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(Lepidoptera, Geometridae)

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ABSTRACT

The genus *Animomyia* is revised for the first time. Until now the females have been unknown. They are described for *smithii*; the members of this sex are flightless as they have greatly reduced wings. One of the three species now ascribed to the genus is placed in synonymy (*increscens* Dyar under *morta* Dyar). Seven species (*dilatata*, *statuta*, *arenae*, *hardwicki*, *turgida*, *nuda*, and *minuta*) and one subspecies (*smithii magna*) are described as new. Keys and photographs are presented for the males of all species. Relationships with other genera are discussed; the genus is placed in the Nacophorini. The genus is restricted in its distribution to xerophytic areas from southern California to western Texas, Nevada, Utah, and Colorado, extending south into the Mexican states of Sonora and Baja California; there is an apparently geographically isolated species that occurs in the sand dunes area of southwestern Saskatchewan.

INTRODUCTION

The genus *Animomyia* has never been revised. Only four names have been placed in it, three being on the specific level and the other in the subspecific category. The females heretofore have been unknown and undescribed. The tribal placement of the genus has not been reviewed in more than half a century. It is the purpose of the present paper to revise *Animomyia*, to describe all the species and the females where known, and to discuss the placement of the genus on a tribal basis.

Dyar (1908), when describing *Animomyia*, was "quite in doubt about the proper family reference of this genus." He thought it might be a member of the Lymantriidae (Liparidae); it was so listed by Barnes and McDunnough (1917, p. 96). Dyar also believed an alternative position would be in the Ennominae of the Geometridae and wrote, "it looks like the Lithosian genus *Nudaria*" (Dyar, 1908, p. 54). Pearsall (1910), on the other hand, had no doubts about the family of his *Graefia*, as it was definitely placed in the Geometridae. McDunnough (1917, p. 233) transferred *Animomyia* to the Geometridae, and placed *Graefia* as its synonym.

Pearsall (1910), showing admirable prescience, believed that the females of this genus would undoubtedly prove to be wingless; they are here described for the first time. Due to the presumed wingless females, Pearsall placed this genus next to *Coniodes* Hulst. Hulst's genus belongs in the Bistonini, which is distinguished by (among other characters) male antennae with pectinations naked and basal, more or less reduced palpi, the tongue weak and not functional, and the cremaster of the pupa ending in two spines (Forbes, 1948, p. 21). *Animomyia* has terminal, scaled pectinations on the male antennae, elongate palpi, a vestigial tongue, and a pupa with the cremaster ending in eight small setae. Consequently I think it unlikely that *Animomyia* should be placed in the Bistonini. Its actual relationships are unclear. The male genitalia have valves that are similar in shape and structure to those of *Gabriola* (Rindge, 1974), a member of the Nacophorini. The genitalic structures of *Animomyia* lack the prominent paired processes of the anellus that are characteristic of that tribe, but have posterolateral sclerotized areas in the manica that might represent these processes if they were greatly reduced. A similar type of reduction has occurred in the South American genus *Dentinalia* Heimlich (Rindge, 1973). Accordingly, I am placing *Animomyia* in the Nacophorini.

Flightless females, with their greatly reduced wings, heretofore have not been known in the Nacophorini. It is known that there is a progression within this tribe from having the sexes with wings and bodies of approximately the same size (the South American genus *Salpis* Mabilie), to having the females with slightly longer wings and heavier bodies than do the males (the North American *Gabriola* Dyar), to markedly longer wings and much heavier bodies (the North American *Phaeoura* Hulst). In the first group the males (in collections) slightly outnumber the females; in *Gabriola* the sex ratio is about 5 to 1; for some species of *Phaeoura* the ratio is at least 25 to 1 (Rindge, 1961, 1971, 1974). This progression could indicate a reduced capacity for flying; the females of some species of *Phaeoura* are so heavy-bodied that it is indeed doubtful if

they do much flying. One result of the reduced capacity for flying would be a decreasing need for functional wings. If the wings are not used, they could begin to atrophy, thus leading to a continued progression of wing reduction, resulting in flightless females, such as those found in *Animomyia*.

During the course of this study I have examined 509 specimens (505 males and 4 females), including the primary types of all the described names. In addition, I have studied 41 genitalic dissections; all but two of these were prepared by me. I also made 33 slides of antennae and legs from every named population.

More than half of the specimens are to be found in two collections: the American Museum of Natural History with 176, and the Natural History Museum of Los Angeles County with 99. The next largest collection is the National Museum of Natural History with 67.

All the photographs in this revision were taken by me. Whenever possible, material from the collection of the American Museum of Natural History was used; some of the adults and genitalia are from other collections and this is specifically noted. The following abbreviations have been used:

AMNH, the American Museum of Natural History
CNC, the Canadian National Collection
LAM, the Natural History Museum of Los Angeles County
MCZ, the Museum of Comparative Zoology, Harvard University
USNM, the National Museum of Natural History, Smithsonian Institution

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Department of Agriculture, for the National Museum of Natural History, Smithsonian Institution; Dr. J. A. Powell of the University of California, Berkeley, for the California Insect Survey; Mr. A. Blanchard of Houston, Texas; and Mr. R. H. Leuschner of Manhattan Beach, California.

I also thank Ms. Marcia Annenberg for making the two drawings.

GENUS *ANIMOMYIA* DYAR

Animomyia Dyar, 1908, p. 53. Barnes and McDunnough, 1917, p. 96. McDunnough, 1917, p. 233; 1938, p. 166.

Graefia Pearsall, 1910, p. 330. Barnes and McDunnough, 1917, p. 119. McDunnough, 1917, p. 233 (placed as synonym of *Animomyia*).

Diagnosis. The males can be recognized by their antennae, with the increasing length of the segments posteriorly and by the very long pectinations extending to the end of the antennae, by the fore tibia either having a very long and very slender process or lacking it entirely, and by the presence of two pairs of spurs on the slender hind tibia. Both the abdomen and wings are rather densely covered with hairlike scales in addition to the normal flattened scales. The male genitalia are recognized by the very large, heavily sclerotized gnathos, the sclerotized areas posterolaterally in the anellus, and by the slender, sharply curved aedeagus. The females have greatly reduced wings and are flightless; the hind tibia has the upper pair of spurs reduced to a single one, which may be covered by scales, or is absent. The species of the genus are found in the arid and semiarid areas of the southwestern United States, Saskatchewan and in Sonora and Baja California, Mexico.

Male. Head, tongue absent; palpi elongate, slender, porrect, extending beyond front by half to entire diameter of eye; antennae of from 27 to 34 segments, basal segments as long as wide, more or less increasing in length posteriorly, with some terminal segments up to 0.5 mm. in length, bipectinate to end with very long pectinations, up to 3.1 mm. in length, with pectinations arising medially at base and posteriorly at middle and distal portions of antennae, shaft thickly covered with long scales, pectinations scaled, with double row of elongate, very slender setae ventrally, and

without terminal seta. Thorax above without tufts; legs long and slender, all tarsi without spines except for small, weak pair at end of each segment; fore tibia either with extremely long and thin process four-fifths length of tibia, arising near anterior end of segment and extending to, or just beyond, end, or with process absent; hind tibia with two pairs of spurs, without hair pencil. Abdomen without tufts, covered with scales and hairlike scales. Wings covered with flattened scales and with numerous hairlike scales. Forewings broad, venation variable, with or without areole, 12 veins; Sc and R_1 connected; R_2 and R_3 stalked; R_4 variable, appearing separate, coming off R_3 or with cross vein to R_5 ; dc from R_{4+5} or from base of M_1 , variably curved; Cu_1 from lower angle. Hind wings broad, outer margin evenly rounded; Sc and R approximate at base only; R and M_1 from or well beyond upper angle; Cu_1 from lower angle.

Upper surface of forewings various shades of pale brown or grayish brown, unicolorous; cross lines usually present, sometimes reduced; discal spot present; hind wings slightly paler than forewings, with or without weakly represented extradiscal line. Under surface of all wings unicolorous pale brown or pale gray, with maculation obsolescent or absent.

Female. Head with eyes reduced in size, front wider than high and with ventral unscaled lip; antennae as thick as legs, heavily scaled except for narrow, naked ventral strip, segments decreasing in length posteriorly, shortly bipectinate to end, the pectinations hidden by scaling. Thorax with forewings greatly reduced, 3 to 4 mm. in length and 0.8 to 1.2 mm. wide, straplike, rounded apically; hind wings absent; legs with tarsi and tibia normally spined, fore tibia without process, hind tibia with upper pair of spurs either reduced to a single, small one, often covered by scales, or absent. Thorax, wings, and abdomen heavily and evenly covered with flattened scales; abdomen without hairlike scales, spines, or tufts.

Male Genitalia. Uncus elongate, thick; gnathos heavily sclerotized, large, sides increasing in width ventrally, median enlargement swollen, bulbous, with variable number of posteriorly-pointing spines; valves simple, broad at base, cucullus narrowed medially; anellus with postero-lateral pair of small, weakly sclerotized areas in

manica; juxta elongate, widest medially; saccus incomplete anteriorly; aedeagus slender, curved medially between 45 and 60 degrees; vesica varying from being simple, having minutely spiculate band, and with or without small patch or row of very small cornuti.

