (T. Spalding). This moth presumably belongs to the present species, but it has not been examined.

ETYMOLOGY: The specific name is from the Latin *cinereus*, ash-colored, in reference to the color of the wings.

*Chesiadodes morosata* Hulst

Figures 23, 26, 41, 53

*Chesiadodes morosata* HULST, 1896, p. 354. DYAR, "1902" [1903], p. 324. Smith, 1903, p. 77. BARNES AND McDUNNOUGH, 1917, p. 117. McDUNNOUGH, 1938, p. 163. RINDGE, 1955, p. 148; 1956, p. 13, fig. 10 (male).

DIAGNOSIS: This species is similar to *simularia* but differs from that species by the upper surface of the forewings being dark gray and having the subterminal area concolorous with the remainder of the wing. The present species has a much longer spine on the fore tibia than is found in *simularia*.

MALE: Head with vertex and front dark gray, some scales pale gray distally; front rounded, strongly protruding, extending one-half diameter of eye in front of eye, with raised straight ventral rim; palpi not attaining front, covered with mixed gray and grayish black scales; antennae with longest pectinations three times as long as their basal segments, terminal five segments not pectinate. Thorax above grayish black, some scales gray tipped, collar slightly darker, patagia with some hairlike scales; below gray; legs slender, gray, with variable number of darker

scales; foreleg with tibia having weakly curved apical spine, combined lengths of tibia and spine 1.6 to 1.8 mm., with spine about one-fourth as long as tibia. Abdomen similar to that of *simularia* but darker.

UPPER SURFACE OF WINGS: Forewings either without fovea or with slight trace of one; uniformly dark gray with poorly defined maculation except for white s. t. line; course of cross lines apparently similar to those of *simularia* but with t. p. line tending to be less curved and some specimens having narrow grayish white distal shade line; discal spot very small or absent; subterminal area concolorous with remainder of wing; s. t. line white or grayish white, complete, tending to be inwardly dentate on veins; terminal line either obsolescent or weakly represented; fringe similar to that of *simularia*. Hind wings gray, paler than forewings, usually becoming darker distally and along anal margin; cross lines represented on anal margin, usually fading out in center of wing; discal spot present, dark gray; s. t. line grayish white, broadly shaded basally by dark gray band; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Forewings gray, hind wings whitish gray, both heavily and evenly covered with dark grayish brown scales; without maculation except for trace of t. p. line anteriorly on forewing, and for discal spots, those on hind wings much more prominent than on forewings; terminal line dark, narrow, present on all wings; fringe similar to that of upper surface but less contrastingly colored.

LENGTH OF FOREWING: 15 to 18 mm.

FEMALE: Similar to male but with t. p. line of upper surface of forewings tending to be less prominent; antennae shortly pectinate, with pectinations 1.5 times longer than basal segments.

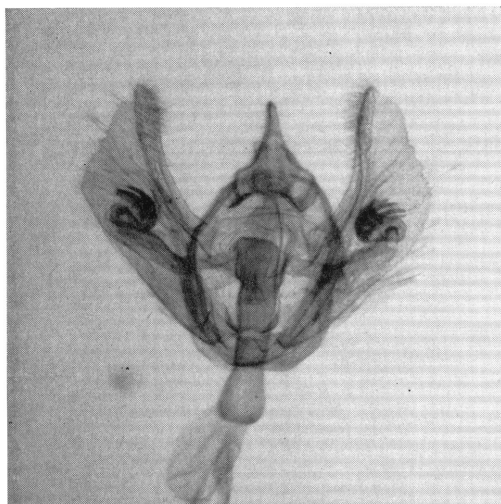
LENGTH OF FOREWING: 14 to 15 mm.

MALE GENITALIA: Similar to those of *simularia*, differing mainly as follows: uncus more evenly tapering, apex less curved ventrally; valves with

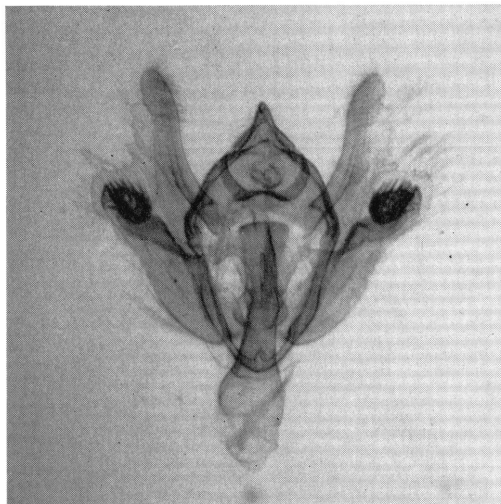
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FIGS. 37-42. Male genitalia. 37. *Nepterotaea memoriata* (Pearsall), Ramsey Canyon, Arizona, May 17, 1965 (R. F. Sternitzky; AMNH). 38. *N. obliviscata* (Barnes and McDunnough), Southwestern Research Station of the American Museum of Natural History, August 29, 1959 (M. Statham; AMNH). 39. *Chesiadodes simularia* (Barnes and McDunnough), Inyo Mountains, California, May 11, 1936 (L. M. Martin; AMNH). 40. *C. cinerea*, new species, holotype, Elk Tank, New Mexico, June 13, 1966 (R. W. Holland; AMNH). 41. *C. morosata* Hulst, Anza, California, March 21, 1965 (R. H. Leuschner; AMNH). 42. *C. tubercula*, new species, holotype, Tucson, Arizona, November 24, 1943 (A. H. Rindge; AMNH).

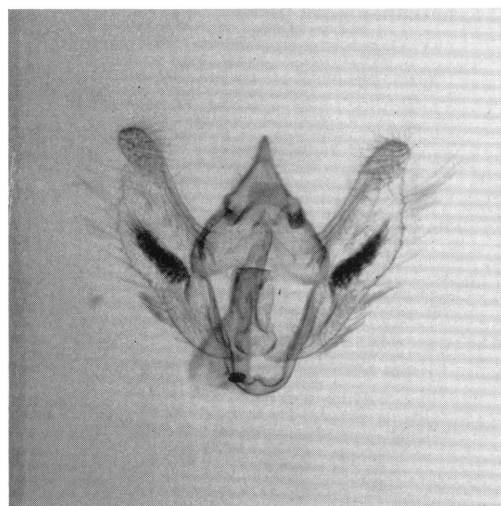




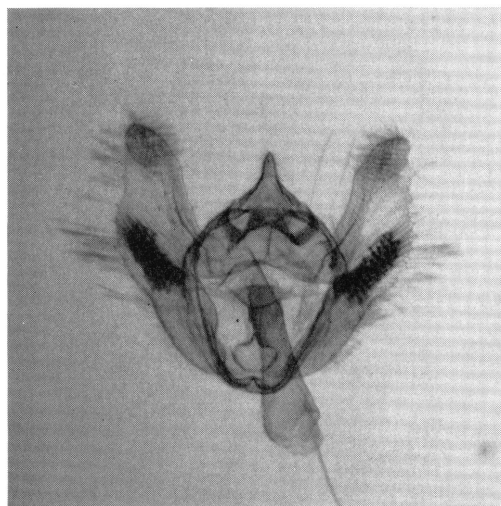
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FIGS. 43–46. Male genitalia of *Chesiadodes*. 43. *C. polingi* (Cassino), Dugout Wells, Big Bend National Park, Texas, September 28, 1965 (A. and M. E. Blanchard; AMNH). 44. *C. bicolor*, new species, paratype, K-Bar Research Station, Big Bend National Park, Texas, September 25, 1971 (A. and M. E. Blanchard; AMNH). 45. *C. coniferaria* (Grossbeck), cotype, "So. Arizona," May 1–15 (AMNH). 46. *C. fusca*, new species, holotype, Madera Canyon, Arizona, September 1–5, 1957 (L. M. Martin; LAC).

costa slightly shorter and broader, with apical region tending to be curved outwardly; sacculus with elongate, low ridge paralleling outer margin, enlarged distally into semicircular sclerotized area; process of sacculus rounded or with one end tapered, with curved spines tending to be smaller and more numerous, ranging from about five to 15, arising from dorsal, inner, and adjacent ventral surfaces; anellus rounded anteriorly, tapering posteriorly, without median

longitudinal ridge; aedeagus elongate, slender, narrowest portion one-half width of swollen anterior end.

**FEMALE GENITALIA:** Similar to those of *simularea*, differing mainly as follows: sterigma with sclerotized median area long and slender, lateral areas swollen and finely denticulate, without ridges or platelike structures; intersegmental area membranous; ductus bursae widest posteriorly, tapering anteriorly, with length about

equal to width; ductus seminalis arising on right side; corpus bursae and signum similar to those of *cinerea*. Apophyses posteriores 1.4 to 1.5 mm. in length.

