A REVISION OF THE GENUS ARCHYTAS JAENNICKE (DIPTERA: TACHINIDAE) FOR AMERICA NORTH OF MEXICO

Thesis for the Degree of M. S.
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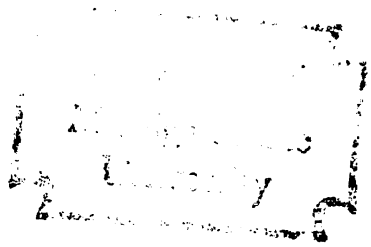

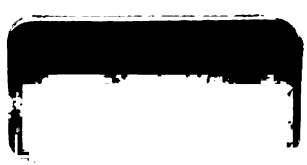

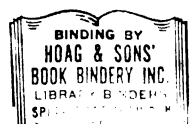

ABSTRACT

A REVISION OF THE GENUS ARCHYTAS JAENNICKE (DIPTERA: TACHINIDAE) FOR AMERICA NORTH OF MEXICO

By

Forrest William Ravlin

The 2 subgenera of Archytas, Archytas sensu stricto and Nemochaeta van der Wulp, including 12 species, are revised for America north of Mexico. A historical review is presented for North American species. Keys are given for genera of the tribe Dejeaniini and species of Archytas, all of which are described or redescribed. All available biological information is summarized including mode of parasitism, host records and rearing data.

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Forrest William Ravlin

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INTRODUCTION

The genus Archytas Jaennicke is a comparatively large group, restricted to the New World, with 12 species in North America and 93 described in the Neotropics at the onset of this revision. Archytas has been divided in North America into 2 subgenera, Archytas, with 7 species and Nemochaeta with 5. Unlike many other tachinid genera, the outer limits of Archytas have remained relatively stable, despite the fact that other dejeaniine genera are morphologically similar.

Adults, especially the females, of the genus have long been notorious for their uniformity. Species complexes such as the so-called "analis group" of Curran (1928) have plagued taxonomists throughout the years, with no useable characters known and keys of questionable utility. Species determinations of females could only be done by association with males in series, pairs in copula, or simply by guess work and distributional data.

HISTORICAL REVIEW FOR NORTH AMERICA

Archytas was described with the monotypic species, bicolor (=diaphanus F.) in 1867 by Jaennicke. Species other than diaphanus were, at this point, scattered in 3 genera; Jurinia Robineau-Desvoidy, Tachina Meigen, and Gonia Meigen. Some 37 years prior to 1867, Robineau-Desvoidy described 4 species in Jurinia: aterrimus, leucostoma (=aterrimus), metallicus, and boscii (=metallicus) of which aterrimus and metallicus stand today.

By 1849 Meigen's Tachina had gained three species via Francis Walker: apicifer, metallifera and carbonifera of which the latter two are synonomous with aterrimus Sabrosky and Arnaud (1965).

Between the years 1849 and 1897 10 additional species were described in either Jurinia or Tachina and 1 species in Gonia (Gonia incertus Macquart).

Coquillett in his Revision of the Tachinidae (1897) did much to stabilize the mounting confusion in Archytas, although failed to solve all of the problems. Species previously placed in the above genera were now assigned to Archytas and narrowed down to 5 species of which only 2 are valid species today (ie. aterrimus and lateralis Macquart). The remaining 3 species will be discussed below. Based on the findings of Sabrosky (1955), Coquillett's usage of piliventris (van der Wulp) was incorrect because piliventris was in reality a South American species and synonomous with A. incertus which does not occur north of Argentina. This meant that the North American species Coquillett alluded to in 1897 had not been formally described, but was masked under the synonymous piliventris auctorum, not van der Wulp. This species was

later described in another of Townsend's many restricted genera as Pseudoarchytas marmorata (Townsend 1915). Coquillett's composite description of analis was just that, citing the opaque, gray vesture of apicifer and the brassy, yellow tones of californiae (Walker). Finally, Aldrich's paper (1931a) gave a convincing argument for A. hystrix auctorum being synonomous with metallicus.

The appearance of Curran's revision of Archytas (1928) is of dubious distinction. It was already evident that grave problems lay within the so-called "analis group" and these difficulties were then compounded by the nomenclatorial chaos that ensued. Since Curran had not observed any of the Archytas types, he was unaware of the identity of apicifer and californiae and hence called californiae apicifer. This left no name for the true apicifer, which he then described as vulgaris. To summarize, Curran incorrectly synonomized californiae under apicifer and described vulgaris as new, which falls as a synonym of apicifer.

In the same paper, metallicus (Jurinia metallica Robineau-Desvoidy, of Curran) was separated from A. pilosa (Drury) of Curran, which was an erroneous conclusion based on Aldrich's findings mentioned above (ie. pilosa=metallicus). Curran did mention, however, that the nomenclature of these 2 species was quite obscure and that the types should be examined. Five other species were described as new for North America in Curran's revision, of which 4 appear tenable today. Curran's contribution to the knowledge of Archytas occured in 3 areas: (1) he recognized that analis was a complex of species; (2) he saw the utility of genitalic characters in the males; and (3) he scrutinized the masses of material with enough vigor to find such species as

instabilis Curran and nivalis Curran which so closely resemble aterrimus and californiae, respectively, as to be overlooked by previous authors.

Finally, convexiforceps Brooks was described in 1949 from 4 specimens (2 male and 2 female) collected in Miami, Florida by C. H. Townsend.

THE TRIBE DEJEANIINI

The dejeaniines are a comparatively small tribe of closely related genera with 24 species found in America north of Mexico (Sabrosky and Arnaud, 1965). Dejeaniini contains medium to large species which are often profusely covered with pollen, brightly colored and maculated. Diagnostic characters include well developed palpi and proboscis, the absence of true facio-orbital bristles (though often with coarse hairs), ocellar bristles which are either proclinate or absent, and crossing inner vertical bristles. The thorax has a bare prosternum, propleura haired and overall maximum chaetotaxy. The North American genera of Dejeaniini can be separated by the following key.

KEY TO THE GENERA OF DEJEANIINI

1. Ocellar bristles present.....2

1'. Ocellar bristles absent.....3

2. Abdomen yellow and black.....PROTODEJEANIA Townsend.

2'. Abdomen dark reddish brown....PARARCHYTAS Brauer and Bergenstamm.

3. Discal area of abdominal tergum 3 (apparent 2) without bristles or, if marginal bristles approach discal area then proboscis approximately 2X the height of the head and palpi distinctly spatulate.....4

3'. Discal area of abdominal tergum 3 (apparent 2) with bristles.....6

4. Proboscis approximately 2X the height of the head; palpi approximately .5X the length of the proboscis and distinctly spatulate; large flies with bright orange abdomens, usually

with black maculations dorsally....ADEJEANIA VEXATRIX Townsend.

4'. Proboscis not more than 1.5X the height of the head; palpi not markedly spatulate but usually enlarged apically.....5

5. Abdominal tergum 3 (apparent 2) with more than 4 median marginal bristles; apical scutellar bristles parallel to divergent.....JURINIOPSIS Townsend.

5'. Abdominal tergum 3 (apparent 2) with 0-2 median marginal bristles; apical scutellar bristles crossing..... .....ARCHYTAS Jaennicke.

6. Eyes bare; discal bristles of abdominal tergum 3 (apparent 2) continuous with lateral bristles and arranged in distinct rows.....PARADEJEANIA RUTILIOIDES Jaennicke.

6'. Eyes hairy; discal bristles of abdominal tergum 3 (apparent 2) not continuous with lateral bristles and not arranged in distinct rows.....7

7. Median marginal and discal bristles many in number..... .....JURINELLA LUTZI Curran.

7'. Median marginal and discal bristles few in number (not more than one pair of each).....MICROTRICHOMMA Giglio-Tos.

ARCHYTAS

General Appearance

Medium to large species, with silvery-white to golden-yellow pollinose heads. Thorax subshining black to golden-yellow pollinose. Abdomen subshining black to reddish-brown, often thinly pollinose dorsally at the posterior border of tergum 1+2 and the adjoining anterior margin of tergum 3. Tergum 5 often pollinose dorsolaterally for the posterior 3/4.

Head (Figs. 1, 2, 8, 9).

Frontal profile subequal to facial profile; vibrissal axis subequal to antennal axis; eye height .7X the head height; head approximately 1.3X as wide as high when viewed from the front; epistoma protuberant; ventral 3/4 of facial ridges evenly concave, with the dorsal 1/4 carinate when measured from vibrissae to antennal axis; facial ridges bristled .10 to .15X the distance from vibrissae to the antennal axis; 2-5 frontal bristles extending below the apex of the ptilinal suture, with the anterior and mesal bristles convergent to crossing and the posterior bristles reclinate, ocellar bristles absent; inner verticals reclinate and crossing at tips; outer verticals reclinate and divergent; eyes bare.

Thorax (Fig. 3).

Lateral margins of prosternum bare with the entire surface covered with a short indumentum; 6 humerals, usually arranged 1-3-2; 4 presutural, 3 postsutural acrosticals; 4 presutural and 4 postsutural dorsocentrals; 2 posthumerals; 3 postsutural supraalars; 1 presutural

and 3 postsutural intraalars, the anterior bristle of the postsutural group not as long and strong as the posterior two; postalars variable but usually 5 postalars, 2 strong, with 2 weaker situated between the strong pair and one weaker posterad of the hindmost strong; 4 marginal scutellars on each side of the scutellum; 1 pair of crossing apical scutellars which are shorter and finer than the marginals; 3 sternopleurals, the ventral bristle slightly behind the anterior bristle; propleuron haired.

Wings (Fig. 4).

Apical cell greatly narrowed and open at the apex; m crossvein less than 1/2 the distance between r-m crossvein and the wing tip, and at approximately the same angle as M_{1+2}; cubitulus without an appendage.

Abdomen

Median dorsal depression extending to posterior border of tergum 1+2; tergum 3 with at most 2 median marginals; tergum 4 with approximately 10 marginal bristles; tergum 5 with numerous discal and marginal bristles.

Male Postabdomen (Figs. 5, 6, 26-49)

Epandrium quadrate with the corners rounded and slightly higher than long, the postero-dorsal surface membranous for at least .8X its length (Figs. 26-49); hypandrium elongate with a pair of postero-dorsal arms (Fig. 6); postgonite pointed at apex and .5 to .6X the length of the pregonite (Fig. 6); pregonite pointed distally and subparallel-sided (Fig. 6); basilliform sclerite pointed distally and bifurcate proximally (Fig. 6); cerci fused, tapering to a distinct projection and varying from pointed to truncate to notched at the apex (Figs. 26-37); surstyli

projecting beyond the ventral apex of the cerci, with the apices convergent and the base with a distal article, except in instabilis (Figs. 26-37).

Female Postabdomen (Figs. 7, 50-73)

Segment 6 and 7 each with a dorsal longitudinal median membrane dividing the segments in half; sternum 8 reduced and often set within the concavity of sternum 7; tergum 8 reduced to at most a few hairs on a thinly sclerotized plate; lingulae typically strap-like and discontinuous with sternite 8 (Fig. 7); postgenital plate triangular to strap-like and becoming membranous at the base, fusing with the lingulae (Fig. 7); cerci convex and generally longer than wide, with setae covering the apex (Figs. 50-73).

NATURAL HISTORY

Adult Habits

Adults appear from early to mid-summer, and remain in the field throughout the rest of the summer (in Michigan).

Species, such as apicifer and californiae can be seen feeding frequently on Daucus carota L. (Queen Anne's lace), Mentha spp. (mint), Solidago spp. (Golden rod), and many other flowers which have relatively open nectaries (=actinomorphic type class of Leppik, 1964). Dissections of the gut of apicifer and californiae have confirmed the findings of Allen (1926) who speculated on the nectar feeding habits of A. analis (=californiae). In all cases, no particulate matter of any kind was observed in the gut. In the laboratory, adults may be kept alive quite easily on sugar cubes or mashed bananas.

Segregation of the Sexes

Collections made by Allen (1926) in Mississippi from the flowers of clover, vetch, and other plants generally produced unequal male to female ratios of californiae. Allen was the first to report this phenomenon in Archytas. This aspect has also been observed in series from other parts of the United States. Samples of apicifer from 13 states and 800 localities yielded 317 collections composed of all males, 374 all females, 34 were predominantly male or female and 75 had approximately equal proportions. This sexual segregation may be influenced by some of the following factors. (1) Male emergence appears to be a few days before female emergence, based on Hughes study (1975) of marmoratus and collections of apicifer and californiae made in Michigan. Therefore, collections made at this time will produce all

males. (2) Mating occurs as soon as the females' wings are expanded (W. C. Nettles Jr., 1974; Allen, 1926). After mating the females presumably leave the area to spend a prelarvapositional period before seeking hosts, with the males staying behind to mate with subsequently emerging females. Prelarvipositional periods in marmoratus range from 9 to 14 days (Hughes, 1975). It is not known what type of activity or inactivity occurs during this period in the field. However, in the genus Nowickia Wachtl, (Tachinini) I observed females of N. algens (Wiedemann) under the loose bark of fallen Picea glauca (Moench) (white spruce), in the Black Hills National Forest of South Dakota in July of 1974. Dissection of the females produced no mature first instar larvae. This could indicate that females of algens spend a prelarvipositional period under bark and wait for their larvae to mature or they may spend a precoital period under bark. The latter hypothesis is unlikely since no teneral individuals were present and no host pupae or tachinid puparia were found.

During the same period that females were found under bark, 1 series of 10 individuals was taken from the flowers of Heracleum lanatum Michaux (cow-parsnip), all of which were male. It may be that a similar phenomenon occurs in Archytas during prelarviposition, but no evidence is available to date. (4) The male life span, based on marmoratus and californiae (Hughes, 1975; Allen, 1926), averages about 15 days. Females of marmoratus averaged 62 days and californiae 24 days. Consequently, toward the end of the generation (season) there are very few, if any, males in the field and collections will be predominantly female.

Larviposition

Host finding by Archytas is seemingly initiated by "infestation odors" (kairomone-like substance)(Nettles, 1974). Upon reaching the site of infestation, Archytas, being a typical dejeaniine, deposits great numbers of fully developed first instars on the foliage. My dissections of 20 adult females for 10 species averaged ca. 300 fully developed larvae with numerous immature larvae largely filling the abdomen.