Female Genitalia. Sterigma simple, with slight ridge around ostium bursae; ductus bursae approximately as wide as long, posterior end slightly broadened, anteriorly rounded; ductus seminalis arising at posterior end of corpus bursae; corpus bursae with long, slender posterior section about 1 mm. in length, anterior portion broadly elliptical, membranous; signum absent; apophyses posteriores 1.1 mm. in length, attached near middle of weakly sclerotized, rather poorly defined papillae anales.

Early Stages. Larvae undescribed. The pupa has a cremaster with eight small recurved hooks, and is enclosed in a large, loosely woven cocoon of tough white silk.

Food Plants. The one species that has been reared (*smithii* Pearsall) fed on *Franseria dumosa* Gray, a low, rounded perennial bush belonging to the Compositae.

Type Species. For *Animomyia*, *morta* Dyar, the sole included species. For *Graefia*, *smithii* Pearsall, by original designation.

Distribution. Xerophytic areas from southern California to western Texas, Nevada, Utah, and Colorado, extending south into the Mexican states of Sonora and Baja California. There is also an apparently geographically isolated species that occurs in the sand dunes area of southwestern Saskatchewan.

The males of *Animomyia* are easily divided into two species groups, one having a very long and slender process of the fore tibia, and the second with this structure entirely lacking (see figs. 1, 2). These two groups have antennae that are somewhat different from each other. The members of the first group have longer pectinations, ranging from 2.0 to 3.1 mm. in maximum length, with the long pectinations extending to the penultimate segment; the longest segments of the shaft vary from 0.3 to 0.5 mm. in length. The members of the second group have shorter pectinations, with their maximum length being from 1.7 to 2.1 mm., with those of the penultimate segment being quite short; the segments of the



FIGS. 1, 2. Fore tibiae of *Animomyia*. 1. *A. smithii smithii* (Pearsall). 2. *A. nuda*, new species, holotype.

shaft are also shorter, 0.2 to 0.3 mm. in length.

The antennae are heavily scaled and quite difficult to analyze when on the specimen. It has been found advisable to clear and to mount the antennae on slides so that they can be studied. The length and shape of the segments of the shaft possess specific characters in a number of the species, as does the relative length of the segments. A comparison of the lengths of the fourth segment from the end and the second segment beyond the scape will yield a ratio that I am calling the "antennal segment ratio," or ASR. This value ranges from 2.1 to 4.1 for the species of group I, thus indicating a considerable diversity in the lengths of the segments; in group II the two included species have a value of 2.2.

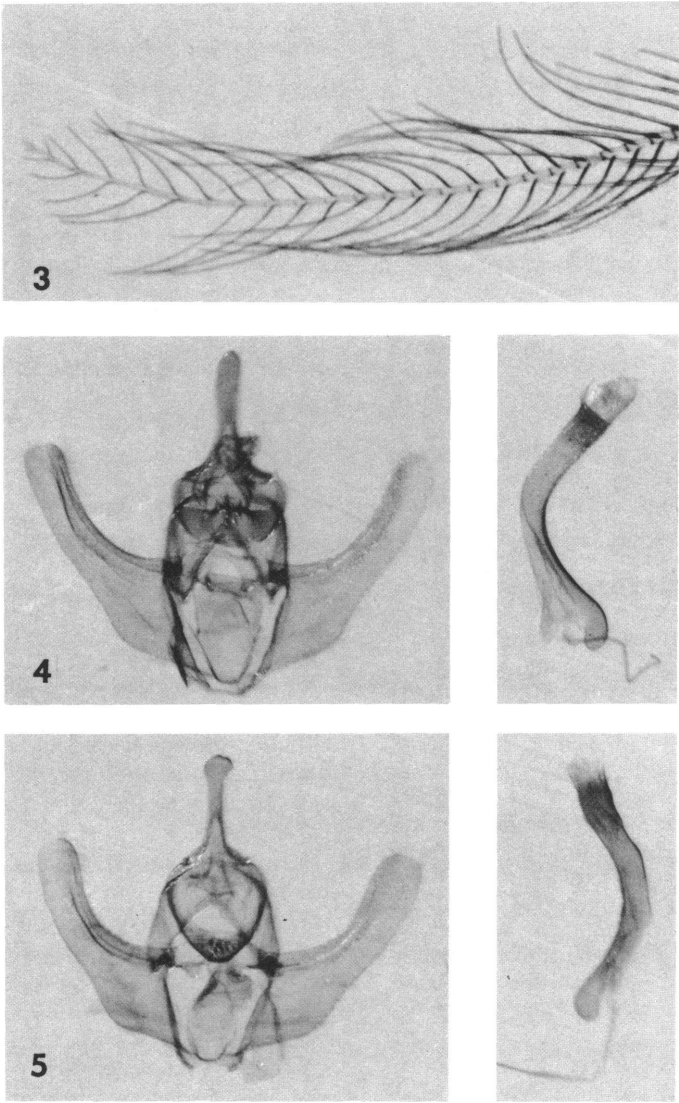
The males are not easy to identify within the species groups. All species are basically similar to one another in color and pattern. Several of them have two or more generations per year; the moths that fly in winter and spring tend to be large and to have maculation that is rather weak, whereas the specimens that are taken in late spring and summer are smaller and often may have a more prominent pattern. Three populations are known that have this characteristic: *smithii smithii* (see figs. 6 and 7), *morta* (see figs.

17 and 18) and *nuda* (see figs. 20 and 21). On the other hand *minuta* has at least two generations per year and they are quite similar to one another in size and pattern.

The male genitalia are not particularly useful as an aid in separating the species. This is due to only small differences between the species. For this reason, the genitalia of only two species are illustrated. A key is included for all species, based on the male genitalia, but it should be used with caution, keeping the above discussion in mind.

KEY TO ADULT MALES BASED ON COLOR, STRUCTURES, AND DISTRIBUTION

1. Fore tibia with very long, slender process 2
- Fore tibia without process 10
- 2(1). Wings semihyaline; forewings short, broad, with rounded apex; coastal southern California and northwestern Baja California. *morta*
- Wings normally scaled; forewings more elongate, with apex more pointed; Ventura County, California, and inland species 3



FIGS. 3-5. Male structures of *Animomyia*. 3. Distal portion of antenna, *A. smithii nigris* (Cassino and Swett). 4, 5. Genitalia. 4. *A. smithii smithii* (Pearsall), Palm Springs, California (AMNH). 5. *A. turgida*, new species, holotype (LAM).

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 3(2). Upper surface of wings dull ochreous brown; Colorado and Mojave deserts of California, southern Nevada and Arizona <i>smithii smithii</i> | 4(3). Upper surface of wings ochreous white, rather thinly scaled; Sonora . . . <i>arenae</i> |
| Upper surface of wings grayish brown or ochreous white; distribution not as above 4 | Upper surface of wings grayish brown . . . 5 |
| | 5(4). Larger species, with length of forewing averaging 15 to 17 mm. 6 |
| | Smaller species, with length of forewing averaging 12 to 14 mm. 8 |

- 6(5). Larger moths, with length of forewing averaging 16 or 17 mm.; forewings heavily scaled, with round discal dot; eastern Sierra Nevada Mountains, California, and Great Basin area of Nevada and Utah 7
 Smaller moths, with length of forewing 15 mm.; forewings more lightly scaled, with elongate discal dash; Ventura County, California *turgida*
- 7(6). Forewings dark grayish brown above, with maculation complete and strongly represented; eastern Sierra Nevada Mountains, California *smithii magna*
 Forewings dark to moderate gray, with maculation reduced or absent; Great Basin area of Nevada and Utah *smithii nigris*
- 8(5). Antennae with longest pectinations 6.5 times as long as basal segments; Saskatchewan *hardwicki*
 Antennae with longest pectinations 7 to 8 times as long as basal segments; Arizona and Sonora 9
- 9(8). Antennae with 30 to 31 segments, terminal ones 0.35 to 0.40 mm. in length; northern Arizona *dilatata*
 Antennae with 27 to 30 segments, terminal ones 0.4 to 0.5 mm. in length; Sonora *statuta*
- 10(1). Larger species, with marked seasonal dimorphism in size, with length of forewings 12 to 17 mm.; upper surface of wings dull ochre or ochreous gray *nuda*
 Smaller species, without seasonal dimorphism in size, with length of forewings 11 to 14 mm.; upper surface of wings dark gray *minuta*
- averaging about 17 to 20, on median swelling 6
 Gnathos with from 8 to 12 spines on median swelling 7
- 6(5). Uncus with narrowest portion 0.10 mm. wide *arenae*
 Uncus with narrowest portion 0.08 mm. wide *dilatata*
- 7(5). Uncus 0.50 mm. in length *minuta*
 Uncus 0.55 to 0.65 mm. in length *nuda*
- 8(1). Gnathos with from 15 to 20 spines on median swelling, length of longest ones equal to narrowest portion of uncus *statuta*
 Gnathos with from 10 to 20 shorter spines, length of longest ones equal to about one-half width of narrowest portion of uncus *morta*

Animomyia smithii (Pearsall)

Graefia smithii Pearsall, 1910, p. 331.

