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# The secondary sexual characters of the Hymenoptera

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#### THE SECONDARY SEXUAL CHARACTERS

OF THE HYMENOPTERA

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Leonard S. McLaine, B. Sc.

Part of a thesis for the Degree of Master of Science

at the Massachusetts Agricultural College

1912



Introduction

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The object of this paper is twofold; first, to bring together all the literature available on the chief secondary sexual characters of the Hymenopters of North America, and second, to put these statements into such a form that a worker beginning on any group can determine readily, without wading thru a mass of literature, the differences between the sexes. In those forms in which the female has the ovipositor or sting exserted the sexes are easily distinguished, but this is not always the case and in many instances it will be found practically impossible to separate the sexes without dissecting out the genitalia (viz. Braconidae).

It has been noted in several cases, that authors in their keys to a group have made separate keys for the different serves without explaining the structures by which these may be distinguished. Whether this was due to an oversight, or whether it was taken for granted that a beginner should be able to separate the serves by instinct or in some other way, we are not able to judge. But we do know that the results may be disastrous to a beginner who is entirely unfamiliar with a group, as has been proved by actual trial.

It is to be regretted that all the references taken could not be verified as to their correctness in connection with the insects themselves, this being due to the lack of material at hand. In some cases it may be found that an insect does not agree with the

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characters given; this may be due to the fact that it is an abnormal member of a genus. The writer was fortunate enough to have the opportunity of seeing such a case, a female Tenthredinid which had all the characters of a female, with the exception that the median ventral cleft was absent. However, it appears that these abnormal forms are not common enough to be regarded, and as we are unable to foretell what abnormalities may occur in a form, we can feel safe in disregarding them altogether.

In order to make the paper more serviceable, it has been made as brief as possible. In cases where a single statement would hold for a superfamily or a family, it has been adopted, as in the Tenthredinoides. It has often been found impossible to make a single statement which would cover an entire family; in such cases statements for the subfamilies have been used. In still other cases it has been found necessary to take up each genus separately and try to provide some statement which would hold, at least, for the genus. In this connection we might add that difficulty was encountered in placing some genera; especially in cases where only a type was mentioned for a description of a genus. These descriptions were often meagre, and secondary sexual characters were rarely mentioned. The writer was unable to trace the following genera: Dicroganium, Stadt, of the family Cosilidae; Neolarra Ashm. of the family Stelididae; Coelioxoides Cress, of the family Nomadidae and Clypeadon, Ashmead, of the family Philanthidae, which probably do not occur in North America.

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Where the number of abdominal segments is mentioned as being exposed, it will be noted that the Propodium has not been considered.

This paper is offered, in part, for the degree of Master of Science at the Massachusetts Agricultural College, the work being carried on in the Entomological Laboratory of that Institution, under the guidance of Dr. H. T. Fernald, Head of the Department of Entomology, and Dr. G. C. Crampton; and the writer wishes to take this opportunity to thank them for their interest and encouragement.

He also wishes to acknowledge his indebtedness to Messrs. Viereck, Rohwer, and Crawford of the U. S. National Museum, and also to Charles W. Nets of Leland Stamford, Jr. University.

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The Families of Hymenopters according to Ashmead and published by him in the Proceedings of the U.S. National Museum, Vol. XXIII. 1900 No.1206. The order is reversed.

Order Hymenoptera

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Suborder Phytophaga

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Superfamily Tenthredinoidea

Family Cimbicidae

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- " Pterygophoridae
- " Perreyiidae
- Lophyridae
- Hylotomidae
- " Lydidae
- " Xyelidae

Superfamily Siricoidea

Family Cephidae

Xiphydriidae

Siricidae

Oryssidae

Suborder Heterophaga

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Superfamily Ichneumonoidea

Family Stephanidae

Braconidae

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#### Family Ichneumonidae

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#### Superfamily Chalcidoidea

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#### Family Cynipidae

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#### Family Platygasteridae

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Superfamily Apoidea	
Family Prosopidae	-
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Order HYMENOPTERA

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Suborder PHYTOPHAG

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Superfamily TENTHREDINOIDEA

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On the ventral surface of the abdomen of the females there is a median ventral cleft which varies in length, but always extends to the apex of the abdomen. Through this cleft the ovipositor is exserted, but this is not always visible in a pinned specimen. The wale is without this cleft.

The above statement is based upon the examination of specimens of all of the North American families of this superfamily.

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#### Superfamily SIRICOIDEA

On the ventral surface of the abdomen of the females there is a median cleft which varies in length, but always extends to the apex of the abdomen. Through this cleft the ovipositor is exserted. The male is without this cleft.

The above statement is based upon an examination of specimens of the four families within this group. Additional characters applying to three of the four families will be found below.

Dennis Linkly

Fam. Oryssidae In the male there are seven abdominal segments above, and eight beneath, the last ventral segment being as long as the seventh and broader and rounder at its hinder end. In the female this plate is larger. The male has all the tarsi five segmented, but the female has only three segments in the anterior (pair). In the male the antennae have eleven segments.

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Cameron, Mon. Br. Phy. Hym. Vol. III.

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An examination of specimens of the genus Oryssus shows that the females have seven segments on the ventral surface of the abdomen, while the males have eight. The females also have ten segmented antennae in comparison with the males which have eleven.

Fam. <u>Siricidae</u> The females have a cylindrical abdomen and a strong horny projecting ovipositor. p 124

by Astronial line par IV of symplete by LA Passary but Association,

Cameron, Mon. Br. Phy. Hym. Vol. III.

In all the members of this family examined, it was found that the males had eight abdominal segments and the females seven.

Fam. <u>Xiphydriidae</u> This family was once considered as a genus under the family Siricidae and an examination of specimens indicates that the characters given for the Siricidae will also hold here.

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# Suborder HETEROPHAGA

Fam. Stephanidae Ovipositor of the female prominently protuberant with two pubescent valves. p 2.

J. J. Kieffer, Genera Insectorum 77 Ne. Fasc.

Fam. Braconidae The antennae of the females are shorter, stouter

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nor wals his life field that they are being and surrow, while his

and usually with fewer segments than those of the male. Some females are apterous. p 45

7. A. Marshall, Tr. Lon. Ent. Soc. 1885 Pt. I.

In some groups the dorsum has one segment less in the male than in the female. In cases where the ovipositor is not exserted the only safe way for a person unfamiliar with the group to determine the sex of a specimen is to remove the genitalia.

Viereck (in litt.) U. S. Nat. Mus.

- Fem. Alysiidae This family is considered as a subfamily of the Braconidae by Von Gy. V. Szepligeti in genera Insectorum Fasc. 22. See latter part of Viereck's statement of Braconidae above.
- Fam. Ichneumonidae The females bear an ovipositor, which differs greatly in length according to the species.

Sharp, Camb. Nat. Hist. Vol. VI. But the above statement does not mean to imply that the female has the ovipositor always exserted; consequently we have to take up the subfamilies separately.

Subfam. <u>Ichneumoninae</u> The ovipositor of the female is not exserted and in many cases it will be found necessary to dissect out the genitalia in order to determine the sex of the specimen. The abdomen of the female ends in a point, whereas in the male it is blunt. The sheaths of the ovipositor are to be distinguished from the claspers of

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Subfam. <u>Cryptinas</u> The ovipositor of the female is exserted, prominent, rarely very short. p 10.

Ashmead, Proc. U. S. Nat. Mas. Vol. XXIII 1900

Subfam. <u>Pimplinae</u> Ovipositor always prominently exserted. p 11. Ashmead (t. c.)

Subfam. <u>Tryphoninae</u> The only way to determine the sex accurately is to dissect out the genitalia.

Viereck (in litt.) U. S. Nat. Mus.

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Subfam. Ophioninae Ovipositor either hidden or prominent. The male is slenderer than the female. In case of doubt a dissection of the genitalia is essential.

The above statements for the Ichneumonidae have been verified by the writer.

Faz. Evaniidae

Subfam. Evaniance (There are only three North American genera) Genus Evania Fabr. "The abdomen of the female is the shape of an isosceles triangle, the projection being produced into a projection which contains the ovipositor. In the male the abdomen is oval." p. 138 Brailey, Frank. Mr. But, For. BLILY ADVIL 1998.

verse investig tradicy "the optimum of the feasts is quite or matty reach, earer distinguing triangular, but is one spectrum to nearly and share is a mattern a siddle configstion of the phylotometra tate a point destaining the optimistics."

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robten. <u>Resting</u> informan birrinen segmented in the mile and resting increased in the reside, p.S.

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#### Superfamily CHALCIDOIDEA

The female has a median ventral cleft which extends from the point where the ovipositor issues to the apex of the abdomen. Crawford (in litt.)

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# Superfamily CINIPOIDEA

This includes the families Figitidae and Cynipidae. The ovipositor is not prominent, not coming out from the tip of the abdomen, but from the ventral surface, a little anterior to the tip. Sometimes the ovipositor is accidentally prominent after the insect has laid. p 2.