Larval Habits

After larviposition, 1st instars lie in wait for a suitable host to pass by, at which time they attach themselves to the host presumably by means of spines and the cephalopharyngeal skeleton (Fig. 10, 13a-j). After attaching itself to the host larva, the 1st instar parasitoids then burrow their way into (but not through) the host's integument. As shown by Hughes (1975) for A. marmoratus, the entire 1st instar is spent within the host's integument, with the 1st instar Archytas larvae having to relocate and repenetrate the integument of the host with each molt. First instar larvae of Archytas and other parasitoids with this type of behavior possess cuticular sensoria distributed about the body surface of first instar larvae (Figs. 11, 12). Presumably their sensoria enable them to relocate the host with a minimum of searching.

The 2nd instar is initiated by host pupation, with the 1st instars positioning themselves in a wing pad of the host pupa and molting to the second instar. Numerous larvae may attack a host larva and develop through the 2nd instar but mortality through competition and inability to relocate the host produces only 1 adult fly per host. Sometime after

the death of the host, a molt to the final 3rd instar and pupation within the host pupa occurs.

The development of A. aterrimus from 1st instar to adult has been followed in Heterocampa manteo (Doubleday) (variable oak leaf caterpillar) collected in Lake Co., Michigan, 14 March 1973 (soil sample). Pupation of H. manteo occured after 24 days in a constant temperature chamber at 24°C with a 16 hour photoperiod. The pupation of the host marked the end of the 1st instar and beginning of the 2nd for aterrimus. Pupation of aterrimus occured 8 days after host pupation, and 23 days later a male emerged. This agrees with the findings in marmoratus where a maximum of 8 days were required for 2nd and 3rd instar completion (Hughes, 1975).

Before pupation, the aterrimus larva prepares a presumed exit in the host pupa. In one case, 12 days after manteo had pupated, the parasitoid had made 2 holes at the caudal end of the host pupa. It then oriented itself with the pseudocephalon nearest the holes and pupated, thus allowing an easy exit for the emerging adult.

Overwintering

It has not been established for every species of Archytas how overwintering occurs. However, it appears to be governed directly by the habits of the host. Heterocampa manteo, for example, spends the winter in Michigan near the litter-soil interface and pupates in the spring; therefore, any Archytas larvae overwintering in them spend the winter as 1st instar larvae within the host's integument. Archytas lateralis has been reared numerous times from Malacosoma (Hubner) (Stehr and Cook, 1968; Patton, 1958; Ross, 1953; Townsend, 1942). In

this instance, the host overwinters in the egg stage and as such cannot accomodate lateralis.

Host Relations

Archytas species have been reared from individuals belonging to 5 families of Lepidoptera and over 30 species (Table I). This list is probably a very small proportion of the potential hosts. Much like Winthemia Robineau-Desvoidy (Guimaraes, 1972), Archytas is apparently a niche-specific parasitoid as opposed to species-specific (Townes, 1962), governed by its larvipositional habits, the availability of host material and its ability to locate infestations. Archytas is attracted to an area by the "host infestation odor" and then chooses any substrate which appears suitable (foliage). It then relies on its high reproductive capacity to ensure that some larvae will find hosts and produce adult flies. A. metallicus and A. lateralis are 2 species having very restricted host records of Datana spp. and Malacosoma spp. respectively. It is not known why these 2 species are apparently genus-specific.

Hyperparasitoids

The only reference is that by Thompson (1943) for Eupteromalus tachinae Gahan (Hymenoptera: Pteromalidae) Ex. Archytas analis auctorum.

KEY TO THE GENUS ARCHYTAS FOR AMERICA NORTH OF MEXICO

1. Proclinate fronto-oribital bristles present; females (Figs. 8, 9).....2

1'. Proclinate fronto-orbital bristles absent; males.....12

FEMALES

2. Basal aristal segment not more than .5X the length of the 2nd aristal segment; parafacial and pleural hair variable though usually yellow to white.....Subgenus ARCHYTAS Jaennicke (3)

2'. Basal aristal segment at least .75X the length of the 2nd aristal segment; parafacial and pleural hair concolorous brown to black.....Subgenus NEMOCHAETA van der Wulp (8)

3. Parafacial area with at least a few hairs differing in color from propleural hair.....4

3'. Parafacial and propleural hair concolorous white to yellow.....5

4. Calypters white; abdomen reddish-orange; abdominal tergum 5 (apparent 4) with conspicuous white pollen; parafacial area with at least a few dark hairs; propleural hair yellow; thoracic notum pollinose, often with a dorso-median vitta..... .....ARCHYTAS RUFIVENTRIS Curran

4'. Calypters smoky-colored; abdomen subshining black; abdominal tergum with inconspicuous pollen; parafacial hair yellow; propleural hair dark brown to black; thoracic notum with inconspicuous pollinose vittae; Florida Keys..... .....ARCHYTAS NONAMENSIS sp. nov.

5. Discal setae on thoracic notum black; parafacial pollen silvery-white to off-white; usually 2 frontal bristles below the apex of the ptilinal suture (Fig. 8); hair on posterior margin of abdominal sternum 2 usually dark brown to black.....6

5'. Discal setae on thoracic notum yellow to white or mixed with black, especially prevalent on the scutellar disc, when viewed postero-laterally; parafacial pollen golden-yellow to yellow; usually 3 frontal bristles below the apex of the ptilinal suture (Fig. 9); hair on posterior margin of abdominal sternum 2 usually yellow; the widespread and common.....
.....the widespread and common ARCHYTAS CALIFORNIAE (Walker)
.....and the eastern and very rare ARCHYTAS NIVALIS Curran

6. Abdominal terga pollinose; median marginal bristles on abdominal tergum 3 (apparent 2) usually absent.....
.....ARCHYTAS MARMORATUS (Townsend)

6'. Abdominal terga subshining black to dark reddish-brown with the posterior of tergum 1+2 (apparent 1) and tergum 5 (apparent 4) pollinose; median marginal bristles on tergum 3 (apparent 2) usually present.....7

7. Sternum 8 greatly reduced and obscured by sternum 7 (Figs. 58, 59); abdomen reddish-brown with abdominal tergum 5 (apparent 4) distinctly pollinose; southern Texas, rare.....
.....ARCHYTAS PLANGENS Curran

7'. Sternum 8 not greatly obscured by sternum 7 (Figs. 56, 57); abdomen usually subshining black and often with metallic blue tinge; widespread and common.....ARCHYTAS APICIFER (Walker)

8. Calypters smoky-colored....ARCHYTAS METALLICUS (Robineau-Desvoidy)

8'. Calypters white to off-white.....9

9. Thoracic terga distinctly pollinose; abdomen usually reddish-brown with a black dorso-medial vitta, though sometimes subshining black (as in apicifer).....10

9'. Thoracic terga indistinctly pollinose except on the prescutum (to the naked eye) and subshining black with white pollinose vittae, usually a metallic blue tinge.....11

10. Parafrontal region subshining black, with sparse white pollen; tergum 7 with a sparse row of hairs (Figs. 72, 73); sternum 8 at base approximately .5X the width of sternum 7 at its widest point (Fig. 73); Florida and rare..... .....ARCHYTAS CONVEXIFORCEPS Brooks

10'. Parafrontal region with color obscured by dense white pollen; tergum 7 covered with sparse hairs for at least .5X its width (Fig. 70); sternite 8 at base .6 to .8X the width of sternum 7 at its widest point (Fig. 71); widespread and common throughout most of its range..... .....ARCHYTAS LATERALIS (Macquart)

11. Abdomen somewhat globose dorsally and usually wider than long; sternum 8 convex in lateral view but not extremely so (Fig. 64); tergum 7 thickened in the pleural area, usually with irregular lateral margins (Fig. 65); length variable

(5-15mm) though usually 7-12mm; widespread and common.....
.....ARCHYTAS ATERRIMUS (Robineau-Desvoidy)

11'. Abdomen elongate, longer than wide; sternum 8 extremely convex in lateral view (Fig. 66); tergum 7 evenly thickened, with the lateral margins regular (Fig. 67); length 5-7mm; eastern and rare.....ARCHYTAS INSTABILIS Curran

MALES

12. Basal aristal segment not more than .5X the length of the 2nd aristal segment; parafacial and pleural hair variable.....
.....Subgenus ARCHYTAS (13)

12'. Basal aristal segment at least .75X the length of the 2nd aristal segment; parafacial and pleural hair concolorous brown to black.....Subgenus NEMOCHAETA (19)

13. Parafacial area with <u>at least</u> a few hairs differing in color from the propleural hairs.....14

13'. Parafacial and propleural hair concolorous white to yellow.....15

14. Calypters white; abdomen reddish-orange; abdominal tergum 5 (apparent 4) with conspicuous white pollen; parafacial area with at least a few dark hairs; propleural hair yellow; thoracic terga pollinose with black vittae.....
.....ARCHYTAS RUFIVENTRIS Curran

14'. Calypters smoky-colored; abdomen subshining black with a metallic blue tinge; abdominal terga with inconspicuous pollen; parafacial hair yellow; propleural hair dark brown to black; thoracic terga with inconspicuous pollinose vittae; Florida Keys.....ARCHYTAS NONAMENSIS sp. nov.

15. Discal setae on thoracic notum black; thoracic pollen gray to yellow-gray; parafacial pollen silvery-white to off-white.....16

15'. Discal setae on thoracic notum yellow to white or mixed with black (especially prevalent on the scutellar disc when viewed postero-laterally); thoracic pollen golden yellow to yellow; parafacial pollen golden yellow to yellow.....18

16. Abdominal terga white to gray pollinose obscuring the reddish-brown base color.....ARCHYTAS MARMORATUS (Townsend)

16'. Abdominal terga glabrous subshining black to reddish-brown except for pollen on the posterior of tergum 1+2 (apparent 1) and tergum 5 (apparent 4).....17

17. Apex of cerci emarginate (Fig. 28); postero-mesal margins of sternum 5 with 2 pairs of copulatory arms (Fig. 15)..... .....ARCHYTAS APICIFER (Walker)

17'. Apex of cerci pointed (Fig. 29); postero-mesal margins of sternum 5 entire (Fig. 17); southern Texas, rare..... .....ARCHYTAS PLANGENS Curran

18. Apex of cerci shallowly emarginate (Fig. 26); width of surstyli at least .5X the width of the apex of the cerci (Fig. 26); widespread and common...ARCHYTAS CALIFORNIAE (Walker)

18'. Apex of cerci distinctly emarginate (Fig. 27); width surstyli at most .5X the width of the apex of the cerci (Fig. 27); eastern and rare.....ARCHYTAS NIVALIS Curran

19. Calypters smoky colored....ARCHYTAS METALLICUS (Robineau-Desvoidy)

19'. Calypters white to off-white.....20

20. Thoracic notum distinctly pollinose (to the naked eye); abdomen reddish-brown with a black median vitta.....21

20'. Thoracic notum subshining black (to the naked eye) with white pollinose vittae and usually with a metallic blue tinge.....22

21. Dorsal portion of cerci convex (Fig. 37); parafrontal region subshining black with sparse pollen..... .....ARCHYTAS CONVEXIFORCEPS Brooks

21'. Dorsal portion of cerci concave (Fig. 36); parafrontal region covered with dense pollen...ARCHYTAS LATERALIS (Macquart)

22. Surstyli with globose distal articles (Fig. 33); abdomen somewhat globose dorsally and usually wider than long; length variable (5-15mm) though usually 7-10mm; widespread and common throughout its range..... .....ARCHYTAS ATERRIMUS (Robineau-Desvoidy)

22'. Surstyli without distal articles (Fig. 34); abdomen elongate, longer than wide; length 5-7mm; eastern and rare..... .....ARCHYTAS INSTABILIS Curran

The subgeneric designations used in this revision have been retained from Sabrosky and Arnaud (1965) and are more than likely artificial in nature. However, their utility is apparent and their use separates Archytas into two morphologically well-defined groups.

Subgenus Archytas

The subgenus Archytas is characterized by the short 1st aristal segment, which is less than .5X the length of the 2nd, the yellow propleural hair except in nonamensis sp. nov. (dark brown to black

hair), and light parafacial hair except in rufiventris where a mixture of light and dark hair occurs. The distal articles of the surstyli are generally linear and subparallel-sided (Figs. 26-28, 31) though sometimes reduced as plangens, (Fig. 29) or quadrate as in nonamensis (Fig. 32).

Most of the difficulties within Archytas have centered around the so-called analis complex of Curran which includes apicifer, californiae, and plangens in America north of Mexico. The complex is characterized by a high degree of uniformity in gross features, which are as follows: The parafacial and frontal areas are covered with silvery-white to golden-yellow pollen and short, white to yellow hairs on the parafacials. The thorax is covered with olive-gray to yellow pollen, with black and/or yellow hairs dorsally. The abdomen is subshining black to reddish-brown with pollinose areas, usually on terga 1+2, 3 and 5. Prior to Curran's 1928 revision, genitalia were not used, hence all of the above mentioned species were, more than likely, lumped into analis auctorum. Workers subsequent to Curran were able to sort out males belonging to 4 species with reasonable accuracy but females could still be placed into 4 or 5 different species with no certainty.

Fabricius described Tachina analis in 1805, with Macquart describing a second analis and placing it in Jurinia in 1843. Based on the descriptions, it appears that both belong in A. (Archytas) with Macquart's analis being a secondary homonym, which may or may not be synonomous with analis (F.).

The Macquart analis was described from the M. Guerin collection and is in the Muséum National D'histoire Naturelle, Paris, France. This type has been characterized by Aldrich as "A specimen in the Paris

Museum, marked Type, is an Archytas with pale hairs on the parafacials, but mouldy and dirty and abdomen gone." Taken from Aldrich's unpublished card catalogue (Sabrosky, 1975).

Fabricius' analis is in the Universitetets Zoologiske Museum, Copenhagen, Denmark, with 2 specimens (females), presumably types, extant (Townsend, 1931; Zimsen, 1964). The types of both Fabricius' and Macquart's analis have, as yet, not been available for study.

Sabrosky and Arnaud (1965) treated amethystinus (Macquart 1843: 196) as a good but unrecognized species. Based on Macquart's description and the type locality (Georgia) it is evident that amethystinus is also a part of the analis problem and would have priority over present day species (ie. apicifer, californiae, and nivalis), although not over analis (F.). The type is in the remnants of Macquart's private collection ("Ma collection") in Lille, France, but according to the manuscript "Catalogue of the Diptera for Lille" the specimen is severely damaged or even represented by remains (Löic Matile, 1975) and examination of the remains has not been possible to date.

