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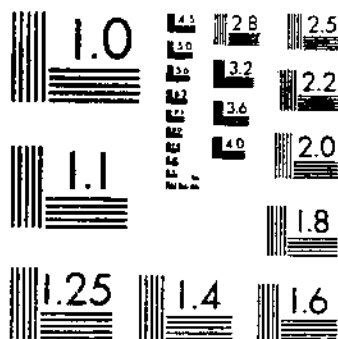
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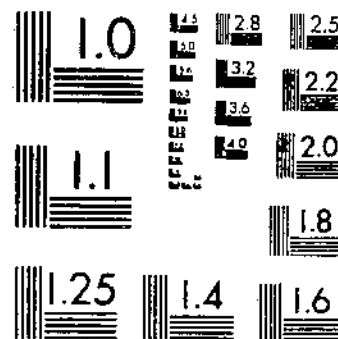
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NEARCTIC SAMELIES I. BLENNOCAMPINAE, ADULTS AND LARVAE HYMENOPTERA
SMITH, D. R. 1 OF 2

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NEARCTIC SAWFLIES

I. Blennocampinae: Adults and Larvae (Hymenoptera: Tenthredinidae)

By **DAVID R. SMITH**

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NEARCTIC SAWFLIES

I. Blennocampinae: Adults and Larvae (Hymenoptera: Tenthredinidae)

By DAVID R. SMITH, *entomologist, Systematic Entomology Laboratory,
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The subfamily Blennocampinae is a group of rather heterogeneous species, most of which are confined to the humid temperate and tropical regions of the world. Many species may be of economic importance to agriculture. Most of them are external feeders in the larval stage on the foliage of various trees and shrubs, such as *Fraxinus*, *Quercus*, *Carya*, *Sambucus*, *Vitis*, *Cissus*, *Rubus*, and *Rosa*, and are destructive in forests or ornamental plantings. Others feed on herbaceous plants, such as *Ranunculus* and various Liliaceae, and one species is a shoot borer in roses and may be a pest in gardens or cultivated plantings. Several species may be destructive to forage grasses, whereas some may be beneficial by feeding on *Veratrum*, a plant harmful to livestock.

In North America this subfamily has received varying degrees of attention. Cresson (1880b)² listed 33 species that are now considered to belong in this group. MacGillivray (1916) in his key to the sawflies of Connecticut included 17 genera and 61 species. Ross (1937) included 14 North American genera in this subfamily, and later he (1951) listed 21 genera and 65 species. Ross (1932b) revised the Lycaotinae, which are now considered a tribe of the Blennocampinae, and Stannard (1949) revised the genus *Periclista*. There have been 156 species names and 41 generic names proposed for the Nearctic components of this group. In this bulletin 21 genera and 72 species are treated; 17 species are new. Konow (1905) listed about 180 species for the world.

No attempt has been made to evaluate the status of the subfamily. It is accepted here as proposed by Ross (1951) and may be separated from other subfamilies of the Tenthredinidae by following Ross' 1937 key to the Blennocampinae and Lycaotinae. Outside of the Lycaotini, the group treated here is the same as the Blennocampini of Benson (1952).

¹ This bulletin is based on information contained in a thesis submitted to the Graduate School of Oregon State University, Corvallis, in partial fulfillment of the requirements for the degree of doctor of philosophy.

² The year in italic after the author's name is the key to the reference in Literature Cited, p. 165.

In this bulletin an attempt is made to clarify the taxonomy of this group and provide workable keys for identifying the known adults and larvae for North America north of Mexico. It is hoped that this study will create further interest, which may add to our knowledge and help fill the large gaps that still exist.

Methods

Specimens from about 41 institutions or individuals were borrowed for this study. Approximately 5,000 specimens were examined, including representatives of most of the Palaearctic and several Neotropical species. All the types located in North America were examined except those that are apparently lost. The types located in Europe represent, in most cases, either Holarctic or introduced forms, and the use of names for these species is based on the original descriptions, Enslin's (1914) or Benson's (1952) interpretations, and specimens identified by Benson. Most of the European synonymy is not given, because it was impossible to see the types and there is considerable confusion in the literature as to the correct placement of some of the names.

Slide mounts of genitalia were essential, and the techniques followed were principally those outlined by Ross (1945). All measurements were made with a calibrated linear ocular micrometer, and drawings were made from an ocular grid. The length of the body is from the anterior part of the head, excluding the antenna, to the posterior part of the abdomen, excluding any protruding structures, such as the sheath, male genitalia, or wings. Body length is of little significance except for comparisons. Where the width of the head is used, it is taken at the widest point, usually just behind the eyes in dorsal view.

Descriptions of adults are based on the most typical specimens representing the species, and the larval descriptions are all based on the last feeding stage. Deviations from these are explained in the discussions. The literature cited for each genus or species is usually the most pertinent to the taxonomy or biology of the group. Many references where only the name is mentioned incidentally are omitted. The morphological nomenclature for the adults follows that of Ross (1937). The larval nomenclature follows that used by Yuasa (1922) and Lorenz and Kraus (1957). The morphology of the adults and larvae is discussed in detail by these authors. By referring to their works and to the illustrations presented here, the terms should be easily understood. The characters in the keys are used only for convenience and ease of identification; they do not necessarily indicate phylogenetic relationships.

Most of the North American sawfly types are in the U.S. National Museum, Illinois Natural History Survey, Canadian National Collection, Academy of Natural Sciences of Philadelphia, and Museum of Comparative Zoology. Whenever possible, holotypes of new species were placed in one of these institutions. Otherwise the policy of the institution from which the specimens were borrowed was followed.

Taxonomic Characters

Since most of the previous descriptions of species and genera are inadequate, all are rewritten to make them more uniform, except in *Periclista*.

Coloration and head punctation were used extensively by the early authors. In some cases these characters were rather constant, but usually they were extremely variable. Characters not used by the early authors, such as the female lancet and sheath and male genitalia, were found to be of considerable taxonomic importance and are employed extensively in this study. Most of the characters for both the adults and larvae have been utilized to some extent by more recent authors.

In general, the females are much easier to separate than the males. Although the males offer adequate characters, in genera such as *Phymatocera* no characters were found for separation of the males, and in other genera the males of some species are not known.

Larval and genital characters are used here for the first time in attempting to construct a more stable and natural generic and tribal classification of the subfamily.

Subfamily BLENNOCAMPINAE Konow

Blennocampides Konow, 1890, p. 231 (in part); Konow, 1905, p. 76 (in part).
Blennocampinae Dalla Torre, 1894, p. 155 (in part); Ashmead, 1898a, p. 250;
MacGillivray, 1906, p. 629; MacGillivray, 1916, p. 142; Yuasa, 1922, p. 92;
Ross, 1937, p. 95; Benson, 1938, p. 357; Berland, 1947, p. 233 (in part);
Ross, 1951, p. 62; Takeuchi, 1952, p. 42; Lorenz and Kraus, 1957, p. 84 (in part).
Blennocampini Enslin, 1914, p. 263 (in part); Benson, 1952, p. 97.
Emprinae Rohwer, 1911c, p. 223 (in part).
Phymatocerinae Rohwer, 1911c, p. 224.

Adults

The adults of the subfamily Blennocampinae, as treated here and as outlined by Ross (1951), may be separated by the following combination of characters: Forewing with vein *M* joining *Rs* + *M* at or slightly before their junction with *Sc* + *R* (pl. I, 1, 3); veins *M* and 1*m-cu* parallel or, in *Tomostethus* and *Tethida*, subparallel and slightly converging (pl. I, 1, 7, 9); vein 2*r* present; anal cell petiolate; vein 2*A* and 3*A* present for entire length, contracted in middle and fused to 1*A* for short distance (pl. I, 4, 5), or partially atrophied with only basal stub present, which is furcate, curved up, or straight at apex (pl. I, 1, 6, 7). Hindwing with anal cell present, petiolate; crossvein *m-cu* present or absent, leaving cell *M* closed or open; cell *Rs* absent (pl. I, 2, 8). Prepectus present or absent; if present, then separated from mesepisternum by suture or furrow; if furrow, appearing as raised shoulder. Mandibles bidentate. Cervical sclerites pointed, not appressed on meson.

In general, the adults are short, robust, and usually dark colored, though some may have a conspicuous red thorax or abdomen.

Adults may be keyed to this subfamily by following Ross' 1937 key to the subfamilies Lycaotinae and Blennocampinae.

Larvae

The larvae of the Blennocampinae may be distinguished by the following combination of characters: Antenna conical, five-segmented. Clypeus wider than long, with four or six setae. Labrum with four, six, or eight setae on outer surface, slightly emarginate, symmetrical; epipharynx with row of spines on each lateral half, varying in position and number. Left mandible with teeth various; index ridge absent or present and unattached at base to any other ridge. Right mandible with teeth various; usually several molar teeth present. Outer surface of each mandible usually with one seta. Maxillary palpus four-segmented; second segment of palpus with at least one seta; palpifer and stipes each usually with one to several setae; galea conical; lacinia with row of spines varying in number and shape. Labial palpus three-segmented; second segment of palpus with or without setae; palpi separated by totaglossa from which arises opening of silk gland.

Thorax with annulation of segments various; ornamentation of same type as that of abdomen. Prothoracic suprapedal lobe of several species decidedly protuberant. Thoracic legs normal, five-segmented; femur usually longer than tibia (in *Ceratulus* subequal in length); tarsal claw present.

Abdomen 10-segmented; spiracles present on segments 1 through 8, sometimes winged. Prolegs obvious (except in *Ardis*), present on segments 2 through 8 and 10. Abdominal segments 1 through 8 each with four, five, or six dorsal annulets (four annulets only in *Ardis* and some *Periclista*). Ornamentation consists of conspicuously branched spines, dark rounded or conical tubercles, dark flat plates, and conspicuous or inconspicuous "glandubae" or glandlike protuberances, which are concolorous with rest of body. Spines, tubercles, or glandubae present on only second and fourth annulets, first and second (if present) postspiracular lobes, subspiracular lobe, and surpedal lobe. Ninth segment indistinctly annulate, with usual ornamentation. Tenth abdominal tergum usually not sclerotized (except in *Ceratulus*), but with ornamentation similar to that of rest of abdomen and arranged variously. Subanal protuberances absent (except in *Ardis*).

In general, the larvae are all typically sawflylike except for *Ardis*, which is adapted to an internal life. The conspicuously branched spines will immediately separate the larvae of the Blennocampini from other sawfly larvae, and the absence of ornamentation on the third annulet of each abdominal segment will separate many of the Blennocampinae from the Allantinae. Some of the larvae may be keyed to this subfamily by using Yuasa's 1922 key or Lorenz and Kraus' 1957 key to subfamilies.

Bionomics

Biological studies have been done for very few species of Blennocampinae, and host plants and larvae are known for less than

half of the known species. Although some species have not been definitely associated with a host, their probable host may be inferred from adult collection data, known habits of closely related species, or both.

All the members of this subfamily are external feeders except for *Ardis brunniventris* (Hartig), which is a tip borer in *Rosa*, and *Biennogeneris spissipes* (Cresson), which forms a terminal bud gall on *Symphoricarpos*. The hosts include a wide variety of plants.

Host Plant Associations of Blennocampinae

MONOCOTYLEDONEAE

Plant family	Plant genus	Insect species
Gramineae	<i>Poa</i>	<i>Eutomostethus ephippium</i> (Panzer)
Cyperaceae	<i>Carex</i>	<i>Paracharactus niger</i> (Harrington) (?)
Juncaceae	<i>Juncus</i>	<i>Eutomostethus luteiventris</i> (Kiug)
Liliaceae	<i>Smilacina</i>	<i>Phymatocera</i> spp.
	<i>Polygonatum</i>	<i>Phymatocera</i> spp. (European) (Nearctic?)
	<i>Veratrum</i>	<i>Rhadinoceraea</i> (<i>Veratra</i>) spp.
	<i>Calochortus</i>	<i>Rhadinoceraea nigra</i> (Rohwer) (?)
Iridaceae	<i>Iris</i>	<i>Rhadinoceraea</i> (<i>Rhadinoceraea</i>) spp. (European)

DICOTYLEDONEAE

Juglandaceae	<i>Carya</i>	<i>Eupareophora parca</i> (Cresson)
		<i>Periclista marginicollis</i> (Norton)
Fagaceae	<i>Quercus</i>	<i>Periclista</i> spp.
Ranunculaceae	<i>Ranunculus</i>	<i>Stethomostus fuliginosus</i> (Schränk)
		<i>Monophadnus</i> spp.
		<i>Ardis brunniventris</i> (Hartig)
Rosaceae	<i>Rosa</i>	<i>Ardis atrata</i> (Harrington) (?)
	<i>Rubus</i>	<i>Monophadnoides geniculatus</i> (Hartig)
	<i>Spiraea</i>	<i>Apareophora dyari</i> (Benson)
Vitaceae	<i>Vitis</i>	<i>Erythraspides vitis</i> (Harris)
	<i>Cissus</i>	<i>Ceratulus spectabilis</i> MacGillivray
Onagraceae	<i>Oenothera</i>	<i>Erythraspides carbonarius</i> (Cresson)

Oleaceae	{ Fraxinus Chionanthus	{ Eupareophora parca (Cresson) Tomostethus multinctus (Rohwer) Tethida cordigera (Palisot de Beauvois) Eupareophora parca (Cresson) (?)
Rubiaceae	{ Galium Symphoricarpos	{ Halidamia affinis (Fallén) Blennogeneris spissipes (Cresson)
Caprifoliaceae	{ Sambucus	{ Lagotis nevadensis (Cresson)

Life History

The life history of the known species follows the typical sawfly pattern. Most of the species are among the first sawflies to appear in the spring. The adults mate and the female oviposits on the host plant, usually in the leaves. When the larvae mature, they drop to the ground and look for a suitable site to pupate. Some may enter the earth and spin a cocoon; others require a more specific medium, such as rotting wood or stems of dying plants. Here the sawfly remains through the summer and following winter in the prepupal stage, then it pupates and emerges as an adult in the following spring. There is usually one generation a year.

For further biological data, see the species discussions.

Historical Review

The subfamily Blennocampinae has received varying degrees of recognition since its establishment by Konow in 1890. The inclusions and exclusions by various authors have depended on their definitions of the subfamily. The first described species of this group were placed in the genus *Tenthredo*, the original sawfly genus proposed by Linnaeus in 1758. The first genus to be described was *Phymatocera* by Dahlbom in 1835, followed by *Blennocampa* and *Monophadnus*, described by Hartig in 1837. Hartig considered these two genera in the section *Blennocampa*, a subgeneric grouping of *Tenthredo*. The characters he used for designating this section were the lanceolate anal cell of the forewing and the filiform antenna with the first segment of the flagellum longer than the following segments. Hartig separated *Blennocampa* from *Monophadnus* by the presence of the middle cell of the hindwing. This formed the basis for the present concept of this subfamily.

Norton (1867) was the first North American author to present a synopsis of the sawflies. The genus *Selandria* included most of what are now known as Blennocampinae except for *Waldheimia*, which was given separate generic status. *Selandria* was separated by the wing venation having two marginal cells and four submarginal cells, by the nine-segmented antenna, and by the short "egg-shaped" abdomen. *Selandria* is now considered a small genus in

the subfamily Selandriinae and is not known to occur in North America. The differences given for *Waldheimia* were the lengthened abdomen and the antenna being filiform and enlarged in the middle. *Blennocampa* was considered a section of the genus *Selandria* and was broken into two tribes, *Blennocampa* and *Monophadnus*. This essentially followed Hartig's classification and the characters used were the same.

Cresson (1880b) followed Norton's scheme, but he (1887) included *Blennocampa*, *Monophadnus*, *Phymatocera*, and *Selandria* as genera in his synopsis of the families and genera of the Hymenoptera of North America.

Konow (1890) gave higher categorical ranking to this group for the first time. He considered the Blennocampides as a subdivision of the Tenthredinini, separated from the Selandriides on the basis of the lanceolate anal cell of the forewing. Konow (1905) followed this classification in the sawfly section of *Genera Insectorum* and included *Waldheimia* in this group for the first time.

In the *Catalogus Hymenopterum*, Dalla Torre (1894) gave full subfamily status to the Blennocampinae. He included 19 genera, seven of which are not now included in the present definition of the subfamily.

Ashmead (1898a) was the third North American author to deal with the higher categories. He radically changed the classification, giving full family status to the Selandriidae with four subfamilies included, the Blennocampinae, Selandriinae, Blasticotominae, and Hoplocampinae. The Blennocampinae were still separated from other subfamilies by the lanceolate cell of the forewing. The Selandriidae were separated on the basis of vein *M* meeting *Rs* + *M* at the junction of *Sc* + *R* and the basal plates not being united.

MacGillivray (1906) presented his first concept of the higher classification when he dealt with the wing venation. His subfamilies were entirely based on wing venational characters. He proposed the subfamily Lycaotinae and separated it from the Blennocampinae by the complete 2A and 3A vein of the forewing. The characters for the Blennocampinae are essentially those still utilized. MacGillivray (1916) used the same characters in his account of the sawflies known to occur in Connecticut.

Rohwer (1911c) presented other characters for subfamily separation, giving most weight to the presence or absence of the prepectus and whether or not the proepisternum meets on the meson. The present Blennocampinae were included in two of Rohwer's categories, one, the Emprinae, separated by the absence of the prepectus, the other, the Phymatocerinae, separated by the presence of the prepectus. The Lycaotini and Blennocampini were considered tribes of the Emprinae.

The European workers more or less followed Konow's classification, as did Euslin (1914) in *Die Tenthredinoidea Mitteleuropas*. The Blennocampini were considered a tribe of the subfamily Tenthredininae.

Ross (1937) presented a generic revision for North American sawflies, which stabilized the generic and subfamily classification

for a while. For the first time ideas concerning the phylogeny and evolution of the Symphyta were proposed, and keys were available for the generic determination of Nearctic sawflies. Although Norton, Cresson, and Ashmead had presented keys, the handling of the sawfly groups, especially on the generic and species level, by MacGillivray and Rohwer put sawfly taxonomy into a state of confusion. Ross' systematic approach gave it a much needed stability. The subfamilies Lycaotinae and Blennocampinae were recognized, and the wing venation characters used for subfamily separation were essentially those proposed by MacGillivray (1906). Ross (1951) presented his classification again, but he changed the Lycaotinae to a tribe of the Blennocampinae. This subfamily concept is followed here.

Benson (1938) criticized Ross' 1937 revision, but he used the same principles and characters, and the names were merely given a different status.

Benson (1952) broadened his concept of the Blennocampinae and included the Eriocampini, Athaliini, Allantini, Emprini, Caliroini, and Fenusini as tribes, as well as the Blennocampini, which is the group treated in this bulletin. The Lycaotini were not included since they do not occur in England.

Takeuchi (1952) presented his concepts in a generic revision of the Japanese sawfly fauna. This closely paralleled Ross' 1937 revision. He also presented a graphic correlation of the various classifications used by various authors beginning with Konow (1905).

The pioneers of North America sawfly taxonomy were Norton and Cresson, although most of the species names were proposed by MacGillivray and Rohwer. The last two workers stressed detail, and though working concurrently each was very independent. MacGillivray proposed 65 of the species names in the Blennocampinae, only 11 of which are still considered valid. This excess work may be attributed to lack of knowledge about other work in the field, unfamiliarity with types, unfamiliarity with Palearctic and possible Holarctic species, and use of variable characters for species separation.

The history of larval work is much less confusing. Brischke and Zaddach (1883) and Cameron (1882) described some larvae, all of which are Palearctic species. For North America the first to rear and describe larvae was Dyar (1898), who gave a key to the known larvae of Blennocampinae. Yuasa (1922) published the major work on North American sawfly larvae and gave keys to the families, subfamilies, genera, and species. His arrangement of taxa was influenced by MacGillivray. For the Blennocampinae, only a key to genera was given.

The major European work is that by Lorenz and Kraus (1957). It is extremely useful, even for North America. The keys to the subfamilies, genera, and species, as well as the descriptions and illustrations, allow partial identification of almost any larva encountered. Also, many useful generic and specific characters are presented, which are used here for the North American forms. No work has been done on the North American larvae since Yuasa's (1922), except for descriptions of individual species and

a key to the families of Symphyta with illustrations of several species by Peterson (1956).