Diagnosis. The male antennae have segments that get progressively longer toward the end of the shaft, and are up to 0.35 to 0.40 mm. in length; each segment is tubular, with parallel sides. The upper surface of the wings varies from dull ochre, brownish gray, to grayish black, with the maculation of the forewings being quite variable in intensity and amount. The fore tibia has a very long and slender process.

Male. Head with vertex and front pale gray, ochreous, or dark gray; palpi concolorous with front, extending beyond eye a distance equal to length of eye; antennae with from 27 to 34 segments, noticeably increasing in length toward end of shaft, being 0.35 to 0.40 mm. in length, and being tubular, with parallel sides, ASR averaging 3.0; antennal pectinations ranging from 2.2 to 3.1 mm. in length, being six to 10 times as long as their basal segments. Thorax above pale gray, grayish brown, or dark gray; below slightly paler; legs pale gray or brownish gray, some specimens with brown scaling on outer sides; fore tibia with process. Abdomen concolorous with thorax.

Upper Surface of Wings. Forewings with slightly rounded outer margin and acute apex; unicolorous pale grayish brown, ochreous brown, brownish gray, or grayish black; maculation variable, ranging from obsolescent, having venular dots, or broad cross bands; t. a. line arising on

BASED ON GENITALIA

1. Uncus 0.50 to 0.70 mm. in length 2
 Uncus 0.30 to 0.45 mm. in length 8
- 2(1). Uncus with apex broadly swollen, bulblike *turgida*
 Uncus with apex only slightly swollen 3
- 3(2). Length of aedeagus, measured in straight line from anterior to posterior ends, 1.3 to 1.5 mm. 4
 Length of aedeagus 1.1 to 1.2 mm. 5
- 4(3). Uncus with narrowest portion basad of middle *smithii*
 Uncus with narrowest portion at or just beyond middle *hardwicki*
- 5(3). Gnathos with from 10 to 30 spines,

costa one-third distance from base, extending across cell at right angle to costa, then curving posteriorly to meet inner margin just basad of middle; discal dot usually present; t. p. line arising on costa approximately three-fourths distance from base, varying from being angled basad to vein R_5 and then swinging distally, to being outwardly curved, then subparallel outer margin, meeting inner margin just basad of outer angle; terminal line absent; fringe concolorous with wing. Hind wings concolorous with forewings, some specimens having brown or dark gray scales evenly distributed over wing; maculation obsolescent, with some specimens having trace of discal dot and extradiscal line; terminal line and fringe similar to those of forewings.

Under Surface of Wings. Pale gray to grayish brown; maculation variable, reduced or obsolete; terminal line absent; fringes concolorous with wings.

Length of Forewing. 11 to 18 mm.

Female. Body and all appendages pale grayish ochre; vestigial forewings and abdomen, to lesser extent, with scattered brown scales.

Male Genitalia. Uncus 0.5 to 0.7 mm. in length, varying from having parallel sides to slightly swollen apical region, with narrowest portion 0.07 to 0.10 mm. wide; gnathos with median swelling variable in shape, rounded or elliptical, and having from about 10 to 30 spines; anellus with poorly defined, weakly sclerotized pair of elongate areas in manica; juxta of most specimens with constriction just basad of widest portion, with terminal end tapering, rounded apically; aedeagus 1.3 to 1.5 mm. in length (measured in straight line from anterior to posterior ends); vesica with very minutely spiculate band, a few specimens with one or two small cornuti or finely toothed band.

Female Genitalia. See generic description.

Early Stages. Undescribed.

Food Plant. The nominate subspecies feeds on *Franseria dumosa* Gray, a low, rounded perennial bush belonging to the Compositae.

Remarks. This species is divided into three subspecies. The nominate one tends to be ochreous brown and relatively small; it flies throughout the year on the Mojave and Sonora deserts of California and Arizona. The second subspecies is larger and grayer, and has definite cross bands on

the forewing; it is single brooded and flies along the eastern face of the central and southern Sierra Nevada Mountains of California. The third population is also large and gray, but has reduced maculation; it is single brooded and occurs in some mountain ranges in the Great Basin area of Nevada and western Utah.

Animomyia smithii smithii (Pearsall)

Figures 1, 4, 6, 7, 10, 11, 12

Graefia smithii Pearsall, 1910, p. 331. Rindge, 1955, p. 153.

Graefia smithi: Barnes and McDunnough, 1917, p. 119. Wright, 1920, p. 489.

Animomyia smithi: McDunnough, 1917, p. 233; 1938, p. 166.

Graefia increscens Cassino and Swett, 1923 (not Dyar, 1923), p. 24.

Diagnosis. This subspecies has the upper surface of the wings pale grayish brown to ochreous brown, with the maculation of the forewings varying from venular dots to being obsolescent. It occurs throughout the year on the Colorado and Mojave deserts of California, southern Nevada, and Arizona.

Male. Head with vertex and front pale gray to ochreous. Thorax and abdomen pale gray to pale grayish brown.

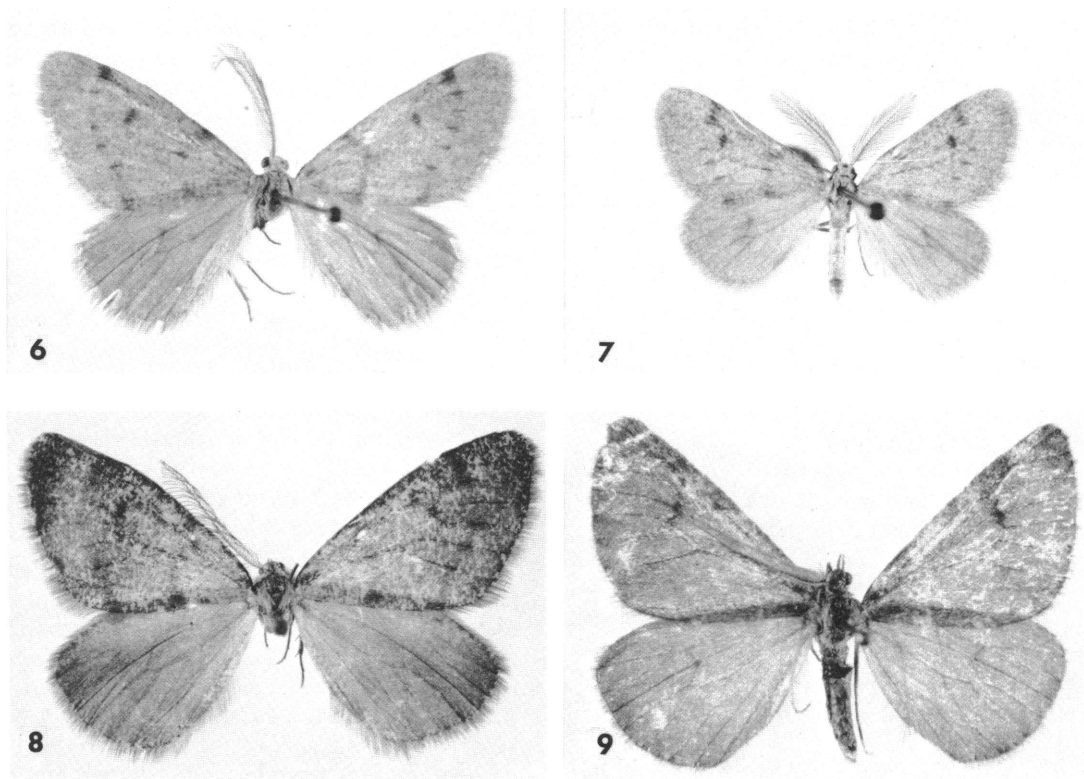
Upper Surface of Wings. Forewings pale gray to ochreous, with variable number of brown scales and strigations, producing a unicolorous pale grayish brown to ochreous brown; maculation variable, ranging from cross lines being distinct to obsolescent, when present, usually represented by brown or dark brown spots or veins; discal dot usually present. Hind wings concolorous with forewings, some specimens having brown scales evenly distributed over wing; maculation obsolescent, with some specimens having trace of discal dot and extradiscal line.

Under Surface of Wings. Pale gray to grayish brown; maculation variable, reduced, ranging from faint discal spot and trace of t. p. line on forewings to having all lines and discal dots represented on all wings.

Length of Forewing. 11 to 16 mm.

Female. As described for the species.

Male Genitalia. As described for the species; most specimens without cornuti in vesica, when



FIGS. 6-9. Males of *Animomyia*. 6, 7. *A. smithii smithii* (Pearsall). 6. Holotype (AMNH). 7. Snow Creek, California (AMNH). 8. *A. smithii magna*, new subspecies, holotype (AMNH). 9. *A. smithii nigris* (Cassino and Swett), holotype (MCZ). All $\times 2$.

present appearing as one or two small cornuti.

Female Genitalia. See generic description.

Early Stages. Undescribed.

Food Plant. *Franseria dumosa* Gray (Compositae).

Type. The holotype, male, is in the collection of the American Museum of Natural History; its genitalia are mounted on slide FHR 17261.