TYPE: Hulst described *morosata* from a single male specimen; it is in the collection of the American Museum of Natural History (Rindge, 1955, p. 148; 1956, p. 13). Its genitalia are mounted on slide FHR 5213.

TYPE LOCALITY: "Sierra Nevada," California. It is stated in the original description that the type came from Henry Edwards. However, there is neither a number from Edwards nor any additional amplifying information on the type or its labels to aid in getting a more definite locality. Edwards did a lot of collecting at Havilah, Kern County, at the southern end of the Sierra Nevada Range. Based on our present knowledge of the distribution of the species, it is quite possible that the type might have come from Havilah.

DISTRIBUTION: The semiarid foothills of southern California. Known localities include the southern end of the Sierra Nevada Range in Kern County, the lower slopes and canyons of the San Gabriel Mountains of Los Angeles and San Bernardino counties, and extending east in Riverside County to the foothills of the San Jacinto Mountains. (See fig. 23.) This distribution apparently corresponds to part of the Southern Cordilleran Biotic Province (Schick, 1965, p. 23). Most specimens have been captured at elevations of from 2500 to 4000 feet.

TIME OF FLIGHT: From mid-December to the end of March.

REMARKS: Twenty-three specimens (16 males and seven females) and five genitalic dissections (four males and one female), including the type and its genitalia, have been studied. This species and *Hulstina aridata* Barnes and Benjamin have been confused in several collections. One quick way to distinguish the two is to look for the tongue; it is absent in *aridata* and present in *morosata*. Additional differences may be found in my revision of *Hulstina* and the description of *aridata* (Rindge, 1970, p. 269, figs. 2, 15, 52, 83).

### *Chesiadodes tubercula*, new species

Figures 27, 42, 54, 63

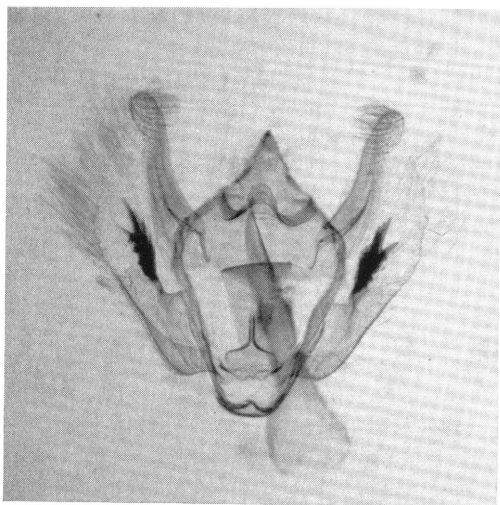
DIAGNOSIS: This species is basically similar to *simularia* in size, color, and maculation but it lacks the pale subterminal area on the upper

surface of the forewings. It also can be separated from that species by the strongly tuberculate front and by the much longer fore tibial spine.

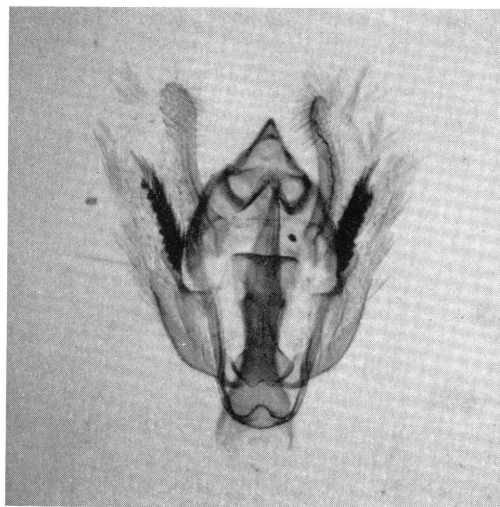
MALE: Head with vertex and front gray or grayish brown; front sparsely scaled, with strongly raised, complete outer rim, with large, laterally compressed median tubercle, and with ridge below each eye, enlarged at both ends, front with outer rim and tubercle each extending beyond eye by one-third diameter of eye; palpi extending as far as outer enlargement of rim of front, slightly beyond anterior enlargement of ridge below eye; tongue vestigial; antennae with longest pectinations two times as long as their basal segments, terminal six segments not pectinate. Thorax above gray or grayish brown, collar and narrow band across patagia brownish black; below paler; legs with fore tibia having long, weakly curved apical spine, combined lengths of tibia and spine 1.0 mm., with spine about two-fifths of length of tibia. Abdomen above grayish brown, tending to have posterior margin of each segment narrowly brownish black; below paler.

UPPER SURFACE OF WINGS: Forewings with slight trace of fovea; uniformly grayish brown to dark brown with more or less distinct black t. p. line and whitish gray s. t. line; t. a. and median lines similar to those of *simularia*; discal dot absent; t. p. line similar to that of *simularia* but not concave below costa and tending to have central portion straight or weakly concave, and with line tending to be shaded distally by pale brown in lower portion of wing; subterminal area concolorous with wing; some specimens with diagonal, nebulous dark dash in cell R<sub>5</sub> from margin to t. p. line; s. t. line slender, complete in most specimens, whitish gray, outwardly curved in cells; terminal line varying from being absent to complete, slender; fringe concolorous with wing. Hind wings gray or pale brownish gray, paler than forewings; cross lines represented along anal margin, with extradiscal and s. t. lines extending across most of wing, latter line with broad dark basal shading; terminal line present; fringe similar to that of forewing.

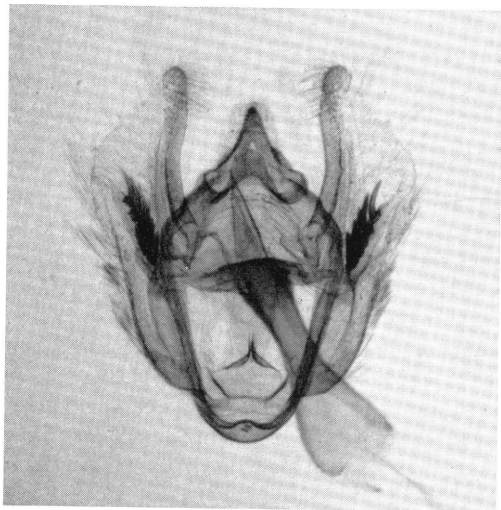
UNDER SURFACE OF WINGS: Forewings pale gray, hind wings whitish gray, both evenly and heavily covered with grayish brown and brown scales; maculation varying from being absent to having complete t. p. and extradiscal lines present; discal dots of hind wing usually larger



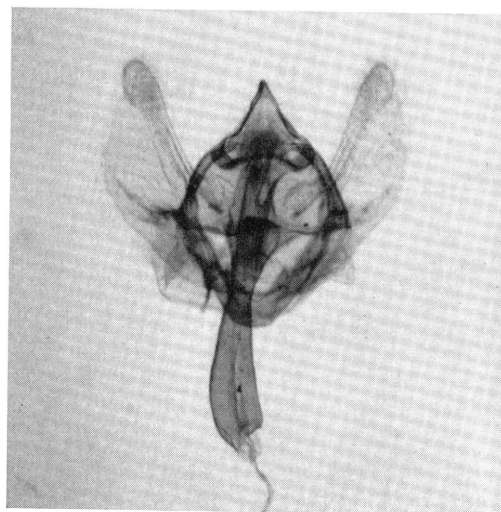
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FIGS. 47-50. Male genitalia of *Chesiadodes*. 47. *C. curvata* (Barnes and McDunnough), Vidal, California, October 28, 1947 (D. Weedmark; AMNH). 48. *C. longa*, new species, holotype, Utah (AMNH). 49. *C. dissimilis*, new species, holotype, Quartzsite, Arizona, January 29, 1971 (AMNH). 50. *C. daedalea* (Rindge), paratype, La Paz, Baja California Sur, November 5, 1961 (Cary-Carnegie Museum Expedition; AMNH).

and more prominent than that of forewing when present; terminal line absent or weakly represented; fringe concolorous with wing.

LENGTH OF FOREWING: 14 to 17 mm.; holotype, 16 mm.

FEMALE: Similar to male but with upper surface tending to be slightly more grayish; antennae with median portion serrate.

LENGTH OF FOREWING: 13 to 15 mm.; allotype, 14 mm.

MALE GENITALIA: Similar to those of *simularia*, differing mainly as follows: uncus with sides strongly and evenly concave, apex less curved ventrally; gnathos with median enlargement truncate, narrower than base of uncus; valves with costa of same length as in *simularia*, apical region swollen outwardly; sacculus with elongate longitudinal thickening enlarging distally into long, irregularly shaped area; process of sacculus variable in shape, usually triangular or wedge-

shaped, with from one to four curved spines from dorsal surface, and four or five thicker spines from inner and adjacent ventral surface; anellus rounded anteriorly, tapering medially, with inverted Y-shaped median ridge; aedeagus with narrowest portion one-half width of swollen anterior end.