Archytas (Archytas) californiae (Walker)

Tachina californiae Walker, 1852, Insecta Saundersiana 1:270.
Archytas analis auctorum, sensu Allen, 1926:417-435; Greene, 1921:26.
For a complete synonomy see Sabrosky and Arnaud (1965).

General Appearance

Length 10-15mm. Facial and parafacial pollen yellow to golden-yellow; parafacial hair yellow; parafrontals with discontinuous yellow

to golden-yellow pollen, allowing some of the base color (brown to black) to show through; anterior half of frontal yellow to orange and darkening slightly in the posterior half; females usually with 3 frontal bristles below the apex of the ptilinal suture (Fig. 9). Thorax gray to golden-yellow pollinose, usually the latter, with black and yellow hair on the discal areas, especially prevalent on the scutellar disc; propleuron with yellow hair; calypters white to off-white. Abdomen subshining reddish-brown to black and often with a metallic blue tinge; posterior margin of sternum 2 with yellow hair; male sternum 5 with 1 pair of mesally directed postero-mesal copulatory arms (Fig. 14).

Male Postabdomen (Figs. 26, 38).

Epandrium as in Fig. 38; cerci produced into 2 dorsal lobes, the meson concave and narrowed into a subparallel-sided projection ventrally, which is shallowly emarginate apically (Fig. 26) surstyli with distal and proximal articles, the proximal pair with their apices directed mesally and tapering to sharp points, the distal pair slightly shorter and subequal in width to the width of the cerci, with their apices rounded and directed ventrally (Fig. 26).

Female Postabdomen (Figs. 52, 53).

Mesal margin of tergum 7 with much denser seta than apicifer, the hairs covering much of the mesal portion; tergum 8 usually represented by 2 hairs; sternum 8 approximately 2X as wide as high and approximately 1/2 the width of sternite 7; cerci with long coarse subapical hairs, at least 2X the length of the cerci and usually projecting beyond the bristles of tergum 6 when in situ.

Type

The holotype male is from California and is in the British Museum of Natural History. The type of californiae has been examined by Austen (1907) and Aldrich (1931b).

Distribution

Found throughout North America north of Mexico. No record of californiae south of Texas (Guimaraes, 1971). I found no specimens south of Texas.

Adult Seasonal Activity

Apparently emerging slightly later in the spring in colder regions than apicifer, and more than likely multivoltine where temperature permits. Allen (1926) speculated on the multivoltine nature of this species in Mississippi.

Remarks

Males of this species may be recognized by the mixture of black and yellow hair on the thoracic disc and the shallowly emarginate cerci (Fig. 26). Females are characterized by long, coarse subapical hairs on the cerci and a relatively dense setation on the 7th tergum (Fig. 53). The above mentioned combination of characters separates californiae from apicifer and plangens which have black hair on the thoracic disc, differences in the male genitalia (Figs. 28 & 29), and females with much finer and shorter apical hairs on the cerci (Figs. 56 & 58). Females of californiae and nivalis are apparently inseparable; tentative determinations are only possible when males and females are collected together. Since californiae is by far the most abundant species, females collected apart from males are most likely californiae.

Archytas analis sensu Allen (1926) and Greene (1921) is without doubt californiae, based on the description of the adult, the cephalopharyngeal skeleton of the 1st instar, and the caudal spiracles of the puparium. The combination of the "tawny yellow pollinose thorax", the 1st instar cephalopharyngeal skeleton with a dorsal hump and prominent downward curve (Fig. 13a), and the caudal spiracles of the puparium are all characteristic of californiae. However, the possibility exists that Allen was working with 2 species (ie. californiae and apicifer) and included both them in analis. I have not seen Allen's specimens.

Biology

As mentioned earlier, some of the natural history of californiae has been covered by Allen (1926). Other aspects dealing with sympatricity are discussed under the biology of apicifer. In numbers of individuals, californiae is less ubiquitous than apicifer, but is certainly one of the more common species.

Host Records

Host records are somewhat obscure due to its misidentification as analis by other workers (see analis complex p. 21). For a summary of host records for analis and known records for californiae, see Table I.

Archytas (Archytas) nivalis Curran

Archytas nivalis Curran, 1928, Can. Ent. 60:203, 254.

General Appearance

Length 10-15mm. Facial and parafacial pollen yellow to golden-yellow; parafacial hair yellow; parafrontals with discontinuous yellow to golden-yellow pollen allowing some of the base color (brown to black)

to show through; anterior half of frontal yellow to orange and darkening slightly in the posterior half as in californiae; females usually with 3 frontal bristles below the apex of the ptilinal suture (Fig. 9). Thorax yellow to golden-yellow pollinose, with predominantly yellow hair (males), though often mixed with black in the discal areas (females as in californiae); propleuron with yellow hair; calypters white to off-white. Abdomen subshining reddish-brown to black; posterior margin of sternum 2 with yellow hair; male sternum 5 with 1 pair of mesally directed postero-mesal copulatory arms (Fig. 16).

Male Postabdomen (Figs. 27 & 39).

Epandrium as in Fig. 29; cerci produced into 2 dorsal lobes, the meson more concave and cupped than californiae when viewed posteriorly (Fig. 27); apex of cerci deeply notched and much broader than in californiae; surstyli with distal and proximal articles, the proximal pair with their apices directed mesally and tapering to sharp points, the distal pair approximately 0.6X the width of the apex of the cerci and slightly shorter than the proximal articles.

Female Postabdomen (Figs. 50 & 51).

As mentioned above, nivalis females are inseparable from californiae females. The following notes are based on a mating pair from Swathmore, Pennsylvania, now in the American Museum of Natural History and the allotype. The bristles on tergum 6 and the apical hair on the cerci appear to be finer and shorter in nivalis than most californiae specimens, but variation in californiae appears to encompass this character. Sternum 8 is smaller and less prominent in nivalis but again the limits of californiae appear to include this variant. Many

differences may be observed in Figures 50-53, but the amount of morphologic variation in californiae obscures diagnostic characters which may be present.

Type

The holotype male is from Washington, D. C., October 29, 1926, and is in the Canadian National Collection, No. 2823. The allotype was collected in Great Falls, Virginia, July 15, 1913, and is also in the Canadian National Collection. It is not clear why Curran designated an allotype when no characters were available to distinguish nivalis from californiae (apicifer of Curran). The allotype was not taken in series with the holotype, nor was it taken in series with any of the male paratypes and therefore cannot be associated with any of the male nivalis.

Distribution

CONNECTICUT: Redding; Stamford. MARYLAND: Cabin John. MASSACHUSETTS: Melrs. Hghds.; North Saugus. MICHIGAN: Owosso. MINNESOTA: Lake Minnetonka, Enchanted Isle; Ramsey Co., University Farm. MISSOURI: Columbia. NEW YORK: Cold Spring Harbor; Huguenot; Ithaca. NORTH CAROLINA: Dillsboro; Lk. Junaluska. OHIO: Amherst; Columbus; Marietta; Miami Co., Neotoma; Newark; Salineville; Waterloo. PENNSYLVANIA: All'y Co.; Castle Rock; Corapolis; Del. Do.; Glenside; Hunters Run; Linglestown; Ogontz; Swathmore; Washington Co. VIRGINIA: Gt. Falls; Falls Church; Nelson Co.

Adult Seasonal Activity

Late May through mid-September, with the majority of the records in August.

Remarks

Males of this species may be recognized by the usual predominance of yellow hair on the thoracic disc and the deeply notched ventral apex of the cerci (Fig. 27). As mentioned above, female nivalis are inseparable from californiae.

Biology

Nothing is known of the biology of nivalis.

Archytas (Archytas) marmoratus (Townsend)

Pseudoarchytas marmorata Townsend, 1915, Insec. Inscit. Menst. (1914) 2:186. For a complete synonomy see Sabrosky (1955) and Sabrosky and Arnaud (1965).

General Appearance

Length 8-15mm. Facial and parafacial pollen silvery-white to off-white; parafacial hair white; parafrontals with continuous yellow to golden-yellow pollen; anterior half of frontal yellow, the posterior half yellow to orange; females usually with 2 frontal bristles below the apex of the ptilinal suture (Fig. 8). Thorax gray pollinose with black hair dorsally; propleuron with yellow to off-white hair; calypters white to off-white. Abdomen grayish-pollinose; posterior margin of sternum 2 with dark-brown to black hair; tergum 3 (apparent 2) with median marginals usually absent in females; male sternum 5 with 1 pair of postero-mesal capulatory arms (Fig. 18).

Male Postabdomen (Figs. 30 & 42).

Epandrium as in Fig. 42; cerci produced into 2 dorsal lobes which are evenly convex toward the meson, ventral apex of the cerci deeply

notched and slightly shorter than the distal articles of the surstyli (Fig. 30); surstyli with distal and proximal articles, the proximal pair with their apices directed mesally and tapering to sharp points; the distal pair subequal to slightly shorter than the proximal pair with their apices rounded and directed ventrally (Fig. 30).

Female Postabdomen (Figs. 60 & 61).

Mesal margins of tergum 7 with sparse hairs confined to the border; tergum 8 represented by 2 hairs; sternite 8 approximately 2X as wide as high and .5X the width of sternite 8; cerci elongate, approximately 5X as long as wide, with the subapical hairs subequal to slightly longer than the length of the cerci.

Type

The holotype female selected from a series of 2 specimens were collected by Townsend from Chosica, Peru, 20 January 1913, on the flowers of Baccharis sp. and is in the U. S. National Museum; TD4226. Two additional females were later collected on Mikania sp., 8 and 9 May 1913, again from Chosica, Peru. The holotype has been examined by Sabrosky (1955).

Distribution

South of a line from Arizona to Kansas to North Carolina and south to Peru.

Adult Seasonal Activity

Probably multivoltine and can be collected throughout the entire year, though more commonly during the summer months.

Remarks

This species may be distinguished from all other species north of Mexico by its pollinose abdomen and male genitalia (Fig. 30). This is the only species in which the median marginal bristles are usually absent in the females. Out of 94 females that were examined by Sabrosky (1955), 83 lacked both bristles.

Townsend's placement in a separate genus (1915) may have had some validity, based on the accumulation of divergent characters from typical Archytas. The combination of a pollinose abdomen, usual lack of median marginal bristles in females and the 1st instar cephalopharyngeal skeleton (Fig. 13e) may merit subgeneric rank when the genus is reviewed over its entire range.

Discussion of the nomenclatorial problems of marmoratus were reviewed by Sabrosky (1955) and briefly outlined earlier (see p. 2).

Biology

As mentioned previously (see p. 11), Hughes' (1975) paper on marmoratus covered much of its biology, especially larval.

Host Records

Species belonging to the Heliothis complex are commonly parasitized (Bottrell and Arnold, 1968; Bibby, 1942; Miller, 1971; Parencia, 1964; Quaintance and Brues, 1905; Shepard and Sterling, 1972) however, other hosts have been recorded. For a summary of known hosts, see Table I.

Archytas (Archytas) apicifer (Walker)

Tachina apicifer Walker, 1849, List of the specimens of dipterous insects in the collection of the British Museum 4:718.

For a complete synonymy see Sabrosky and Arnaud (1965).

General Appearance

Length 10-15mm. Facial and parafacial pollen silvery-white to off-white; parafacial hair off-white to white; parafrontals with discontinuous off-white pollen, allowing some of the base color (brown to black) to show through; anterior half of frontal orange, with the posterior half, dark orange to red; females usually with 2 frontal bristles below the apex of the ptilinal suture (Fig. 8). Thorax olive-gray to yellow-gray pollinose with black hair on the dorsal discal areas; propleuron with yellow to off-white hair; calypters white to off-white. Abdomen subshining reddish-brown to black and often with a metallic blue tinge; posterior margin of sternum 2 with dark brown to black hair; male sternum 5 with 2 postero-mesal copulatory arms (Fig. 15).

Male Postabdomen (Figs. 28 & 40).

Epandrium as in Fig. 40; cerci produced into 2 dorsal lobes, the meson concave and narrowed into a subparallel-sided projection ventrally, which is distinctly emarginate apically (Fig. 28); surstyli with distal and proximal articles, the proximal pair with their apices directed mesally and tapering to sharp points, the distal pair slightly shorter and with their apices rounded and directed ventrally (Fig. 28).

Female Postabdomen (Figs. 56, 57).

Mesal margins of tergum 7 with sparce hairs confined to the border; tergum 8 represented usually by 2 hairs; sternite 8 approximately 2X as wide as high and approximately .5X the width of sternum 7; subapical hairs of the cerci not much coarser than the surrounding hairs and usually obscured by the bristles of tergum 6 when in situ.

Type

The holotype male is from North America and is in the British Museum of Natural History. The type of apicifer has been examined by Austen (1907) and Aldrich (1931b).

Distribution

United States and Canada, as well as Mexico and tropical South America.

Adult Seasonal Activity

Early spring through late fall in colder regions, with the height of the season in August and September. Where temperature permits, apicifer is probably multivotine and may be collected year round.

Remarks

Archytas apicifer is without doubt the most common species, hence Curran's name vulgaris (see p. 3). This species is most readily recognized by its olive to yellow-gray thorax, the all-black hairs on the thoracic disc, and the characteristic 5th sternum in the males (Fig. 15). Females are characterized by having white to silvery-white parafacial hair, usually 2 frontal bristles below the apex of the ptilinal suture (Fig. 8) and relatively fine subapical hairs on the cerci (Fig. 56) when compared with californiae (Fig. 52).

Thirty specimens from the Tempe, Arizona area were found to have the same color combinations as plangens, but the genitalia were distinctly apicifer.

Archytas lobulatus Curran was described in 1928 from 42 specimens (5 male and 37 female). The holotype male was collected from Chapada,

Brazil, in November and is in the American Museum of Natural History. The allotype is from Yucatan, Mexico, with no collection date and is in the Snow Museum, University of Kansas. The status of this species is questionable based on the following. The allotype and paratype females were not collected in series with males and apparently are not distinct from apicifer females. Differences occur in males with the dorsal lobes of the cerci closely approximated and the ventral projection slightly thinned in the lobulatus holotype. Examination of 3,000 specimens of apicifer from the United States and Canada has shown variation in the above characters which approachs lobulatus. Reduction in the postero-ventral copulatory arm of sternum 5 is quite striking in the lobulatus holotype, although there is some variability in this character exhibited by apicifer. Curran exaggerates this point in his description and does not figure it. No specimens of lobulatus have been examined other than the types. However, the distributions of the 2 species do appear distinct though overlapping. A. lobulatus ranges from Brazil to presumably southern Texas (Sabrosky and Arnaud, 1965) with apicifer being a strictly Nearctic species.