Classification and Relationships

The North American genera and species of Blennocampinae may be grouped into six categories or tribes, each composed of closely related species (see chart). Previous groupings have been difficult because of the lack of obvious characters on which to base a phylogenetic classification. Benson (1938) was the first to attempt a tribal classification, and he included the Blennocampini, Tomostethini, Phymatocerini, and Lycaotini, as well as several exotic tribes, and separated them by using adult characters, such as the wing venation and prepectus. Benson (1952) grouped the Tomostethini, Phymatocerini, and Blennocampini into one tribe, the Blennocampini, and Ross (1951) recognized two tribes, the Lycaotini and Blennocampini. Takeuchi (1952) included four tribes in the Japanese fauna, the Phymatocerini, Tomostethini, Perclistini, and Blennocampini, separated by wing venation, malar space, prepectus, and antenna. In this bulletin additional charac-

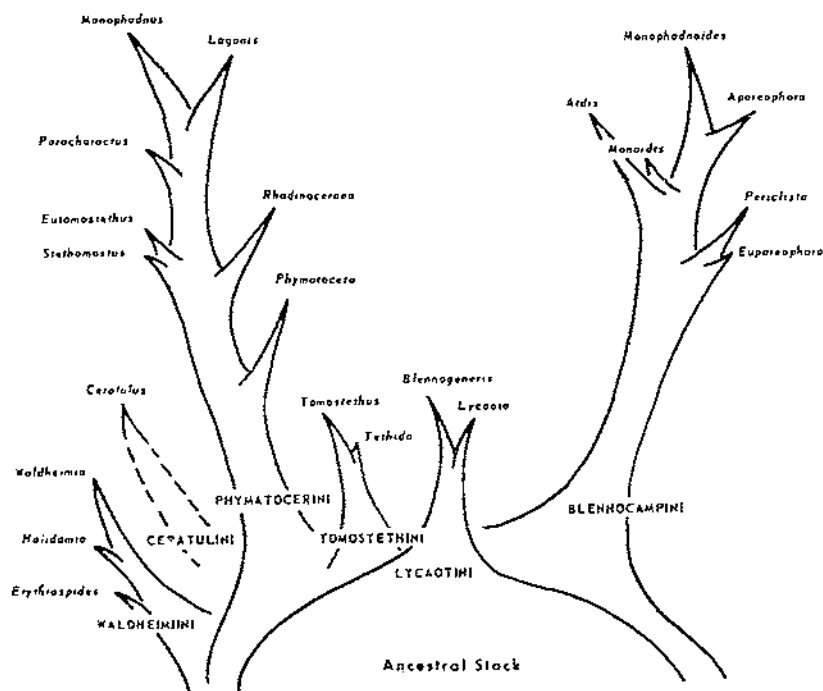


Chart showing relationships between genera of Blennocampinae.

ters have been utilized, especially the male genitalia and larval characters. In my opinion the classification presented here represents a natural classification.

The relationships between taxa indicate that members of the subfamily have evolved in a radiating palmate fashion, similar to that proposed by Ross (1937) for the Tenthredinidae, in which each tribe or phyletic line has generalized members that are apparently closely related. Some morphological characters indicating a generalized condition in the adults were pointed out by Ross (1937) and include the presence of a prepectus, simple antennae, the proximal anal cell contracted in the middle and separated from the distal anal cell by an anal crossvein, and vein *M* of the forewing joining *Rs* + *M* at the junction of *Sc* + *R*.

In the Blennocampinae the prepectus may be present or absent, vein *M* of the forewing joins *Rs* + *M* at or slightly before the junction with *Sc* + *R*, the antennae vary from being filiform to serrate, the relative length of the antennal segments varies considerably, and the anal crossvein is never present except for some *Lycaola* species, where it is extremely short. Several steps toward the reduction of the anal cell are evident within this subfamily, ranging from that of the *Lycaotini*, which has vein 2A and 3A complete and fused to 1A for a short distance, to that of genera such as *Monophadnus* and *Monophadnoides*, which have the stub of 2A and 3A straight at its apex. The transitory forms are apparently those with the furcate 2A and 3A vein, such as in *Rhadino-ceraca* and *Phymatocera*, and the curved-up 2A and 3A vein, which is present in many genera.

Some additional characters, which I believe represent a generalized condition, have also been useful for this subfamily. These include the presence of crossvein *m-cu* in the hindwing enclosing cell *M*, the lack of lateral armature on the penis valve of the male genitalia, simple tarsal claws, abdominal segments 1 through 8 of the larvae each with six dorsal annulets, and the lack of elaborate body ornamentation on the larva. In contrast, the more specialized members show a reduction of parts, such as the lack of prepectus, reduced wing venation, and reduced annulation of the larvae, and an increase of what may be more specialized structures, such as the additional teeth of the tarsal claw, lateral armature of the penis valve, and various tubercles and spines as body ornamentation on the larva.

The host plant does not seem to give a good indication of phylogeny, though usually the more generalized members feed on monocotyledonous plants, such as grasses, sedges, and members of Liliaceae, whereas more specialized members feed on dicotyledonous plants, such as *Ranunculus* and woody shrubs and trees.

The characters discussed have been used to set up the tribal classification, and relationships are described under each tribe. This is certainly not a definitive arrangement, but it is presented only to indicate the possible relationships or affinities between the species and genera found in North America. A key is not given for their separation, since the genera are more readily identified without first determining their respective tribes.

Systematic Arrangement

Family TENTHREDINIDAE

Subfamily BLENNOCAMPINAE Konow

Tribe LYCAOTINI MacGillivray

Genus *Blennogeneris* MacGillivray

(1) *Blennogeneris coloradensis* (Rohwer); Colorado, Idaho, Manitoba, Utah, Washington.

(2) *Blennogeneris gittinsi*, new species; Idaho.

(3) *Blennogeneris spissipes* (Cresson); Alberta, British Columbia, California, Colorado, Idaho, Manitoba, Minnesota, Montana, Ontario, Oregon, Saskatchewan; forms bud galls on *Symphoricarpos*.

Genus *Lycaota* Konow

(4) *Lycaota bouquetensis*, new species; California.

(5) *Lycaota janetae*, new species; California, Oregon.

(6) *Lycaota sodalis* (Cresson); Alberta, British Columbia, Colorado, Idaho, Saskatchewan, Utah, Washington.

Tribe TOMOSTETHINI Benson

Genus *Tomostethus* Konow

(7) *Tomostethus multicinctus* (Rohwer); California, Connecticut, District of Columbia, Illinois, Iowa, Kansas, Massachusetts, Missouri, New Jersey, North Carolina, Ontario, Oregon, South Dakota, Texas, Virginia, Wisconsin; on *Fraxinus*.

Genus *Tethida* Ross

(8) *Tethida cordigera* (Palisot de Beauvois); Connecticut, Florida, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Brunswick, New Hampshire, New York, North Carolina, Ontario, Pennsylvania, Quebec, Saskatchewan, South Dakota, Tennessee, Texas, Virginia, Wisconsin; on *Fraxinus*.

Tribe PHYMATOCERINI Rohwer

Genus *Phymatocera* Dahlbom

(9) *Phymatocera fumipennis* (Norton); Alabama, Connecticut, Illinois, Indiana, Maryland, Massachusetts, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Ontario, Pennsylvania, Quebec, Virginia, West Virginia, Wisconsin; on *Smilacina*.

(10) *Phymatocera offensa* (MacGillivray); Alberta, British Columbia, California, Colorado, Idaho, Illinois, Maine, Manitoba, Ontario, Oregon, Quebec, Saskatchewan, Utah; on *Smilacina*.

(11) *Phymatocera racemosae*, new species; British Columbia, Connecticut, Illinois, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Ontario, Pennsylvania, Quebec, Virginia, Washington, Wisconsin; on *Smilacina*.

(12) *Phymatocera similata* (MacGillivray); Alberta, British Columbia, California, Colorado, Idaho, Illinois, Iowa, Manitoba, Michigan, Montana, Nebraska, Ontario, Oregon, Utah; on *Smilacina*.

(13) *Phymatocera smilacinae*, new species; Illinois, Maryland, Michigan, New York, Ohio, Ontario, Pennsylvania, Quebec, Virginia, Wisconsin; on *Smilacina*.

Genus *Paracharactus* MacGillivray

(14) *Paracharactus montivagus* (Cresson); California, Idaho, Montana, Nevada, Oregon, Washington.

(15) *Paracharactus niger* (Harrington); Connecticut, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Ohio, Ontario, Pennsylvania, Quebec, Wisconsin.

(16) *Paracharactus rudis* (Norton); Colorado, Connecticut, Georgia, Illinois, Iowa, Kansas, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Ohio, Ontario, Quebec, Saskatchewan, South Dakota, Wisconsin.

Genus *Rhadinoceraea* Konow

Subgenus *Rhadinoceraea* Konow

(17) *Rhadinoceraea brysonensis*, new species; California.

(18) *Rhadinoceraea ctenidium*, new species; California.

(19) *Rhadinoceraea nigra* (Rohwer); California; on *Calochortus*.

(20) *Rhadinoceraea utahensis*, new species; Utah.

Subgenus *Veratra*, new subgenus

(21) *Rhadinoceraea aldrichi* (MacGillivray); Alberta, British Columbia, California, Idaho, Montana, Nevada, Oregon, Washington; on *Veratrum*.

(22) *Rhadinoceraea insularis* (Kincaid); Alaska, British Columbia, California, Oregon, Washington.

(23) *Rhadinoceraea jacintensis*, new species; California.

(24) *Rhadinoceraea nubilipennis* (Norton); Connecticut, Massachusetts, New Brunswick, New Hampshire, New York, North Carolina, Quebec, Virginia; on *Veratrum*.

Genus *Lagonis* Ross

(25) *Lagonis nevadensis* (Cresson); Alberta, British Columbia, California, Idaho, Nevada, Oregon, Utah, Wyoming; on *Sambucus*.

Genus *Monophadnus* Hartig

(26) *Monophadnus aequalis* MacGillivray; Alberta, Colorado, Illinois, Iowa, Maine, Manitoba, Maryland, Michigan, New York, Ontario, Quebec, Saskatchewan; on *Ranunculus*.

(27) *Monophadnus assaracus* MacGillivray; Oregon.

(28) *Monophadnus bakeri*, new species; Illinois, Kansas, Maryland, Montana, Virginia.

(29) *Monophadnus californicus* (Rohwer); California, Oregon; on *Ranunculus* (?).

(30) *Monophadnus contortus* (MacGillivray); British Columbia, California, Idaho, Montana, Oregon, Yukon Territory.

(31) *Monophadnus lattini*, new species; Connecticut, Manitoba, Massachusetts, Minnesota, New Hampshire, Wisconsin.

(32) *Monophadnus pallescens* (Gmelin); British Columbia, Maine, Massachusetts, New Brunswick, Newfoundland, New York, Ontario, Quebec; Palaearctic; on *Ranunculus*.

Genus *Stethomostus* Benson

(33) *Stethomostus fuliginosus* (Schränk); Maine, Massachusetts, Michigan, New Brunswick, New Hampshire, New York, Nova Scotia, Quebec; Palaearctic; on *Ranunculus*.

Genus *Eutomostethus* Enslein

(34) *Eutomostethus ephippium* (Panzer); British Columbia, Connecticut, Maine, Maryland, Massachusetts, New Brunswick, New Hampshire, New Jersey, New York, Nova Scotia, Ontario, Pennsylvania, Quebec, Texas, Washington; Palaearctic; on *Poa* and other soft Gramineae.

(35) *Eutomostethus luteiventris* (Klug); Alberta, British Columbia, Connecticut, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Nova Scotia, Ontario, Oregon, Quebec, Vermont, Washington; Palaearctic; on *Juncus*.

Tribe BLENNOCAMPINI Konow

Genus *Ardis* Konow

(36) *Ardis atrata* (Harrington); British Columbia, California, Oregon, Washington; on *Rosa* (?).

(37) *Ardis brunniventris* (Hartig); Alberta, British Columbia, California, Colorado, Idaho, Illinois, Iowa, Maine, Manitoba, Michigan, Missouri, Montana, New Mexico, New York, North Carolina, Northwest Territories, Ontario, Oregon, Quebec, South Dakota, Utah, Washington; Palaearctic; shoot borer in *Rosa*.

Genus *Monardis* Enslein

(38) *Monardis pulla*, new species; Alberta, British Columbia, Colorado, Idaho, Montana, Saskatchewan, Utah.

Genus *Apareophora* Sato

(39) *Apareophora dyari* (Benson); Connecticut, New Brunswick, New Hampshire, New York, Ontario, Quebec, Vermont; on *Spiraea*.

(40) *Apareophora rossi*, new species; Maine, Michigan, Minnesota, Ontario, Wisconsin.

Genus *Eupareophora* Enslein

(41) *Eupareophora parca* (Cresson); Arkansas, California, Illinois, Iowa, Kansas, Manitoba, Maryland, Mississippi, Missouri, New Brunswick, New Jersey, New York, Ontario, Oregon, Quebec, Saskatchewan, Texas, Wisconsin; on *Carya*, *Chionanthus* (?), *Fraxinus*.

Genus *Periclista* KonowSubgenus *Periclista* Konow

(42) *Periclista albicollis* (Norton); Illinois, Iowa, Kansas, Louisiana, Maine, Manitoba, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Oklahoma, Ontario, Pennsylvania, Texas, Virginia; on *Quercus*.

(43) *Periclista bipartita* (Cresson); Connecticut, Florida, Massachusetts, Missouri, New York, Texas; on *Quercus*.

(44) *Periclista californica* Rohwer; California.

(45) *Periclista diluta* (Cresson); Connecticut, Florida, Illinois, Kansas, Maine, Massachusetts, Michigan, Missouri, New York, Ontario, Pennsylvania, Texas, Wisconsin; on *Quercus*.

(46) *Periclista electa* MacGillivray; California, Oregon.

(47) *Periclista entella* MacGillivray; California, Oregon; on *Quercus*.

(48) *Periclista linea* Stannard; California, Oregon; on *Quercus*.

(49) *Periclista marginicollis* (Norton); Connecticut, Florida, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, New York, Oklahoma, Pennsylvania, Texas, Vermont; on *Carya*, *Quercus*.

(50) *Periclista media* (Norton); District of Columbia, Florida, Illinois, Iowa, Manitoba, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Virginia, Wisconsin; on *Quercus*.

(51) *Periclista naranga* Stannard; California.

(52) *Periclista rileyi* (Cresson); Florida, Illinois, Missouri, Texas.

(53) *Periclista spicula* Stannard; California.

(54) *Periclista stannardi*, new species; Iowa, Texas.

(55) *Periclista sulfurana* Stannard; Illinois, Iowa, Michigan, New Jersey, New York.

(56) *Periclista vergorba* Stannard; California.

Subgenus *Neocharactus* MacGillivray

(57) *Periclista inaequidens* (Norton); Illinois, New Hampshire, New York, Texas, Wisconsin; on *Quercus*.

(58) *Periclista occidentalis* Rohwer; California; on *Quercus*.

(59) *Periclista pallipes* (Provancher); California; on *Quercus*.

(60) *Periclista subtruncata* Dyar; Florida, Illinois, Indiana, Louisiana, Maryland, Mississippi, New York, South Carolina, Texas, Virginia; on *Quercus*.

Genus *Monophadnoides* Ashmead

(61) *Monophadnoides atratus* (MacGillivray); Alaska, British Columbia, Northwest Territories, Oregon, Washington.

(62) *Monophadnoides conspiculatus* MacGillivray; Maryland, New York, North Carolina, Nova Scotia, Ontario, Quebec, Tennessee, Virginia, West Virginia.

(63) *Monophadnoides geniculatus* (Hartig); Alberta, Arkansas, British Columbia, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Brunswick, Newfoundland, New Hampshire, New Jersey, New

York, North Carolina, North Dakota, Northwest Territories, Ohio, Ontario, Oregon, Pennsylvania, Quebec, Rhode Island, Saskatchewan, Tennessee, Texas, Virginia, Washington, Wisconsin; Palaearctic; on *Rubus*.

(64) *Monophadnoides osgoodi*, new species; Maine, Ontario.

(65) *Monophadnoides pauper* (Provancher); Alberta, Colorado, Connecticut, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Newfoundland, New Hampshire, New Jersey, New York, Ontario, Pennsylvania, Quebec, Saskatchewan, Wisconsin.

(66) *Monophadnoides quebecensis*, new species; Quebec.

(67) *Monophadnoides typicus* (Rohwer); British Columbia, California, Oregon.

Tribe CERATULINI, new tribe

Genus *Ceratulus* MacGillivray

(68) *Ceratulus spectabilis* MacGillivray; Texas; on *Cissus*.

Tribe WALDHEIMIINI, new tribe

Genus *Waldheimia* Brullé

(69) *Waldheimia bedae*, new species; Arizona.

Genus *Erythraspides* Ashmead

(70) *Erythraspides carbonarius* (Cresson); Colorado, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, North Dakota, Ontario, Pennsylvania, Quebec, Saskatchewan, South Dakota, Texas, Virginia; on *Oenothera*.

(71) *Erythraspides vitis* (Harris); Arkansas, Florida, Georgia, Illinois, Iowa, Louisiana, New Hampshire, New York, Pennsylvania, South Carolina, Virginia; on *Vitis*.

Genus *Halidamia* Benson

(72) *Halidamia affinis* (Fallén); Connecticut, Maryland, Michigan, New Jersey, New York, Ontario, Wisconsin; Palaearctic; on *Galium*.

Keys to Blennocampinae Genera

ADULTS

- | | |
|---|----------------------|
| 1. Forewing with vein 2A and 3A distinct for entire length; fused to 1A for only short distance (pl. I, 4, 5) | 2 |
| Forewing with vein 2A and 3A atrophied; only basal stub present, which may be straight, curved up, or furcate at apex (pl. I, 1, 6, 7) .. | 3 |
| 2. Legs black | <i>Lycaota</i> |
| Legs reddish brown | <i>Blennogeneris</i> |
| 3. Antenna distinctly serrate (pl. IV, 71, 72) | <i>Ceratulus</i> |
| Antenna filiform or with segments only slightly expanded at apices (pl. III, 41-70) | 4 |
| 4. Prepectus present, separated from mesepisternum by distinct suture or furrow | 5 |
| Prepectus absent | 10 |

5. Prepectus large and triangular, on same level as mesepisternum and separated from it by suture (pl. II, 29); forewing with veins *M* and *1m-cu* slightly divergent (pl. I, 9)----- 6
 Prepectus narrow, appearing as raised shoulder and separated from mesepisternum by furrow (pl. II, 28); forewing with veins *M* and *1m-cu* parallel (pl. I, 1)----- 7
6. Tarsal claw simple (pl. II, 13); thorax without rufous markings----- *Tomostethus*
 Tarsal claw with small inner tooth (pl. II, 14); thorax with considerable rufous markings----- *Tethida*
7. Antenna with third segment longer than fourth segment (pl. III, 58); prepectal furrow and hindmargin of scutellum with distinct punctures; hindwing with cell *M* present or absent; front tibial spur simple or furcate at apex----- 8
 Antenna with third segment subequal in length to fourth segment (pl. III, 44-49); prepectal furrow and scutellum without punctures; hindwing with cell *M* present; front tibial spur furcate at apex----- 9
8. Forewing with stub of 2A and 3A straight at apex (pl. I, 1); tarsal claw simple; front tibial spur furcate at apex (pl. II, 31); hindwing with cell *M* absent----- *Stethomostus*
 Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); tarsal claw simple or with small inner tooth; front tibial spur simple (pl. II, 30); hindwing with cell *M* present or absent----- *Eutomostethus*
9. Postgenal carina absent; forewing with stub of 2A and 3A furcate at apex (pl. I, 7); wings moderately to darkly infusate (in western North America, lancet of female with serrulae rounded (pl. VII, 143, 144), and harpe of male without inner extension (pl. IX, 198, 200))----- *Phymatocera*
 Postgenal carina developed slightly below eye; forewing with stub of 2A and 3A furcate or straight at apex (pl. I, 1, 7); wings moderately infusate to hyaline (in western North America, lancet of female with serrulae flat and serrate (pl. VII, 148, 149), and harpe of male with long inner extension (pl. IX, 202))----- *Paracharactus* (pt.)
10. Apical four antennal segments distinctly reduced, together subequal in length to or only slightly longer than third segment (pl. III, 67-70); tarsal claw with long inner tooth subequal in length to or slightly longer than outer tooth, basal lobe present (pl. II, 20, 22)----- 11
 Apical four antennal segments not reduced (pl. III, 41-66); tarsal claw various----- 13
11. Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); hindwing with cell *M* absent----- *Halidamia*
 Forewing with stub of 2A and 3A straight at apex (pl. I, 1); hindwing with cell *M* present or absent----- 12
12. Tarsal claw with inner tooth wider and longer than apical tooth (pl. II, 22); hindwing with cell *M* present----- *Waldheimia*
 Tarsal claw with inner tooth shorter or subequal in length to outer tooth and of same width (pl. II, 20); hindwing with cell *M* absent (male of *vitis* with peripheral vein in hindwing)----- *Erythraspides* (pt.)
13. Antenna with third segment subequal in length to fourth segment (pl. III, 44-48, 51, 52, 65)----- 14
 Antenna with third segment distinctly longer than fourth segment (pl. III, 50, 53-64)----- 17
14. Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); upper half of mesepisternum and scutellum with large craterlike punctures; tarsal claw with small inner tooth (pl. II, 14)----- *Lagonis*
 Forewing with stub of 2A and 3A straight or furcate at apex (pl. I, 1, 7); mesepisternum and scutellum without punctures; tarsal claw various----- 15
15. Tarsal claw with inner tooth long, nearly subequal to outer tooth in length, and with basal lobe (pl. II, 18, 19, 20); forewing with stub of 2A and 3A straight at apex (pl. I, 1); hindwing with cell *M* absent----- *Monophadnoides* (pt.)
 Tarsal claw simple or with small inner tooth (pl. II, 13, 14, 16); forewing with stub of 2A and 3A straight or furcate at apex; hindwing with cell *M* present----- 16