Distribution. The arid regions of southern and eastern California, southern Nevada, and southwestern Arizona (see fig. 12). In California the species occurs primarily on the Mojave Desert, extending north as far as Inyo County. To the southeast it descends to the Sonoran Desert, and in Arizona it occurs in both the Lower Colorado Valley and the Arizona Upland areas.

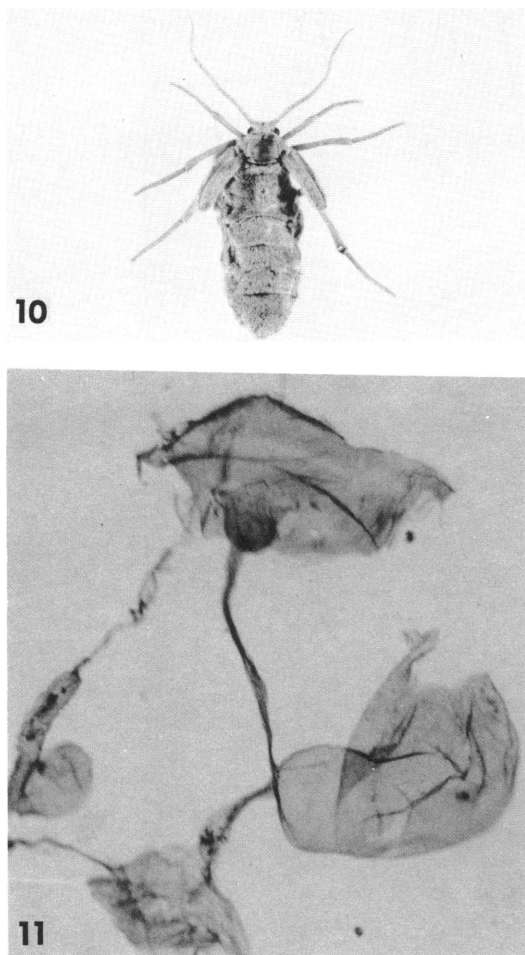
Flight Period. Presumably during every month of the year, even though no speci-

mens caught in December have been studied.

Remarks. Three hundred sixty-four specimens (360 males and four females), 16 genitalic dissections (15 males and one female), and 11 slide mounts of male antennae and legs have been examined.

Specimens of this population show a marked difference in size and, to a lesser extent, in maculation. Moths caught from about January into the first part of May are larger, ranging from about 13 to 16 mm. in wing length; those from mid-May through November are smaller, with wings about 11 to 13 mm. in length. The former tend to have a more diffuse maculation; the latter may have the pattern more sharply defined. Freshly reared males are considerably grayer than older, flown specimens.

In the collection of the Museum of Compara-



FIGS. 10, 11. Females of *Animomyia smithii smithii* (Pearsall). 10. Adult, 9.6 miles north of Adelanto, California (LAM). X2.3. 11. Genitalia, Yucca Valley, California (USNM).

tive Zoology are three dissected males from Palm Springs, California, labeled topotypes of *Animomyia increscens* Dyar. The type locality for Dyar's species is Laguna Beach, California. It is assumed that the three above-mentioned specimens form the basis for the Cassino and Swett reference (1923) to *increscens*.

***Animomyia smithii magna*, new subspecies**

Figures 8, 12

Diagnosis. This subspecies is larger and grayer

than is nominate *smithii*, and the cross lines on the upper surface of the forewings tend to be complete bands. It occurs along the eastern slope of the Sierra Nevada Range of California, having but one generation per year.

Male. Head with vertex, front and palpi gray to dark gray. Thorax and abdomen paler than head, similar to those of nominate *smithii* but grayer.

Upper Surface of Wings. Forewings pale gray, heavily and evenly covered with dark grayish brown scales, producing a finely speckled, unicolorous brownish gray; cross lines tending to be complete and broad, about 0.5 mm. wide, dark grayish brown, with some specimens having t. p. line darkened on veins. Hind wings an even gray, with obsolescent maculation; terminal line and fringe similar to those of nominate *smithii*.

Under Surface of Wings. Grayish brown: maculation obsolescent on forewings, absent on hind wings.

Length of Forewing. 15 to 18 mm.; holotype, 17 mm.

Female. Unknown.

Male Genitalia. As described for the species; vesica with small cornuti or band.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Smoky Valley, Tulare County, California, June 27, 1951 (C. Ingham). The genitalia of the holotype are mounted on slide FHR 17207. Paratypes, all from California: same data as holotype, June 22, 1947, June 27, 1951 (C. Ingham), June 23, 1954 (C. Ingham and C. Henne), nine males; above Independence, elevation 6000 feet, Inyo County, July 4-5, 1958 (R. H. Leuschner), seven males; 6 miles west of Lone Pine, Inyo County, July 11, 1966 (L. M. Martin), one male; 9 miles west of Lone Pine, Inyo County, July 8, 1961 (J. Powell), one male; Westgard Pass, White Mountains, Inyo County, July 19, 1968 (J. Scott), July 25, 1959 (S. F. Cook, Jr.), two males; Tom's Place, elevation 7200 feet, Mono County, July 10, 1966 (R. H. Leuschner), one male.

The holotype is in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Insect Survey, of the Los Angeles

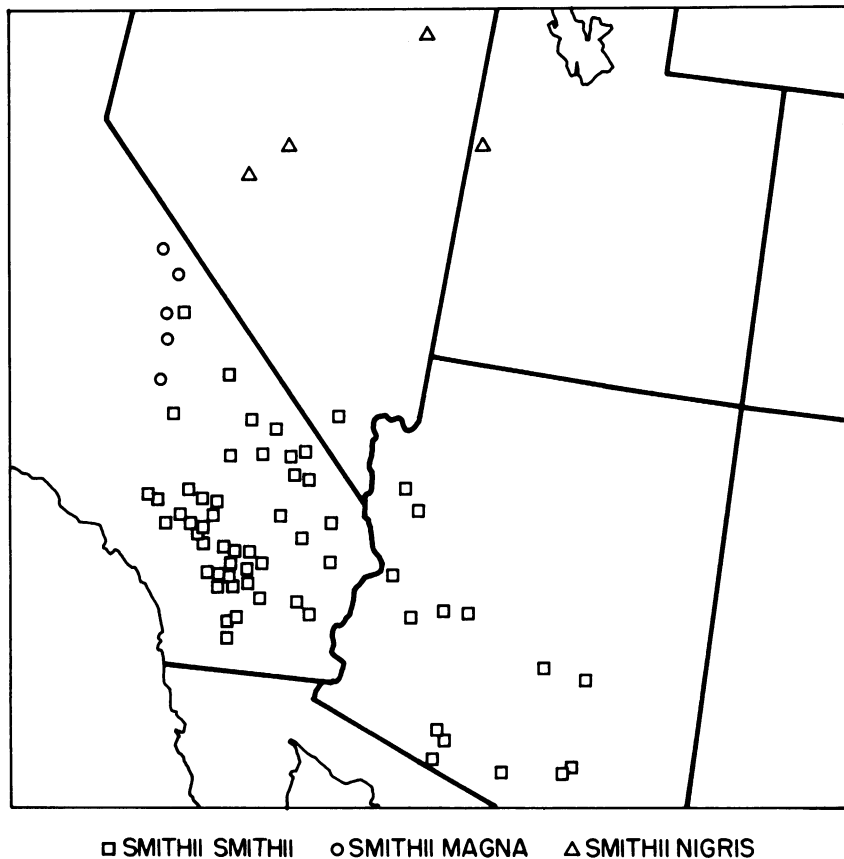


FIG. 12. Distribution of *Animomyia smithii* (Pearsall).

County Museum of Natural History, and of R. H. Leuschner.

Distribution. The eastern face of the central and southern Sierra Nevada Range, California, and the adjacent White Mountains, known from Mono, Inyo, and Tulare counties (see fig. 12). This apparently corresponds to the Monoan district of the Great Basin Biotic Province.

Flight Period. Late June and July.

Remarks. Twenty-two specimens (all males), two genitalic dissections, and two slide mounts of antennae and legs have been studied.

The upper surface of the forewings is rather variable in color, as it ranges from a rather smooth dark gray to a finely speckled brownish gray.

Etymology. The name is from the Latin *mag-nus*, large, in reference to the size of the moths of this population.

Animomyia smithii nigris (Cassino and Swett)

Figures 3, 9, 12

Graefia smithii nigris Cassino and Swett, 1923, p. 24.

Animomyia smithii nigris: McDunnough, 1938, p. 166.

Diagnosis. This subspecies is larger than nominate *smithii*. The upper surface of the wings is dark gray, and the maculation is obsolescent. These moths occur in Nevada and western Utah, and have a single generation per year.

Male. Head with vertex, front, and palpi dark gray. Thorax above brownish gray; below paler. Abdomen pale gray.

Upper Surface of Wings. Forewings dull gray, heavily and evenly covered with dark gray and grayish brown scales, producing a more or less very finely speckled, unicolorous dark gray; cross lines obsolescent, with t. p. line sometimes indicated by spots on veins; discal spot prominent, large. Hind wings an even dull gray, without maculation.