**FEMALE GENITALIA:** Similar to those of *simularea*, differing mainly as follows: sterigma with sclerotized median area broadly triangular, lateral areas sclerotized, without ridges; intersegmental area strongly sclerotized laterally forming basal trough, becoming weakly sclerotized ventrally; ductus bursae with parallel sides, slightly wider than long; ductus seminalis arising medioventrally; corpus bursae with relatively broad posterior tubelike portion and broadly swollen anterior end; signum situated ventrally. Apophyses posteriores 1.5 mm. in length.

**TYPES:** Holotype, male, Tucson, Pima County, Arizona, November 24, 1943 (A. H. Rindge); allotype, female, same data, November 30, 1943; both specimens are from the author's collection. The genitalia of the holotype are mounted on slide FHR 16802, and of the allotype on 16727. Paratypes: *Arizona*: same data as holotype, December 18, 1943, one male; Redington, [Pima County], one male; Wickenburg, Maricopa County, at city lights, elevation 2100 feet, November 14, 1958 (R. H. Leuschner), one male; "So. Ariz., X1-15-30" and "So. Ariz., X1-15-30/[19]26," one male and four females. *California*: Acton Junction, Los Angeles County, October 28, 1949 (Hill), one male; Mint Canyon, Los Angeles County, November 11, 1950 (Hill), one male; Soledad Canyon, Mojave Desert, Los Angeles County, November 12, 1962 (R. H. Leuschner), one male; Lancaster, Mojave Desert, Los Angeles County, November 3, 1945, one male; Juniper Hills, 2 miles south of Pearblossom, Los Angeles County, elevation 3500 feet, November 10, 1966 (C. Henne), one male; Piñon Hills, near Wrightwood, San Bernardino County, elevation 4000 feet, November 6, 1969 (R. H. Leuschner), two males.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the Museum of Comparative Zoology, of the National Museum of Natural History, of the Natural History Museum of Los Angeles County, and of R. H. Leuschner.

**DISTRIBUTION:** The Sonoran desert of southern Arizona and southern California, extending into the Mojave Desert along the northern slopes of the San Gabriel Mountains (see fig. 63). This species has been taken at elevations of from about 2100 feet up to 4000 feet.

**TIME OF FLIGHT:** From late October until mid-December.

**REMARKS:** Seventeen specimens (12 males and five females) and five genitalic dissections (four males and one female) have been studied. The specimens from southern California tend to be slightly darker in color and to have a less distinctive pattern on the forewings than do the moths from Arizona.

**ETYMOLOGY:** The specific name is from the Latin *tuberculum*, a swelling or tubercle, in reference to the strongly tuberculate front.

*Chesiadodes polingi* (Cassino), new combination  
Figures 28, 43, 55, 63

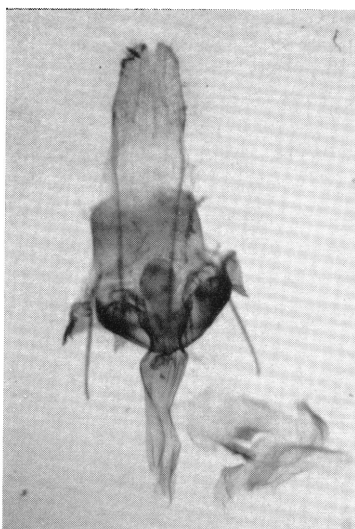
*Nepterotaea polingi* CASSINO, 1927, p. 79. McDUNNOUGH, 1938, p. 165.

*Morina polingi*: McDUNNOUGH, 1945, p. 66.

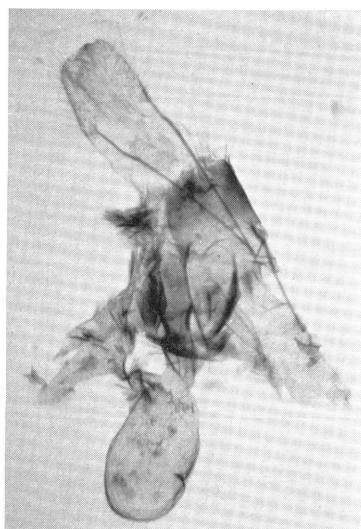
**DIAGNOSIS:** This species can be recognized by the upper surface of the forewings being very dark gray or grayish black, and by the rounded, raised front. It looks rather like *Nepterotaea furva*, but the present species is larger and can be recognized by the front and fore tibial spine.

**MALE:** Head, vertex dark grayish black, some scales tipped with pale gray, with small tufts of scales posteromedial of antennal bases; front round, with low, raised outer rim and with swollen median area, covered with dull black scales, ventral margin grayish white, of varying width; palpi dark grayish black, with variable number of gray scales, barely reaching front; antennae with longest pectinations 3.5 times as long as their basal segments, terminal two or three segments not pectinate. Thorax above gray to grayish black, collar darker; below gray; legs variably gray to grayish black, all tibia with ends of segments white; foreleg with tibia having prominent, slightly curved apical spine, combined lengths of tibia and spine 1.2 mm., with spine about half as long as tibia. Abdomen above grayish black, paler at ends of segments; below paler.

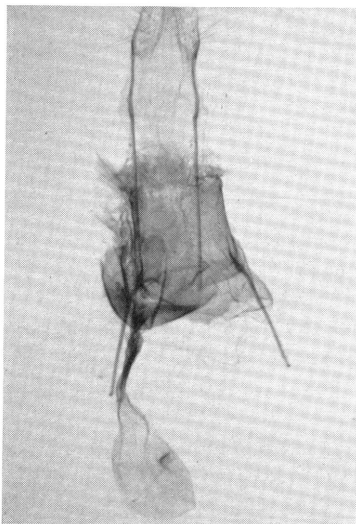
**UPPER SURFACE OF WINGS:** Forewings without fovea; dark, uniform grayish black with black cross lines; t. a. line arising on costa one-fourth



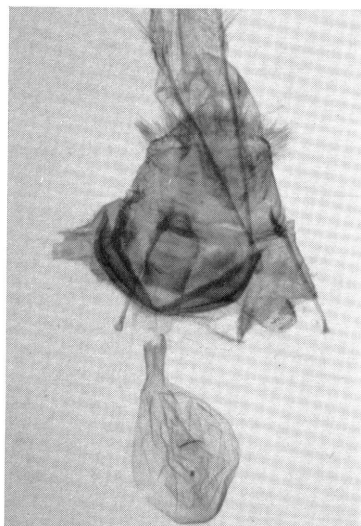
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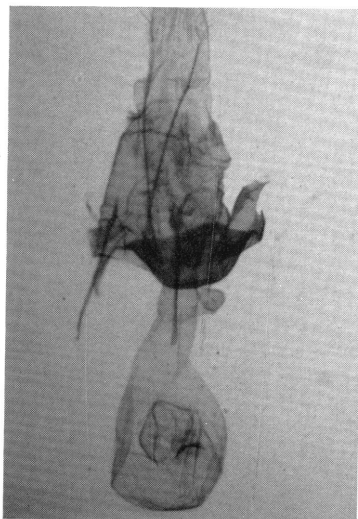
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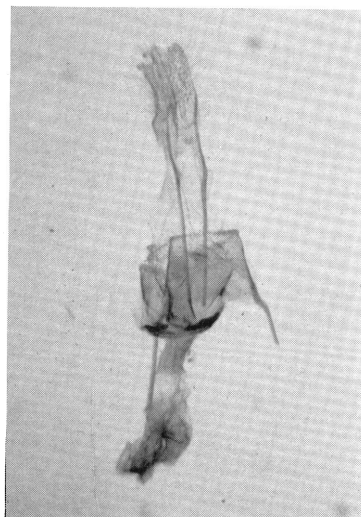
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of distance from base, outwardly curved to below cell, then paralleling costa to anal vein, meeting inner margin about one-fifth of distance from base; discal spot very small or absent; median line usually present in lower portion of wing only, rather variable in course, more or less paralleling t. p. line, being near the latter or mid-way between t. a. and t. p. lines; t. p. line arising on costa four-fifths of distance from base, thickened on veins in anterior part of wing, strongly sinuate with two basal bows, crossing anal vein at right angle, then curving basad again to meet inner margin at middle; s. t. line white, more or less complete, weakly angled or curved outward in cells; terminal area with oblique black stripe from margin to s. t. line in cell  $R_5$ ; terminal line black, complete, some specimens with small intravenular spots; fringe concolorous with wing, slightly darkened opposite vein endings. Hind wings gray, paler than forewings, becoming darker distally and along anal margin; cross lines represented on anal margin, fading out in center of wing; discal spot absent; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** Forewings gray, apical area darkened, costa black with gray strigations; hind wings light gray, evenly covered with grayish black scales; without maculation except for trace of t. p. line anteriorly on forewing, and for slender terminal line on all wings; fringe as on upper surface.