16. Postgenal carina absent; forewing with stub of 2A and 3A furcate at apex (pl. I, 7); prepectus absent.....*Rhadinoceraea* (pt.)
 Postgenal carina developed slightly below eye; forewing with stub of 2A and 3A straight or furcate at apex (pl. I, 1, 7); prepectus indistinct, usually indicated.....*Paracharactus* (pt.)
17. Forewing with stub of 2A and 3A furcate at apex (pl. I, 7); tarsal claw simple or with small inner tooth.....*Rhadinoceraea* (pt.)
 Forewing with stub of 2A and 3A straight or curved up at apex (pl. I, 1, 6); tarsal claw various..... 18
18. Forewing with stub of 2A and 3A curved up at apex (pl. I, 6)..... 19
 Forewing with stub of 2A and 3A straight at apex (pl. I, 1)..... 23
19. Tarsal claw bifid, with long inner tooth and with basal lobe present or absent (pl. II, 15, 18-20)..... 20
 Tarsal claw simple (pl. II, 13)..... 21
20. Deep postorbital groove present with large craterlike punctures (pl. II, 10); epimeron without small membranous area; hindwing with cell *M* present; tarsal claw with basal lobe.....*Ardis*
 Postorbital groove absent; epimeron with small membranous area (except in *marginicollis*); hindwing with cell *M* present or absent; tarsal claw usually without basal lobe.....*Periclista*
21. Forewing with veins *M* and *Rs* + *M* meeting before joining *Sc* + *R* (pl. I, 3); eye large, close to, and parallel with posterior margin of head (pl. II, 10); postorbital groove present, with punctures.....*Eupareophora*
 Forewing with veins *M* and *Rs* + *M* meeting at junction with *Sc* + *R* (pl. I, 1); eye smaller, removed from posterior margin of head (pl. II, 11); postorbital groove absent..... 22
22. Wings darkly infusate; hindwing with cell *M* present.....*Monardis*
 Wings hyaline; hindwing with cell *M* absent.....*Apareophora*
23. Anterior margin of clypeus slightly convex (pl. II, 26); wings with basal two-thirds infusate, apical one-third hyaline; antenna with apical four segments reduced, but not noticeably so (pl. III, 69).....*Erythraspides* (pt.)
 Anterior margin of clypeus truncate (pl. II, 27); wings hyaline or uniformly lightly infusate; antenna with apical four segments not reduced (pl. III, 53-57, 61-66)..... 24
24. Tarsal claw either simple (pl. II, 13), with small inner tooth (pl. II, 14), or with long inner tooth (pl. II, 15), and with basal lobe absent; postgenal carina may be slightly developed below eye; hindwing with cell *M* present (penis valve of male genitalia rounded or quadrate, without lateral spine or dorsal lobe (pl. X, 221, 223, 225, 227, 229); lancet of female with serrulae low and serrate, not lobelike and rounded (pl. VIII, 160-166).....*Monophadnus*
 Tarsal claw with long inner tooth and basal lobe (pl. II, 18-21); postgenal carina absent; hindwing with cell *M* present or absent (penis valve of male genitalia with dorsal lobe and lateral spine (pl. XI, 243, 245, 247, 251); lancet of female with serrulae lobelike or rounded (pl. IX, 181-187).....*Monophadnuoides* (pt.)

LARVAE

(based on last feeding stage)

1. Prolegs reduced to blunt swellings; body smooth and white; abdominal segments 1 through 8 each with four dorsal annulets; flat, lightly sclerotized suranal plate present; pair of subanal appendages present (pl. XV, 306); shoot borer in *Rosa*.....*Ardis brunneiventris* (Hartig)
 Prolegs distinct; body either covered with long, conspicuously branched spines; short, simple spines; tubercles; sclerotized plates; or appears smooth with inconspicuous glandulae; abdominal segments 1 through 8 each with four, five, or six dorsal annulets; 10th abdominal tergum rounded; subanal appendages absent; external feeders (except *Blennogeneris*)..... 2

2. Body covered with long and slender or short and stout conspicuous spines, some of which are bifurcate; abdominal segments 1 through 8 each with four or five dorsal annulets (pl. XVIII, 340; pl. XIX, 347, 354) ----- 3
- Body either with short spines, none of which are bifurcate, short conical tubercles, sclerotized plates, or inconspicuous glandubae; abdominal segments 1 through 8 each with six dorsal annulets; if five, then dorsum of body covered with conical, darkly sclerotized, simple spines (pl. XII, 268, 279; pl. XIII, 285; pl. XIV, 292; pl. XV, 311; pl. XVI, 315; pl. XVII, 326; pl. XVIII, 333) ----- 7
3. Subspiracular and surpedal lobes each with three simple spines; on *Spiraea* ----- *Apareophora dyari* (Benson) ----- 4
- Subspiracular and surpedal lobes each with only two spines, some of which are usually bifurcate (pl. XVIII, 340; pl. XIX, 347, 354) ----- 4
4. Spines on subspiracular lobe and surpedal lobe arranged as follows: Subspiracular lobe with anterior spine bifurcate, posterior spine simple; surpedal lobe with anterior spine simple, posterior spine bifurcate; 10th abdominal tergum with central compound spine (pl. XIX, 346, 347); on *Rubus* ----- *Monophadnoides geniculatus* (Hartig) ----- 5
- Spines on subspiracular lobe and surpedal lobe arranged differently; 10th abdominal tergum with or without central spine ----- 5
5. Spines on subspiracular lobe and surpedal lobe arranged as follows: Subspiracular lobe with two bifurcate spines; surpedal lobe with two simple spines; 10th abdominal tergum without central spine (pl. XVIII, 339, 340); lacinia with four to six spines (pl. XVIII, 338); on *Fraxinus* and *Carya* ----- *Eupareophora parva* (Cresson) ----- 6
- Spines on subspiracular lobe and surpedal lobe arranged differently; 10th abdominal tergum with or without central spine; lacinia usually with more than six spines ----- 6
6. Spines on subspiracular lobe and surpedal lobe arranged as follows: Subspiracular lobe with anterior spine bifurcate, posterior spine simple; surpedal lobe with two simple spines; 10th abdominal tergum with central spine absent; abdominal segments 1 through 8 with four or five dorsal annulets (pl. XIX, 353, 354); on *Quercus* and *Carya* ----- *Periclista* spp. ----- 8
- Spines on subspiracular lobe and surpedal lobe arranged as follows: Subspiracular lobe with two bifurcate spines or two simple spines; surpedal lobe with two bifurcate spines; 10th abdominal tergum with central bifurcate spine; abdominal segments 1 through 8 each with five dorsal annulets; on *Rosa* from Utah ----- Unidentified species ----- 8
7. Body with stout, conical, simple, dark spines, which are confined to dorsal surface; abdominal segments 1 through 8 each with six dorsal annulets, fifth and sixth annulets narrow, often appearing as one; second annulet with three spines on each side; fourth annulet with two spines on each side (pl. XVIII, 333); on *Vitis* ----- *Erythraspides vitis* (Harris) ----- 8
- Body with or without conical dark spines; if present, then they are also present on postspiracular, subspiracular, and surpedal lobes; abdominal segments 1 through 8 with six distinct dorsal annulets; tubercles, plates, or glandubae of second and fourth annulets various ----- 8
8. Spiracles distinctly and darkly winged; clypeus with two setae on each side; labrum with three setae on each side ----- 9
- Spiracles not winged, if winged, then lightly so; setae of clypeus and labrum various ----- 11
9. Large dark plates present on body with small papillae or setae arising from each one; 10th abdominal tergum with dark plate; thoracic legs slightly reduced, trochanter narrow and ringlike, visible only on inner surface of leg, tibia and femur subequal in length (pl. XVII, 324-326); on *Cissus* ----- *Ceratulus spectabilis* MacGillivray ----- 10
- Plates absent, only small dark tubercles present on body; thoracic legs normal, trochanter distinct, femur longer than tibia; 10th abdominal tergum without dark plate ----- 10

10. Postspiracular lobes, subspiracular lobe, and surpedal lobe each with only one tubercle; annulets 2 and 4 each with only two or three tubercles on each side (pl. XIV, 292, 296); left mandible with two ventral teeth (pl. XIV, 288); on *Veratrum*.....*Rhadinoceraea* spp.
 Postspiracular lobes, subspiracular lobe, and surpedal lobe each with two or more tubercles; annulets 2 and 4 each with more than three tubercles on each side, usually four to six; left mandible with three ventral teeth (pl. XV, 308); on *Ranunculus*, California
Monophadnus sp. (pt.) (?)
11. Tubercles on body dark, contrasting in color with rest of body (pl. XIII, 284-286); spiracles may be lightly winged; on *Smilacina*
Phymatocera spp.
 Tubercles or protuberances on body of same color as rest of body; spiracles not winged..... 12
12. Prothoracic suprapedal lobe distinctly protuberant (pl. XV, 301)..... 13
 Prothoracic suprapedal lobe normal, not protuberant..... 14
13. Clypeus with two setae on each side; head uniformly light brown; on *Carex*.....*Paracharactus* sp. (?)
 Clypeus with three setae on each side; head light, mottled with darker spots; on *Poa*, *Juncus*.....*Eutomostethus* spp.
14. Glandubae numerous and long; subspiracular and surpedal lobes each with row of seven or eight glandubae; annulets 2 and 4 each with three or four pairs of glandubae (pl. XVI, 313-315); clypeus and labrum each with two setae on each side; on *Sambucus*
Lagonis nevadensis (Cresson)
 Glandubae less numerous and shorter; subspiracular and surpedal lobes each with no more than two or three glandubae; glandubae of annulets not in pairs (pl. XII, 268, 279; pl. XV, 311); setae of clypeus and labrum various..... 15
15. Labrum with two setae on each side; body entirely smooth; glandubae of annulets 2 and 4 small and indistinct (pl. XII, 279); on *Fraxinus*
 Labrum with three setae on each side; body smooth with inconspicuous glandubae or with glandubae distinct; host not *Fraxinus*..... 17
16. Head light; thoracic legs light; lacinia with six to eight spines (pl. XII, 277).....*Tomostethus multicinctus* (Rohwer)
 Head black; thoracic legs with segments black; lacinia with 9 or 10 spines (pl. XII, 273).....*Tethida cordigera* (Palisot de Beauvois)
17. Head light with two pairs of large brown spots on vertex (pl. XV, 312); second segment of maxillary palpus with one seta; on *Ranunculus* from Illinois.....*Monophadnus* sp. (pt.) (?)
 Head uniformly light; second segment of maxillary palpus with one or two setae..... 18
18. Second segment of maxillary palpus with two setae; on *Galium*
Halidamia affinis (Fallén)
 Second segment of maxillary palpus with one seta; feebs in developing buds of *Symphoricarpos* (pl. XII, 267-269)
Blennogeneris spissipes (Cresson)

Tribe LYCAOTINI MacGillivray

Lycaotinae MacGillivray, 1906, p. 629; Ross, 1932b, p. 41; Ross, 1937, p. 101.
 Lycaotini Rohwer, 1911c, p. 223; Benson, 1938, p. 367; Ross, 1951, p. 62;
 Benson, 1966, p. 75.

This group was first proposed as a subfamily by MacGillivray (1906). Rohwer (1911c) considered it as a tribe of the Empriinae, and Ross (1932b, 1937) treated it as a subfamily. Ross believed this group to be a present-day representative of the ancestor of the Tenthredininae on the basis of the structure of the anal cell of the forewing, which is similar to that of *Zaschisoma* Ashmead and some *Macrophya* Dahlbom. However, Ross kept them separate because of the following differences: Vein *M* of the forewing meet-

ing $Rs - M$ at the junction of $Sc + R$ and the cervical sclerites being pointed in front and not meeting on the meson. Benson (1938) immediately reduced this group to tribal rank in the Blennocampinae, believing that the similarities of this group with the Blennocampinae outweighed the differences. Also, Benson pointed out that this form of contraction of the anal cell of the forewing may be a step toward the condition in which the anal cell becomes petiolate as in all other Blennocampinae. The latter is a specialized condition according to Ross (1937). Ross (1951) also included this group as a tribe of the Blennocampinae. Maxwell (1955), on the basis of the internal larval anatomy, stated that the Lycotini have an extremely anomalous position in the Blennocampinae and should be considered as a separate subfamily.

Vein 2A and 3A of the forewing, which is complete and fused to 1A for a short distance, will separate this group from all other Blennocampinae. This is a condition that may have been retained from the ancestral stock of the Blennocampinae while other characters have evolved. In other respects, members of this tribe are similar to those of the Phymatocerini and the Blennocampini. The larvae are similar to those of the Phymatocerini, having the abdominal segments six-annulate and lacking branched spines. The male genitalia are similar to those of the Blennocampini, having a lateral spine. With these characters in common with the other tribes and the generalized condition of the anal cell, members of this group may be the most generalized and may most closely resemble the ancestral stock of this subfamily.

Description.—Vein 2A and 3A of forewing complete, contracted in middle, and fused with 1A for short distance; veins M and $m-cu$ parallel. Hindwing with crossvein $m-cu$ present. Antenna normal. Tarsal claw simple or with small inner tooth. Prepectus absent. Penis valve rounded or elliptical; dorsal lobe absent; lateral spine present. Larvae with abdominal segments 1 through 8 each with six dorsal annulets; body ornamentation consisting of inconspicuous glandulae, branched spines absent.

Genera Included.—*Blennogeneris*, *Lycota*.

Benson (1966) gave a key to the eight world genera of this tribe.

Genus *BLENNOGENERIS* MacGillivray

Blennogeneris MacGillivray, 1923c, p. 8; Benson, 1938, p. 361; Ross, 1951, p. 62; Malaise, 1963, p. 165; Benson, 1966, p. 76.

Type: *Blennocampa typicella* MacGillivray. Monotypic.

Lycantella Ross, 1932b, p. 41; Malaise, 1933, p. 58; Ross, 1937, p. 101; Conde, 1937, p. 107; Benson, 1938, p. 361 (= *Blennogeneris* MacGillivray).

Type: *Schindria* (*Hoplocampa*) *spissipes* Cresson. Original designation.

Description.—Antenna filiform, second segment as wide as long, third segment slightly longer or subequal in length to fourth segment. Clypeus truncate; malar space slightly narrower than diameter of front ocellus; postgenal carina absent; postorbital groove absent. Prepectus absent. Tarsal claw simple or with large basal lobe (pl. II, 34, 36); in female, hindtarsus is usually short and stocky, not of same proportions as segments of middle tarsus

(pl. II, 34); if back and middle tarsal segments are of same proportions, then back tibial spurs are equal to at least one-half length of hindbasitarsus and lobes of lancet are flat and serrate; back tibial spurs of female equal to one-half or more length of hindbasitarsus (pl. II, 34, 36, 38); in male, back tarsal segments are normal. Forewing with vein 2A and 3A complete for entire length, fused with 1A for short distance (pl. I, 5). Hindwing with cross-vein *m-cu* present, enclosing cell *M*. Wings hyaline. Serrulae of female lancet flat and serrate (pl. VI, 134, 135, 136). Penis valve of male rectangular (pl. IX, 189).

Malaise (1933) criticized Ross for separating *Lycaota* and *Blennogeneris* on the basis of sexual and adaptive characters. He was referring to the genitalic characters and reduction of the back tarsal segments. Ross (1937) pointed out that such characters may be necessary when considering the arbitrary nature of genera and, in many groups, the lack of other diagnostic characters. After examination of species in these two genera, it is evident that there are two distinct groups present, each composed of closely related species. Even though a new species is added to *Blennogeneris*, one not possessing the reduced back tarsal segments, it is easily placed in this genus by the characters of the lancet and the length of the back tibial spurs. Also, two new species are added to *Lycaota*, both of which fall into that group on the basis of the male and female genitalia and the length of the back tibial spurs. In order not to obscure relationships between these species, I believe that *Blennogeneris* and *Lycaota* should be maintained as separate genera.

MacGillivray received credit for this genus in a rather casual manner. After describing *Blennocampa typicella*, he (1923c) stated: "If a new generic name is found necessary, *Blennogeneris* can be used."

Blennogeneris is known only from North America.

Larva.—The larva of only one species, *B. spissipes*, is known. It is difficult to distinguish from the larvae of several other *Blennocampinae*, but it may be separated by those characters given in the preceding key.

The close relationship of the larva of *spissipes* to the larvae of other *Blennocampinae* is a supporting factor for placing the *Lycaotini* in the *Blennocampinae*.

Key to *Blennogeneris* Species

(Male of only one species, *spissipes*, is known.)

1. Sheath with distinct scopa, from above bulbous at base, narrowing at center, and widening at apex (pl. IV, 78), in lateral view, truncate at apex (pl. IV, 76); middle tibial spurs long, at least one-half length of middle basitarsus (pl. II, 33) *spissipes* (Cresson)
- Sheath with scopa absent or with very narrow one (pl. IV, 73-75, 79-81), from above uniformly wide throughout (pl. IV, 81) or only slightly bulbous at base and widened at apex (pl. IV, 75), in lateral view, broadly rounded at apex (pl. IV, 73) or straight above and rounded below (pl. IV, 79); middle tibial spurs short, less than one-half length of middle basitarsus (pl. II, 35, 37) 2

2. Sheath with slight scopa, from above slightly bulbous at base, narrowing at center, and slightly widened at apex (pl. IV, 75), in lateral view, broadly rounded at apex (pl. IV, 73); hindbasitarsus longer than two following segments, usually as long as three following segments (pl. II, 36); middle basitarsus subequal to or longer than two following segments.-----*coloradensis* (Rohwer)
 Sheath without scopa, from above uniformly wide throughout (pl. IV, 81), in lateral view, straight above and rounded below (pl. IV, 79); hindbasitarsus shorter than or subequal to two following segments (pl. II, 38); middle basitarsus shorter than two following segments
gittinsi, n. sp.

Descriptions of *Blennogeneris* Species

Blennogeneris coloradensis (Rohwer)

Lycaota coloradensis Rohwer, 1911b, p. 384, ♀.

Lycaotella coloradensis, Ross, 1932b, p. 42.

Blennogeneris coloradensis, Ross, 1951, p. 62.

Female.—Average length, 6.2 mm. Antenna black; head black, suffused with brown; clypeus entirely black or with anterior half reddish brown. Thorax with dorsum entirely reddish brown to nearly entirely black with all intermediates; mesopleuron and pectus usually concolorous reddish brown, if pectus is darker, then it blends in with color of mesopleuron without sharp contrast. Legs reddish brown; tarsus black. Abdomen with various amounts of black and reddish brown. Wings hyaline.

Tarsal claw without large basal tooth; back tarsal segments short and stocky, not of same proportions as middle tarsal segments (pl. II, 36); hindbasitarsus subequal in length to three following segments (pl. II, 36); middle basitarsus subequal in length or slightly longer than two following segments; back tibial spurs equal to one-half length of hindbasitarsus (pl. II, 36). Sheath with small scopa, less than one-half posterior margin of sheath; in lateral view, broadly rounded (pl. IV, 73); in dorsal view, slightly bulbous at base, narrowing, then slightly expanded at apex (pl. IV, 75). Lancet with serrulae flat and serrate; apex with dorsal membranous projection (pl. VI, 134).

Male.—Unknown. As Ross (1932b) suggested, the male may be masquerading under *spissipes*. No series of *coloradensis* with associated males has been seen.

Holotype.—The type (♀) is No. 13839 at the U.S. National Museum. The only label reads "Colo."

Distribution.—Washington to Manitoba and south in the Rocky Mountains to Colorado (fig. 1, A).

North American Records.—*Colorado*: "Colo." *Idaho*: Moscow, April 11, 1936, 2560', B. F. Coen. *Manitoba*: Ninette, May 9, 1958, at margin of beaver pond, J. F. McAlpine. *Utah*: Logan Canyon, May 16, 1933, T. O. Thatcher. *Washington*: Fort Lewis, Pierce Co., April 15, 1945, P. H. Arnaud.³

Host.—Unknown.

Larva.—Unknown.

³ Throughout this bulletin all information pertaining to distribution records is given essentially as it appeared on the insect labels.