Biology

Adult apicifer have been collected commonly on Solidago canadensis L. (golden rod), Mentha spp. (mint), Asclepias syriaca L. (milk weed), and Daucus carota L. (Queen Anne's lace). Large numbers of apicifer and californiae were collected by Burriff and Davis (1974) (Washington Island, Wisconsin) with the use of a modified double-wing sticky trap (Pherotrap IC) and baited with ca. 15ml of Maggottract^{tm} I on cotton wicks. The total number of tachinids captured was 382 in 10 traps hung for 23 days (27 July through 17 August). It is interesting to note

that apicifer and californiae have also been found to occur sympatrically in Michigan and were collected together on Mentha arvensis L. in Ingham Co., Michigan, 24 July 1974 around 12:00 noon.

Host Records

Host records are somewhat obscure due to its misidentification as analis by other workers (see analis complex p. 21). For a summary of host records for analis and known records for apicifer see Table I.

Archytas (Archytas) plangens Curran

Archytas plangens Curran, 1928, Can. Ent. 60:204, 255.

General Appearance

Length 12-15mm. Facial and parafacial pollen silvery-white to off-white; parafacial hair white to yellow; parafrontals with discontinuous yellow pollen allowing some of the base color (brown to black) to show through; anterior half of frontal yellow to orange and darkening in the posterior half to a darker orange or red; females usually with 2 frontal bristles below the apex of the ptilinal suture (Fig. 8). Thorax silvery-off-white to yellow pollinose with black hair dorsally; propleuron with yellow hair; calypters white to off-white. Abdomen subshining reddish-brown, the 5th tergite with a relatively dense white pollen, much more distinct than other "analis" species; posterior margin of sternum 2 with brown to black hair; male sternum 5 without copulatory arms and punctate on the postero-mesal margins (Fig. 17).

Male Postabdomen (Figs. 29, 41).

Epandrium as in Fig. 41; cerci produced into dorsal lobes, much like nivalis (Fig. 27) but with its ventral apex acutely pointed

(Fig. 29); surstyli with distal and proximal articles, the proximal pair somewhat flattened and on the same plane as the lateral areas of the epandrium, their apices directed mesally, the distal articles highly reduced to approximately .2X the height of the proximal pair (Fig. 29).

Female Postabdomen (Figs. 58, 59).

Tergum 7 with sparse setae restricted to the mesal margins, as in apicifer (Figs. 56 & 57); tergum 8 often with 4 or more setae on a distinct sclerotized plate; sternum 8 reduced and obscured by sternum 7; cerci often somewhat quadrate.

Type

Both the holotype male and allotype are from Ecuador, and are in the United States National Museum with no other data.

Distribution

ARIZONA: Continental. TEXAS: Brownsville; Alcedo; Laguna Madre, 25mi. S.E. Harlingen; Hildago Co., McAllen; Mission; Pharr.

Adult Seasonal Activity

Probably multivoltine, with scattered records throughout the entire year. Few specimens of plangens (10) were obtained; therefore, data is very scattered.

Remarks

This is the most distinctive species in the analis complex. Males of plangens may be quickly recognized by the pointed cerci and the reduced distal articles of the surstyli (Fig. 29). Females may be recognized by the reduced 8th sternum and the usual presence of more

than 2 hairs (often 4) on a distinct sclerotized plate representing tergum 8 (Figs. 58, 59). Species which may be confused with plangens are apicifer, californiae, and rufiventris, all of which have females with a larger and readily visible 8th sternum and males with emarginate cerci.

Biology

Nothing is known of the biology of plangens.

Archytas candens (Walker)

Tachina candens Walker, 1849, List of the specimens of dipterous insects in the collection of the British Museum 4:720.

Type

The holotype of candens is a female in the British Museum of Natural History. The label data is Nova Scotia (Lt. Redman).

Remarks

Coquillett in his 1897 revision placed candens as a synonym of lateralis, but failed to recognize the light parafacial hair and the small 1st aristal segment which places it in the subgenus Archytas and not in Nemochaeta. Aldrich (1931b) studied the North American Walker types and made note of this, as well as surmising that the specimen was Neotropical in origin and not Nearctic. Aldrich based this hypothesis on not being able to find Nearctic material to confirm a North American locality. He also mentioned discal abdomen bristles, although I saw none. Examination of the type has yielded the following results. The cerci and tergum 8 are highly developed and totally divergent from any North American form seen in this study. The pollinosity of the

parafacials, parafrontals and thorax appear as in plangens, as does the reddish-brown abdomen with the white pollinose 5th tergum. However, the genitalia are distinctly different. A specimen with the above set of characters has been collected from Nova Teutonia, Brazil, XII-1966 and is most certainly the same species. Therefore, Aldrich's hypothesis appears to be correct and candens probably does not belong to the Nearctic fauna. The male of this species is, as yet, unknown and possibly described under another name. Guimaraes (1971) does not mention candens in the Catalogue of the Diptera of the Americas South of the United States (Family Tachinidae).

Archytas (Archytas) nonamensis sp. nov.

General Appearance

Length 12-15mm. Facial and parafacial pollen golden-yellow; parafacial hair yellow; parafrontals with continuous, dense, golden-yellow pollen except at the vertex, where the base color (dark-brown to black) shows through; frontal dark brown in entirety with some pollen at the vertex; females with 2 or 3 frontal bristles below the apex of the ptilinal suture (Figs. 8, 9). Thorax subshining black with indistinct grayish pollinose vittae; propleuron with dark brown to black hair; calypters smoky-colored. Abdomen subshining black with a metallic-blue tinge; male sternum 5 without copulatory arms, the postero-mesal margins serrate (Fig. 20).

Male Postabdomen (Figs. 32, 44).

Epandrium as in Fig. 44; cerci produced into 2 dorsal lobes which are evenly convex posteriorly, the ventral apex broad and coming to a

point (Fig. 32); surstyli with distal and proximal articles, the distal pair mesally directed and evenly rounded, the proximal pair also mesally directed, but tapering to sharp points (Fig. 32).

Female Postabdomen (Figs. 62, 63).

Mesal margins of tergum 7 with sparce hairs covering approximately .33X the width of the tergum; tergum 8 represented by 2 hairs with well-developed sclerotized bases; sternum 8 reduced and somewhat obscured from view by sternum 7, its width at most .25X the width of sternum 7; cerci narrowed basally and approximately 2X as long as wide when measured at their widest points.

Type

The holotype male is from Monroe Co., Florida, No Name Key, February 24, 1972, W. H. Pierce. The allotype is from Monroe Co., Florida, No Name Key, April 13, 1971, W. H. Pierce. Both types have been deposited in the Florida State Collection of Arthropods, Gainesville, Florida. The paratypes are as follows: 2 males, No Name Key, Monroe Co., Florida 5 February 1972, W. H. Pierce (MSUC); 4 males, No Name Key, Monroe Co., Florida 24 February 1972, W. H. Pierce (USNM); 1 male, Key Largo, Monroe Co., Florida 26 February 1956, H. V. Weems (AMNH); 1 male, No Name Key, Monroe Co., Florida 1 March 1972, W. H. Pierce (CNCI); 3 females, 13 April 1971 in McPhail trap, W. H. Pierce (CNCI); 1 female, 1 March 1971 in McPhail trap, W. H. Pierce (USNM); 1 male, 10 April 1970 in malaise trap, W. H. Wirth (CASC); 1 male, Matheson Hamm., Florida 30 April, 1957 H. V. Weems (Ravlin collection).

Distribution

As listed above, Monroe Co., Florida.

Adult Seasonal Activity

Early February through April. Probably univoltine but more data is needed.

Remarks

This species may be easily recognized by its yellow parafacial hair, dark-brown to black propleural hair, and smoky-colored calypters.

Biology

Many of the specimens were collected by means of a McPhail trap (McPhail, 1937). No hosts are known.

Archytas (Archytas) rufiventris Curran

Archytas rufiventris Curran, 1928, Can. Ent. 60:280, 281.

General Appearance

Length 11-16mm. Facial and parafacial pollen silvery-white to off-white; parafacials with a mixture of dark-brown and off-white hair or wholly dark-brown; parafrontals with discontinuous off-white pollen allowing the base color (orangish-brown) to show through; anterior half of frontal yellow to orange, the posterior half orange to red; females usually with 3 frontal bristles below the apex of the ptilinal suture (Fig. 9). Thorax gray pollinose with black vittae on mesal and lateral areas of the notum; propleuron with yellow to off-white hair; calypters white to off-white. Abdomen subshining brownish-orange, often with a dark brown dorso-mesal vitta; posterior margin of sternum 2 with dark brown to black hair; male sternum 5 without copulatory arms, the postero-mesal margins punctate with distinct postero-ventral calli (Fig. 19).

Male Postabdomen (Figs. 31, 43).

Epandrium as in Fig. 43; cerci produced into 2 dorsal lobes which are evenly convex posteriorly, the ventral projection with its apex deeply emarginate and subequal in length to the distal articles of the surstyli (Fig. 31); surstyli with distal and proximal articles, the proximal pair .8X longer than the distal, with their apices directed mesally and tapering to sharp points, the distal pair approximately .8X wider than the proximal pair with their rounded apices and directed ventrally (Fig. 31).

Female Postabdomen (Fig. 54, 55).

Mesal margins of tergum 7 with sparse scattered setae; tergum 8 usually with 4 or more setae on a distinct sclerotized plate; sternum 8 comparatively large and subequal in width to the postgenital plate; cerci with margins rounded and approximately 2X as long as wide.

Type

The holotype male is from Royal Palm Park, Florida, April 12-18, 1923, and is in the Canadian National Collection. The allotype is from Miami, Florida, Nov. 12, and is also in the Canadian National Collection.

Distribution

This species is found throughout Florida with 1 record in Dare Co., North Carolina; and 1 record from the extreme northwest corner of Tennessee.

Adult Seasonal Activity

Recorded for all months of the year except August and September. Probably multivoltine.

Remarks

This species is most easily recognized by the dark parafacial hairs. All other species in the subgenus Archytas have light parafacial hair.

Biology

Nothing is known of the biology of rufiventris.

Subgenus Nemochaeta van der Wulp

Nemochaeta van der Wulp, 1888: 38 (as genus). Type-species dissimilis van der Wulp (monotypic).

Archytas (Nemochaeta) Sabrosky and Arnaud 1965: 1000 (as subgenus).

The subgenus Nemochaeta differs from Archytas by the length of the 1st aristal segment, which is at least .75X the length of the 2nd, and the dark-brown to black parafacial and propleural hair. Most of the species within the subgenus possess globose distal articles of the surstyli (Figs. 33, 35, 36) except instabilis Curran and convexiforceps Brooks (Figs. 34, 37).

Archytas (Nemochaeta) convexiforceps Brooks

Archytas (Nemochaeta) convexiforceps Brooks, 1949, Can. Ent. 81:23.

General Appearance

Length 11-12mm. Facial and parafacial pollen silvery-white; parafrontals subshining black with sparse silvery-white pollen; anterior half of frontal yellow to orange, posterior half dark-orange to brown; females usually with 3 frontal bristles below the apex of the ptilinal suture (Fig. 9). Thorax subshining black with the anterior of the

prescutum whitish pollinose; calypters white to off-white. Abdomen subshining reddish-brown with a dorso-median black vitta as in lateralis; male sternum 5 with a broad U-shaped excavation mesally, the postero-mesal apices convergent with a rounded mesally projecting copulatory arm (Fig. 21).

Male Postabdomen (Figs. 37, 49).

Epandrium as in Fig. 49; cerci convex postero-dorsally and narrowed into a thin truncated ventral projection; surstyli with yellow distal articles, the proximal articles with their apices short and pointed mesally (Fig. 37).

Female Postabdomen (Figs. 72, 73).

Mesal margins of tergum 7 with a single row of sparse hairs; tergum 8 represented by 3 hairs; sternum 8 slightly wider than high and approximately .5X the width of sternum 7 at its widest point.

Type

The holotype male is from Miami, Florida, 11 Nov. The allotype is from Miami, Florida, 21 Nov. Both types are in the United States National Museum.

Distribution

FLORIDA: Everglades Nat'l. Pk., Dade Co., Larkins; Miami; Royal Palm Pk.

Adult Seasonal Activity

Adults have been collected in January, March, October, and November.

Remarks

Males of convexiforceps can be recognized by the subshining black parafrontals, the U-shaped mesal excavation of the 5th sternum (Fig. 21), and the convex dorsal portion of the cerci (Fig. 37). Females can be recognized by the subshining black parafrontals and the 8th sternum, which is approximately .5X the width of sternum 7 at its widest point. The 8th sternum of lateralis is approximately .6 to .8X the width of sternum 7 at its widest point (Fig. 71).

The limits of variability of convexiforceps are not well known due to a lack of specimens (7 specimens were examined).

Biology

Nothing is known of the biology of convexiforceps.

Archytas (Nemochaeta) lateralis (Macquart)

Jurinia lateralis Macquart, 1843, Soc. Roy. de Sci., de l'Agr. et des Arts, Lille Mem. 1842:199.
Jurinia gonoides Bigo, 1887, Bul. Soc. Ent. France, (ser. 6), 7:cxl.
Echinomyia dispar van der Wulp 1890: 34.

General Appearance

Length 10-15mm. Facial and parafacial pollen silvery-white to off-white; parafrontals with discontinuous silvery-white to yellow pollen allowing some of the base color (dark-brown to black) to show through; anterior half of frontal yellow and darkening to reddish-orange in the posterior half; females with 2 to 5 frontal bristles below the apex of the ptilinal suture. Thorax grayish pollinose, much denser than aterrimus and usually covering much of the notum; calypters

white to off-white. Abdomen subshining reddish-brown with a black median vitta dorsally; male sternum 5 with postero-mesal margins serrulate to serrate (Fig. 23).

Male Postabdomen (Figs. 36, 48).