**LENGTH OF FOREWING:** 11 to 12 mm.

**FEMALE:** Similar to male but with upper surface of forewings tending to be slightly more brownish, with less distinct maculation, and with hind wings slightly darker than in male; antennae shortly pectinate medially, with pectinations shorter than segments.

**LENGTH OF FOREWING:** 12 to 13 mm.

**MALE GENITALIA:** Similar to those of *simularia*, differing mainly as follows: uncus with narrower base, more elongate and slender apically; valves with concave costa, not enlarged apically;

sacculus with anterior portion smoothly rounded, posterior margin more heavily sclerotized, becoming dorsoventrally thickened and wedge-shaped distally, apically truncate; process of sacculus large, occupying much of inner face of valve, more or less elliptical in outline, usually without curved spines from dorsal surface, with from three to seven slender spines from inner margin and with from six or seven, heavier, outwardly curving spines from ventral surface; anellus with median anterior incision or indentation, bluntly tapering posteriorly to midline, with narrower posterior straplike portion; aedeagus with median portion lightly sclerotized, only slightly more slender than scarcely swollen anterior end, posterior end with more slender longitudinal strip on right side, and without apical spine.

**FEMALE GENITALIA:** Similar to those of *simularia*, differing mainly as follows: sterigma with sclerotized median area round, small, and with lateral areas scarcely differentiated; intersegmental area deep, weakly sclerotized at bottom; ductus bursae weakly sclerotized, with parallel sides, longer than wide; ductus seminalis arising medioventrally; corpus bursae with relatively broad posterior portion and evenly swollen anterior end; signum situated ventrally, in form of curved, transverse, indented ridge. Apophyses posteriores 1.5 mm. in length.

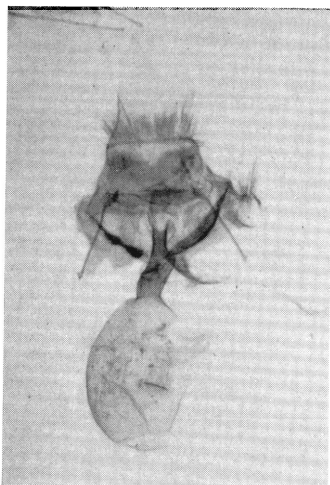
**TYPES:** According to the original description *polingi* was named from a "Holotype ♂ Paratype ♂, Alpine, Texas. Taken by Mr. Poling, Aug. 1-15. In author's collection." Five specimens have been located bearing *Nepterotaea polingi* type labels; four are in the Museum of Comparative Zoology and one is in the National Museum of Natural History. None of these agree with the description, locality, or date as given in the original citation.

In the collection of the Museum of Comparative Zoology are two male specimens, bearing an unpublished Cassino name, that do agree with the original description of *polingi*, including

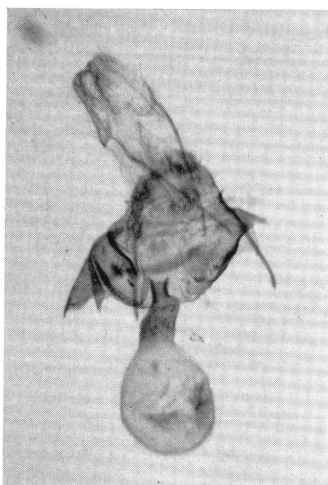
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FIGS. 51-56. Female genitalia of *Chesiadodes*. 51. *C. simularia* (Barnes and McDunnough), Lundy Creek, California, May 10, 1936 (L. M. Martin; AMNH). The bursa copulatrix is broken and detached. 52. *C. cinerea*, new species, allotype, Denio, Nevada, June 18, 1962 (AMNH). 53. *C. morosata* Hulst, Bodfish, California, March 31, 1962 (R. H. Leuschner; AMNH). 54. *C. tubercula*, new species, allotype, Tucson, Arizona, November 30, 1943 (A. H. Rindge; AMNH). 55. *C. polingi* (Cassino), Chihuahuan Desert, Big Bend National Park, Texas, October 1, 1967 (A. and M. E. Blanchard; AMNH). 56. *C. bicolor*, new species, allotype, Chihuahuan Desert, Big Bend National Park, Texas, October 1, 1967 (A. and M. E. Blanchard; AMNH).

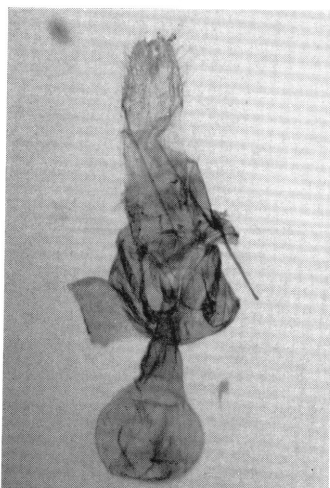
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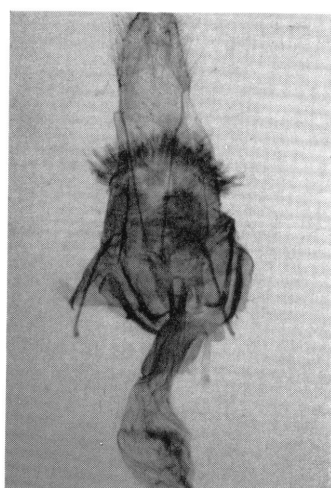
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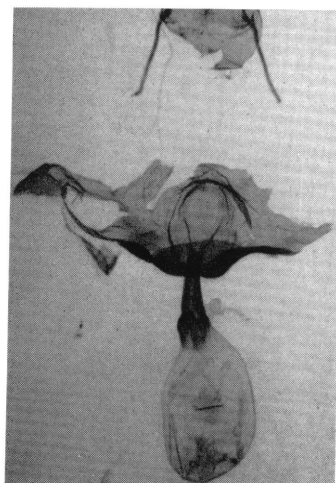
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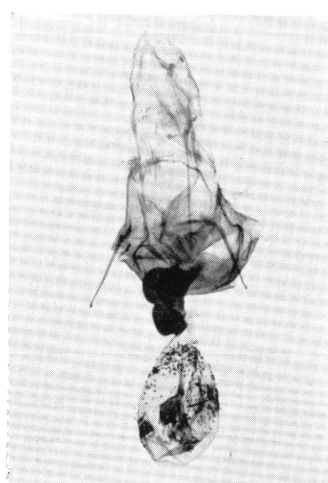
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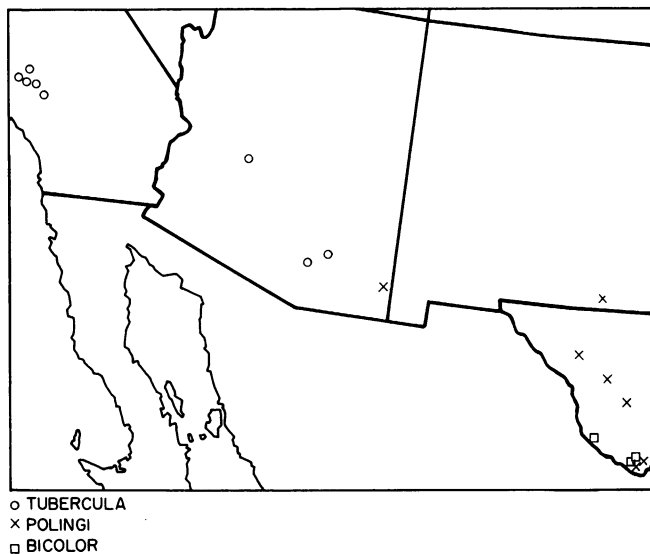


FIG. 63. The distribution of *Chesiadodes tubercula*, new species, *C. polingi* (Cassino), and *C. bicolor*, new species.

the locality and date; no collector's name is given. It is therefore assumed that these are the true types of *polingi*, and I have labeled them accordingly. The genitalia of the holotype are on Cassino's slide 3940.

TYPE LOCALITY: Alpine, Brewster County, Texas.

DISTRIBUTION: Western Texas, southern New Mexico, and southeastern Arizona (see fig. 63).

TIME OF FLIGHT: From mid-August until early October.

REMARKS: Fifty-five specimens (51 males and four females) and eight genitalic dissections (seven males and one female), including the type and its genitalia, have been studied. There is some variation in the course of the t. p. line on the upper surface of the forewings; it varies from being smoothly biconcave to rather angulate.

