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SYSTEMATICS OF THE NEARCTIC *PTILODEXIA* BRAUER AND
BERGENSTAMM (DIPTERA: TACHINIDAE)*

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ABSTRACT: A revised classification of the Nearctic prosenine genus *Ptilodexia* Brauer and Bergenstamm (Diptera: Tachinidae) is presented. A total of 8,000 specimens and type material for nearly all species were studied. All seventeen previously described valid species of *Ptilodexia* are diagnosed and illustrated. Five new species, *P. sabroskyi*, *P. pacifica*, *P. californica*, *P. westi*, and *P. maculata* are described and illustrated. A key to the Nearctic species is presented. The following new synonymies are made: *P. conjuncta* (Wulp) (= *Rhynchodexia simulans* Wulp); *P. contristans* (Wulp) (= *R. punctipennis* Wulp); *P. carolinensis* Brauer and Bergenstamm (= *P. neotibialis* West, *P. minor* West); *P. halone* (Walker) (= *P. hucketti* West); *P. harpasa* (Walker) (= *P. leucoptera* West, *Dinera robusta* Curran); *P. rufipennis* (Macquart) (= *Dexia cerata* Walker, *D. albifrons* Walker, *Rhynchodexia confusa* West, *R. translucipennis* West, *Rhynchodexia dubia* Curran); *P. major* (Bigot) (= *Dexiosoma fumipennis* Bigot, *Rhynchodexia fraterna* Wulp, *R. omissa* Wulp); *P. incerta* West (= *P. proxima* West; *Rhynchodexia elevata* West).

The biology of these parasitic flies is reviewed and possible host-parasite relationships are discussed. The taxonomic significance of numerous morphological characters in the genus and the subfamily is discussed. The phylogeny of *Ptilodexia* and its nearest relatives is discussed; six species groups are separated, and an evolutionary tree presented for these groups. The contemporary and historical zoogeography of the genus is discussed as it pertains to host and parasite distribution. A distribution map is presented for each species treated.

INTRODUCTION

Flies of the genus *Ptilodexia* are large calyptrate Diptera belonging to the Tachinidae, a family of exclusively parasitic flies. *Ptilodexia* adults are commonly collected on flowers during the summer months. The larvae parasitize the

larvae of certain scarabaeid beetles. They are of economic interest because they are known parasites of such pests as *Phyllophaga* spp., *Popillia japonica* Newman, and *Macrodactylus subspinosus* (Fabricius). The genus is distributed throughout the New World.

Although specimens of *Ptilodexia* are common in collections, few are correctly identified. Sabrosky and Arnaud (1965) made no attempt to give synonymies or distributions in their catalog listing of 27 species names. The special problems leading to such confusion in *Ptilodexia* are (1) difficulty in associating the sexes, (2) a high degree of intraspecific variation, (3) an unusually low degree of interspecific variation, and

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(4) the lack of consistent traditional morphological characters.

The purpose of this study is to revise the classification of *Ptilodexia* on the basis of all available material, to analyze the life history of its species, and to determine evolutionary and zoogeographical trends which may apply also to other members of the family Tachinidae.

MATERIALS

This study was based on over 8,000 specimens borrowed from various museums. In addition, type-specimens for most of the known species and numerous representatives of other genera in the Prosenini were studied.

Institutions loaning material used in this study were as follows: American Museum of Natural History (AMNH), Arizona State University (ASUT), British Museum (Natural History) (BMNH), California Academy of Sciences (CASC), University of California Berkeley (CISC), Canadian National Collection (CNCI), Cornell University (CUIC), University of Nebraska (DEUN), Field Museum of Natural History (FMNH), Florida State Collection (FSCA), Iowa State University (ISUI), Los Angeles County Museum of Natural History (LACM), Leningrad Museum of Natural History (LMNH), Museum of Comparative Zoology, Harvard University (MCZC), Michigan State University (MSUC), Ohio State University (OSUC), Oklahoma State University (OSEC), Oregon State University (OSUO), Paul H. Arnaud, Jr., Collection (PHAC), Yale University (PMNH), Purdue University (PURC), South Dakota State University (SDSU), University of Kansas (SEMC), Staten Island Institute of Science (SIIS), University of Oklahoma (SMNH), Texas A & M University (TAMU), University of Arizona (UAIC), University of Alberta (UASM), University of California Davis (UCDC), University of California Riverside (UCRC), University of Idaho (UICM), University of Montreal (UMIC), University of Michigan (UMMZ), Utah State University (USUC), National Museum of Natural History (USNM), Vienna Museum of Natural History (VMNH), Washington State University (WSUC).

METHODS

The male genitalia of *Ptilodexia* species are partially obscured on dry, pinned specimens. To

examine them, the posterior half of the abdomen was removed, placed in a solution of 10 percent KOH, and heated until the structures were sufficiently softened to be dissected easily. They were later rinsed twice with water and twice with acetic acid, placed in glycerine, and examined. They were stored in a microvial pinned beneath the insect.

Illustrations of the genitalia were made using an ocular grid. The postabdomen was anchored to a small piece of soft wax on the bottom of the dish of glycerine to prevent it from drifting about.

Drawings of the heads were made by projecting photographic transparencies of them onto drawing paper. Manipulation of the projector provided images of uniform size. The image was then traced with a hard pencil; the details were filled in after thorough examination of the specimen with a dissecting microscope.

All measurements were made using an ocular grid, calibrated by a stage micrometer. Ratios were calculated from these measurements.

Because of the extreme intraspecific variability of *Ptilodexia*, a description which included all variation would be unwieldy and would be similar for each species. To make the description more useful and manageable in size, only one specimen, the holotype, is described.

A complete synonymy and list of citations are given for each species included in this study. New species are thoroughly described and diagnosed. For previously described species, only a diagnosis is presented. Known information on each species is summarized and notes regarding types and nomenclature are presented.

Intraspecific variation is discussed thoroughly for all new species. With previously described species, variation is discussed only where it is necessary for species identification. Complete data from each specimen, including sex, locality, collector, depository, and other information, have been recorded by Wilder (1976) and therefore are not presented here. Wilder (1976) also gives complete redescriptions for all previously described species of *Ptilodexia*.

The scope of this revision has been limited for practical reasons. Inclusion of the southern Mexican species would have doubled the number of species treated, and the material available for these species is wholly inadequate. All Nearctic species are treated herein.

ACKNOWLEDGMENTS

I extend my sincerest appreciation to Dr. C. W. Sabrosky, who initiated this study and without whose help this revision could not have been completed. Dr. Sabrosky also generously loaned types and was always available to answer questions about *Ptilodexia* and related tachinids.

I thank Dr. K. C. Kim for his valuable assistance during this project. His enthusiasm and drive served as a constant inspiration.

Persons and institutions loaning type material, for which I am grateful, are: Dr. R. W. Crosskey (BMNH), who was extremely generous in loaning 56 type-specimens for this project; Dr. R. Lichtenberg (VMNH); Dr. V. Richter (LMNH); Dr. L. L. Pechuman (CUIC) who kindly loaned me the types of 14 species for an extended period of time; also J. C. Scott (MCZC), Dr. P. Wygodzinsky (AMNH), and Dr. F. C. Thompson (USNM) who helped in uncovering some important syntypes.

I am indebted to Dr. P. H. Arnaud, Jr., and the Department of Entomology, California Academy of Sciences, for providing facilities and valuable assistance during my time on the West Coast. Thanks are also due to Dr. D. C. Rentz and D. H. Kavanaugh for their frequent assistance with many problems.

I finally thank my husband, George Zelznak, for his unending encouragement and optimism throughout this study.

BIOLOGY

The larvae of *Ptilodexia* flies parasitize and kill their scarabaeid larva hosts. The adult flies, however, feed on nectar and they spend considerable time probing at flowers, particularly composites. While feeding they become covered with pollen and probably act as pollinators. *Ptilodexia conjuncta* and *P. agilis* adults have been observed pollinating the flowers of dwarf mistletoe (*Arceuthobium cyanocarpum*). Adults of *Ptilodexia* have been collected with pollinia attached to the tarsi.

Adults are collected in many environments. Members of some species are collected at the seashore, while others have been taken at altitudes as high as 3,000 m in the Sierra Nevada and the Rocky Mountains. These flies have been taken at UV light, Malaise, and other flight traps. But the most productive method of col-

lecting seems to be sweeping flowers, especially composites such as *Baccharis* and *Solidago*.

The occurrence of specimens of *Ptilodexia* is, as with most parasites, seasonal. At times, hundreds of individuals of one, two, or even three species may be collected simultaneously at one kind of flower. In other years the flies will be rare—perhaps representing the normal build-up and decline of a parasitic population. In some areas, such as Long Island, New York, and Riverside, California, specimens of certain species have been collected on the same dates every year for ten or more years. However, both these areas have been extensively surveyed regularly by specialists and may represent the actual situation, which is not seen in other areas simply because of poor sampling.

There is no information on the mating habits of *Ptilodexia* spp. Despite the numerous specimens collected, few have been pinned in copula. Males usually emerge before females, but the place and time of mating is unknown.

The female carries hundreds of tiny larvae in her abdomen during larviposition. It is not known if she simply broadcasts them or if she places them directly on the soil. Neither is it known if the female is able to locate areas of host density, nor if the larva has the sensory capacity to find a host. If the larvae are deposited in a jar, they will wander along the sides for two to three days before dying. First-instar larvae of *Prosenia siberita* survive a week or more in the soil (Clausen 1927).

The larvae are presumably quite easy to rear if the host larvae can be kept alive under laboratory conditions. During the development of the parasite larva, a defensive response of the host causes a respiratory funnel to appear at the point of attachment to the host. This is a sclerotized funnel-shaped structure which encloses the caudal end of the larva and can be seen through the integument of the host. The larva feeds on the internal fluids and fat body of the host and finally leaves the host to pupate in the soil. By this time, the larva has ingested nearly all the contents of the host.

Based on Davis's (1919) data, *Ptilodexia* larvae overwinter within the host. The pupal stage is quite short, cold temperatures are not required to complete development.

The host scarabaeid larvae, or white grubs, belong to the subfamily Melolonthinae, which

includes such common and economically important genera as *Phyllophaga*, *Popillia*, and *Macroductylus*. The dynastine scarabaeids of the genus *Aphonus* are also parasitized by these flies. Champlain and Knull (1944), and Peterson (1948) implicate *Ptilodexia canescens* as a parasite of the cerambycids *Saperda calcarata* and *Rhagium lineatum*.

Most species of *Phyllophaga* have a two- or three-year life cycle. *Popillia japonica* and some of the other hosts have one-year life cycles. The life cycle of *Ptilodexia* probably does not exceed one year. Early-instar white grubs are attacked in the fall and fed upon until the following spring or summer when the parasite pupates. Adult flies emerge shortly thereafter.

According to Davis (1919), when infested host larvae are brought indoors in the fall, the *Ptilodexia* larvae will continue their development within the host, pupate, and emerge as adults in the winter, without interruption. It is thus possible that in areas with long seasons, two or more broods could develop. My samples from Texas, southern California, and some southeastern states appear to support this. Two broods per year are possible only if there is an ample supply of grubs of the proper stage feeding in the soil. In these areas of bivoltinism, variant populations in the species concerned are apparently more common than in areas where only one brood is possible. One can extrapolate to the tropical regions where even more generations per year are possible, and the number of species and the variation among species is phenomenal.

It is not known if any species of *Ptilodexia* is host specific, but some species are known to have more than one host. For example, *P. carolinensis* can complete its life cycle either in *Phyllophaga rugosa* (fide Davis 1919, as *Ptilodexia abdominalis*) or in *Popillia japonica*. On the other hand, *Ptilodexia maculata* and *P. prexaspes* have restricted ranges and show little intraspecific variation—perhaps indicative of host specificity. *Ptilodexia harpasa* and one of its reported hosts, *Macroductylus subspinosus*, are sympatric.

Many questions remain unanswered regarding the relationship of host preference and speciation in *Ptilodexia*. In some species, local aberrant populations are found that only vaguely resemble the typical population. The possibility exists that these aberrant populations have shift-

ed to a host significantly different from the common one. It is conceivable that such a shift could be an early step in speciation.

Many factors involving the relationship of host and parasite presumably influence the appearance of the adult fly. These factors include number of fly larvae per host, instar of parasitized host, rate of host development, and rate of parasitoid development. Specimens of *P. carolinensis* developed in *Phyllophaga* grubs differ greatly from those developed in larvae of *Popillia*.

These factors contribute to the extreme intraspecific variability in *Ptilodexia*, perhaps ultimately leading to speciation in the group. Carefully controlled breeding experiments are needed to help understand the effects on the parasites of the host and host environment.

TAXONOMIC CHARACTERS

Most of the specific characters previously used by *Ptilodexia* taxonomists are subtle, difficult to see, and unstable, sometimes differing not only between individuals but also on each side of the same specimen. Of the characters traditionally used to separate species, many have been either stable within the genus (e.g., "arista plumose") or different within a species (e.g., color, wing venation). Most earlier workers lacked sufficient study material to recognize normal intraspecific variation. Certain characters these early workers used were good, but they are more useful used in combination with certain other characters.

Sexual dimorphism has caused problems in the taxonomy of *Ptilodexia*. Abdominal color and color pattern, and leg color frequently differ between sexes; hence the two sexes of some species have been described under different names.

I have freely used raw measurements in my descriptions, recognizing nonetheless that they are of limited use in this group. Proportional measurements are generally more useful, and I include them in my descriptions and diagnoses. The standards for these proportional measurements are head height and length of the first antennal segment—both measurements which are proportional to general size.

This study is limited to dried adult flies, so structural characters are the only ones which form the basis of my classification. What follows

is a brief discussion of the taxonomic importance of the various physical characters and how their states are determined. The headings and general organization are similar to those used by Crosskey (1973a). It is hoped that other workers in the Tachinidae will adopt the same format, eventually bringing some order to the study of variation in the family.

Body Color and Vestiture

The general integumental color of *Ptilodexia* adults is a dull brown, although adults of certain more-advanced species may be black or testaceous, and teneral specimens are generally paler. The color of the scutellum compared to that of the rest of the notum sometimes is specifically useful (e.g., *P. planifrons*–*P. contristans*); however, in adults of some species (*P. rufipennis*), it also varies intraspecifically. The color of the abdomen varies from reddish or testaceous with a dark longitudinal stripe, to concolorous black to testaceous. Although abdominal color may be of occasional taxonomic value, it almost always varies between males and females of the same species. In the female it is frequently concolorous, with the longitudinal stripe indistinct or absent. General body color sometimes varies climally, and in some species, smaller, darker populations exist in the northern parts of the range.

Vestiture characters can aid in distinguishing members of different species. These characters seem to vary independently of integumental color. Facial tomentum varies from extremely heavy—totally obscuring the underlying integumental color—to fine and sparse. Occasionally there is a pattern or spot of color in this vestiture which can be distinct for a species (e.g., *P. contristans*, *P. canescens*). Facial tomentum may be dull (*P. westi*) or strongly shining (*P. incerta*). The color of the facial tomentum varies intraspecifically.

The tomentum on the pleuron is of little taxonomic value, and that on the notum is only slightly more useful. The notal tomentum on adults of some species (e.g., *P. westi*, *P. arida*) is heavy, abundant, and almost flocculent, nearly obscuring the integumental color, whereas on those of others (*P. mathesoni*) it is so fine that the notum appears polished. In members of other species (*P. conjuncta*), the tomentum is flattened and shiny, giving the notum, or parts of it, a coppery hue. Usually notal tomentum is

arranged in longitudinal stripes, but this striping varies among individuals and is of little diagnostic value. Notal tomentum also varies between the sexes, usually being heavier in the female. Tomentum on the mediotergite can be fine or heavy; in specimens of *P. agilis* and *P. mathesoni*, however, it is absent.

Abdominal tomentum varies more between species than between sexes. It is generally grayish and tessellate, although in some individuals it may be gold or brownish; and it may be shining or dull. Only in adults of one species (*P. mathesoni*) has the tessellate pattern been replaced by a more uniform distribution of tomentum, and even then, only in the males. In members of a few species (e.g., *P. pacifica*, *P. ponderosa*), the grayish tomentum is the only vestiture on the abdomen, but in most there are patterns of brown or gold tomentum which can aid in distinguishing species. In *P. rufipennis* adults the bases of the median marginal setae on the third and fourth abdominal tergites are surrounded with gold tomentum; adults of *P. agilis* have a marginal band of it on the third and fourth tergites; those of *P. arida* have brown tomentum overlying the longitudinal stripe.

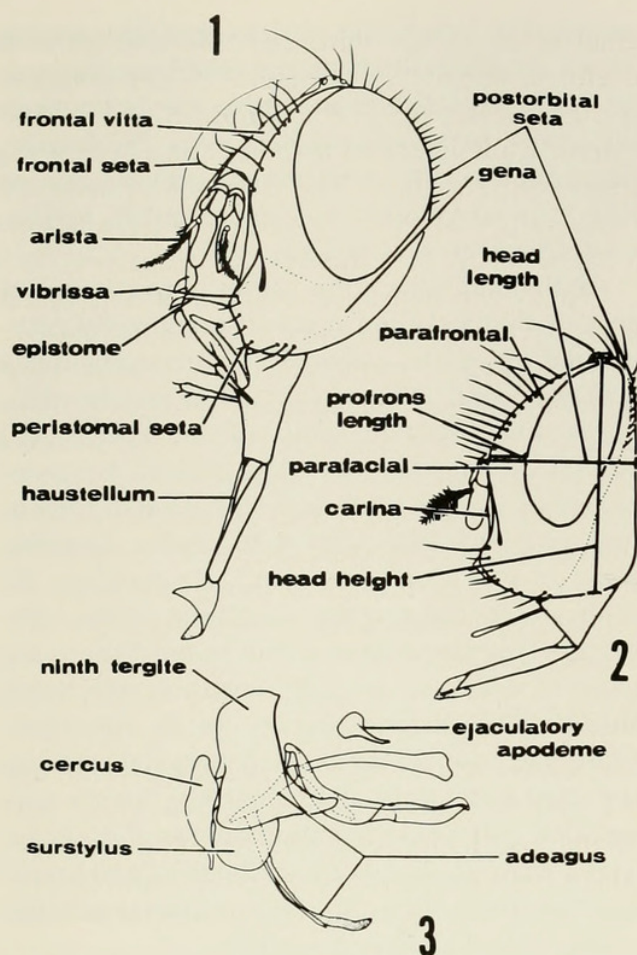
These characters of general color and vestiture show a greater degree of variation within *Ptilodexia* than within all other Nearctic Prosenini, with the possible exception of the most closely related genus, *Mochlosoma*.

When examining specimens for colors and patterns of tomentum, it is imperative that they be viewed from several different angles. Often a pattern can be distinguished only if it is seen obliquely.

Chaetotaxy and Hairing

Chaetotaxy is of minor taxonomic use in *Ptilodexia*, as it varies widely within species but little between them. Frequently, numbers and even the presence of setae vary from one side of the specimen to the other. This phenomenon is represented in the descriptions by separating the two states with a slash (1/0). Hairs differ from setae in being much smaller and finer.

The taxonomically useful setae on the head are the oral vibrissae (Fig. 1). There is usually one pair (two in specimens of *P. contristans*). The size and spatial relationships between the vibrissae and the peristomal setae can aid in identifying adults in some species. In *P. rufipennis* adults the peristomals immediately below



FIGURES 1-3. Structure of generalized *Ptilodexia*. Fig. 1. Head, anterolateral view. Fig. 2. Head, lateral view. Fig. 3. Genitalia, lateral view.

the vibrissae are short, becoming longer with distance from the vibrissae; in *P. conjuncta* adults, on the other hand, the peristomals are subequal and nearly as long as the vibrissae. Numbers of peristomal setae vary between and within species, but considerable overlap between species is common. The number and size of frontal setae vary, but these are even less reliable characters than are the number and size of the peristomal setae.

The ocellar, postocellar, internal vertical, and external vertical setae show some intraspecific differences in size and number. I have described these differences, but they are too variable to be used diagnostically. The postorbital setae vary in length between species, but not as much as between the sexes. The hairs which are sometimes inserted between them have minor significance. In adults of some species the postorbitals are long and closely spaced, while in those of others they are interspersed with fine setae

half the length of the postorbitals, and in still others they are interspersed with tiny hairs.

Another group of taxonomically useful hairs on the head are those immediately ventral to the postorbitals. Members of species such as *P. planifrons* and *P. mathesoni* are characterized as having two to four irregular rows of dark hairs between the postorbital setae and the yellow or white occipital hair. Members of other species have only one row of these dark hairs (*P. californica*), and those of others have none or just a few scattered hairs (*P. maculata*). This character also shows much intraspecific variation and must be used cautiously.

Perhaps the best diagnostic character in *Ptilodexia* is the hairing of the parafacials (herein defined as the sides of the head bounded by the apex of the second antennal segment, the oral vibrissae, the frontal suture, and the anterior eye margin). The presence, size, distribution, and color of these hairs are extremely variable but species specific. There is slight variation in the characteristics of these hairs between males and females belonging to the same species; that is, the parafacial hairs of the female are slightly sparser, finer, and are not inserted as far ventrally on the parafacial as they are on the male. These hairs may be absent (*P. rufipennis*); long, dark, and abundant (*P. planifrons*); sparse and pale (*P. halone*); minute and occurring only on the upper anterior parafacial (*P. incerta*); strong and concentrated at the lower edge of the eye (*P. canescens*); strongly inclined anteriorly (*P. contristans*); or inclined ventrad (*P. harpasa*). Many other combinations exist. It appears that this character can be of diagnostic value even in the Tropics, where there are many undescribed species. I have illustrated the character state for parafacial hairs in every Nearctic species herein described or diagnosed. The nature of the parafacial hairs is also of importance in *Mochlosoma*, where they are always present, but not in the other Nearctic Prosenini.

Parafacial-hair characteristics appear frequently in the key to species. When the hairs are small and pale, specimens must be examined carefully from several angles; often it is the bases of the hairs rather than the hairs themselves which are visible.

The parafrontal hairs are of much less taxonomic value. They are usually present, dark, and are either sparse or abundant.

Thoracic chaetotaxy is of little diagnostic importance in *Ptilodexia*. The numbers of such setae as sternopleurals, notopleurals, and postalars are generally constant within the genus. Others such as posthumeral, presutural, acrostichal, dorsocentral, and scutellar vary somewhat between species, but they also show considerable intraspecific variation. The number of humeral setae and discal scutellars are more constant, but must be used in combination with other characters to aid identification.

The length and density of hairs covering the *Ptilodexia* thorax vary between species. These, however, are difficult characters to divide into easily defined states. Propleural hairs do not occur in *Ptilodexia* adults, but are present in members of several closely related genera. They have diagnostic value at the generic level.

Another group of hairs on the thoraces of these flies is the *infrasquamal setulae*, small hairs inserted beneath the point of attachment of the squamae or calypters. In adults of some related genera in the Prosenini, these are always absent. In some *Ptilodexia* adults their absence may be a reliable specific character state (e.g., *P. canescens*, *P. maculata*), but in others, their absence carries less taxonomic importance. Sixty percent of the specimens of *P. rufipennis* examined had *infrasquamal setulae*, but they were present in only twenty percent of *P. incerta* specimens. This character is of equal value in both sexes. When using this character, one must realize that the 'absence' of *infrasquamal setulae* indicates absence on both sides of the body.

Hairs and setae on the legs have little diagnostic value; often the setal length reflects total body size more than any specific difference. The exception to this is the length of the antero- and posteroventral setae on the posterior leg of the male, which show species-level variation. These are difficult to measure, however, and have not been used in this revision. Other setae on the femora show some taxonomic potential, especially the presence or absence of anterior setae on the posterior femora.

Numbers of abdominal setae vary intraspecifically, but they usually vary around a certain number which can be defined for some species. The presence or absence of median marginal setae on the first syntergite can be a useful character.

The number of median discal and median mar-

ginal setae on the third and fourth tergites is useful in separating members of some closely related species (e.g., *P. californica* and *P. pacifica*), while in others it shows considerable intraspecific variation. The presence or absence of lateral discal setae on these tergites will separate members of distantly related species.

Length and density characters of abdominal hairs have about the same taxonomic value as those characters in thoracic hair. That is, they differ and seem to be constant among members of a species, but are difficult to separate into character states.

Although hairing on the genitalia varies only slightly between species, the presence of strong setae on the ninth tergite (epandrium) is an excellent diagnostic character in adults of *P. contristans* and *P. westi*.

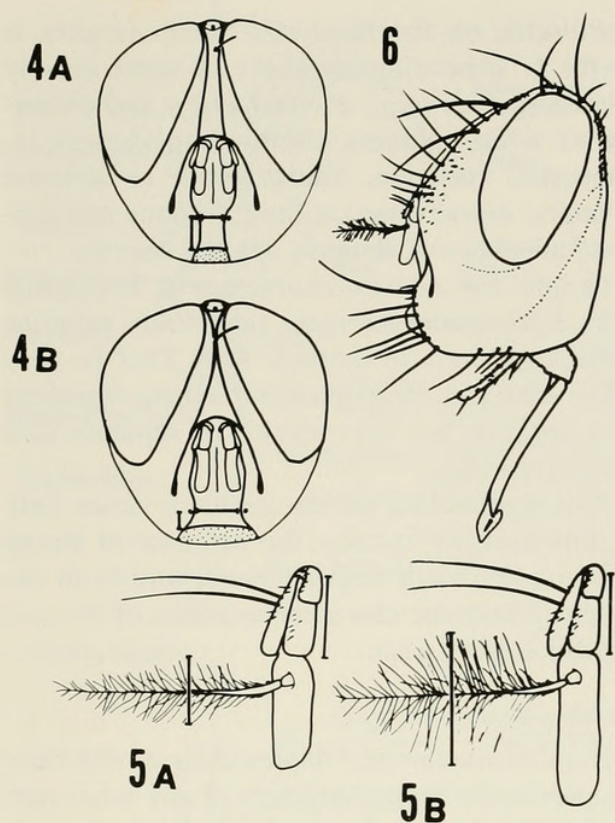
Head

Head characters in *Ptilodexia* are of more use taxonomically than characters of any other part of the fly. Included are those of chaetotaxy, which have been discussed in the previous section. Drawings of the head, with the terms used in this paper, are presented in Figures 1-2.

The head, in members of this genus, is wide and boxlike. The parafacials and genae are wide and covered with fine, dull-lustered tomentum. The genae are usually reddish, contrasting with the whitish parafacials and genal dilations. The velvety-appearing frontal vitta extends from the vertex to the frontal suture. The third antennal segment is rarely longer than twice the length of the second and bears an arista covered with long fine hairs. Between the antennae is a raised ridge or carina which does not protrude beyond the antennae. The epistome may or may not protrude. Mouthparts are similar to those of other calypterate flies with the mentum length from 0.3 to 0.8 times the head height.

The width of the parafacial is of considerable diagnostic use in *Ptilodexia*. *Ptilodexia rufipennis* adults have narrow parafacials, while in *P. conjuncta* adults they are quite wide. This character is easier to evaluate in males than in females, and it varies more among *Ptilodexia* adults than among *Mochlosoma* adults.

The shape of the frontal vitta can be of use in this genus. Below the ocellar triangle and between the eyes, the frontal vitta is usually obliterated (Fig. 4b), the parafrontals becoming con-



FIGURES 4-6. Comparison of specimens of *Ptilodexia*. Fig. 4. Comparison of adults of two generalized species of *Ptilodexia* showing variation in width of epistome, position of oral vibrissae, and width of frontal vitta; A. head, anterior view, with frontal vitta not obliterated and distance of oral vibrissae from oral margin greater than distance between oral vibrissae; B. head, anterior view, with frontal vitta obliterated and distance of oral vibrissae from oral margin less than distance between oral vibrissae. Fig. 5. Comparison of antennae of adults of two generalized species of *Ptilodexia*; A. antenna, showing length of plumosity on arista shorter than length of second antennal segment; B. antenna showing length of plumosity on arista longer than length of second antennal segment. Fig. 6. *Ptilodexia ponderosa* (Curran), holotype, head of female, lateral view.

tiguous. In members of some species (e.g., *P. canescens*, *P. halone*), however, the parafrontals do not touch, and the frontal vitta is continuous from the antennal base to the ocellar triangle (Fig. 4a). This character varies to a similar degree in specimens of *Mochlosoma*.

The size and shape of the carina are useful at the supraspecific level. Among *Ptilodexia* species, the carina is sometimes distinctly shaped (e.g., *P. planifrons*). Carina characters vary more among *Mochlosoma* than *Ptilodexia* adults, in general being wider and better developed in individuals of the former genus. In members of several closely related genera such as *Dinera* and *Hesperodineria*, the carina is strong-

ly developed, protruding from between the antennae, appearing almost bulbous, and visible from the lateral aspect. In *Rhamphina* adults it is short, narrow, and strongly keeled. The carina shows no sexual dimorphism in size and shape, and except in a few cases it is species specific.

The oral vibrissae and adjoining areas hold characters of taxonomic value in *Ptilodexia*. These are the width of the depression between the bases of the oral vibrissae and the distance of the vibrissae from the epistome (sclerotized oral margin). Members of some species of *Ptilodexia* have this area wide and short; an example is *P. rufipennis*, in adults of which the vibrissae are far apart and close to the oral margin (Fig. 4b). The opposite state is shown in *P. prexaspes* adults, which are characterized by vibrissae that are far from the oral margin, but not far apart (Fig. 4a). In *Rhamphina* specimens, the area is four times as high as wide. This character is diagnostic in a few species, but in others it varies intraspecifically. It shows no sexual dimorphism. In evaluating this character, physical measurement is necessary; estimate is inadequate. The invisible line connecting the vibrissae should pass through the center of their bases, and the sclerotized margin of the epistome should serve as the ventral boundary. Width is measured only at the vibrissae; height is measured mesially.

The epistome generally protrudes in *Ptilodexia* and *Mochlosoma* specimens, and although both genera show variation, in *Ptilodexia* adults it is sometimes species specific. In adults of species like *P. prexaspes*, *P. canescens*, and *P. halone*, the oral margin projects slightly if at all. As a result, the lower anterior portion of the head is vertical in profile (Fig. 71), and in some cases the anterior margin of the head protrudes further anteriorly at the antennae than at the vibrissae. *Ptilodexia conjuncta* adults show the opposite state, the epistome projecting strongly, as does the lower anterior portion of the face (Fig. 26). In other prosenines the character shows less intraspecific variation than it does among species of *Ptilodexia*.

The length of the haustellum is an extremely valuable taxonomic character in *Ptilodexia* (and *Mochlosoma*), and it is also the chief difference distinguishing *Ptilodexia* from *Mochlosoma* specimens. In individuals of the former genus, the length of the haustellum varies from 0.3 to

0.9 times the head height, and the shape is broad and linear or slightly tapered; it is rigid in all individuals. *Mochlosoma* specimens have the haustellum much longer than the head height, and narrow and flexible. In other Prosenini this character serves to separate genera. In *Ptilodexia* I have compared the length of the haustellum with the head height and used the resulting ratio as a diagnostic character which varies consistently between species, little within species, and not at all between the sexes. When using this character in the key, actual measurements must be made; estimating the ratio is difficult because a slender haustellum appears longer than a broad one of the same length.

There is intraspecific variation in the length of the haustellum among members of a few species. Among *P. rufipennis* (as well as *P. arida*, *P. carolinensis*, and *P. pacifica*) specimens, the haustellum length varies locally. The length can be short in members of one population and noticeably longer in those of another. The character is still useful, though, since the variation remains within easily expressed values.

The length and shape of the palpi vary slightly between members of different species of *Ptilodexia*. The length is expressed, in this paper, as a fraction of the haustellum length. Some Prosenini, such as *Prosenia* and *Senostoma* specimens, have short stubby palpi; and in *Atelogliossa* adults they are completely absent. This character varies among *Mochlosoma* specimens much as it does among those of *Ptilodexia*. In members of *P. arida* and *P. prexaspes*, the length of the palpi may nearly equal the length of the haustellum, while in those of *P. obscura*, it is rarely more than 0.3 times the haustellum length.