Dalla Torre and J. J. Kieffer, Genera Insectorum, Fasc. 9 "The number of segments apparent in the abdomen is seven in both sexes, with one less on the ventral side of the female and two less in the male. In the female the apical ventral segment is much larger than the others, and in the gall making species is frequently ploughshare shaped, the apex being usually produced into a sharp point which is often hairy." p 149

Cameron, Mon. Br. Phy. Hym. Vol. III.

# Superfamily PROCTOTRYPOIDEA

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#### All families except Pelecinidae

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"The ovipositor agrees with the other terebrant Hymenoptera. The outer sheaths of the ovipositor are conjoined and form a tube or scabbard at the tip of the abdomen that affords protection for the ovipositor proper and its two spiculae when not in use." p. 14

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Ashmead, Mono. of Proctotrypidae, Bul. 45 U. S. Nat. Mus. The above reference was taken when Ashmead regarded the families as subfamilies of the Proctotrypidae, but it will doubtless hold now Longertantin development. that he has raised them to families of the Proctotrypoidea. THE PARTY OF THE PARTY.

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At the apex of the abdomen of the female there is a tube through which the ovipositor is exserted. sentimer is as small; large t

sprace in company of the line. Fam. Pelecinidae "Female without ovipositor exserted, but with an - Party and a state extremely long abdomen. The male has no elongation of the abdomen A TAX A DESCRIPTION OF A LOCAL and the proportions are normal." p 563

IN COMPANY LAY

Sharp, Camb. Nat. Hist. Vol. V "Abdomen of the female greatly lengthened, slender and cylindrical, on Annual And Description. about five times the length of the head and thorax united, composed all shared or conditions. of six segments. Male abdomen clavate." p 198 The state of the second state of the

Ashmead, Ichneumonoidea, Proc. U. S. Nat. Mus. Vol. XXIII summaries of arrestory the value of the source in sortain surger the and

# survivations generate, and waterships a family waters then a service term. Superfamily FORMICOIDEA the following 24 A paper only white

According to Ashmead the Formicoidea contains seven Fam. Formicidae 1.1.4.4 families, but Wheeler maintains that it is erroneous to give them more than subfamily rank under the Formicidae.

See Wheeler, "Ants, Their Structure, Development and Behavior" tember or

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cases ot polymorphism under these, which are as follows;

The body of the male ant is graceful in form; its sense organs, especially the eyes and the antennae, the wings and the genitalia are highly developes; its mandibles are more or less imperfectly developed, and in correlation with them the head is proportionately shorter, smaller and rounder than in the females and workers of the same species. The male may have modifications. <u>Macraner</u> is an unusally large form of male which occasionally occurs in populous colonies.

<u>Micraner</u> or dwarf male, differs from the typical form merely in its smaller stature. Such forms often arise in artificial nests. <u>Dorylaner</u> is an unusually large form peculiar to the driver and legionary ants of the subfamily Dorylinae. It is characterised by its large and peculiarly modified mandibles, long cylindrical gaster and singular genitalia.

<u>Brgataner</u> ergatomorphic or ergatoid male resembles the worker in having no wings and in the structure of the antennae. <u>Gynoecaner</u> or gynaemorphic male occurs in certain parasitic and workerless genera, and resembles a female rather than a worker form. <u>Fhthisaner</u> is a pupal male which in its larvae or semi-pupal state has its juices partially extracted by an Orasema larva. This male is too much depleted to pass on to the imaginal stage. The wings are suppressed, and the legs, head, thorax and antennae remain abortive. <u>Female or Queen</u> is the more highly specialized sex among ants and is characterized, as a rule, by a larger stature and the more uniform development of her organs. The head is well developed and provided there is allowed the outer varies, which her a failer the first of the site and is gravitable to their the same are balled and here here is a set of the estemat, the share all the restriction are hashing transformer. The middle is not seen as the are another and the terminant of the another is the term and the restriction of the same reaction of the middle is not seen and the restriction of the same reaction of the middle is not seen and the restriction of the same reaction of the middle is not seen and the restriction of the same reaction of the middle is not seen and the restriction of the same reaction of the middle is not seen and the restriction of the same reaction of the middle is the seen and the restriction of the same reaction of the middle is the seen and the restriction of the same reaction of the middle is the seen and the restriction of the same reaction of the middle is the seen and the restriction of the same reaction of the middle is the seen and the restriction of the same reaction of the same is the seen and the restriction of the same reaction of the same is the same is the same is the restriction of the same set of the same is the same is the same is the restriction of the same is the same is the same is the same is the restriction of the same is the restriction of the same is the restriction of the same is the restriction of the same is the restriction of the same is the restriction of the same is the restriction of the same is the restriction of the same is t

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<u>Microgyne</u> or dwarf female, is an unusually small female which in certain ants is the only female of the species and may be actually smaller than the largest workers; in others, microgynes may sometimes be found in the same nest as the typical females.

<u>B. femate</u> is an aberrant form of female and occurs either as the only form or so existing with the normal female which is then called the A female. In this case therefore the female is dimorphic. The B. female is characterized by excess developments in the legs and antennae and in the pilosity of the body or by defective development of the wings.

<u>Trgatogyne</u> ergatomorphic or ergatoid female is a worker like form with ocelli, large eyes, and a thorax more or less like that of the female but without wings.

<u>Pseudogyne</u> is a worker like form with enlarged mesonotum and sometimes traces of other thoracic sclerites of the female, but without wings or very rarely with wing vestiges.

Phthisogyne arises from a female larva under the same conditions as the phthisaner, and differs from the typical female in the same

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characters, namely, absence of wings, stemonoty, microcephaly, micropthalmy. It is unable to obtain the marginal instar. <u>Morker or Ergates</u> characterized by complete absence of wings and a very small (stemonotal) thorax, much simplified in the structure of its sclerites. The eyes are small and the ocelli are usually absent or when present are extremely small. The gaster is small owing to the undeveloped condition of the ovaries. A 'receptaculum seminis' is usually lacking, and the number of ovarian tubules is greatly diminished. The antennae, legs and mandibles are developed. <u>Gynaecoid</u> is an egg laying worker. It is a physiological rather than a morphological phase, since it is probable that all worker ants when abundantly fed become able to lay eggs.

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Dichthadiigyne or dichthadiiform female is peculiar to the ants of the subfamily Dorylinae and probably represent a further development of the gynaecoid. It is wingless and stenonatal, destitute of eyes or ocelli, or with these organs very feebly developed and with a huge gaster and extraordinary voluminous ovaries.

Macrorgate is an unusually large worker form which in some species is produced only in populous or affluent colonies.

<u>Microrgate</u> or dwarf worker is a worker of unusually small stature. It appears as a normal or constant form in the first brood of all colonies that are founded by isolated females.

<u>Soldier-dinergate</u> is characterized by a huge head and mandibles, often adapted to particular functions (fighting and guarding the nest, crushing seeds or hard parts of insects) and a thoracic structure sometimes approaching that of the female in size or in development of its manageters, assett, itereve of these, standarty, arrivelynely, atomactively a to the set obtain the marking that the term party of the discretering and the conducts account of a new and a very math (thermodul) there, and the indiction to the standard of the establisher. The spectrum party will all the reality are to and assets as marking to a spectrum of a standard to be an and assets as marking to a spectrum and the termination of the second to the establisher are subly and the termination output to the anticipation of the second to a second assets as an and the termination of the second to a second assets as an and the termination of the second to a second assets a second of the anticipation of the termination of the assets and the anticipation of the termination of the assets the second to the termination of the termination of the assets the second to be an anticipation of the termination of a second to an attain the termination of the termination of the assets the second to the termination of the termination of the assets the second to the termination of the termination of the assets the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of the asset termination of the termination of the termination of termination of

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Desmergate is a form intermediate between the typical worker and dinergate.

<u>Plerergate</u> "replete" or "rotund," is a worker which in its callow stage has acquired the peculiar habit of distending the gaster with stored liquid food, till it becomes a large spherical sac and locomotion is rendered difficult and even impossible.

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<u>Petergate</u> is a worker or soldier with vestiges of wings on a thorax of the typical ergate or dinergate form.

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Mermithergate is an enlarged worker, produced by Mermis parasitism and often presenting dimergate characters in the thorax and minute ocelli in the head.

Pathisergate, which corresponds to the pathisogyne and pathisaner, is a pupal worker which in its late larvae or semipupal stage has been attacked and partially exhausted of its juices by an Orasema larva. It is characterized by stenonoty, microcephaly, microphthalmy and is unable to pass on to the imaginal stage. It is in reality an infraergatoid form.

<u>Gynandromorph</u> is an anomalous individual in which male and female characters are combined in a blended or more often in a mosaic manner. <u>Ergatandromorph</u> is an anomaly similar to the last, but having worker instead of female characters combined with those of the male.