Epandrium as in Fig. 48; cerci concave postero-dorsally and narrowed into a rounded to truncated ventral projection (Fig. 36); surstyli with yellow, globose, basal articles distally and a proximal pair with their apices pointed and directed mesally (Fig. 36).

Female Postabdomen (Figs. 70, 71).

Mesal margins of tergum 7 covered with sparse hairs for at least .5X the width of the tergum, the lateral margins often irregular; tergite 8 represented by 2 or 3 hairs; base of sternite 8 3/5 to 4/5 the width of sternum 7 at its widest point.

Type

No trace of the holotype has been found in the Paris or Lille Collections.

Distribution

California to Iowa, south to Mexico; also British Columbia, Montana, Georgia and Florida.

Adult Seasonal Activity

Late March through October in colder regions (possibly more than one generation); probably multivoltine where temperature permits with collection dates essentially year-round.

Remarks

This species may be recognized by its pollinose parafrontals and thorax, and reddish-brown abdomen with a dorso-median vitta. The male cerci are concave dorsally, and the apical projections of the surstyli are consistently longer than those of aterrimus or convexiforceps (Figs. 36, 37).

Biology

As stated earlier (see p. 14) lateralis has a restricted host record of species in the genus Malacosoma. Since Malacosoma overwinter in the egg stage, alternate hosts are presumably sought. The only record of a possible alternate host is that given by Townsend (1942) for Chloridea sp. which is a synonym for either Heliothis Hubner or Raghuva Walker (Noctuidae). The known hosts for lateralis are summarized in Table I.

Archytas (Nemochaeta) metallicus (Robineau-Desvoidy)

Jurinia metallica Robineau-Desvoidy, 1830, (Paris) Inst. de France, (Cl. des.) Sci. Math. et Phys., Acad. Roy. des Sci., Mem. presente par divers Savans (ser. 2) 2:35.

Jurinia congruens van der Wulp, 1892, Biol. Centralri-Americana Zooliogia, Insecta Diptera. 2:192. NEW SYNONOMY

For a complete synonomy see Sabrosky and Arnaud (1965).

General Appearance

Length 11-16mm. Facial and parafacial pollen silvery-white to off-white; parafrontals with discontinuous yellow to off-white; parafrontals with discontinuous yellow to off-white pollen allowing some of the base

color (brown to black) to show through; anterior half of frontal brown to dark-brown, posterior half reddish-brown to dark-brown; females with 2 or 3 frontal bristles below the apex of the ptilinal suture (Figs. 8, 9). Thorax subshining dark-brown to black and pollinose on the prescutum with pollinose vittae on dorso-mesal and lateral areas; calypters smoky-colored. Abdomen subshining reddish-brown to black, sometimes with a metallic blue tinge; male sternum 5 with postero-mesal margins punctate to serrate (Fig. 25).

Male Postabdomen (Figs. 35, 47)

Epandrium as in Fig. 47; cerci concave postero-dorsally and narrowed into a pointed ventral projection (Fig. 35); surstyli with yellow to brown, globose, distal articles and a proximal pair with their apices pointed and directed mesally.

Female Postabdomen (Figs. 68, 69).

Tergum 8 covered with sparse hairs on the mesal margins for approximately .33X the width of the tergum, with the lateral margins often irregular; tergum 8 represented by 2 or 3 hairs; sternite 8 3/5 to 4/5 the width of sternum 7 at its widest point.

Type

The female holotype is from "Carolina" and is in the Paris Museum, No. 195. The specimen has not been available for examination. The type was examined by Aldrich (1931a).

Distribution

California to Ontario and New Hampshire, south to Mexico and Florida.

Adult Seasonal Activity

Late May through October in colder regions and early May to mid-November where temperature permits, with the height of the season from July through September. Probably 1 or 2 generations per year.

Remarks

This is the only species in A. (Nemochaeta) which has its calypters smoky-colored.

Biology

As stated earlier (see p. 14) metallicus has a restricted host record and would appear to be genus-specific (ie. Datana spp.). Datana overwinters in the pupal stage (Baker, 1972) and would therefore allow metallicus to overwinter as a 2nd or 3rd instar larva or puparium. For a summary of known host records see Table I.

Archytas (Nemochaeta) aterrimus (Robineau-Desvoidy)

Jurinia aterrima Robineau-Desvoidy, 1830, (Paris) Inst. de France, (Cl. des.) Sci. Math. et Phys., Acad. Roy. des Sci., Mem. presentes par divers Savans (ser. 2) 2:35.
For a complete synonymy see Sabrosky and Arnaud (1965).

General Appearance

Length 8-17mm. Facial and parafacial pollen white to yellow; parafrontal pollen concolorous with the parafacial pollen but discontinuous allowing some of the base color (black) to show through and often approaching subshining; anterior half of frontal yellow to orange, the posterior half dark orange to red; females usually with 3

frontal bristles below the apex of the ptilinal suture (Fig. 9). Thorax subshining black to the naked eye, often sparse grayish pollen on prescutellar and postscutellar areas, especially when viewed posteriorly. Abdomen subshining reddish-brown to black and often with a metallic blue tinge; male sternum 5 with postero-mesal margins serrulate to serrate (Fig. 22).

Male Postabdomen (Figs. 33, 45).

Epandrium as in Fig. 45; cerci concave postero-dorsally and narrowed into a truncated ventral projection (Fig. 33); surstyli with yellow, globose, distal articles and a proximal pair with their apices pointed and directed mesally (Fig. 33).

Female Postabdomen (Figs. 64, 65).

Tergum 7 covered with sparce hairs for at least .5X the width of the tergum with the lateral margins often irregular; tergum 8 represented by 2 hairs; sternum 8 approximately .8X the width of sternum 7 at its widest point.

Type

The female holotype is from Carolina and is in the Museum Nationale D'histoire Naturelle, Paris (No. 196). The type has been unavailable for study.

Distribution

Manitoba to New Brunswick, south to Florida and Mexico. Isolated specimens have been taken from Arizona and southern California.

Adult Seasonal Activity

April to October in colder regions; probably multivoltine where temperature permits, with collection dates year round.

Remarks

Archytas aterrimus may be recognized by its subshining black thorax and abdomen. The sparse thoracic pollen in postscutellar and scutellar areas separates it from lateralis, which has prevalent pollen on the thoracic notum when viewed with the naked eye. The characters found in the surstyli are variable, though the majority of the specimens examined have a relatively short apical projection with a prominent flange (Fig. 36). A study of character variation in surstyli has shown that differences are quite subtle in some cases. The thoracic pollen is easily viewed and more discernible. Another closely related species is instabilis which lacks basal articles of the surstyli (Fig. 34). Females of aterrimus may be differentiated by the relatively large tergum 7 with irregular lateral margins; tergum 7 in instabilis has regular lateral margins (Fig. 67). A character easily viewed is the width to length ratio of the abdomen as well as its shape. The abdomen of aterrimus is generally globose and wider than long.

Biology

The biology of aterrimus is at best, incomplete, although the data from reared specimens (Ex. Heterocampa manteo) is given earlier (see p. 13). Host records for aterrimus are summarized in Table I.

Archytas (Nemochaeta) instabilis Curran

Archytas instabilis Curran, 1928, Can. Ent. 60:203, 224.

General Appearance

Length 9-11mm. Facial and parafacial pollen golden-yellow pollen, allowing some of the base color (brown to black) to show through; anterior half of frontal yellow to orange and darkening to reddish-orange in the posterior half; females usually with 3 frontal bristles below the apex of the ptilinal suture (Fig. 9). Thorax subshining black to the naked eye, and often sparsely pollinose on prescutellar and postscutellar areas, especially when viewed posteriorly; calypters white to off-white. Abdomen subshining black and often with a metallic blue tinge; male sternum 5 with postero-mesal margins serrulate (Fig. 24).

Male Postabdomen (Figs. 34, 46).

Epandrium as in Fig. 46; cerci convex postero-dorsally and narrowed into an apically rounded ventral projection (Fig. 34); surstyli without distal articles, the apex of the proximal pair with their apices pointed and directed mesally (Fig. 34).

Female Postabdomen (Figs. 66, 67).

Tergum 7 covered with sparse hairs over much of the tergum, more sparsely so than aterrimus (Fig. 64), the lateral margins evenly convex; tergum 8 represented by 3 hairs; sternum 8 approximately .6X the width of sternum 7 at its widest point.

Type

The holotype male is from Hewitt, New Jersey, 18 June, 1904, and is in the Canadian National Collection, No. 2828.

Distribution

NEW JERSEY: Atco; Waterloo. NEW YORK: Tuxedo; Keene Valley. NORTH CAROLINA: Highlands. PENNSYLVANIA: Lehigh Gap. ONTARIO: Lanrk Co.; Thunder Bay B'ch.

Adult Seasonal Activity

Early May through August. Probably 1 generation per year.

Remarks

Archytas instabilis is the smallest species within the North American element of the genus (9-11mm) and can be recognized by the absence of distal articles of the surstyli in the males. The abdomen is longer than wide, contrasting with aterrimus which has distal articles (males) and an abdomen which is somewhat globose and subequal to wider than long.

Curran's character of pollinosity on the 3rd abdominal tergum (2nd apparent) is of limited value based on examination of 1,200 specimens of aterrimus. Numerous specimens have been examined which possess pollen on the basal half or more of the 3rd abdominal tergum in aterrimus.

One specimen of instabilis was found to have aberrant cerci with as prominent apical notch on the ventral projection. The label data is as follows. Atco, New Jersey, 6.6.97, C. W. Johnson Collection and is in the Museum of Comparative Zoology, Harvard University. Since only 1 specimen of this form was observed, and little is known of the variation in instabilis, I choose not to name this variant at this time.

Biology

Nothing is known of the biology of instabilis, however, it is possible that host records may be hidden in misidentifications of aterrimus.

TABLE I
Host Records

Archytas analis auctorum

Ex. LASIOCAMPIDAE
Malacosoma californicum (Packard) (Thompson, 1943)
M. fragile (Stretch) (Thompson, 1943)
(The above 2 species were more than likely parasitized by A. lateralis)
NOCTUIDAE
Elaphria nucicolora Guenee (Thompson, 1943)
Leucania juncicola Guenee (Thompson, 1943)
L. latiuscula Herrich-Schaeffer (Thompson, 1943)
L. multilinea Walker (Thompson, 1943)
Peridroma saucia Hubner (Thompson, 1943)
Pseudaletia unipuncta (Haworth) (Thompson, 1943)
Spodoptera ornithogalli Guenee (Thompson, 1943)
S. praefica Grote (Thompson, 1943)

Archytas californiae (Walker)

Ex. NOCTUIDAE
Trichoplusia ni (Hubner) (Burriff and Davis, 1974; Metcalf and Luckman, 1975)
Spodoptera praefica Grote (Metcalf and Luckman, 1975)

Archytas apicifer (Walker)

Ex. NOCTUIDAE
Peridroma saucia Hubner (Thompson, 1943)
Pseudaletia unipuncta (Haworth) (Burrell, 1967, Patton, 1958)
Spodoptera ornithogalli Guenee (Botrell, 1969)

Archytas marmoratus (Townsend)

Ex. NOCTUIDAE
Agrotis ypsilon Hufnagel (Thompson, 1943)
Heliothis virescens (Fab.) (authors)
H. zea (Boddie) (authors)
Laphygma frugiperda Abbot and Smith (Thompson, 1943)
Leucania latiuscula Herrich-Schaeffer (Thompson, 1943; Vickery, 1926)
Spodoptera latifascia Grote (Patton, 1958)
Pseudaletia unipuncta (Haworth) (Thompson, 1943)

Archytas aterrimus Robineau-Desvoidy

Ex. ARCTIIDAE
Cycnia ternera Hubner (Thompson, 1943)
LASIOCAMPIDAE
Malacosoma americanum (Fab.) (Thompson, 1943) (Probably parasitized by A. lateralis.)

MEGALOPYGIDAE
Megalopyge crispata Packard (Coquillett, 1897)
NOCTUIDAE
Acronicta interrupta Guenee (Coquillett, 1897)
A. ovata Grote (Coquillett, 1897)
Catocala neogama Abbot and Smith (Thompson, 1943)
Plathypena scabra Fab. (Thompson, 1943)
NOTODONTIDAE
Cerura sp. (Coquillett, 1897)
Heterocampa manteo (Doubleday) (Surgeoner, 1975)

Archytas lateralis (Macquart)

Ex. LASIOCAMPIDAE
Malacosoma americanum (Fab.) (Patton, 1958)
M. californicum (Packard) (Stehr and Cook, 1968)
M. californicum lutescens (Neumoegen and Dyar) (Stehr and Cook, 1968)
M. californicum fragile (Stretch) (Stehr and Cook, 1968)
M. constrictum constrictum (Henry Edwards) (Stehr and Cook, 1968)
M. disstria Hubner (Ross, 1953)
M. incurvum incurvum (Henry Edwards) (Stehr and Cook, 1968)
NOCTUIDAE
Chloridea Westwood (=Heliothis Hubner or Raghuva Walker)(Townsend, 1942)

Archytas metallicus (Robineau-Desvoidy)

Ex. NOTODONTIDAE
Datana angusii Grote and Robinson (Thompson, 1943; personal observation)
D. integerrima Grote and Roginson (Thompson, 1943; personal observation)
D. ministra Drury (Thompson, 1943; personal observation)
D. perspicua Grote and Robinson (Thompson, 1943; personal observation)

PLATE I

Figs. 1-9. General morphological details of Archytas.

Fig. 1. Head, frontal aspect.

Fig. 2. Head, lateral aspect.

Fig. 3. Thorax, dorsal aspect.

Fig. 4. Wing.

Fig. 5. Male postabdomen (external), lateral aspect.

Fig. 6. Male postabdomen (internal), lateral aspect.

Fig. 7. Female postabdomen, lateral aspect.

Fig. 8. Female head, frontal aspect.

Fig. 9. Female head, frontal aspect.