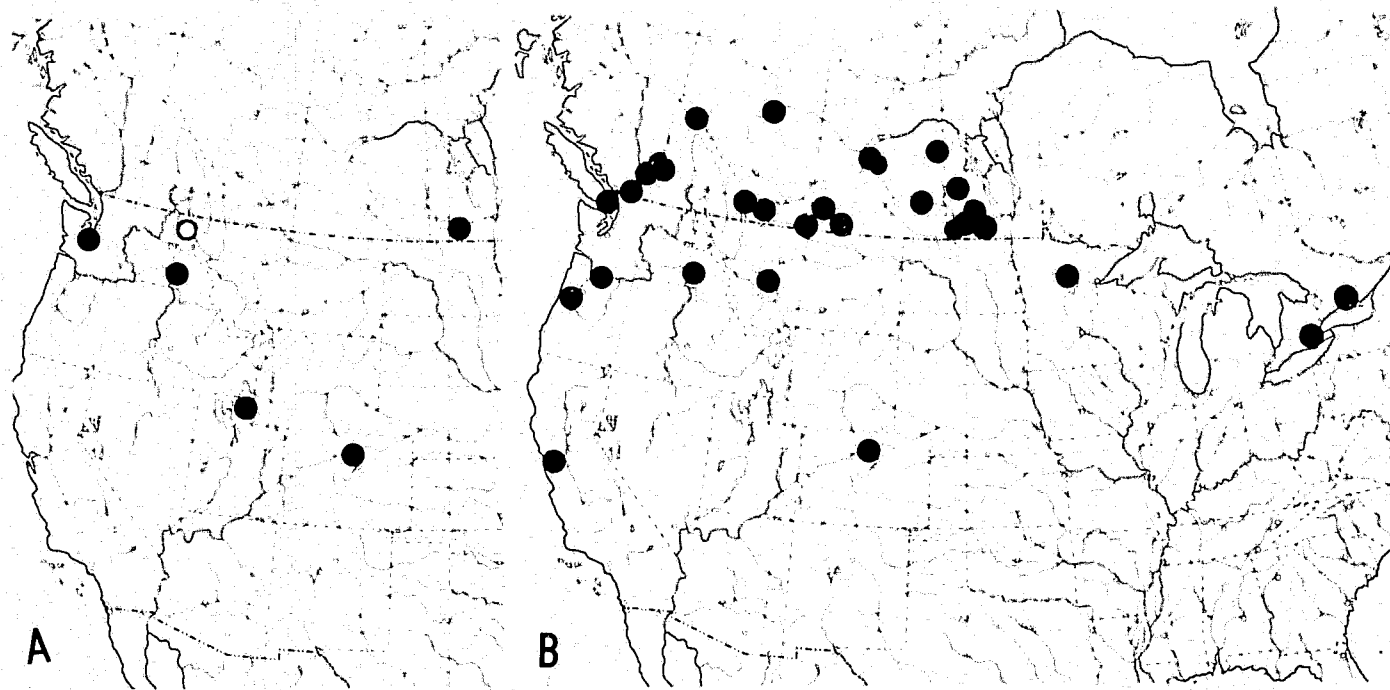


FIGURE 1.—Distribution of (A) *Blennogaster coloradensis* (solid circles), *gittinsi* (open circle), and (B) *spissipes*.

Discussion.—This species is easily separated from *spissipes* by the small scopa and rounded sheath. The back tarsal segments are modified as in *spissipes* but somewhat less so and more slender.

Blennogeneris gittinsi, new species

Female.—Length, 6.6 mm. Antenna and head black with labrum and anterior two-thirds of clypeus reddish brown. Thorax reddish brown with broad black band separating pectus and mesopleuron. Legs reddish brown; tarsus black. Abdomen dark brown to black with narrow white band on posterior margin of each segment. Wings hyaline.

Antenna with second segment as wide as long; third segment slightly longer than fourth segment (pl. III, 41). Clypeus truncate; malar space slightly less than diameter of front ocellus; postgenal carina absent; postorbital groove absent. Prepectus absent. Tarsal claw simple; back tarsal segments not reduced, of same proportions as middle tarsal segments (pl. II, 38); middle basitarsus shorter than two following segments; hindbasitarsus shorter or subequal to two following segments (pl. II, 38); middle tibial spurs less than one-half length of middle basitarsus (pl. II, 37); back tibial spurs equal to one-half length of hindbasitarsus (pl. II, 38). Forewing 2A and 3A complete for entire length, fused with 1A for only short distance (pl. I, 5). Hindwing with cross-vein *m-cu* present, enclosing cell *M*. Sheath without scopa; in dorsal view, uniformly thick throughout (pl. IV, 81); in lateral view, straight above and rounded below (pl. IV, 79). Lancet with serrulae flat and serrate; apex without dorsal membranous lobe (pl. VI, 135).

Male.—Unknown.

Holotype.—Female, 1 mi. N. Cocolalla, Idaho, Bonner County, May 9, 1960, A. R. Gittins, collector. The type has been deposited at the California Academy of Sciences, San Francisco, at the request of A. R. Gittins of the University of Idaho.

Distribution.—Known only from Idaho (fig. 1, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—Only the type female is known. This species is very distinct, differing from the other two members of this genus by the lack of reduced back tarsal segments and the lack of a scopa on the sheath. The characters of the lancet place it in this genus.

This species is named after the collector, Arthur R. Gittins, of the University of Idaho.

Blennogeneris spissipes (Cresson)

Selandria (*Hoplocampa*) *spissipes* Cresson, 1880a, p. 14, ♀; Cresson, 1916, p. 9.

Hoplocampa spissipes, Dalla Torre, 1894, p. 191; Weldon, 1907, p. 302.

Macrophya spissipes, Konow, 1905, p. 123; Will, 1932, pp. 43, 44.

Lycaola spissipes, Rohwer, 1911d, p. 147; Rohwer, 1911b, p. 384.

Lycaotella spissipes, Ross, 1932b, p. 42; Ross, 1937, p. 101.

Blennogeneris spissipes, Benson, 1938, p. 361; Ross, 1951, p. 62.

- Selandria* (*Hoplocampa*) *lenis* Cresson, 1880a, p. 14, ♂; Rohwer, 1911b, p. 384 (= *spissipes* Cresson); Cresson, 1916, p. 5.
Hoplocampa lenis, Dalla Torre, 1894, p. 189; Weldon, 1907, p. 302.
Zaschisonya lenis, Konow, 1905, p. 131.
Lycaota spissipes brunneus Rohwer, 1911b, p. 384, ♀; Ross, 1951, p. 62 (= *spissipes* Cresson).
Lycaotella spissipes var. *brunneus*, Ross, 1932b, p. 44.
Blennocampa typicella MacGillivray, 1923c, p. 8, ♂; Frison, 1927, p. 238; Ross, 1951, p. 62 (= *spissipes* Cresson).
Lycaotella spissipes var. *typicella*, Ross, 1932b, p. 44.
Blennocampa typicella, Benson, 1938, p. 361.

Female.—Average length, 6.4 mm. Antenna black; head black, suffused with brown; clypeus usually with anterior half reddish brown. Thorax variable, entirely brownish or entirely black, with all intermediates; mesopleuron brownish, pectus black, the two usually sharply contrasting. Legs reddish brown; tarsus black. Abdomen either entirely black or with various amounts of reddish brown. Wings hyaline.

Tarsal claw with large basal lobe (pl. II, 34); back tarsal segments reduced, short and stocky, not of same proportions as middle tarsal segments; hindbasitarsus subequal in length to three following segments (pl. II, 34); back tibial spurs equal to more than one-half length of hindbasitarsus (pl. II, 34); middle tibial spurs equal to more than one-half length of middle basitarsus (pl. II, 33). Sheath with distinct scopa, extending along nearly entire posterior margin of sheath (pl. IV, 77); in dorsal view, bulbous at base, narrowing, then distinctly widened at apex (pl. IV, 78); in lateral view, short and truncate at apex (pl. IV, 76). Lancet with serrulae flat and serrate; large dorsal membranous lobe at apex (pl. VI, 136).

Male.—Average length, 6.3 mm. Coloration as variable as in female. Thorax usually black with tegula and upper angles of pronotum reddish brown; each coxa, trochanter, and tarsus black; each tibia and femur reddish brown. Head and abdomen similar to female.

Structure as for female except for middle and back tarsal segments, which are normal. Back tarsal segments not shortened and of same proportions as middle tarsal segments; middle tibial spurs less than one-half length of middle basitarsus; back tibial spurs less than one-half length of hindbasitarsus. Penis valve rectangular, with dorsoapical spine and finely serrate ventral margin (pl. IX, 189).

Holotypes.—*Selandria spissipes* Cresson (♀) is type No. 362 at the Academy of Natural Sciences of Philadelphia and bears the data "Colo." *Selandria lenis* Cresson (♂) is type No. 195 at Philadelphia with the same locality data. *Lycaota spissipes brunneus* Rohwer (♀) is type No. 13838 at the U.S. National Museum with the data "Montana." *Blennocampa typicella* MacGillivray (♂) is at the Illinois Natural History Survey and bears the data "Corvallis, Oregon, March 14, 1915, Leroy Childs, collector."

Distribution.—British Columbia to Ontario and south to California and Colorado in the West (fig. 1, B).

North American Records.—*Alberta*: Magrath, May 20, 1938, G. S. Walley; Radmor, May 12, 1931, O. Peck; Edmonton, June 20, 1926, E. H. Strickland, May 14, 1924, G. Salt; Blairmore, June 18, 1962, K. C. Herrman; Elkwater, June 2, 1955, A. R. Brooks, 49°42', 110°16', June 2, 1955, J. R. Vockeroth; Elkwater Lake, June 10, 1956, E. E. Sterns; Norton, 49°52', 110°24', May 31, 1955, J. R. Vockeroth; Onefour, 49°6', 110°24', June 4, 1955, J. R. Vockeroth. *British Columbia*: Vernon, April 23, 1939, H. B. Leech; Agassiz, May 30, 1927, em. March 3, 1928, reared, *S. racemosa*, em. March 15, 1928, ex *Symphoricarpos*, H. H. Ross; Victoria, May, 1916, R. C. Treherne; Midday Valley, Merritt, May 15, 1925, *Pinus ponderosa*, J. Stanley; Chase, May 30, 1919, W. B. Anderson; Orofino Mt., May 25, 1959, R. E. Leech; Trinity Valley, R. Madge; Robson, April 4, 6, 11, 15, 17, 19, 21, 22, 24, 27, 1947, April 8, 9, 10, 23, 1949, April 18, 19, 28, 1950, April 23, 1951, May 24, 1951, April 16, 1952, May 9, 16, 1952, H. R. Foxlee. *California*: Berkeley, April 6, 1936, G. E. Bohart. *Colorado*: "Colo." *Idaho*: Moscow, Viola Grade, April 24, 1935, 3000', W. E. Shewell; Joel, Latah Co., April 22, 26, 1949, W. F. Barr; Juliaetta, April 8, 1949, 1083', W. F. Barr; Moscow Mtn., May 5, 1937, C. J. Peterson; Robinson Lake, Latah Co., April 17, 1956, A. R. Gittins; Laird Park, Latah Co., May 11, 1962, R. E. Stocker. *Manitoba*: Birtle, May 2, 1928, R. D. Bird; Aweme, May 15, 28, 1926, R. D. Bird; Wawanesa, May 25, 1923, R. M. White; Treesbank, May 19, 1925, N. Criddle, April 3, 1925, R. M. White; Brandon, June 17, 1899, J. Fletcher; 5 mi. S. W. Shilo, May 28, 1958, C. D. F. Miller; Hartney, May 21, 1955, Brooks and Kelton; Ninette, May 30, 1958, C. D. F. Miller, May 21, 1955, maple-elm, floodplain community, J. F. McAlpine, May 3, 1958, oak-aspen community along small stream, J. F. McAlpine. *Minnesota*: Itasca Park, May 22, 1937, H. R. Dodge. *Montana*: "Montana." *Ontario*: Kinburn, May 28, 1956, J. E. H. Martin; Marmora, May 6, 1952, J. C. Mitchell; Ancaster, May 28, 1956, J. E. H. Martin. *Oregon*: 5 mi. W. Philomath, Benton Co., March 31, 1962, D. R. Smith; Sulphur Springs, Benton Co., April 4, 1963, D. R. Smith; Wakeena Falls, Multnomah Co., April 8, 1964, on thimbleberry, K. Goeden. *Saskatchewan*: Dundurn, May 16, 1923, K. M. King; Indian Head, June 3, 1929, K. Stewart; Pike Lake, May 9, 10, 12, 14, 1939, A. R. Brooks; Cypress Hills, May 26, 1955, J. R. Vockeroth; Scout Lake, 49°20', 106°0', June 17, 1955, J. R. Vockeroth; Parkside, May 21, 1961, J. R. Vockeroth; Canora, June 13, 1954, Brooks and Wallis; Katepwa, June 18, 1954, Brooks and Wallis; Val Marie, 49°15', 107°44', June 9, 1955, J. R. Vockeroth; Maple Creek, May 28, 1955, J. R. Vockeroth; Oxbow, F. Knab; Saskatoon, May 14, 1924, K. M. Kring, May 12, 1939, May 31, 1951, June 6, 1950, A. R. Brooks.

Host.—The larva forms a terminal bud gall on *Symphoricarpos albus* (L.) Blake. Ross (1932b) gave a brief account of its biology from his rearings in British Columbia. In Oregon the adults are one of the first sawflies to appear in the spring and were swept from the host in late March and early April at the time the buds were forming on the host. About 6 weeks later

larvae were easily collected from the galls that they formed. There was always one larva per gall.

Larva.—The larva of this species is described here for the first time.

Late instar entirely light green when alive; ocularium, spiracles, and apex of mandible dark.

Head covered with numerous slender hairs. Clypeus with two setae on each half. Labrum shallowly emarginate; three setae on each side of outer surface; epipharynx with arcuate row of about seven stout spines on each anterolateral margin (pl. XII, 265). Each mandible with one seta on outer lateral margin; left mandible with two ventral teeth, lower one broad and concave, three lateral teeth, outer one broad, and one tooth on mesal ridge (pl. XII, 263); right mandible with two sharp ventral teeth, two sharp and one truncate lateral teeth, and three molar teeth (pl. XII, 262). Maxillary palpus four-segmented, one seta on outer margin of second segment; palpifer with three setae; stipes with one seta; lacinia with eight to 10 spines, proximal two or three bifurcate (pl. XII, 266). Labial palpus three-segmented; prementum with three setae on each side.

Thorax with glandubae arranged as in plate XII, 269. Glandubae inconspicuous and of same color as body; exact number in each area as pictured not always constant. Thoracic legs normal; femur longer than tibia. Sternum of each thoracic segment with pair of setiferous lobes. Fine hairs present on segments of each thoracic leg.

Abdominal segments 1 through 8 each with six dorsal annulets (typical segment shown in pl. XII, 268); annulets 1, 3, 5, and 6 without glandubae; annulet 2 with one glanduba on each side above spiracle; annulet 4 with two glandubae on each side; first and second postspiracular lobes each with one glanduba; subspiracular and surpedal lobes each with two glandubae. Ninth abdominal segment with annulation indistinct; glandubae arranged as in plate XII, 267. Tenth abdominal tergum with 20–25 glandubae; numerous setae on suranal and subanal areas (pl. XII, 267).

I have seen several larvae taken from *Symphoricarpos* at Williams, Ariz. It may be another species of this genus or a species of *Lycaota*. The larvae fit the above description except for the arrangement of the glandubae on the body. The glandubae on annulets 2 and 4 of abdominal segments 1 through 8 are arranged in two groups with two to four glandubae in each group. Each postspiracular lobe, the subspiracular lobe, and the surpedal lobe all bear one to three glandubae.

Discussion.—This is the most commonly collected species of the genus. The females are easily distinguished by their modified back tarsal segments, large back tibial spurs, large basal lobe of the tarsal claw, and the large and distinct scopa of the sheath. The rectangular shape of the penis valve will separate the males of this species from those of *Lycaota*. Males of other species of *Blennogenes* are not known. The distribution is much wider than

previously recorded; it extends from the west coast east to Ontario.

Genus LYCAOTA Konow

Lycaota Konow, 1903a, p. 147; Konow, 1905, p. 101; Rohwer, 1911a, p. 82; Rohwer, 1911b, p. 384; Rohwer, 1911c, p. 223; Ross, 1932b, p. 42; Malaise, 1933, p. 58; Ross, 1937, p. 101; Conde, 1937, p. 107; Benson, 1938, p. 361; Ross, 1951, p. 62; Malaise, 1963, p. 164; Benson, 1966, p. 76.
Type: *Selandria sodalis* Cresson. Original designation.

Description.—Antenna filiform, second segment as wide as long, third segment slightly longer than fourth segment or subequal to it. Clypeus truncate; malar space slightly more than one-half diameter of front ocellus; postorbital groove absent; postgenal carina absent. Prepectus absent. Tarsal claw appearing simple, but always with minute inner tooth; back tarsal segments shorter than middle tarsal segments, but segments of each are of same proportions (pl. III, 39, 40). Forewing with 2A and 3A complete, fused with 1A for short distance or approaching 1A and connected to it by very short crossvein (pl. I, 4, 5); hindwing with crossvein *m-cu* present, enclosing cell *M*. Wings infusate or hyaline. Female lancet with serrulae rounded and lobelike (pl. VI, 137–139). Penis valve of male rounded (pl. IX, 191, 193).

The relationship of this genus to *Blennogeneris* has been discussed under the latter. There are now three species of this genus known from North America. Ross (1932b) treated only one in his revision of the *Lycaotinae*.

The European species *Hoplocampoides xylostei* (Giraud), a close relative of *Lycaota*, is known to form galls on *Lonicera xylosteum* L. (Kontkanen, 1948). The habits of the Nearctic species of *Lycaota* are not known.

Larva.—The larva is not known for species of this genus. Maxwell (1955) described the internal anatomy of a species she called *Lycaota* sp., probably *sodalis* (Cresson). It was collected in British Columbia and is probably *Blennogeneris spissipes* (Cresson).

Key to *Lycaota* Species

1. Wings darkly infusate; tarsal claw with very minute and indistinct inner tooth; female with thorax partly rufous.....*sodalis* (Cresson)
- Wings hyaline or very lightly infusate; tarsal claw with inner tooth indistinct or moderate; thorax entirely black or black with some white on upper angles of pronotum..... 2
2. Sheath with slight scopa (pl. IV, 82, 83); tarsal claw with moderate inner tooth (pl. II, 16); upper angles of pronotum light; third antennal segment subequal in length to fourth segment; male unknown.....*bouquetensis*, n. sp.
- Sheath without scopa (pl. IV, 84, 85); tarsal claw with minute and indistinct inner tooth; pronotum black; third antennal segment slightly longer than fourth segment in female.....*janetae*, n. sp.

Descriptions of *Lycaota* Species*Lycaota bouquetensis*, new species

Female.—Length, 6.9 mm. Antenna and head black. Thorax black with tegula and upper angles of pronotum reddish brown. Legs black with extreme apex of each femur and basal part of each tibia and its outer surface white. Abdomen black with narrow white band on posterior margin of each segment. Wings hyaline. Body covered with fine white pubescence.

Antenna with second segment as wide as long, third segment subequal in length to fourth segment (pl. III, 45). Clypeus truncate; malar space equal to about one-half diameter of front ocellus; postorbital groove absent; postgenal carina absent. Prepectus absent. Tarsal claw with small inner tooth (pl. II, 16); back tarsal segments of same proportions as their respective middle tarsal segments. Forewing with 2A and 3A present for entire length, fused to 1A for short distance (pl. I, 5); hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath, in lateral view, slightly truncate at apex (pl. IV, 82), in dorsal view apex slightly widened (pl. IV, 83); posterior margin with slight scopa. Lancet with serrulae rounded and lobelike, each as long or slightly longer than wide (pl. VI, 137).

Male.—Unknown.

Holotype.—Female, Bouquet Cn., Calif., March 15, 1941, J. Wilcox, collector. Deposited in the U.S. National Museum, type No. 69150.

Paratype.—California: 2 mi. S. Pine Valley, San Diego Co., April 5, 1966, C. W. O'Brien, Edw. L. Smith Collection (1♀). Deposited in the collection of Edward L. Smith.

Distribution.—Known only from southern California (fig. 2, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is very distinct and may be separated from *sodalis* by the black thorax and hyaline wings and from both of the other species of this genus by the slight scopa of the sheath, small inner tooth of the tarsal claw, and characters of the lancet.

The name of this species is derived from the type locality.

Lycaota janetae, new species

Female.—Length, 6.9 mm. Entirely black. Wings hyaline. Body covered with fine white pubescence.