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William Morton Wheeler, "Ants, their Structure,

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Development and Behavior." pp 93-99

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In all the Formicidae that were examined, it was found that the males had thirteen segments to their antennae, and the females, worker and soldiers twelve.

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# Superfemily VESPOIDEA

Fam. Mutillidae "The female is destitute of wings and ocelli, frequently having the parts of the thorax so closely soldered that the divisions between them are obliterated. The males are winged, furnished with ocelli and have the thoracic divisions distinct." p 94

Ally BRIDE ADDRESS TO A TAXABLE

Sharp, Camb. Nat. Hist. Vol.VI

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In all the specimens of this family examined the males have thirteen segmented antennae and seven segments to the abdomen on the ventral surface, while the females have only twelve segmented antennae and six segments to the abdomen on the ventral side.

Fam. Myrmosidae "Thorax in the females divided into two parts, hypopygium in males produced into a sharp aculeus which curves upwards, or very rarely simple." p 49

Ashmead, Journ. N. J. Ent. Soc. Vol. VII Mar. '99

"Males winged, females wingless." p 41

Ashmead, Cem. Ent. Vol.XXXV

There is only one specimen male at hand; the antennae are missing; seven ventral abdominal segments are visible.

Fam. Thynnidae

<u>Female</u> "Apterous, antennae scarcely longer than the head, the scape hollowed at the apex and almost concealing the first joint of the abdomen. Thorax divided into three parts including the median segment more or less contracted in the middle. Femora compressed, posterior coxaecontiguous, intermediate coxae nearly always separated by a bilobed projection of the mesostermum. Eyes small, entire, ocelli nearly always absent."

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Rowland E. Turner, Genera Insectorum, Fasc. 105 1910

Only two specimens, both males, at hand. They have numerous joints to the antennae, but only seven ventral abdominal segments. Fam. Rhopalosomidae

Genus <u>Rhopalosoma</u>, Gress. (apparently the only genus) "Antennae twolve segmented in the female, thirteen segmented in the male. Femora slightly thickened in the female. Tarsi very slender in the male, flattened and dilated beyond the first joint in the female. Abdomen first segment nearly as long as the remaining segments together in the female, shorter in the male, slender at the base and gradually swollen beyond the middle, much more strongly so in the male, remaining segments slightly incurved at the tip in the female." p 56

Ashmead, Proc. Ent. Soc. Phil. Vol. IV 1865

- Fam. Cosilidae Apparently there are no North American species with the possible exception of members of the genus Dicrogenium, Stad. This genus could not be traced.
- Fam. <u>Tiphiidae</u> "Pygidium in male entire, the hypopygium terminating in a sharp aculous which curves upward." p 196.

Ashmead, Proc. U. S. Nat. Mus. Vol. XXIII 1900 Only four specimens of this family in the material at hand, three females and one male. The male has thirteen segmented antennae, and seven segments on the ventral surface of the abdomen. andre "Proseit, spos anties, titleposition mean amounted by a bilippedmodernian of the respiratement, informations thank with an append emission (terrophics countly situation), p.2.

Booland S. Burstry, Sports Lassestim, 1885, 1921

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while the females have twelve segmented antennae and six segments on the ventral surface of the abdomen.

### Fam. Scoliidae

Male, antennae thirteen segmented, long and slender. Body small, slender, and marrow. Three spines on the tip of the abdomen. Spines on legs, but fewer than in the female.

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<u>Female</u>, antennae twelve segmented, shorter, thicker built and recurved. Body larger, broader and generally more highly colored than in the male. No spines at the tip of the abdomen. Legs covered with spines, due to their forsorial habits.

O. C. Bartlett, (in litt.) Mass. Agri. College.

An examination of members of this family indicates that the males have seven ventral segments to the abdomen and the females six. Fam. <u>Myzinidae</u> "Pygidium in the male deeply emerginate at the apex, the hypopygium terminating in a sharp thorn or aculeus, which curves upward and rests in the emergination of the pygidium." p 196

Ashmead, Proc. U. S. Nat. Mus. Vol. XXIII 1900

The female does not possess this aculeus. Antennae twelve segmented in the male, thirteen segmented in the female. Eyes emarginate in male, entire in female. The male's body and legs are very much more slender than those of the female.

S. S. Crossman, (in litt.) Mass. Agri. College

In the specimens at hand it was found that the males had seven abdominal segments whereas the females had six.

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Fam. Sapygidae "Antennae thirteen segmented in the male, twelve segmented in the female." p 196 BARR warmen fait time segmented, have the strutcher. Note wait, standar, and meres. These edited is the sig of the structure, between

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Ashmoad, Proc. U. S. Nat. Mas. Vol. XXIII 1900

Fam. Trigonalidae

Subfam. Trigonalinae (Seven genera, but none are common to North America) subfam. Lycogastrinae

Genus Lycogaster Shuckard. Abdomen in female thick, in male abdomen moderately depressed dorsoventrally. p 11

T. A. Schulz, Genera Insectorum, Fasc. 61 Genus <u>Stygnogonalos</u> Schulz. Only a female at hand does not possess "Tyloiden" on the antennae. p 12 Schulz (t.c.)

Genus Lapidogonalos Schulz. Frontal protuberances separated in the male; in the female they are joined together to form a sort of hood above the antennae. The antennae always possess "Tyloiden" on the outer side in the male, sometimes in the female. Sternites of the abdomen of the male unarmed. Second sternite of the female before the hinder border with a slight indication of a protuberance. p 13 Schulz (t.c.) survey he properties of a lower differ. Genus Tapinogonalos Schuls. Abdomen small and thin. In the female for Displaterols, Don, is hald as the most part, closely wrinkled and punctate, on this account feebly shiny On labler some miles the headylines to dull; the vertex and abdomen of the male are smooth with a pronounced gloss. Abdomen elongate, spindle shaped, in the female rotund, in the in Britsler that Do to This of the male depressed. The posterior margins of the third, fourth, fifth and Meanin Lines and Link Rodally of sixth tergites of the female slightly depressed and in the middle slightly these successives and statement with emarginate or incised; in the male straight and not emarginate. p 14 Schulz (t.c.)

Genus Taeniogonalos, Schulz. Male abdomen slightly depressed. Sternites of the male so far as known, unarmed. p 15 Schulz (t.c.)

Subfam. Seminotinae Abdomen of the male slightly depressed (flattened)

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and unarmed. Abdomen of the female rotund and more than one of the sternites armed. Tip of the abdomen of the female strongly turned upwards, with the sternites in a groove. p 10 Schulz (t.c.) Subfam. <u>Bareogonaloinae</u> Antennae in the male eighteen and in the female nineteen segmented. Both sexes without "Tyloiden." Abdomen in the male considerably depressed and unarmed; in the female very rotund, with more than one of the sternites armed and with the tip of the abdomen bent towards the ventral side. The male is distinctly smaller than the female. p 18 Schulz (t. c.)

Fam. Bethylidae (Kieffer, nec Ashmead)

Subfam. <u>Sclerogibbinae</u> Ashm. All the females known are wingless; the males have the radial cell constant. p 2

J. J. Kieffer, Genera Insectorum, Fasc. 76

subfam. Bethylinae Ashm.

Ph. T.

Genus <u>Parasierola</u> C meron. This genus is practically connected with Goniozus, Forster by Kieffer. Parasierola Cam. is held as a synonyme of Goniozus, Forster. The latter comes under the Bethylinae of the Proctotrypidae.

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"The head in the male is much broader than the thorax with a prominent clypeal carina, in the female longer and less broad. Abdomen in the female pointed ovate or long conical, in the male oblong oval and more depressed." p 73

Ashmead, Bull. 45 U. S. Nat. Mus. 1893 Genus <u>Goniozus</u> Forster. See preceding genus Parasierola, Cam.

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and marries, dominanted the female potent and mare that the use along this area. The of the immune to the track stratcher barries areas all in the stratiles is a growth of index line) that a growth all the immune is to be and a stratcher and the tratering allocation parameter. There areas a final "globing, a strand for the same and tracks parameter and the stratcher and the tracktering and the second stratcher and the stratcher and the trackrest and the abbrest areas and the stratcher and and the trackrest and the abbrest areas and the stratcher file, the area is interest and the the stratcher is a stratcher in the stratcher is the stratcher than the second stratcher is a stratcher in the state of the stratcher is a stratcher in the stratcher is a stratcher and the the stratcher is a stratcher in the stratcher is a stratcher and the stratcher is a stratcher in the stratcher is a stratcher in the state of the stratcher is a stratcher in the stratcher is a stratcher and the stratcher is a stratcher in the stratcher is a stratcher in the state is a stratcher in the stratcher is a stratcher in the state is a stratcher in the stratcher in the stratcher is a stratcher and the stratcher in the stratcher is a stratcher in the stratcher in the

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Genus <u>Progoniogus</u> Kieffer. This genus contains part of Perisemus, Ashm., the latter being included in the Bethylinae. p. 69 Ashmead (t.c.)