The antennae possess some useful taxonomic characters: length, shape, and arista plumosity. The length of the third segment is herein expressed in terms of its relationship to the relatively constant second segment. Measurement of the second segment is taken from a slightly anterodorsal aspect and is the longest dorsoventral length of the segment.

Among *Prosenia* and *Senostoma* adults, length of the third segment is approximately twice the length of the second; in those of most other Prosenini, it is considerably shorter. Among *Mochlosoma* species the length varies, the most usual state being the third segment equal to 1.4 to 1.5 the second. The same is true

in *Ptilodexia* species, where this character can be used to separate adults of some species. *Ptilodexia sabroskyi* adults have a short third segment, subequal to or shorter than the second, whereas those of *P. rufipennis* have the third segment up to twice the length of the second. Specimens of *P. obscura* sometimes have the third antennal article broadened apically instead of slightly pointed as it is in members of most species.

The length of the plumosity on the arista is an excellent diagnostic character in *Ptilodexia*. I have expressed it in relation to the length of the second antennal segment. The arista, including the plumosity, is measured at its greatest width (Fig. 5). In specimens of *P. rufipennis* and *P. harpasa*, two species with long third antennal segments, the length of the plumosity is greater than twice the length of the second antennal segment, while in those of *P. planifrons* and *P. prexaspes*, the length of the plumosity is less than or equal to the length of the second segment. This character is especially useful in separating adults of the closely related *P. californica* and *P. sabroskyi*.

Thorax

Most of the thoracic characters used in this revision have been discussed in the sections on vestiture and chaetotaxy, the remaining ones are those of the mediotergite, legs, and wings.

Adults of *Ptilodexia* have a typical calyptrate thorax with the mesothorax highly developed, and the prothorax and metathorax reduced. The scutellum is small; ventral to it is the bulging postscutellum, which distinguishes members of the family Tachinidae. The pleuron is typical of other calyptrate flies. The propleuron is bare, although the rest of the pleuron is beset with fine hairs and numerous groups of setae. The legs are long with extremely long tarsi. The wings are also long, the venation typical of calyptrate flies.

The mediotergite is the oval arched area ventral to the postscutellum. In members of some species the mediotergite is dorsally polished, although other parts of it may be tomentose. Care must be taken when observing this character, since on adults of some species the mediotergite has a thin layer of tomentum and still appears shiny.

Leg color is a taxonomically useful character. In species where the color is similar in members

of both sexes, pale-colored legs are diagnostic. The color of the tarsi can also separate members of different species (e.g., *P. halone* and *P. prexaspes*). *Ptilodexia maculata* specimens are distinguished by distinct femoral patches which, although present on members of other species, are strikingly evident on those of *P. maculata*. Other species exhibit dimorphism in leg color, the males with dark legs, the females with pale legs (e.g., *P. agilis*, *P. arida*). Two other species, *P. rufipennis* and *P. pacifica*, have females with pale legs and males with legs of varied color.

Wing venation is useful in distinguishing members of some genera in this tribe (*Nimio-glossa*). Within *Ptilodexia* (and *Mochlosoma*), however, it is of dubious value. Wing color is constant within species and can be used diagnostically. Adults of *P. contristans* have the wings distinctly darkened basally, while those of *P. mathesoni* have the entire wing darkened. The colors of the squamae, epaulet, and basicoxa also show slight differences between members of certain species, but they can be varied among those of others.

Abdomen and Genitalia

In *Ptilodexia* adults as in most Nearctic Prosenini, the abdominal tergites meet ventrally, entirely obscuring the sternites. The first tergite is actually composed of two fused segments; the next three tergites—third, fourth, and fifth—are conspicuous. The sixth tergite is fairly broad, the edges not meeting ventrally (but embracing the fifth sternite); it and those remaining are withdrawn into the fifth tergite. The next two tergites are fused and become the seventh syntergite, which is fairly narrow in *Ptilodexia* members (not much wider than the epandrium), with its surface oriented posterodorsally, as is the epandrium (the ninth tergite). This pattern is similar in *Mochlosoma* members, but in other Prosenini it is different. In *Prosenia* adults, for example, the ninth tergite appears to be fused with the seventh and eighth, and in members of *Hesperodinera*, the fused seventh and eighth tergites are exposed and greatly enlarged, the surface facing posterad, the epandrium forced beneath the abdomen.

Abdominal color is varied intraspecifically but is still useful as a key characteristic distinguishing members of some species. In the key presented herein, when the abdomen is described

as reddish laterally, at least the second and third tergites (of the male—the character is not as consistently applicable to the female) have the integument reddish or rufotestaceous laterally. On specimens in which the abdomen is concolorous dark brown or gray, there may be a slight rufescent cast along the margins of the tergites. This state should not be confused with the previous one, in which the reddish color extends from the anterior to posterior margins of the tergites.

In specimens of *Ptilodexia*, the external male genitalia (Fig. 3) have taxonomic value. The characters which vary slightly between members of different species are the shape of the ninth tergite, the shape of the surstyli, and the shape of the cerci. These characters are useful in distinguishing members of a few species, but sometimes vary more intra- than interspecifically. Only in species with extraordinarily modified members (e.g., *P. westi*, *P. rufipennis*) can the external genitalia be called diagnostic, and even then, they must be dissected for characters to be examined properly. Often the genitalia of adults of *Mochlosoma* and *Ptilodexia* are identical. The above-mentioned characters vary greatly between specimens belonging to different genera and are of excellent supraspecific group characters.

Internal genitalia are generally not useful in separating members of species of *Ptilodexia*. The aedeagus is nearly identical in members of this genus and those of *Mochlosoma*. The ejaculatory apodeme, however, is useful in distinguishing specimens of some species or species groups. Its shape can be distinct, as in *P. contristans*, *P. planifrons*, and *P. rufipennis* members; between many of the species, though, it does not vary. Female genitalia show no striking diagnostic differences, with the notable exception of the surface sculpturing of the spermathecae which, with high-magnification studies, may reveal specific differences. The reproductive systems of both sexes of *Ptilodexia* have been described by Townsend (1938).

The larvae of *Ptilodexia* have never been described, even though there is a figure of a mature larva and the puparium in Davis (1919). The nature of the cephalopharyngeal skeletons of first instar larvae (from the abdomen of gravid females) has been used to separate species in some genera of tachinids (*Archytas*), but the character is of no use in *Ptilodexia*. Greene (1922) de-

scribed the puparium of an unknown species of *Ptilodexia* (erroneously determined as *P. tibialis*).

Of the useful diagnostic characters, none works to separate members of all species from those of all others. Most of these characters are of high value in distinguishing members of the derived species, but when members of certain primitive species (*P. carolinensis*, *P. major*) are examined, they lose much of their value and more characters must be considered in making identifications.

PHYLOGENY

Present attempts to reconstruct the phylogeny of a genus or tribe in the Tachinidae are based on incomplete data and should be considered extremely tentative at best. Characters used at generic and tribal levels are so unstable that convergence, loss, and acquisition occur repeatedly. Most of the species, and probably many of the genera, are unknown or poorly defined on a worldwide basis. Host relationships are largely unknown.

For the phylogeny of *Ptilodexia*, Neotropical species and representatives of closely related genera were carefully examined to infer apomorphic and plesiomorphic states. Character matrices were then constructed and phylogenetic trees inferred. This method works well when trying to construct probable relationships in higher categories, but for relationships among species it is not adequate. This is because the characters distinguishing species are generally more unstable than those distinguishing families or tribes. Many specific characters can be lost or regained easily.

Relationships within the Prosenini can be inferred only after examining members of the tribe on a world basis. I have not had the opportunity to do this. I have seen a few representatives of the North American genera, none of the exclusively Neotropical genera, one of an Australian genus, and one of *Prosenia*, a worldwide genus. Most of the species in these genera can not yet be identified with existing keys.

The characters used to infer relationships between genera are facial carina, space between vibrissae, propleural hairs, and haustellum length. The form of the facial carina provides a good generic character, much as it does in the tribe Rutiliini (Crosskey 1973a). In members of

Prosenini, the carina was lost once, although slight expression is common in members of some species of *Ptilodexia* and *Mochlosoma*.

The area between the vibrissae is another stable generic character. In *Ptilodexia* and *Mochlosoma* adults, and in those of some of the other genera, this area is depressed and may be flat or slightly concave, while in members of the more primitive genera, it is slightly to strongly convex. In the primitive genera, the oral vibrissae are situated at or slightly above the oral margin, while in *Ptilodexia*, *Mochlosoma*, and *Rhamphina* adults, they are inserted distinctly dorsal to the epistome. In *Arctophyto* and *Milada* adults, their placement is intermediate between that in members of the primitive and the derived genera.

Propleural hairs are lacking in members of *Sentstoma* and *Prosenia*, two of the more primitive genera. They have been lost in *Hesperodina* adults and are never seen in those of the advanced genera.

The haustellum is longer than the head height in specimens of *Prosenia*, *Prosenoides*, *NimioGLOSSA*, and *Mochlosoma*, but is much shorter in those of the other genera. Also, there is great variation in haustellum length among *Ptilodexia* species (from 0.3 to 0.9 times head height).

The position of *Ptilodexia* within the Prosenini is advanced. Assuming an Oriental center of origin for the group, there is a wealth of forms (members of which have a broad, blunt, facial carina) in the Oriental and Palearctic regions. Some of these, such as *Prosenia* and *Dinera*, are widespread. It was probably a form similar to *Dinera*, *Milada*, and *Arctophyto* which, along with its hosts, crossed the Bering Land Bridge during favorable conditions in the late Tertiary. Subsequent radiation before and during the Pleistocene must have been great, for *Ptilodexia* is the most diverse genus of prosenines in the western hemisphere.

Dinera and *Arctophyto-Milada* remain on both sides of the Pacific with relatively few species. Other small genera which probably originated from this complex are *Ateloglossa*, *Dolichocodia*, *Prosenoides*, and *Hesperodina*, members of which have retained the inflated carina, and *Myoceropsis*, *Rhamphina*, and *NimioGLOSSA*, whose members have lost it.

Ptilodexia and *Mochlosoma*, both large genera, probably had similar origins, *Mochlosoma* from a more restricted ancestral line. Although

the strong carina has been lost, it is expressed to a moderate degree in members of some species in both genera. It is my opinion that the only character which separates *Ptilodexia* from *Mochlosoma* adults, the haustellum shape and length, is a phylogenetically sound one, that is, its origin in *Mochlosoma* is monophyletic. Although radiation of both genera has been great, divergence between *Mochlosoma* and *Ptilodexia* members is only slight.

Ateloglossa and *Hesperodineria* had their origins from a *Dinera*-like ancestor, members of the former having lost the palpi and the latter the propleural hairs, but both having retained the squarish head and inflated facial carina. *Prosenoides* adults, on the other hand, bear a closer resemblance to *Prosenia* specimens, and the two may be closely related. Both *Nimioglossa* and *Rhamphiniina* had their origins early in the *Ptilodexia*-*Mochlosoma* line, their members having diverged from the ancestral forms in having the area between the oral vibrissae depressed and the vibrissae placed considerably above the oral margin, as do representatives of *Ptilodexia* and *Mochlosoma*.

Within *Ptilodexia*, characters indicating relationship are difficult to determine. The ancestral and derived states of a few of these characters have been inferred.

Small size and dark color seem to be primitive states within *Ptilodexia*, while the derived states are large size and pale color. The primitive state of the length of the third antennal segment, the length of the plumosity on the arista, and length of the haustellum is an intermediate one, with the derived states being short and long. The presence of both parafacial hairs and infrascapular setulae appear to be primitive within this genus. Primitively the oral margin is narrow and projecting, while the more advanced forms show it to be wide and not projecting. The primitive, typical shape of the ejaculatory apodeme can be seen in most species (Fig. 44). Members of some of the advanced species have this structure modified in various ways (Fig. 29, 35), although those of others do not.

The genus *Ptilodexia* in North America is comprised of six loosely knit groups. The first, and probably most primitive of these, is the *agilis* group, which consists of *P. agilis*, *P. obscura*, and *P. mathesoni*. The next group is the *carolinensis* group, with member species *P. carolinensis*, *P. halone*, *P. prexaspes*, and *P.*

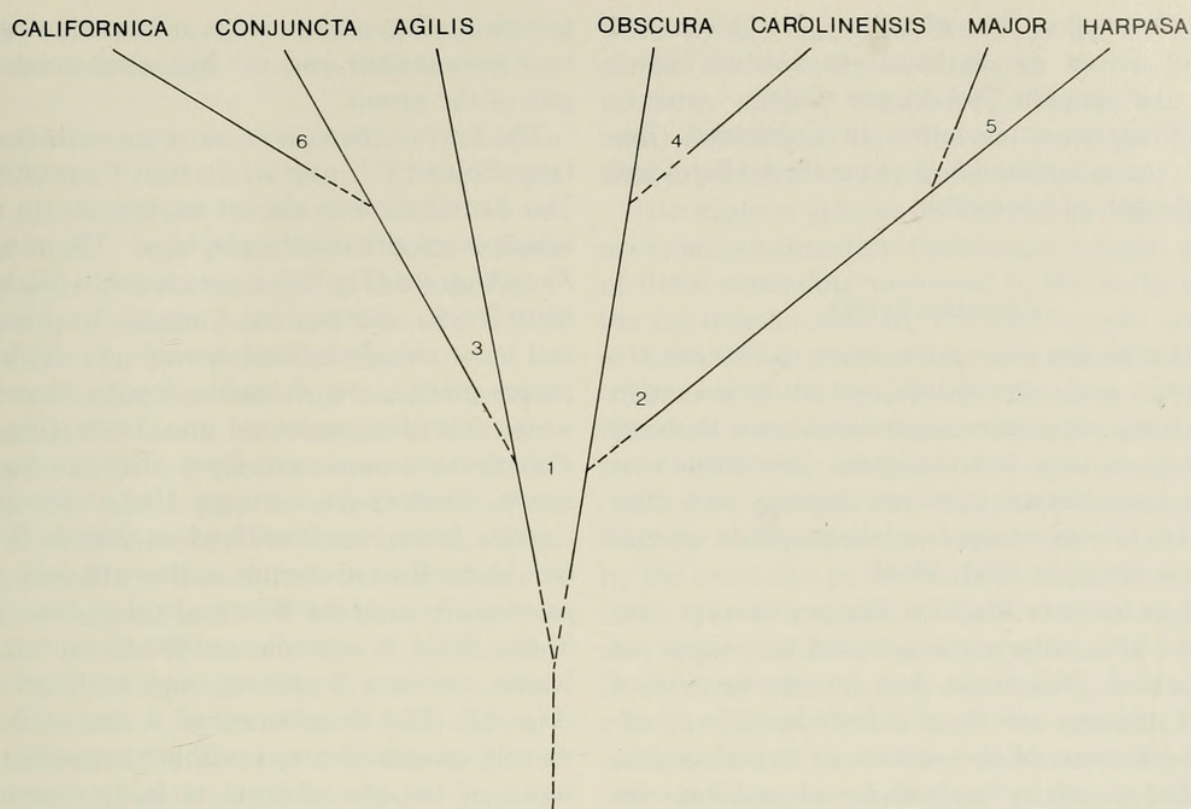
canescens. The *harpasa* group is composed of *P. rufipennis*, *P. arida*, *P. harpasa*, and *P. ponderosa*. In the *major* group are *P. major*, *P. incerta*, *P. maculata*, and *P. flavotessellata*. The *conjuncta* group contains *P. conjuncta*, *P. planifrons*, *P. contristans*, and *P. westi*; and the *californica* group, *P. californica*, *P. sabroskyi*, and *P. pacifica*.

The character states which segregate members of these groups are vague and difficult to define, but since the groups appear to have both a zoogeographical and morphological basis, they will be discussed. Their relationships to each other are somewhat less clear.

Members of the *agilis* group are small, dark flies with little red color on the abdomen and a short haustellum. The legs of the females of *P. agilis* and *P. mathesoni* are pale, while those of *P. obscura* are dark. The mediotergite is polished or shiny in members of all three species. This is probably the most primitive group of *Ptilodexia*; *P. agilis* members perhaps being similar to those of the prototype of the genus. *Ptilodexia agilis* is a widespread western form, occurring into central Texas; *P. mathesoni*, closely related, is a northern form found in New York, Michigan, and eastern Canada. *Ptilodexia obscura* has a distribution from the Appalachians to the Rocky Mountains and is nearly complimentary to that of *P. agilis*.

Species included in the *carolinensis* group have members with a nonprojecting epistome and a nearly vertical anterior head profile. All adults have relatively short plumosity on the arista and the abdomen reddish laterally. Two of these species, *P. halone* and *P. prexaspes*, have limited east coast distributions. *Ptilodexia canescens* occurs across the northern United States and Canada, while *P. carolinensis* is widely distributed from the east coast to the Rocky Mountains. *Ptilodexia carolinensis* is probably the oldest of the four, *P. canescens*, *P. halone*, and *P. prexaspes* being derived from it during the Pleistocene.

The *harpasa* group is the most ambiguous of all, containing most of the Antillean and many Mexican species. Members of these species all have long antennae and long plumosity on the arista; some lack parafacial hairs. *Ptilodexia rufipennis* occurs from the east coast to the Rocky Mountains and across Canada; *P. harpasa* is more restricted, *P. arida* is restricted to the Southwest and Mexico, while *P. ponderosa* is

FIGURE 7. Inferred phylogeny of *Ptilodexia* species groups.

probably a West Indian species, with one record from Florida. Assuming that *P. harpasa* is the closest to the ancestor of the group, *P. rufipennis* became the most widespread and *P. arida* and *P. ponderosa* radiated in the southern latitudes.

Ptilodexia major, the most primitive member of the next group shows slight similarities to specimens of *P. harpasa*. It ranges widely throughout the Midwest, Southwest, and Mexico. *Ptilodexia incerta* has an eastern distribution almost exactly complementary to that of *P. major*, while *P. maculata* and *P. flavotessellata* are restricted in the Southwest and Midwest. These species all have members with short, pale, parafacial hairs.

The next group, *conjuncta*, is probably derived directly from the ancestral *agilis* group and consists of only western species. *Ptilodexia conjuncta*, its most primitive member, ranges throughout the Rocky Mountains from Canada into Mexico and west to California. *Ptilodexia planifrons* and *P. contristans* extend from the southwestern United States into Mexico; and *P. westi*, a close relative of *P. contristans*, is restricted to the extreme southern Midwest and the Southwest.

The last, or *californica* group, is related to the *conjuncta* group and probably had a similar origin. Its three species are confined to California and the West Coast, and members of these taxa show similarities only to members of the *conjuncta* group.

A graphic representation of the relationships of these species groups is given in Figure 7. Possible events at the numbered branching points are as follows:

1. Major east-west split. Eastern group members with parafacial hairs extending low on the face; western group members with parafacial hairs high on the face.
2. Widening of face; lighter general color. Some females with yellow legs; lengthening of plumosity on arista. Some advanced members radiating widely; radiation into Mexico and Antilles.
3. Lengthening of haustellum, increase in size, widening of face. Extensive radiation into Mexico.
4. Slight increase in size. Flattening of oral margin and anterior facial margin; shortening of haustellum and plumosity on arista.

5. Shortening of haustellum. Radiation and isolation in southwestern United States and Mexican Pleistocene refugia.
6. Pleistocene isolation in California. Decrease in abundance of parafacial hairs and length of haustellum.

ZOOGEOGRAPHY

Although the dispersal powers of Diptera are relatively great, the distribution patterns seen in *Ptilodexia* seem to be dependent upon those of their hosts, the Scarabaeidae. Distribution of some Scarabaeidae are well known, and their possible histories have been discussed in several papers (Howden 1963; 1966).

All statements made in this section are tentative. The patterns discussed are those of species of *Ptilodexia*, but interpretations of those patterns are those which have been offered for some of the species of Scarabaeidae. No host specificity has been found, and it is only speculation that similar patterns of *Ptilodexia* and their scarabaeid hosts are due to similar histories.

Howden (1966) stated that North American species of *Phyllophaga* show a decline in numbers from Georgia to Canada and from Texas or Arizona to Nebraska. This is true of *Ptilodexia*. He also stated that if certain areas of Texas were included with Arizona and New Mexico, there would be little overlap between the eastern and western faunas (approximate dividing line, 100th meridian). This holds true for the most part in *Ptilodexia*. However, a number of eastern species occur all the way into British Columbia in the northern parts of their ranges. As with *Phyllophaga*, many of the southern Arizona records represent the northern limits of Mexican species.

When plotting the centers of distribution of species of *Ptilodexia*, it was noted that six species groups could be defined geographically. These were the same six groups which had been structurally and zoogeographically defined above. Although these groups show that the phylogeny presented herein has a zoogeographical basis, they are not the best groupings for discussing zoogeography.

I have categorized the species of *Ptilodexia* into six zoogeographical groups, based on their complete distributions rather than centers of dis-

tribution. The relationships of these categories may give insight into the historical zoogeography of the group.

The first of these is an extreme northern pattern shown by *P. canescens* and *P. mathesoni*. The distribution is almost exclusively in areas which were previously glaciated. The range of *P. mathesoni* (Fig. 17) is restricted to Michigan, New York, and eastern Canada. Its ancestral and most closely related species, *P. agilis*, occupies a large area from the Rocky Mountains west, extending eastward into Texas (Fig. 12). *Ptilodexia canescens*, from the *carolinensis* group, inhabits the northern United States and Canada from Newfoundland to British Columbia. In the East it extends southward only to the previous front of the Wisconsin glaciation, while in the West it extends southward into eastern Idaho, western Wyoming, and northern Utah (Fig. 67). The distribution of a species in previously glaciated areas without representation south of the glacial front is fairly uncommon (Ross 1965). This deglaciated area may have offered considerable opportunity for expansion to certain Scarabaeidae and their *Ptilodexia* parasitoids.

The next group has a widespread distribution, throughout the eastern United States into the plains states and, in some cases, even further west. Of these species, only *P. harpasa* (Fig. 82) lacks representation in the lower Midwest. The other species, *P. carolinensis* (Fig. 62), *P. incerta* (Fig. 103), *P. obscura* (Fig. 22), and *P. rufipennis* (Fig. 88) occur widely throughout the Midwest and the East.

The remaining eastern distribution pattern is that of *P. halone* and *P. prexaspes*. Both of these species belong to the *carolinensis* group; they are closely related and complementary in distribution. *Ptilodexia prexaspes* occurs in Florida and along the Atlantic coast to Virginia (Fig. 77), while *P. halone* is found in Mississippi, Tennessee, and along the coast from Maryland to New York (Fig. 72). It is possible that these relatively uncommon species are host-specific parasites of some of the large, flightless scarabs found in the Southeast and discussed by Howden (1963).

Two species, *P. agilis* and *P. conjuncta*, have large western ranges, the former from British Columbia to Texas and west to the Pacific coast (Fig. 12), the latter from Mexico to British Co-

lumbia, west to the coast (excluding California), and eastward through Canada to Ontario (Fig. 27).

Ptilodexia californica (Fig. 47), *P. pacifica* (Fig. 52), and *P. sabroskyi* (Fig. 57) have ranges which are restricted to the west coast of the United States. It is possible that some unique local populations are parasitic on the large flightless genera of scarabs (such as *Pleocoma*) which survived in situ during the Pleistocene.

The remaining distribution group is the most common in *Ptilodexia*, occurring in at least seven species. This is a southwestern distribution, with species which may have had Mexican refugia. Four of these are Mexican species whose ranges extend northward into the mountainous regions of Arizona and New Mexico, rarely into Utah and Idaho. These four are *P. contristans* (Fig. 37), *P. planifrons* (Fig. 32), *P. maculata* (Fig. 108), and *P. arida* (Fig. 93), all recently differentiated. It is possible that the ranges of many other Nearctic Mexican species also extend into these areas, but specimens have not yet been taken by collectors.

Two of this southwestern group, *P. westi* and *P. flavotessellata*, apparently do not range into Mexico. The former occurs broadly along the international boundary from central Arizona to eastern Texas and into Oklahoma and southern Kansas (Fig. 42), while *P. flavotessellata* occurs in northern New Mexico, Colorado, and Nebraska (Fig. 113).

The last species in the southwestern group is *P. major*. Its distribution is a combination of the ranges of the previous two groups, extending from Mexico (where it is widespread) into the mountains of Arizona, New Mexico, and Colorado and through Texas into the Plains in Nebraska and Kansas (Fig. 98).

Unlike those of *Phyllophaga* (Howden 1966), eastern species of *Ptilodexia* frequently occur from Georgia to southern Ontario; others range broadly across the northern part of the United States and Canada. I see this deviation as a result of the vagility of these flies and the probable capability of developing in different hosts, factors which may account for other deviations from typical scarabaeid distributions.

Inferring the historical zoogeography of *Ptilodexia* is extremely speculative. The genus, as we know it, probably evolved on this continent, its ancestor reaching the area via the Bering

Land Bridge during the Tertiary. By the onset of the Pleistocene, most of the species were probably already established. Pleistocene climatic fluctuations must have affected the distribution patterns we see in the genus today.

The eastern species in our fauna may have occupied southeastern Pleistocene refugia, most of them expanding westward in the north after the ice sheets retreated. *Ptilodexia agilis* seems to have been much more widespread at one time, one of the species derived from it being found only in the Northeast. While *P. agilis* may have had a wide refugium, *P. conjuncta* and *P. californica* perhaps survived the Pleistocene in Mexico and California, respectively, separated by the extensive desert barriers of the time. The three species endemic to California were probably separated from the other species at a relatively early time, closely resembling each other considerably more than any other species. Their refugia were in central and southern California, and subsequent recolonization proceeded no further north than the southern limits of the ice sheet. The southwestern groups could have survived the glacial periods in situ or in Mexican refugia. It appears that *P. major* was once a widespread species, extending well into Mexico before the Pleistocene and giving rise to many species there.

The Southwest, including Texas and Arizona, has the largest number of endemics. In the warmer parts of the country such as these, more generations per year are possible, and evolution can proceed at a faster pace than in the north. This may account, in part, for the large number of endemics; it also helps explain the numerous divergent populations seen in California and Texas as well as the tremendous diversity of the genus in Mexico.

Genus **PTILODEXIA** Brauer and Bergenstamm

Ptilodexia BRAUER AND BERGENSTAMM, 1889:119 (Type-species, *Ptilodexia carolinensis* Brauer and Bergenstamm, 1889, by original designation.)

Myoceropsis TOWNSEND, 1915:23 (Type-species, *Rhynchiodexia flavotessellata* Walton by original designation.)

Rhamphina, authors, not Bigot.

Rhynchiodexia, authors, not Bigot.

Rhynchodexia, emend. Wulp, 1891.

The genus *Ptilodexia* Brauer and Bergenstamm is confined to the New World. It is best represented in the Neotropical region, as is the entire tribe Prosenini.

DIAGNOSIS.—Members of *Ptilodexia* can be distinguished from those of all closely related species of Nearctic Prosenini by the following combination of character states: propleuron bare; facial carina sometimes well developed (but never broad, blunt, and separating the antennae); haustellum shorter than the head height; apical cell open or closed at wing margin; and infrascapular setulae usually present.

DESCRIPTION.—Color black to reddish, usually with thorax dark and abdomen pale with dark longitudinal stripe. *Head* with face broad in profile, anterior margin usually vertical; epistomal margin somewhat projecting; frontal vitta strongly narrowed between eyes, often obliterated; facial tomentum heavy to sparse, dull to shining, color varied, but usually grayish; parafacial hairs varied, absent or present; carina long, not much deeper than width of third antennal segment; postocular setae long; one or two pairs of oral vibrissae; epistome generally projecting to some degree; haustellum rigid, varied, from 0.3 to 0.8 times head height; palpi long. Antennae with length of third segment varied from one to two times length of second; arista with length of plumosity more than length of second antennal segment. *Thorax* with propleuron bare; mesonotum strongly or weakly tomentose, usually indistinctly striped; three or four pairs of presutural and postsutural acrostichals; a tuft of small hairs on postalar wall. *Wing* length 2.5 times width; apical cell open or closed at wing margin; infrascapular setulae present or absent. *Legs* dark, tibiae lighter in most cases, posterior tarsi very long, 1.5 times length of tibia; claws and pulvilli long. *Abdomen* broad, conical, tomentum usually in large irregular patches; numerous median discal and marginal setae on abdominal tergites; four abdominal tergites visible, lateral margins meeting ventrally. *Genitalia* slightly withdrawn, terminal, axis vertical; cerci and surstyli variously modified. *Female* differs from male in following ways: frontal vitta wide with sides subparallel; eyes widely separated; profrons a little wider; frontal and peristomal setae not as abundant; vertex with few hairs or setae; postocular setae shorter and sparser; height of eyes distinctly less; frontal orbital setae present (Fig. 6). Thorax with fewer setae and hairs and more heavily tomentose; thorax and legs frequently lighter in color with fewer and shorter major setae and hairs; tarsal claws and pulvilli much shorter. Abdomen

broader, shorter, and much more heavily tomentose; usually with fewer median discals and often lacking other setae; integumental color uniform brown or gray in many females, even when it is marked in males of the same species.

Brauer and Bergenstamm erected the genus *Ptilodexia* in 1889 for the North American species *P. carolinensis*. There has been much confusion since that time regarding the limits of the genus. This is because several characters normally constant within tachinid genera vary among *Ptilodexia* species. These characters include the presence or absence of parafacial hairs and infrascapular setulae.

Prior to 1889, Macquart and Walker described species belonging to *Ptilodexia* in the genus *Dexia* Meigen, while Bigot (1885) created the genus *Rhamphina* for those species he described. Bigot thought that *Rhamphina*, a neotropical genus, and *Rhynchodexia*, one of his Australian genera, could be distinguished from one another by the presence or absence of a facial carina. Wulp (1891) considered this to be an inconsistent character.

Wulp (1891) emended the name to *Rhynchodexia*, which he used for what we now call *Ptilodexia*. He felt that *Rhynchodexia* and *Rhamphina* were congeneric and mistakenly placed one Mexican species, *contristans*, in *Hystriodexia*.

West (1924; 1925), a North American worker, thought that the species with hairy parafacials belonged to *Ptilodexia* while those with bare parafacials were *Rhynchodexia*. Austen (1907) shared this opinion. Later, West (1950) agreed with Curran (1934) that the two were probably one and *Rhynchodexia* was the proper name for the complex. Reinhard (1943) stated that the name *Ptilodexia* was available for American species.

Examination of species of *Rhynchodexia*, now *Senostoma* (Crosskey 1973a), shows that this genus differs from *Ptilodexia* in having a pronounced facial carina as well as numerous other differences which will be discussed later. *Rhamphina dubia*, the type-species of the genus, is not a *Ptilodexia*.

The name *Estheria tibialis* Robineau-Desvoidy is frequently used for species of *Ptilodexia* (Townsend 1921; Aldrich 1905; Austen 1907). The type of this species is lost, so we cannot know if *E. tibialis* belongs to *Ptilodexia*. However, since a characteristic of *Estheria* is the

presence in its members of a petiolate apical cell, and since this rarely occurs in *Ptilodexia*, I agree with previous workers who have chosen to reject the name *E. tibialis*.