***Chesiadodes bicolor*, new species**

Figures 29, 44, 56, 63

DIAGNOSIS: This species is smaller than *polingi*,

and has the upper surface of the forewings with two contrasting colors, rather than a unicolorous gray. In addition, the present species has a strongly tuberculate front, as compared with the raised, rounded front of the preceding species.

MALE: Head, vertex white, with scattered pale brown scales; front with prominent, raised outer rim, with large, broadly elliptical, raised central tubercle, and with ridge below each eye, front with outer rim and tubercle each extending beyond eye by one-fourth of diameter of eye; palpi grayish white, with brown and gray scales, extending to rim of front; tongue vestigial; antennae with longest pectinations two times as long as their basal segments, terminal nine segments not pectinate. Thorax and legs similar to those of *polingi*, but with former whiter above; forelegs with very short, broad tibia bearing elongate spine, combined lengths of tibia and spine 0.9 mm., with spine about two-fifths length of tibia. Abdomen above grayish white with scattered darker scales, with small dull black,

FIGS. 57–62. Female genitalia of *Chesiadodes*. 57. *C. coniferaria* (Grossbeck), Providence Mountains, California, May 5, 1934 (G. H. and J. L. Sperry; AMNH). 58. *C. fusca*, new species, allotype, Madera Canyon, Arizona, September 7, 1951 (L. M. Martin; LAC). 59. *C. curvata* (Barnes and McDunnough), Chino Canyon, California, October 17, 1929 (LAC). 60. *C. dissimilis*, new species, allotype, Wenden, Arizona, November 14, 1958 (R. H. Leuschner; AMNH). 61. *C. pallens*, new species, paratype, 2 miles east of San Simón, Baja California, September 8–9, 1955 (J. A. Comstock; AMNH). 62. *C. daedalea* (Rindge), allotype, La Paz, Baja California Sur, October 31, 1961 (Cary-Carnegie Museum Expedition; CM).

paired spots dorsally on posterior portion of each segment; below gray.

UPPER SURFACE OF WINGS: Forewings with slight foveal swelling; dark grayish black as far as t. p. line, except for variable amount of grayish white scaling along costa, obscuring t. a. and median lines; discal dot absent; t. p. line obsolescent from costa to vein  $M_1$ , thence extending almost straight to middle of inner margin, followed distally by narrow grayish white band and wider ochreous to grayish brown band; subterminal area broadly white, including poorly defined s. t. line, with black, diagonal streak extending from outer margin below apex to tip of t. p. line; terminal area pale gray, interrupted by brownish veins; terminal line black, narrow; fringe white basally, darker gray distally, broadly checkered with black opposite vein endings. Hind wings similar to those of *polingi*, but white.

UNDER SURFACE OF WINGS: Similar to those of *polingi* but whiter.

LENGTH OF FOREWING: 10 to 11 mm.; holotype, 10 mm.

FEMALE: Similar to male but with more brown scaling on both upper and under surfaces of wings; antennae shortly pectinate medially, with pectinations shorter than segments.

LENGTH OF FOREWING: 11 mm. (allotype).

MALE GENITALIA: Similar to those of *polingi*, differing mainly as follows: uncus smaller, sides straighter, apex more curved ventrally; gnathos with smoothly sclerotized median enlargement slightly narrower than base of uncus; valves with costa weakly swollen apically; sacculus broader anteriorly, posterior margin well-sclerotized, evenly curved, enlarging in width distally, apically rounded; process of sacculus rounded or elliptical in outline, dorsal surface with some curved spines, inner margin and ventral surface thickly covered with numerous spines; anellus without anterior incision; aedeagus with median portion about one-half width of swollen anterior portion, right side posteriorly more broadly sclerotized, with apical spine; vesica with small, slender, apically dentate sclerotized strip.

FEMALE GENITALIA: Similar to those of *simularia*, differing mainly as follows: sterigma with sclerotized median area small, longer than wide, slightly swollen anteriorly, truncate posteriorly, and with lateral areas smoothly sclerotized, large; intersegmental area sclero-

tized and apparently rugose at bottom; ductus bursae sclerotized, elongate, about twice as long as wide, widest anteriorly; ductus seminalis apparently arising on right side; corpus bursae with posterior portion longitudinally striate; signum on right side. Apophyses posteriores 1.2 mm. in length.

TYPES: Holotype, male K-bar Research Station, Big Bend National Park, Texas, September 22, 1971 (A. and M. E. Blanchard); allotype, female, Chihuahuan Desert near Nugent Mt., Big Bend National Park, Texas, October 1, 1967 (A. and M. E. Blanchard). The genitalia of the holotype are mounted on slide FHR 16430, and of the allotype on AB 1295. Paratypes, all from Texas and all collected by A. and M. E. Blanchard: same data as holotype, September 16, 25, 1971, three males; same data as allotype, April 10, 1967, October 9, 1966, October 1, 3, 7, 10, 1967, seven males; Government Spring, Big Bend National Park, September 29, 1965, one male; Dugout Wells, Big Bend National Park, September 28, 1965, one male; Grapevine Hill, Big Bend National Park, October 2, 1965, one male; Presidio, Presidio County, October 17, 1968, one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of A. Blanchard.

DISTRIBUTION: Southwestern Texas, being known only from the southernmost portion adjacent to Mexico. (See fig. 63.)

TIME OF FLIGHT: A single specimen has been taken in mid-April; all the others are from September and October.

REMARKS: Sixteen specimens (15 males and one female) and six genitalic dissections (five males and one female) have been studied. There is some variability in the width and intensity of the white or grayish white subterminal area, as well as in the degree of straightness in the t. p. line.

ETYMOLOGY: The specific name is from the Latin *bicolor*, of two colors, in reference to the upper surface of the forewings.

*Chesiadodes coniferaria* (Grossbeck),  
new combination

Figures 30, 45, 57, 64

*Morina coniferaria* GROSSECK, 1912, p. 399, fig. 10, 1 (venation), 2-4 (legs), 5 (side view of head), 6 (male antenna). BARNES AND McDUNNOUGH, 1917, p. 117. McDUNNOUGH, 1938, p. 162.

**DIAGNOSIS:** This species has the upper surface of the rather short and broad forewings pale gray or grayish brown, being much paler than *bicolor*. The maculation of the forewings is generally rather weakly represented, with the t. p. line being biconcave.

**MALE:** Head, vertex pale gray, with scattered brown scales; front similar to that of *bicolor*, with prominent, laterally flattened, elliptical or narrowly oval central tubercle; palpi extending to, or just beyond, rim of front; tongue vestigial; antennae with longest pectinations two times as long as their basal segments, terminal seven segments not pectinate. Thorax above pale gray or grayish brown, collar brown, patagia with narrow median brown band; paler below; legs grayish brown, with variable number of brown scales; foreleg with very short, broad tibia bearing elongate apical spine, combined lengths of tibia and spine 0.9 mm., with spine about two-fifths length of tibia. Abdomen above gray, with numerous grayish black scales tending to form two dorsal spots posteriorly on each segment, and with very narrow grayish white band on each segment; below with less dark scaling.

**UPPER SURFACE OF WINGS:** Forewings with faint trace of fovea; pale gray to gray, with variable number of brown, grayish brown, and grayish black scales more or less evenly spread over wing; veins tending to be faintly brown; maculation variable in intensity, usually rather poorly defined, with cross lines similar in course to those of *bicolor*; t. a. line obsolescent; discal spot and median shade line weakly represented or absent; t. p. line most prominent part of pattern, biconcave below vein  $M_1$ , with outward bow on and just posterior of vein  $Cu_2$ , having brown or dark gray distal shade band; subterminal area mostly pale gray; s. t. line pale gray, varying from complete to partially represented, with or without broad, dark basal shade band; terminal line black, narrow, complete, interrupted by veins in some specimens; fringe either concolorous with wing and having narrow, basal pale gray band or mostly grayish white, darkened opposite vein endings. Hind wings whitish gray, paler than forewings, with variable number of brown and gray scales, these intensified along anal margin; cross lines represented on anal margin, fading out in center of wing; discal spot absent or obsolescent; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** Forewings pale

gray, hind wings whitish gray, both with scattered brown and gray scales; without maculation except for trace of t. p. line anteriorly on forewings, and for slender terminal line on all wings; fringe as on upper surface.

**LENGTH OF FOREWING:** 10 to 12 mm.

**FEMALE:** Similar to male but with upper surface of forewings tending to be browner or darker grayish brown, with t. p. line remaining relatively distinct; antennae weakly serrate medially.