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Perisemus Ashm, should be Perisemus Forster. Se distinctions for Proctotrypidae, as the Bethylinae was held as a subfamily of the Proctotrypidae.

Genus <u>Digoniozus</u> Kieffer. This genus contains the remaining species of Perisemus, Forster. The preceding statement should hold in this case. p 69 Ashmead (t.c.)

Genus <u>Bethylus</u> Latr. "Pedicel of antennae in female a little longer than the first flagellar joint, in the male shorter." p 52 Ashmead (t.c.)

See distinctions for Proctotrypidse.

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Genus <u>Plastanoxus</u> Kieffer (Anoxus Ashmead) "Ocelli subobsolete in the female; eyes in the male oblong, in the female more rounded, slightly hairy. Antennae pilose in the male. Prothorax in the female much elongated, in the male short." p 67 Ashmead (t.c.) Genus <u>Pristocera</u> Klug. Males winged, females wingless. p 21 Kieffer (t.c.)

Genus <u>Pseudisobrachium</u> Kieffer. Males apterous, females winged. p. 23 Kieffer (t.c)

less Plagailes plat, is the main slipping shirthy.

Genus Apenesia Westwood. Females wingless, male winged. p. 25 Kieffer (t.c.)

Genus Epyris Westwood. "Antennae long and slender in the male, shorter in the female." p 57 Ashmead (t.c.) person Propagations in order. This parent contribution for the second se

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See also characters of the Proctotrypidae, as this genus was placed by Ashmead in the Bethylinae, the latter being held as a subfamily of the former. Genus <u>Holepyris</u> Kieffer. There is only one species described from North America (Massachusetts). In looking up the description it was found that only a female was mentioned. p 23

Nelander & Brues, Biol. Bull. Vol. 5 1903 Gemus <u>Rhabdepyris</u> Kieffer. This genus contains part of the gemus <u>Epyris</u> Ashmead, and part of the genus Goniosus Forster. Both of these genera belonged to the Bethylinae, consequently distinctions for Proctotrypidae ought to hold here. Genus <u>Anisepyris</u> Kieffer. Antennae twelve segmented, thirteen segmented in the female. p 32 Kieffer (t.c.) Genus <u>Acrepyris</u> Kieffer. Only a male described from North America (Texas)

Genus <u>Procalyozoa</u> Kieffer. Only a male described (from Panama) p 34 Kieffer (t.c.)

p 34 Kieffer (t.c.)

Genus <u>Dissomphalus</u> Ashmead. Males winged, females apterous. p 35 F. F. Kieffer (t.c.)

Genus <u>Laelilus</u> Ashmead. "Head oblong, nearly as wide across the eyes as long; in the male wider across the eyes than long; eyes large, oval, hairy; ocelli three in a triangle, and larger in the maile than in the female. The pedicel of the antennae in the female is a little longer and stouter than the first flagellar joint, in the male slightly shorter." p 50 Ashmead (t.c.) dama barakating thatter, wontred to an antenna of the famile & 11012; have the third field theorithm joint, in his well distant." As the the Historican water the realizer paint, in this more wat programent, and we hadden were do weld and y and this were to be made to be addened and the realizer to this well and the to the to the thermal terms and the transmission of the town and the matrix of the terms of the realizer to the transmission of the town and the second transfer.

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Fam. Dryinidae The anterior pair of legs of the females, with the exception of the genus Aphelopus, have a peculiar modification which is not present in any other group of Hymenoptera. This modification has given the insects the name of "pedes raptorii," "pattes ravisseuses," "Raubfusse," "tarsi chelate," etc.

The modification of the tarsus enables them to grasp Homopterous insects, upon which the females feed.

For a description of this apparatus, see p 2. The male is without this modification.

F.F. Kieffer, Genera Insectorum, Fasc. 54 Genus <u>Aphelopus</u> Dalman. "Antennae shorter in the female than in the male. In female antennae sub-clavate, the scape very short, scarcely longer than the second segment, the other (segments) variable in length; in the male filiform hairy, the scape usually longer than the third, (segment), the last joint (segment) sometimes thickened." p 99

Ashmead, Bull. 45 U. S. Nat. Mus. 1893

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Fam. Chrysididae The male is generally narrower and shorter and never possesses an annular styliferous tube. The female is longer and more robust, and armed at the anus with a retractile annularstyliferous tube, which may or may not be exserted. Both seres have thirteen segmented antennae and the same number of visible abdominal segments. p 26 Alex. Mocsary, "Mongraphia Chrysididarum Orbis Terrarum Universi." 1889 to reach an andro, in the feedbo in trailing alreading a second

Note: Statements which which of here of her installes, with the meaning of the second solutions, here a needbloc second to see their is and provide to and shart grade of Specondore. This method her here are a first and solution to a second to a second of "sales regional." To the mean second s."

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Nor & thistagains of this spectator, see p 5.

3.7. Madram, Consta Presentaria, Past 34 Manual Ashelyner, Dilean (Antenna Inceptor in The Freeds Line Å We mits. 26 Private incommentations, the summe rary which, antenaty brucks from the second imports. We allow temperate turbins is beginn to an out finiteme bases, the allow temperate hart the work, (assoch), the Lini Joint (Faminel) complete work to b second July 35 C. 8 Con Mar. 1935

Mess, <u>Dervelding</u> for and the encountly surrowey and sharker and series passesses an examine any interval of a first one region the monlasery? Corone with exitin and any all he encounted. Sith series have fullation adjusted which are any all he encounted. Sith series have fullation adjusted abreates and the meas summer of all hits series have fullation adjusted. All the area summer of all he region is adjusted any of abreates and the meas summer of all here any start abreates and the meas summer of all here any of the area and the meas summer of all here any of all the area and any all here any of all here any all the area and all here any of all here any all the area and all here any of all here any all the area and all here any al The above statement hinges on the fact as to whether the styliferous tube is exserted or not. In most cases it is withdrawn.

S. A. Rohwer (in litt.) points out that the antennae of the male may be elongate, but that this character will not hold throughout for a single genus. In many descriptions the sex is not mentioned as it is very difficult to determine. The only safe way to determine the sex is to remove the genitalia.

Fam. <u>Macaridae</u> Antennae twelve segmented in the female, thirteen segmented in the male. Abdomen consists of six segments in the female, and seven in the male. p 1

This family was considered as a tribe under the Family Vespidae by H. de Saussure in his "Synopsis of American Wasps, Solitary Wasps." Smithsonian Miscellaneous Collections, 254 1875.

<u>Fumenidae</u> Antennae twelve segmented in the female, thirteen segmented in the male. The abdomen has six segments in the female, and seven segments in the male. p 1

Part.

Fam.

This family was also considered as a tribe under the Vespidae. Henri de Saussure (t.c.)

In an examination of specimens of this family, it has been noted that the distal end of the antennae of the female is blunt and that the filamental segments are nearly of equal size, whereas the apical segment of the antennae of the male is pointed and in many cases is strongly recurved; the next to the last segment is much smaller than the others and the last segment is narrower but longer and sometimes When adopted in the first on the first parts and the anglitudese

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has a distinct hook-like form, (viz. Eumenes globulosus Sauss.)

Vespidae Antennae twelve segmented in the female, thirteen segmented Fam. in the male. Abdomen six segmented in the female, seven segments in the male, p 1

Henri de Saussure (t.c.)

The apical segment of the antenna of the male is more pointed than that of the female.

Psanmocharidae Syns.: Ceropalidae, Pompilidae, Cress. Fan. The antennae of the females twelve segmented, those of the male thirteen segmented. The abdomen of the female has only six segments, whereas that of the male has seven.

Superfamily SPHECOIDEA

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#### within describer Subrisk, Sull. & LYTE, D. F. Ballagian and Amoulicidae Fam.

Genus Ampulex Only one species occurs in the United States. The on the province framework and the set of the offer of a state of the set. males on the average are smaller than the females. The antennae columns in an and some bad some bad make and are thirteen segmented in the males and twelve segmented in the A 107 11 1 females. But above all the males differ from the rest (females) personal design of the second part of the fiber beread design in having the abdomen depressed, and in the shortness of the last or only in the loss of the photoenty which a support the support the abdominal segment, p 458

> present a participation. We day involve here a procession F.F.Kohl, Ueber Ampulex Jurine

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Annalen des K. K. Naturhistorischen Hofmuseums. Bd VIII of surveys the i compared or approach to which it's address the survey Heft 3 U. 4, 1893 Defended and taking this offere instanting and only the second terms which any

Fam. Sphecidae Antennae twelve segmented in female, thirteen segmented in the male. p. 307

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H. T. Fernald, Proc. U. S. Nat. Mus. Vol. XXXI

The female has only six ventral plates on the abdomen while eight plates are visible in the male. In the female the abdomen comes to a point, whereas in the male it presents a much blunter appearance.

In the process being any parallel how making how and the subject of the later.

Fam. <u>Stizidae</u> (Ashmead) Sting if exserted differentiates sexes. Subfam. <u>Stizinae</u> (Johnson & Rohwer)

penary in this selectedly lith the point berrist.