Antenna with second segment as wide as long, third segment slightly longer than fourth segment (pl. III, 42). Clypeus truncate; malar space slightly less than diameter of front ocellus; postgenal carina absent; postorbital groove absent. Prepectus absent. Tarsal claw with very minute inner tooth; back tarsal segments of same proportions as their respective middle tarsal seg-

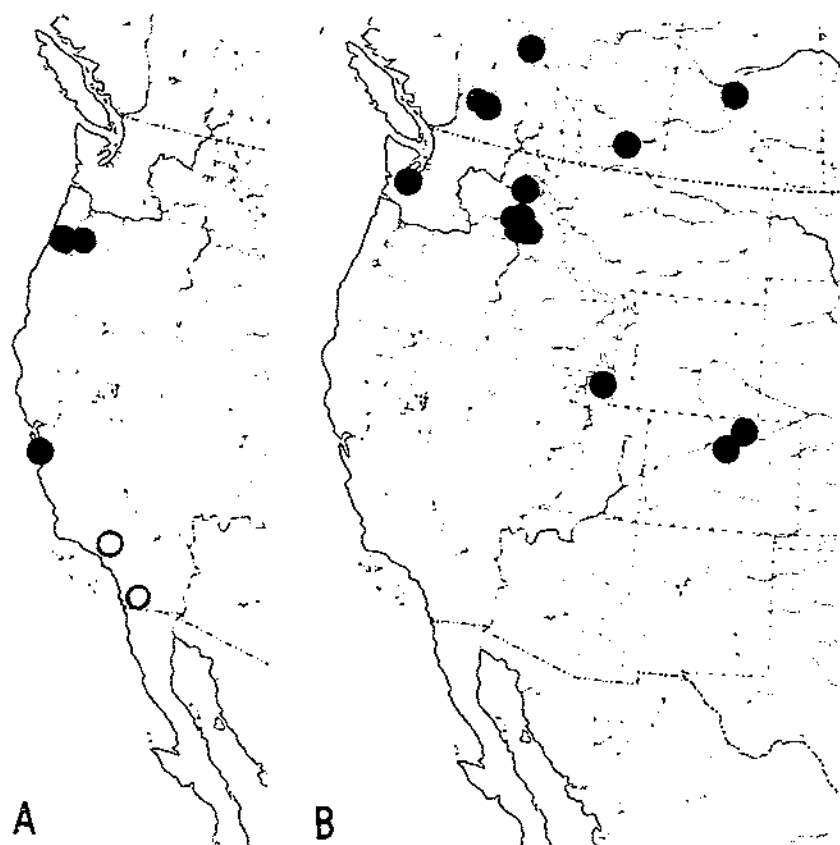


FIGURE 2.—Distribution of (A) *Lycaota janetae* (solid circles), *bouquetensis* (open circles), and (B) *sodalis*.

ments. Forewing with 2A and 3A present for entire length, fused to 1A for short distance (pl. I, 5); hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath broadly rounded at apex (pl. IV, 84); without scopa; in dorsal view, not widened at apex (pl. IV, 85). Lancet with serrulae rounded and lobelike, each serrula as long as wide (pl. VI, 138).

Male.—Length, 6.7 mm. Color as for female. In structure similar to female except for third antennal segment, which is subequal in length to fourth segment. Penis valve rounded, more oblong than in *sodalis* (pl. IX, 193); harpe flattened at apex (pl. IX, 192).

Holotype.—Female, Sulphur Springs, Benton Co., Oreg., April 4, 1963, David R. Smith, collector. Deposited in the U.S. National Museum, type No. 69151.

Allotype.—Male, 5 mi. W. Philomath, Benton Co., Oreg., March 31, 1962, David R. Smith, collector. Deposited with the holotype.

Paratypes.—*California*: Felton, St. Cruz Mts., 300–500', May 15–19, 1907, Bradley (1♀). *Oregon*: McDonald Forest, 5 mi. N. Corvallis, April 6, 1958, R. K. Eppley (♀); Benton Co., Oak Cr. Lab., 5 mi. N. W. Corvallis, March 30, 1963, Noel McFarland (1♀); Marion Co., Mehama, April 12, 1962, snowberry, Kenneth Goeden (1♀).

Disposition of Paratypes.—Paratypes have been deposited at the U.S. National Museum, Oregon State University, State Department of Agriculture, Salem, Oreg., and Cornell University.

Distribution.—Oregon and California (fig. 2, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is distinguished from *sodalis* by its entirely black color and hyaline wings, as well as genitalic characters. It may be separated from *houquetensis* by the tarsal claw, sheath, and characters of the lancet. In Oregon this is one of the earliest spring fliers.

This species is named after Jan Bedea, a student in entomology at Oregon State University.

Lycaota sodalis (Cresson)

Selandria sodalis Cresson, 1880a, p. 14, ♀; Dalla Torre, 1894, p. 146; Weldon, 1907, p. 302; Cresson, 1916, p. 9.

Hoplocampa (?) *sodalis*, Kirby, 1882, p. 168.

Lycaota sodalis, Konow, 1903a, p. 147; Konow, 1905, p. 102; Rohwer, 1911b, p. 384; Ross, 1932b, p. 42; Ross, 1951, p. 62.

Lycaota fusca Rohwer, 1908b, p. 180. ♂; Rohwer, 1911b, p. 384 (= *sodalis* Cresson).

Female.—Average length, 6.8 mm. Antenna and head black. Thorax black with prothorax, tegula, mesonotum, and mesopleuron rufous. Legs black. Abdomen black. Wings darkly infuscate.

Antenna with third and fourth segments subequal in length (pl. III, 45). Tarsal claw with minute inner tooth. Forewing with 2A and 3A fused to 1A for short distance or connected to 1A by very short perpendicular crossvein (pl. I, 4, 5). Sheath broadly rounded at apex (pl. IV, 84); scopa absent; in dorsal view, not widened at apex. Lancet with serrulae rounded and lobelike, each serrula wider than long and slightly flattened (pl. VI, 139).

Male.—Average length, 6.6 mm. In color differs from female by being entirely black with outer surface of foretibia whitish. Structure as for female. Penis valve evenly rounded (pl. IX, 191); harpe with apex truncate (pl. IX, 190).

Holotypes.—*Selandria sodalis* Cresson (♀) is type No. 361 at the Academy of Natural Sciences of Philadelphia and bears the data "Colorado, Morrison." *Lycaota fusca* Rohwer (♂) is type No. 13837 at the U.S. National Museum and bears the data "Ft. Collins, Colo., 5–4–99."

Distribution.—Washington and British Columbia east to Saskatchewan and south in the Rocky Mountains to Colorado (fig. 2, B).

North American Records.—*Alberta*: Lethbridge, May 21, 1938, G. S. Walley. *British Columbia*: Lumby, Creighton Valley, April

24, 1934, H. B. Leech; Salmon Arm, April 28, 1930, H. B. Leech; Vernon, May 13, 1923, D. G. Gillespie; Robson, April 11, 17, 1947, April 16, 1952, H. R. Foxlee. *Colorado*: Golden, May 25; Ft. Collins, May 12, 1900. *Idaho*: Moscow, Viola Grade, April 24, 1935, 3000', W. E. Shull; Julietta; Troy, May 7, 1909, Peck; 10 mi. N. Nez Perce, April 17, 1952, W. F. Barr; Lewiston, April 21, 1937, 550', R. W. Every; Lewiston Grade, April 22, 1938, E. Ritzheimer; Moscow Mt., Latah Co., April 21, 1954, A. R. Gittins; 5 mi. E. Moscow, April 19, 1957, C. J. Peterson; Moscow, May 6, 1956, 2560', C. J. Peterson; Athol, Kootnai Co., May 9, 1961, W. F. Barr; Dreary, April 18, 22, 1951, 2775', W. F. Barr; Lawyers Canyon, Lewis Co., May 14, 1956, A. R. Gittins; Joel, April 22, 26, 1949, W. F. Barr; Lenore, April 8, 1948, 1000', W. F. Barr; Woodland, Idaho Co., April 4, 1949, W. F. Barr; Robinson Lake, Latah Co., April 17, 1956, A. R. Gittins. *Saskatchewan*: Saskatoon, May 14, 1924, K. M. King, May 4, 7, 1939, May 5, 9, 1949, A. R. Brooks. *Utah*: Dry Canyon, Logan, May 2, 1943, D. R. Maddock; Brigham, July 14, 1947, R. L. Rigby. *Washington*: Kamiac Butte, April 18, 1929; Pullman, April 12; Olympia.

Host.—Unknown.

Larva.—Unknown.

Discussion.—Both sexes of this species may be separated from the two other members of this genus by the darkly infuscate wings. The female is also easily recognized by its partly rufous thorax. This is the most commonly collected species of this genus and appears to be more widely distributed than the other two species.

Unplaced Name of *Lycaotini*

Lycaota bruneri Rohwer

Lycaota bruneri Rohwer, 1908a, p. 104, ♀.

The type of this species cannot be located. In the description Rohwer gives Colorado as the locality. According to the description, this species would fit the female of *Blennogeneris spissipes* (Cresson); however, correct placement is impossible unless the type is examined.

Tribe TOMOSTETHINI Benson

Tomostethini Benson, 1938, p. 367; Takeuchi, 1952, p. 42.

Benson (1938) proposed this tribe for the genus *Tomostethus*. Takeuchi (1952) also included *Eutomostethus* and *Paracharactus* in this tribe, both of which belong in the Phymatocerini.

The presence of a prepectus separated from the mesepisternum by a suture (not a furrow), the slight convergence of veins *M*

and *1m-cu* of the forewing, and vein 2A and 3A of the forewing, which has an indication of being complete, are the characters that separate this tribe. The prepectus and larval characters resemble those of the more generalized Phymatocerini, and members of this tribe may be similar to the parent stock that gave rise to that group. The faint indication that 2A and 3A is complete is like this structure in the Lycaotini and may be a transitional step toward the complete loss of part of 2A and 3A evident in other Blennocampinae. Although members of this tribe could be placed in the Phymatocerini, I believe such a step would obscure their distinctiveness and generalized position.

Description.—Vein 2A and 3A of forewing straight or curved up at apex, with faint indication of being complete; veins *M* and *1m-cu* subparallel, slightly converging. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Antenna normal. Tarsal claw simple or with a small inner tooth. Prepectus present, large and triangular, flat, separated from mesepisternum by suture. Penis valve without dorsal lobe or lateral spine. Larvae with abdominal segments 1 through 8 each with six dorsal annulets; body ornamentation consisting of inconspicuous glandulae.

Genera Included.—*Tomostethus*, *Tethida*.

Genus TOMOSTETHUS Konow

Tomostethus Konow, 1886, p. 184, 214; Dalla Torre, 1894, p. 174; Ashmead, 1898a, p. 251; Ashmead, 1898b, p. 128; Konow, 1905, p. 82; Rohwer, 1911a, p. 91; Rohwer, 1911c, p. 224; Enslin, 1912, p. 125; Rohwer, 1913, p. 240; Enslin, 1913, p. 167; Enslin, 1914, p. 286; MacGillivray, 1916, p. 148; Ross, 1937, p. 95; Benson, 1938, p. 367; Berland, 1947, p. 246; Ross, 1951, p. 62; Benson, 1952, p. 99; Takeuchi, 1952, p. 45; Lorenz and Kraus, 1957, p. 115.

Type: *Tenthredo nigrila* Fabricius. Designated by Rohwer (1911a).

Description.—Antenna short and stout, second segment as wide as long, third segment longer than fourth segment and subequal in length to fourth plus fifth segments (pl. III, 43). Clypeus truncate; malar space linear; postorbital groove absent; postgenal carina absent. Tarsal claw simple (pl. II, 13); front tibial spur furcate at apex. Prepectus present, large and triangular, not raised above level of mesepisternum and separated from it by suture (pl. II, 29). Forewing with stub of 2A and 3A straight or faintly curved up at apex (pl. I, 1, 6) with indication of being complete; veins *M* and *1m-cu* slightly divergent (pl. I, 9). Hindwing with crossvein *m-cu* present, enclosing cell *M*.

This genus and *Tethida* are similar except for the structure of the tarsal claw and veins *M* and *1m-cu* of the forewing. The relationship between these two genera is discussed under *Tethida*.

Only one species is known from North America. The genus consists of about a dozen species, mainly centered in eastern Asia. A common Palearctic species is *nigrilus* (Fabricius).

Larva.—The larva of *multicinctus* is known, and it feeds on *Fraxinus* as does the Palearctic *nigrilus*.

Description of *Tomostethus* Species*Tomostethus multicinctus* (Rohwer)

Monophadnus multicinctus Rohwer, 1909a, p. 90, ♀; Sasser, 1911, p. 107.
Tomostethus multicinctus, Yuasa, 1922, p. 93; Langford and McConnell, 1935, p. 208; Ross, 1937, p. 96; Armitage, 1950, p. 183; Armitage, 1951a, p. 116; Armitage, 1951b, p. 154; Ross, 1951, p. 62; MacNay, 1953, p. 43; Maxwell, 1955, p. 87; Peterson, 1956, pp. 255, 269; MacNay, 1957, p. 184.

Female.—Average length, 7.0 mm. Antenna and head black. Thorax black with tegula white and pronotum reddish brown. Legs black with extreme apex of each femur, each tibia, and each tarsus whitish; hindtibia and tarsus infuscate. Abdomen black with narrow white band on posterior margin of each segment. Head and body may be suffused with reddish brown, especially in some specimens from the West. Wings hyaline.

Head and body covered with fine white pubescence, less conspicuous on abdomen. Sheath short and broadly rounded (pl. IV, 88). Lance straight above, rounded below, and wider near apex than at base and center. Lancet lightly sclerotized, serrulae flatly rounded with subbasal teeth distinct (pl. VI, 140).

Male.—Average length, 6.6 mm. Color similar to that of female except for thorax, which is entirely black with tegula whitish, and abdomen, which has much less conspicuous white margins on segments. Structure similar to female. Genitalia with penis valve narrow and oblong (pl. IX, 195); harpe and parapenis as in plate IX, 191.

Holotype.—The type (♂) is at the U.S. National Museum, No. 56337, and bears the data "Washington, D.C., May 6, N. Banks."

Distribution.—Eastern North America from Massachusetts and North Carolina west to the Dakotas and Texas; California and western Oregon (fig. 3, A).

North American Records.—*California*: El Portal, May 14, 1959, R. P. Allen; Green Valley, Solano Co., March 20, 1936, R. M. Bohart; Red Bluff, Tehama Co., March 23, 1951, ex *Fraxinus*, Kane and Osburn; Palo Alto, April 26, 1892; Redding, Shasta Co., March 17, 1951, ash, W. A. Kane, March 22, 1951, Kane and Osburn; Anderson, March 22, 1951, on ash; Cazadire, March 29, 1934. *Connecticut*: Windsor, May 2, 1945, June 16, 1951. *District of Columbia*: Washington, May 2-9, N. Banks, May 1, 1928, ovip. on ash in mall, H. G. Dyar, April 25, 1933, under ash, Middleton and VanDine, April 19, 1909. *Illinois*: Murodock, 1938, on *Fraxinus*, em. in lab. May 4, 1938, Mohr; Camargo, reared on ash, C. O. Mohr; Cobden, May 7-9, 1918, J. R. M.; Champaign, May 5, 1886, C. M. Weed; Pontiac, April 23, 1941. *Iowa*: Ames, May 11, 1960, S. M. Gaud, May 3, 1950, R. A. A., May 8, 1939, Fiene; Ledges St. Pk., Boone Co., May 2, 1961, J. L. Keller. *Kansas*: Manhattan, May 1, 1949, ash, April 24-27, 1949, ash, J. B. Kring; Riley Co., April 12-19, Popenoe. *Massachusetts*: Brookline, May 12, 1925, larva on ash; Melrose, May 19, 1925, larva on ash; Wakefield, May 13, 1925, *Fraxinus*. *Missouri*: Kansas City, April 17-23, ash,

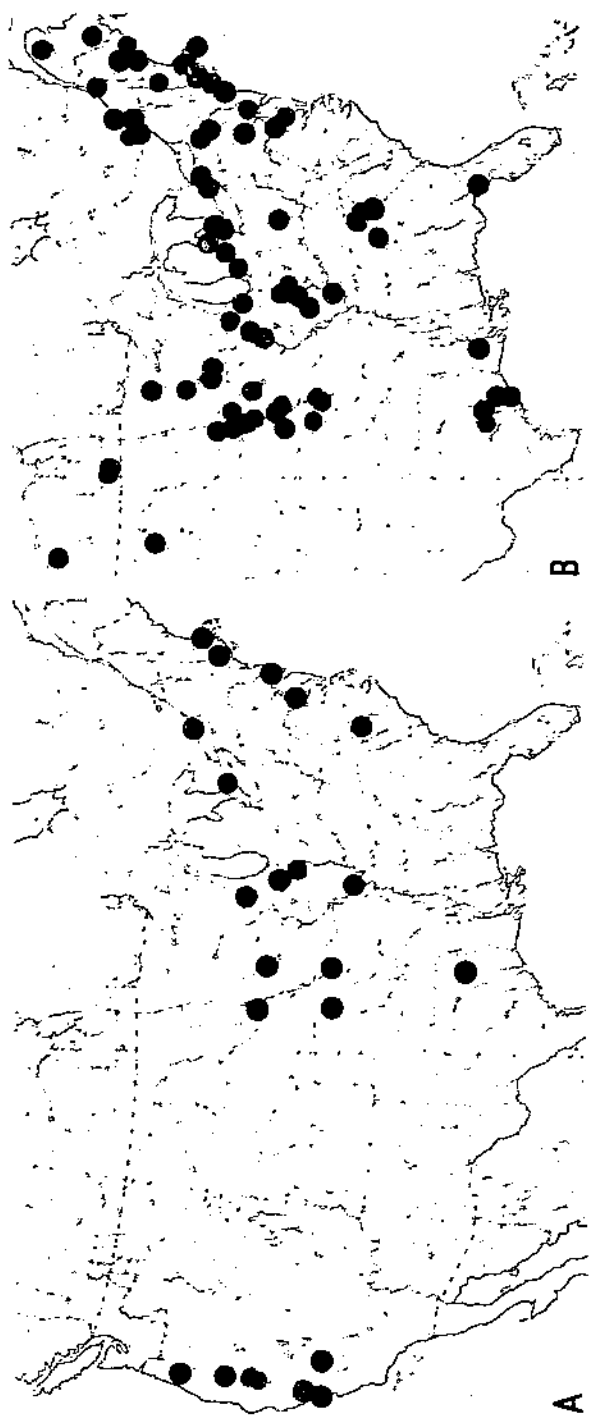


FIGURE 3.—Distribution of (A) *Tomostethus multivittatus* and (B) *Tethia cordigera*.

Kring and McNellys. *New Jersey*: Hamonton, May, 1938, on ash, Girth. *North Carolina*: Raleigh, April 14, 1942, on ash. *Ontario*: London, em. April 28, 1954, assoc. larvae coll. June 3, 1953, *Fraxinus americana*, R. E. Sampson; Belleville, May 15, 1956, on white ash, H. C. Coppel. *Oregon*: Kiger's Island, April 12, 1930, J. Wilcox; Little Squaw Lake, 7 mi. E. Copper, Jackson Co., 3200', R3W, T41S, Sec. 2, May 22, 1964, R. Shoemaker. *South Dakota*: Springfield, May 28, 1954, H. C. Severin. *Texas*: "Texas" Belfrage, C. V. Riley Collection. *Virginia*: Falls Church, April 27. *Wisconsin*: Madison, June 1941.

Host.—Adults have been reared from larvae feeding on *Fraxinus americana* L. and *F. oregona* Nutt.

Larva.—Yuasa (1922) included this larva in his key to the Blennocampinae but did not examine any of them. Sassocer (1911) described the larvae in a biological note on this species. The larva is illustrated by Peterson (1956).

In late instar, body entirely light, probably green when alive, with minute glandubae, which are same color as rest of body. Head capsule light brown to yellowish.

Clypeus with two setae on each side. Labrum with two setae on each side; shallow central emargination present; epipharynx with about six spines arranged in arcuate row on each antero-lateral half (pl. XII, 276). Each mandible with one seta on outer lateral surface; left mandible with three sharp ventral teeth and two sharp and one truncate lateral teeth (pl. XII, 275); right mandible with two sharp ventral teeth, one sharp and one truncate lateral teeth and two molar teeth (pl. XII, 274). Maxillary palpus four-segmented; second segment with one seta on outer margin; palpifer with two setae; stipes without setae; lacinia with six to eight spines (pl. XII, 277). Labial palpus three-segmented; two setae on each side of prementum.

Glandubae of thorax mostly confined to prothorax, each suprapedal lobe, and first and third annulets of mesothorax and metathorax. Each thoracic sternum with a pair of setiferous tubercles. Thoracic legs normal, femur longer than tibia; inner margin of each coxa and trochanter with coarse setae, appearing to be arranged in two rows.

Abdominal segments 1 through 8 each with six dorsal annulets; annulets 1, 3, 5, and 6 without glandubae; annulets 2 and 4 each with two glandubae on each side; first and second postspiracular lobes each with one glanduba; subspiracular lobe and surpedal lobe each with two glandubae (typical segment shown in pl. XII, 279). Ninth segment with glandubae mostly confined to surpedal area (pl. XII, 278). Tenth abdominal tergum usually with about 10 scattered glandubae and scattered hairs; suranal and subanal area with numerous setae (pl. XII, 278).

Discussion.—This species is easily separated by the prepectus, wing venation, simple tarsal claw, and coloration. The approved common name for this species is the brown-headed ash sawfly, and it may be of minor economic importance when present in large numbers. It was believed this species was introduced to the west coast; however, a record from California dated 1892 and one

from Oregon dated 1930 indicate that it has been present on the west coast for some time. The adults are not usually collected and are obtained most commonly by rearing. Sasser (1911) and Langford and McConnell (1935) discussed the habits and biology of this species.

Genus TETHIDA Ross

Tethida Ross, 1937, p. 96; Ross, 1951, p. 62.

Type: *Tenthredo cordigera* Palisot de Beauvois. Original designation.