Key to the Nearctic Species of *Ptilodexia*

- 1a. Parafacial hairs present, although very small and pale in some individuals; legs of females varied in color 2
- 1b. Parafacial hairs absent; legs of females pale in color 27
- 2a. Infrascapular setulae present 5
- 2b. Infrascapular setulae absent 3
- 3a. Parafacial hairs dark, long, present on most of parafacial (Fig. 66); length of plumosity on arista subequal to length of second antennal segment; face with traces or spots of brownish tomentum (northeastern U.S., trans-Canada, northern mountain states)
..... *canescens* (Walker)
- 3b. Parafacial hairs pale and/or short, present only on upper anterior portion of parafacial; length of plumosity on arista at least 1.5 times length of second antennal segment (Fig. 5b); facial tomentum concolorous silvery gray or yellowish 4
- 4a. Femora of members of both sexes brown or black (eastern U.S. to about 100th meridian) *incerta* (West) (in part)
- 4b. Femora of members of both sexes orange with definite black or brown patches on flexor surfaces, coxae also with dark patches (Arizona and New Mexico) *maculata* n.sp.
- 5a(2a). Flies pale colored; thorax, abdomen, and femora pale brown to orange, or width of depression between oral vibrissae less than distance between oral vibrissae and oral margin (Fig. 4a) 6
- 5b. Flies dark; thorax, abdomen, or legs brown or darker in color; width of depression between oral vibrissae equal to or greater than distance between oral vibrissae and oral margin (Fig. 4b) .. 10
- 6a. Integument of tarsi pale, concolorous with legs ventrally *halone* (Walker)
- 6b. Integument of tarsi brown or black..... 7
- 7a. Width of the depression between oral vibrissae greater than distance from vibrissae to oral margin 8
- 7b. Width of depression between oral vibrissae less than or equal to distance from vibrissae to oral margin (Fig. 4a)
..... *prexaspes* (Walker)
- 8a. Parafacial hairs minute, confined to upper anterior parafacial; haustellum length 0.6 times head height (Fig. 6) (southern Florida) *ponderosa* (Curran)
- 8b. Parafacial hairs long, scattered on parafacial; haustellum length no more than 0.5 times head height (southwestern U.S. and Texas) 9
- 9a. Parafacial hairs dark, coarse and abundant (Fig. 61); femora or notum brown in many individuals; this color form uncommon (Texas)
..... *carolinensis* Bauer and Bergenstamm (in part)
- 9b. Parafacial hairs pale or light brown, fine, sparse (Fig. 112); femora and notum pale orange-brown (southwestern U.S. into Colorado and Nebraska)
..... *flavotessellata* (Walton)
- 10a(5b). Mediotergite polished immediately beneath postscutellum; parafacial hairs distant from eye; haustellum 0.5 times head height or less (Fig. 11); legs of females yellow; species with members small, dark 11
- 10b. Mediotergite with at least a fine dusting of tomentum; parafacial hairs and haustellum varied 12
- 11a. Abdomen and thorax black, strongly shining; abdomen with tomentum evenly distributed; parafacial hairs black, coarse (Fig. 16); squamae of males dark brown (northcentral and eastern U.S.)
..... *mathesoni* (Curran)
- 11b. Abdomen with tomentum in large irregular patches; thorax with definite tomentose striping; parafacial hairs black, fine (Fig. 11); squamae of males white to pale brown (western U.S. and Texas)
..... *agilis* Reinhard (in part)
- 12a(10b). Length of plumosity on arista less than or equal to 1.25 times length of second antennal segment (southwestern U.S. and Mexico) 13
- 12b. Length of plumosity on arista more than 1.25 times length of second antennal segment (widespread) 15
- 13a. Abdomen and scutellum concolorous dark gray or brown, slightly lighter on ventral margins of tergites in a few in-

- dividuals; ninth tergite and parafacial hairs varied; haustellum length 0.7 to 0.8 times head height (Fig. 31) 14
- 13b. Abdomen and scutellum distinctly reddish laterally; ninth tergite with several strong setae (Fig. 33); parafacial hairs long, dark, occurring along parafacial ventrally to level of oral vibrissae; haustellum length 0.6 times head height (Fig. 36) *contristans* (Wulp)
- 14a. Parafacial hairs long, coarse, numerous, occurring on entire parafacial (Fig. 31) (Arizona, New Mexico into Mexico) *planifrons* (Wulp)
- 14b. Parafacial hairs fine, sparse, occurring only on anterior parafacial (Fig. 41) (Texas, Oklahoma, Kansas) *westi* n.sp. (in part)
- 15a(12b). Parafacial hairs short, pale or otherwise inconspicuous 16
- 15b. Parafacial hairs long, dark, although sparsely placed in some individuals .. 20
- 16a. Mediotergite polished; legs of females yellowish; haustellum length no more than 0.5 times head height (Fig. 11); scutellum concolorous with rest of notum *agilis* Reinhard (in part)
- 16b. Mediotergite tomentose to subshining; legs of females dark; haustellum length varied; scutellum lighter in color than rest of notum in most individuals 17
- 17a. Parafacial hairs pale and, in most individuals, small (Fig. 97) (west only to Arizona and Rocky Mountains) 18
- 17b. Parafacial hairs light brown to black, short or medium in length (Pacific coast states) 19
- 18a. Infrascapular setulae absent or greatly reduced in number in most individuals; parafacial hairs only on upper anterior parafacial (Fig. 102); length of palpi equal to or slightly less than half length of haustellum, broadened at tip (central and eastern U.S.) *incerta* (West) (in part)
- 18b. Infrascapular setulae present in most individuals; parafacial hairs extending ventrally on face to level of apex of antennae (Fig. 97); length of palpi greater than half length of haustellum, narrow (southwestern U.S. into Texas) *major* (Bigot)
- 19a(17b). Third antennal segment subequal to or shorter than second segment; smallest distance between eyes of male subequal to width of frontal vitta at antennal base; female with parafacial hairs confined to area near antennae; facial tomentum dull (southern California) *sabroskyi* n.sp.
- 19b. Third antennal segment longer than second segment; smallest distance between eyes of male less than width of frontal vitta at base of antennae; females with parafacial hairs scattered, often along center of parafacial; facial tomentum shining (throughout California) *californica* n.sp.
- 20a. Haustellum length greater than 0.6 times head height, thin, narrowed apically 21
- 20b. Haustellum length less than or equal to 0.6 times head height, broad and linear in most individuals 24
- 21a. Length of plumosity on arista more than twice length of second antennal segment; haustellum length 0.65 to 0.7 times head height, narrow (Fig. 81) (northern and eastern U.S.) *harpasa* (Walker)
- 21b. Length of plumosity on arista less than or equal to twice length of second antennal segment; haustellum length varied (western U.S.) 22
- 22a. Parafacial hairs long, dark, and abundant, uniformly covering parafacial (Fig. 26); haustellum length 0.6 to 0.8 times head height, narrowed apically in most individuals; abdomen reddish laterally *conjuncta* (Wulp)
- 22b. Parafacial hairs sparse (Fig. 41); haustellum length and abdomen varied 23
- 23a. Length of haustellum more than 0.7 times head height, strongly narrowed apically; parafacial hairs sparse, located only on anterior portion of parafacial (Fig. 41); male abdomen dark brown or gray with little if any reddish color; ninth tergite with several strong setae (Fig. 38) (Texas and Oklahoma) *westi* n.sp. (in part)
- 23b. Length of haustellum less than 0.65 times head height, broad; not narrowed apically in most individuals; parafacial hairs occurring along center of parafacial (Fig. 46); male abdomen distinctly reddish with longitudinal stripe; ninth ter-

- gite with hairs only (Pacific coast states)
 ----- *californica* n.sp. (in part)
- 24a(20b). Abdomen blackish with little if any orange coloration laterally; parafacial hairs inserted close to anterior margin of eye in most individuals; palpi very short, less than half length of haustellum (Fig. 21); wings of many males basally darkened ----- *obscura* West
- 24b. Abdomen, especially of male, with at least some red or orange coloration laterally; parafacial hairs not inserted close to anterior eye margin in most individuals; palpi longer than half length of haustellum (Fig. 51); wings of males not basally darkened ----- 25
- 25a. Femora of members of both sexes orange or marked with orange; abdominal tomentum concolorous (California)-----
 ----- *pacifica* n.sp.
- 25b. Femora of members of both sexes brown or black (some specimens from Texas may have orange femora); abdominal tomentum bicolored (widespread) ----- 26
- 26a. Epistomal angle of head not prominent (Fig. 61); females with 6 to 8 dorsal and lateral marginal setae on abdominal segment III; males with 1 pair of dorsal marginal setae on abdominal segment II; haustellum length 0.4 to 0.5 times head height (central and eastern U.S.) -----
 ----- *carolinensis* Brauer and Bergenstamm
 (in part)
- 26b. Epistomal angle of head prominent (Fig. 46); females with 10 to 12 dorsal and lateral marginal setae on abdominal segment III; most males with 2 pairs of dorsal marginal setae on abdominal segment II; haustellum length 0.5 to 0.65 times head height (western U.S.) -----
 ----- *californica* n.sp. (in part)
- 27a(1b). Abdomen without any reddish or orange coloration laterally in most males; tip of abdomen and genitalia generally reddish yellow; facial tomentum strongly shining; length of plumosity on arista more than twice length of second antennal segment; face appearing narrow (Fig. 87); infrasquamal setulae absent in many individuals; femora of many males yellow (central and eastern U.S. into New

Mexico and British Columbia) -----

- *rufipennis* (Macquart)
- 27b. Abdomen orange laterally in most males; tip of abdomen not noticeably lighter than rest of abdomen; facial tomentum rather dull; length of plumosity on arista at most equal to twice length of second antennal segment; face appearing broad (Fig. 92); infrasquamal setulae present; femora of males dark (Utah and southern Idaho south into Mexico) *arida* (Curran)

The Nearctic Species of *Ptilodexia*

agilis Group

Ptilodexia agilis Reinhard

(Figures 8–12)

Ptilodexia agilis REINHARD, 1943:22. SABROSKY AND ARNAUD (1965:988). [HOLOTYPE, male, deposited in CNCI, labeled, College Station, Texas, 8 Oct. 1933, H. J. Reinhard.]

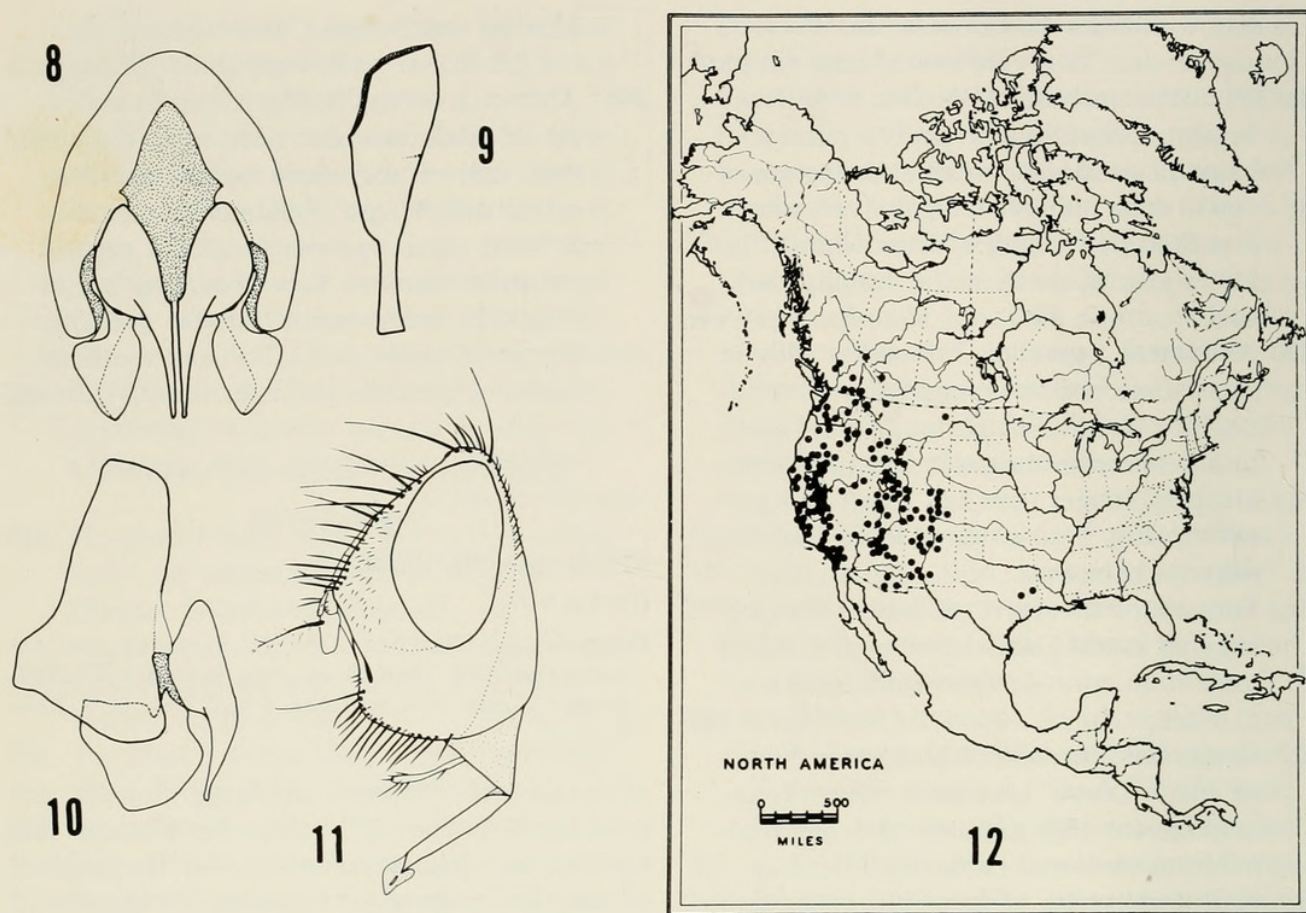
TAXONOMIC NOTES.—Although I have not seen the holotype of *P. agilis*, members of this species are quite distinctive, and the original description is adequate to assure the identity of the specimens examined. Even though *P. agilis* was described from a disjunct population, the type-specimens are typical of the species. Type material is reported to be in excellent condition.

DIAGNOSIS.—*Ptilodexia agilis* is a distinct species, members of which can be separated from their congeners by the following character states: size small; parafacial hairs fine, medium in length, inserted below apex of antennae or less than 0.25 mm from anterior margin of eye in only a few individuals; haustellum less than half head height; length of plumosity on the arista 1.5 to 2.0 times length of second antennal segment; mediotergite polished; abdomen and scutellum entirely blackish; female with legs pale colored.

MATERIAL EXAMINED.—Specimens examined include 812 males and 488 females, data as listed by Wilder (1976).

DISTRIBUTION.—*Ptilodexia agilis* ranges from Arizona and New Mexico north through California, the Great Basin, and the Rocky Mountains into Alberta and British Columbia. There are a few records from eastern Texas, where the topotypic population is found.

BIOLOGICAL NOTES.—The flight period lasts from April to October, and adults can be col-



FIGURES 8-12. *Ptilodexia agilis* Reinhard. Fig. 8. Genitalia of male, posterior view. Fig. 9. Ejaculatory apodeme. Fig. 10. Genitalia of male, lateral view. Fig. 11. Head of male, lateral view. Fig. 12. Distribution of *P. agilis*.

lected at any time during this period. July and August are the most frequent months of collection, but local variation is common. In California, for example, *P. agilis* adults are collected more frequently in September and October along the coast and in the south; but in the Sierra, northern California, and Oregon, June and July are the main periods of activity.

This species inhabits both mountains and lowlands. Adults have been collected at elevations up to 2,600 m in Arizona, 3,800 m in California, above the 3,000-m level in Colorado, and frequently above 3,000 m elsewhere. *Ptilodexia agilis* adults have frequently been taken at low elevations in such areas as the San Joaquin Valley, the Great Basin, and eastern Texas. Specimens have been collected by UV light trap, Malaise trap, wind vane trap, and by sweeping foliage.

Flowers visited include the Compositae *Achillea Millefolium*, *Chrysothamnus viscidiflorus*, *Baccharis glutinosa*, *B. pilularis*, *Eriogonum nudum*, *Solidago trinervata*, and *Lepidospartum*

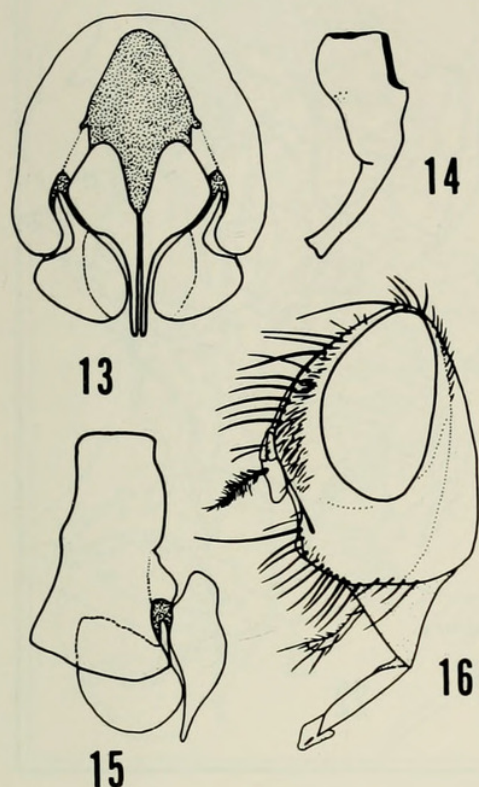
squamatum. Unidentified Compositae visited were *Achillea* sp., *Baccharis* sp., *Solidago* sp., *Eriogonum* sp., and *Haplopappus* sp. Other flowers from which *P. agilis* adults have been collected are *Allium* (Liliaceae) and *Salix* (Salicaceae). At two localities in Colorado, specimens were collected on Dwarf Mistletoe (*Arceuthobium cyanocarpum*); and members of this species are believed to be pollinators of that plant. One specimen was collected in an emergence trap under a filbert tree in Oregon.

There are no data on the life history of this insect. Its members are probably not host specific, judging from the diverse assortment of habitats and wide geographical and temporal ranges of the species.

***Ptilodexia mathesoni* (Curran)**

(Figures 13-17)

Rhynchiodexia mathesoni CURRAN, 1931:93. WEST (1950:110); SABROSKY AND ARNAUD (1965:989). [LECTOTYPE (here designated), male, deposited in CUIC, labeled, "Douglas Lake, Mich., 24-VII-22"/"Wing Slide, Cornell U., Lot. 919, Sub. 138, L. S. West"/"♂ Holotype *Rhynchiodexia mathesoni*



FIGURES 13–17. *Ptilodexia mathesoni* (Curran). Fig. 13. Genitalia of male, posterior view. Fig. 14. Ejaculatory apodeme. Fig. 15. Genitalia of male, lateral view. Fig. 16. Head of male, lateral view. Fig. 17. Distribution of *P. mathesoni*.

Curran''/'Holotype Cornell U. No. 1938''/'Cornell U. Lot. 922, Sub. 40''/'Lectotype *Rhynchioidexia mathesoni* Curran designated by D. Wilder, 1976.'']

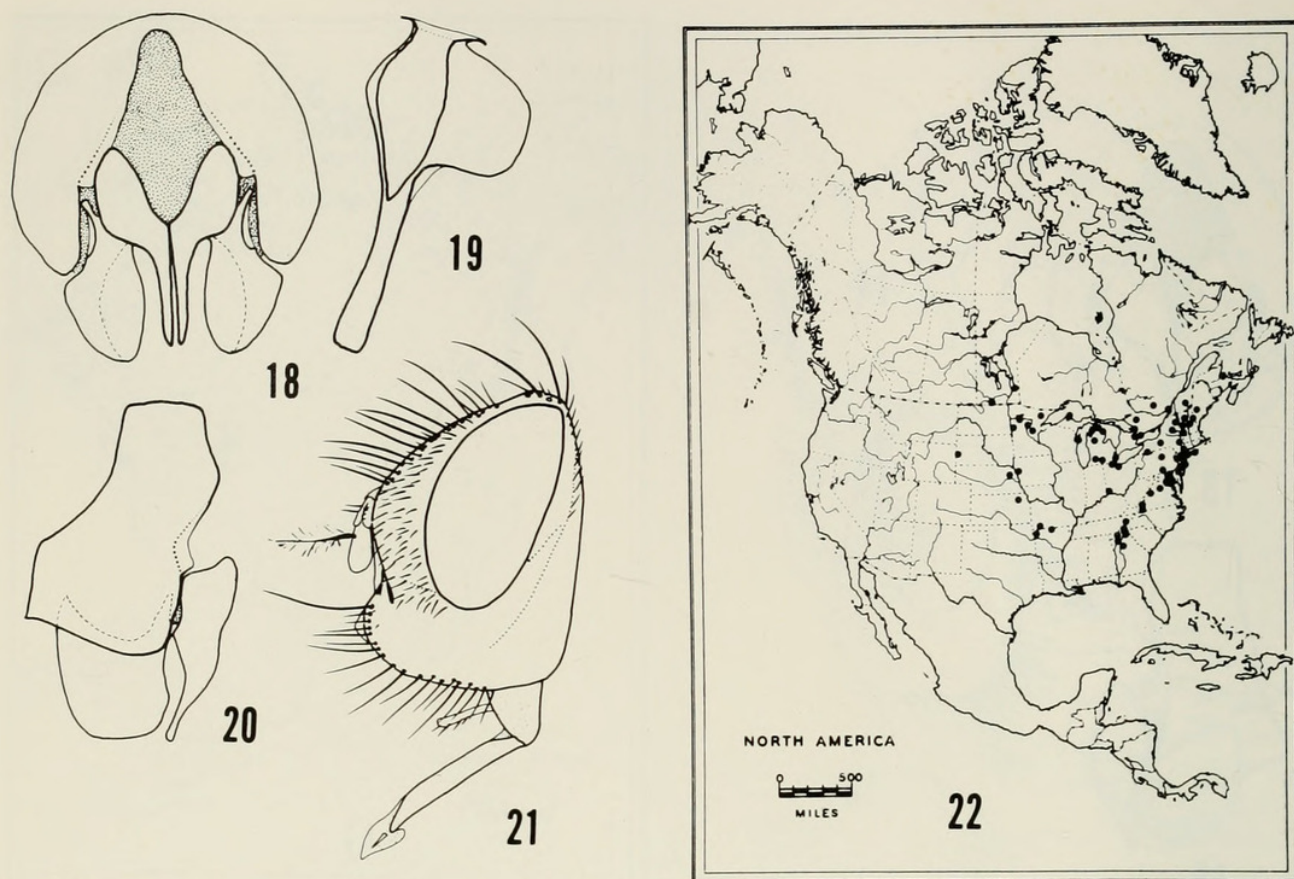
TAXONOMIC NOTES.—Even though the label on the type-specimen reads "Holotype *Rhynchioidexia mathesoni* Curran," this specimen is *not* a holotype. The author of the paper validating the species made no mention of type material or of type-locality. The type label with Curran as author was put on the specimen at a later date; it was West's "holotype," not Curran's. The name *P. mathesoni* was proposed by West and validated by Curran in his 1931 key. I have designated West's "holotype" as the lectotype. It is a large specimen in excellent condition.

There is one other specimen which I believe Curran had before him while writing his key. This specimen, also from Douglas Lake, Michigan, is deposited in AMNH and was collected on the same date as the specimen West labeled as holotype. I have designated this specimen as a paralectotype. It might be argued that this sec-

ond specimen, because it is labeled with Curran as the author, was later sent to AMNH and not seen by Curran. However, the type labels of all five of the species validated in Curran's key give Curran as the author. I believe that all these labels were changed at a later date, and since Curran makes no mention of material, I feel that these two identically labeled specimens are actually syntypes.

DIAGNOSIS.—*Ptilodexia mathesoni* is a distinctive species, evidenced by the following combination of character states: body color black, shining; parafacial hairs long, black, inserted ventral to apex of antennae or less than 0.25 mm from anterior margin of eye in only a few individuals; haustellum less than half head height in length; width of arista and plumosity 1.5 to 2 times length of second antennal segment; mediotergite polished; wings dark in color; male abdomen with pollen evenly distributed; female with pale-colored legs.

MATERIAL EXAMINED.—Twenty-one males and eleven females were examined.



FIGURES 18-22. *Ptilodexia obscura* West. Fig. 18. Genitalia of male, posterior view. Fig. 19. Ejaculatory apodeme. Fig. 20. Genitalia of male, lateral view. Fig. 21. Head of male, lateral view. Fig. 22. Geographical distribution.

DISTRIBUTION.—The species, although records are few, seems to range through the north-eastern United States and eastern Canada. There is one record from Victoria Beach, Manitoba.

BIOLOGICAL NOTES.—The flight period is from April to October with the main period of activity between mid-June and mid-August. All records for months other than July and August are from Suffolk County, New York.

There are no life-history data for *P. mathe-soni*. One male was collected on *Solidago canadensis*.

Ptilodexia obscura West

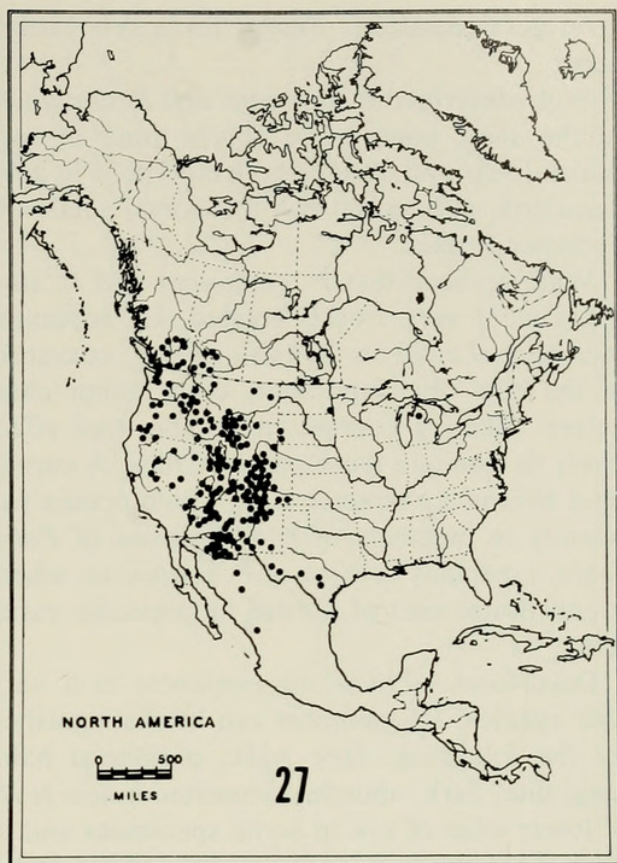
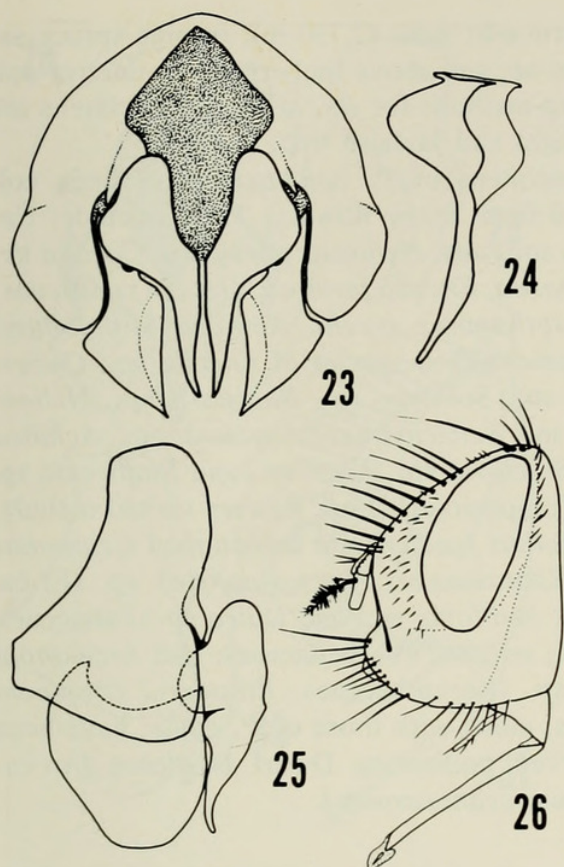
(Figures 18-22)

Ptilodexia obscura WEST, 1925:133. LEONARD (1928:822); CURRAN (1930:93); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, female, deposited in SIIS, labeled, "Wading River, L.I., June 29, 1917, W. T. Davis."]

TAXONOMIC NOTES.—West described *P. obscura* from three female specimens, one of which he designated holotype. The two paratypes are so labeled and are deposited in CUIC.

They closely resemble the holotype. There is a male specimen from Victoria Beach, Manitoba, deposited in AMNH, which bears a handwritten label reading, "*R. obscura* West." It appears that West recognized the male of the species at a later time, even though this particular male specimen differs considerably from the female type-series. West still used the generic name *Ptilodexia* for *obscura* in 1950, but because his concept of the genus changed, it is possible that he might have written "*R. obscura*" instead of "*P. obscura*." It is doubtful that Curran labeled the specimen or ever looked at West's types, since in his 1931 key, he describes *P. obscura* specimens as being over 12.5 mm long.

DIAGNOSIS.—*Ptilodexia obscura* is a fairly distinctive species. Its members may be separated from their congeners by the following combination of character states: face narrow, with parafacial hairs abundant, long, fine, dark, and inserted below lower edge of eye and close to its anterior edge; third antennal segment dark in most specimens, broadened apically; length of plumosity on arista 1.5 times length of second



FIGURES 23–27. *Ptilodexia conjuncta* (Wulp). Fig. 23. Genitalia of male, posterior view. Fig. 24. Ejaculatory apodeme. Fig. 25. Genitalia of male, lateral view. Fig. 26. Head of male, lateral view. Fig. 27. Geographical distribution.

segment; haustellum broad, length 0.55 to 0.6 times head height; palpi short, half haustellum length or less; notum covered with short, appressed, grayish pollen, giving it a smooth, subshining appearance; legs of females brown; abdominal color, grossly appearing black, but actually rufescent laterally.

MATERIAL EXAMINED.—One hundred forty-two males and 53 females of *P. obscura* were examined.

DISTRIBUTION.—The range of *P. obscura* extends from New Brunswick south into the Georgia Appalachians west into Arkansas, eastern Kansas and Nebraska, western South Dakota and Saskatchewan, and Manitoba.

BIOLOGICAL NOTES.—The flight period lasts from April to September with June and July the most common months of collection, a later average seen only in Manitoba. Most specimens have been collected at low elevations, the exceptions coming from 800–1,700 m in the Appalachians in Tennessee, North Carolina, and Virginia.

Collecting methods yielding specimens of *P. obscura* include sweeping and Malaise trap.

Specimens have been collected on the flowers of *Solidago canadensis* (Compositae), and *Aruncus* sp. and *Spiraea latifolia*, both Rosaceae.

conjuncta Group

Ptilodexia conjuncta (Wulp)

(Figures 23–27)

Rhynchodexia conjuncta WULP, 1891:228. ALDRICH (1905:499); GUIMARAES (1971:33). [LECTOTYPE (here designated), male, deposited in BMNH, labeled "Lectotype"/"♂"/"B.C.A. Dipt. II, *Rhynchodexia conjuncta* v.d.W."/Central America. Pres. by F. D. Godman, O. Salvin. 1903–172"/"Ciudad, Mex., 8100 ft., Forrer"/"Lectotype *Rhynchodexia conjuncta* Wulp designated by D. Wilder, 1975."]

Rhynchodexia simulans WULP, 1891:229. ALDRICH (1905:499); GUIMARAES (1971:34). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "Lectotype"/"N. Sonora, Mexico. Morrison"/"♂"/"B. C. A. Dipt. II, *Rhynchodexia simulans*, v.d.W."/Central America, pres. by F. D. Godman, O. Salvin. 1903–172"/"Lectotype *Rhynchodexia simulans* Wulp, designated by D. Wilder, 1975."]

NEW SYNONYMY

Ptilodexia tibialis (partim): ALDRICH (1905:504).

TAXONOMIC NOTES.—Wulp described *P. conjuncta* from two male cotypes, one of which I have designated as lectotype. This specimen

is in good condition except for a few broken setae.

Wulp described *P. simulans* and *P. conjuncta* in the same paper. The cotype (one of two) which I saw and designated lectotype is in good condition, although it has the dorsal setae and abdomen broken.

Wulp realized that *P. conjuncta* and *P. simulans* were very closely related. He separated members of each on the basis of size, curvature of the hind tibia, and some other minor characters. Size, of course, cannot be used effectively to separate these parasitic flies. A curved hind tibia is a character state which occurs frequently in members of many species of *Ptilodexia*, especially in those of *P. conjuncta*, where it constitutes part of normal intraspecific variation.