Tribe Stisini (Patton)

Group <u>Sphecii</u> "Female, spurs of posterior tibiae greatly enlarged; a sub triangular enclosure on the dorsal valve of the abdomen; sixth ventral segment elongate and acute, hiding the seventh ventral one. Pleural lobes of the seventh segment not distinct." p 341

Patton, American Stizini, Bull. 3 1879, U. S. Geological and Geographical Survey of the Territories. In the group Sphecii only one specimen (female) is at hand. It has thirteen segmented antennae, but only six ventral abdominal segments.

Group <u>Stizi</u> "Female, spurs of the posterior tibiae not dilated, reaching only to the middle of the first tarsal joint. Male, three spines or only one at the apex of the abdomen, sixth ventral segment transverse, pleural lobes of the seventh segment separated by an incision on a suture from the tergum" p 344 Patton (t.c.)

It appears that according to Ashmead's classification the group Sphecii contains only one genus Sphecius and that the group Stisi would THE LOOP AND ALL A ALL DOTT ALL THE ALL AND AL

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In the group bilance's only one cooking (freeda) is an paper. It has the start of the start of the second of the s

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include the remaining genera.

In the group Stizi the females have twelve segmented antennae, whereas, the males have thirteen. The females have six ventral abdominal segments; seven are visible in the male.

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### Fam. Nyssonidae

Subfam. Gorytinae Dalla Torre & Handlirsch apparently group all the genera in this subfamily into the genus Gorytes.

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Genus <u>Gorytes</u> Latreille. The females have twelve segmented antennae, whereas there are thirteen segments to the antennae of the males. In the male each segment of the antennae is frequently provided with spines, humps, notches, or curvatures. The antennae of the male are inserted, as a rule, somewhat further away from the elypeus than in the female.  $p \ 6 \ 4 \ (321)$ 

The sixth dorsal tergite is of various shapes in the female but it is always triangular along its chief axis; it is flattened on the sides with a more or less sharply carimate surface which always differs from the rest of the abdomen in its sculpturing. On the male the seventh dorsal plate is in many cases hidden behind the sixth.

p 5 & (323)

Handlirsch Mono. d. m. Nysson U. Bembex Sitzungsberichten

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d. Kais. Akad. d. Wissenschaften in Wien.

Mathem, Natur. Classe; Bd. XCVII Abth. 1 Juli 1885

Antennae thirteen segmented in the male, twelve segmented in the female. Supra-anal valbular of the female provided with a pygidial area. Six ventral segments of the male uncovered. There is

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terteres thereas seconder to the second of the termina terminates in the family. However, without of the Vester receives with a systified area. Mr. record, aspects of the Vester min terminal size is a tareal comb on the anterior feet of the female, p 413

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second of the works his himself has K. K. Naturhistorischen Hofmuseums, Bd. XI Heft 3 1896

Subfam. Alygoninae

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Genus Didineis Jurine & Panzer) Grouped by Kohl Genus Alyson Wesmael

Antennae twelve segmented in the female, thirteen segmented in the male. In the male the spical segment of the antennae is more or less cinuately excised. p 402

Supra-anal segment of the abdomen of the female with a subtriangular pygidial area. There is only a feeble metatarsal comb on the anterior metatarsus of the female. The fifth joint of the anterior tarsus of the female is quite incrassated. The last ventral segment of the abdomen of the male provided with two setiform spines. p 403

F.F.Kohl (t.c.) Subfam. Hyssoning

Genus Mysson Latr. (The genera Brachystegus Ach. Costa; Paranysson Guerin; Hyponysson Cresson; Nysson Handlirsch and Gerstacker are regarded by Kohl either as synonyms or as subgenera of the genus Nysson Latr.)

Antennae twelve segmented in the female, thirteen segmented in the male. Apical joint of the antennae of the male irregular in form. Valvula on the supra-anal segment of the abdomen of the female provided with a pygidial area, nearly triangular in form. In the male the area is sub-trapeziform. Only six of the ventral segments of the male are exposed. p. 395

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Only three specimens, two females and a male, at hand. The apex of the abdomen of the male is blunt; in the females it is more conical or pointed.

Genus Foxia Ashmead "Ventral abdominal segments four and five in the female with a lateral tooth, lateral margins of pygidium towards apex serrated. Ventral abdominal segments in the male four, five and six with a lateral tooth, the pygidium at the apex tridentate." p 187

Ashmead, Entomological News, Vol. IX 1898 Genus <u>Diploplectron</u> Fox "Anterior tersi of the female with a comb formed of long, slender and widely separated spines; the male has no tarsal comb. Last dorsal segment of the female with an elongate triangular pygidium." p 38

W. J. Fox, Trans. Am. Ent. Soc. Vol. XX 1893 Genus <u>Astata</u> Latr. Antennae twelve segmented in the female, thirteen segmented in the male. In the female there is a tarsal comb on the anterior tarsus. The eyes of the male are large and are completely opposed. They are smaller and are not opposed in the female. p 339

The pygidial area in the female is triangular, while in the male it is usually somewhat truncated.

The basal alula of the hind wings of the male is markedly larger, broader and has an almost semicircular posterior contour; in the female it differs greatly from the above, p 341

F. F. Kohl (t.c.)

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## Fam. Mellinidae

Genus Mellimus Fabr.

In the females the orbits are parallel or diverge slightly towards the clypeus; they converge towards the vertex above in the males, they sometimes converge towards the clypeus and the vertex. Mandibles of the male bidentate; of the females tridentate. Antennae twelve segmented in female, thirteen segmented in male. Supra-anal valvular of the female with a distinct triangular pygidial area. Eight ventral segments of the abdomen of the male are exposed, of which the pemultimate segment is emarginate behind. p 406

F. F. Kohl, "Die gattungen der Sphegiden"

Ann. des K. K. Naturhistorischen Hofmuseums, Bd. XI Heft 3 1896

Genus <u>Euspongus</u> Lepel. This genus is held as subgenus of the genus Gorytes, Latr. by Kohl. See his "Die gattungen der Sphegiden," etc. p 412. Consequently the characters given under the genus Gorytes Latr. ought to hold for this genus.

Genus <u>Hypomellinus</u> Ashm. Type Gorytes rufocinctus Fox. There is only a female described under this type, consequently no comparison can be drawn. p 153

Fox, Canadian Entomologist Vol. XXIV 1892 Genus <u>Mellinozrasta</u> Ashm. Type Gorytes mellinoides Fox. Evidently the characters given by Kohl under the genus Gorytes will hold in this genus.

Genus Hapalomellinus Ashm. Type Gorytes eximitis Prov.

Although Ashmead states that the male and female have been described by Provancher, only a description of the female was found in Handlirsch Control Marching Street,

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(Mono. d. m. Nysson u. Bembex, Sitzungsberichten d. Kais, Akad. d. Wissenschaften in Wien, Mathern, Natur. Classe, Bd. XCVII Abth. 1 Juli 1885, p 944)

As the type of this genus was originally placed under the genus Gorytes, doubtless the main characters should hold as previously described under Gorytes.

<u>Conclusion</u> Unfortunately no material is at hand to verify the following statement, but as four out of the five genera were originally included in the genus Gorytes, Latr., it would seem that such a character as the female having twelve segmented and the male thirteen segmented antennae should hold for this entire family, especially as the genus Mellimus Fabr. also bears out this character.

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Fam. Trypoxylidae

Genus Trypoxylon Latr. Antennae composed of twelve segments in the female, thirteen segments in the male. p 140

Jurine, Nour. Meth. Class. Hymenopter 1807

"The hind trochaters of the male are simple." p 377

Rohwer, Ent. News, Nov. 1909, Vol. XX

An examination of specimens of this genus shows that the females have only six ventral abdominal segments, while seven are visible in the males.

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Fam. Philanthidae

Subfam. Cercerinae

Genus Cerceris Latr. Antennae twelve segmented in the female, thirteen

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segmented in the male. Clypeus trilobed, lateral lobes of the male, with the anterior margin provided with a coarctately conjoined fringe. Frons of the female wider than that of the male. p 320

F. F. Kohl, "Die gattungen der Sphegiden,"

Ann. des K. K. Naturhistorischen, Hofmuseums, Bd. XI

Heft 3 1896

Apex of the infra-anal segment of the abdomen of the female profoundly incised in the middle. Males with seven or eight ventral segments exposed, with the apex of the eighth ventral segment more or less emarginate. Anterior tarsi of the female on the exterior margin provided with a tarsal comb. p 321

F. F. Kohl (t.c.)

The females have only six ventral abdominal segments. Genus <u>Didesmus</u> Dahl. Kohl maintains that the only differences between the members of this genus and those of the genus Cerceris are the abdominal configurations. Therefore the sexual characters given for the above genus should hold here also.