Under Surface of Wings. Dull gray, with some dark brownish gray scaling on forewings; without maculation except for small discal dot on forewing.

Length of Forewing. 14 to 18 mm.

Female. Unknown.

Male Genitalia. As described for the species; vesica with very slender band.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Type. The holotype, male, is in the Museum of Comparative Zoology, MCZ 16862.

Type Locality. Trout Creek, Ibanpah Mountains, Juab County, Utah.

Distribution. Mountain ranges in the Great Basin in Nevada and western Utah (see fig. 12).

Flight Period. Late June and July.

Remarks. Sixteen specimens (all males, including the type), one genitalic dissection, and one slide mount of antennae and legs have been studied.

There is considerable individual variation within this population. The two syntypes from the type locality are darkest in color, and are without maculation except for a rather faint discal dot on each forewing. Eight males from Angel Lake, south of Wells in northeastern Nevada, are smaller, paler, and have more clearly defined maculation. The two males from the Toiyabe Range of southern Lander County, central Nevada are larger than the preceding, but are basically similar in color and pattern. The four specimens from Ichthyosaur State Park, Nye County, Nevada are less than 50 miles (air distance) from the previous locality and are in the adjacent mountain range to the southwest; they are slightly paler, and vary from being immaculate to having the t. p. line represented by dull black venular dots.

Animomyia dilatata, new species

Figures 13, 23

Diagnosis. This species has the appearance of a small *smithii* but it may be recognized by the antennae of the male, among other characters. In the present species the segments of the antennae tend to be of a more uniform length for most of the shaft, with fewer terminal ones becoming elongate. The segments gradually increase in width to the base of the pectinations and then are more sharply narrowed to join the next posterior segment. In the male genitalia the aedeagus of the present species is shorter than that of *smithii*.

Male. Head with vertex and front dark gray; front broader and flatter than that of *smithii*; palpi concolorous with front, projecting beyond eye a distance slightly less than length of eye; antennae with 30 or 31 segments, majority of approximately the same length, terminal ones becoming elongate, 0.35 to 0.40 mm. in length, each segment increasing in width to base of pectinations, then more sharply narrowed to join next posterior segment, ASR averaging 2.9; longest antennal pectinations 2.5 mm. in length, eight times as long as their basal segments. Thorax and abdomen similar to those of *smithii magna*; fore tibia with process.

Upper Surface of Wings. Forewings pale gray, heavily and evenly covered with dark grayish brown scales, producing a finely speckled, unicolorous brownish gray very similar to that of *smithii magna*; maculation as in that subspecies but with t. a. line usually obsolescent and with t. p. line narrower. Hind wings similar to those of *smithii magna*.

Under Surface of Wings. Similar to that of *smithii magna*.

Length of Forewing. 13 to 15 mm.; holotype, 14 mm.

Female. Unknown.

Male Genitalia. Similar to those of *smithii*, differing mainly as follows: uncus 0.55 to 0.60 mm. in length, weakly swollen apically; aedeagus 1.2 mm. in length (measured in straight line from anterior to posterior ends); vesica with pair of very minutely spiculate bands and small cornutus.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, 7 miles east of Jacob Lake, elevation 6800 feet, Coconino County, Arizona, July 23, 1965 (F., P., and M. Rindge). The genitalia of the holotype are mounted on slide FHR 17215. Paratypes: same data as holotype, July 21 and 23, 1965, six males.

Distribution. This species is known only from the type locality (see fig. 23).

Flight Period. July.

Remarks. Seven specimens (all males), two genitalic dissections, and two slide mounts of antennae and legs have been studied.

There is a fair amount of variability in the seven specimens of the type series, including size, color, and amount of maculation. Some are practically immaculate, others have a narrow, curved t. p. line, and one has a broad, very slight curved t. p. line.

The moths were caught near the junction of Trail Canyon Road and highway US 89A. The locality is at the lower end of the ponderosa pine belt, where it overlaps the junipers and pinyon pine. A few Gambel oaks and some other shrubs were present; the understory vegetation was mostly of the sage brush type.

Etymology. The specific name is from the Latin *dilatatus*, dilated or enlarged, in reference to the antennal segments.

Animomyia statuta, new species

Figure 15

Diagnosis. This species is very similar in appearance to *dilatata*. It may be recognized by the segments of the shaft and the pectinations of the antennae being more slender; the terminal segments of the shaft are longer than are those of that species (0.4 to 0.5 mm., as compared with 0.35 to 0.40 mm. for *dilatata*). The male genitalia of the present species have a shorter uncus than is to be found in *dilatata*.

Male. Head, thorax, and abdomen similar in color to those of *dilatata*, but with front narrower; palpi extending beyond front of eye a distance equal to length of eye, being proportionally longer than in *dilatata*, extending 0.6 mm. in front of eye (compared with 0.4 to 0.5 mm. in preceding species); antennae of 27 to 30 seg-

ments, the latter becoming very long, 0.4 to 0.5 mm. in length, and very slender, slightly swollen at base of each pectination, with ASR averaging 4.1; pectinations very slender, up to 2.2 to 2.5 mm. in length, seven to eight times as long as their basal segments. Fore tibia with process.

Upper Surface of Wings. Forewings gray or pale gray, heavily and evenly covered with dark grayish brown scales, producing a finely speckled, unicolorous brownish gray very similar to that of *smithii magna*; maculation as in that subspecies but with much narrower cross lines. Hind wings similar to those of *smithii magna*, with faint discal dot and narrow extradiscal line present in most specimens.

Under Surface of Wings. Similar to those of *smithii magna*.

Length of Forewing. 12 to 14 mm.; holotype, 13 mm.

Female. Unknown.

Male Genitalia. Similar to those of *smithii*, differing mainly as follows: slightly smaller; uncus 0.4 mm. in length, weakly swollen apically, with narrowest portion 0.07 mm. wide; gnathos tending to be narrower, with less swollen median enlargement having from 15 to 20 spines; aedeagus 1.0 to 1.1 mm. in length (measured in straight line from anterior to posterior ends); vesica unarmed.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Alamos, Sonora, Mexico, February 27, 1963 (P. H. Arnaud, Jr.). The genitalia of the holotype are mounted on slide FHR 17245. Paratypes: same data as type, February 26, 27, 1963, two males; Bahía San Carlos, Sonora, Mexico, February 17, 18, 19, 1963, March 1, 2, 1963 (P. H. Arnaud, Jr.), eight males.

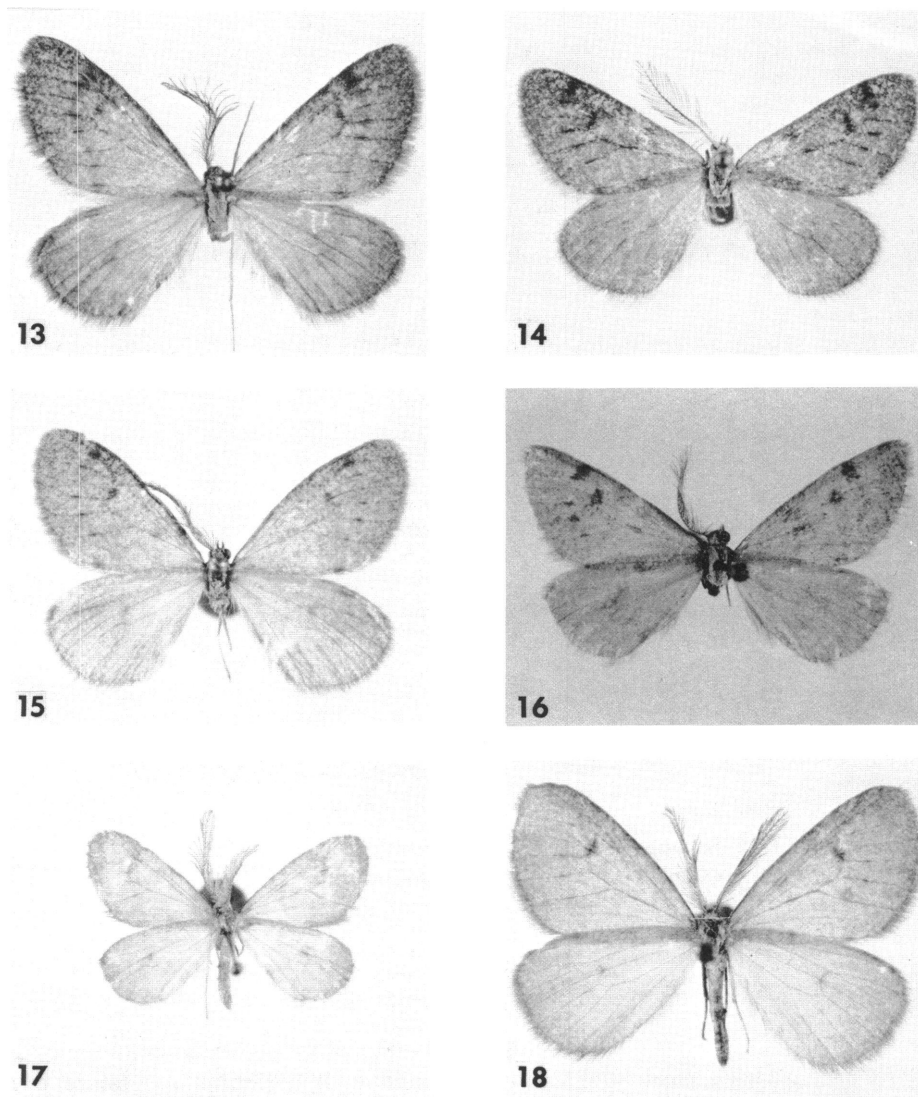
The holotype is in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of the California Academy of Sciences.