Description.—Antenna short and stocky, second segment slightly longer than wide; third segment longer than fourth segment and subequal in length to fourth plus fifth segments (pl. III, 43). Clypeus truncate; postgenal carina absent; postorbital groove absent; malar space equal to one-half diameter of front ocellus. Prepectus present, large and triangular, not raised above level of mesepisternum and separated from it by a suture (pl. II, 29). Tarsal claw with small inner tooth (pl. II, 14); front tibial spur furcate at apex. Forewing with stub of 2A and 3A straight or curved up at apex (pl. I, 1, 6) with indication of being complete; veins *M* and *1m-cu* slightly divergent (pl. I, 9). Hindwing with crossvein *m-cu* present, enclosing cell *M*.

This genus was separated from *Tomostethus* primarily on the basis of veins *M* and *1m-cu* of the forewing being parallel (more parallel than in *Tomostethus*) and the tarsal claw having a small inner tooth. Other than these differences and several differences in coloration and sheath shape of the female, these genera are remarkably similar, even being found on the same host, *Fraxinus*. It was decided to leave *Tomostethus* and *Tethida* separate, however, since a relatively small portion of the *Tomostethini* is found in North America and a much wider study will be needed to evaluate their status.

The North American species is the only known member of this genus.

Description of *Tethida* Species

Tethida cordigera (Palisot de Beauvois)

Tenthredo cordigera Palisot de Beauvois, 1809, p. 97, ♀; Lepeletier, 1823, p. 109.

Monophadnus cordigera, Kirby, 1882, p. 174; Cameron, 1883, p. 28 (?); Dalla Torre, 1894, p. 161; Konow, 1905, p. 86.

Tethida cordigera, Ross, 1937, p. 96; Ross, 1951, p. 62.

Tenthredo barda Harris, 1835, p. 583. *Nomen nudum*.

Tenthredo bardus Say, 1836, p. 218, ♀; LeConte, 1859, p. 678; Kirby, 1882, p. 174 (*T. cordigera* Palisot de Beauvois).

Selandria bardus, Norton, 1861, p. 220; Norton, 1864, p. 9; Norton, 1867, p. 247; Provancher, 1878, p. 98; Provancher, 1883, p. 200; Osborne, 1884a, p. 148; Osborne, 1884b, p. 32; Packard, 1890, p. 544.

Monophadnus bardus, Provancher, 1880, p. 350; Dyar, 1895b, p. 308.

Tomostethus bardus, Sasser, 1911, p. 109; MacGillivray, 1916, p. 148; Yuasa, 1922, p. 93.

Selandria dubia Cresson, 1865, p. 244, ♂; Norton, 1867, p. 248; Provancher, 1878, p. 99; Kirby, 1882, p. 174 (*T. cordigera* Palisot de Beauvois); Provancher, 1883, p. 200; Cresson, 1916, p. 4.

Female.—Average length, 7.2 mm. Antenna and head black. Thorax black with tegula, pronotum, mesonotum, and upper half of mesepisternum rufous. Abdomen black. Wings darkly infusate.

Head and body smooth and shining; prepectus of same texture as mesepisternum. Sheath short, broadly rounded; scopa distinct, (pl. IV, 86, 87). Lancet with serrulae low and rounded, with distinct subbasal teeth (pl. VI, 141).

Male.—Average length, 6.8 mm. Color similar to that of female except for thorax, which usually has less rufous coloration. In structure similar to female. Penis valve long and narrow (pl. IX, 197); harpe and parapenis as in plate IX, 196.

Holotypes.—The type of *S. bardus* Say is lost. *S. dubia* Cresson (?) is type No. 191 at the Academy of Natural Sciences of Philadelphia. The type of *cordigera* has not been located.

Distribution.—Widely distributed in eastern North America from New Brunswick south to Florida and west to Saskatchewan and Texas (fig. 3, B).

North American Records.—*Connecticut*: E. Hartford, June, 1939, H. E. Evans; Storrs, May, 1936, Thompson; New Haven, May 3 and 20, 1920, B. H. Walden. *Florida*: Gulf Hammock, April 23, 1952, G. S. Walley; Torreya St. Pk., April 29, 1952, G. S. Walley. *Illinois*: St. Joseph, May 3, 10, 1914, May 4, 11, 25, 1913, June 9, 1912, salt fork; Mohamet, May 18, 1913, Sangamon R.; Urbana, April 17, 1915, May 12, 1934, T. H. Frison, May 7, 1933, H. H. Ross, June 13, 1947, on ash tree, L. J. Stannard, May 16, 1909; White Heath, May 9, 1913, April 25, 1915, June 3, 1917, May 18, 1889; Algonquin, June 1, 5, 1905, May 20, 21, 1905, W. A. Nason, June 10, 1904, May 29, 1895; Shawneetown, April 23, 1926, Frison and Anden; Muncie, May 4, 1936, Ross and Burks; Dubois, May 23, 1917; Savanna, June 11, 12, 1917; Oakwood, May 8, 1920, T. H. Frison; Rock Island, June 8, 1931, H. H. Ross; Toledo, June 23, 1935, C. O. Mohr; E. Dubois, June 1, 1933, Ross and Townsend; Herod, May 24, 1946, Ross and Mohr; Hillsdale, June 5, 1940, Mohr and Burks. *Indiana*: Turkey Run St. Pk., April 25, 1948, Sanderson and Becker. *Iowa*: Council Bluffs, June 1924, A. S. Beardsley; Lewis and Clark St. Pk., Monoma Co., June 6, 1960, J. Shaffner; Shenandoah, May 7, 1950, W. S. Craig, June 14, 1922, J. C. Browning; Ames, May 27, 1946, V. S. Hagen, June 8, 1947, July 11, 1947, J. Laffoon; loess bluff by Turin, Monoma Co., June 6, 1960; Estherville, May 17, 1949, C. N. Ainslie; Sioux City, south ravine, June 20, 1928, C. N. Ainslie; Sioux City, May 19, 1919. *Kansas*: Baldwin, May, 1897, J. C. Bridwell; Manhattan, June 1, 1950, J. B. Kring, May 1, 1949; Riley Co., April 25, Marlatt, April 29, J. B. Norton, April 21, 24, Popenoe, May; Mission, June 6, 1952, W. R. Evans; Douglas Co., May 21, 1950, N. Massey; Lawrence, April, 1930, L. W. Brown. *Louisiana*: Opelousas. *Maine*: Newport, May 28, 1925, *Fraxinus*: Augusta, June, 1939, emgd. April, 1941, ash sprouts, emgd. April 16, 1941, ash sprouts, May 31, 1946, A. E. Brower; Bar Harbor, June 4, 1936, May 16, 1937, A. E. Brower. *Manitoba*: Aweme, June 13, 1911, E. Criddle; Treesbank, June 27, 1925, R. M. White; 5 mi. S. W. Shilo, July 7, 1958, R. L. Hurley. *Maryland*: Bowie, May 20, 1944, H. K. Townes;

Glen Echo; Plummers Island, April 30, 1965, D. R. Smith; 3 mi. S. E. Beltsville, May 5, 15, 30, 1966, D. R. Smith. *Massachusetts*: Brookline, May 12, 1925, *Fraxinus*; Melrose, May 20, 21, 23, 1935, June 1, 1926, *Fraxinus*; Framingham, May 10, 1936, C. A. Frost; Nantucket Is. *Michigan*: Ingham Co., June 18, 1948, R. Fischer; Douglas Lake, July 2, 1928, C. H. Kennedy; E. Lansing, June 2, 1937, May 25, 1939, C. Sabrosky; Detroit; Ag. Coll., May 12, 1891; Port Huron, June; Saginaw, May, 1938; Gull Lake Biol. Sta., Kalamazoo Co., June 26, 1956, R. W. Hodges. *Minnesota*: Foley, June 19, 1917; St. Anthony Park, May 29, 1911; Itasca Park, June 20, 1937, H. R. Dodge, June 16, 1938, H. E. Milliron; Rice Co., June 21, 1938, D. Murray; Olmstead Co., C. N. Ainslie. *Mississippi*: Ag. Coll., April 18, 1915, C. C. Greer. *Missouri*: Kansas City, April 22, 1949, ash, McNollis. *Montana*: "Mont." *Nebraska*: Lincoln, May. *New Brunswick*: Fredericton, April 12, 1915, F. A. Urquhart. *New Hampshire*: Rummey, July 1, 1926, Darlington. *New York*: Hartsdale, June 2, 1938, G. P. Englehard; Ithaca, June 12, 1904, Ellis; Ardsley, Westchester Co., May 20, 26, 1957, June 1, 1957, E. R. Ferguson; Oswego, May 16, 1896; Ithaca, June 6, 1935, H. K. Townes. *North Carolina*: Highlands, May 12, 1957, Wilson Gap, 3100', J. R. Vockeroth. *Ontario*: Ottawa, July 16, 1954, W. R. M. Mason, June 17, 20, 1954, C. D. Miller; Selkirk, June 10, 1935, adult taken on white spruce; Bells Corners, June 24, 1935, F. A. Urquhart; Vineland, June 4, 1922, June 5, 1923, W. G. Garlick; Pelham, June 2, 1923, W. A. Ross; Beamsville, June 8, 1924, W. L. Putnam; Niagara Falls, June 8, 1962, Kelton and Thorpe. *Pennsylvania*: Rockville, May 26, 1923; Linglestown, May 11, 1912, W. S. Fisher, May 13, 1919, Champlain; Roxborough, April 30, 1901, C. T. Greene, May 13; Shiremanstown, May 28, 1914, W. S. Fisher, June 6, 1915, *Fraxinus*; Harrisburg, May 24, 1912, Champlain; Charter Oak, April 20, 1917, J. N. Knull; Conewago, May 23, 1911. *Quebec*: Cascapedia R., June 17, 1934; Aylmer, June 7, J. N. Knull, May 21, 1923, R. Ozburn; St. Damien, May 31, 1940, host *Fraxinus americana*, L. Daviault; Gracefield, June 12, 1937, F. A. Urquhart; Montreal, June 11, 1899. *Saskatchewan*: Pike Lake, May 30, 1949, J. R. Vockeroth. *South Dakota*: Brookings, June 12, 1891; Canton, June 16, 1924, H. C. Severin. *Tennessee*: Knoxville, April 23, 1919; East Ridge, May 6, 1952, G. S. Walley; Great Smoky Mt. Nat. Pk., Green Bradove, 2000', April 28, 1954, H. and A. Howden. *Texas*: College Station, April 13, 1932, H. J. Reinhard; Crosby, April 26, 1953, L. O. Beamer; Lincoln, April 23, 1953, R. H. Beamer; Dickinson, June, 1929, F. M. Hull. *Virginia*: Great Falls, May 1-17, flying, C. T. Greene; Clifton, 1933, J. C. Bridwell; Dixie Landing, May 27, C. L. Marlatt. *Wisconsin*: Dane Co., May 22, 1911, W. S. Marshall; Madison, May, 1939, April 3, 1945.

Host.—*Fraxinus americana* L. and probably other species of ash.

Larva.—Yuasa (1922) included a description of the larva of this species.

In late instar, body light, creamy colored, probably green when alive. Head shining black except for clypeus, which is lighter.

Segments of thoracic legs dark brown. Body with minute glandubae.

Clypeus with two setae on each side. Labrum with two setae on each side; narrow central emargination present; epipharynx with six or seven spines located in arcuate row on each anterolateral half (pl. XII, 272). Each mandible with one seta on outer lateral surface; left mandible with three sharp ventral teeth and two sharp and one truncate teeth (pl. XII, 271); right mandible with two large sharp ventral teeth, one sharp and one truncate lateral teeth, and two molar teeth (pl. XII, 270). Maxillary palpus four-segmented; second segment of palpus with one seta; palpifer with three setae; stipes without setae; lacinia with 10 or 11 spines (pl. XII, 273). Labial palpus three-segmented; two setae on each half of prementum.

Thorax with glandubae arranged approximately as for *Tomostethus multicinctus*. Thoracic legs with femur longer than tibia; numerous setae on inner margin of each leg.

Abdominal segments 1 through 8 each with six dorsal annulets. Annulets 1, 3, 5, and 6 without glandubae; second annulet with two glandubae on each side; fourth annulet with three glandubae on each side; first and second postspiracular lobes each with one glanduba; subspiracular lobe with one or two glandubae; surpedal lobe with one glanduba. Lower inner surface of each proleg with several setae. Ninth segment as for *multicinctus*. Tenth abdominal tergum with two or three indistinct glandubae; numerous hairs on suranal and subanal areas.

The black head and brown thoracic legs will serve to separate this larva from that of *Tomostethus multicinctus*.

Discussion.—This is a large and robust species. The rufous thorax will separate both sexes from *Tomostethus multicinctus*, and the large scopa of the female sheath is a good distinguishing character.

The report of the species from Mexico, Venezuela, and Brazil by Kirby (1882) and Cameron (1883) was undoubtedly a result of confusion with another species. I have seen nothing resembling *cordigera* from these countries and Palisot de Beauvois stated his specimen was from "États-Unis d'Amerique." The date of the description is 1809 (Griffin, 1937), not 1805 as commonly given.

This species has been given the approved common name of the black-headed ash sawfly. Biological notes on this species include those by Osborne (1884a, 1884b) and Packard (1890).

Tribe PHYMATOCERINI Rohwer

Phymatocerinae Rohwer, 1911c, p. 224.

Phymatocerini Benson, 1938, p. 367; Takeuchi, 1952, p. 42.

Rohwer (1911c) separated the Phymatocerinae by the presence of the prepectus. The prepectus has been found to be a variable character, especially in *Paracharactus*, and even within the species *P. rudis* (Norton), where it is either present or absent. Benson (1938) and Takeuchi (1952) both considered this group as a tribe.

In this bulletin some genera have been included and some excluded from their interpretation.

Characters of the larva, male genitalia, and tarsal claw are the most constant for this tribe. The ornamentation of the larva consists of inconspicuous glandulae or dark tubercles (spines such as those present in the Blennocampini are lacking), and the abdominal segments are always six-annulate. The penis valve of the male genitalia always lacks any type of lateral armature, and the tarsal claw always lacks a basal lobe. The prepectus and vein 2A and 3A of the forewing are variable. Those genera, considered as the most generalized members of this tribe, possess a prepectus and have vein 2A and 3A furcate at its apex, whereas the more specialized genera lack a prepectus and have vein 2A and 3A curved up or straight. *Paracharactus* appears to be a transitory genus in which these two characters vary.

The known hosts for members of this tribe include monocotyledonous plants, such as grasses, sedges, and members of the Liliaceae, and also dicotyledonous plants, such as *Ranunculus* and *Sambucus*.

Description.—Vein 2A and 3A of forewing furcate, curved up, or straight at apex; veins *M* and *1m-cu* parallel. Hindwing with crossvein *m-cu* present or absent, usually present. Prepectus absent or present as raised shoulder, separated from mesepisternum by furrow. Penis valve rounded, elliptical, or rectangular, without dorsal lobe or lateral spine. Larvae with abdominal segments 1 through 8 each with six dorsal annulets; body ornamentation consisting of inconspicuous glandulae or dark tubercles, lacking branched spines.

Genera Included.—*Phymatocera*, *Paracharactus*, *Rhadinoceraea*, *Lagonis*, *Monophadnus*, *Stethomostus*, and *Eutomostethus*.

Genus PHYMATOCERA Dahlbom

Tenthredo subgenus *Phymatocera* Dahlbom, 1835, p. 11; Hartig, 1837, p. 276; Norton, 1867, p. 252.

Phymatocera Dahlbom, Konow, 1886, p. 184, 213; Cresson, 1887, p. 162; Dalla Torre, 1894, p. 176; Konow, 1905, p. 82; Rohwer, 1911c, p. 224; Enslin, 1914, p. 285; Rohwer, 1916, p. 107; MacGillivray, 1916, p. 150; Ross, 1937, p. 100; Benson, 1938, p. 367; Ross, 1951, p. 64; Benson, 1952, p. 100; Takeuchi, 1952, p. 44; Lorenz and Kraus, 1957, p. 117; Burks, 1958, p. 15; Togashi, 1958, p. 161.

Type: *Tenthredo* (*Allantus*) *aterrima* Klug. Monotypic.

Pectinia Brullé, 1846, p. 664; Dalla Torre, 1894, p. 177 (= *Phymatocera* Dahlbom).

Type: *Tenthredo* (*Allantus*) *aterrima* Klug. Original designation.

Melanosclandria Ashmead, in Smith, J. B., 1900, p. 606; Ross, 1937, p. 100 (= *Phymatocera* Dahlbom). *Nomen nudum*.

Hypargyrius MacGillivray, 1908a, p. 290; MacGillivray, 1916, p. 144; Malaise, 1933, p. 59; Ross, 1937, p. 100 (= *Phymatocera* Dahlbom).

Type: *Hypargyrius* *infuscatus* MacGillivray. Original designation.

Melanosclandria MacGillivray, 1909, p. 404 (= *Hypargyrius* MacGillivray); Burks, 1958, p. 15 (= *Phymatocera* Dahlbom).

Type: *Melanosclandria* *zabriskii* MacGillivray. Monotypic.

Description.—Antenna filiform (pl. III, 45) or subserrate with segments distinctly expanded at their apices (pl. III, 46); second

segment as wide as long; third and fourth segments subequal in length or fourth segment slightly longer than third segment. Clypeus truncate; malar space slightly narrower than diameter of front ocellus; postorbital groove indistinct, or, in Palearctic species, distinct and ending in pit halfway down eye; postgenal carina absent. Prepectus present as raised shoulder, separated from mesepisternum by furrow. Tarsal claw with inner tooth long and nearly subequal to outer tooth in length and outer tooth sharply bent over at apex (pl. II, 15), or inner tooth small and outer tooth not long or sharply bent over at apex (pl. II, 16). Wings moderately to darkly infuscate. Forewing with stub of 2A and 3A furcate at apex (pl. I, 7); hindwing with crossvein *m-cu* present, enclosing cell *M*. Basal plates normal, separated medially with only small membranous area present (pl. II, 25).

This genus is very close to *Paracharactus*, especially in the West where the two genera may be confused. The western species of *Paracharactus*, *montivagus*, varies in the structure of vein 2A and 3A of the forewing, the postgenal carina, the inner tooth of the tarsal claw, and in the infuscation of the wings. This variation results in an overlapping of the generic characters; consequently, genitalic examination is necessary for generic determination in many cases. Such an intergradation of the two groups may be enough evidence to consider them as the same genus; however, in my estimation they are distinct enough to be regarded separately. The lack of intergradation in the other two species of *Paracharactus*, their characteristic genitalic structure, their host, and their different larval forms are all supporting factors for regarding these two groups as separate genera.

Within the genus *Phymatocera*, there are three groups present. These groups may be delineated as follows: (1) The Palearctic species with a deep postorbital groove ending in a pit halfway down the eye; tarsal claw with a long outer tooth, sharply bent over at its apex, and with inner tooth nearly subequal in length to the outer tooth; and, in the male, numerous, long erect hairs on the antenna. (2) The Nearctic species, all of which lack a post-orbital groove and pit; have similar tarsal claws as those in group 1; and, in the male, lack the conspicuous erect hairs on the antenna. (3) The Nearctic species similar to group 2 but having a tarsal claw with the outer tooth short, not sharply bent over, and with inner tooth small. Although these characters are fairly evident, the species included in all of them fall into one distinct group on the basis of the characters in the generic description of *Phymatocera*, the known host plants, and the larval similarity. The characters mentioned in separating these three groups serve best by helping in species determination.

There are few reliable external characters for separating the species of this genus. The species are based almost entirely on the structure of the female lancet, but no reliable genitalic characters could be found for separation of the males. The only useful external character is the relative length of the antenna and its segments, which are useful in combination with the lancet for separation of two of the species. In other species the antenna

varies, especially in the degree of serration. This variation is most evident in the transcontinental forms.

The narrow ecological zone that members of this genus occupy may help to explain the confusing assemblage of forms that are available for study. The host, false Solomons-seal (*Smilacina*), is usually found in rather isolated areas, especially in the prairie regions and in the West, the very regions where the most variation is apparent. The adults of *Phymatocera* seem to be very weak and clumsy fliers and probably do not stray far from their home grounds except by some means of passive dispersal. Combining these two factors with past geologic phenomena, there now exist numerous isolated populations that have tended to evolve in their own direction and thus lead to the many slightly different populations across the continent. In the East, where the vegetation is rather uniform, much less variation is evident in the species present.

Five Nearctic species are included in this genus, three are transcontinental and two are confined to the East. The discussions at the end of each will explain their characteristics and variability. Long series of specimens from various parts of the continent and considerably more biological information will be needed to determine the validity of the species treated here.

There is one European species, *P. aterrima* (Klug), and one Japanese species, *P. nipponica* Togashi, in this genus. Chapman (1915, 1917) discussed the biology of *aterrima*. This genus is closely related to *Phymatoceroopsis* Rohwer of Japan, but *Phymatoceroopsis* is distinguished by the basal plates, which are broadly and deeply emarginate.