DIAGNOSIS.—*Ptilodexia conjuncta* is a variable species. Its members can be distinguished by the following: face wide; parafacial hairs long, fine, dark, abundant, inserted below level of lower edge of eye in some specimens and at least 0.12 mm from anterior edge of eye in all but a few specimens; haustellum long, ranging from 0.6 to 0.8 times head height, slender, narrowed apically in most specimens; carina fairly well developed; width of arista and plumosity 1.5 to 2 times length of second antennal segment; oral margin distinctly protruding; scutellum and sides of abdomen reddish.

MATERIAL EXAMINED.—Specimens examined included 1,238 males and 629 females.

DISTRIBUTION.—This species ranges from British Columbia and Alberta south through the Rocky Mountains into Mexico. There are scattered records from the plains states, the Great Basin, California, and Oregon. There are a few doubtful records from the eastern United States.

BIOLOGICAL NOTES.—The flight period ranges from February to October. Most of the activity occurs in July and August, earlier in the northern areas and later further south. In Arizona (and possibly Texas), *P. conjuncta* appears to have two broods, one in March and April, and another in August and September.

Ptilodexia conjuncta adults are generally found in mountainous areas at altitudes from 1,500 to 2,750 m and in some areas up to 3,660 m. They are also, although less commonly, collected at low elevations in coastal as well as inland areas. Label data indicate that they have been collected in meadow sweeps, in a meadow

in spruce-fir zone (2,750 m), in pine-spruce-aspen zone, and above timberline. Productive collecting methods for *P. conjuncta* specimens are UV light and Malaise trap.

Specimens of *P. conjuncta* have been collected from many flowers. These include: *Senecio salignus*, *Heliopsis parvifolia*, *Cacalia decomposita*, *Encelia farinosa*, *Geraea canescens*, *Chrysanthamnus greeni*, *Achillea Millefolium*; and unidentified species of *Encelia* sp., *Gutierrezia* sp., *Solidago* sp., *Baccharis* sp., *Helianthus* sp., *Senecio* sp., *Eriogonum* sp., *Achillea* sp., *Bigelovia* sp., *Aster* sp., and *Rudbeckia* sp. (all Compositae). Other flowers visited include, *Ceanothus fendleri* and unidentified *Ceanothus* sp. (Rhamnaceae); *Arctostaphylos* sp. (Ericaceae); *Melilotus* sp., and *Dalea* sp. (Fabaceae); *Lippia wrightii* (Verbenaceae); and *Arceuthobium* sp. (Loranthaceae). *Ptilodexia conjuncta* adults, along with those of *P. agilis*, have been observed pollinating Dwarf Mistletoe (*Arceuthobium cyanocarpum*).

***Ptilodexia planifrons* (Wulp)**

(Figures 28–32)

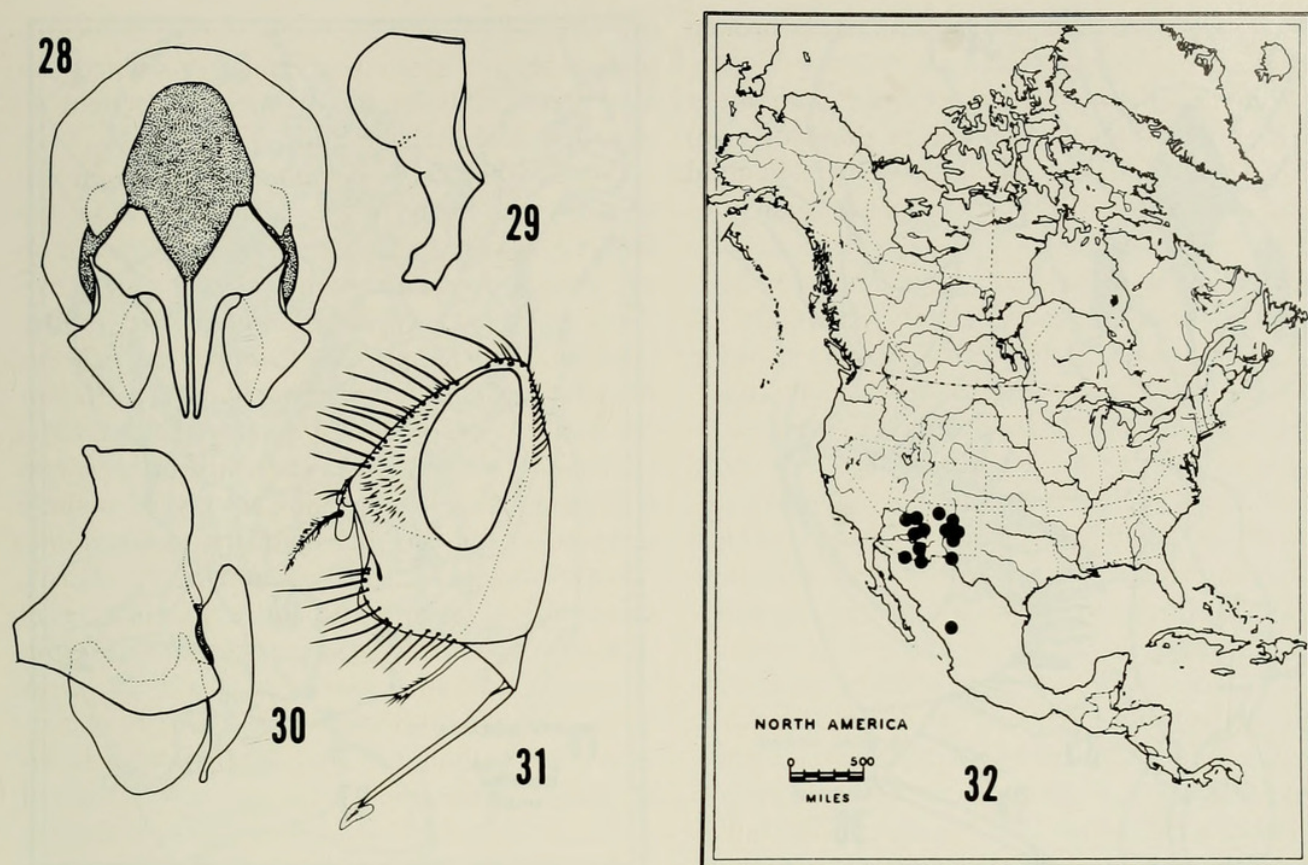
Rhynchodexia planifrons WULP, 1891:234. ALDRICH (1905:499); GUIMARAES (1971:33). [HOLOTYPE, male, deposited in BMNH, labeled, "Holotype"/"Ciudad, Mexico, 8100 ft., Forrer"/"♂"/"B. C. A. Dipt. II, *Rhynchodexia planifrons*, v.d.W"/"Central America pres. by F. D. Godman, O. Salvin. 1903–172."]

Dexia harpasa (partim): ALDRICH (1925:114). (Misidentification).

TAXONOMIC NOTES.—The holotype of this species, deposited in BMNH, is in poor condition, but is still recognizable. The facial band is obscured, the tibiae are quite light and distinctly curved (a frequently encountered anomaly in species of *Ptilodexia*), and the striping on the notum is more distinct.

Labels on the specimen say only "Ciudad, Mexico, 8100 ft.," but in the description, the origin of this specimen is stated as "Ciudad in Durango, 8100 ft." I follow Wulp's original publication in calling Durango the type-locality.

DIAGNOSIS.—*Ptilodexia planifrons* is a distinctive species and its members can be identified by the following character combination: face wide; presence of a contrasting tomentose diagonal band extending from antennal base to eye margin; parafacial hairs dark, coarse, abundant, inserted lower than level of oral vibrissae only in a few specimens; antenna with plumosity



FIGURES 28-32. *Ptilodexia planifrons* (Wulp). Fig. 28. Genitalia of male, posterior view. Fig. 29. Ejaculatory apodeme. Fig. 30. Genitalia of male, lateral view. Fig. 31. Head of male, lateral view. Fig. 32. Geographical distribution.

on arista less than or equal to length of second antennal segment; carina long, slightly keeled and prominent; two pairs of oral vibrissae in most specimens; frontal vitta very wide at antennal base; haustellum long, 0.7 to 0.85 times head height, narrowed apically; scutellum and abdomen entirely dark gray or black.

MATERIAL EXAMINED.—One hundred seventy-three males and 70 females of *P. planifrons* were examined.

DISTRIBUTION.—This species ranges from Flagstaff south through the mountains of central and southeastern Arizona, through the central mountainous region of New Mexico, the western tip of Texas, and south into Durango, Mexico. There is one record from Colorado; however, no exact locality is given.

BIOLOGICAL NOTES.—The flight period lasts from August through October, with the majority of records from mid-August to mid-September. The earliest seasonal record is one specimen collected on 27 June (error?) from El Paso, Texas, in 1921, and the latest is a series of 24 females collected on 22 October 1964, in Cochise County, Arizona.

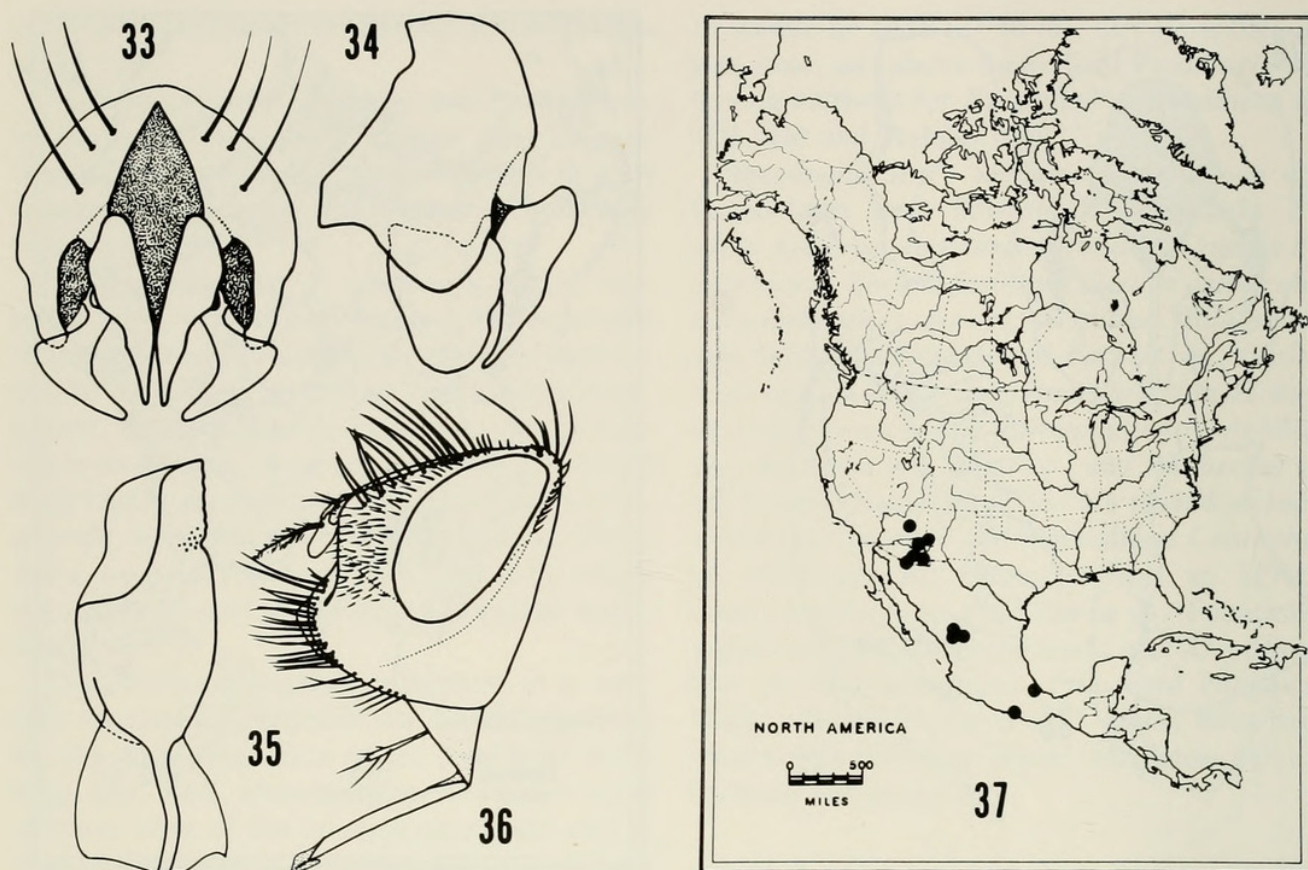
Ptilodexia planifrons adults generally occur in the mountains and have been collected at many elevations between 1,370 and 3,350 m. Flowers visited include *Gutierrezia sarothrae* (1,800–2,440 m, Apache County, Arizona), *Heliopsis parvifolia* (2,590 m, Chiricahua Mts., Cochise County, Arizona), *Solidago trinervata* (Sierra Madre, 2,230 m), and *Rudbeckia* sp. in Chihuahua, all Compositae. All except two of the flower-visiting flies were males (one female collected on *Heliopsis* sp. and another at *Rudbeckia* sp.). One specimen was collected at a light.

Ptilodexia contristans (Wulp)

(Figures 33-37)

Hystrichodexia contristans WULP, 1891:221. [HOLOTYPE, male, deposited in BMNH, labeled, "Holotype"/"Omiteme, Guerrero, 8000 ft., July, H. H. Smith"/"♂"/"B. C. A. Dipt. II., *Hystrichodexia contristans*, v.d.W."/ "Central America, Pres. by F. Godman, O. Salvin. 1903-172."]

Rhynchodexia punctipennis WULP, 1891:233. ALDRICH (1905:499); GUIMARAES (1971:33). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "Cotype"/"Sierra de las Aguas Escondidas, Guerrero, 9500 ft., July, H. H. Smith"/"♂"/"B. C. A. Dipt. II. *Rhynchodexia punctipennis*, v.d.W."/ "Central America. Pres. by F. D. Godman, O. Salvin. 1903-172"/ "Lectotype *Rhynchodexia*



FIGURES 33-37. *Ptilodexia contristans* (Wulp). Fig. 33. Genitalia of male, posterior view. Fig. 34. Genitalia of male, lateral view. Fig. 35. Ejaculatory apodeme. Fig. 36. Head of male, lateral view. Fig. 37. Geographical distribution.

punctipennis Wulp designated by D. Wilder 1975."'] NEW SYNONYMY.

Ptilodexia constrictans (Wulp); GUIMARAES (1971:33) [*lapsus calamus*].

TAXONOMIC NOTES.—The holotype of this species is in fair condition except for a broken thorax and an abdomen which is oily, obscuring the tomentum patterns.

Wulp described *Rhynchodexia punctipennis* and *Hystrichodexia contristans* in the same paper. He felt that the two genera differed by two superficial characters, the general body shape and the hairs of the abdomen. The lectotype of *P. punctipennis*, although in poor condition is certainly a teneral specimen of *P. contristans*.

DIAGNOSIS.—Specimens of *P. contristans* can be separated from those of related species by the following combination of characters: face very wide; parafacial hairs long, dark, abundant, occurring to, and in most specimens, also below level of lower eye margin; third antennal segment broadened apically in some individuals; plumosity on arista short, its width subequal to

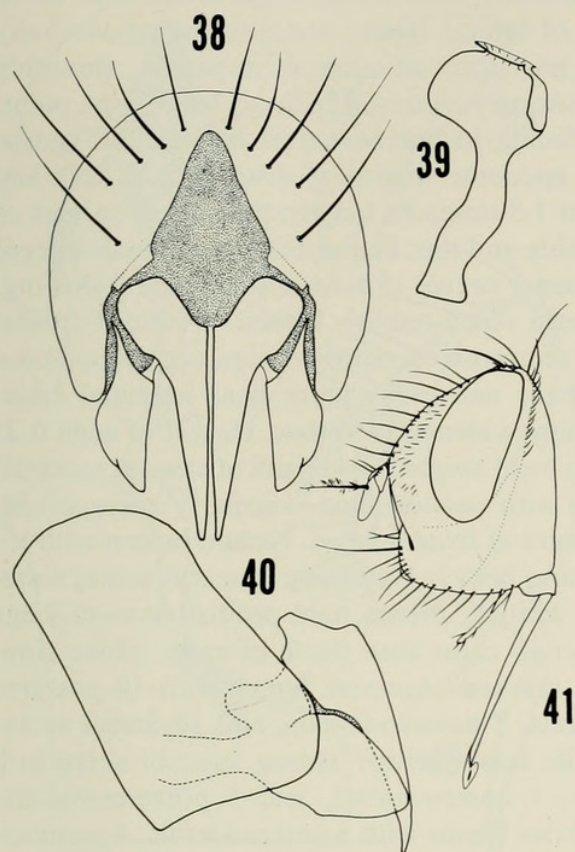
length of second antennal segment; carina short but well developed; haustellum narrow, equal to 0.6 times head height; oral margin strongly protruding; scutellum and sides of abdomen reddish laterally, wing base distinctly darkened; ninth tergite with several strong setae.

MATERIAL EXAMINED.—Ninety-one males and 20 females were examined.

DISTRIBUTION.—This species ranges from the central and southeastern mountains of Arizona southward into the mountains in Durango, Veracruz, and Guerrero. There is one record from New Mexico.

BIOLOGICAL NOTES.—The flight period is from mid-August to early September, with a few scattered records in July. The holotype was collected in July.

All specimens were collected in mountainous areas. The lowest elevation indicated on labels is 2,130 m, in Veracruz, the highest, 2,900 m, in Guerrero. Specimens have been collected on the following Compositae: *Heliopsis parvifolia*, *Calcia decomposita*, *Verbesina encelioides*, *He-*



FIGURES 38-42. *Ptilodexia westi*, n.sp. Fig. 38. Genitalia of male, posterior view. Fig. 39. Ejaculatory apodeme. Fig. 40. Genitalia of male, lateral view. Fig. 41. Head of male, lateral view. Fig. 42. Geographical distribution.

lenium hoopesii, and unidentified *Senecio* sp., *Cirsium* sp., and *Solidago* sp. There are no associated host data.

***Ptilodexia westi*, new species**

(Figures 38-42)

TYPE-LOCALITY.—The holotype was collected at Imperial, Texas, 10 April 1954 by L. D. Beamer.

TYPE-SPECIMENS.—The male holotype is deposited in CNCI, the allotype, from Las Cruces, New Mexico, in USNM. Complete data from these specimens and the 21 paratypes are listed below.

DIAGNOSIS.—This is a distinctive species, its members easily separable from those of other species in the genus by the following combination of character states: face wide, tomentum grayish, very heavy; parafacial hairs from short to medium in length, occurring only on anterior half of parafacial, below apex of antennae in a few individuals; length of haustellum 0.7 to 0.8 times head height, narrowed apically, length of plumosity on arista varied, from 1 to 1.25 times length of second antennal segment; abdomen

heavily tomentose, in males integument dark gray with no median stripe, in females brown or rufous; ninth tergite of males with several strong setae; genitalia unlike those of adults of any other species.

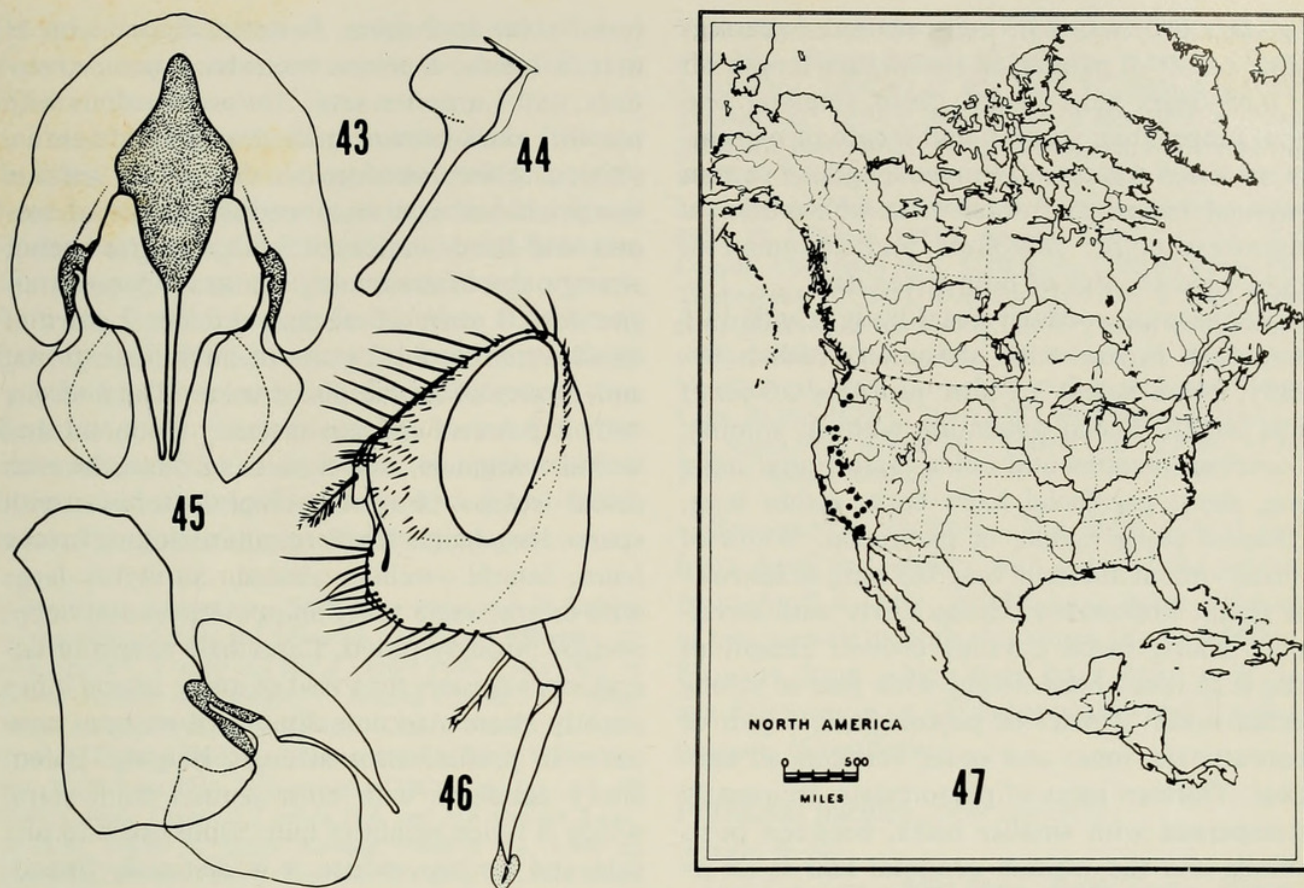
DESCRIPTION.—**Male:** Total body length 10.5 mm, grayish. Head height 2.6 mm; profrons 0.25 of head length. Facial tomentum very heavy, dull, grayish white, obscuring integumental color; parafrontal hairs long, sparse, dark; parafacial hairs medium in length, dark, rather sparse, located along anterior half of parafacial ventrally to slightly beyond apex of antennae. Width of frontal vitta at antennal base 0.4 mm, at narrowest part, 0.1 mm; carina strongly developed, slightly keeled, broad, not depressed below apex of antennae; facial cavities strongly darkened. Height of gena 0.25 times head height. One pair of strong ocellar setae, one pair of smaller postocellars and postverticals; one pair of strong and one pair of weak inner verticals; outer verticals subequal to postorbitals. Fifteen pairs of medium-length postorbital setae, some a little shorter

than others; ventral to postorbitals is an irregular row of dark hairs merging into dense whitish occipital hair. Seven pairs of frontal setae; one pair of oral vibrissae 0.3 mm from oral margin, the shallow depression between them 0.4 mm wide; 9 additional oral setae, one above vibrissae quite strong, peristomals gradually increasing in length with distance from vibrissae. Epistome not protruding, its width twice length of first two antennal segments. Haustellum narrow, length 0.7 times head height, narrowed apically; palpi testaceous, narrow, length 0.5 times haustellum length. Antennae dark testaceous, third segment brownish apically, arista and plumosity dark brown. Third segment of antenna 1.5 times length of second antennal segment. *Thorax*: Mesonotum dark brown with heavy gray tomentum; striping obscure. Integument of scutellum and postalar calli concolorous with rest of notum. Six humeral setae, 2 posthumeral and 1 presutural, 3 pairs of discal scutellars. Pleura brown, sutures lighter, tomentum grayish; infra-squamal setulae present; squamae whitish, wings light brown; epaulet light brown, basica testaceous; mediotergite tomentose. *Legs* dark reddish brown, tibiae lighter apically. Anterior femur with 7 dorsal setae, 8 posterodorsals, 13 posteroventrals; tibia with slightly darkened dorsal line. Middle femur with 5 short anterior setae in 2 rows. Posterior femur with 8 anterodorsals, 5 anteroventrals, 6 posteroventrals, and no anterior setae. Femora with color uniform, tibiae darkened on basal third, tarsi black. *Abdomen* dark brownish black with heavy gray tomentum which is slightly brownish around bases of median marginal setae on second tergite and along posterior margins of third tergite. First syntergite with 1 pair of lateral marginal setae. Second tergite with 1 pair of median discals, 1 pair of median marginals, and 1 pair of lateral marginal setae. Third tergite with 1 pair of median discal setae, and 8 dorsal and lateral marginal setae. *Genitalia*: Eighth tergite with sparse small brown hairs. Ninth tergite long, covered with long dense brown hairs and many long, strong setae; lateral swelling absent. Surstylus small, narrow, lateral angle smoothly rounded, internal depression absent, mesal surface slightly convex with strong hairs; basally with strong setae, in profile, elongate, heart-shaped, inclined strongly in posteroventral direction, partially obscuring cerci. Cerci with lateral lobes angular, only slightly differentiated

from arms; arms wide, height more than twice that of lateral lobes; arms extending ventrally well past apex of surstyli; in profile, smoothly but strongly incurved with no bulge, tips pointed, facing in anteroventral direction. Ejaculatory apodeme with stem distinct from bulb and about 1.3 times its length; bulb open on part of one side and top. **Female**: Similar to male except for usual sexual differences and the following. General color reddish brown. Width of frontal vitta at narrowest point 0.3 mm, at antennal base 0.4 mm, narrowest point near antennal base, strongly widened to vertex. Height of gena 0.25 times head height. Nine pairs of stout postorbital setae with smaller setae irregularly interspersed; six pairs of frontal setae. Notum brown with tomentum heavy; six strong humeral setae; squamae whitish; pleura light reddish brown. Legs lighter in color than those of male, tibiae similarly marked. Anterior femur with 10 posteroventrals, 8 posterodorsals, and 10 dorsal setae. Middle femur with 5 strong anterior setae in 2 rows, 1 anteroventral, and 5 posteroventrals. Posterior femur with 6 anterodorsals, 4 posteroventrals, 5 anteroventrals, and no anterior setae. Abdomen brownish, lighter laterally, covered with heavy grayish tomentum. First syntergite with 1 pair of lateral marginal setae. Second tergite with 1 pair of lateral marginals and 1 pair of median marginal setae. Third tergite with 1 pair of median discals and 10 dorsal and lateral marginals.

VARIATION.—*Ptilodexia westi* adults are quite distinct, but even among the small number of specimens examined, a certain degree of variation is seen. Total body length ranges from 10 to 12 mm. Facial tomentum is yellow or gray in a few specimens; parafacial hairs do not extend to below the antennal apex in most individuals, and the hairs are varied in length, from short to long. The carina is shorter and not visible beyond the apices of the antennae in some specimens. There are two rows, instead of one, of dark hairs ventral to the postorbitals in a few adults. The haustellum length is varied, from 0.7 to 0.8 times the head height. The antennae are also varied, from rufotestaceous to light brown, with the third segment not darkened.

The wings of some specimens are light in color. The femora are darkened apically on all except the dorsal surfaces in some individuals; this is especially noticeable in females, where ground color of the femora can be pale in color.



FIGURES 43-47. *Ptilodexia californica*, n.sp. Fig. 43. Genitalia of male, posterior view. Fig. 44. Ejaculatory apodeme. Fig. 45. Genitalia of male, lateral view. Fig. 46. Head of male, lateral view. Fig. 47. Geographical distribution.

In a few specimens, the abdomen is without brownish tomentum, and the integument is reddish brown ventrally and laterally. The abdomen of many females is reddish with a vague narrow median stripe, and in most females, it has no median discal setae.

MATERIAL EXAMINED.—Fifteen males and 8 females were examined from the following localities. **Arizona:** *Pima Co.:* 1♂, Brown's Canyon, Baboquivari Mts., 18 Aug. 1955, G. Butler (UAIC). **Kansas:** *Clark Co.:* 1♀, Sitka, 12 June 1960, W. Van Velzen (MSUC). **New Mexico:** *Dona Ana Co.:* 1♀, Las Cruces, 21 Sep. (USNM). **Oklahoma:** *Woodward Co.:* 1♂, Range 1 mile NW Supply, 1 June 1961, D. Bryan, 7♂♂-3♀♀, 9 June, 2♂♂3♀♀, 15 June (OSEC). **Texas:** *Brazos Co.:* 1♂, College Station, 30 May 1936, student collector (TAMU). *Pecos Co.:* 1♂, Fort Stockton, 28 Sep. 1935 (TAMU); 1♂, Imperial, 10 Apr. 1954, L. Beamer (CNCI). *Uvalde Co.:* 1♂, Uvalde, 18 May 1914, Bishopp (USNM).

Although few specimens were available for study, this species appears to be the most unusual *Ptilodexia* in the Nearctic region. Its members are, in fact, so dissimilar from those of other species that it may ultimately be assigned to a new genus.

BIOLOGICAL NOTES.—The flight period

stretches from April to September, with too small a sample available to generalize on peak activity. There is no information available regarding host, collecting techniques, or ecology of this species.

DERIVATION OF NAME.—This species is named in honor of Dr. L. S. West, who did much of the early work with this genus in the United State.

californica Group

Ptilodexia californica, new species

(Figures 43-47)

TYPE-LOCALITY.—Two miles (3.2 km) S of Luther Pass, Alpine County, California.

TYPE-SPECIMENS.—The male holotype and the allotype are deposited in the collection of the California Academy of Sciences. The holotype bears the CASC type number 12571. Complete data from these specimens and the 52 male and 37 female paratypes are listed below.

DIAGNOSIS.—*Ptilodexia californica* adults can usually be distinguished from those of other species in the genus using the following combination of character states: facial tomentum shin-

ing, dark brown or pale hairs scattered sparsely along center of parafacial; haustellum length 0.5 to 0.65 times head height; third antennal segment longer than second, and length of plumosity on arista equal to 1.4 times length of second antennal segment; frontal vitta obliterated at narrowest point; scutellum and abdomen of males reddish, legs of both sexes dark.