Distribution. Southern Sonora.

Flight Period. February and March.

Remarks. Eleven specimens (all males), three genitalic dissections, and three slide mounts of antennae and legs have been studied.

This species, at first glance, looks like a

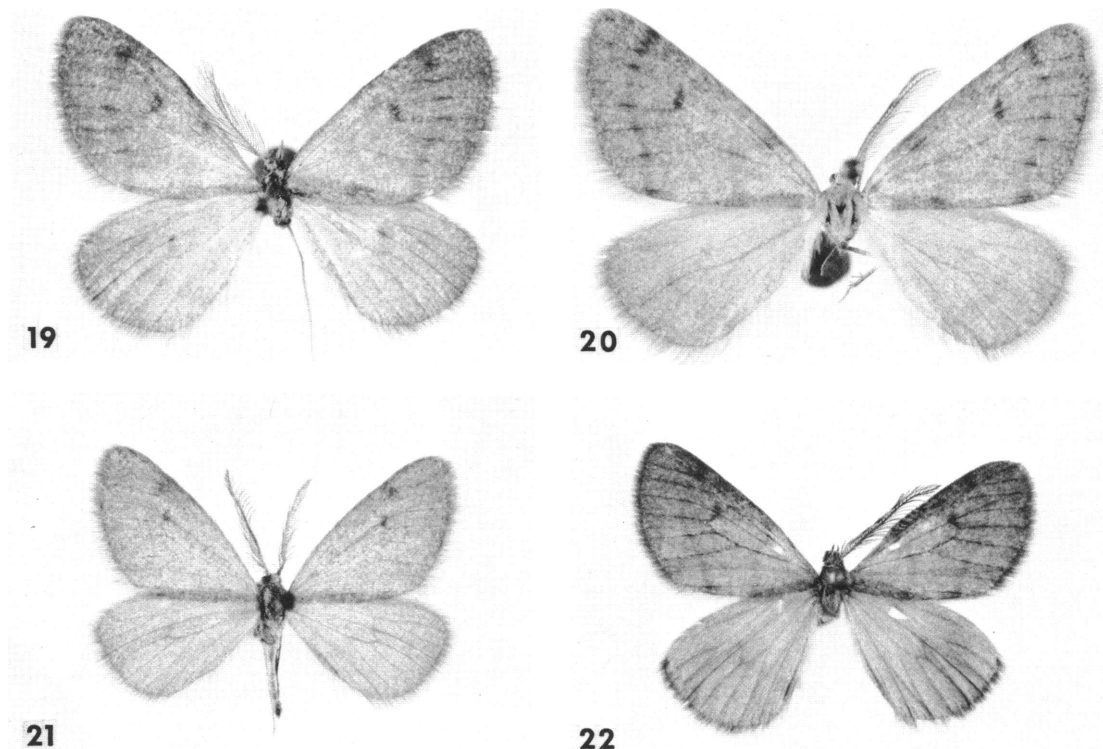


FIGS. 13-18. Males of *Animomyia*. 13. *A. dilatata*, new species, holotype (AMNH). 14. *A. hardwicki*, new species, holotype (CNC). 15. *A. statuta*, new species, holotype (AMNH). 16. *A. arenae*, new species, holotype (LAM). 17, 18. *A. morta* Dyar. 17. Lectotype (USNM). 18. Olive, California (LAM). All X2.

summer specimen of *smithii smithii*, notwithstanding the fact that the present species was caught in February. This moth is a darker gray, and has the apex of the forewing more rounded

than is to be found in nominate *smithii*.

Etymology. The specific name is from the Latin *statutus*, slender, in reference to the antennal segments.



FIGS. 19-22. Males of *Animomyia*. 19. *A. turgida*, new species, holotype (LAM). 20, 21. *A. nuda*, new species. 20. Holotype (AMNH). 21. Paratype, Alamagordo, New Mexico (CNC). 22. *A. minuta*, new species, holotype (AMNH). All X2.

***Animomyia arenae*, new species**

Figure 16

Diagnosis. This species is much paler than the preceding one; the wings are rather thinly scaled, and the forewings are more pointed. The present species has an ASR of 2.5, compared to 4.1 in the preceding species.

Male. Head, thorax, and abdomen grayish white; front wider than that of *statuta*; palpi shorter, projecting one-half of eye in front of eye, or for a distance of 0.4 mm.; antennae of 30 to 32 segments, latter not becoming extremely long, being only 0.3 mm. in length, increasing in width to base of each pectination, then tapering to next segment, with ASR of 2.5; pectinations up to 2.2 mm. in length, being about 7 times as

long as their basal segments. Fore tibia with process.

Upper Surface of Wings. Forewings elongate, with each apex pointed; rather thinly scaled, grayish white, with scattered brown scales, producing a unicolorous faintly ochreous white; maculation as in preceding species but with t. p. line thinner, represented by venular dots; more angulate anteriorly, paralleling outer margin for most of its length. Hind wings concolorous with forewings, apparently without maculation.

Under Surface of Wings. Slightly paler than upper surface, unicolorous; without maculation except for trace of discal dot on forewing.

Length of Forewing. 12.5 (holotype) to 13.0 mm.

Female. Unknown.

Male Genitalia. Similar to those of *statuta*, differing mainly as follows: larger, more heavily sclerotized; uncus 0.53 to 0.60 mm. in length, swollen apically, with narrowest portion 0.1 mm. wide; gnathos evenly rounded apically, with about 15 to 20 spines; aedeagus 1.2 to 1.3 mm. in length (measured in straight line from anterior to posterior ends); vesica with broad area of very minute spiculations.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, and paratype, male, 47 miles east southeast of San Luis, Sonora, Mexico, May 13, 1966 (R. Lavenberg). The genitalia of the holotype are mounted on slide FHR 17265.

The holotype is in the collection of the Natural History Museum of Los Angeles County; the paratype is in the collection of the American Museum of Natural History.

Distribution. This species is known only from the type locality, which is in the Gran Desierto in northwestern Sonora.

Flight Period. May.

Remarks. Two specimens (both males), two genitalic dissections, and two slide mounts of antennae and legs have been studied.

This species is much paler in color than are any of the preceding species. It has the posterior antennal segments much shorter than do the other species.

Etymology. The specific name is from the Latin *arena*, sand or sandy place, in reference to the type locality of this species.

Animomyia hardwicki, new species

Figure 14

Diagnosis. This species looks like *dilatata* but can be distinguished by the forewings having a larger discal dash, a more angulate t. a. line, and a heavier costal spot at the origin of the t. p. line. The segments of the antennae are shorter than those of *dilatata*.

Male. Head, thorax, and abdomen grayish white; front narrower than that of *dilatata*; palpi

concolorous with front, projecting beyond eye a distance equal to length of eye; antennae with 29 segments, terminal ones 0.3 mm. in length, with sides almost parallel, having ASR of 2.1; pectinations up to 2.0 mm. in length, being 6.5 times as long as their basal segments. Fore tibia with process.

Upper Surface of Wings. Forewings pale gray, heavily and evenly covered with dark grayish brown scales, producing a finely speckled, unicolorous brownish gray slightly darker than *dilatata*; maculation as in *dilatata* but with t. a. line extending outward to cubital vein, then angled posteriorly; discal dash prominent, elongate, 1.3 mm. long; t. p. line marked by prominent dash on costa, then as elongate dashes on veins. Hind wings similar to those of *dilatata* but with maculation almost completely absent.

Under Surface of Wings. Similar to that of *dilatata* but faintly paler.

Length of Forewing. 12.5 mm. (holotype).

Female. Unknown.

Male Genitalia. Similar to those of *smithii*, differing mainly as follows: uncus with constriction tending to be more posteriad, near middle of uncus; gnathos tapering, scarcely swollen medially; aedeagus 1.3 mm. in length (measured in straight line from anterior to posterior ends); vesica with pair of very minutely spiculate bands.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Type. Holotype, male, 1 mile south of Beverly, Saskatchewan, elevation 2400 feet, August 22, 1968 (D. F. Hardwick). The genitalia of the holotype are mounted on slide FHR 17257.

The type is in the Canadian National Collection.

Distribution. This species is known only from the type locality. Beverly is in the sand dunes area of southwestern Saskatchewan.

Flight Period. Mid-August.

Remarks. One specimen, one genitalic dissection, and one slide mount of the antennae and legs have been studied.

Etymology. It gives me great pleasure to name this species in honor of my friend, colleague, and captor of this unique specimen, Dr. David F. Hardwick of the Biosystematics Research Institute, Ottawa.