Larva.—Yuasa (1922) treated two species of larvae from North America, which he called *H. fumipennis* (Norton) and *Hypargyricus*, sp. 1. These undoubtedly correspond to the two in the key to larvae (p. 45). The two forms are not associated with any adults. They are associated with the genus only by the host plant and their similarity to the description of *Phymatocera* by Lorenz and Kraus (1957). I am calling the two forms "species 1" and "species 2." Species 1 may well be *P. smilacinae*, *racemosae*, or *jumipennis* since it was taken in Rhode Island. Species 2 from Indiana may be any one of the five species. However, since its larva differs so radically from the larvae of the other species, it may be *P. racemosae*, *similata*, or *offensa*.

The following description gives characters that both species have in common. The key to the two forms follows.

In late instar, head with very few scattered hairs. Clypeus with two setae on each half. Labrum cleft for about one-third its medial length; two setae on each side of outer half; epipharynx with six to nine spines located in arcuate row on each anterolateral half (pl. XIII, 282). Each mandible with one seta on outer lateral surface; left mandible with one large and several indistinct ventral teeth and three sharp and one truncate lateral teeth (pl. XIII, 281); right mandible with two large sharp ventral teeth, three molar teeth, and one truncate lateral tooth (pl. XIII, 280). Maxillary palpus four-segmented; one seta on outer surface of second

segment; palpifer with three setae; lacinia with about 10 simple spines, which may be arranged in three groups (pl. XIII, 283). Labial palpus three-segmented; prementum with three setae on each side.

Body covered with small or large, dark, conical tubercles. Spiracles lightly winged. Thorax with tubercles arranged as in plate XIII, 286. Thoracic legs normal; femur longer than tibia (pl. XIII, 286); setae on inner surface of each coxa and trochanter.

Abdominal segments 1 through 8 with six dorsal annulets. Annulets 1, 3, 5, and 6 without tubercles; annulets 2 and 4 each with two tubercles on each side; first and second postspiracular lobes, subspiracular lobe, and surpedal lobe each with one tubercle (pl. XIII, 285). Ninth and 10th abdominal segments as in plate XIII, 284; 10th tergum usually with four tubercles; hairs numerous on suranal and subanal areas.

Keys to *Phymatocera* Species

ADULTS

- | | |
|---|------------------------------------|
| 1. Female..... | 2 |
| Male..... | 7 |
| 2. Tarsal claw with outer tooth small, not sharply bent over, and inner tooth small (pl. II, 16); usually smaller species with wings moderately infusate..... | 3 |
| Tarsal claw with outer tooth large, sharply bent over, and inner tooth long, nearly subequal in length to outer tooth (pl. II, 15); usually larger species with wings darkly infusate..... | 5 |
| 3. Lancet with serrulae low, close together, evenly rounded, and more than 20 in number; hairs of lancet long, leaving no or only short area of segments without hairs (pl. VII, 145, 146); antenna filiform with segments only slightly expanded at apices or subserrate with segments distinctly expanded at apices and laterally flattened (pl. III, 46, 47); head either entirely black, or black with clypeus, supra-clypeal area, and first two antennal segments yellowish, with all combinations..... | <i>P. racemosae</i> , n. sp. (pt.) |
| Lancet with serrulae deeper, farther apart, asymmetrical and less than 20 in number; hairs of lancet confined to narrow band separating each segment (pl. VII, 143, 144); antenna filiform and long or short and stocky with subserrate appearance (pl. III, 44, 45); head always entirely black..... | 4 |
| 4. Antenna short and stocky, its length equal to about twice width of head with segments 2 to 2½ times longer than wide and distinctly expanded at apices giving antenna subserrate appearance (pl. III, 44); lancet with segmental hairs sparse (pl. VII, 143)..... | <i>P. offensa</i> (MacGillivray) |
| Antenna longer and filiform, its length equal to more than twice width of head with segments three times or more as long as wide and only slightly or not at all expanded at apices (pl. III, 45); lancet with segmental hairs numerous (pl. VII, 144)..... | <i>P. similata</i> (MacGillivray) |
| 5. Lancet with serrulae flat and serrate (pl. VI, 142); antenna with segments only slightly expanded at apices (pl. III, 47); head always entirely black..... | <i>P. fumipennis</i> (Norton) |
| Lancet with serrulae rounded (pl. VII, 146, 147); antenna with segments slightly or distinctly expanded at apices, if distinctly so, then laterally flattened (pl. III, 46, 47); head entirely black or black with clypeus, supra-clypeal area, and first two antennal segments yellowish, with all combinations..... | 6 |

6. Lancet with serrulae low, evenly rounded, and close together (pl. VII, 145, 146); antenna with segments only slightly expanded at apices or distinctly expanded giving antenna subserrate appearance and laterally flattened (pl. III, 46, 47); head either entirely black or black with clypeus, supraclypeal area, and first two antennal segments yellowish, with all combinations.....*P. racemosae*, n. sp. (pt.)
 Lancet with serrulae deeper, farther apart, and asymmetrical (pl. VII, 147); antenna filiform, with segments only slightly expanded at apices (pl. III, 47); head always entirely black.....*P. smilacinae*, n. sp.
7. Tarsal claw with outer tooth small, not sharply bent over, and inner tooth small (pl. II, 16); usually smaller species with wings moderately infusate..... 8
 Tarsal claw with outer tooth large, sharply bent over, and inner tooth long, nearly subequal in length to outer tooth (pl. II, 15); usually larger species with wings darkly infusate..... 9
8. Clypeus partly yellowish.....*P. racemosae*, n. sp. (pt.)
 Clypeus black.....*P. racemosae*, n. sp. (pt.), *P. offensa* (MacGillivray),
P. similata (MacGillivray)
9. Clypeus partly yellowish.....*P. racemosae*, n. sp. (pt.)
 Clypeus black.....*P. racemosae*, n. sp. (pt.), *P. fumipennis* (Norton),
P. smilacinae, n. sp.

LARVAE

1. Head black with occipital area, area around antennaria, part of frons, and clypeus light; legs black; tubercles large, black; some specimens with broken lateral line on each side; on *Smilacina*, from Rhode Island.....Species 1
 Head brownish yellow; legs concolorous with body; tubercles smaller but distinct, brown; lateral dark line absent; on *Smilacina racemosa*, from Gary, Ind.....Species 2

Descriptions of *Phymatocera* Species*Phymatocera fumipennis* (Norton)

Selandria fumipennis Norton, 1861, p. 222, ♂, ♀; Norton, 1867, p. 252; Provancher, 1878, p. 99; Provancher, 1883, p. 201.
Phymatocera fumipennis, Provancher, 1888, p. 350; Dalla Torre, 1894, p. 178; Ross, 1951, p. 64.
Rhadinoceraca fumipennis, Konow, 1905, p. 81.
Hypargyricus fumipennis, Rohwer, 1915, p. 198; MacGillivray, 1916, p. 145; Yuasa, 1922, p. 95 (?).

Female.—Average length, 8.5 mm. Entirely black. Wings darkly infusate.

Antenna with segments only slightly expanded at apices, third and fourth segments subequal in length (pl. III, 47). Tarsal claw with outer tooth long and sharply bent over; inner tooth long and nearly subequal to outer tooth in length (pl. II, 15). Sheath straight above, rounded below (pl. IV, 89). Lancet with serrulae flat and serrate with about six anterior subbasal teeth and about 10 posterior subbasal teeth (pl. VI, 142).

Male.—Average length, 7.5 mm. Color as for female. Structure as for female except for antenna, which has segment 4 slightly longer than segment 3. Genitalia as in plate IX, 198, 199.

Holotype.—*S. fumipennis* Norton (♀) is type No. 14001 at the Museum of Comparative Zoology. It bears the labels "Type 14001" and "*Selandria fumipennis* N., Ct. ♀." In the original description Norton did not designate a type. He simply stated "Six speci-

mens." At the Museum of Comparative Zoology this type label had been put on one of the specimens, which Norton probably examined. This specimen fits Norton's description and fits the traditional concept of this species; therefore, the specimen bearing these labels is here designated as the lectotype.

Distribution.—Eastern North America from Wisconsin to New England south to Missouri and Alabama (fig. 4, A).

North American Records.—*Alabama*: Pyziton, Clay Co., H. H. Smith. *Connecticut*: Lyme, July 2, 1918, June 24, 1918, C. T. Greene. *Illinois*: Palos Park, June 17, 1906, W. J. Gerhard; Algonquin, June 10, 1895, June 13, 1895, July 2, 1897; Oregon, June 20, 1917; Oakwood, June 15, 29, 1930, H. H. Ross; Antioch, June 5, 1919, T. H. Frison, July 9, 1932, Frison et al. *Indiana*: Mineral Springs, June 25, 1916, S. Spooner. *Maryland*: Plummers Island, June 24, 1917, G. M. Greene, June 28, 1905, H. S. Barber, June 28, 1905, E. A. Schwarz, June 29, 1911, S. A. Rohwer, June 25, 1959, K. V. Krombein, July, 1907, W. Palmer; Takoma Park, July 6, 1941, H. K. Townes; Cabin John, June, 1917, R. M. Fouts; Glen Echo; Travilah; College Park, August 17, 1914. *Massachusetts*: Saugus, July 21, 1924, Solomons-seal. *Missouri*: "Mo.," C. V. Riley. *New Hampshire*: Mt. Washington. *New Jersey*: L. Branch, June 13; Somerville, July 18, 1921; Ramsey, June 18, 1916. *New York*: Ithaca, June 1, 193—, W. Middlekauff, July 13, 1918; Flatbush, June 5, 1897, May 27, 1896, J. L. Zabriske; Lott Wood, Flatbush, L.I., July 11, 1891, July 6, 1891; Hartsdale, May 26, 1936, on false Solomons-seal, G. P. Engelhardt; Prospect Park, L.I., June 2, 1918, G. P. Engelhardt. *North Carolina*: Valley of Black Mts., June 24–30, 1906, W. Beutenmuller; Canton, June, 1910, F. Sherman. *Ohio*: Clifton, June 23, D. J. & J. N. Knull; Delaware Co., August 1, 3, 1949, July 2, D. J. & J. N. Knull; Put-in-Bay, S. Bass 1st, July 1–10, 1924, July 11 20, C. H. Kennedy, June 22, 1927, R. C. Osburn, July 14, 1928. *Ontario*: Vineland Sta., June 29, 1928, W. Putnam; Vineland, June 16 17, 1929, W. L. Putnam; Niagara Glen, July 1, 1926, C. S. Walley; Leamington, June 11, 1929, L. J. Milne; Point Pelee, June 4 5, 1961, Kelton and Brumpton; Black Rapids, Ottawa, July 28, 1959, J. R. Vockeroth. *Pennsylvania*: Inglenook, May 30, 1912, Champlain, May 30, 1912, June 14, 1913, W. S. Fisher, July 14, 1910, P. R. Myers; Glenside, July 5, 1909; Roxborough, June 28, 1908, C. T. Greene, June 3; Mt. Holly Springs, July 28, 1918, R. M. Fouts; Charter Oak, August 4, 1946, L. Stannard; Rockville, August 14, 1910, P. R. Myers; Linglestown, June 26, 1917, W. S. Fisher; Lemont, August 1, 1946, S. W. Frost; The Rock, June 24, 1945, S. W. Frost. *Quebec*: Ste. Annes, June 12, 1954, G. A. Moore; Cap Rouge, July 8, 1953, July 7, 1953, R. Lambert; Montfort, July 10, 1916; Kingsmere, June 12, 1953, R. Lambert; Montreal, June 21, 1923, June 14, 16, 18, 29, 1924, June 21, 1925, June 7, 1930, J. W. Buckle, June 4, 1931, A. F. Wian. *Virginia*: Great Falls, June 27, 1913, S. A. Rohwer; Black Pond, Fairfax Co., August 4, 1922, R. A. Cushman; Glencarlyn, June 1, 1919, W. L. McAtee. *West Virginia*: Cowan, July, 1934. *Wisconsin*: Madison, June 26, 1929, C. L. Fluke, June 22, 1929, M. H. Doner; Dane Co., July 12, 1913, W. S.

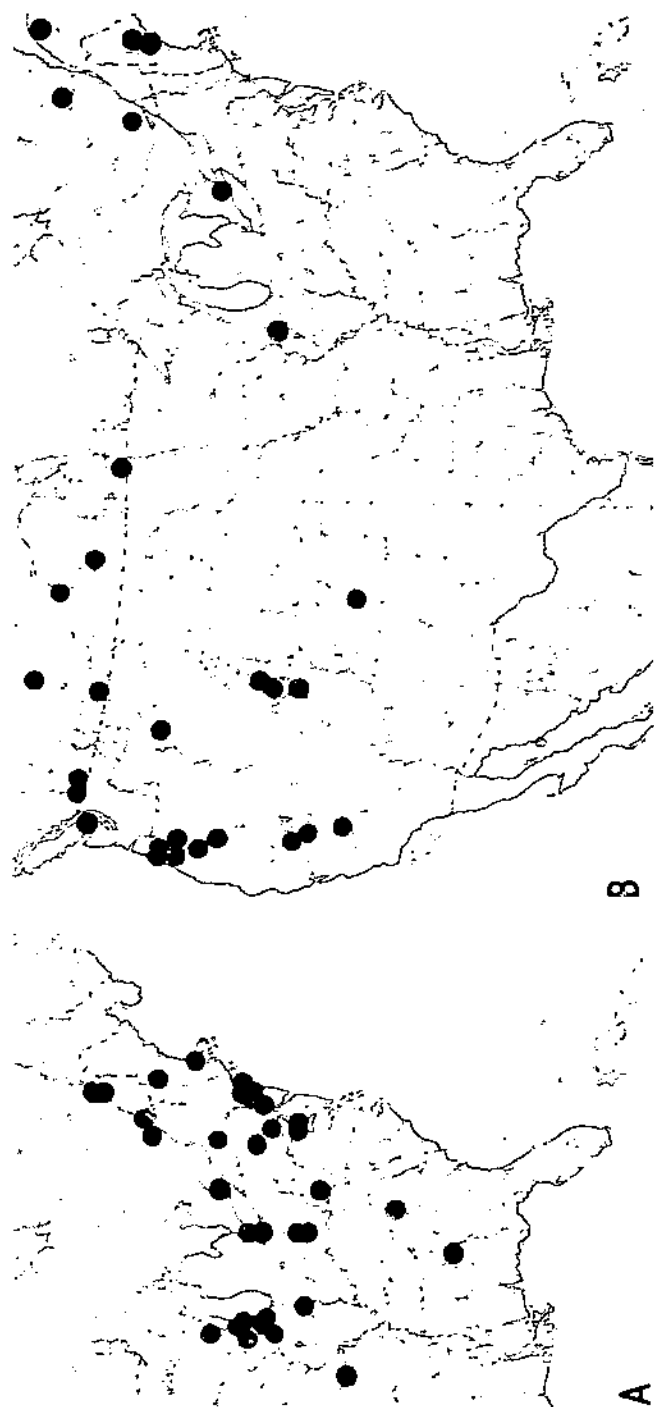


FIGURE 4.—Distribution of (A) *Phymatocera fumipennis* and (B) *offensa*.

Marshall; Milwaukee, W. H. Ashmead; Cloverleaf Lakes, Shawano Co., June 29, 1935, sweeping.

Host.—Adults have been collected from false Solomons-seal (*Smilacina*).

Larva.—The larva has not been associated by rearing, but it may be the one described as species 1.

Discussion.—This species is characterized by the large tarsal claw and the flat serrulae of the female lancet. It is most closely related to *smilacinae* and *racemosae* and is differentiated from these by the lancet. The characters of this species are relatively constant.

An interesting relationship exists between this species and *smilacinae*. All the collection records for *fumipennis* are from the last of May into August and the records for *smilacinae* are from April to the first of June. Specimens of each species have been collected at the same locality, but usually with about 3 months between the collection dates. Possibly these may be seasonal forms of the same species since they each occur at different times of the year and the lancet character is the only character that separates these forms. However, this possibility can be substantiated by rearings only, and it seems best to distinguish between these forms since there is a constant character separating them.

Phymatocera offensa (MacGillivray), new combination

Paracharactus offensus MacGillivray, 1923c, p. 28, ♀; Frison, 1927, p. 255; Ross, 1951, p. 64 (*Phymatocera ruscullus* (MacGillivray)).

Female.—Average length, 6.2 mm. Entirely black with labrum, extreme apex of forefemur, and outer surface of foretibia whitish. Wings moderately infusate.

Antenna short and stocky, length approximately equal to twice width of head; segments 3 and 4 subequal in length; segments beyond second never more than $2\frac{1}{2}$ times longer than greatest width; segments each distinctly expanded at apices, giving antenna suberrate appearance (pl. III, 44). Tarsal claw with outer tooth small, not sharply bent over, and with inner tooth small (pl. II, 16). Sheath straight above, rounded below (pl. IV, 91). Lancet with serrulae rounded, asymmetrical, less than 20 in number; segmental setae sparse (pl. VII, 143).

Male.—Average length, 5.8 mm. Color as for female. Structure as for female except antenna, which is usually much longer in relation to width of head, laterally flattened, and with fourth segment longer than third segment. Genitalia as in plate IX, 200 and 201.

Holotype.—The type (♀) is located at the Illinois Natural History Survey and bears the data "Rock Creek, Oregon, III 19."

Distribution.—British Columbia to Quebec and Maine with southern extensions into the California Sierras, Rocky Mountains of Colorado, and Illinois (fig. 4, B).

North American Records.—*Alberta*: Gull Lake, June 14, 1929, E. R. Strickland; Waterton N. P., trail to Rowe Lk., 55–6500', June 17, 1961, H. E. Milliron. *British Columbia*: E. entrance

Manning Pk., May 31, 1959, R. Madge; Saanich, April 28, 1930, W. H. Preece; Agassiz, May 8, 1927, H. H. Ross. *California*: Alta Meadows, Sequoia N. P., July 19, 1902, 9000', J. C. Bradley; Donner Pass, Nevada Co., June 18, 1940, M. Cazier and T. Aitken; Markleeville, Alpine Co., May 6, 1959, from grass, F. L. Blanc. *Colorado*: Westcliff, W. H. Ashmead; "Colorado," Cockerell. *Idaho*: Cub River, May 27, 1950, E. H. Kardos; Lolo Pass, Clearwater Co., June 14, 1963, W. F. Barr. *Illinois*: Amboy, em. April 6, 1946, ex *Smilacina racemosa*. *Maine*: Augusta, May 22, 1965, A. E. Brower; Penobscot Co., 3 mi. N. Passadumkeag, May 26, 1966, D. R. Smith. *Manitoba*: Aweme, May 27, 1925, R. D. Bird. *Ontario*: Marmora, May 20, 1952, R. Lambert. *Oregon*: Mare's Egg Spring, Klamath Co., May 30, 1962, J. Schuh; Kelsey Valley, Douglas Co., June 26, 1962, J. D. Vertrees; Big Meadows, N. Santiam Pass, June 5, 1954, V. D. Roth; McMinville, April 27, 1934-1935, McNab; Boyer, April 27, 1934. *Quebec*: Nominigue, June 4, 1941, O. Peck; Mt. Albert, 3500', June 10, 1954, June 19, 1954, W. J. Brown; Mistassini Post, June 11, 1956, June 13, 1956, J. R. Lonsway. *Saskatchewan*: Regina, May 29, 1943, P. Larkin; Pike Lake, May 14, 1939, A. R. Brooks. *Utah*: Alta, Salt Lake Co., June 24, 1958, W. J. and J. W. Gertsch; Logan, April 24, 1949, R. W. McAdams.

Host.—Adults of this species have been reared from larvae on false Solomons-seal (*Smilacina racemosa* (L.) Desf.) from Amboy, Ill.

Larva.—No larvae were kept from the above rearings. The larva may be similar to that described as species 2.

Discussion.—This species is most closely related to *similata*, but it may be separated by the shorter, stouter, subserrate antenna and the sparse segmental hairs of the lancet. Males with the shorter antenna may also belong here; however, the antennae of the males are extremely variable and cannot be relied on for determination. No constant characters could be found to separate the males of this species.

This species is transcontinental as is *similata*, but the records are most common in the more northern latitudes and higher mountain chains extending to the south. There is a slight variation in the antenna, which seems to be somewhat more slender in the western specimens and shorter and more distinctly serrate in the Midwest and East. The female lancet does not differ noticeably, but it shows slight variation in the shape of the serrulae both between and within populations.

Phymatocera racemosae, new species

Female.—Length, 8.5 mm. Antenna and head entirely black, or black with labrum, clypeus, supraclypeal area, and first two antennal segments yellowish or only clypeus yellowish. Legs black with light areas on outer surface of front tibia. Thorax and abdomen black. Wings darkly infuscate.

Antenna filiform with segments only slightly expanded at apices or subserrate with segments distinctly expanded at apices and

laterally flattened; third segment subequal in length to fourth segment (pl. III, 46, 47). Clypeus truncate; malar space narrower than diameter of front ocellus; postgenal carina absent; postorbital groove indistinct. Prepectus present as raised shoulder, separated from mesepisternum by furrow. Tarsal claw with outer tooth large and sharply bent over and with inner tooth long and nearly subequal to outer tooth in length (pl. II, 15). Forewing with stub of 2A and 3A furcate at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below (pl. IV, 89). Lancet with serrulae low, rounded, close together, symmetrical, and more than 20 in number; segmental hairs long and dense (pl. VII, 145, 146).