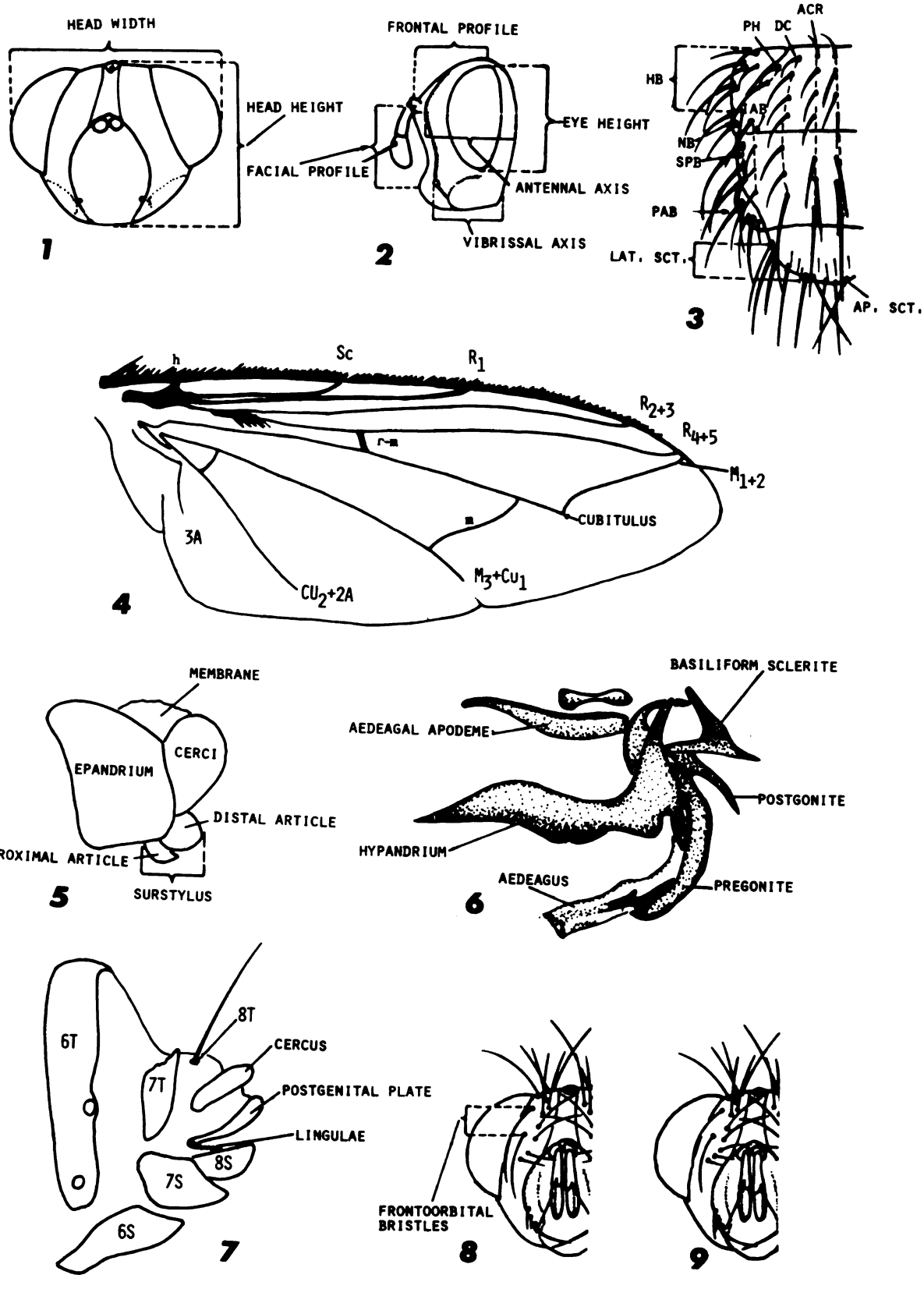

HEAD WIDTH
HEAD HEIGHT
FACIAL PROFILE
1
FRONTAL PROFILE
EYE HEIGHT
ANTENNAL AXIS
VIBRISSAL AXIS
2
ACR
PH
DC
HB
AB
NB
SPB
PAB
LAT. SCT.
AP. SCT.
3
h
Sc
R1
R2+3
R4+5
M1+2
CUBITULUS
3A
M3+Cu1
CU2+2A
4
MEMBRANE
EPANDRIUM
CERCI
DISTAL ARTICLE
PROXIMAL ARTICLE
SURSTYLUS
5
BASILIFORM SCLERITE
AEDEAGAL APODEME
POSTGONITE
HYPANDRIUM
AEDEAGUS
PREGONITE
6
6T
8T
CERCUS
7T
POSTGENITAL PLATE
LINGULAE
8S
7S
6S
7
FRONTOORBITAL BRISTLES
8
9

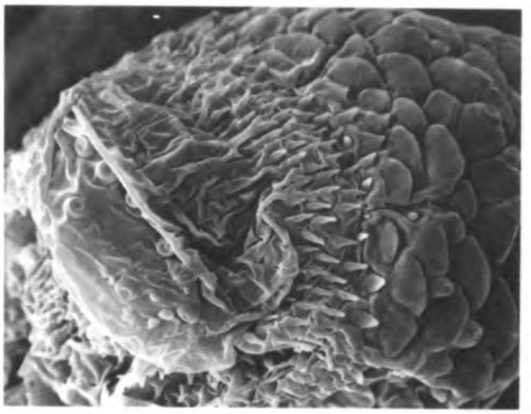
PLATE II

Figs. 10-12. 1st instar sensory structures.

Fig. 10. Pseudocephalon of Archytas apicifer (2000X).

Fig. 11. Dorsal aspect of 3rd abdominal tergum in Archytas rufiventris (1000X).

Fig. 12. Caudal sensoria of Archytas apicifer (5000X).



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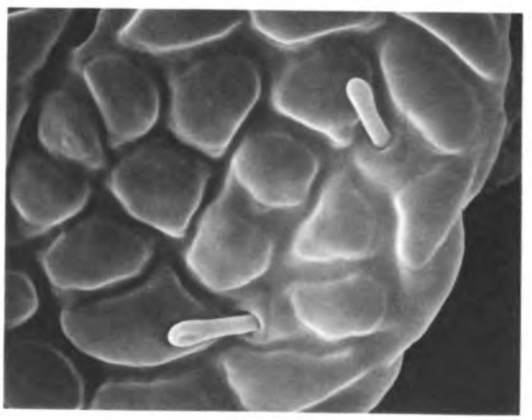

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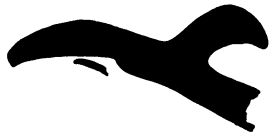
PLATE III

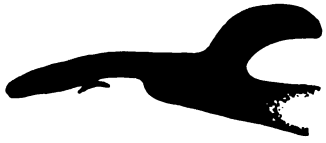
Fig. 13a-j. Cephalo-pharyngeal skeletons of first instar larvae.

13a CALIFORNIAE

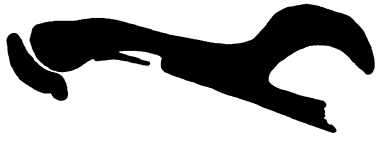


b NIVALIS

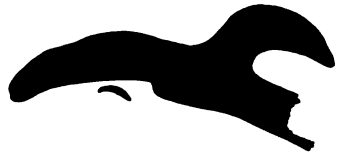
c APICIFER



d PLANGENS

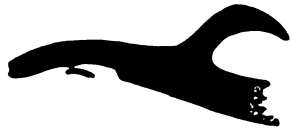


e MARMORATUS



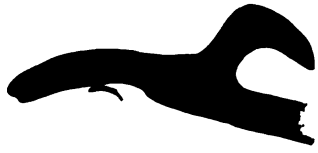
f RUFIVENTRIS

g NONAMENSIS



h ATERRIMUS

i LATERALIS



j METALLICUS

PLATE IV

Figs. 14-19. Male sternum 5, ventral aspect.

Fig. 14. Archytas californiae

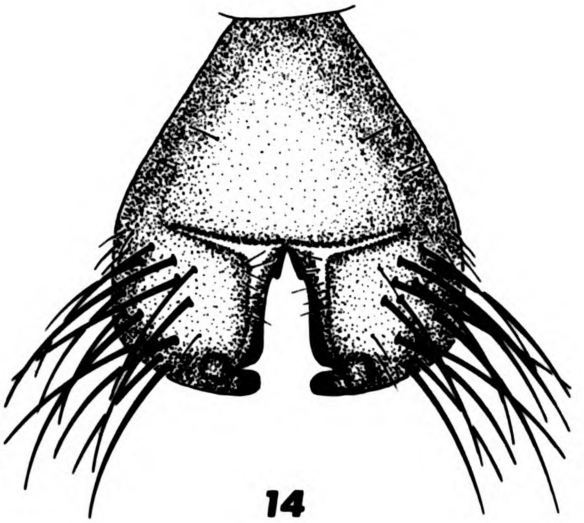
Fig. 15. A. apicifer

Fig. 16. A. nivalis

Fig. 17. A. plangens

Fig. 18. A. marmoratus

Fig. 19. A. rufiventris



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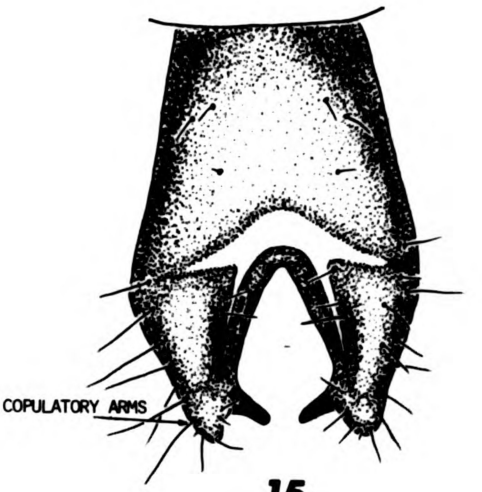

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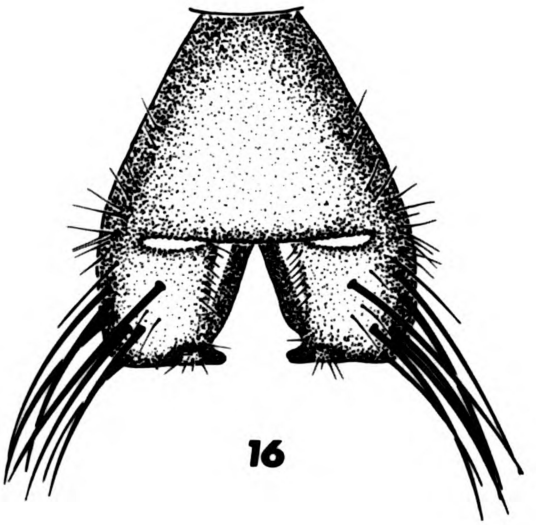

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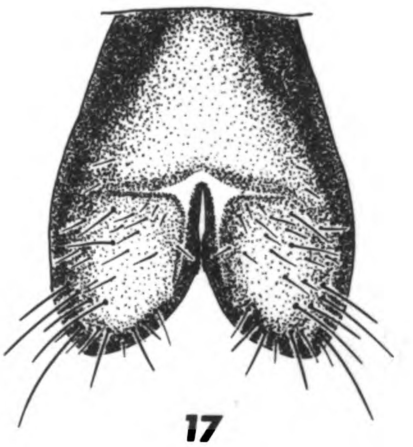

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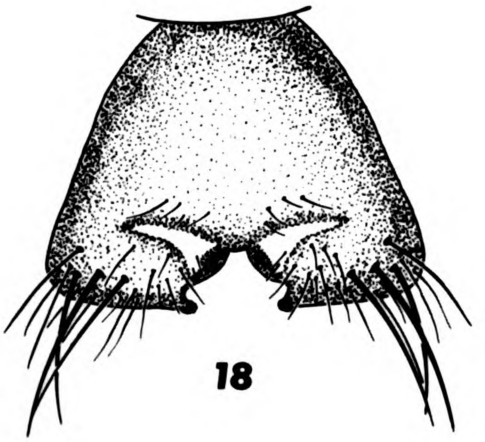

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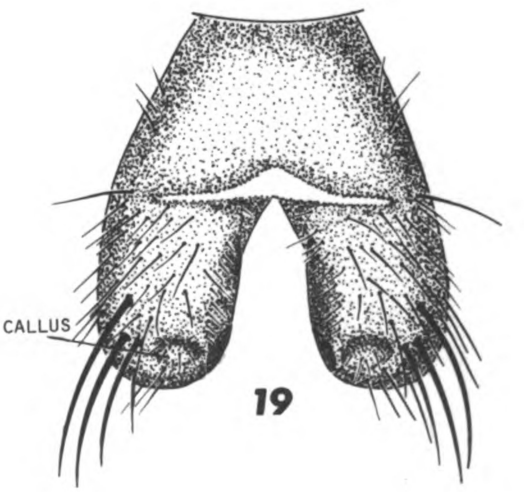

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PLATE V

Figs. 20-25. Male sternum 5, ventral aspect.