See F. F. Kohl, p 329 (t.c.)

the internal distribution in the growing by a subscription of the side Genus Fucerceris Cresson. Frons of the female wider than that of That I wall, MI 1880 = 51 ap Passands, and THE OWNER NAME La Trans the male. Clypeus trilobed, lateral lobes of the male with the mails is Pear for les. Puil, Tot, T 1860 h 100 measure DE BLA anterior margin provided with dense fringes, but not conjoined cosurvey all the love of this passe is padde from the survey arctately. Antennae twelve segmented in the female, thirteen seg-Philips there waits, the about him along along the hadden parents with in mented in the male. Supra-anal valvula provided with a pygidial area strongly carina te in the male. Apex of the infra-anal segthe role manifestion of evening of shite printing ment in the female deeply excised in the middle. Male with seven or presenting taken. Syne "Black-Dine secondaries Taken eight ventral segments exposed, apex of the eighth more or les

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F.F. Kohl (t.c.)

Only one specimen, a female, is at hand. It has six ventral abdominal plates exposed, the apical one being deeply emarginate in the middle.

Subfam. Philanthinae

Genus <u>Aphilanthops</u> Patton. Antennae twelve segmented in the female, thirteen segmented in the male. Supra-anal valvula of the female provided with a large pygidial area. Eight ventral segments of the male are exposed. A tarsal comb is present on the feet of both sexes, but it is larger in the female. p 334

F. F. Kohl (t.c.)

Only one specimen, a female, is at hand. It has six ventral abdominal plates exposed, as contrasted with eight in the male, as given in Kohl's statement above.

Genus <u>Fpiphilanthus</u> Ashm. Type Philanthus solivagus Say. No 'sexual differentiations are given, but a description of the male is found in Proc. Ent. Soc. Phil. Vol. VI 1866 p 57 by Packard, and of the female in Proc. Ent. Soc. Phil. Vol. V 1865 p 103 by Cresson.

However, as the type of this genus is taken from the genus Philanthus Fabr. the characters given under the latter genus will doubtless hold in this case. The above statement is furth r borne out by the examination of specimens of this genus.

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Genus Pseudanthophilus Ashm. Type Philanthus ventilabris Fabr.

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Pothinsking fair, in intraction gives more in a little provingit for the lites will in this case. The oblive electronics is forth a borne on a by the manuality of eventions of loke geam. Cresson gives a description of this insect in the Proc. Ent. Soc. and amount from on amonine then the shorts rought, Phil. Vol. V 1865 p 98. Andrea of Marina and Laforenteen and Assoc Tonada.

The note given under the preceding genus will doubtless hold One correctly benerate the buildening general party lors. here. the fidentics has been demanded on the line when the prover and the set.

Genus Philanthus Fabr. ) F. F. Kohl holds that the second ) genus is a synonym of Philanthus Fabr. Genus Anthophilus Dahl.) Therefore the following characters will hold for both genera.

Clypeus trilobed, lateral lobes of the male have a long dense fimbria on the anterior margin. The antennae are twelve segmented in the famale and thirteen segmented in the male. The supra-anal valvular of the female is provided with a pygidial area. often only distinct at the posterior end, edged with lateral carinae. Seven or eight abdominal ventral segments of the male are visible, which are more or less fimbriate pilose. A tarsal comb is present Canal Sociarias fundar, detennes of Do Coulor Coursed of peaks on the anterior feet of both sexes. p 330

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F. F. Kohl (t.c.)

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An examination of the members of this genus at hand, shows second of an make surveying transitions, purily brangelar, or the that the females have only six ventral abdominal segments, where-Along allowy or pullant pressionary sight around of as the males have seven or eight, as is mentioned above. are approach, the colonil and being entired at the middle. Genus Trachypus Klug. Clypeus trilobate, lateral lobes on the . F. Bull, "Boy hittenten Ast Propagates, anterior margin of the male are fimbriate pencillate. Antennae The Country house many sin rendered alignedies housening represent, thirteen segmented in the male, twelve segmented in the female. to non-Long to the same a sector signer. There Is a target and the Supra-anal valvular of the female provided with a pygidial area. which may or may not be distinct. Ventral segments of the male Although Brains summained in how Invallent Date for the most part not fimbriate. Seven or eight ventral abdominal A REAL PROPERTY AND INCOME. segments in the male are uncovered, the seventh often being entirely the balance which we can granted and entering so. Tarsal combs are present on the anterior feet of both sexes. p 333

F. F. Kohl (t.c.)

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# Fam. Larridge

Subfam. Lerrinae

Genus <u>Tachytes</u> Panzer. Antennae of the females composed of twelve segments, thirteen segments in the males. Anal segment of the females provided with a triangular area with dense pubescence. Supra-anal segment of the male generally trapeziform, rarely triangular, with a dense silvery or golden pubescence. Eight ventral abdominal segments are exposed, the apical one being excised in the middle. p 363

TALL OF A STREET ALL

F. F. Kohl, "Der gattungen der Sphegiden," etc.

ALLS. M.

The females have only six ventral abdominal segments exposed, in contrast to the males having eight. There is a tarsal comb present in both sexes.

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Genus Larra Fabr. Antennae twelve segmented in the females, thirteen segmented in the males. Males have eight ventral abdominal segments exposed, the eighth being entire or emarginated posteriorly. Tarsal Combaring the second conservation of states and the conservation of the above general edde are assessed on the failinglest general characteria, have been been found, the fraction makes the failinglest general characteria, have the demeters of the faults of a second and the shift wave prime is the to a state of the tentor of a second and the shift wave related are stated a to der table, second and all all and the statements, webs in the fault are to the fault to be table of a second the second to be the table to the fault are stated a constant of the second and the second to be a second to be the fault of the second to the state of the second to be the table to the tends of the second to the second to be a second to be a second to be the fault of the second to the second to be a second to be the table to the second to be the second to be the second to be a second to be the second to be the second to be a second to be a second to be the second to be the second to be a second to be a second to be the second to be the second to be a second to be a second to be the second to be the second to be the second to be a second to be the second to be the second to be a second to be a second to be a second to be the second to be the second to be a second to be a second to be the second to be the second to be the second to be a second to be the second to be the second to be the second to be a second to be second to be the second to be the second to be the second to be a second to be second to be the second to be the second to be the second to be a second to be second to be the second to be second to be the second to be the second to be the second to be the second to be second to be second to be the second to be the second to be the second to be second to be the second to be seco

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F. F. Soll, "I'll Anthoness day Truncines," why.

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F. F. Kohl (t.c.)

The one specimen at hand, a female, has six ventral abdominal segments exposed, the male having eight, as Kohl has stated above. Genus <u>Motogonia</u> A. Costa. Antennes twelve segmented in the female, thirteen segmented in the male. Supra-anal segment of the female provided with a pygidial area, distinctly flat, pubescent or tomentose, or partially denuded; posteriorly it is provided with rigid, rod like, compressed spines. Supra-anal segment of the male slightly convex, truncate, tomentose. Eight ventral abdominal segments of the male visible, the apical one being posteriorly excised. Third abdominal segment of the female, below more or less convex. p 355

F. F. Kohl (t.c.)

The female examined has only six ventral abdominal segments. There is a tarsal comb present in both serves. Genus <u>Ancistromma</u> Fox. Antennae twelve segmented in the females, thirteen segmented in the males. Anal segment of the female provided with a pygidial area, posteriorly covered with pubescence. The pygidial area of the supraanal valvula of the male, generally trapeziform, provided with pubescence posteriorly. Eight ventral abdominal segments of the male exposed, posterior margin of the eighth either emarginate or entire. Tarsal combs present in both serves. p 361.

F. F. Kohl (t.c.)

The female has only six ventral abdominal segments. Genus Tachysphex Kohl. Interior margin of the mandibles bidentate The a state of the late of the second state of

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in the females, and either unidentate or entire in the males. Antennae twelve segmented in the females, thirteen segmented in the males. Anal segment with a triangular pygidial area with no pubescence. Supra-anal segment of the male with a trapeziform, rarely a discrete, pygidial area. Eight ventral abdominal segments in the male exposed, posterior margin of the eighth either emarginate or excised. Tarsal combs are present on the anterior feet of the females. p 366

# F. F. Kohl (t.c.)

T. F. LULLIERS

The females examined have only six ventral abdominal segments.

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<u>Conclusion</u> The following characters appear to hold for the subfamily Larrinae. Antennae twelve segmented in the female, thirteen segmented in the male. Eight ventral abdominal segments are visible in the male, while in the female only six are exposed.

# Subfam. Lyrodinae

Gemus Lyroda Say. Antennae twelve segmented in the females, thirteen segmented in the males. Tarsal comb present on anterior feet in both sexes. Seven ventral abdominal segments of the male are exposed. p 344

F. F. Kohl (t.c.)

The female at hand has only six ventral abdominal segments. Subfam. <u>Nitelinae</u>

Genus Nitelopterus Ashm. This is a new genus created by Ashmead.