Animomyia morta Dyar

Figures 17, 18, 23

Animomyia morta Dyar, 1908, p. 53. Barnes and McDunnough, 1917, p. 96. McDunnough, 1917, p. 233; 1938, p. 166.

Graefia smithii Pearsall, 1910, p. 331 (in part).

Animomyia increscens Dyar, 1923, p. 24. McDunnough, 1938, p. 166. New synonym.

Diagnosis. This species has forewings with the outer margin broadly rounded and curving inwardly to the apex, and all wings are somewhat transparent due to the relatively thin scaling. The moths occur along the coastal region of northwestern Baja California and southern California.

Male. Head with vertex and front grayish brown; palpi concolorous with front, more tightly scaled than in *smithii*, projecting beyond eye a distance equal to length of eye; antennae with from 29 to 30 segments, terminal ones increasing in length, 0.35 to 0.45 mm. long, each segment very slightly swollen at base of pectinations, with ASR averaging 3.0; longest antennal pectinations ranging from 2.0 to 2.5 mm. in length, varying from 6.5 to 8.0 times as long as their basal segments. Thorax and abdomen pale gray or pale ochreous gray; fore tibia with process.

Upper Surface of Wings. Forewings with outer margin broadly rounded and curving inwardly to rounded apex; thinly scaled and somewhat transparent, being unicolorous pale gray, with variable number of ochreous brown, dark brown, or grayish brown scales; maculation weakly represented, with t. p. line usually about midway between discal dot and outer margin; t. a. line obsolescent, curving across wing; discal dot usually prominent, rounded; t. p. line curving more or less parallel with outer margin; terminal line absent; fringe concolorous with wing. Hind wings tending to be slightly paler than forewings, with less dark scaling; maculation obsolescent, with faint trace of discal dot and extradiscal line; terminal line and fringe similar to those of forewing.

Under Surface of Wings. Pale gray to grayish brown, with forewings slightly darker than hind wings; maculation obsolescent except for discal dots on all wings; terminal line absent; fringes concolorous with wings.

Length of Forewing. 10.5 to 15.0 mm.

Female. Unknown.

Male Genitalia. Similar to those of *smithii*, differing mainly as follows: smaller; uncus 0.40 to 0.45 mm. in length, scarcely swollen apically, with narrowest portion 0.07 mm. wide; gnathos weakly swollen medially, having 10 to 21 spines; aedeagus 1.0 to 1.1 mm. in length (measured in straight line from anterior to posterior ends); vesica with small area of very minute spiculations.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Dyar described *morta* from a series of four male specimens but did not designate the type. Three of these are in the collection of the National Museum of Natural History; the fourth is in the San Diego Natural History Museum. The lectotype is hereby designated as the specimen in the former collection bearing Dyar's handwritten type label; it is USNM 11695.

Dyar described *increscens* from two male specimens. The lectotype is hereby designated as the one larger of the two. It is USNM 25818.

Type Localities. For *morta*, Grapevine, San Diego County, California; for *increscens*, Laguna Beach, Orange County, California.

Distribution. A relatively narrow strip along the Pacific coast from Ensenada, Baja California, to southern California (see fig. 23). Specimens have been examined from San Diego, Orange, and Los Angeles counties.

Flight Period. March, April, May, July, and September.

Remarks. Fifteen specimens (all males, and including both of Dyar's lectotypes), seven genitalic dissections, and four slide mounts of antennae and legs have been studied.

The adults of *morta* show a difference in size that reflect the month of capture. The moths taken in February, March, and April have forewings that are 13 to 15 mm. in length; those caught in July and September, 10.5 to 11.0 mm.

Pearsall, when describing *smithii* (1910, p. 331), included in his type series "a single cotype recently received from San Diego, Calif." that "is almost worthy of varietal distinction." McDunnough (1917, p. 233) has already pointed out that this specimen, now in the collection of the American Museum of Natural History, is really *morta*.

***Animomyia turgida*, new species**

Figures 5, 19, 23

Diagnosis. The wings of this species are more densely scaled, darker in color, and have a more distinct pattern than does *morta*. The male genitalia are larger than those of *morta*, and the uncus of the present species has a knoblike apex.

Male. Head, thorax, and abdomen similar to those of *morta*; palpi projecting beyond eye a distance slightly greater than length of eye; antennae with about 32 segments, terminal ones 0.35 mm. long, each segment slightly swollen at base of pectinations, with ASR of 2.85; longest antennal pectinations 2.3 mm. in length, being 8.0 times as long as their basal segments; fore tibia with process.

Upper Surface of Wings. Forewings slightly less rounded than those of *morta*, and with normal scaling, not being somewhat transparent; pale gray, heavily and evenly covered with grayish brown scales, producing a unicolorous brownish gray; maculation stronger than in *morta*, with t. a. line more angulate and t. p. line complete, emphasized by dark grayish brown venular dashes; discal spot elongate, about 1.0 mm. in length, prominent; terminal line absent; fringe concolorous with wing. Hind wings slightly paler than forewings, with less dark scaling; discal spot and extradiscal line weakly represented; terminal line and fringe similar to those of forewing.

Under Surface of Wings. Grayish brown, with forewings slightly darker than hind wings; maculation of upper surface faintly repeated; terminal line absent; fringes concolorous with wings.

Length of Forewing. 15 mm. (holotype).

Female. Unknown.

Male Genitalia. Similar to those of *morta*, differing mainly as follows: larger; uncus 0.53 mm. in length, with narrowest portion 0.07 mm. wide, apex broadly swollen, about twice width of narrowest portion; gnathos scarcely swollen medially, with about 12 spines; valves more angulate; aedeagus longer, 1.3 mm. in length (measured in straight line from anterior to posterior ends); vesica with small, elongate area of very minute spiculations.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Type. Holotype, male, Camp Ozena, Ventura County, California, June 14, 1963 (C. W. Kirkwood). The genitalia of the holotype are mounted on slide FHR 17253.

The type is in the collection of the Natural History Museum of Los Angeles County.

Distribution. Known only from the type locality, which is just north of the Pine Mountains, near Cuyama Valley, in west-central Ventura County (see fig. 23).

Flight Period. Mid-June.

Remarks. One specimen, one genitalic dissection, and one slide mount of antennae and legs have been studied.

Etymology. The specific name is from the Latin *turgidis*, swollen, in reference to the shape of the apex of the aedeagus.

***Animomyia nuda*, new species**

Figures 2, 20, 21, 23

Diagnosis. This species can be separated from all the preceding ones by the absence of the process on the fore tibia. This species has two generations per year, with a marked size difference between them.

Male. Head with vertex pale to medium gray; front pale to dark gray, broader than high; palpi concolorous with front, extending beyond front a distance equal to approximately half length of eye; antennae with 28 to 34 segments, only slightly increasing in length towards end of scape, being about 0.35 mm. in length, becoming very slightly swollen at origin of pectinations; longest pectinations 1.9 to 2.1 mm. in length, being from 6.0 to 8.5 times as long as their basal segments. Thorax above and below pale gray or pale grayish brown; legs concolorous with thorax, with some grayish brown scaling on outer surfaces; fore tibia without process. Abdomen concolorous with thorax.

Upper Surface of Wings. Forewings unicolorous pale gray, more or less heavily covered with pale grayish brown, grayish brown, or dark gray scales; maculation variable, cross lines present or obsolescent, with discal dot present; cross lines similar in course to those of *smithii* but with t. a. line straighter; terminal line absent; fringe concolorous with wing. Hind wings slightly paler than forewings; without maculation, or with very faint trace of extradiscal line.

Under Surface of Wings. Unicolorous pale ochreous gray or pale gray; maculation absent or obsolescent, some specimens with faint trace of t. p. line and discal dot on forewings; terminal line absent; fringe concolorous with wings.

Length of Forewings. 12 to 17 mm.; holotype, 17 mm.

Female. Unknown.

Male Genitalia. Similar to those of *smithii*, differing mainly as follows: uncus 0.55 to 0.65 mm. in length, swollen apically, with narrowest portion 0.1 mm. wide; gnathos more heavily sclerotized, median area not swollen but slightly elongate, having about 10 to 12 spines; anellus with larger paired sclerotized areas in manica; juxta with anterior portion considerably larger than short posterior portion; aedeagus 1.1 to 1.2 mm. in length (measured in straight line from anterior to posterior ends); vesica unarmed.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Tijeras Wash at Four Hills, Albuquerque, elevation 5900 feet, Bernalillo County, New Mexico, October 18, 1968 (R. Holland). The genitalia of the holotype are mounted on slide FHR 17217. Paratypes: same data as holotype, one male; Alamogordo, Otero County, New Mexico, "5-10-50" [presumably May 10, 1950], (E. C. Johnston), three males; Lordsburg, Hidalgo County, New Mexico, "5-9-50" [presumably May 9, 1950], (E. C. Johnston), one male; Lamar, [Prowers County, elevation 3500 feet], Colorado, September 24, 1945 (E. C. Johnston), two males.

The holotype is in the collection of the American Museum of Natural History; paratypes are in that collection and in the Canadian National Collection.

Distribution. The lower elevations of New Mexico and Colorado (see fig. 23).