Fig. 20. *Archytas nonamensis*

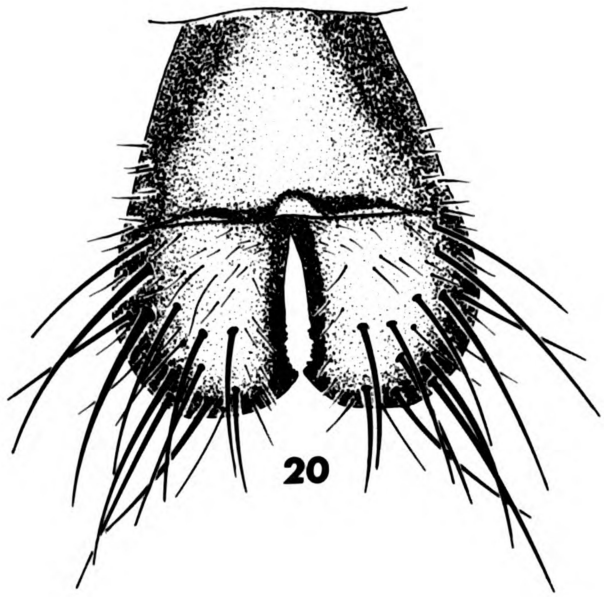
Fig. 21. *A. convexiforceps*

Fig. 22. *A. aterrimus*

Fig. 23. *A. lateralis*

Fig. 24. *A. instabilis*

Fig. 25. *A. metallicus*



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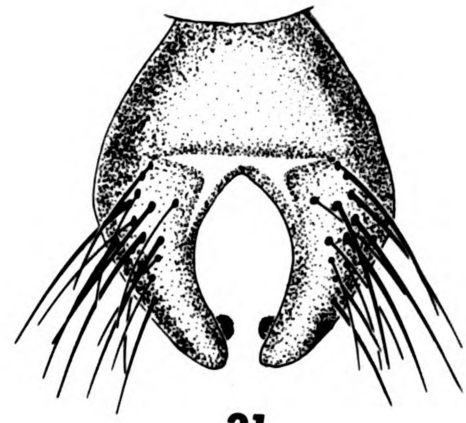

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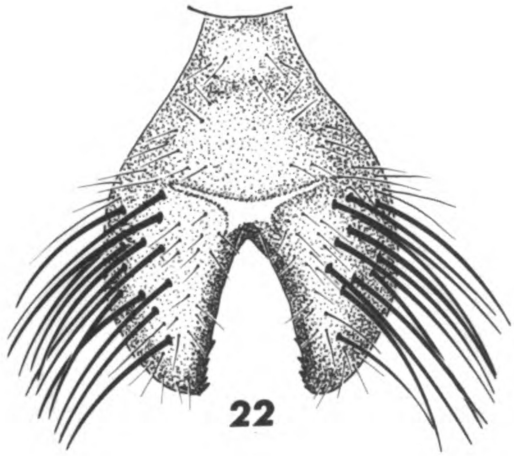

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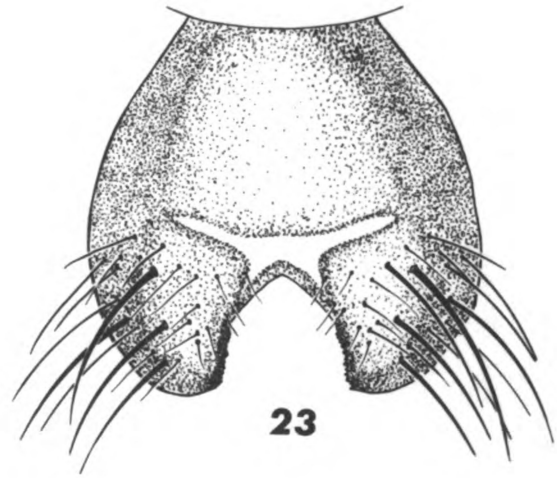

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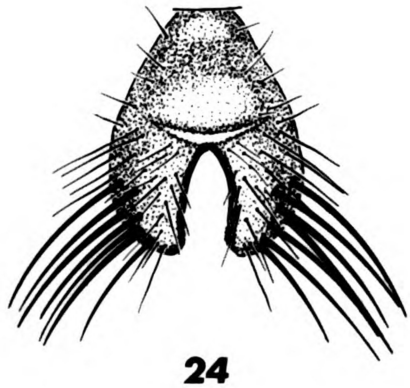

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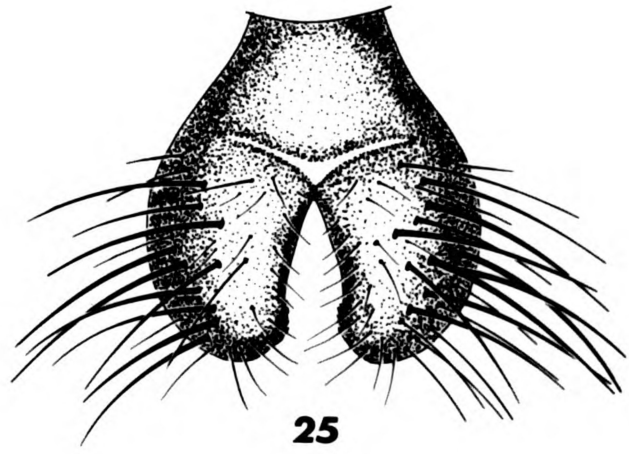

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PLATE VI

Figs. 26-37. Male postabdomen, posterior aspect.

Fig. 26. Archytas californiae

Fig. 27. A. nivalis

Fig. 28. A. apicifer

Fig. 29. A. plangens

Fig. 30. A. marmoratus

Fig. 31. A. rufiventris

Fig. 32. A. nonamensis

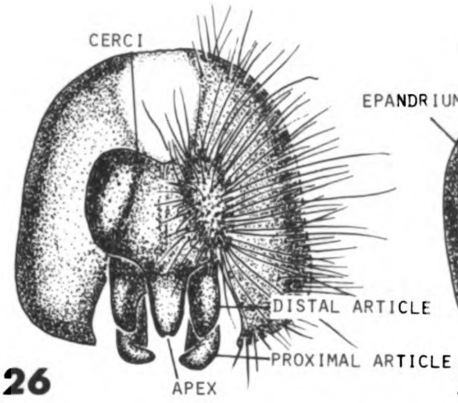
Fig. 33. A. aterrimus

Fig. 34. A. instabilis

Fig. 35. A. metallicus

Fig. 36. A. lateralis

Fig. 37. A. convexiforceps



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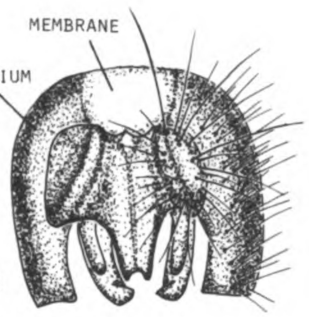

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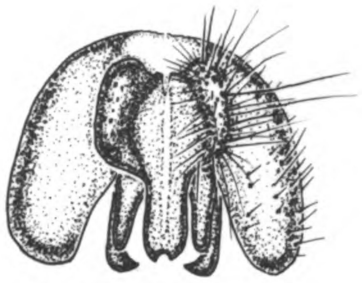

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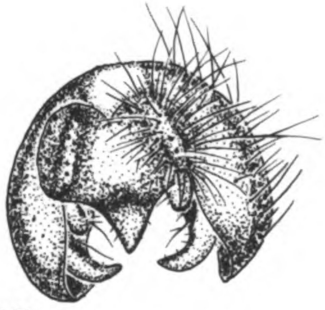

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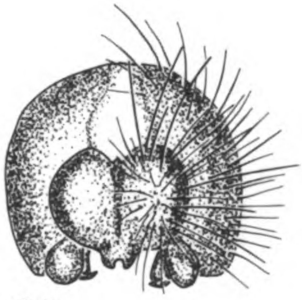

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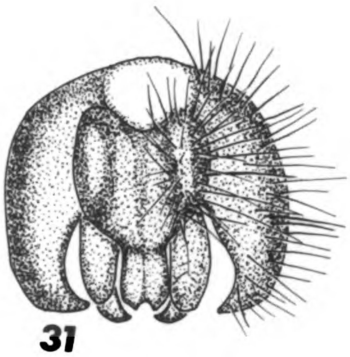

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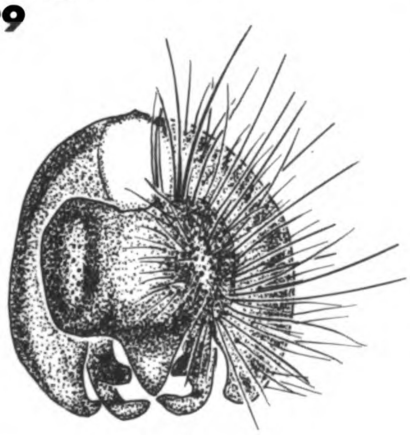

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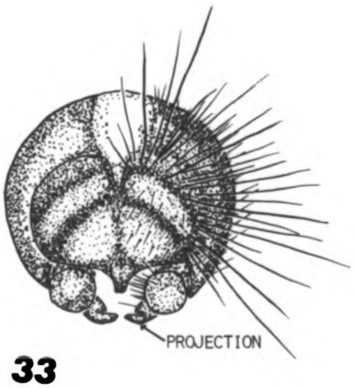

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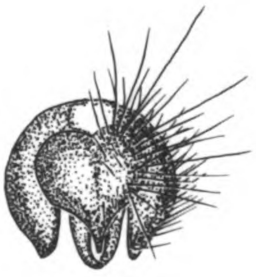

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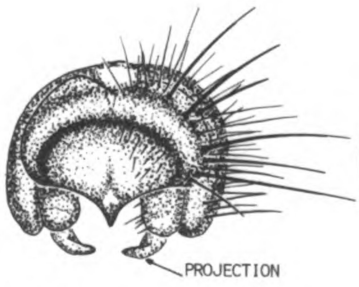

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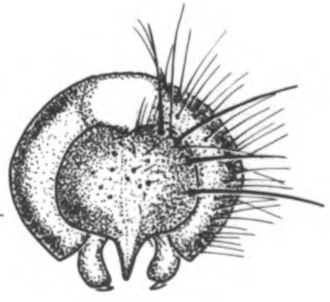

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PLATE VII

Figs. 38-49. Male postabdomen, lateral aspect.

Fig. 38. Archytas californiae

Fig. 39. A. nivalis

Fig. 40. A. apicifer

Fig. 41. A. plangens

Fig. 42. A. marmoratus

Fig. 43. A. rufiventris

Fig. 44. A. nonamensis

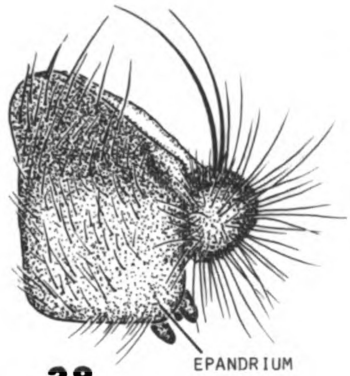
Fig. 45. A. aterrimus

Fig. 46. A. instabilis

Fig. 47. A. metallicus

Fig. 48. A. lateralis

Fig. 49. A. convexiforceps



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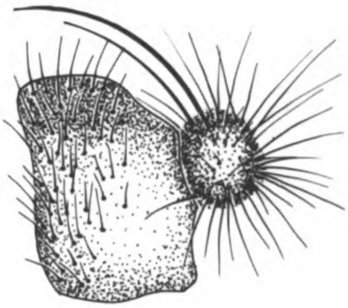

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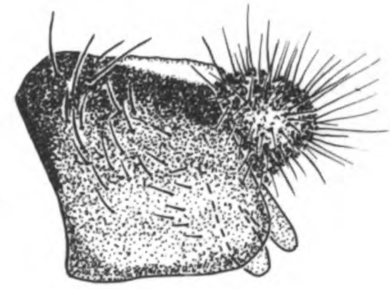

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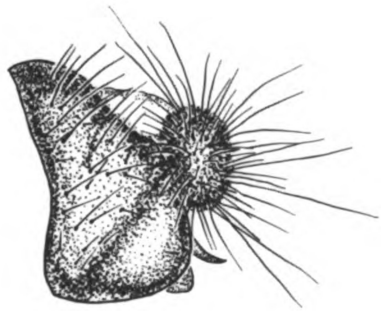

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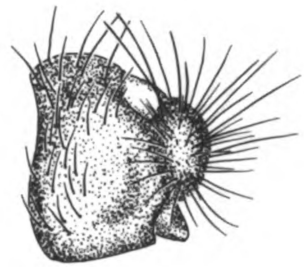

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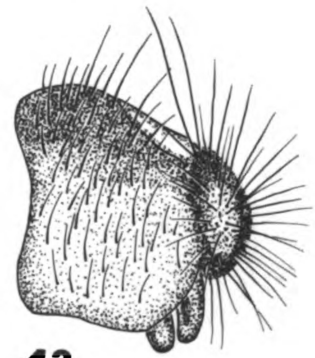

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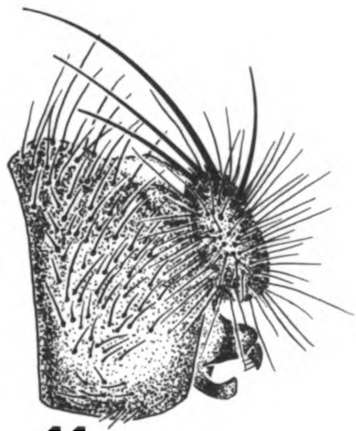

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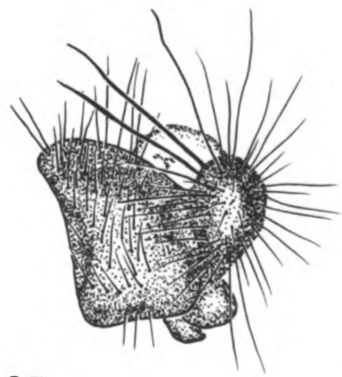

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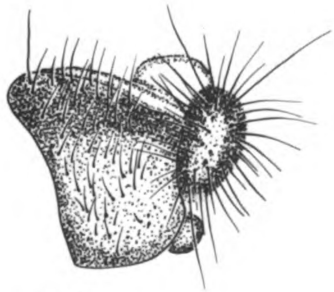

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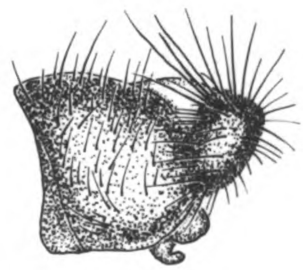

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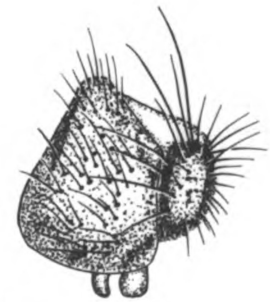

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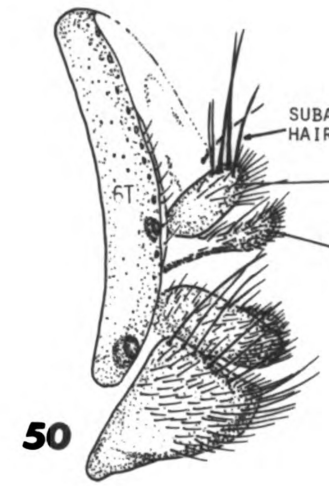
PLATE VIII

Figs. 50-55. Female postabdomen, lateral and posterior aspects.