DESCRIPTION.—Male: Total body length 13.5 mm, dark brown with abdomen reddish laterally. *Head* height 3.3 mm; profrons 0.3 times head length. Facial tomentum whitish, shining, obscuring integumental color; parafrontal hairs long, dark; parafacial hairs dark, rather long, scattered along middle of parafacial. Width of frontal vitta at antennal base 0.5 mm, at narrowest point, obliterated; carina fairly well developed, short; facial cavities brown. Height of gena 0.25 times head height. One pair of strong ocellar setae; 2 pairs of postocellars, 1 pair of postverticals, inner and outer verticals all subequal. Thirteen pairs of postorbitals, frequently interspersed with smaller hairs; between postorbitals and the whitish occipital hair is an irregular row of dark setae. Twelve pairs of frontal setae; one pair of oral vibrissae 0.3 mm from oral margin, the depression between them 0.4 mm wide; 18 additional oral setae, at least one above vibrissae and peristomals subequal. Epistome strongly protruding, its width 1.6 times length of first two antennal segments. Haustellum long, of medium width, 0.6 times head height; palpi long, narrow, testaceous, length 0.5 times haustellum length. Antennae dark rufotestaceous, third segment, arista and plumosity dark brown. Third segment of antenna 1.4 times length of second segment; length of plumosity on arista 1.4 times length of second antennal segment. *Thorax:* Mesonotum dark brown with fine, dull-gray pollen, striping indistinct; integument of scutellum and postalar calli rufotestaceous. Six humeral setae, 1 posthumeral and 2 presuturals, 3 pairs of discal scutellars. Pleura dark brown with fine grayish tomentum; infra-squamal setulae present; squamae whitish, wings pale brown; epaulet dark brown, basicoستا testaceous; mediotergite tomentose, subshining. *Legs* dark brown, tibiae rufotestaceous darkened slightly basally and apically; tarsi blackish. Anterior femur with 9 dorsal setae, 8 posterodorsals, and 21 posteroventrals; tibia with dark dorsal line. Middle femur with 3/4 an-

terior setae in 2 rows. Posterior femur with 11 anterodorsals, 8 anteroventrals, 5 posteroventrals, and 1 anterior seta. *Abdomen* rufous with narrow, dark-brown median stripe; tomentum shining white, shining brown around median marginals and posterior median discals of second and third tergites. First syntergite with 1 strong pair of lateral marginal setae. Second tergite with 3 pairs of median discals, 2 pairs of median marginals, 2 pairs of lateral marginals, and 2 pairs of lateral discal setae. Third tergite with 2 pairs of median discals, 12 dorsal and lateral marginals, and 6 pairs of miscellaneous discal setae. *Genitalia:* Eighth tergite with sparse long hairs. Ninth tergite with long brown hairs, lateral swelling absent. Surstylus large with lateral angle fairly sharp, depression deep; surface strongly pitted. Cerci with height of lateral lobes greater than that of arms; lateral lobes slightly attenuated dorsally, mesal margins concave; in profile, arms strongly bulging. Ejaculatory apodeme with bulb distinct from stem, which is twice height of bulb. Bulb open on one side and on top, where it is distinctly lipped. **Female:** Similar to male except for usual sexual differences and the following. Width of frontal vitta at narrowest point 0.4 mm, at antennal base 0.6 mm. Height of gena 0.3 times head height. Eleven pairs of short postorbital setae; 10 pairs of frontal setae. Legs colored similarly to those of male, tibiae not as pale. Anterior femur with 14 posteroventrals, 8 posterodorsals, and 6 dorsal setae. Middle femur with 5 anterior setae in 2 rows. Posterior femur with no anterior setae, 5 anterodorsals, 5 posteroventrals, and 6 anteroventrals. Abdomen dark reddish brown; median stripe broad and indistinct. First syntergite with 1 pair of lateral marginal setae. Second tergite with 1 pair of median marginals, 1 pair of median discals, and 1 pair of lateral marginal setae. Third tergite with 2 pairs of median discals, 2 pairs of lateral discals, and 12 dorsal and lateral marginal setae.

VARIATION.—*Ptilodexia californica* adults show relatively little variation in many of the diagnostic characters of this group. However, they do seem to exhibit a distinctly greater than usual degree of variation in minor characters as well as in the genitalia. It is possible that later, more-detailed studies may uncover cryptic or incipient species within *P. californica*. There are also a few specimens which appear to be

intermediate between *P. californica* and *P. sabroskyi*, and between *P. californica* and *P. pacifica*.

Total body length ranges from 11 to 16 mm. In a few individuals, facial tomentum has a yellowish cast and the carina is keeled. Most specimens have no small hairs interspersed between the postorbital setae. The haustellum is varied, with the length ranging from 0.5 to 0.65 times head height. Notal tomentum may be partially or wholly dull brown and the mediotergite can be fairly shiny. The abdomen is varied from the state shown in the holotype to dark reddish brown with the median stripe broad and indistinct. The genitalia are extremely varied.

MATERIAL EXAMINED.—Fifty-three males and 39 females were examined from the following localities. **California:** *Alpine Co.:* 1♂, 2 miles [3.2 km] S Luther Pass, 6 July 1959, at flower *Achillea Millefolium*, P. Arnaud (CASC); 1♂, Hope Valley, 9 July 1948, J. MacSwain (CISC). *Fresno Co.:* 1♀, Prather, 29 June 1956, R. Schuster (CISC); 2♀♀, Watts Valley, 22–23 June 1956, R. Schuster (CISC). *Inyo Co.:* 1♀, W Fork Coyote Creek, 2.1 miles [3.4 km] NE Coyote Lake, 37°14'N, 118°30'W, Sierra Nevada, 9,840 ft [ca. 3,000 m] sweeping, 16 Sep. 1969, S. Frommer (UCRC); 1♂, near Mono Pass, 12,000 ft [ca. 3,658 m] 19 Aug. 1956, C. MacNeill (CISC); 1♂ Panamint Mts., 28 May 1937, B. Brookman (CASC). *Kern Co.:* 1♂, 4 miles [ca. 6.4 km] N Muroc, 30 Apr. 1950, T. Leigh (CISC); 2♂♂, Short Canyon, 7 miles [ca. 11 km] NW Inyokern, 13 Apr. 1954, J. MacSwain (CISC); 1♂, Walker Pass, 11 June 1962, G. Bohart (USUC). *Los Angeles Co.:* 3♂♂2♀♀, Oct., Coquillett (USNM); 5♀♀3♂♂, Crystal Lake, 29 June 1950, W. Bentnick, 13♂♂11♀♀, 9 July 1952, R. Wagner (CISC, LACM); 1♂, Little Rock, 10 May 1941, J. Wilcox (PHAC); 1♂1♀, 1 mile W Little Rock, 13 May 1956, J. MacSwain (CISC); 1♂, 2 miles [ca. 3.2 km] W Pearblossom, 12 May 1956, E. Linsley (CISC); 1♀, Rock Creek, 21 July 1936, A. Basinger (CASC). *Mariposa Co.:* 1♂, Yosemite Valley, 26 June 1921, E. Van Dyke (CASC). *Mono Co.:* 1♂1♀, Sardine Creek, 27 June 1957, D. Flaherty (UCRC, UAIC); 1♂, Sonora Pass, 9,000–10,000 ft [ca. 2,740–3,050 m], 16 July 1951, P. Ashlock, 1♀, 10 Aug. 1960, C. Toschi (USNM, CISC). *Nevada Co.:* 1♀, Prosser Dam, 15 July 1966, D. Miller (UCDC); 1♂, 7 miles [ca. 11 km] SE Truckee, 24 June 1954, G. Schaefer (CISC). *Plumas Co.:* 2♂♂1♀ (Allotype), Meadow Valley, 10 June 1924, E. Van Dyke (CASC). *Riverside Co.:* 1♂, Hemet, 26 Apr. 1961, Ewart (UCRC); 1♂, Hidden Valley, Joshua Tree National Monument, 18 May 1946, A. Melander (USNM); 1♂, Pinon Flat, 24 Apr. 1950, C. MacNeill (CISC); 1♂, Pinon Flat, San Jacinto Mts., 18 May 1939, E. Ross, 2♀♀, *Eriogonum*, 21 May 1940, H. Reynolds, 1♂, 27 May 1939, B. Brookman (CISC, UCRC); 1♂, Pinon Flat, Santa Rosa Mts., 27 May 1941, D. Knull (OSUC). *San Bernardino Co.:* 1♂, Helendale, 16 May 1955, W. Richards (CNCI). *San Diego Co.:* 1♀, 16.5 miles [ca. 26.6 km] N of Carlsbad, Timberlake (UCRC). *San Luis Obispo Co.:* 1♂, Oso Flaco Lake, 19 July 1964, M. Irwin (UCRC). *Santa Barbara Co.:* 1♀, Janama Beach, 9 July 1965, J. Powell (CISC); 1♀, Los Prietos, 23 June 1965, J. Powell (CISC). *Santa Cruz Co.:* 1♂, Bear

Valley, Santa Cruz Mts., July 1913, F. Clark (CUIC). *Siskiyou Co.:* 2♂♂, Hebron Summit, 10 miles [ca. 16 km] S of Dorris, 5,300 ft [ca. 1,600 m] 27 July 1953, W. Gertsch (AMNH). *Tehama Co.:* 1♂3♀♀, Deer Creek, 6 July 1952, M. Cazier (AMNH). *Ventura Co.:* 1♀, Quatal Canyon, NW corner Ventura Co., *Stanleya pinnata*, 9 May 1959, J. Powell (CISC); 2♂♂, Hungry Valley, 5 miles [ca. 8 km] S of Gorman, 6 May 1959, C. O'Brien (CISC). **Nevada:** *Clark Co.:* 1♀, Kyle Canyon, Charleston Mts., 5,200 ft [ca. 1,580 m] 4 June 1941, Timberlake (UCRC). *Ormsby Co.:* 1♀, 6 July, Baker (USNM). **Oregon:** *Hood River Co.:* 1♂, Hood River, 17 June, Childs (CISC). *Jackson Co.:* 1♀, Coleston, 31 July 1918, E. Van Duzee (CASC). *Klamath Co.:* 1♂, Eagle Ridge, Klamath Lake, 20 May 1924, C. Fox (CISC). **Washington:** *Yakima Co.:* 1♀, Signal Peak Ranger Stn., 4,000 ft [ca. 1,200 m], 15 July 1933, J. Wilcox (PHAC).

BIOLOGICAL NOTES.—The flight period lasts from April to October with most of the activity from April to July. Adults have been collected at low as well as high elevations (up to 3,660 m). Flowers from which they have been collected are *Eriogonum* sp. (Polygonaceae) and *Stanleya pinnata* (Cruciferae).

Ptilodexia pacifica, new species

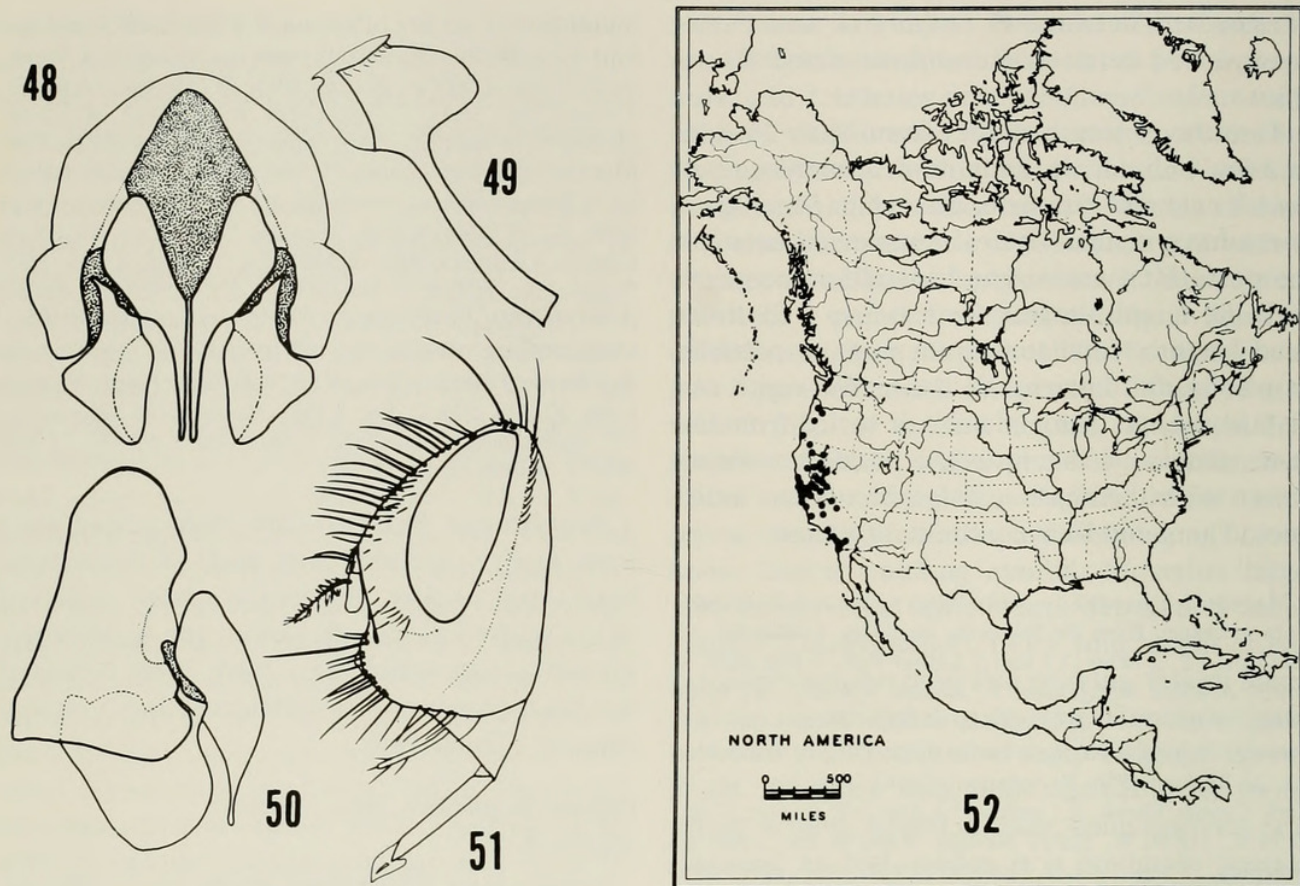
(Figures 48–52)

TYPE-LOCALITY.—Point Pinos, Pacific Grove, Monterey County, California.

TYPE-SPECIMENS.—The holotype, a male, and the allotype are deposited in the collection of the California Academy of Sciences. The holotype bears the CASC type number 12572. Complete data from these specimens and the 62 male and 16 female paratypes are listed below.

DIAGNOSIS.—*Ptilodexia pacifica* is a complex species, but specimens can generally be separated from those of other species in the genus by the following combination of character states: parafacial hairs long, dark, inserted along center of parafacial as low as ventral eye margin; haustellum length varied, from 0.4 to 0.55 times head height; legs of most adults either pale in color or marked with rufotestaceous; notum of most specimens covered with flat, shiny, brownish tomentum, giving it a coppery appearance; abdominal tomentum concolorous—either whitish or brownish in most individuals—white marked with brown in only a few.

DESCRIPTION.—**Male:** Total body length 10.5 mm, dark brown, abdomen reddish. *Head* height 2.75 mm; profrons 0.25 times head length. Facial tomentum heavy, shining grayish, obscuring integumental color; parafrontal hairs long, dark, sparse; parafacial hairs long, dark, rather sparse, inserted along middle of parafacial to ventral margin of eye. Width of frontal vitta



FIGURES 48-52. *Ptilodexia pacifica*, n.sp. Fig. 48. Genitalia of male, posterior view. Fig. 49. Ejaculatory apodeme. Fig. 50. Genitalia of male, lateral view. Fig. 51. Head of male, lateral view. Fig. 52. Geographical distribution.

at base of antenna 0.4 mm, at narrowest part obliterated; carina low, broad, rounded; facial cavities dark brown. Height of gena 0.3 times head height. One pair of strong ocellar setae, 3 pairs of postocellars, 1 pair of postverticals, inner verticals, and outer verticals. Fifteen pairs of long postorbital setae, not interspersed with smaller hairs; between postorbitals and whitish occipital hairs are a few irregular dark setae. Thirteen pairs of frontal setae; 1 pair of strong oral vibrissae 0.2 mm from oral margin, the depression between them 0.4 mm wide. Thirteen additional oral setae; one above vibrissae and peristomals subequal to each other; oral margin protruding, its width equal to 2.2 times length of first two antennal segments. Haustellum of medium width, length 0.5 times head height; palpi long, rufotestaceous, the length 0.6 times haustellum length. Antennae rufotestaceous, third segment, arista and plumosity brown. Third segment of antenna 1.5 times length of second segment; length of plumosity on arista 1.75 times length of second antennal segment. *Thorax*:

Mesonotum dark brown with tomentum appearing grayish from one angle and shiny brownish from others; striping indistinct. Integument of postalar calli, scutellum, and sides of notum rufotestaceous. Six humeral setae, 2 posthumeral and 2 presutural, 2 pairs of discal scutellars. Pleura dark brown with grayish tomentum; infrascapular setulae present; squamae white, wings light brown; epaulet brown, basicosta rufotestaceous; mediotergite thinly tomentose, shining. *Legs* dark rufotestaceous, anterior and middle femora brownish with pale apical markings; posterior femora with dark apicoventral patches; tibiae unmarked, tarsi dark brown. Anterior femur with 7 dorsal setae, 8 posterodorsals, and 15 posteroventrals; tibia without dark dorsal line. Middle femur with 5 anterior setae in 2 rows. Posterior femur with 15 anterodorsals, 8 anteroventrals, 4 posteroventrals, and no anterior setae. *Abdomen* rufotestaceous with a dark median stripe; tomentum whitish. First syntergite with 1 pair of lateral marginal setae. Second tergite with 2 pairs of median discals, 2

pairs of median marginals, 4 pairs of lateral marginals, and 2 pairs of lateral discal setae. Third tergite with 2 pairs of median discals, 10 dorsal and lateral marginals, and 2 pairs of lateral discal setae. **Genitalia:** Eighth tergite with sparse, long, fine hair. Ninth tergite with long brown hair and a distinct lateral swelling. Surstylus with lateral angle sharp, internal depression deep. Cerci with lateral lobes longer than arms; arms reaching to ventral margin of surstylus; in profile, cerci bulging, tips directly ventrally. Ejaculatory apodeme with bulb and stem distinct; stem twice as long as height of bulb, which is widely opened on one side and top; opposite side decumbent. **Female:** Similar to male except for usual sexual differences and the following: General color dark brown. Width of frontal vitta at narrowest point 0.4 mm, at antennal base 0.6 mm wide. Height of gena 0.35 times head height. Seven pairs of medium postorbital setae; 10 pairs of frontal setae. Notum dark brown with heavy brownish tomentum; six humeral setae. Legs rufotestaceous. Anterior femur with 11 posteroventrals, 4 posterodorsals, and 5 dorsal setae. Middle femur with 3 anterior setae in 2 rows, 1 anteroventral, and 4 posteroventrals, 4 anteroventrals, and no anterior setae. Abdomen dark brown, a little lighter laterally. Second tergite with 1 pair of median discals, 1 pair of median marginals, 3 pairs of lateral marginals, and 1 pair of lateral discal setae. Third tergite with 1 pair of median discals, 10 dorsal and lateral marginals, and 2 pairs of lateral discal setae. Tip of abdomen reddish.

VARIATION.—*Ptilodexia pacifica* is the most variable Nearctic species of *Ptilodexia*. Several fairly distinct populations are present, each of which may eventually be recognized as a separate species. I fail to name these as species now because of the inadequate sample and numerous specimens which appear to be intermediates.

The form to which the type-specimens belong has males and females with pale-colored legs. These specimens have the parafacial hairs rather sparse; are small in body size (7–13 mm); and the abdominal tomentum is uniformly whitish in most individuals. This form occurs from southern California along the coast into Monterey County.

Members of the second form are larger; have parafacial hairs abundant; and only females have pale-colored legs, although the legs of some males are marked with orange or reddish. The

facial tomentum is brownish in some specimens, and the abdominal tomentum is so in most. These specimens are more hairy and much darker in color than those of the previous form. Many have one to two rows of dark hairs ventral to the postorbitals, and have dark squamae and wings. This form ranges from Oregon south along the California coast to Monterey County, where both this and the previous form are found.

The third form is found in the Sierra Nevada from northern California south into Inyo County. These specimens resemble those of the first form in size and facial hair; however, most individuals are darker in color, and males and females have dark-colored legs. The abdominal tomentum is concolorous, whitish.

Specimens of the three forms have a number of character states in common which segregate them from specimens of other western species. It is for this reason and the lack of material that I have treated the complex as one species. It is hoped that further collecting, and ecological and life history studies will elucidate relationships and uncover a basis for the variability within this species.

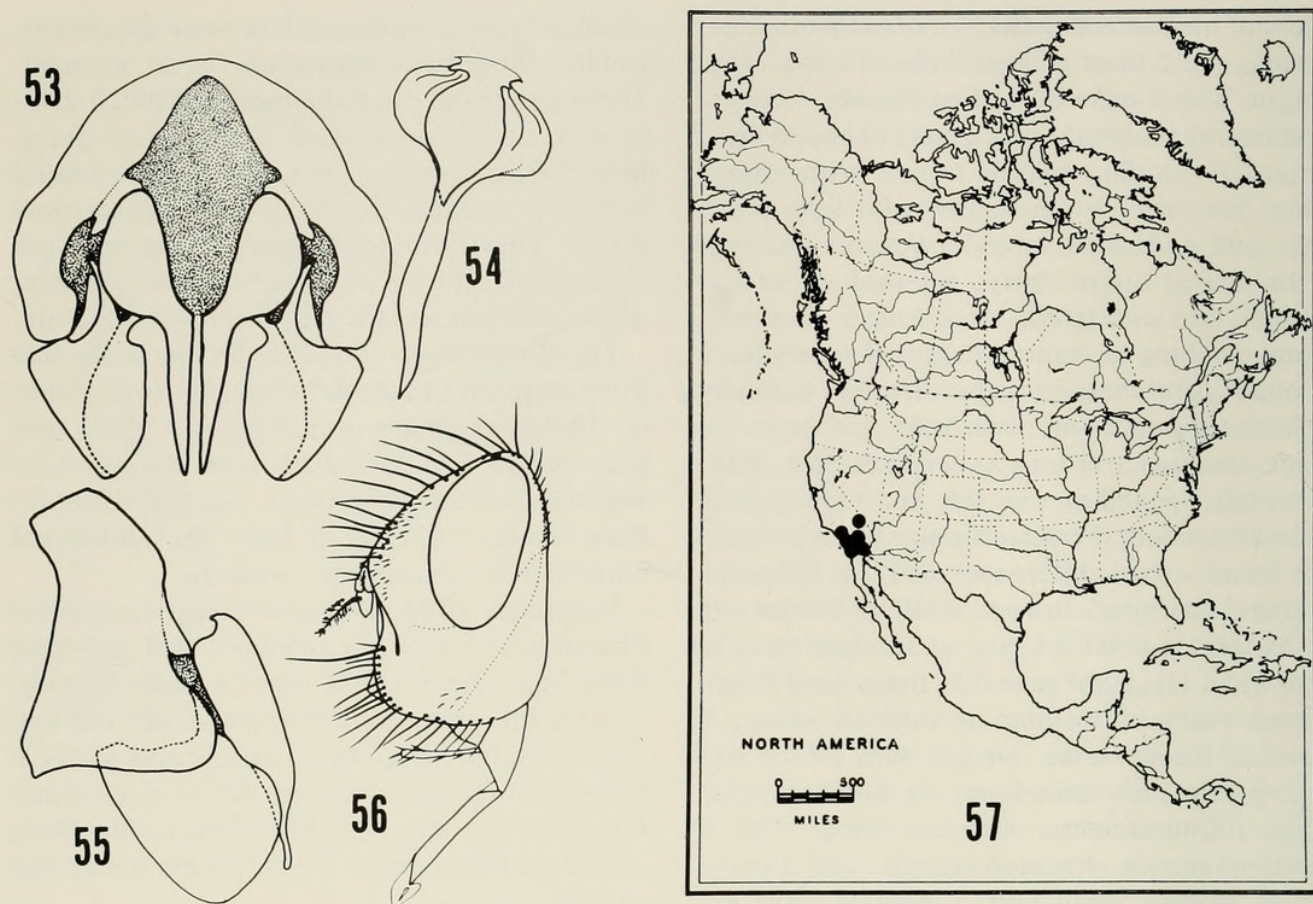
MATERIAL EXAMINED.—Two hundred twenty-six males and 115 females of *P. pacifica* were examined. Data from those specimens in the type-series are as follows: **California:** *Monterey Co.*: 35♂♂1♀, Point Pinos, Pacific Grove, 24 May, 1952, P. Arnaud, 4♂♂12♀♀, 13 June 1959, 25♂♂5♀♀, 19 Aug. 1957 (PHAC).

Data from the other specimens examined are recorded by Wilder (1976).

DISTRIBUTION.—The species ranges from southern California north along the coast to northern Oregon. It is also found in the Central Valley and through the Sierra Nevada in California.

BIOLOGICAL NOTES.—The flight period ranges from May to November with specimens occurring throughout that period with perhaps two activity peaks—one in late spring and early summer, and the other in the fall.

Specimens of *P. pacifica* have been collected on the following flowers belonging to the family Compositae: *Baccharis pilularis*, *Chrysothamnus viscidiflorus*, and *Achillea Millefolium*, and undetermined *Baccharis* sp. and *Solidago* sp. Specimens have also been collected from *Eriogonum elatum* (Polygonaceae). They have also been collected while resting on the leaves of *Rubus parviflorus* and *Umbellularia californica*. This species inhabits both low and high (up to



FIGURES 53-57. *Ptilodexia sabroskyi*, n.sp. Fig. 53. Genitalia of male, posterior view. Fig. 54. Ejaculatory apodeme. Fig. 55. Genitalia of male, lateral view. Fig. 56. Head of male, lateral view. Fig. 57. Geographical distribution.

3,660 m) elevations. Collecting methods used include UV and white light, sweeping, flight trap, and light trap. *Ptilodexia pacifica* adults have been collected in meadows, near streams, on sand dunes, and on rocks.

Ptilodexia sabroskyi, new species

(Figures 53-57)

TYPE-LOCALITY.—San Clemente, Orange County, California.

TYPE-SPECIMENS.—The holotype, a male, was collected by G. Eickwort on 25 July 1961, and is deposited in MSUC. The allotype, deposited in LACM, is from near Wrightwood, 1,719 m, San Bernardino County, California. Complete data from these specimens and the 37 male and 7 female paratypes are listed below.

DIAGNOSIS.—Specimens of *P. sabroskyi* are large, robust, and quite distinctive. They can be distinguished from those of other species of *Ptilodexia* by the following combination of character states: parafacial hairs brown, rather short, concentrated near upper anterior edge of parafacial and scattered randomly elsewhere, lower ones often yellowish; length of plumosity

on arista less than twice length of second antennal segment, the third antennal segment short, subequal to the second in length; smallest distance between eyes greater than width of frontal vitta at antennal base; frontal vitta not obliterated at its narrowest point; length of haustellum varied from 0.5 to 0.6 times head height; legs of both sexes dark; notum light brown laterally in most individuals.

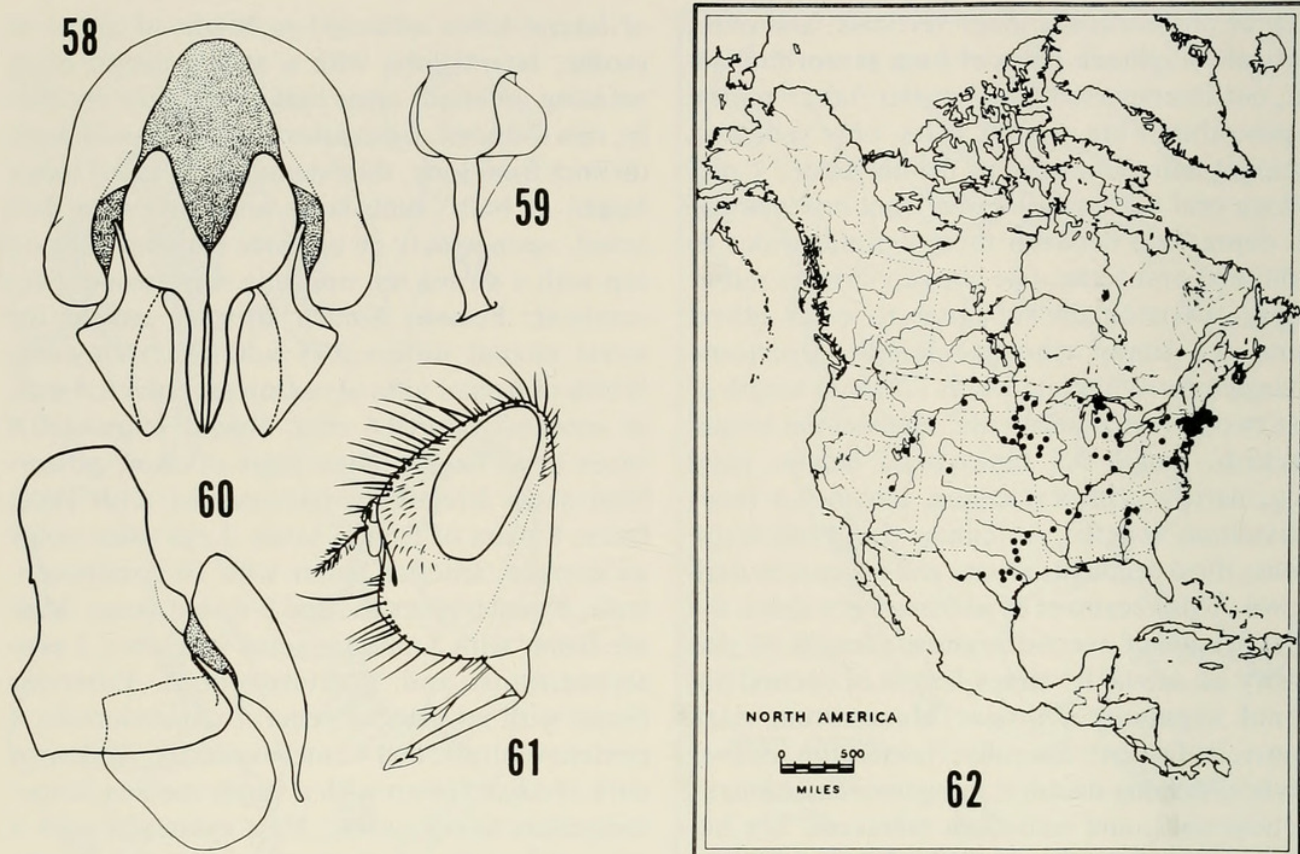
DESCRIPTION.—**Male:** Total body length 17 mm, dark brown with abdomen reddish laterally. *Head* height 4 mm; profrons 0.3 times head length. Facial tomentum dull whitish, heavy, obscuring integumental color; parafrontal hairs medium in length, dark, abundant; parafacial hairs brown, short, concentrated on upper anterior portion of face, short, pale hairs scattered elsewhere on parafacial. Width of frontal vitta at antennal base 0.6 mm, at narrowest point 0.1 mm; carina well developed, broad; facial cavities dark gray. Height of gena 0.3 times head height. One pair of strong ocellar setae, two pairs of smaller postocellars, one pair

each of postverticals, inner verticals, and outer verticals. Eighteen pairs of long postorbital setae, not interspersed with smaller hairs; ventral to postorbitals are no dark hairs, only yellowish occipital hair. One pair of frontal setae, 1 pair of long oral vibrissae 0.4 mm from oral margin, the depression between them 0.6 mm wide; 16 additional oral setae, one above vibrissae rather strong, peristomals subequal to each other, about 0.5 times vibrissae length. Epistome strongly protruding, its width 1.7 times length of first two antennal segments. Haustellum broad, blackish, length 0.5 times head height; palpi long, narrow, rufotestaceous, length 0.6 times haustellum length. Antennae dark rufotestaceous; third segment, arista, and plumosity dark brown. Third segment of antenna very short, 0.8 times length of second segment; length of plumosity on arista 1.5 times length of second antennal segment. *Thorax*: Mesonotum dark brown, rufescent laterally; tomentum heavy, grayish, striping distinct; integument of humeri, postalar calli, and scutellum rufescent. Six humeral setae, 2 posthumeral and 2 presuturals, 6 pairs of discal scutellars. Pleura dark brown, sutures lighter, tomentum heavy, grayish; infra-squamal setulae present; squamae whitish, wings light brown, epaulet dark brown, basicoxa testaceous; mediotergite subshining tomentose. *Legs* dark brown, tibiae rufous, darkened basally and slightly apically; tarsi blackish. Anterior femur with 12 dorsal setae, 11 postero-dorsals, and 18 posteroventrals; tibia with dark dorsal line. Middle femur with 4 strong anterior setae in 2 rows. Posterior femur with 13 antero-dorsals, 10 anteroventrals, 6 posteroventrals, and no anterior setae. *Abdomen* rufous with a narrow, dark brown, median stripe; tomentum white, heavy, patchy, brown around median marginal setae of second and third tergites. First syntergite with 1 pair of lateral marginal setae. Second tergite with 3 pairs of median discals, 2 pairs of median marginals, 3 pairs of lateral marginals and 2 pairs of lateral discals. Third tergite with 3 pairs of median discals, 12 dorsal and lateral marginals, and 4 pairs of lateral discals. *Genitalia*: Eighth tergite with numerous small, fine hairs. Ninth tergite with long dark hairs; lateral swelling pronounced. Surstylus large with lateral angle sharp, internal depression rather shallow, basally strongly convex; in profile, inclined slightly posterad. Cerci with height

of lateral lobes subequal to height of arms; in profile, lateral lobe with a strong dorsal hook pointing anteriorly, arms bulging slightly ventrally, tips rounded. Ejaculatory apodeme with bulb distinct from long, thin stem, which is 2.5 times height of bulb. Bulb large and somewhat flattened, open widely on one side and narrowly on top with a strong lip; opposite side strongly decumbent. **Female**: Similar to male except for usual sexual differences and the following. Width of frontal vitta at narrowest point 0.4 mm, at antennal base 0.6 mm. Height of gena 0.4 times head height. Nine pairs of short postorbital setae irregularly interspersed with short hairs; 8 pairs of frontal setae. Legs same color as in male, anterior femur with 10 posteroventrals, 8 posterodorsals, and 8 dorsal setae. Middle femur with 3 anterior setae in 2 rows, 5 posteroventrals, and 1 anteroventral. Posterior femur with no anterior setae, 7 anterodorsals, 4 posteroventrals, and 4 anteroventrals. Abdomen dark reddish brown with a vague median stripe; tomentum heavy, white. First syntergite with 1 pair of lateral marginal setae. Second tergite with 1 pair of median discals, 1 pair of median marginals, and 1 pair of lateral marginal setae. Third tergite with 1 pair of median discals and 12 dorsal and lateral marginals.