**LENGTH OF FOREWING:** 9 to 11 mm.

**MALE GENITALIA:** Uncus with concave sides, apex scarcely curved ventrally; gnathos with dentate median enlargement narrower than base of uncus, nearly square in outline; valves with costa enlarged apically on distal side and bearing numerous setae; sacculus weakly sclerotized, broadly swollen medially and having elongate rectangular or tapering area bearing very many, closely set, slender, curved parallel spines all directed along long axis of swelling; anellus rounded anteriorly with raised lateral rims, flattened posteriorly and extending as two deep parallel ridges, with only slight narrowing of anellus medially; aedeagus with anterior portion broadly swollen, approximately 2.5 times wider than slender posterior portion, latter with right side sclerotized, apically with diagonal apex, and with single apical spine.

**FEMALE GENITALIA:** Similar to those of *simularia*, differing mainly as follows: sterigma with sclerotized median area smaller, more elongate, and with smaller, well separated, smoothly sclerotized lateral areas; intersegmental area weakly sclerotized laterally along bottom; ductus bursae slender, elongate, twice as long as wide, anterior end slightly widened and diagonal; ductus seminalis arising medioventrally; corpus bursae with short posterior portion wider than ductus bursae, and with elongate, swollen anterior portion; signum ventral. Apophyses posteriores 0.8 to 1.0 mm. in length.

**TYPES:** Grossbeck described *coniferaria* from "two males and two females from Dr. Barnes, a pair of cotypes of which are deposited in the American Museum of Natural History." The specimens labeled "♂ type" and "♀ type" are in the collection of the National Museum of Natural History. The male is hereby designated as the lectotype; its genitalia are mounted on slide HWC 193.

**TYPE LOCALITY:** Baboquivari Mountains,



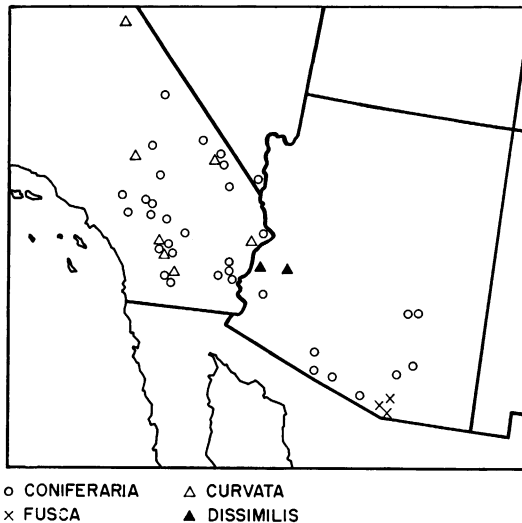


FIG. 64. The distribution of *Chesiadodes coniferaria* (Grossbeck), *C. fusca*, new species, *C. curvata* (Barnes and McDunnough), and *C. dissimilis*, new species.

Pima County, Arizona. The lectotype is dated July 16–23.

**DISTRIBUTION:** The Sonora and Mojave deserts of southern Arizona, southeastern California, and southern Nevada. (See fig. 64). In California, the range includes the Yuman, Saltonian, and Mojavian districts of the Sonoran Biotic Province (Schick, 1965, p. 24).

**TIME OF FLIGHT:** This species has definite spring and fall flights, with dates of captures ranging from February into May, and from July into October. The moths have been captured most commonly in March, April, and September.

**REMARKS:** Seventy-two specimens (39 males and 33 females) and 17 genitalic dissections (eight males and nine females), including the lectotype and its genitalia, have been studied. This species might be confused with the following one, as well as with *curvata* and its two closely allied species. The biconcave t. p. line of the forewing should serve to identify the present and the following, smaller and darker species. The three members of the *curvata* complex have the t. p. line gently S-curved. Both the male and female genitalia have good characters with which to recognize the species groups and their component parts.

There is some individual variation in the color of the upper surface of the forewings of *coniferaria*.

Specimens vary from a uniform, even light gray to those examples that have the median area dark brown, contrasting with the paler gray subterminal area.

***Chesiadodes fusca*, new species**

Figures 31, 46, 58, 64

**DIAGNOSIS:** The upper surface of the forewings is darker in color than is that of *coniferaria*. In addition, the present species is slightly smaller than the preceding one.

**MALE:** Head with vertex, front, and palpi similar to those of *coniferaria*; tongue vestigial; antennae with longest pectinations 2.2 times as long as their basal segments, terminal seven segments not pectinate. Thorax similar to that of *coniferaria*, tending to be slightly darker above; foreleg with combined lengths of tibia and spine 1.0 mm., with spine two-fifths length of tibia. Abdomen similar to that of *coniferaria*, tending to be slightly darker above.

**UPPER SURFACE OF WINGS:** Forewings with or without faint trace of fovea; dark gray to dark grayish brown, more or less evenly and heavily covered with grayish black scales; veins tending to be brown; maculation similar to that of *coniferaria* but tending to be more clearly and strongly represented; pale subterminal area and s. t. line obsolescent or absent. Hind wings similar to those of *coniferaria* but tending to have more dark scaling; veins pale brown.

**UNDER SURFACE OF WINGS:** Similar to that of *coniferaria* but with more dark brown scaling, with maculation varying from absent to weakly represented; discal dots small, present on all wings.

**LENGTH OF FOREWING:** 9 to 10 (holotype) mm.

**FEMALE:** Similar to male but with upper surface of forewings tending to be grayer and having maculation slightly less clearly represented; antennae serrate, more strongly so than in *coniferaria*.

**LENGTH OF FOREWING:** 9 to 12 mm.; allotype, 11 mm.

**MALE GENITALIA:** Similar to those of *coniferaria*, differing mainly as follows: uncus shorter, not so long as width of base, sides concave, apically slightly wider but with very slender apex curved ventrally; gnathos with tapering sides; valves with costa more S-shaped; sacculus slightly narrower, with elongate, rectangular spinose area occupying most of width of saccu-

lus; aedeagus tapering, narrow central portion one-half width of anterior end, with apical spine slightly larger.

**FEMALE GENITALIA:** Similar to those of *coniferaria*, differing mainly as follows: sterigma with median area less heavily sclerotized, slightly smaller, tending to have median indentation on posterior margin, and with lateral areas also smaller; ductus bursae shorter, only slightly longer than wide. Apophyses posteriores 1.0 to 1.1 mm. in length.

**TYPES:** Holotype, male, Madera Canyon, Santa Rita Mountains, southern Arizona, September 1-5, 1957 (L. M. Martin); allotype, female, same data, September 7, 1951. The genitalia of the holotype are mounted on slide FHR 16800, and of the allotype on 16855. Paratypes: same data as types, August 18, 1949, August 23, 1946, August 24, 1951, September 7, 11, 1951 (L. M. Martin), August 31, 1951 (Hill), eight females; Nogales, Santa Cruz County, Arizona, September 15, 1951 (C. W. Kirkwood), one male; road to Nogales, Santa Rita Mountains, Arizona, August 13-15, 1960 (R. Leuschner), one female.

The holotype and allotype are in the collection of the Natural History Museum of Los Angeles County; paratypes are in the collections of that institution, of the American Museum of Natural History, and of R. H. Leuschner.

**DISTRIBUTION:** Southern Arizona, being known only from the Santa Rita Mountains and Santa Cruz County (see fig. 64).

**TIME OF FLIGHT:** Mid-August to mid-September.

**REMARKS:** Twelve specimens (two males and 10 females) and four genitalic dissections (two males and two females) have been studied. There appears to be relatively little individual variation in the specimens of *fusca*, considerably less than is to be found in *coniferaria*. The color of the upper surface of the forewings appears uniformly darker than in the preceding species.

**ETYMOLOGY:** The specific name is from the Latin *fuscus*, dark or dusky, in reference to the color of the upper surface of the forewings.

*Chesiadodes curvata* (Barnes and McDunnough),  
new combination

Figures 32, 47, 59, 64

*Morina curvata* BARNES AND MCDUNNOUGH, 1916 p. 27,  
pl. 2, fig. 17 (lectotype male); 1917, p. 117. MCDUNNOUGH, 1938, p. 162.

**DIAGNOSIS:** This species can be separated from *coniferaria* by the evenly S-shaped t. p. line of the forewings and by its larger size. The genitalia of the two species are quite distinct; see keys for the differential characters.

**MALE:** Head with vertex and front similar to those of *coniferaria*, but with tubercle tending to be rounder and smaller in diameter; tongue normal, apparently functional; antennae with longest pectinations 2.5 times as long as their basal segments, terminal seven segments not pectinate. Thorax similar to that of *coniferaria*; foreleg with very short, broad tibia bearing elongate apical spine, combined lengths of tibia and spine 0.9 mm., with spine about three-sevenths length of tibia. Abdomen similar to that of *coniferaria*.