Figs. 50-51. *Archytas nivalis*

Figs. 52-53. *A. californiae*

Figs. 54-55. *A. rufiventris*



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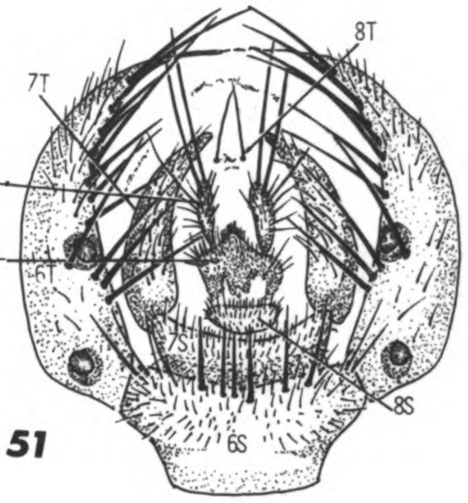

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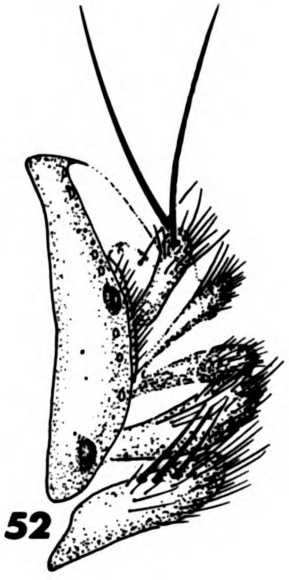

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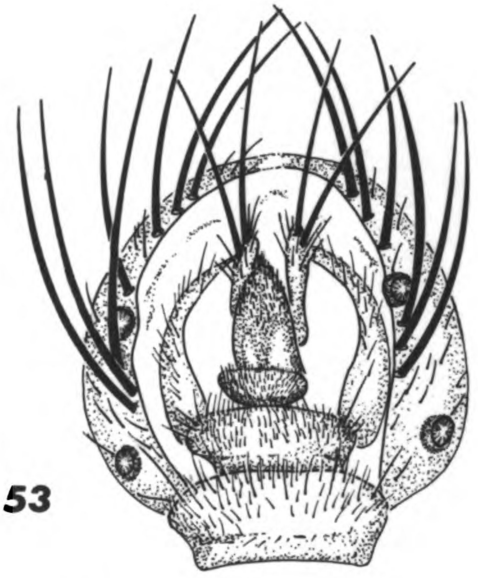

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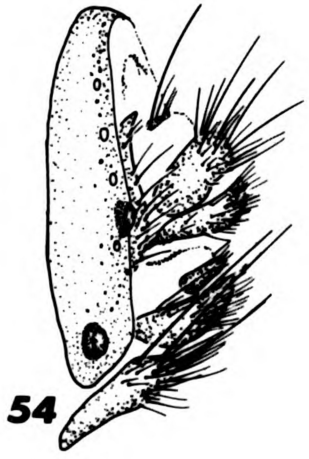

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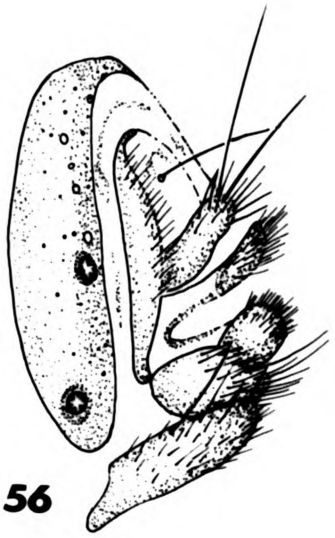
PLATE IX

Figs. 56-61. Female postabdomen, lateral and posterior aspects.

Figs. 56-57. *Archytas apicifer*

Figs. 58-59. *A. plangens*

Figs. 60-61. *A. marmoratus*



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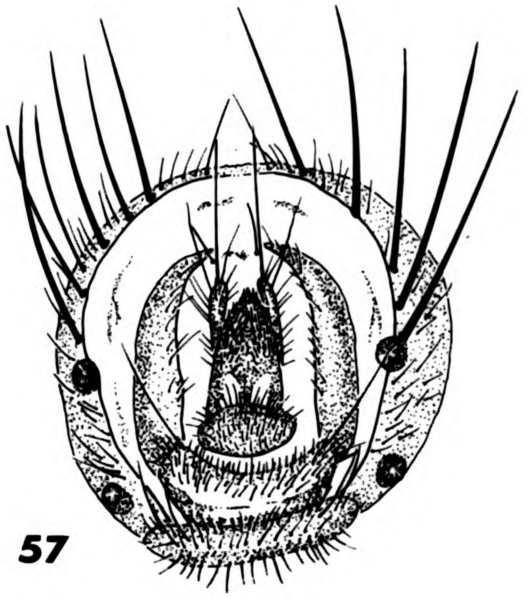

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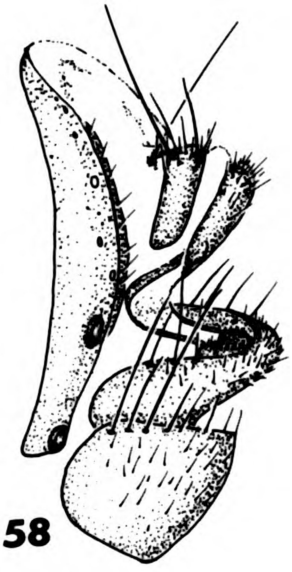

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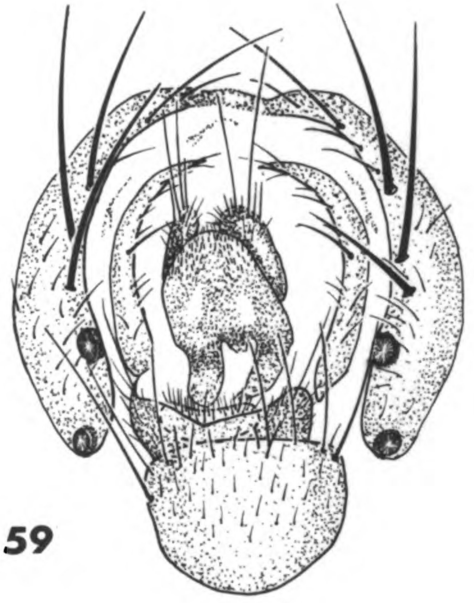

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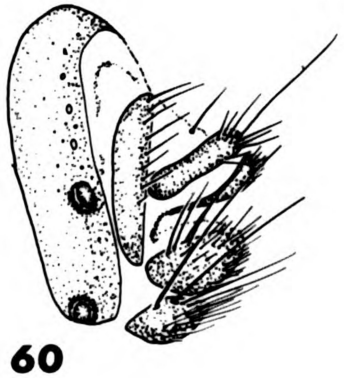

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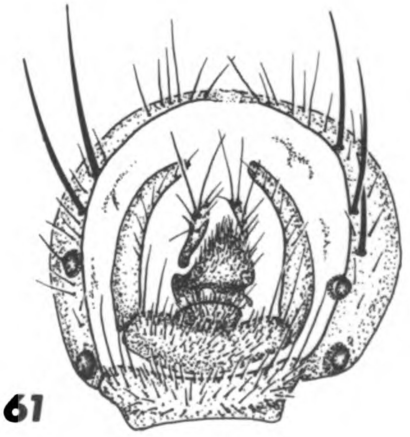

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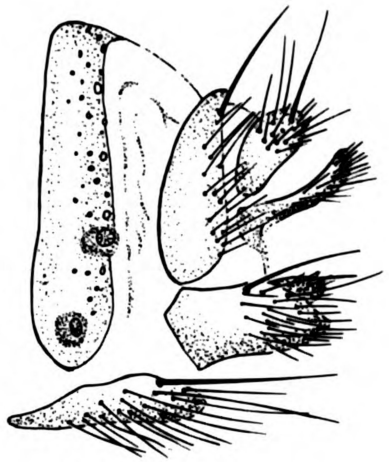
PLATE X

Figs. 62-67. Female postabdomen, lateral and posterior aspects.

Figs. 62-63. *Archytas nonamensis*

Figs. 64-65. *A. aterrimus*

Figs. 66-67. *A. instabilis*



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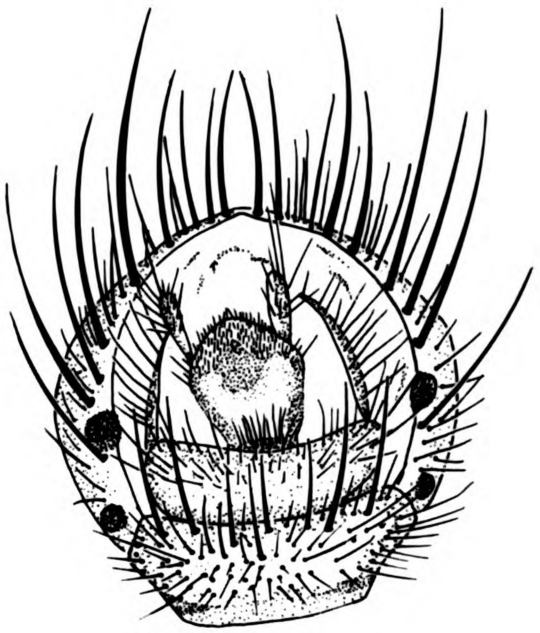

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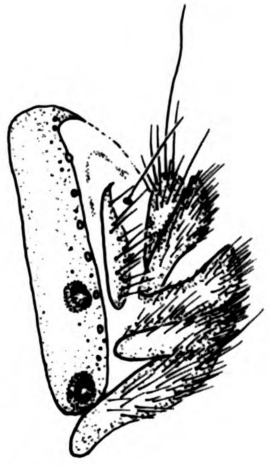

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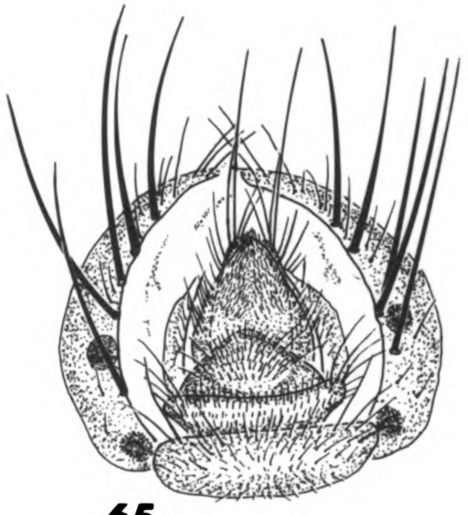

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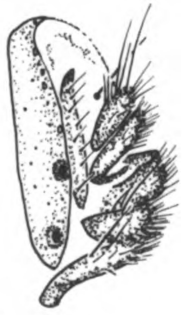

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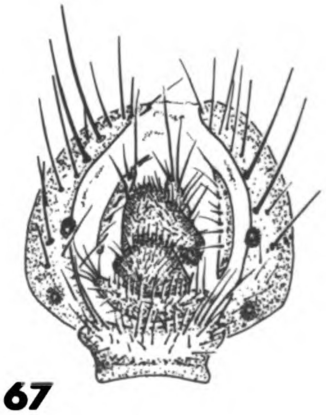

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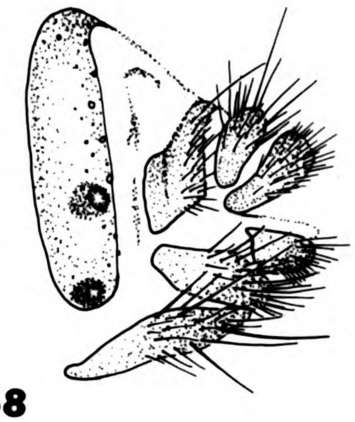
PLATE XI

Figs. 68-73. Female postabdomen, lateral and posterior aspects.

Figs. 68-69. Archytas metallicus

Figs. 70-71. A. lateralis

Figs. 72-73. A. convexiforceps



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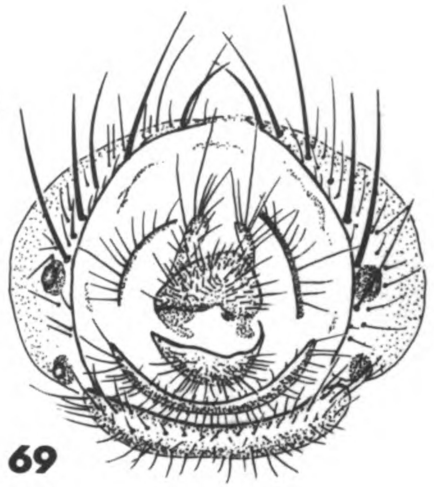

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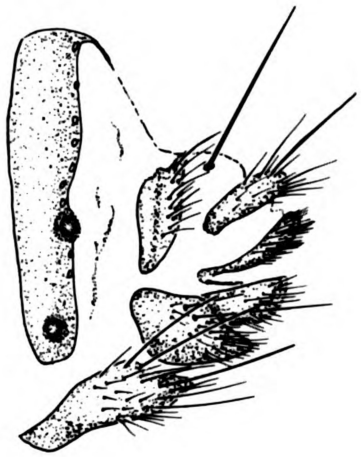

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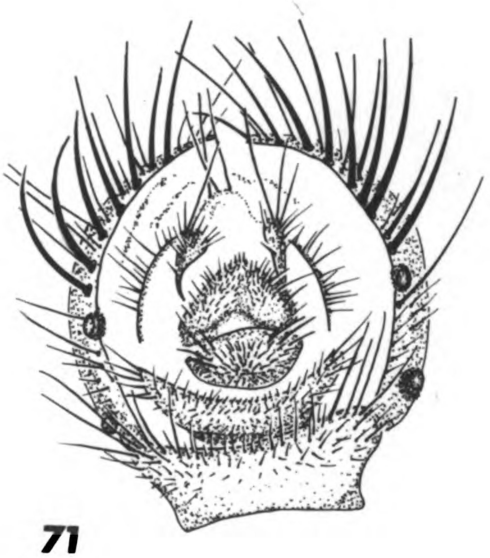

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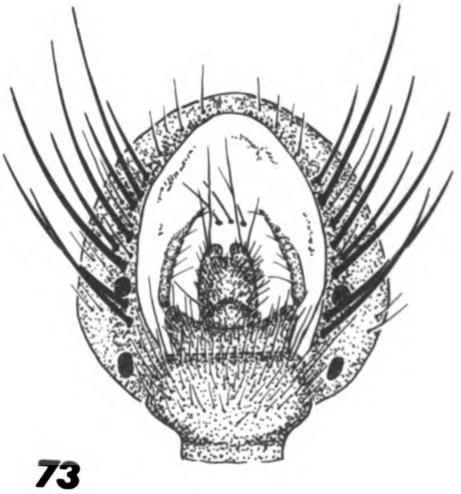

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