Flight Period. May, and again in September and October.

Remarks. Eight specimens (all males), three genitalic dissections, and three slide mounts of antennae and legs have been studied.

There is a marked size difference in the different generations of this species. As with *smithii smithii*, the change occurs in May. Three of the four specimens taken in that month are small,

with a wing length of 12.0 to 12.5 mm., and relatively immaculate. The fourth May specimen, and those taken in September and October, are larger, with a wing length of 14.5 to 17.0 mm., and tend to be more clearly marked.

Etymology. The specific name is from the Latin *nudus*, bare, in reference to the lack of the process on the fore tibia.

Animomyia minuta, new species

Figures 22, 23

Diagnosis. This species is smaller and darker gray than is the preceding one. It also lacks the process of the fore tibia. It is multivoltine but does not have a marked size difference between the generations.

Male. Head with vertex, front and palpi gray; palpi extending beyond eye a distance equal to about three-fourths length of eye; antennae with 30 or 31 segments, moderately increasing in length toward end of shaft, being 0.30 mm. in length, very slightly increasing in width posteriorly; longest pectinations from 1.7 to 2.1 mm. in length, being from 7.0 to 8.5 times as long as their basal segments. Thorax above pale to medium gray; below, and legs, pale gray; fore tibia without process. Abdomen concolorous with thorax.

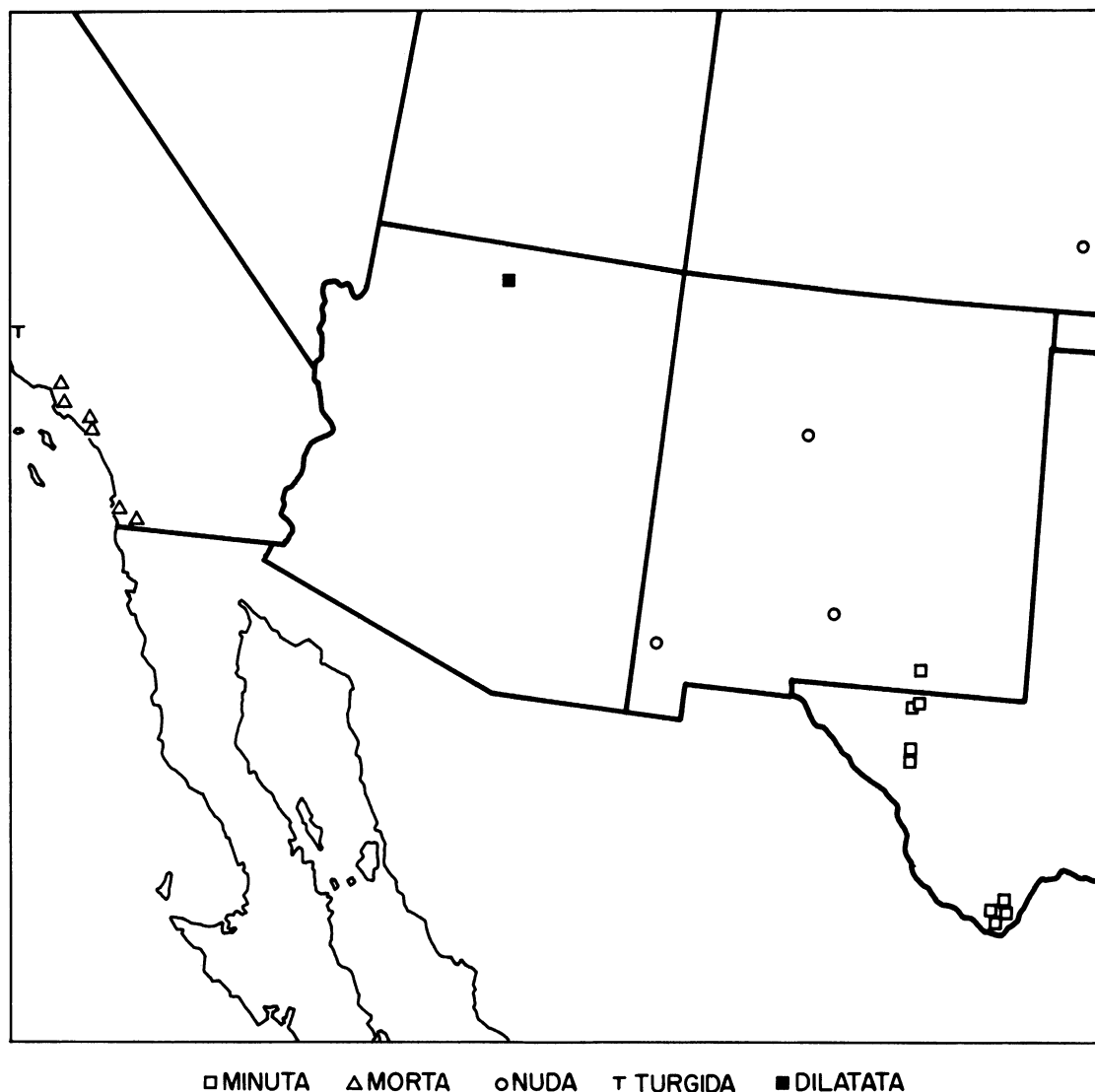
Upper Surface of Wings. Forewings unicolorous pale gray to gray, heavily and evenly covered with darker gray or dark grayish brown scales; maculation weakly represented or obsolescent; discal dot usually present; course of cross lines as in *nuda*; terminal line absent; fringe concolorous with wing. Hind wings concolorous with, or slightly paler than, forewings, varying from being immaculate to having faint discal dot and extra-discal line.

Under Surface of Wings. Unicolorous dull gray; maculation absent or obsolescent, some specimens with faint trace of t. p. line and discal dot on forewings; terminal line absent; fringe concolorous with wings.

Length of Forewing. 11 to 14 mm.; holotype, 12.5 mm.

Female. Unknown.

Male Genitalia. Similar to those of *smithii*, differing mainly as follows: uncus 0.5 mm. in length, swollen apically, with narrowest portion

FIG. 23. Distribution of *Animomyia* species in the United States.

0.1 mm. wide; gnathos broad, tapering to elongate median projection, and having eight to 12 spines; anellus with larger paired sclerotized areas in manica; juxta with anterior portion only slightly larger than posterior; aedeagus 1.1 to 1.2 mm. in length (measured in straight line from anterior to posterior ends); vesica unarmed.

Female Genitalia. Unknown.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Oak Spring, Big Bend National Park, Texas, October 4, 1965 (A. and M. E. Blanchard). The genitalia of the holotype are mounted on slide FHR 17229. Paratypes: *Texas:* same data as type, May 8, 1972, October 4, 14, 1965 (A. and M. E. Blanchard), 10 males; Chihuahuan desert, near Nugent Mountain, Big Bend National Park, May 1, 5, 1972, September

17, 1971, October 8, 1966 (A. and M. E. Blanchard), 14 males; Government Spring, Big Bend National Park, May 6, 1972, May 10, 1972, May 12, 13, 1966, September 20, 1971 (A. and M. E. Blanchard), 11 males; K-Bar Research Station, Big Bend National Park, May 11, 1972, September 16, 1971 (A. and M. E. Blanchard), June 1, 1973 (D. C. Ferguson), four males; Green Gulch, Big Bend National Park, October 2, 1965 (A. and M. E. Blanchard), four males; Grapevine Hill, Big Bend National Park, October 2, 1965 (A. and M. E. Blanchard), two males; Basin, Big Bend National Park, September 4, 1964 (A. and M. E. Blanchard), one male; Dugout Wells, Big Bend National Park, October 3, 1966 (A. and M. E. Blanchard), one male; Croton Spring, Big Bend National Park, March 24, 1971 (A. and M. E. Blanchard), one male; Panther Junction, elevation 4000 feet, Big Bend National Park, April 29-30, 1959 (Howden and Becker), one male; 8 miles north of Van Horn, Culberson County, June 24, 1965 (A. and M. E. Blanchard), one male; Cherry Canyon, elevation 5096 feet, Guadalupe Mountains, Culberson County, May 23, 24, 1973 (D. C. Ferguson), six males; McKittrick Canyon, Guadalupe Mountains, Culberson County, May 23, 1973 (D. C. Ferguson), two males; Sierra Diablo wildlife management area, elevation 6000 feet, Culberson County, May 20, 1968, June 22-23, 1965 (A. and M. E. Blanchard), two males; Shafter, Presidio County, October 18, 1968 (A. and M. E. Blanchard), two males. *New Mexico*: Sitting Bull Falls, elevation 4800 feet, 42 miles southwest of Carlsbad, Eddy County, June 29, 1964 (F., P., and M. Rindge), two males.

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

Distribution. Western Texas and southeastern New Mexico (see fig. 23).

Flight Period. Late March, April, May, and June; September and October.

Remarks. Sixty-five specimens (all males), three genitalic dissections, and three slide mounts of antennae and legs have been studied.

There is very little difference in either size or

pattern between the moths caught in March, April, May, and June, and those caught in September and October.

Etymology. The specific name is from the Latin *minutus*, small, in reference to the size of this species.

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