**UPPER SURFACE OF WINGS:** Forewings similar to those of *coniferaria*, tending to be an even, slightly darker gray; maculation poorly defined, most specimens having only gently S-shaped t. p. line and dentate, pale gray s. t. line; terminal line narrowly interrupted by veins; fringe pale gray, darkened opposite vein endings. Hind wings similar to those of *coniferaria* but tending to have more dark scaling; discal dot absent.

**UNDER SURFACE OF WINGS:** Similar to that of *coniferaria* but without maculation except for narrow terminal line on all wings.

**LENGTH OF FOREWING:** 12 to 13 mm.

**FEMALE:** Similar to male but with some specimens tending to have upper surface slightly browner; antennae simple.

**LENGTH OF FOREWING:** 10 to 12 mm.

**MALE GENITALIA:** Similar to those of *coniferaria*, differing mainly as follows: uncus shorter, sides straighter; gnathos with slender, elongate median enlargement about one-half width of base of uncus, varying from rounded to truncate in shape; valves with sacculus more truncate anteriorly near saccus, more heavily sclerotized, with raised median swelling 0.2 mm. in length bearing from seven to 11 thick spines in narrow strip, with spines slightly curved and directed posteriorly; anellus variable in shape; aedeagus with slender median area one-third to two-fifths width of swollen anterior end, posterior end more broadly sclerotized on right side and extending to sharp posteriad point, and without terminal spine.

**FEMALE GENITALIA:** Sterigma with membranous or very lightly sclerotized, somewhat rugose median area, and with very large, sclerotized

lateral areas having V-shaped opening medially, anterior margins curved dorsally into one or more ridges, laterally varying from smoothly sclerotized to having one or two low, longitudinal rugae; intersegmental areas sclerotized basally; ductus bursae situated below V-opening of lateral plates, appearing like median area of sterigma, elongate, at least twice as long as wide, varying in shape from tapering with wide posterior end to an elongate ellipse; ductus seminalis arising from curved extension of corpus bursae ventrally or posterolaterally on right side; corpus bursae more or less evenly increasing in width anteriorly, posterior portion with longitudinal striations; signum ventral. Apophyses posteriores 1.0 to 1.2 mm. in length.

**TYPES:** This species was described from four males and two females; the moths bearing the "Type ♂," "Type ♀" labels, and one paratype of each sex are in the collection of the National Museum of Natural History. The specimen bearing the "Type ♂" label is hereby designated as the lectotype; this is the specimen illustrated with the original description. One paratype is in the collection of the Museum of Comparative Zoology; the remaining one has not been located.

**TYPE LOCALITY:** La Puerta Valley, San Diego County, California.

**DISTRIBUTION:** The Sonoran and Mojave deserts of southeastern California, extending from San Diego County into Mono County (see fig. 64). This includes the Yuman, Saltonian, and Mojavian districts of the Sonoran Biotic Province (Schick, 1965, p. 24).

**TIME OF FLIGHT:** Late September, October, and early December.

**REMARKS:** Twenty specimens (11 males and nine females, including the lectotype) and eight genitalic dissections (four males and four females) have been studied. The color of the upper surface of the forewings of *curvata* and *coniferaria* is almost identical; there appears to be less individual variation in this species than in the other. Most specimens of *curvata* tend to have a more unicolorous forewing above than does *coniferaria*; many specimens of the latter have the subterminal area paler than the basal portion of the wing.

***Chesiadodes longa*, new species**

Figures 33, 48

**DIAGNOSIS:** This species is very similar to

*curvata* but the upper surface of the forewings is paler gray, and the subterminal area is slightly paler than the remainder of the wing.

**MALE:** Head with vertex and front similar to those of *curvata* but with slightly larger and more elliptical frontal tubercle; tongue apparently normal, functional; (antennae missing). Thorax similar to that of *curvata*; foreleg with very short, broad tibia bearing elongate spine, combined lengths of tibia and spine 1.1 mm., with spine about two-fifths length of tibia. Abdomen similar to that of *curvata*.

**UPPER SURFACE OF WINGS:** Forewings similar to those of *curvata* but paler, light gray with dark gray and grayish brown scales evenly distributed over wing; maculation similar in course to that of *curvata*; t. a. line present in lower portion of wing, subparalleling costa; median shade band nebulous; t. p. line straighter than in *curvata*, followed by complete grayish white band and narrower pale ocher band in lower portion of wing; subterminal area pale basally, becoming darker next to complete, grayish white s. t. line, inwardly dentate on veins; terminal line dull black, narrowly interrupted by veins; fringe not checkered, narrowly grayish white basally, gray distally. Hind wings similar to those of *curvata* but with less dark scaling.

**UNDER SURFACE OF WINGS:** Similar to those of *curvata* but slightly paler.

**LENGTH OF FOREWING:** 12 mm. (holotype).

**FEMALE:** Unknown.

**MALE GENITALIA:** Similar to those of *curvata*, differing mainly as follows: gnathos with median enlargement triangular; valves with sacculus having longer raised median swelling, 0.4 mm. in length, bearing approximately 16 to 19 thick spines in two rows; anellus with more prominent median incision on anterior margin, and with poorly defined median longitudinal ridges; aedeagus with posterior pointed end more broadly sclerotized.

**FEMALE GENITALIA:** Unknown.

**TYPE:** Holotype, male, Utah; from the collection of Chas. Palm. The genitalia of the type are mounted on slide FHR 3535.

The unique type is in the collection of the American Museum of Natural History.

**DISTRIBUTION:** "Utah"; unfortunately the type does not have any additional locality data. It is suspected that the specimen may have come from the St. George area in Washington County. The reasons for this statement are as follows:

(1) The other species that are closely related to *longa* are all found in desert areas; in Utah this usually means the St. George area. (2) Specimens are known from St. George in the Palm collection (which is in the American Museum of Natural History). (3) No material has been seen from central Utah, where T. Spalding collected extensively.

TIME OF FLIGHT: Unknown. It is thought likely that this species flies in mid-winter, as do the other two species of the *curvata* group. *Chesiadodes curvata* flies in September, October, and December; the following species has been taken in November and January.

REMARKS: One specimen and one genitalic dissection have been studied.

ETYMOLOGY: The specific name is from the Latin *longus*, long, in reference to the length of the ridges of the sacculus.

***Chesiadodes dissimilis*, new species**

Figures 34, 49, 60, 64

DIAGNOSIS: This species is both larger and has the upper surface of the forewings darker in color than does *curvata*. The two species have distinctive genitalia; see the keys for details.

MALE: Head with vertex and front similar to those of *curvata* but with slightly larger, longer, and more elliptical frontal tubercle; tongue normal, apparently functional; antennae with longest pectinations 2.2 times as long as their basal segments, terminal six segments not pectinate. Thorax similar to that of *curvata* but tending to be browner above; foreleg with very short, broad tibia bearing elongate spine, combined lengths of tibia and spine 1.2 mm., with spine about one-third length of tibia. Abdomen similar to that of *curvata* but darker brown above, with first segment tending to be paler.

UPPER SURFACE OF WINGS: Forewings similar to those of *curvata* but dull black or dark grayish black; maculation poorly defined, with t. p. line straighter than in *curvata*, only slightly darker than wing itself, having narrow grayish white shade band distally in lower part of wing; s. t. line strongly dentate, pale grayish white, weakly defined; terminal line somewhat diffuse, narrowly interrupted by pale brownish veins; fringe weakly darkened opposite vein endings. Hind wings similar to those of *curvata*.

UNDER SURFACE OF WINGS: Similar to those of *curvata* but with small black discal spots on all wings.

LENGTH OF FOREWING: 15 mm. (holotype).

FEMALE: Similar to male but with upper surface of forewings dark brownish gray and with maculation obsolescent, having t. p. line nearer center of wing; antennae simple.

LENGTH OF FOREWING: 12 mm. (allotype).

MALE GENITALIA: Similar to those of *curvata*, differing mainly as follows: larger; valves with sacculus apparently having asymmetrical raised swellings and numbers of spines, right side 0.30 mm. in length and bearing approximately nine spines, left side 0.35 mm. long and with 12 spines; anellus without anterior median incision, with well-defined median longitudinal ridges; aedeagus with posterior pointed end entirely sclerotized.

FEMALE GENITALIA: Similar to those of *curvata*, differing mainly as follows: sterigma with large, sclerotized lateral areas separated medially by width of ductus bursae, subtriangular in outline; intersegmental area more heavily sclerotized basally, forming U-shaped lateral troughs; ductus bursae short, slightly longer than wide, dorsal surface extended as flat, sclerotized, rectangular area posteriad of opening by almost length of ductus bursae; ductus seminalis arising from curved extension of corpus bursae posterolaterally on right side; signum apparently on right side. Apophyses posteriores 1.1 mm. in length.