VARIATION.—*P. sabroskyi* exhibits relatively little variation. Total body length ranges from 12 to 18 mm. The scattered hairs on the parafacial are brown in some individuals, but are long in none. The third antennal segment is varied in length, at its longest being equal to the second segment. The number of discal scutellar setae is quite varied, as are the lengths of those setae. Abdominal color in males and females ranges from rufous to dark reddish brown, although few individuals exhibit the latter. There is no brownish tomentum on the abdomens of a few males and many females.

MATERIAL EXAMINED.—Material examined included 38 males and 8 females. Data from these specimens are as follows: **California**: *Unknown*: 1♂, Marina Beach, 17 June 1961, C. Philip (CASC); 1♂, Pine Lake, southern California, Johnson (USNM). *Inyo Co.*: 1♀, Wyman Canyon, White Mts., near stream, 21 July 1967, S. Frommer (UCRC). *Los Angeles Co.*: 1♂, Malibu Creek mouth, 17 July 1953 (LACM); 1♂, Claremont, Baker (LACM). *Orange Co.*: 1♂, Newport, 10 July 1916, D. Hall (USNM); 3♂♂, Newport Beach, 19 Aug. 1920, Timberlake (UCRC); 1♂, San Clemente, 25 July 1961, G. Eickwort (MSUC). *Riverside Co.*: 1♂, Coachella Valley, 7 Apr. 1928, R. Woglum (CISC); 1♂, Palm Springs, Andreas



FIGURES 58-62. *Ptilodexia carolinensis* Brauer and Bergenstamm. Fig. 58. Genitalia of male, posterior view. Fig. 59. Ejaculatory apodeme. Fig. 60. Genitalia of male, lateral view. Fig. 61. Head of male, lateral view. Fig. 62. Geographical distribution.

Canyon, 24 Apr. 1954, M. Wasbauer (CISC). *San Bernardino Co.*: 1♂, May, Coquillet (USNM); 1♂, Barton Flats, 20 July 1950, A. Melander (USNM); 5♂♂, Cajon, 11 May 1934, C. M. (UCRC); 3♂♂, Colton, 26-28 May 1917, E. VanDuzee (CASC); 1♂, Deep Creek Public Camp, 15 June 1957, A. Menke (LACM); 1♂, South Fork Camp, San Bernardino Mts., 2 Sep. 1946, Timberlake (UCRC); 1♂, upper Santa Ana River, 6 July 1948, A. Melander, 1♂, 9 July 1959, 1♂, 16 July 1947, 1♂, 18 July 1950, 1♂1♀, 22 July 1950, 1♂, 4 Aug. 1946, 1♂, 10 Aug. 1949, 1♂, 29 Aug. 1946, 1♂, 15 Sep. 1946 (USNM); 1♂, Verdmont, 22 May 1954, A. Melander (USNM); 1♀, near Wrightwood, 1,719 m (LACM). *San Diego Co.*: 1♂, A. Moldenke (USNM); 1♂, 1 mile S of Del Mar, *Eriogonum fasciculatum*, 10 July 1963, P. Hurd (CISC); 1♂1♀, Dulzura, 14 June 1917 (AMNH); 1♀, 2.8 miles [ca. 4.5 km] SW of Poway, Los Penasquitos Creek, 400 ft [ca. 120 m], 25 July 1965, R. Somerby (UCRC); 1♀, Tecate Peak, 10 July 1963, J. Powell (CISC). *Ventura Co.*: 1♀, Oxnard Beaches, 13 June 1955, R. Erdmann, 1♂, 16 July 1953, W. Gertsch, 1♀, 25 July 1956, R. Erdmann (LACM, AMNH).

DISTRIBUTION.—The range of *P. sabroskyi* is restricted to southern California and the White Mountains.

BIOLOGICAL NOTES.—The period of activity lasts from April to September. Adults have been

collected near a stream and on *Eriogonum fasciculatum* (Polygonaceae).

DERIVATION OF NAME.—*Ptilodexia sabroskyi* is named in honor of Dr. C. W. Sabrosky for his enormous contribution to the study of the Tachinidae.

carolinensis Group

Ptilodexia carolinensis Brauer and Bergenstamm

(Figures 58-62)

Ptilodexia carolinensis BRAUER AND BERGENSTAMM, 1899:119.

BRAUER (1899:508); ALDRICH (1905:499); SABROSKY AND ARNAUD (1965:988); COLE (1969:543). [LECTOTYPE (here designated), male, deposited in VMNH, labeled, "S. Carolina"/"rufipennis Mq, carolinensis, Coll. Winthem, (two indistinguishable words)"/"Carolinensis Type, det. Brauer. Bergenst."/"carolinensis Type Br Bgst"/"Ptilodexia carolinensis Br. Bgst."/"Lectotype *Ptilodexia carolinensis* designated by D. Wilder 1976."]

Estheria tibialis (partim): COQUILLET (1910:598); TOWNSEND (1931:102). (misidentification)

Ptilodexia abdominalis (partim): DAVIS (1919:84). (misidentification)

Ptilodexia neotibialis WEST, 1924:184. LEONARD (1928:822);

CURRAN (1930:93); SABROSKY AND ARNAUD (1965:989); COLE (1969:543). [HOLOTYPE, male, deposited in MCZC, labeled, "Colebrook, Conn., Coll. W. M. Wheeler"/"Black square"/"MCZ Type 26963"/"Holotype *Ptilodexia neotibialis* West."] NEW SYNONYMY

Dexia harpasa (partim): ALDRICH (1925:114); JOHNSON (1925b:208). (misidentification)

Rhynchodexia confusa (partim): JOHNSON (1925b:208). (misidentification)

Ptilodexia minor WEST, 1925:132. LEONARD (1928:822); WEST (1950:pl. I, fig. 3, pl. IV, fig. 8); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, female, deposited in CUIC, labeled "Duck Lake, N.Y., 6-VIII-21"/"L. S. West Collector"/"Wing Slide, Cornell U., Lot 919, Sub 86, L. S. West"/"Holotype *Ptilodexia minor* West"/"Holotype Cornell U., No. 1875"/"Cornell U., Lot. 922, Sub. 43."] NEW SYNONYMY

TAXONOMIC NOTES.—*Ptilodexia carolinensis* has been confused routinely with other species by earlier workers. Neither Curran nor West had ever seen the type. West speaks of generic characters but never mentions *P. carolinensis*, the type-species of the genus, in any of his papers.

Aldrich (1925) saw the types, matched them with his specimens of *P. canescens* and *P. planifrons*, which he thought were *Estheria tibialis*. Following Austen (1907), he assigned this species to *Dexia harpasa* Walker. Townsend (1931) and Coquillett (1910) also felt that *P. carolinensis* was a synonym of *E. tibialis*. Sabrosky and Arnaud (1965) considered *P. carolinensis* separate from *P. harpasa*.

I have seen the type—there is only one male now, not the two which Aldrich (1925) reported—and it is in excellent condition. The specimen has been designated lectotype.

DIAGNOSIS.—*Ptilodexia carolinensis* is a diverse species (or perhaps species group), its members lacking distinct characters. Specimens can be more easily assigned here by characteristics which they lack rather than those which they possess.

Adults with rather broad, parallel-sided face, vibrissal angle protruding little or not at all; parafacial hairs long, fine, inserted along middle of parafacial; epistome protruding only slightly; third antennal segment 1.5 times length of second in most specimens; length of plumosity on arista varied from 1 to 1.5 times length of second antennal segment; haustellum length varied from 0.4 to 0.5 times head height; scutellum and sides of abdomen orange-brown in most adults; some specimens from Texas and South Dakota are totally orange-brown.

MATERIAL EXAMINED.—Two hundred fifty-six males and 133 females were examined.

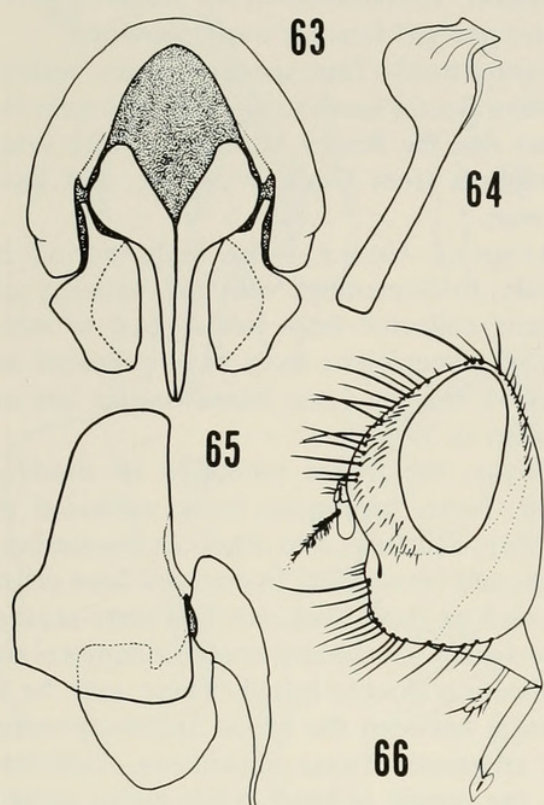
DISTRIBUTION.—This species ranges widely from Nova Scotia south to Georgia and west into Texas and the Rocky Mountains, with scattered records from Utah, Wyoming, and Saskatchewan.

BIOLOGICAL NOTES.—The flight period is from July to September with the majority of specimens collected from mid-August to mid-September. Specimens have been collected as early as 30 May on Long Island and as late as 23 October in Virginia.

In Texas, the insect seems to be double-brooded, some specimens being collected in April, May, and June, and others in September, October, and November. In material from other areas, such as New York, we find early-season and late-season specimens, but their numbers do not indicate a double brood. There may be a correlation between the brood and body color in the enigmatic Texas specimens. Unfortunately, the sample at hand, while giving weight to this possibility, is too small for any such conclusions to be drawn.

Specimens which have been brought into the lab complete their development and emerge much earlier than they would have in nature. Parasitized Japanese beetles, collected in October, yielded adult *Ptilodexia carolinensis* as early as 21 December. It is not known if these specimens were exposed to cold temperatures. It is feasible that in a warm climate two broods might occur. In the area where the above-mentioned specimens were collected (Connecticut), the adult would not have emerged, under normal conditions, until the following summer.

Nearly all of the specimens of this species were collected at low elevations. One was collected at 1,450 m in the southern Appalachians, and others in Colorado and Wyoming at 1,950 m and 2,060 m, respectively. A number of specimens have been collected by sweeping vegetation, and some have been taken on *Solidago* sp. Perhaps coincidentally, Japanese beetle feeds on the foliage of *Solidago juncea* (Fleming 1972). Available host data indicate that this insect parasitizes *Popillia japonica* in the Northeast and *Phyllophaga* sp. in Texas. Davis (1919:84) reports that adults (under the name of *P. abdominalis*) were reared from the larvae of *Phyllophaga rugosa* collected in Manitoba.



FIGURES 63–67. *Ptilodexia canescens* (Walker). Fig. 63. Genitalia of male, posterior view. Fig. 64. Ejaculatory apodeme. Fig. 65. Genitalia of male, lateral view. Fig. 66. Head of male, lateral view. Fig. 67. Geographical distribution.

Ptilodexia canescens (Walker)

(Figures 63–67)

Dexia canescens WALKER, 1852:310. OSTEN SACKEN (1878:155); ALDRICH (1905:502); AUSTEN (1907:345); CHAMPLAIN AND KNULL (1944:214); PETERSON (1948:60); SABROSKY AND ARNAUD (1965:988). [HOLOTYPE, male, deposited in BMNH, labeled “*Dexia canescens*, Walk.”/“Holotype”/“U.S.”/“United States. Ex. Coll. Saunders 68.4”/Crosskey examination label, 1970]

Ptilodexia harpasa (partim): DAVIS (1919:82); ALDRICH (1925:114); JOHNSON (1925b:208). (misidentification)

Rhynchodexia confusa (partim): JOHNSON (1925b:208). (misidentification)

TAXONOMIC NOTES.—The holotype has many dorsal setae broken and one antenna missing. The wings are in excellent condition.

DIAGNOSIS.—Adults of *P. canescens* are unique in the following combination of characters: parafacial hairs long, coarse, denser near lower anterior edge of eye in most individuals. Oral margin in most adults not protruding; males with frontal stripe not obliterated at narrowest point; width of plumosity on arista less than or equal to length of second antennal segment; length of haustellum less than half head height;

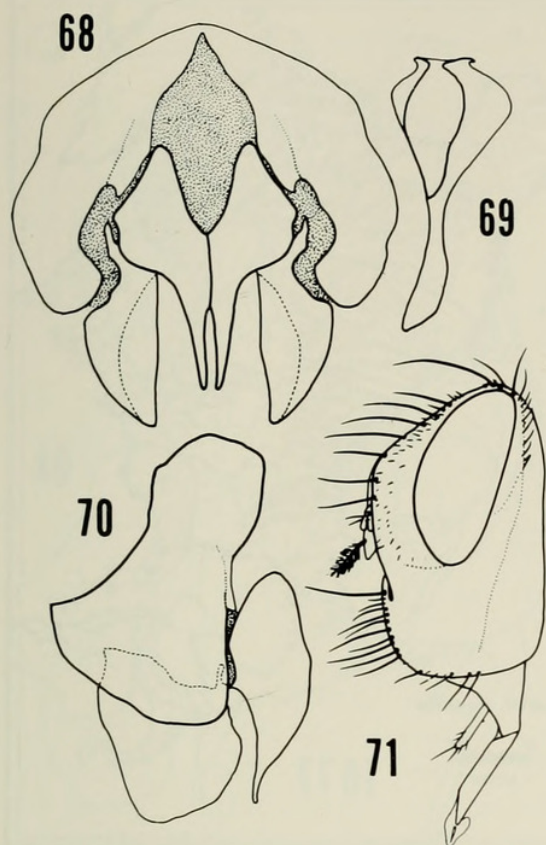
total absence of infrascapular setulae; abdomen quite dark in most specimens, with a distinct median stripe in a few.

MATERIAL EXAMINED.—One hundred forty-eight males and 68 females were examined.

DISTRIBUTION.—This species ranges from Nova Scotia to Long Island and west to the Rocky Mountains. There are scattered records in British Columbia, Idaho, Wyoming, and Utah.

BIOLOGICAL NOTES.—The flight period is from June to August, with the majority of records in mid-July. Specimens have been collected as early as 24 April (Long Island, 1923) and as late as 8 September (Massachusetts, 1907) in nature.

The majority of specimens were collected at low elevations; however, there are records from mountainous areas, the highest being 2,040 m in Wyoming. Specimens from Massachusetts and Utah have been collected on the flowers of parsnip. Specimens from State College, Pennsylvania, were taken at a UV light. In Kindred, in eastern North Dakota, a male and a female were



FIGURES 68-72. *Ptilodexia halone* (Walker). Fig. 68. Genitalia of male, posterior view. Fig. 69. Ejaculatory apodeme. Fig. 70. Genitalia of male, lateral view. Fig. 71. Head of male, lateral view. Fig. 72. Geographical distribution.

collected on native prairie vegetation. Two males and six females have been reared and are associated with puparia. The only host data available indicate that this insect is a parasitoid of *Phyllophaga* sp.

Ptilodexia halone (Walker)

(Figures 68-72)

Dexia halone WALKER, 1849:837. OSTEN SACKEN (1878:155); ALDRICH (1905:502); SABROSKY AND ARNAUD (1965:988). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "*Dexia halone* Wlk."/"Lectotype"/"Georgia, U.S.A., Ex. Coll. Abbot"/"Georgia"/Crosskey examination label 1970/"Lectotype *Dexia halone* Walker designated by D. Wilder 1975."]

Ptilodexia hucketti WEST, 1952:131. LEONARD (1928:822); CURRAN (1930:93); WEST (1950:pl. I, fig. 1); SABROSKY AND ARNAUD (1965:988) [HOLOTYPE, male, deposited in CUIC, labeled, "Riverhead, L.I., N.Y., 30 July 1922, H. C. Hockett"/"Holotype *Ptilodexia hucketti* West, ♂"/"Holotype Cornell U. No. 1872"/"Cornell U., Lot. 922, Sub. 44"]
NEW SYNONYM

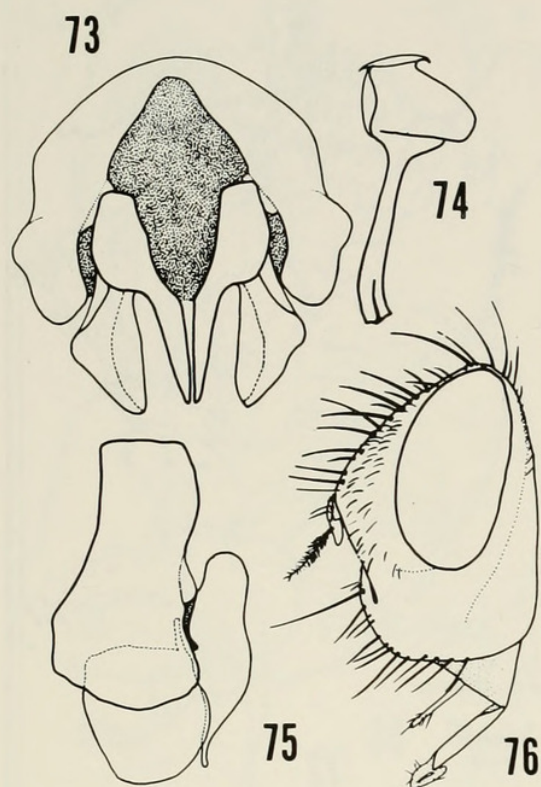
TAXONOMIC NOTES.—The lectotype and paralectotype are in poor condition but still easily recognizable. The lectotype has all dorsal setae broken or absent, most tarsi and the left pos-

terior leg missing, and the abdomen broken and glued.

DIAGNOSIS.—Adults of *Ptilodexia halone* can be distinguished from those of all other species of *Ptilodexia* by the following combination of characters: totally orange or orange-brown in color; parafacial hairs short and pale, inserted rather randomly on parafacial; oral margin not or only slightly protruding; area between oral vibrissae and oral margin higher than wide (length and width may be equal); length of haustellum 0.3 to 0.4 times head height; third antennal segment only slightly longer than second; length of plumosity on arista 1.4 times length of second segment; inner vertical setae strongly convergent; tarsi concolorous with femora and tibiae; presence of median marginal setae on first abdominal segment.

MATERIAL EXAMINED.—Thirteen males and seven females were examined.

DISTRIBUTION.—Scant available records show that *P. halone* ranges from southern Mississippi presumably through the Appalachians into Tennessee and along the East Coast from Maryland



FIGURES 73-77. *Ptilodexia prexaspes* (Walker). Fig. 73. Genitalia of male, posterior view. Fig. 74. Ejaculatory apodeme. Fig. 75. Genitalia of male, lateral view. Fig. 76. Head of male, lateral view. Fig. 77. Geographical distribution.

to Albany, New York. There is one record from Georgia. Adults appear to be uncommon.

BIOLOGICAL NOTES.—The flight period ranges from June to July in the southern part of its range and from mid-July to late August in the north. There are no ecological data associated with the material examined.

Ptilodexia prexaspes (Walker)

(Figures 73-77)

Dexia prexaspes WALKER, 1849:837. OSTEN SACKEN (1878:155); BRAUER (1899:502); AUSTEN (1907:345); BRIMLEY (1938:368); SABROSKY AND ARNAUD (1965:989). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "*Dexia prexaspes* Walk."/"Lectotype"/"Georgia, U.S.A., Ex. coll. Abbot"/"Georgia"/Crosskey examination label, 1970/"Lectotype *Dexia prexaspes* Walker, designated by D. Wilder 1975."]

TAXONOMIC NOTES.—The lectotype has the right front and rear tarsi missing, most frontals, dorsal abdominal, and thoracic setae missing, and the haustellum withdrawn.

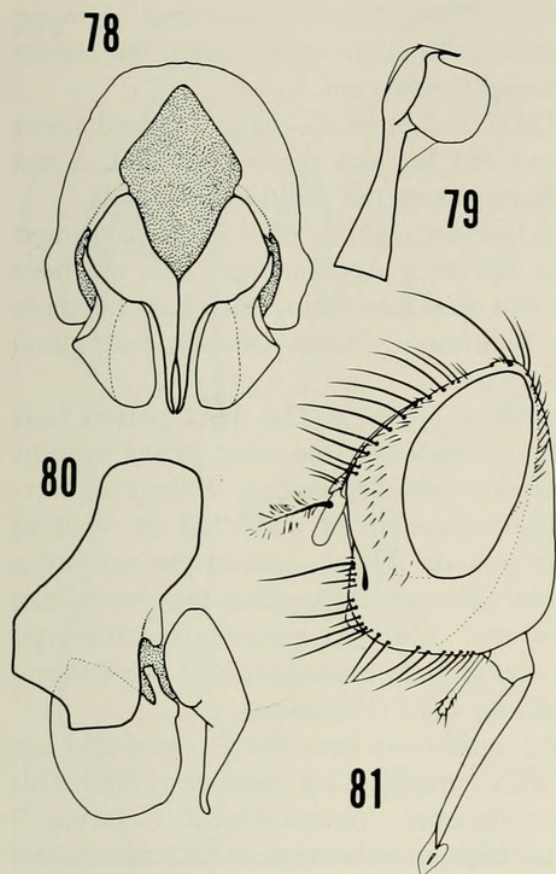
DIAGNOSIS.—Adults of *Ptilodexia prexaspes* are unique in the following combination of characters: Rather light-colored flies, females uni-

formly dark rufotestaceous except for darker tarsi; males may be partially brown dorsally, but with at least humeri and legs pale rufotestaceous; parafacial hairs dark, short in females, long and coarse in males, scattered on parafacial; third antennal segment 1.5 times length of second; length of plumosity on arista subequal to second antennal article; frontal vitta of males obliterated at some point between eyes; length of haustellum 0.3 to 0.4 times head height; oral margin protrudes slightly, if at all; area between oral vibrissae and oral margin distinctly higher than wide; legs of males and females light in color.

MATERIAL EXAMINED.—Only six males and six females of *P. prexaspes* have been examined for this study.

DISTRIBUTION.—This species appears to be localized and its members uncommon. The range extends from central Florida along the southern Atlantic coast to Cape Hatteras, North Carolina.

BIOLOGICAL NOTES.—This insect appears to have two broods in Florida. The flight periods



FIGURES 78-82. *Ptilodexia harpasa* (Walker). Fig. 78. Genitalia of male, posterior view. Fig. 79. Ejaculatory apodeme. Fig. 80. Genitalia of male, lateral view. Fig. 81. Head of male, lateral view. Fig. 82. Geographical distribution.

are from late March and April to June in Florida, and late August and September to October in Florida and North Carolina.

Adults of *P. prexaspes* have been collected at a 15-watt UV light in March and June. In the fall they have been taken on *Solidago microcephala* and *Eupatorium*, both Compositae. One specimen was collected from a female asilid, *Efferia aestuans* (Linnaeus), which had presumably taken it as prey.

harpasa Group

Ptilodexia harpasa (Walker)

(Figures 78-82)

Dexia harpasa WALKER, 1849:840. OSTEN SACKEN (1878:155); ALDRICH (1905:502); AUSTEN (1907:344); DAVIS (1919:82); WEST (1924:186); ALDRICH (1925:114); JOHNSON (1925a:89); (1925b:208); (1927:203); LEONARD (1928:822); CURRAN (1930:93); TOWNSEND (1931:102); BRIMLEY (1938:368); PROCTER (1938:371); (1946:429); SABROSKY AND ARNAUD (1965:988). [HOLOTYPE, a female, deposited in BMNH, labeled, "*Dexia harpasa*, Walk."/"Holotype"/"40 3 30 1026"/"N. America. ex. Coll. Children 40.3.30.1026."/"Crosskey examination label 1970.]

Ptilodexia leucoptera WEST, 1925:132. LEONARD (1928:822); CURRAN (1930:93); WEST (1950:pl. I, fig. 2); SABROSKY AND

ARNAUD (1965:989). [HOLOTYPE, female, deposited in CUIC, labeled, "Riverhead, L.I., N.Y., IX-17-13"/"Wing Slide, Cornell U., Lot. 919, Sub. 115, L. S. West"/"Holotype *Ptilodexia leucoptera* West ♀"/"Holotype Cornell U., No. 1874"/"Cornell U., Lot. 922, Sub. 42."] NEW SYNONYMY

Dinera robusta CURRAN, 1930:93. WEST (1950:111); SABROSKY AND ARNAUD (1965:989). [LECTOTYPE (here designated), male, deposited in CUIC, labeled, "Poughkeepsie, N.Y., July 1906, N.Y.S. Coll."/"♂ Allotype *Rhynchiodesia robusta* Curran"/"Allotype Cornell U., No. 1935"/"Cornell U., Lot. 922, Sub. 3"/"Ptilodexia obscura West, det. H. J. Reinhard"/"Lectotype *Dinera robusta* Curran designated by D. Wilder 1976."] NEW SYNONYMY
Ptilodexia tibialis (partim): TOWNSEND (1931:102).

TAXONOMIC NOTES.—*Ptilodexia harpasa* was first described and named from one female by Walker in 1849. The holotype is in poor condition, lacking posterior legs, right middle leg, and antennae (one antenna is glued to the double mount). All the setae from the dorsal surface of the thorax and abdomen are missing, and the coxal, sternopleural, and hypopleural areas of the left side are obliterated by the pin. The parafacial hairs have been rubbed off, but were obviously present at one time. Despite its condi-

tion, there is no question about the identity of the specimen.

Austen (1907) placed the name *P. harpasa* in synonymy with *P. tibialis*, apparently without seeing the type of the latter (which had been lost). Aldrich (in Davis 1919) disputed this and restored validity to *P. harpasa*. In 1925, upon visiting the Vienna Natural History Museum, he placed *P. carolinensis* in synonymy with *P. harpasa*, using for comparison specimens from USNM which were actually *P. canescens* and *P. planifrons*. At no time does Aldrich mention seeing the type of *P. harpasa*; he apparently based his conclusions solely on the word of Austen. In 1931, Townsend reiterated this synonymy and restored the name *P. tibialis* as the valid one, again without looking at the latter type. Since that time, the names *P. tibialis* and *P. harpasa* have both been used for many species of *Ptilodexia*.

Ptilodexia leucoptera was also described from a single female by West in 1925. The holotype, from Riverhead, Long Island, is in good condition and is deposited in CUIC.

Curran introduced the name *Dinera robusta* into the literature in his 1930 key. West (1950) claimed that he had never intended to describe *robusta* in the genus *Dinera*. This manuscript name was only tentative—until Curran validated it. The specific epithet, *robusta*, is totally misleading since this species is one of the smallest in the genus. West redescribed and illustrated *Rhynchiodexia robusta* in 1950, incorrectly designating his earlier types as holotype and allotype. Since Curran was the describer, the specimens he looked at (including West's holotype and allotype) became a syntype series, and the only valid designation could be lectotype and paralectotype. I have designated West's female "holotype" as paralectotype and his male "allotype" as lectotype. Other determined material in AMNH and CUIC which Curran probably used in developing his concept of the species have also been designated paralectotypes.

DIAGNOSIS.—*Ptilodexia harpasa* adults are among the smallest, most slender flies in the genus. They have parafacial hairs medium to long, fine, distributed sparsely along center of parafacial, in a few individuals inserted below ventral eye margin; haustellum length 0.65 to 0.7 times head height, slender; third antennal segment long; length of plumosity on arista more

than twice length of second antennal segment; abdomen and scutellum appear dark, but are actually partially rufescent.

MATERIAL EXAMINED.—Four hundred seven males and 465 females were examined, a sex ratio different from the usual in the genus.

DISTRIBUTION.—*Ptilodexia harpasa* ranges from the southern Appalachians into northern Quebec and west into Ohio, Michigan, northern Illinois, Minnesota, North Dakota, and Manitoba.

BIOLOGICAL NOTES.—The flight period lasts from May to October, the most active months being August and September. *Ptilodexia harpasa* adults have been collected in Malaise traps, by net, on foliage, and as the prey of a crab spider. Flowers from which they have been collected are: *Solidago canadensis*, *Solidago rugosa*, *Eupatorium coelestinum* (Compositae); and *Melilotus alba* (Fabaceae).

Several specimens have been reared and are pinned with puparia. Two specimens from Ontario bear the label, "reared from R. C. larvae." This is perhaps an abbreviation for rose chafer, *Macrodactylus subspinosus*, a small scarab, whose range coincides with that of *P. harpasa*. Davis (1919) reports that adults have been reared from grubs (*Phyllophaga*?) from Connecticut.