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As only a male has been described by him, no sexual differences can be mentioned. p 22

Ashmead, Ent. News Vol. VIII 1897

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Genus <u>Miscophimus</u> Ashm. This is a new genus created by Ashmead and the only secondary sexual character mentioned is that the females have the anterior tarsi combed.

See Ashmead p 185, Ent. News Vol. IX 1898

Unfortunately no material is at hand, so that no additional characters can be brought out.

Genus <u>Miscophus</u> Jurine. Antennae with twelve segments in the female, thirteen segments in the male. Anal segment destitute of a pygidial area in both sexes, anal segment conical in the female, muticus in the male. There is a tarsal comb present on the anterior feet of the females. p 446

F. F. Kohl (t.c.)

There are no specimens of this genus at hand, consequently the number of ventral abdominal segments exposed in the male and the female can not be determined.

<u>Conclusion</u> No general statement can be drawn up for this subfamily, as references and material are lacking.

# Subfam, Pisoninae

Genus <u>Pisonopsis</u> Fox Eyes in the female strongly emarginate, in the male but slightly so. Last dorsal segment of the abdomen of the female provided with a distinct pygidial area. Last ventral

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## Definition Plantitude

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segment of the abdomen of the male posteriorly emarginate. Seven ventral segments of the male are exposed. Tarsal combs are absent. p 457

F. F. Kohl (t.c.)

No mention is made of the number of segments in the antennae of either sex. No material at hand.

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Genus <u>Pison</u> Spinola Antennae twelve segmented in the females and thirteen segmented in the males. Anal segment of the female conical; pygidial area of the male absent, apical segment sub-truncate or arguate. Tarsal combs on anterior feet are absent. p 458

F. F. Kohl (t.c.)

No mention is made of the number of abdominal segments in either sex. No material at hand.

Genus <u>Bothynostethus</u> Kohl Antennae of the female consists of thirteen segments; the number of antennal segments in the male are not mentioned. Anal segment of the female provided with a large pygidial area, which is protected above by small bristles. Anal segment of the male obtuse posteriorly. A very fine tarsal comb is present on the anterior feet of the females. p 395

F. F. Kohl (t.c.)

It is unfortunate that the statement in regard to the number of segments in the antennae of the female has not been verified, as this is an unusual case. It would also be interesting to know the number of ventral abdominal segments in the male and female. No material is at hand.

Gemus	Solierella Spinola	)Kohl regards Niteliopsis as
Genus	Niteliopsis S. Saunders	)a subgenus of Solierella; )therefore the following
		characters will hold for both

genera.

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Antennae twelve segmented in the females and thirteen segmented in the males. The anterior margin of the clypeus of the males may have from one to three teeth. Anal segment of the female is conical, while in the male it is more rounded, the pygidial area is missing above. Seven ventral abdominal segments in the male are exposed. Tarsal combs are absent. p 451

#### F. F. Kohl (t.c.)

Genus <u>Plenoculus</u> Fox Clypeus, with the lateral lobes of the male provided with a dense marginal fimbria. Antennae twelve segmented in the females and thirteen segmented in the males. Supra-anal segment of the female provided with a distinct pygidial area. Seven ventral abdominal segments of the male are exposed. Anterior tarsi of the females are provided with tarsal combs. p 449

#### **F. F.** Kohl (t.c.)

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<u>Conclusion</u> No general statement for the entire family Larridae cân be formed by the writer, as the references in numerous instances are not full enough, and material is lacking. Moreover, in the genus Bothynostethus it will be noted that the females are reported as having thirteen antennal segments, whereas in all other genera, where note is made of the fact, it will be found that the antennae in this sex have only twelve segments.

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#### Fan. Bembicidae

An examination of different members of the various genera of this family has brought out the following facts. The females have twelve segmented antennae, the segments being simple. There are

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To manifestion of different ambass of the particus contro of this fourity his beyond to at the fellighten that an feature into males parameted appropriate the segment's build plants, there are thirteen segments to the antennae of the males and these are often modified toward the apex by excisions, etc. Tarsal combs are present in both sexes, but are much larger in the females, the individual spines being much longer and stouter. The females have six unmodified ventral abdominal segments, the apical one being conical. In the male from seven to eight abdominal segments are present, the apical one is not as concial as in the female, but is more truncated. Furthermore, spines are often present on the sides of the spical segments. On the second abdominal plate in the genus Steniola, Say, there is a spinelike projection which extends posteriorly. Additional characters are present in the different genera, but they do not hold for the entire family.

## Fam, Pemphredonidae

The only general statement which will apparently hold for the entire family is that the females have antennae with twelve segments, while there are thirteen segments to the antennae of the males. As the antennae are often missing, the following generic characters may be used in addition.

#### Subfam. Pemphredoninae

Genus <u>Annoplanus</u> Giraud Supra-anal segment of the female provided with a sub-triangular pygidial area. Seven ventral abdominal segments of the male are exposed. Tarsal combs are absent in the female. p 270 F. F. Kohl, "Die gattungen der Sphegiden"

Ann. des K. K. Naturhistorischen Hofmuseum Bd. XI

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Genus Spilomena Suckard Supra-anal valvula of the female greatly

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compressed, provided with a very narrow pygidial area, with the margins parallel. Infra-anal valvula of the male not compressed, and no spinous process is present. p 272

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F. F. Kohl (t.c.)

and chose on a household only saven of it

Genus <u>Stigmus</u> Jurine Supra-anal valvula of the female with a distinct pygidial area. Infra-anal segment of the male compressed; there is a spinous process on the posterior margin of the eighth ventral segment. p 274

F. F. Kohl (t.c.)

Genus <u>Pemphredon</u> Lat. )Kohl holds that Gemonus Lat. is a )subgenus of Pemphredon; therefore the )following characters will hold for both genera.

Interior margin of the compound eyes of the male parallel or converging slightly towards the clypeus. Supra-anal varula of the female with a pygidial area, bordered with two lateral carinae, rarely with a single median carina. Supra-anal valvula of the male without a pygidial area, seven ventral abdominal segments exposed, the eighth protracted under the seventh. p 285

(11) discould see You bell, pense

An examination of the females shows that there are only six ventral abdominal segments exposed.

Genus <u>Passaloecus</u> Suckard Fascies of the male with a silvery pubescence below. The supra-anal valvula of the females always lacks a pygidial area; in the males the greater part of it is hidden beneath the preceding segment. Seven ventral segments of the male are distinctly exposed, the median posterior part of the eighth produced below the seventh in sensitively restlict with a surp measure opplication and in a state and give a state of a state of

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E. S. Ball (k.s. )

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F. F. Kohl (t.c.)

Genus <u>Diodontus</u> Curtis Frons of the female especially wide. Fascies of the male silvery pubescent below. Clypeus of the female medianly biarcuately emarginated; of the male medianly more or less deeply or narrowly excised. Both sexes are provided with a pygidial area. In the male seven ventral abdominal segments exposed, the eighth being practically completely hidden. p 279

F. F. Kohl (t.c.)

Subfam. Pseninae

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Genus <u>Psen</u> Lat ) Mimesa is regarded as a subgenus of ) Psen by Kohl. He gave the following Genus <u>Mimesa</u> Shuckard) characters for both genera.

Passing Anone many and without internation, algorithm emption, there has in the

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Flagellum of the antennae sub-clavate or sub-filiform, not at all moniliform in the male; segments two to five of the female distinctly longer than wide. Supra-anal segment of the female provided with a flat and sometimes large pygidial area. Six ventral segments of the male are exposed, the seventh is hidden, the eighth emitting a reflexed hook; supra-anal valvula practically hidden by the preceding segment. p 289

F. F. Kohl (t.c.)

The females examined have only six ventral abdominal segments. The male abdomen can be recognized from that of the female by the presence of the reflexed hook at its apex. This is the first time in the entire superfamily, in specimens examined by the writer, that the male has the same number of ventral abdominal segments exposed as the female.

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J. J. CORL [1, p. ]

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# Fam. Crabronidae

Antennae of the females twelve segmented; in the males there are generally thirteen segments, but in a few cases only twelve are reported. The female antennae are simple, whereas those of the male may be simple or may be provided with excisions, dentations, or dilations, etc. The females always have a pygidial area, whereas it may or may not be present in the males. The abdomen of the female is more pointed at the spex than it is in the male; in the latter, it generally appears truncated. The females have only six ventral abdominal segments exposed, whereas in the male eight are visible. The anterior legs of the male are subject to more modifications than those of the female.

Fam. Oxybelidae

Antennae twelve segmented in the females, thirteen segmented in the males. Both sexes provided with a pygidial area on the supra-anal valvula; it is sub-triangular in the females, trapesiform or rectangular quadrangular in the males. Eight ventral abdominal segments are exposed in the males. Tarsal combs are present in both sexes.

The one specimen at hand is a female and has only six ventral abdominal segments.

The above statements are compiled from the various generic characters, which were found in references.