TYPES: Holotype, male, Quartzsite, [Yuma County], Arizona, January 29, 1971; allotype, female, Wenden, Yuma County, Arizona, at city lights, elevation 1500 feet, November 14, 1958 (R. H. Leuschner; and from his collection). The genitalia of the holotype are mounted on slide FHR 16632, and of the allotype on 16873.

Both type specimens are in the collection of the American Museum of Natural History.

DISTRIBUTION: Yuma County, Arizona (see fig. 64). Both localities, within about 40 miles of each other, are in the Sonoran Desert.

TIME OF FLIGHT: November and January.

REMARKS: Two specimens and two genitalic dissections have been examined.

ETYMOLOGY: The specific name is from the Latin *dissimilis*, unlike or dissimilar, in reference to the ridges of the sacculus.

***Chesiadodes pallens*, new species**

Figures 35, 61

DIAGNOSIS: This species can be distinguished

from all the preceding ones by the white or pale grayish white upper surface of the wings.

MALE: Unknown.

FEMALE: Head with vertex and front similar to those of *curvata* but paler; front with large, ovate or tear-shaped tubercle, widest ventrally; tongue normal, apparently functional; antennae strongly serrate with longest serrations one-half length of their segments. Thorax similar to that of *curvata* but much paler, white or pale grayish white above, collar grayish black, patagia with narrow dark transverse stripe; foreleg with short tibia bearing elongate, curved spine, combined lengths of tibia and spine 1.3 mm., with spine about two-fifths length of tibia. Abdomen similar to that of *curvata* but paler, with paired, black dorsal spots on each segment above.

UPPER SURFACE OF WINGS: Forewings similar to those of *curvata*; white or pale grayish white, with variable number of pale brown and grayish brown scales; cross lines as in *curvata*, black or brownish black, variable in intensity, ranging from being complete to having dots on veins only; discal spot gray or grayish black, small; subterminal area and s. t. line combined, white, not or only scarcely differentiated from remainder of wing, and with black or grayish black diagonal mark from outer margin below apex to near t. p. line; terminal line narrow, black, with small intravenular dots; fringe narrowly white at base, darker distally, slightly darkened opposite vein endings. Hind wings similar to those of *curvata* but white; small discal dot present.

UNDER SURFACE OF WINGS: All wings white, with variable number of grayish brown scales; small discal dots present on all wings; maculation variable, ranging from complete t. p. and extradiscal line to being absent; terminal line present, complete, grayish black; fringe paler than on upper surface.

LENGTH OF FOREWING: 12 to 13 mm.; holotype, 13 mm.

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Sterigma with median area sclerotized, elongate, slender, ovate but with incision on midline posteriorly, and with smaller lateral areas situated opposite posterior end of ductus bursae; intersegmental area deep, only weakly sclerotized laterally near bottom; ductus bursae long and very slender, four to five times longer than wide, slightly increasing in width anteriorly; ductus seminalis arising toward right side as elongate sac; corpus bursae ovate,

dorsally with lightly sclerotized thickening, appearing as posteriorly directed sac near junction with ductus bursae; signum ventral. Apophyses posteriores 1.0 to 1.1 mm. in length.

TYPES: Holotype, female, and two female paratypes, 2 miles east of San Simón, Baja California, September 8–9, 1955 (John A. Comstock). The genitalia of the holotype are mounted on slide FHR 15287.

The holotype is in the collection of the Natural History Museum of Los Angeles County; paratypes are in the collections of that institution and of the American Museum of Natural History.

DISTRIBUTION: The State of Baja California, Mexico. San Simón is on the west coast near San Quintín, and is approximately 125 miles south of Ensenada.

TIME OF FLIGHT: September.

REMARKS: Three specimens and two genitalic dissections have been studied. The specimens of *pallens* show a considerable range of individual variation. The t. a. and t. p. lines vary from obsolescent, being represented by small dots on the veins, to having both lines complete and solidly represented. The holotype is intermediate between the two extremes, with the cross lines thin and being absent along the costa.

ETYMOLOGY: The specific name is from the Latin *pallens*, pale or wan, in reference to the color of the upper surface of the wings.

*Chesiadodes daedalea* (Rindge), new combination

Figures 36, 50, 62

*Morina daedalea* RINDGE, 1969, p. 36, figs. 3 (holotype male), 9 (male genitalia), 10 (female genitalia).

DIAGNOSIS: This species is similar to the preceding one in that it also has pale-colored wings above. The present species can be recognized by the narrower, rounded frontal tubercle, by the much larger discal dots on both the upper and under surfaces of the wings, and by the genitalia.

This species was recently described, and so only a few of the outstanding characters are given here. The front is similar to that of *curvata*, having a relatively small, rounded tubercle. The tongue is normal and apparently functional. The antennae have the longest pectinations 2.5 times as long as their basal segments; the terminal seven segments are not pectinate. The combined lengths of the short tibia and elongate spine are 1.1 mm., with the somewhat outwardly angled

spine being about one-third of the length of the tibia.

The upper surface of the forewings is grayish white, with narrow, dark brown cross lines, apparently similar in course to those of *curvata*; the discal spot is large and prominent. The hind wings are white, with scattered brown scales; the most prominent portion of the maculation is the large dark discal spot. The under surface of the wings is grayish white, similar to that of *curvata*, but having large, brownish black discal dots. The female is similar to the male. The length of the forewings is 10 to 12 mm. in the male, and 10 mm. in the female.

The genitalia of both sexes are the most distinctive of any species in the genus. The male structures are recognized by the long, slender bifurcate aedeagus; the aedeagus is longer than the combined lengths of the uncus, tegumen, and saccus. The valves have reduced spining on the sacculus, with from six to 12 scattered, outwardly pointing spines. The female genitalia can be recognized by the very broad ductus bursae, having a large swelling on the left side.

Types: The holotype, male, and allotype,

female, are in the collection of the Carnegie Museum. The genitalia of the holotype are on slide FHR 12601, and those of the allotype on 14850.

TYPE LOCALITY: Guaycura Hotel grounds, La Paz, Baja California Sur, Mexico.

DISTRIBUTION: This species is known only from the type locality in the Territory of Baja California Sur.

TIME OF FLIGHT: October, November, and December.

REMARKS: Four specimens (three males and one female) and three genitalic dissections (two males and one female) have been examined; these constituted the type series. Unfortunately those four specimens are all rather worn. They appear to have more dark scaling on the upper surface of the forewings than does *pallens*; these two Baja California species can be separated by the presence of prominent discal dots on all wings in the present species. The genitalia of *daedalea* are the most highly modified of any species in the genus, as they have the bifurcate aedeagus and the swollen ductus bursae.

## LIST OF SPECIES WITH THEIR KNOWN DISTRIBUTION

### GENUS *Nepterotaea* McDUNNOUGH, 1920

- |   |                                      |
|---|--------------------------------------|
| 1. <i>diagonalis</i> Cassino, 1927                  | Texas, New Mexico                    |
| 2. <i>marjorae</i> , new species                    | Arizona, New Mexico                  |
| 3. <i>ozarkensis</i> , new species                  | Missouri, Arkansas                   |
| 4. <i>dorotheata</i> Sperry, 1949                   | Arizona, New Mexico, Chihuahua       |
| 5. <i>furva</i> , new species                       | Texas                                |
| 6. <i>memoriata</i> (Pearsall), 1906                | Arizona, New Mexico, Utah, Texas     |
| 7. <i>obliviscata</i> (Barnes and McDunnough), 1918 | Arizona, ?New Mexico, ?western Texas |

### GENUS *Chesiadodes* HULST, 1896

#### *Morina* GROSSBECK, 1912

#### *Jenana* CLARKE, 1939

- |   |                                    |
|---|------------------------------------|
| 1. <i>simularia</i> (Barnes and McDunnough), 1918 | California                         |
| 2. <i>cinerea</i> , new species                   | New Mexico, Utah, Nevada, Oregon   |
| 3. <i>morosata</i> , Hulst, 1896                  | California                         |
| 4. <i>tubercula</i> , new species                 | Arizona, California                |
| 5. <i>polingi</i> (Cassino), 1927                 | Texas, New Mexico, Arizona         |
| 6. <i>bicolor</i> , new species                   | Texas                              |
| 7. <i>coniferaria</i> (Grossbeck), 1912           | Arizona, California, Nevada, ?Utah |
| 8. <i>fusca</i> , new species                     | Arizona                            |
| 9. <i>curvata</i> (Barnes and McDunnough), 1916   | California                         |
| 10. <i>longa</i> , new species                    | Utah                               |
| 11. <i>dissimilis</i> , new species               | Arizona                            |
| 12. <i>pallens</i> , new species                  | Baja California                    |
| 13. <i>daedalea</i> (Rindge), 1969                | Baja California Sur                |



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