***Ptilodexia rufipennis* (Macquart)**

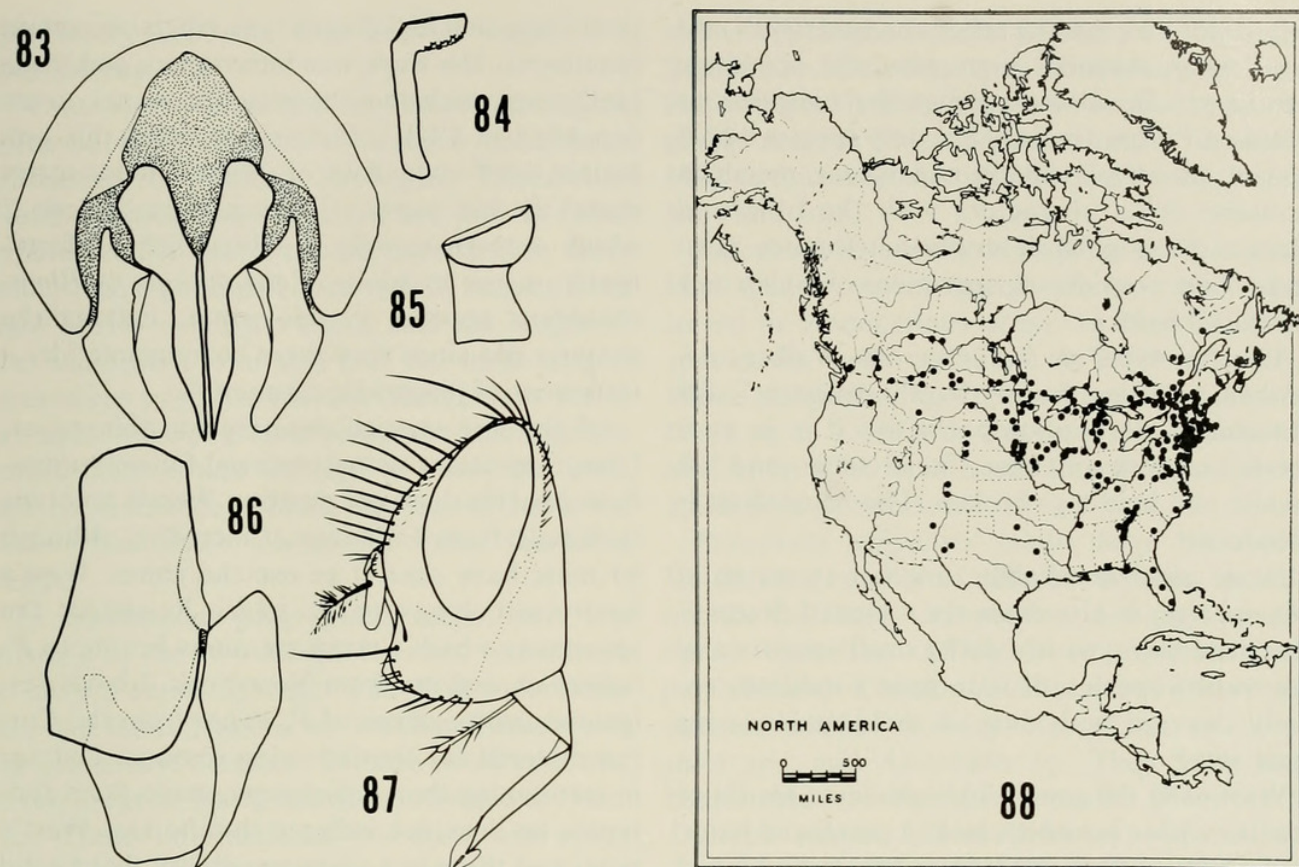
(Figures 83–88)

Dexia rufipennis MACQUART, 1842:244. OSTEN SACKEN (1878:155); BRAUER (1899:508); JOHNSON (1925b:209); ALDRICH (1905:504); CURRAN (1930:93); BRIMLEY (1938:367); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, female, lost.]

Dexia cerata WALKER, 1849:847. OSTEN SACKEN (1878:155); ALDRICH (1905:502); AUSTEN (1907:344); FATTIG (1944:3); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, female, deposited in BMNH, labeled, "*Dexia cerata* Walk."/"Holotype"/"N. Amer."/"N. America. Pres. by the Entomological Club, 44.12"/Crosskey examination label, 1970.]
NEW SYNONYMY

Dexia albifrons WALKER, 1852:317. OSTEN SACKEN (1878:155); ALDRICH (1905:501); AUSTEN (1907:345); SABROSKY AND ARNAUD (1965:988). [HOLOTYPE, male, deposited in BMNH, labeled, "*Dexia albifrons* Walk."/"Holotype"/"U.S."/"United States Ex. Coll. Saunders. 68.4"/"albifrons"/Crosskey examination label, 1970.]
NEW SYNONYMY

Rhynchodexia confusa WEST, 1924:185. JOHNSON (1925b:208); LEONARD (1928:821); CURRAN (1930:93); WRAY (1938:91); REINHARD (1943:22); WEST (1950:109); SABROSKY AND ARNAUD (1965:988). [HOLOTYPE, male, deposited in CUIC, labeled, "Selden, L.I., July 1, 1923, N.Y."/"Holotype



FIGURES 83-88. *Ptilodexia rufipennis* (Macquart). Fig. 83. Genitalia of male, posterior view. Fig. 84. Ejaculatory apodeme. Fig. 85. Ejaculatory apodeme. Fig. 86. Genitalia of male, lateral view. Fig. 87. Head of male, lateral view. Fig. 88. Geographical distribution.

Rhynchodexia confusa West, ♂. [Holotype, Cornell U. No. 1245. [Cornell U., Lot. 922, Sub. 35.]] NEW SYNONYMY

Rhynchodexia translucipennis West, 1925:135. LEONARD (1928:821); CURRAN (1930:93); WEST (1950:pl. I, fig. 6); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, male, deposited in CUIIC, labeled, "Ithaca, N.Y., 18 July '21" [L. S. West Collector] [Wing Slide, Cornell U., Lot 919, Sub. 116, L. S. West] [Holotype, *Rhynchodexia translucipennis* West, ♂. [Holotype Cornell U., No. 826. [Cornell U., Lot 922, Sub. 37.]] NEW SYNONYMY

Ptilodexia harpasa (partim): JOHNSON (1925b:209). (misidentification)

Ptilodexia neotibialis (partim): JOHNSON (1925:208). (misidentification)

Rhynchodexia dubia CURRAN, 1930:93. WEST (1950:110); SABROSKY AND ARNAUD (1965:988). [LECTOTYPE (here designated), male, deposited in AMNH, labeled, "Sta. Study Insects, Tuxedo, N.Y., 28-VII-1928" [Collector C. H. Curran] [Lectotype *Rhynchodexia dubia* Curran designated by D. Wilder 1976.]] NEW SYNONYMY

TAXONOMIC NOTES.—The name *P. rufipennis* has been misused frequently in the literature. It also has a long list of synonyms. Part of the reason for this is clear—the species exhibits exceptionally high variability. Females and males

differ from each other in taxonomic characters which were used previously in the group to define species. There is also strong clinal variation in males, which without being thoroughly sampled could lead workers to name certain populations as separate species. Specimens also are commonly collected. These factors, combined with the failure of earlier workers to examine type material, have contributed to the taxonomic problems in this species.

The name has been in general use since it was proposed in 1843. Brauer (1899) felt that this species was the same as *P. carolinensis*, and therefore placed the species in *Ptilodexia*. Subsequent workers used the name but failed to define the species. This was understandable since the type was lost and the original description was short.

Curran's 1930 key characterized members of the species as having infrascapular setulae absent, parafacials haired, and the scutellum reddish. Macquart's description states that the female from Nova Scotia, which he named *Dexia*

rufipennis, has, among other characteristics, the legs, basal antennal segments, and scutellum "testace." He also describes the epistome as "saillant" or protruding. The only species which ranges into Nova Scotia and whose members combine those characters with the others in Macquart's original description is the one presently being considered, specimens of which lack parafacial hairs.

The holotype of *Dexia cerata* Walker, described as being from "North America," fits Macquart's description perfectly. It is in poor condition, with antennae, facial setae, and left middle and hind legs broken. The haustellum is withdrawn.

Dexia albifrons Walker, another synonym of this species, is also from the "United States." The male holotype is a dark, small specimen of this varied species. It is in poor condition, entirely covered with dust or mold and missing most setae.

West used the genus *Rhynchodexia* for those species whose members lacked parafacial hairs. In describing *Rhynchodexia confusa*, he looked only at specimens from the northeastern United States and suspected that more than one species was involved. He also stated that this species had been represented in collections under the name *P. harpasa*, another Walker species described in the same paper as *P. cerata*. The description of *P. harpasa* is much less characteristic of members of this species than is that of *P. cerata*, and it is difficult to understand why that name was being used instead of *P. cerata*. The holotype and allotype of *P. confusa* are both large specimens with light-colored legs. They are in excellent condition.

West's other synonym of *P. rufipennis* is *Rhynchodexia translucipennis*. This species was described from two unusual-looking specimens of *P. rufipennis*. The holotype (and paratype) has translucent, milky-white wings and a light, reddish-brown thorax. It is possible that these specimens are teneral; however, they lack the characteristic collapsed face normally associated with teneral *Ptilodexia*. Tenerals do not generally have milky wings. Nevertheless, these specimens definitely belong in *P. rufipennis*. The type-specimens are in good condition.

The name *Rhynchiodexia dubia* was introduced into the literature by C. H. Curran in 1931. Between 1921 and 1925, West had been working with tachinids of New York and adja-

cent states and had placed type labels on certain specimens. His work was interrupted, and these specimens, with their manuscript names, were deposited in CUIC. Curran consulted this collection and used five of West's manuscript names in his paper "Diptera from Tuxedo," which was essentially a faunal list. Unfortunately, a key to adults of the species of *Rhynchiodexia* appears in this paper, making the names valid since they were accompanied by a statement of diagnostic characters.

Of the five species described in this paper, Curran mentions actual material for only one—*P. dubia*. He does not mention West's holotype (a female from Cimarron, Colorado), although he must have seen it to use the name. West's holotype belongs to *P. agilis* Reinhard; the specimens which Curran mentions belong to *P. rufipennis* and are from New York. I have designated the lectotype of *P. dubia* from the Curran material for the following reasons. Curran, in mentioning these specimens, made them syntypes; he does not indicate that he saw West's type, and there is a slight possibility that he did not. Also, West's type is in poor condition, whereas Curran's material is in good condition, and a lectotype designated from it would be supported by a long series of paralectotypes. I have given West's Colorado "holotype" the status of misassociated paralectotype.

The lectotype and paralectotypes are in excellent condition and are deposited in AMNH, FSCA, and CUIC. These specimens definitely belong to *P. rufipennis* (except West's "holotype").

In Curran's 1930 key, he separated *P. rufipennis*, as I have now defined it, into four species. The characters he used are: presence or absence of infrascapulars, color of male legs, color of scutellum, and presence or absence of parafacial hairs. All except the last are character states which vary among *P. rufipennis* adults.

DIAGNOSIS.—Specimens of *P. rufipennis* are distinguished from those of all other species of *Ptilodexia* by the following combination of characters: face long and narrow, totally devoid of parafacial hairs ventral to second antennal segment; antennae long, width of plumosity on arista more than twice length of second antennal segment; abdomen grayish black or dark brown, reddish laterally in a few individuals; extreme tip of abdomen and genitalia yellowish; legs of females and often those of males pale in color;

ejaculatory apodeme with bulb in shape of a shallow cup.

VARIATION.—This species shows remarkable intraspecific variation. Northern specimens (those from Canada, Michigan, Wisconsin, North Dakota, and Montana) are dark in facial ground color; the antennae are dark in most adults; the legs of males are varied, ranging from light brown to almost black; and the length of the haustellum is almost half the head height. Specimens from Florida and Georgia into Texas are light in facial ground color; the antennae are rufotestaceous and the legs of males are pale, just as in females. These specimens have the haustellum short, about 0.3 times the head height.

In intermediate geographical areas, there is a mixture of the two forms. It is not uncommon to have a series split into half dark individuals and half light. There is no striking difference in the genitalia of members of these two forms, and in the areas of intergradation, intermediates occur. These intermediates are dark with short mouthparts or light with longer ones, and they are few in number. Many of the intermediate areas are represented by one or two specimens, and it is possible that a representative sample of these flies will show the presence of a smooth cline, northern areas having the largest percentage of dark specimens, southern areas the largest proportion of light ones, and the intermediate areas showing a north-south gradient of light and dark.

MATERIAL EXAMINED.—The sample of *Ptilodexia rufipennis* includes 694 males and 612 females.

DISTRIBUTION.—This species ranges from Newfoundland to southern Florida, across the continent to British Columbia, southeastern Washington, and central Montana. There are scattered records in central Colorado, New Mexico, and Texas.

BIOLOGICAL NOTES.—The flight period lasts from May to November. However, most specimens have been collected in the months of July, August, and September. In the Midwest and Canada, records for the months of July and August predominate, while in the Northeast and Mid-Atlantic states most are collected during August and September. In areas of heavy collecting (Suffolk County, New York), specimens seem to occur with similar frequency throughout the season. The small sample from Florida

shows specimens collected in May and again in September, October, and November, perhaps indicating a bivoltine situation. In nearby Georgia the records show specimens taken from mid-May to mid-August with most occurring during June and July.

Ptilodexia rufipennis is predominately a lowland species. A few specimens have been collected in mountainous areas. In New Mexico, specimens were collected at 2,440 m in the White Mountains; specimens from Georgia were taken up to 1,460 m in the southern Appalachians; up to 1,890 m in North Carolina; and up to 1,830 m in Tennessee.

Ptilodexia rufipennis adults have been collected on a number of different flowers, including the following Compositae: *Solidago trinervata*, *Achillea Millefolium*, *Eupatorium perfoliatum*, *Chrysanthemum leucanthemum*, and unidentified *Solidago* sp., *Aster* sp., *Cirsium* sp., and *Anaphalis* sp. They have also been noted visiting *Melilotus alba* (Fabaceae), *Daucus carota* (Umbelliferae), *Ceanothus americanus*, and unidentified *Ceanothus* sp. (Rhamnaceae), and *Lonicera* sp. (Caprifoliaceae). Most of these flowers are yellow or white.

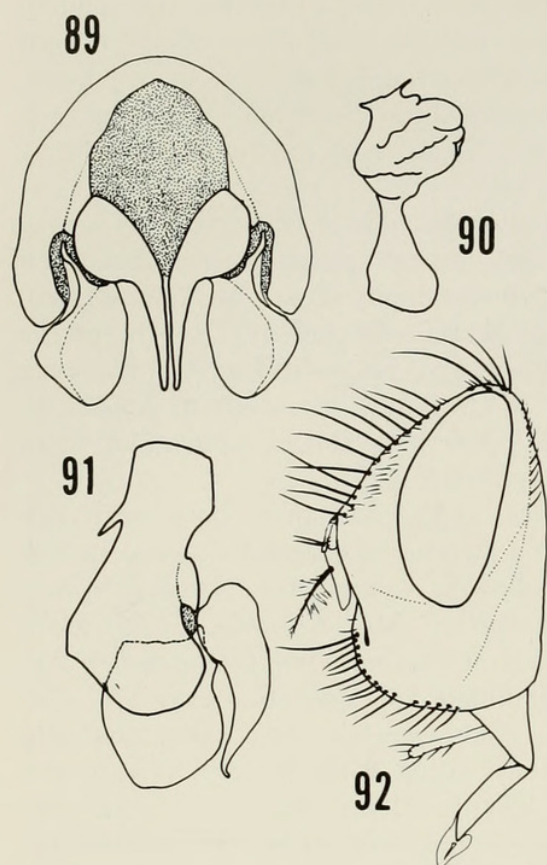
One specimen was collected from a female asilid (*Proctocanthus philadelphicus* Macquart), which had presumably captured it as prey. Other means of collecting have been by net (sweeping foliage), UV light trap, aerial light, and Malaise trap. *Ptilodexia rufipennis* adults have been collected in a cranberry bog, marshy meadow, creek bank, maple-elm floodplain along stream, and in a maple-mixed-oak-hickory forest.

***Ptilodexia arida* (Curran)**

(Figures 89–93)

Rhynchiodexia arida CURRAN, 1931:93. WEST (1950:110); SABROSKY AND ARNAUD (1965:988); COLE (1969:543). [LECTOTYPE (here designated), a female, deposited in CUIC, labeled, "Pinnaleno Mts., Ft. Grant, Ariz."/"R. C. Shannon July 17, 1917"/"Altitude 7000 ft."/"Wing Slide, Cornell U., Lot. 919, Sub. 120, S. S. West"/"♀ Holotype *Rhynchiodexia arida* Curran"/"Holotype, Cornell U., No. 1937"/"Cornell U., Lot. 922, Sub. 39"/"Lectotype *Rhynchiodexia arida* Curran designated by D. Wilder 1976."]

TAXONOMIC NOTES.—Curran introduced the name into the literature in his 1930 key. West, however, was the one to segregate and name the species. West's "holotype," a female, has been designated as lectotype, even though it bears a holotype label with Curran as author. A speci-



FIGURES 89–93. *Ptilodexia arida* (Curran). Fig. 89. Genitalia of male, posterior view. Fig. 90. Ejaculatory apodeme. Fig. 91. Genitalia of male, lateral view. Fig. 92. Head of male, lateral view. Fig. 93. Geographical distribution.

men from Manitoba has been designated as paralectotype. This specimen has an undated Curran determination label, and I think that he compared the specimen with West's type, felt that they were the same, and consulted both when writing the 1930 key.

West's type is a female in poor condition, but the Manitoba male is in good condition. The Manitoba specimen is misassociated, actually belonging to *P. major*.

DIAGNOSIS.—*Ptilodexia arida* adults are unique in the following combination of characters: broad, square face, no parafacial hairs ventral to second antennal segment; plumosity on arista long, up to twice length of second antennal segment; legs of females pale in color; abdomen of males and many females reddish laterally.

MATERIAL EXAMINED.—Sixty-four males and 33 females were examined.

DISTRIBUTION.—*Ptilodexia arida* ranges from Veracruz in Mexico into the mountains of Arizona and Utah. There is one record from Jefferson County, Idaho.

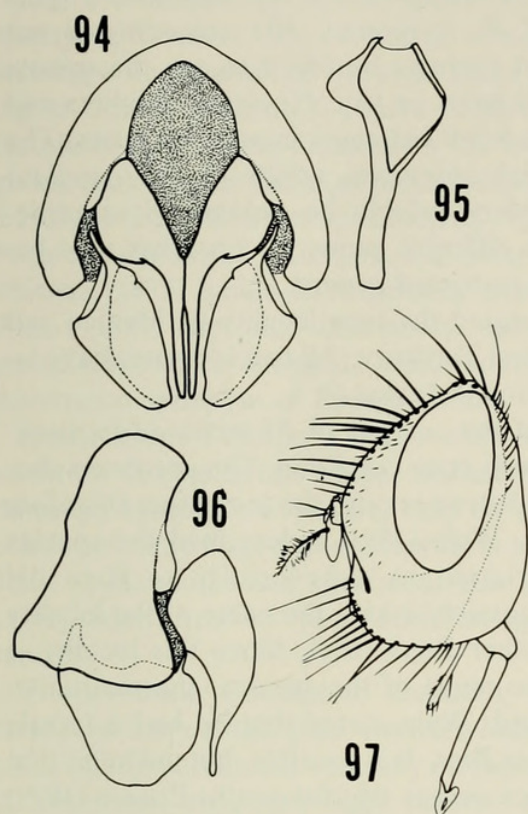
BIOLOGICAL NOTES.—The flight period is from March to October, the majority of specimens being captured in July and August. There is only one March record and none for the months of April and May. One specimen from Morelos in Mexico was collected in November.

This species inhabits a mountainous region. Specimens have all been collected in the mountains, some at elevations up to 2,560 m. One exception is a male collected in Jefferson County, Idaho, an area of extensive lava fields. Other specimens have been collected by special devices, such as UV light and Malaise traps. One female was collected on *Ceanothus* (Rhamnaceae), and four males were swept from *Ipomoea* (Convolvulaceae). There are five reared specimens; however, they lack data. They are pinned with their hosts, small scarabaeid larvae.

Ptilodexia ponderosa (Curran)

(Figure 6)

Rhynchiodesia ponderosa CURRAN, 1930:93. WEST (1950:110); SABROSKY AND ARNAUD (1965:989). [LECTOTYPE, female,



FIGURES 94–98. *Ptilodexia major* (Bigot). Fig. 94. Genitalia of male, posterior view. Fig. 95. Ejaculatory apodeme. Fig. 96. Genitalia of male, lateral view. Fig. 97. Head of male, lateral view. Fig. 98. Geographical distribution.

deposited in CUIIC, labeled, "Chokoloskee, Fla." "Wing Slide, Cornell U. Lot. 919, Sub. 129, L. S. West" "♀ Holotype *Rhynchioidexia ponderosa* Curran" "Holotype Cornell U. No. 1936" "Cornell U. Lot. 922, Sub. 38" "Lectotype *Rhynchioidexia ponderosa* Curran."]

TAXONOMIC NOTES.—This species was originally segregated and named by West, but the name was introduced into the literature by Curran and dates from his 1930 key. The unique specimen was not designated as a holotype. Since Curran did not mention the number of specimens which he had, even though there is only one, it must be designated lectotype. The specimen is in excellent condition.

DIAGNOSIS.—Since this species is represented by one specimen, it is difficult to diagnose. The *P. ponderosa* specimen can be distinguished from members of all other related species by the following combination of characters. Size large, color light reddish brown; face wide; parafacial hairs small, brown, inserted only on anterior half of parafacial; vibrissal angle of head quite pronounced; epistome protrudes noticeably; third antennal segment long; length of plumosity 1.6 times length of second antennal segment; haus-

tellum length 0.6 times head height; legs uniformly testaceous.

DISTRIBUTION.—The lectotype was collected in extreme southern Florida and almost certainly represents a West Indian species. It more closely resembles specimens from these islands (most of which have small, pale, parafacial hairs, long plumosity on the arista, and a medium-long haustellum) than those from the United States. It differs from the specimens I have seen from the islands in being much larger and having uniformly pale legs.

major Group

Ptilodexia major (Bigot)

(Figures 94–98)

Rhamphina major BIGOT 1888:265. WULP (1891:228); GIGLIO-TOS (1894:60); BRAUER (1899:509); ALDRICH (1905:504); SABROSKY AND ARNAUD (1965:989); COLE (1969:543); GUIMARAES (1971:33). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "Lectotype" "Rhamphina major Bigot" "Mexico. Ex. coll. Bigot. Pres. by G. H. Verrall, Oct. 1904. 1904–274" "Lectotype *Rhamphina major* Bigot designated by D. Wilder 1975."]

Rhynchioidexia tincticornis BIGOT, 1888:266. WULP (1891:228); BRAUER (1899:509); ALDRICH (1905:504); GUIMARAES

(1971:34). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "Lectotype"/"Rhynchiodesia tincticornis Bigot"/"Mexico. Ex. coll. Bigot. Pres. by G. H. Verrall, Oct. 1904. 1904-274"/Bigot's original inked label/Austen's penciled note regarding Bigot's label/"Lectotype *Rhynchiodesia tincticornis* Bigot designated by D. Wilder 1975."]

Dexiosoma fumipennis BIGOT, 1888:270. WULP (1891:230); BRAUER (1899:508); ALDRICH (1905:504); GUIMARAES (1971:34). [HOLOTYPE, female, deposited in BMNH, labeled, "Holotype"/"Rhynchiodesia fumipennis"/"Mexico. Ex. coll. Bigot. Pres. by G. H. Verrall, Oct. 1904. 1904-274"/2 folded labels.] NEW SYNONYMY

Rhynchodesia fraterna WULP, 1891:229. GIGLIO-TOS (1894:61); ALDRICH (1905:499); THOMPSON (1963:517); GUIMARAES (1971:33). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "Lectotype"/"Cuernavaca, Morelos. June H. H. S."/"♂"/"B. C. A. Dipt. II *Rhynchodesia fraterna*, v.d.W."/"Central America Pres. by F. D. Godman, O. Salvin. 1903-172"/"Lectotype *Rhynchodesia fraterna* Wulp, desig. by D. Wilder 1975."] NEW SYNONYMY

Rhynchodesia omissa WULP, 1891:235. ALDRICH (1905:499); GUIMARAES (1971:33). [LECTOTYPE (here designated), male, deposited in BMNH, labeled, "Lectotype"/"N. Yucatan, Gaumer"/"♂"/"B. C. A. Dipt. II *Rhynchodesia omissa* v.d.W."/"Central America Pres. by F. D. Godman, O. Salvin. 1903-172"/"Lectotype *Rhynchodesia omissa* Wulp designated by D. Wilder 1975."] NEW SYNONYMY

Ptilodexia harpasa (partim): DAVIS (1919:83). (misidentification)

Rhynchodesia arida (partim): CURRAN (1930:93). (misidentification)

TAXONOMIC NOTES.—The confusion and synonymy of this species in the literature is understandable. It is quite variable in color characteristics and size of its members. It also has a broad geographical range. Bigot proposed three names for *P. major* and Wulp two.

The syntype series for *P. major* consists of five males. Two of these are misassociated, one resembling specimens of *P. conjuncta* but with a shorter haustellum, the other resembling specimens of *P. scutellata* but with much hairier parafacials. The other three are conspecific. The specimen chosen as a lectotype has the upper parafacials a little hairier than the others, and its facial tomentum has a slightly yellowish cast. The series is in poor condition, the lectotype having only one leg and one antenna; most of the setae are broken.

Associated with the syntype series is a penciled label in Austen's handwriting. It mentions that Brauer (1899:509) felt the species belonged to *Ptilodexia*. He continued, however, saying that he (Austen) felt that the series was comprised of representatives of three distinct genera, only one specimen belonging to *Ptilodexia*. The specimen which Austen felt was a *Ptilo-*

dexia is the misassociated type resembling specimens of *P. conjuncta*. His reasoning is not clear, but perhaps he failed to see the minute parafacial hairs on true *P. major* members and therefore felt it belonged in another genus. The type which resembles adults of *P. scutellata* could understandably be considered as representing a different genus by a worker who believed in restricted genera.

Bigot stated the type-locality as Mexico and Washington Territory. All five syntypes have labels reading "Mexico."

Both of the cotypes of *Rhynchiodesia tincticornis* are in poor condition. The specimen chosen as lectotype is oily, the tomentum therefore obscured. Wulp (1891) redescribed the species and restricted the type-locality to Paso del Macho, possibly taking the name of the locality from another Bigot label. Since this locality is within the range of the species, the restriction is accepted. Wulp stated that he had a female from Costa Rica. It is possible, but unlikely, that the species ranges that far south. Brauer (1899) placed *P. major* in *Ptilodexia* and listed *P. tincticornis* as a synonym.

Bigot described *R. fraterna* in 1891 from 21 males and 5 females. Of the four male specimens which I had the opportunity to see, one was misassociated, the other three belonged to *P. major*. Wulp himself stated after his description that three of his largest specimens "agree fully with a typical example of *Rhamphina major*," and he then cited a few minor color differences. He also felt that some of the smaller specimens "bear a striking resemblance" to *P. fumipennis* adults. The lectotype, a male from Cuernavaca, is in good condition.

Rhynchiodesia omissa was described from three male and two female cotypes. The male which I saw and designated as lectotype belongs to *P. major*. The specimen was collected in northern Yucatan. It is in excellent condition and is similar in color to the lectotype of *P. tincticornis*. Guimaraes (1971) was the first to place *omissa* in *Ptilodexia*.

Another name must be considered while discussing *P. major*. This is *Rhamphina dubia* Bigot, the type-species of that genus. Bigot described *R. dubia* from two females labeled only "Mexico." The two specimens now in the British Museum are, however, a male and a female. The male belongs to *P. major* and the female to *Macrometopa calogaster*, the latter placed by

Austen. Townsend (1931:100) spoke of a female holotype; however, this cannot be considered a lectotype designation of the type-series according to Crosskey (in litt.). I have designated the female of the original material as the lectotype, giving the male the status of misassociated paralectotype. Had the other specimen (δ , *P. major*) been chosen as the lectotype, the name *Rhamphina* (1885) would have priority over *Ptilodexia* (1889) and our commonly used name would have to be changed. *Macrometopa* now becomes a synonym of *Rhamphina*.

DIAGNOSIS.—*Ptilodexia major* exhibits much variation throughout its range, and after a more thorough sample is available, may be found to consist of more than one species. It is most difficult to diagnose, and specimens can be more easily identified by first eliminating other species.

Thorax dark, the notum distinctly striped; parafacial hairs small, pale, inserted only on anterior half of parafacial, ventrally on face to apex of antennae; they are light brown, medium length, and/or scattered on parafacial in few individuals; haustellum length varied, from 0.55 to 0.65 times head height, in some small specimens it is slightly longer; palpi longer than half haustellum length in most individuals; length of plumes on arista more than twice length of second antennal segment; abdomen reddish with dark median stripe in most males, entirely dark or dark with fourth tergite reddish in a few.

VARIATION.—*Ptilodexia major* exhibits more variability than do most *Ptilodexia*. A summary of this variation is given by Wilder (1976).

There are some specimens, notably those from Texas, New Mexico, Colorado, and Nebraska, which seem to fall somewhere between specimens of *P. incerta* and *P. major*, two species which are, from available records, allopatric. It is possible that these represent an as yet unrecognized species and that true *P. major* is a more southern species. Most of the characters involved, however, are vague and in other species are part of normal intraspecific variation. This problem may be solved when a larger sample is available, thereby allowing the use of statistical techniques. I have placed these specimens in *P. major* because it is with members of this species that they share the most character states.

Most Nearctic *Ptilodexia* do not have ranges which extend into neotropical Mexico (*P. con-*

juncta is an exception). Specimens of *P. major* from Chiapas, Campeche, and Yucatan, however, differ very little from those from Arizona, at least in characters which easily separate adults or other species in the genus. I feel justified in placing all these specimens in *P. major*, although when more Mexican material is available for study, it may show that more than one species is involved.

MATERIAL EXAMINED.—One hundred fifty-two males and 77 females of *P. major* were examined.

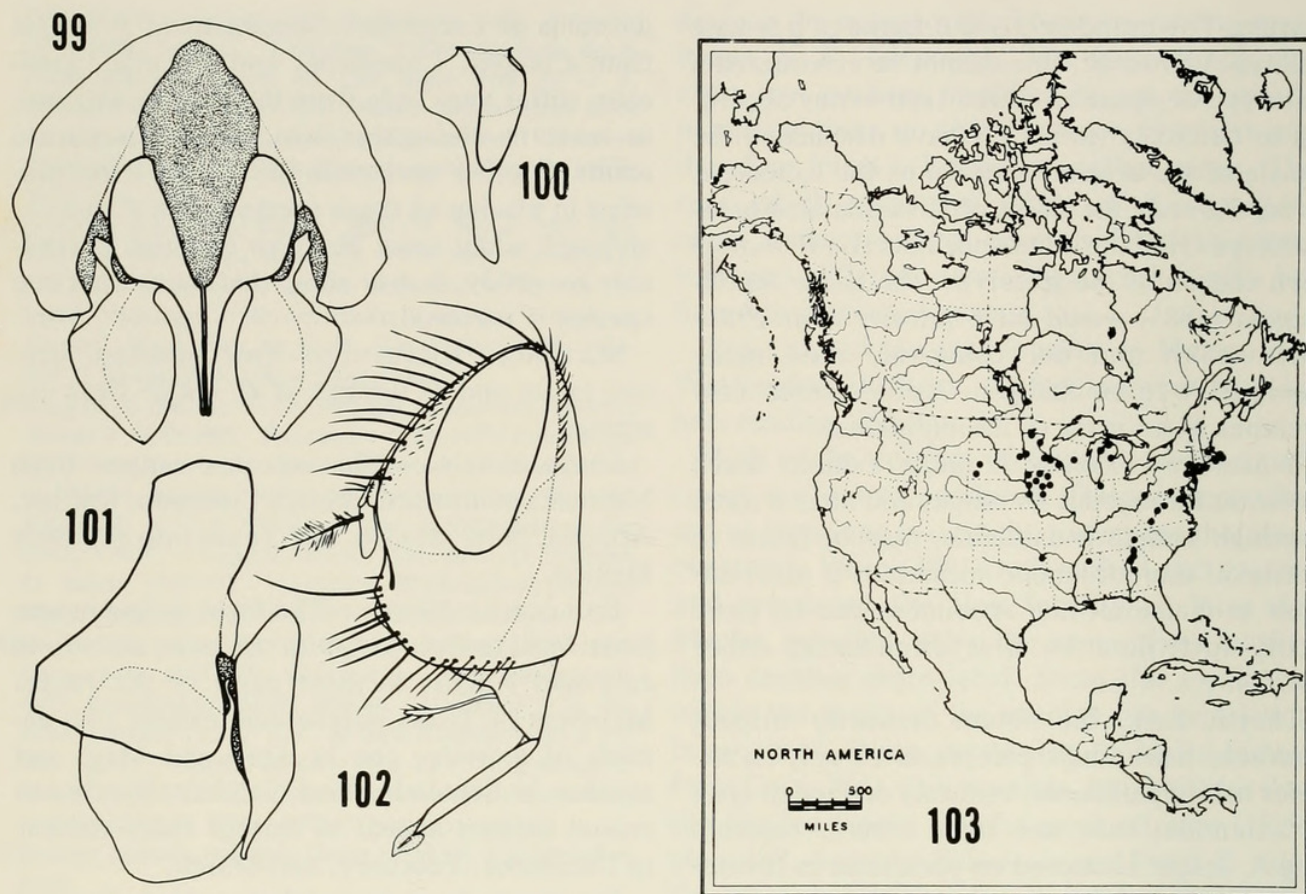
DISTRIBUTION.—This species ranges from Nebraska southward through Colorado, Kansas, Arizona, New Mexico, and Texas into southern Mexico.