# Superfamily APOIDEA

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In all the specimens of the superfamily Apoidea examined by the writer, it was found that the females had twelve segmented antennae, whereas normanic of the freedor reales argumaned; is the mine there are generally well-then example, his is is is a substant to the mile we be stands the freedor salester of main of the state of the mile we be stands or my be previous with state, shown these of the mile we be the freedor state of the emission, despect one, as dilatings who the freedor states the statement of the freedor is any to may be example is the me miles in a sectored from the freedor is more polared at the space that the termine intervention is an intervent to me polared at the space that is the termine of the freedor to presently argue at the space the termine toget and yields of the freedor is more polared at the space the mile of the intervent of the state of the freedor is and the space of the reaction of the state of the freedor is and the state of the space of the termine of the state of the freedor is and the space of the main of the intervention of the state of the state of the mile of the state of the mile of the state of the state of the state of the state of the mile of the state of the mile of the state of the mile of the state of the mile of the state of the mile of the state of the mile of the state of the mile of the state of the mile of the state of the mile of the state of the

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there were thirteen in the males. It was also noted that the females had six abdominal segments visible, though in some cases only five are plainly seen above, as in the case of the <u>Halictinae</u>. However, six ventral ones are plainly visible in these cases. The reverse may be the case and six segments may be visible above and only five below. In the males seven segments are generally visible both above and below, but sometimes as in the case of the genus Prosopis, only the tip of the seventh is visible. However, seven segments will be visible either above or below.

In many cases the abdomen is contracted and it is practically impossible to see all the segments; in order to facilitate the separation of the sexes when this occurs, the following characters may be used.

Specimens of the Family Euglossidae, which do not occur north of Mexica, and of the Subfamily Meliponinae, also chiefly southern forms, have not been examined and it can not be stated positively whether they will possess the above characters or not, as no reference has been found in regard to these points, but it appears reasonable that they should, as the characters are so wide spread throughout the remainder of the group.

# Fam. Prosopidae

Lotter Different South

1-00-

Genus <u>Prosopis</u> Fabr. There is more yellow on the face of the makes than there is on that of the females, the latter rarely having ny on the clypeus The scape of the males is swollen an may have some yellow on it; the scape of the females is slender and is black.

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Chas. W. Metz (in litt.), Leland Stanford, Jr. Univer.

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these, w. shite (in 1898.), boland Stendort, Jr. Delever.

Fam. Colletidae "The hind tibia and tarsi of the female always with a assessed of the other any leaser that the moreast distinct pollen brush." p 93

Ashmead, Trans. Am. Ent. Soc. Vol. XXVI 1899

Fam. Andrenidae

Carling P. Stat

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Subfam. Andreninge "The scope on the hind legs of the female always distinct and well developed." p 87

Ashmead, Trans. Am. Ent. Soc. Vol.XXVI 1899

Subfam. Halictinae "Hind femora and tibiae in the female with a distinct flocculus or scopa. The apical dorsal abdominal segment of the female has a median groove or rima. This is not present in the male." AND ADD DOCTORS AND ADD DOCTORS ADDRESS ADDRES 9 13 p 87

Ashmead (t.c.)

Subfam. Sphedocinae while signs shall, his blad oblars being a maching a the

Genus Sphecodes Latr. In addition to the general statement for the superfamily, no general character is apparent. The females have no in two / " This with the and they I by the Preside with a Long. Lance polleniferous scopa. anormal algorithm in the sale blank, while long address p 40

- Fam. Pamurgidae Not all the genera mentioned by Ashmead (in Trans, Am, Ent. Soc. Vol. XXVI p 82 1899) as members of this family were represented by specimens in the collection at hand. Nor did many references give sexual differences, but those which gave generic sexual distinctions are mentioned below. Cave a tax ballow of an orderal long Taxaily.
  - Genus Macropis Panzer "Clypeus in male yellow" p 83 Ashmead, Trans. Am. Ent. Soc. Vol. XXVI 1899 THE R. LEWIS CO., LANSING MICH. Genus Parandrena Robt. "Abdomen in the female rufous or brownish. Clypeus in the male yellow." p 83 Ashmead, (t.c.)

Assessed, Frank, AR. M.T. Pak, Vol. 2391 1891

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  - denne sacropis Tunest "Cimpens in onte pelles" v 33

Genus Murandrane Robt. Vikingen in the Smalls reform on browning,

( a d) iteration

Genus <u>Dufoures</u> Lepel "Antennae of the male not longer than the thorax; flagellum simple." p 83

Ashmead (t.c.)

Genus Biarcolina Dufour

This genus is held as a subgenus of Andrena by both Cockerell and Dalle Torre. Mr. Vachal states that "The sixth ventral segment of the male has lateral projecting points." p 187

Cockerell, Trans. Am. Ent. Soc. Vol.XXIV 1903 Genus <u>Rhophitoides</u> Schenck "Face in the female with white hairs; antennae in the males as long as the thorax, the last joint acuminate at the apex only." p 83

Ashmead (t.c.)

Germs <u>Cockerellia</u> Ashm. "Claws in the female simple, in the male with the anterior and middle claws cleft, the hind claws being simple." p 85

Ashmead (t.c.)

Genus Panurgus Latr., "Hind tibias and tarsi in the female with a long, dense pubescence; clypeus in the male black, with long hairs." p 85

Ashmeed (t.c.)

Genus <u>Macroteropsis</u> Ashm. "Abdomen in the female black, in the male red."p 85 Ashmead (t.c)

North American forms?

Fam. Stelididae See statement for preceding family.

subfam. Stelididinae

Genus <u>Melanostelis</u> Ashm. "Male with the pygidium sub-emarginate, the hypopygium tridenate." p 79

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Ashmead, Trans. Am. Ent. Soc. Vol. XXVI 1899

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ashment, Secon, An. Con. Soc. Vol. 2093

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Ashmead, Trans. Am. Ent. Soc. Vol. XXVI 1899

Inclusion Company of Male Tand in 1 Fam. Nomadidae See statement under the family Pamurgidae.

NAME OF TAXABLE Genus Crocisa Latr. The males have the last abdominal segment terminated water and the in a wide plate, slightly excised, while that of the females appears to successive and the state of the be trifid, i.e. composed of the sting and of two small lateral plates And the are name of story and supply over 10 these covered with hair. p 239 they likewid mirror," in 1983

Jourine, 1807, Nouvelle Methode de Classer les Hymenopteres. summer, rows, 9, 7, and lot. Genus Nomada Scopoli Anterior claws deeply bifid in the males; all the Dana Later are poutly Oasters] American feel of the females are provided with large basal spines. The males differ from the females in having the head and thorax densely pilose and the abdomen narrowly pointed with seven segments. p 15

H. L. O. Schriedeknecht, Apidae Europaeae

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the Server saint the Lineart,

The amount of pilosity varies and therefore does not appear to be a very good character.

# Fam. Anthophoridae

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information Proton, and states when the Lines. "Female with a dense polleniferous scopa on the hind tibiae and tarsi." p19: The well was he deterrides the feating from the workers ha by black many. Ashmead, Proc. U. S. Nat. Mus. Vol. XXIII 1890

#### Fam, Psithyridae

Genus Psithyrus Lepeletier "Female with corbiculae, with the hind tibiae dorsally convex and densely pilose; hind tarsi not forcipate at To the haping of lotter, but an the other the base; anus inflexed. Male with the hind tibiae equally pilose, the genitalia, squama and lacinia always membraneous." p 58

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Ashmead, Trans. Am. Ent. Soc. Vol. XXVI 1899

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"Hind tibiae and metatarsi in the female strongly dilated, outwardly concave; metatarsus forcipate. Females with corbiculae, but with the polleniferous scope on the hind tibiae and tarsi very sparse or thin and confined to the lateral edges." p 191

Ashmead, Proc. U. S. Nat. Mus. Vol. XXIII 1900 These forms are South, Central American and Mexican in their distribution.

Fam. Bombidae "Three castes. Females and worker s with corbiculae and a dense polleniferous scopa on the hind tibae and tarsi." p 54 Females and workers with posterior tibiae dorsally depressed, polished and furnished with corbiculae; post. tarsi, first joint angulated above, forming a forcipate hook externally." Male with the posterior tibiae above, more or less shiny, somewhat concave." p 57

Ashmead, Trans. Am. Ent. Soc. XXVI 1899 The only way to determine the females from the workers is by their size, the former being the larger.

H. J. Franklin (in litt.) Mass. Agric. College.

#### Fam. Apidae

Subfam. <u>Meliponinae</u> No material at hand, but as the other subfamily of the Apidae have twelve segmented antennae in the females, and thirteen in the males, and abdomens with six segments in the females and workers, and seven segments in the males, it appears that the above characters should be present in this group also. A sting is not present in this a. markeridan Southers at this Davidy have not heat want and then been and the second of the following:

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group.

Subfam. Apinae

"The females and workers possess stings. The worker has a corbiculae, this is absent in the female." "In the males the eyes are holoptic." p 56 & 57

Ashmead, Trans. Ent. Soc. Am. Vol. XXVI 1899

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