BIOLOGICAL NOTES.—The flight period ranges from April to October, with the main activity in July and August in most parts of the range. Members of Texas populations exhibit two periods of activity, one in April and May, and another in September and October. Specimens reared indoors appear to emerge much earlier, in December, February, and March.

Specimens have been taken at both low and high elevations, the highest being 2,130 m in Coahuila, Mexico. Methods used to collect *P. major* adults are sweeping, UV light trap, Malaise trap, and rearing. Flowers from which *P. major* adults have been captured include: *Senecio* sp., *Baccharis glutinosa* (Compositae); *Lepidium thurberi* (Cruciferae); *Croton* sp. (Euphorbiaceae); *Medicago sativa*, *Dalea albiflora* (Fabaceae); *Marrubium vulgare* (Labiatae); *Gossypium* sp. (Malvaceae), and *Tamarix* sp. (Tamaricaceae). Unlike other *Ptilodexia*, composites are not the group of flowers most frequently visited.

Several specimens among the material examined have been reared and are associated with skins of host larvae. Unfortunately, these skins cannot be identified. Host data on some specimens list the host as "May beetle" and *Phyllophaga farcta*. David (1919) mentions *Phyllophaga* grubs collected on 29 April, at Austin, Texas:

Ptilodexia larvae were first observed from May 18 to June 18. In these cases, adult flies issued between June 11 and July 10, the puparium stage varying from 20–32 days. Grubs collected in New Mexico May 10 and 24 showed parasitism from May 20 to July 7, while larvae from the same locality collected on September 7 and confined in indoor cages showed parasitic larvae from October 7 to February 23.



FIGURES 99-103. *Ptilodexia incerta* (West). Fig. 99. Genitalia of male, posterior view. Fig. 100. Ejaculatory apodeme. Fig. 101. Genitalia of male, lateral view. Fig. 102. Head of male, lateral view. Fig. 103. Geographical distribution.

Aldrich called these New Mexico and Texas specimens *Ptilodexia harpasa*, but they are typical of *P. major* adults. Davis also reports members of this species being reared from grubs of *Aphonus pryiformis* collected in Las Vegas and Caffrey, New Mexico.

Ptilodexia incerta West

(Figures 99-103)

Ptilodexia incerta WEST, 1925:131. LEONARD (1928:822); CURRAN (1930:93); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, male, deposited in CUIC, labeled, "Riverhead, L.I., N.Y. 6-30-21"/"Holotype *Ptilodexia incerta* West ♂"/"Holotype Cornell U. No. 1873"/"Cornell U. Lot. 922, Sub. 45"]

Ptilodexia proxima WEST, 1925:133. LEONARD (1928:822); CURRAN (1930:93); WEST (1950:pl. I, fig. 4); SABROSKY AND ARNAUD (1965:989). [HOLOTYPE, male, deposited in CUIC, labeled, "Riverhead, L.I., N.Y."/"/"Wm. T. Davis, Aug. 5, 1917"/"Wing Slide, Cornell U. Lot. 919, Sub. 121, L. S. West"/"Holotype *Ptilodexia proxima* West ♂"/"Holotype Cornell U. No. 1877"/"Cornell U. Lot 922, Sub. 47"] NEW SYNONYMY

Rhynchodexia elevata WEST, 1925:135. LEONARD (1928:821); SABROSKY AND ARNAUD (1965:988). [HOLOTYPE, male, deposited in CUIC, labeled, "Riverhead, L.I., N.Y., Aug. 20, 1922"/"Wing Slide Cornell U. Lot. 919, Sub. 123, L. S.

West"/"Holotype *Rhynchodexia elevata* West ♂"/"Holotype Cornell U. No. 1871"/"Cornell U. Lot. 922, Sub. 36."]

NEW SYNONYMY

Ptilodexia harpasa (partim): JOHNSON (1925b:208). (misidentification)

Rhynchidexia levata West: CURRAN (1930:93). (lapsus calamus)

TAXONOMIC NOTES.—West described *P. incerta* and its two synonyms in the same paper. The type-localities of all three are Riverhead, Long Island. None of his holotypes, all males, show any significant differences. The type of *P. proxima* is large, that of *P. elevata* is small, while the type of *P. incerta* is intermediate in size.

West placed *P. elevata* in the genus *Rhynchodexia* because he thought that it lacked parafacial hairs. These hairs, however, are present and are similar in size, color, and number to those of the other two species. He also felt that the *P. elevata* adult differed in having the vibrissae inserted far above the oral margin, another characteristic which is the same in the other two species.

West stated no diagnostic difference between the *P. incerta* and *P. proxima* males, and the descriptions of the two are nearly identical.

The types of these three species names are in excellent condition, with the possible exception of the holotype of *P. incerta*, which is dusty. They are all deposited in CUIC. The three are unquestionably conspecific.

DIAGNOSIS.—Adults of *P. incerta* can be distinguished from those of other species of the genus overlapping in range by the following combination of character states: parafacial hairs tiny and pale (rarely brown), present only on extreme upper anterior portion of parafacial; length of third antennal segment about 1.5 times length of second; length of plumosity on arista twice length of second antennal segment. Haustellum length 0.5 to 0.6 times head height; palpi, broad in many individuals, equal to or less than half haustellum length. Thorax distinctly striped; in many specimens there are few or no infra-squamal setulae; in most abdomen reddish with a median longitudinal stripe.

MATERIAL EXAMINED.—Specimens examined include 105 males and 32 females.

DISTRIBUTION.—This species occurs throughout the eastern U.S., west to about the 100th meridian.

BIOLOGICAL NOTES.—The flight period lasts from May to September, with most specimens being collected during July. In certain areas, especially in the Southeast, specimens have been taken in every month from 10 May to 26 September.

Associated data show that *P. incerta* adults have been collected while at blooms of *Cirsium* sp. and *Solidago* sp., both Compositae. They have also been taken on high prairie in Hennepin County, Minnesota. A male was taken from a phymatid, which had presumably captured it as prey. Records show that *P. incerta* adults have only been collected at low elevations.

***Ptilodexia maculata*, new species**

(Figures 104–108)

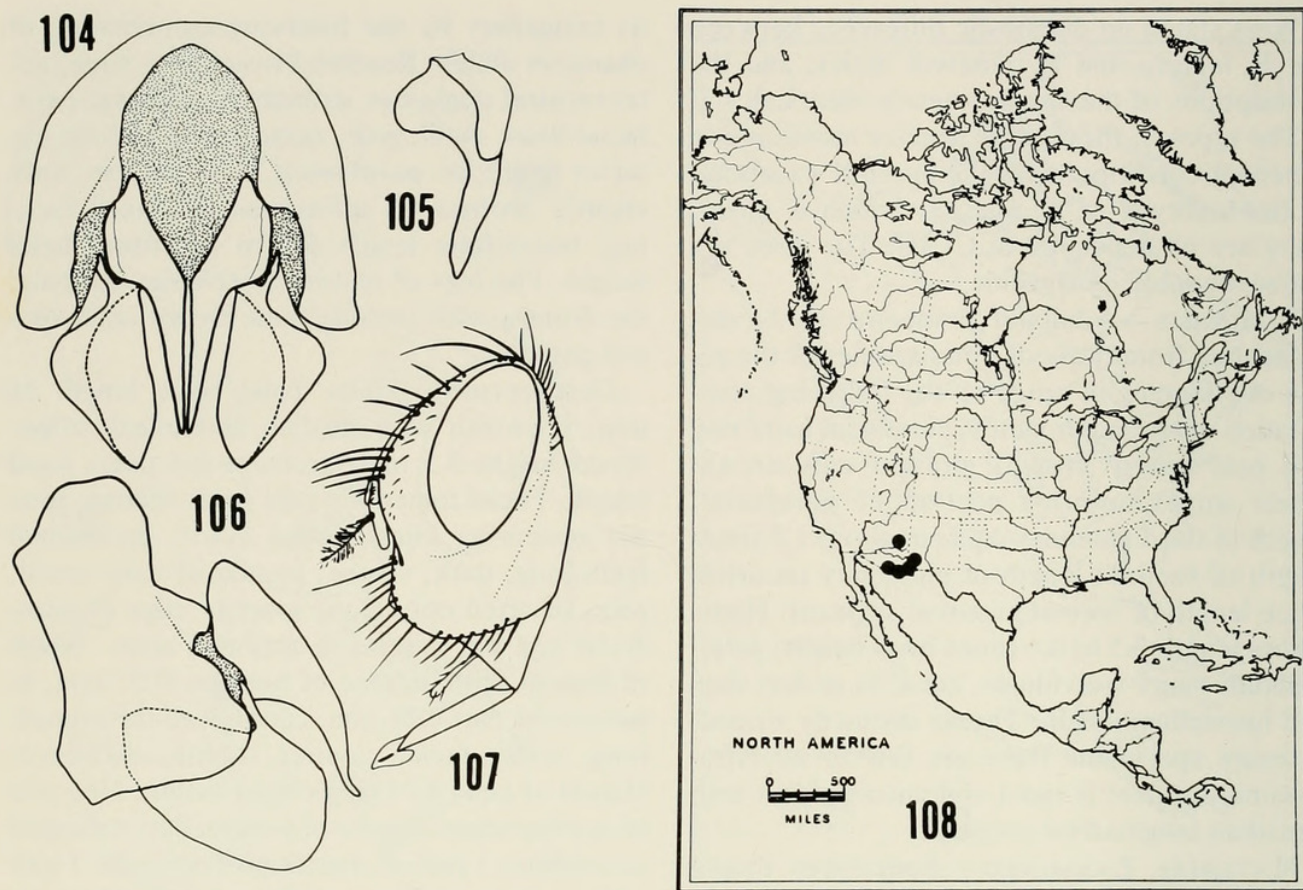
TYPE-LOCALITY.—The holotype was collected 14 miles [ca. 22.5 km] north of Silver City, Grant County, New Mexico.

TYPE-SPECIMENS.—The holotype, a male, is deposited in MSUC, the allotype, from Show-Low Arizona, in USNM. Complete data from these specimens and the 12 male and 10 female paratypes are listed below.

DIAGNOSIS.—*Ptilodexia maculata* is a distinctive species, its members differing from those of

its congeners by the following combination of character states. Reddish brown; face wide, anteroventral angle not strongly protruding; parafacial hairs small, pale, occurring only along anterior edge of parafacial; oral margin only slightly protruding; infrasquamal setulae lacking; haustellum length 0.4 to 0.5 times head height. The legs of males and females are pale, the femora with striking dark brown apicoventral patches.

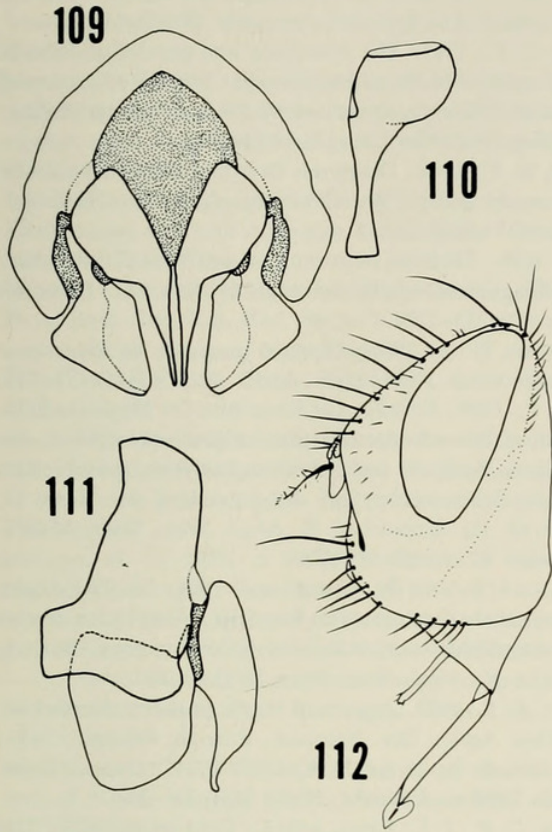
DESCRIPTION.—**Male:** Total body length 16 mm, brownish with median abdominal stripe. Head height 3.5 mm; profrons 0.3 times head length. Facial tomentum pale gold, shining, fine, not obscuring integumental color; parafrontal hairs long, dark, sparse; parafacial hairs small, pale, inserted only along anterior edge of parafacial and not ventral to antennal apex. Width of frontal vitta at base of antenna 0.55 mm, at narrowest part 0.25 mm; carina well developed, long, wide; facial cavities slightly darkened. Height of gena 0.35 times head height. One pair of ocellar setae, 2 pairs of postocellars subequal to ocellars, 1 pair of shorter postverticals, 1 pair of long inner verticals, and 1 pair of outer verticals subequal to postorbitals. Fifteen pairs of postorbital setae not interspersed with smaller hairs, those closest to ocellar triangle long, becoming smaller with distance from ocellar triangle, curved only slightly anterad; between postorbitals and the dense whitish occipital hair are a few scattered hairs. Twelve pairs of frontal setae; one pair of oral vibrissae 0.25 mm from oral margin, the depression between them 0.4 mm wide; 12 additional oral setae, 1 above vibrissae fairly strong, peristomals subequal to each other. Epistome only slightly protruding, its width 1.3 times length of first two antennal segments. Haustellum broad, brown, 0.4 times head height; palpi testaceous, 0.7 times haustellum length. Antennae unique; second segment light brown, testaceous apically; third segment testaceous on basal half, light brown apically; arista and plumosity pale brown. Third segment of antenna slightly narrowed apically, 1.3 times length of second segment; length of plumosity on arista 1.5 times length of second antennal segment. **Thorax:** Mesonotum rufotestaceous, brown posteriorly, subshining; tomentum beige, striping indistinct. Integument of humeri and postalar calli rufotestaceous. Six pairs of strong humeral setae, 1 posthumeral, 1 presutural, and 2 pairs of discal scutellars. Pleura rufotestaceous



FIGURES 104-108. *Ptilodexia maculata*, n.sp. Fig. 104. Genitalia of male, posterior view. Fig. 105. Ejaculatory apodeme. Fig. 106. Genitalia of male, lateral view. Fig. 107. Head of male, lateral view. Fig. 108. Geographical distribution.

marked with brown, tomentum beige, translucent; infrasquamal setulae absent; squamae and wings pale testaceous; epaulet light brown, basicosta testaceous, mediotergite tomentose, subshining. *Legs* rufotestaceous, tibiae darkened basally and apically, coxae and trochanters marked with dark brown; femora with dark brown, strongly contrasting ventral patches on apical half, bases of setae inserted on dark patches pale in color, pale setal bases on maculae of anterior femur coalesced into pale stripe; tarsi black. Anterior femur with 12 dorsal setae, 8 posterodorsals, and 13 posteroventrals, tibia with a distinct dark dorsal line. Middle femur with 2 anterior setae in 1 row. Posterior femur with a row of 7 anterodorsal setae, 9 anteroventrals, 6 posteroventrals, and 1 anterior seta; posterior tibia curved. *Abdomen* rufotestaceous with dark brown, narrow, median stripe; tomentum whitish, brown above median stripe. First syntergite with 3 pairs of lateral marginal setae. Second tergite with 3 pairs of median discals, 12 dorsal and lateral marginals, and 4 pairs of lateral discal setae. Ventral margins of tergite

marked with brown. *Genitalia*: Eighth tergite with numerous fine, dark setae. Ninth tergite with many long, dark setae, lateral swelling small. Surstylus huge, lateral angle smoothly rounded, depression fairly deep, with only fine hairs; in profile, smoothly rounded with slight ventral swelling. Cerci elongate, lateral lobes laterally curved strongly anterad, mesal margins slightly concave; height of arms slightly greater than that of lobes, arms not reaching ventral margins of surstyli, in profile, slightly bulging, tips large, round. Ejaculatory apodeme with bulb and stem distinct, the latter slightly longer and curved. Bulb widely open on one side and top; opposite side strongly decumbent. **Female**: Similar to male except for usual sexual differences and the following. Width of frontal vitta at narrowest point 0.4 mm, at antennal base 0.7 mm. Height of gena 0.35 times head height. Ten pairs of short postorbital setae, with 1 or 2 small hairs interspersed; 7/8 frontal setae. Anterior femur with 9 posteroventrals, 7 posterodorsals, and 9 dorsal setae. Middle femur with 4 anterior setae in 2 rows, 4 posteroventrals, and no an-



FIGURES 109–113. *Ptilodexia flavotessellata* (Walton). Fig. 109. Genitalia of male, posterior view. Fig. 110. Ejaculatory apodeme. Fig. 111. Genitalia of male, lateral view. Fig. 112. Head of male, lateral view. Fig. 113. Geographical distribution.

teroventrals. Posterior femur with no anterior setae, 5 anterodorsals, 3 posteroventrals, and 3 anteroventrals. Abdomen rufous with vague dark-brown median stripe, pollen whitish, light brown around median marginal setae. First syntergite with 1 pair of strong lateral marginal setae. Second tergite with 1 pair of lateral marginals, median discals, and median marginals. Third tergite with 1 pair of median discals and 5 dorsal and lateral marginal setae.

VARIATION.—Intraspecific variation is slight. Total body length ranges from 10 to 16 mm. The parafacial hairs are brownish in some specimens, but they are small in all adults. The area between the oral vibrissae and the oral margin has the height equal to width in some specimens. The integument of the notum in some individuals is rufotestaceous striped with dark brown. All facial and body tomentum are shades of brown in some adults, in females, quite dark.

MATERIAL EXAMINED.—Thirteen males and eleven females were examined from the following localities. **Arizona:** *Cochise Co.*: 1♂, Garden Canyon, Huachuca Mts., 30 July 1949, W. Gertsch (AMNH); 1♂, Ramsey Canyon, 15 miles [ca. 24 km]

S of Sierra Vista, 6,000 ft [ca. 1,830 m], 1 July 1964, Sternitzky (CNCI); 1♂, Rucker Canyon, Chiricahua Mts., 22 Aug. 1965, G. Wallace (UCRC). *Navajo Co.*: 1♀, Show-Low, 24 July 1956, Butler (UAIC). *Santa Cruz Co.*: 1♀, Madera Canyon, 4,880 ft [ca. 1,490 m], 15 June 1965, D. Harrington, 1♀, 25 July, 1♂, 6 Aug. 1961, at light, G. Nelson, 1♀, 11 Aug. 1965, D. Harrington, 2♀♀, 12 Aug., 1♂, 15 Aug., 1♂, 17 Aug. 1972, D. Knull, 1♂1♀, 26 Aug. 1965, D. Harrington, 1♂, 1 Sep., 1♂3♀♀, 7 Sep., 1♀, 15 Sep. (UCDC, OSUC). **New Mexico:** *Catron Co.*: 2♂♂, Mogollon Mts., 29 Aug. 1951 (CASC). *Grant Co.*: 1♂, 14 miles [ca. 22.5 km] N of Silver City, 8 July 1961, G. Eickwort (MSUC). *Hidalgo Co.*: 1♂, Guadalupe Canyon, 7 Aug. 1967, J. Smith (UCRC).

BIOLOGICAL NOTES.—The flight period lasts from July to September. Adults of this species have been collected at lights. They inhabit mountainous areas and have been taken at elevations from 1,490 m to 1,830 m.

DERIVATION OF NAME.—The name of this species refers to the striking femoral maculae on its members.

Ptilodexia flavotessellata (Walton)

(Figures 109–113)

Rhynchiodesia flavotessellata WALTON, 1914:176. TOWNSEND (1915:23); (1938:349); SABROSKY AND ARNAUD

(1965:988); COLE (1969:543). [HOLOTYPE, female, taken in copula and pinned with its mate, deposited in USNM, labeled, "Koehler, New Mexico, 8-14"/"Webster No. 7707"/"W. R. Walton collector."]

TAXONOMIC NOTES.—Walton stated that he described this species from four specimens taken at Eagle Tail Mountain, Colfax County, New Mexico. He named a female, pinned in copula with its mate, the holotype. These specimens bear a label which reads only, "Koehler, New Mexico" as the locality; however, since Walton himself was the collector, his restriction is accepted. There are more specimens than the description records with identical labels, so the three males which he indirectly makes paratypes cannot be segregated. The type material is in excellent condition.

Townsend (1915) erected the genus *Myoceroopsis* for *P. flavotessellata*. He believed that specimens of *Ptilodexia* had the haustellum longer than 0.75 times the head height and that *P. flavotessellata*, its members with the haustellum length 0.5 times the head height, differed sufficiently to be segregated generically.

DIAGNOSIS.—Specimens of *P. flavotessellata* can be distinguished from those of other North American *Ptilodexia* by the following combination of character states: general color pale orange-brown, tarsi darker; parafacial hairs pale to brown, of medium length, sparse, scattered randomly on parafacial; third antennal segment not much longer than second; length of plumosity 1.25 to 1.5 times length of second antennal segment; haustellum light brown in color, narrow, about 0.5 times head height; area between oral vibrissae and oral margin wider than high; epistome protrudes only slightly.

MATERIAL EXAMINED.—Five male and three female specimens were examined.

DISTRIBUTION.—*Ptilodexia flavotessellata* ranges from northeastern New Mexico north into Colorado and Nebraska.

BIOLOGICAL NOTES.—The collection dates on the specimens examined range from 22 June in Boulder, Colorado, to 9 September in Nebraska. There are no associated ecological data.

LITERATURE CITED

- ALDRICH, J. M. 1905. A catalogue of North American Diptera. *Smithson. Misc. Collect.* 46(2):1-680.
- . 1924. Notes on some types of American muscoid Diptera in the collection of the Vienna Natural History Museum. *Ann. Entomol. Soc. Am.* 17:209-218.
- . 1925. Notes on some types of American muscoid Diptera in the collection of the Vienna Natural History Museum (cont.). *Ann. Entomol. Soc. Am.* 18:107-130.
- AUSTEN, E. E. 1907. The synonymy and general position of certain species of Muscidae (*sens. lat.*) in the collection of the British Museum, described by the late Francis Walker. *Ann. Mag. Nat. Hist., Ser. 7*, 19:326-347.
- BIGOT, J. M. F. 1885. Diagnoses de trois genres nouveaux de Diptères du groupe des Déxières. *Ann. Soc. Entomol. France* (6)5:xi-xii.
- . 1889. Diptères nouveaux ou peu connus 34^a partie, XLII, Diagnoses de nouvelles espèces. *Ann. Soc. Entomol. France* (6)8:253-270.
- BLANCHARD, E. E. 1966. Dipteros parasitos de escarabeoideos argentinos. *Rev. Invest. Agric., Ser. 5*, 3(11):175-229.
- BRAUER, F. 1899. Beiträge zur Kenntniss der Muscaria Schizometopa. Bemerkungen zu den original exemplaren der von Bigot, Macquart und Robineau-Desvoidy, beschreiben Muscaria Schizometopa aus der Sammlung des Herrn G. H. Verrall, III. Sitzungsber. K. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 1(108):495-529.
- AND J. E. VON BERGENSTAMM. 1889. Die Zweiflügler des Kaiserlichen museums zu Wien. IV. Vorarbeiten zu einer monographie der Muscaria Schizometopa. Pars I. *Denkschr. K. Akad. Wiss. Wien* 56(1):69-180.
- BRIMLEY, C. S. 1938. Insects of North Carolina. North Carolina Dep. Agric., Div. Entomol., Raleigh. 491 pp.
- CHAMPLAIN, A. B., AND J. N. KNULL. 1944. Notes on Pennsylvania Diptera. *Entomol. News* 34(7):211-215.
- CLAUSEN, C. P., J. L. KING, AND C. TERANISHI. 1927. The parasites of *Popillia japonica* in Japan and Chosen (Korea) and their introduction into the United States. U.S. Dep. Agric. Agric. Res. Serv. Tech. Bull. 1429. 56 pp.
- COLE, F. R. 1969. The flies of western North America. Univ. Calif. Press, Berkeley and Los Angeles. 693 pp.
- COQUILLET, D. W. 1910. The type species of the North American genera of Diptera. *Proc. U.S. Natl. Mus.* 37:499-647.
- CROSSKEY, R. W. 1973a. A revisionary classification of the Rutiliini (Diptera: Tachinidae), with keys to the described species. *Bull. Brit. Mus. (Nat. Hist.) Entomol. Suppl.* 19:1-167.
- . 1973b. A conspectus of the Tachinidae (Diptera) of Australia, including keys to the supraspecific taxa and taxonomic and host catalogues. *Bull. Brit. Mus. (Nat. Hist.) Entomol. Suppl.* 21:1-221.
- CURRAN, C. H. 1930. Report on the Diptera collected at the Station for the Study of Insects, Harriman Interstate Park, N.Y. *Bull. Am. Mus. Nat. Hist.* 61:21-115.
- . 1934. The Diptera of Kartabo, Bartica district, British Guiana with descriptions of new species from other British Guiana localities. *Bull. Am. Mus. Nat. Hist.* 66:287-532.
- DAVIS, J. J. 1919. Contributions to a knowledge of the natural enemies of *Phyllophaga*. III. *Nat. Hist. Surv. Bull.* 8(5):53-138.
- FATTIG, P. W. 1944. *Phyllophaga* of Georgia. *Emory Univ. Mus. Bull. Georgia*, no. 2, 32 pp.
- FLEMING, W. E. 1963. The Japanese Beetle in the United States. U.S. Dep. Agric. Agric. Res. Serv. Agric. Handb. 236. 30 pp.
- GIGLIO-TOS, E. 1894. Ditteri del Messico. Pt. 3. 76 pp. Torino.
- GREENE, C. T. 1922. An illustrated synopsis of the puparia of 100 muscoid flies (Diptera). *Proc. U.S. Natl. Mus.* 60(10):1-39.
- GUIMARAES, J. H. 1971. Family Tachinidae. Pages 1-333 in

- A catalogue of the Diptera of the Americas south of the United States. 104. Museum of Zoology, University of Sao Paulo, Brazil.
- HOWDEN, H. F. 1963. Speculation on some beetles, barriers and climates during the Pleistocene and pre-Pleistocene periods in some nonglaciated portions of North America. *Syst. Zool.* 12:178-201.
- . 1966. Some possible effects of the Pleistocene on the distributions of North American Scarabaeidae. *Can. Entomol.* 98:1177-1190.
- JOHNSON, C. W. 1925a. Diptera of the Harris collection. *Proc. Bost. Soc. Nat. Hist.* 38(2):57-99.
- . 1925b. Fauna of New England, List of the Diptera or two-winged flies. *Occas. Pap. Bost. Soc. Nat. Hist.* 7(15):1-326.
- . 1927. The insect fauna with reference to the flora and other biological features. In Procter, W., *Biological survey of the Mount Desert Region. Part I.* Wistar Institute Press, Philadelphia.
- LEONARD, M. D. 1928. A list of the insects of New York. *Cornell Univ. Agric. Exp. Stn. Mem.* 101:1-1121.
- MACQUART, J. 1843. Diptères exotiques nouveaux ou peu connus. *Mém. Soc. Sci. Agric. Arts Lille* 1842:162-460.
- . 1846. Diptères exotiques nouveaux ou peu connus. *Supplement. Mém. Soc. Sci. Agric. Arts Lille* (1845), 1844:133-364.
- OSTEN SACKEN, C. R. 1878. Catalogue of the described Diptera of North America (ed. 2). *Smithson. Misc. Collect.* 16(2):1-276.
- PETERSON, L. O. T. 1948. Some aspects of Poplar Borer (*Saperda calcarata* Say) (Cerambycidae) infestations under parkbelt conditions. *Ann. Rep. Entomol. Soc. Ont.* 78:56-61.
- PROCTER, W. 1938. The insect fauna with references to methods of capture, food plants, the flora and other biological features. In Procter, W., *Biological survey of the Mount Desert Region. Part VI.* Wistar Institute Press, Philadelphia. 496 pp.
- . 1946. The insect fauna with references to methods of capture, food plants, the flora and other biological features. In Procter, W., *Biological survey of the Mount Desert Region. Part VII.* Wistar Institute Press, Philadelphia. 566 pp.
- REINHARD, H. J. 1943. New North American Muscoidea. *J. Kansas Entomol. Soc.* 16:14-23.
- ROBINEAU-DESVOIDY, J. B. 1830. Essai sur les Myodaires. *Mém. Acad. Sci. Inst. Fr., Ser. 2*, 2:1-813.
- ROSS, H. H. 1965. Pleistocene events and insects. Pages 583-595 in Wright, H. E., Jr., and D. G. Frey, editors. *The Quaternary of the U.S.* Princeton University Press, Princeton, N.J.
- SABROSKY, C. W., AND P. H. ARNAUD, JR. 1965. Family Tachinidae. Pages 961-1108 in Stone, A., C. W. Sabrosky, W. W. Wirth, R. H. Foote, and J. R. Coulson. *Catalogue of the Diptera of America North of Mexico.* U.S. Dep. Agric. Agric. Res. Serv. Agric. Handb. 276.
- STEYSKAL, G. C. 1976. The terminology of the bristles on the upper back of the head in the higher Diptera. *J. Kansas Entomol. Soc.* 49(2):155-159.
- THOMPSON, W. R. 1963. The tachinids of Trinidad. II. Echinomyiines, dexiines and allies. *Can. J. Zool.* 41:335-576.
- TOWNSEND, C. H. T. 1915. Proposal of new muscoid genera for old species. *Proc. Biol. Soc. Wash.* 28:19-23.
- . 1921. Notes on American oestromuscoid types. *Rev. Entomol.* 1:65-104.
- . 1938. Manual of myiology in twelve parts. Pt. 7: Oestroid generic diagnoses and data (Gymnosomatini to Senostomatini), 434 pp. São Paulo.
- WALKER, F. 1837. Descriptions, etc. of the insects collected by Cpt. P. P. King, R.N.F.R.S., in the survey of the Straits of Magellan, Diptera. *Trans. Linn. Soc. London.* 17:331-359.
- . 1849. List of specimens of dipterous insects in the collection of the British Museum. *London.* 4:689-1172.
- . 1852. Diptera. Pages 157-252, 253-414 in Saunders, W. W., ed. *Insecta Saundersiana. Vol. 1.* London.
- WALTON, W. R. 1914. Report on some parasitic and predaceous Diptera from northeastern New Mexico. *Proc. U.S. Natl. Mus.* 48:171-186.
- WEST, L. S. 1924. New northeastern Dexiini. *Psyche* 31:184-193.
- . 1925. New Phasiidae and Tachinidae from New York State. *J. N.Y. Entomol. Soc.* 33:121-135.
- . 1950. The status of *Rhynchiodexia robusta* Curran together with a consideration of certain cephalic and other characters useful in muscoid taxonomy. *Pap. Mich. Acad. Sci. Arts Lett.* 34:109-117.
- WILDER, D. D. 1976. Systematics of the Nearctic *Ptilodexia* Brauer and Bergenstamm (Diptera: Tachinidae). Ph.D. dissertation. Pennsylvania State University. 390 pp.
- WILLISTON, S. W. 1896. On the Diptera of St. Vincent (West Indies). *Trans. Entomol. Soc. London*; 253-446.
- WRAY, D. L. 1938. Insects of North Carolina. North Carolina Dep. Agric. Third Supp., 181 pp. Raleigh, N.C.
- WULP, F. M. VAN DER. 1891. Family Muscidae. Pages 225-248 in F. D. Godman, O. Salvin, editors. *Biologia Centrali-Americana. Zoologia.*



1979. "Systematics of the Nearctic Ptilodexia Brauer and Bergenstamm (Diptera: Tachinidae)." *Proceedings of the California Academy of Sciences, 4th series* 42, 1–55.

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