Male.—Length, 7.7 mm. Color similar to that of female. Structure similar to that of female except antenna, which has fourth segment slightly longer than third segment. Genitalia as in plate IX, 198 and 199.

Holotype.—Female, Rockville, Pa., July 14, 1910, P. R. Myers. Deposited in the U.S. National Museum, type No. 69152.

Allotype.—Male, same data as holotype. Deposited with the holotype.

Paratypes.—*British Columbia*: Robson, May 16, 1947, H. R. Foxlee (2 ♀♀), June 3, 1949, H. R. Foxlee (1 ♂), April 24, 1947, H. R. Foxlee (2 ♂♂), June 8 10, 1950, H. R. Foxlee (1 ♂), May 15, 1948, H. R. Foxlee (1 ♀). *Connecticut*: Lyme, June 13, 1918, flying, W. S. Fisher (1 ♀); New Haven, July 28, 1911, A. B. Champlain (1 ♀). *Illinois*: Kickapoo S. P., July 31, 1947, sawing slits in upper side of leaf, true Solomons-seal, Sanderson and Stannard (4 ♀♀). *Maryland*: Ft. Meade, July 21, 1962, R. E. Rice (1 ♂). *New Jersey*: Greenwood Lakes, August 16, 1920, J. Bequaert (1 ♀). *New York*: Huntington, L.I., July 31, 1938, Blanton and Borders (1 ♀); Farmingdale, L.I., July 30, 1938, Blanton and Borders (1 ♀); Flatbush, July 6, 1897, J. L. Zabriske (1 ♀); Niagara Falls, June 2, 1901 (1 ♀). *North Carolina*: Valley of Black Mts., July 7, 1906, W. Beutenmuller (1 ♀); "N. C." (1 ♀). *Ohio*: Sandusky, Cedar Point (3 ♀♀), June 21, 1894 (1 ♀). *Pennsylvania*: Lehigh Gap, August 2, 1902, G. M. Greene (1 ♂). *Quebec*: Montreal, June 18, 1924, J. W. Buckle (3 ♂♂), June 26, 1925, J. W. Buckle (1 ♀), June 21, 1925, J. W. Buckle (1 ♂), June 27, 1929, J. W. Buckle (2 ♀♀), June 21, 1930, J. W. Buckle (1 ♂), July 1, 1930, J. W. Buckle (1 ♀); Lakeside, June 26, 1931, J. W. Buckle (1 ♀); Levis, Rev. T. W. Fyles (1 ♀). *Virginia*: Great Falls, June 27, N. Banks (1 ♀). *Washington*: Electron, June 28, 1933, J. Wilcox (1 ♀). *Wisconsin*: Dane Co., April 8, 1947 (1 ♀).

Other Records.—*British Columbia*: Kleanza Creek, 14 mi. E. Terrace, June 29, 1960, J. G. Chillcott; Terrace, June 23, 1964, hemlock, F. I. S. *Michigan*: East Lansing, June 8, 1943, C. Sabrosky. *Ohio*: Put-in-Bay, Green Isl., June 20–30, 192–, C. H. Kennedy, July 1926. *Ontario*: Pt. Pelee, June 27, 1927, F. P. Ide, June 17, 18, 1927, F. P. Ide.

Disposition of Paratypes.—Paratypes have been deposited at the U.S. National Museum, Canadian National Collection, Illinois

Natural History Survey, University of Wisconsin, American Museum of Natural History, Ohio State University, Lyman Entomological Museum, Pennsylvania State University, Museum of Comparative Zoology, Harvard University, University of California at Davis, and Oregon State University.

Distribution.—British Columbia and Washington in the West and Wisconsin to Quebec south to North Carolina in the East (fig. 5).

Host.—Adults were captured in Illinois sawing slits in true Solomons-seal (*Polygonatum*).

Larva.—Unknown. The larva may be that described as species 1.

Discussion.—The lancet is the most constant character for this species. The antenna, tarsal claw, and coloration vary from one part of its geographical range to the other. Those specimens from the East, primarily from Wisconsin to New York and south, have distinctly subserrate antennae, large tarsal claws, and a yellow clypeus, supraclypeal area, and first two antennal segments. Many of those specimens from Quebec have the segments of the antenna less expanded at their apices, slightly smaller tarsal claws, and usually only the clypeus is yellow, though it may also be black. In those specimens from the West, the antenna is nearly filiform, the tarsal claw has the outer and inner teeth smaller, and the head is nearly always black. Since such a gradation of characters was apparent, coupled with the constant structure of the lancet, all these forms have been grouped into one species. Those specimens from the West and the northern section of the East show characters of group 3 of *Phymatocera*. Most of the specimens from the East show characters of group 2.

The name is derived from the probable host plant *Smilacina racemosa* (L.) Desf.

Phymatocera similata (MacGillivray), new combination

Rhadinoceraca similata MacGillivray, 1908a, p. 290, ♀; MacGillivray, 1916, p. 144; Frison, 1927, p. 259; Ross, 1951, p. 64 (= *fumipennis* Norton).

Hypargyriens infuscatus MacGillivray, 1908a, p. 290, ♀; MacGillivray, 1916, p. 144; Frison, 1927, p. 249; Ross, 1951, p. 64 (= *fumipennis* Norton).

New synonymy.

Rhadinoceraca lucida Rohwer, 1912, p. 229, ♀; Ross, 1951, p. 64. New synonymy.

Female.—Average length, 6.5 mm. Entirely black with extreme apex of forefemur and outer surface of foretibia whitish. Wings moderately infuscate.

Antenna filiform, slender, length equal to more than twice width of head; segments not at all or very slightly expanded at apices; third segment subequal in length to fourth segment; segments beyond second three or more times as long as greatest width (pl. III, 45). Tarsal claw with outer tooth small, not sharply bent over, and with inner tooth small (pl. II, 16). Sheath straight above, rounded below (pl. IV, 90). Lancet with serrulae rounded, asymmetrical, and less than 20 in number; segmental hairs short, numerous (pl. VII, 144).

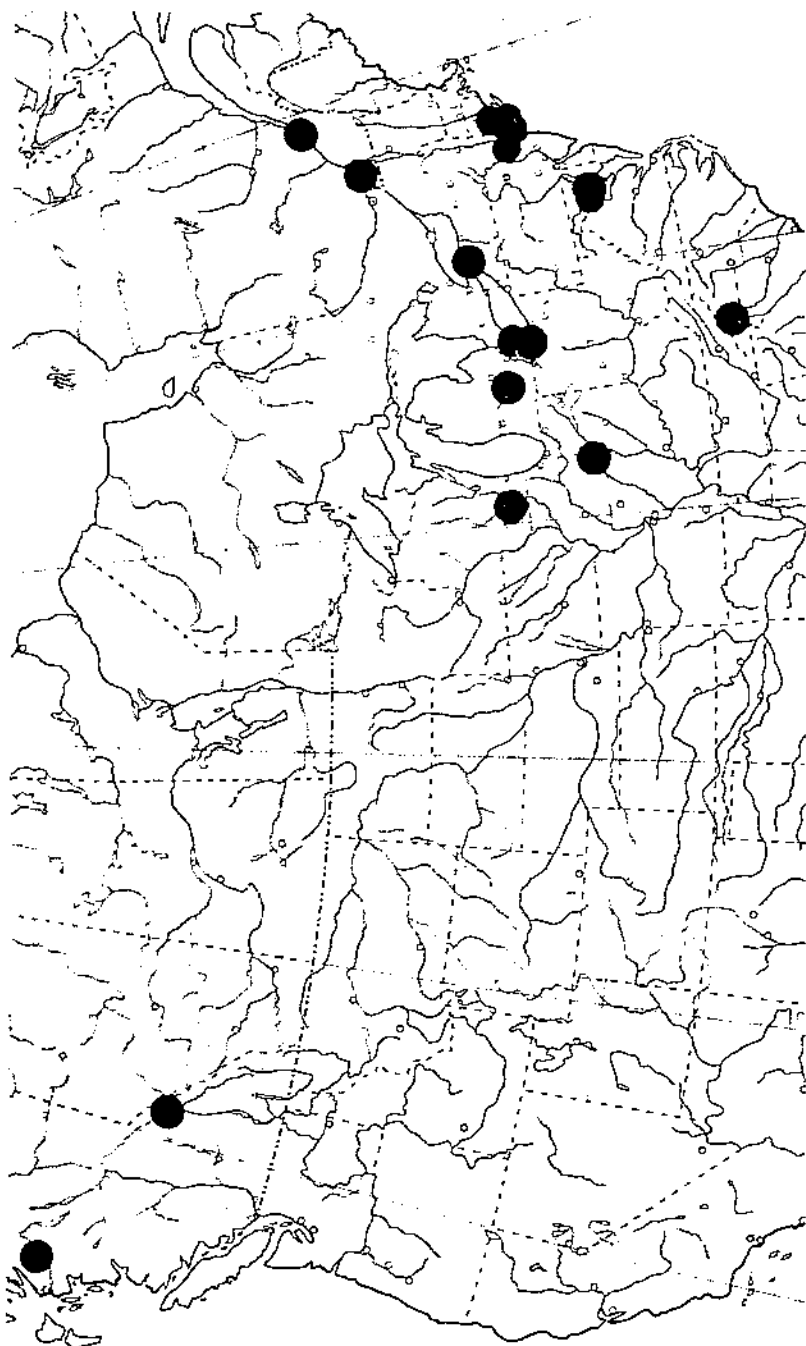


FIGURE 5.—Distribution of *Phymatocera racemosa*.

Male.—Average length, 5.9 mm. Color as for female. Structure as for female except antenna, which is usually laterally flattened and with fourth antennal segment longer than third segment. Genitalia as in plate IX, 200 and 201.

Holotypes.—Both MacGillivray types are at the Illinois Natural History Survey. *R. similata* (♀) bears the data "Ag. Coll. Mich., 6-3-96," and *H. infuscatus* (♀) bears the data "Ithaca, N.Y." *R. fucida* Rohwer (♀) is type No. 14756 at the U.S. National Museum and bears the data "Dane Co., Wisc., V-20-1909, Wm. S. Marshall."

Distribution.—British Columbia to Quebec extending south into northern California, Colorado, Illinois, and New York (fig. 6, A).

North American Records.—*Alberta*: Gull Lake, June 24, 1929, E. H. Strickland. *British Columbia*: White Lake, Oliver, May 18, 1959, E. E. MacDougall. *California*: Oakland, April 8, 1937, E. S. Ross; Berkeley, April 2, 1915, E. P. VanDuzee; Alameda, April; 4.8 mi. S. E. Sierraville, Sierra Co., June 14, 1959, Byers and party; Weott, Humboldt Co., June 4, 1936, E. C. VanDyke; Ft. Bragg, Mendocino Co., May 30, 1937, R. L. Usinger; Echo Lk., Eldorado Co., July 13, 1961, 7500', B. H. Poole. *Colorado*: Eckert, June 28, 1938, U. Lanham; Westcliff, W. H. Ashmead; Estes Park, 7500', June 14, 1961, C. H. Mann. *Idaho*: Moscow Mt., Latah Co., July 1, 1959, G. W. Byers; Rock Cr., Canyon Co., 13 mi. S. Rock Creek, June 30, 1953, W. F. Barr. *Illinois*: Urbana, May 1, 1957, on *Smilacina racemosa*, H. H. and J. A. Ross, August 3, 1885. *Iowa*: Ames, May 9, 1927. *Manitoba*: Int. Peace Gardens, Turtle Mtn. For. Res., July 17, 1958, J. G. Chillcott; Riding Mtn. N. P., June 15, 1938, W. J. Brown. *Michigan*: Ag. Coll., May 23, 1890; East Lansing, April 30, 1942, C. Sabrosky, May 22, 1937. *Montana*: Toston, July 9, 1949, B. A. Haws. *Nebraska*: Sioux Co., May; Lincoln. *Ontario*: Turkey Pt., 42°39', 80°21', May 25, 1956, J. R. Vockeroth; Coldstream, May 31, 1922, A. A. Wood; Pt. Pelee, May 25, 1937, G. S. Walley; Ottawa, W. H. Harrington. *Oregon*: Upper Klamath Lake, Geary Canal, May 25, 1958, J. Schuh; Benton Co., Mary's Peak, June 12, 1962, D. R. Smith; Crescent Cr., Hy. 58, Klamath Co., June 27, 1962, K. Goeden; S. E. edge Crater Lake N. P., June 23, 1959, G. W. Byers; Little Squaw Lk., Jackson Co., 7 mi. E. Copper, 3200', R3W, T41S, Sec. 2, May 22, 1964, D. R. Smith. *Utah*: Logan Canyon, May 10, 1951, G. E. Bohart, June 18, 1945, G. F. K. and S. L. W.

Host.—This species has been taken from *Smilacina racemosa* (L.) Desf. at Urbana, Ill. K. Goeden and I have also swept it from the same host in Oregon.

Larva.—Unknown. The larva may be similar to that described as species 2.

Discussion.—The slender antenna and lancet characters will separate this species from *offensa*, the species with which it is most likely to be confused. The small tarsal claw will separate it from other members of the genus.

This species, like *offensa*, is transcontinental. The available records indicate that it is slightly more southern in distribution and occurs at lower elevations in the West. The specimens from

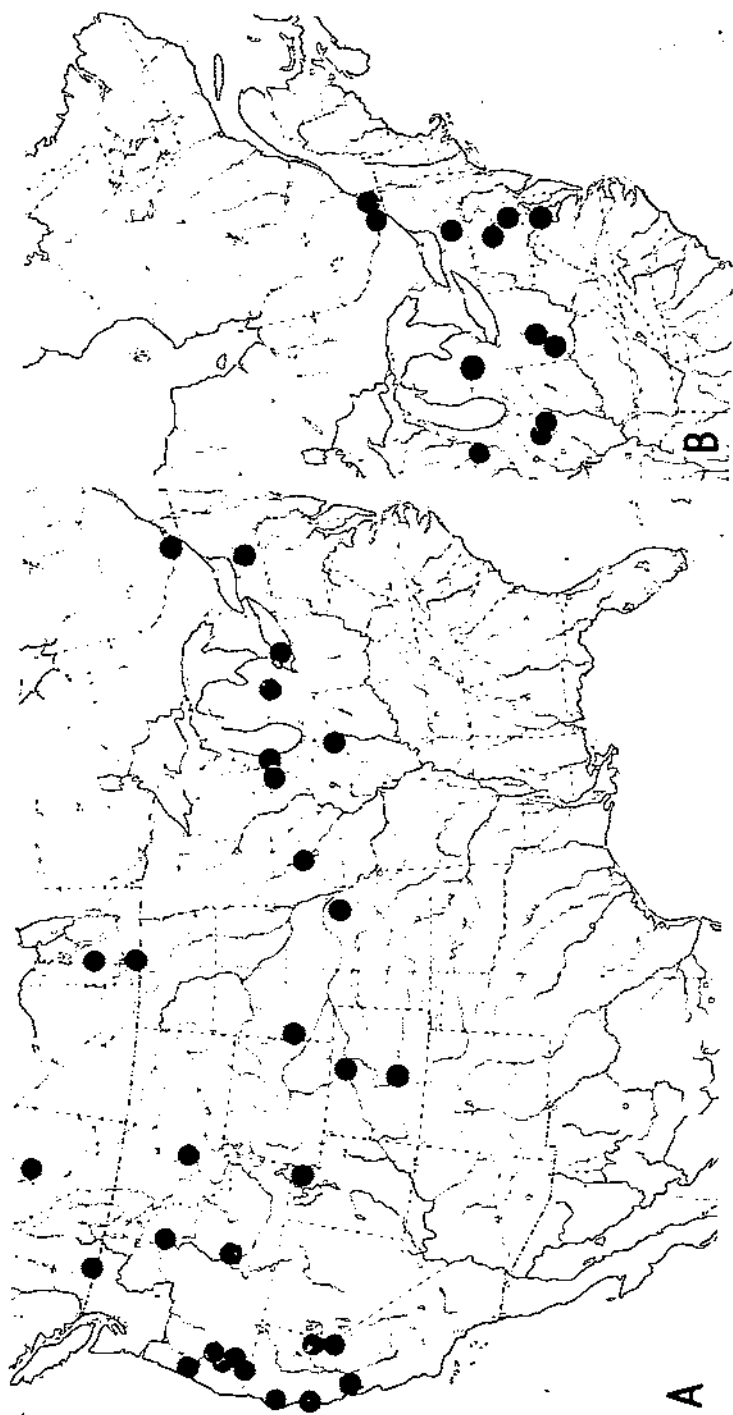


FIGURE 6.—Distribution of (A) *Phymatocera similata* and (B) *smilacinae*.

the East, Midwest, and West vary slightly in the structure of the lancet, but this character did not seem to be constant within these geographical areas. The males are indistinguishable from *offensa*, and their antennae vary considerably in relative length.

Phymatocera smilacinae, new species

Female.—Length, 8.5 mm. Entirely black. Wings darkly infuscate.

Antenna filiform; segments only slightly expanded at apices; third segment subequal to fourth segment in length (pl. III, 47). Clypeus truncate; malar space narrower than diameter of front ocellus; postgenal carina absent; postorbital groove indistinct. Prepectus present as raised shoulder, separated from mesepisternum by furrow. Tarsal claw with outer tooth large, sharply bent over, and with inner tooth long, nearly subequal to outer tooth in length (pl. II, 15). Forewing with stub of 2A and 3A furcate at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below (pl. IV, 89). Lancet with serrulae rounded, asymmetrical, and far apart; segmental hairs long and numerous (pl. VII, 147).

Male.—Length, 7.8 mm. Color as for female. Structure as for female except antenna, which has fourth segment slightly longer than third segment. Genitalia as in plate IX, 198 and 199.

Holotype.—Female, Plummers Is., Maryland, June 18, 1913, P. R. Myers. Deposited in the U.S. National Museum, type No. 69153.

Allotype.—Male, same data as for holotype. Deposited with the holotype.

Paratypes.—*Illinois*: Urbana, Champaign Co., April 26, 1960, J. K. Bouseman (1 ♂, 1 ♀). *Maryland*: Great Falls, April 27, N. Banks (1 ♀); Cabin John, April 24, 1914, R. M. Fouts, (2 ♂ ♀); Plummers Island, April 17, 1913, H. S. Barber (4 ♂ ♀), June 28, 1912, H. S. Barber (1 ♀), April 28, 1915, W. L. McAtee (1 ♀), April 23, 1920, W. L. McAtee (1 ♀), May 10, 1916, on *Smilacina*, W. L. McAtee (1 ♀), May 1, 1914, J. D. Hood (1 ♀), April 22, 1915, J. C. Crawford (2 ♂ ♀), May 1, 1914, on *Polygonatum biflorum*, E. A. Schwarz (1 ♀), April 23, 1914, R. C. Shannon (1 ♀), April 25, 1915, R. C. Shannon (1 ♀), Hopk. U.S. 10704a, false Solomons-seal, P. R. Myers (1 ♀), April 18, 1913, P. R. Myers (6 ♂ ♀), June 20, 1911, S. A. Rohwer (1 ♀). *Michigan*: "Mich." (1 ♀). *New York*: Ithaca, Van Natta's Dam, May 6, 1936, Babig (1 ♂), May 8, 1936, Babig (1 ♀); Ithaca, May 9, 1936, W. Middlekauff (3 ♂ ♀), May 6, 1936, W. Middlekauff (1 ♂, 1 ♀); Ithaca, N. Banks (1 ♀); Ithaca (1 ♀). *Ohio*: Greene Co., May 12, D. J. and J. N. Knull (2 ♂ ♀), May 8, 1958, D. J. and J. N. Knull (1 ♀); Delaware Co., May 14, 1950, D. J. and J. N. Knull (2 ♂, 2 ♀), May 2, D. J. and J. N. Knull (2 ♂ ♀), May 15, 1950, D. J. and J. N. Knull (1 ♀), May 21, D. J. and J. N. Knull (1 ♀). *Pennsylvania*: State Co., May 16, 1921 (1 ♀); Stoverdale, May 10, 1916, flying, W. S. Fisher (4 ♂ ♀); Linglestown, May 13, 1919, Champlain (1 ♀), May 18,

1912, W. S. Fisher (1 ♂). *Quebec*: Montreal, May 22, Cornell U., Lot 917, Sub. 53 (1 ♂). *Virginia*: Rosslyn (1 ♀); Bluemont, May 6, 1913, C. T. Greene (2 ♀). *Wisconsin*: U. W. Campus, May 29, 1926, C. L. Fluke (1 ♀); Madison, May 28, 1926, C. L. Fluke (1 ♀), May 30, 1924, C. L. Fluke (1 ♀), May, 1954 (1 ♀).

Other Records.—*Illinois*: Oakwood, May 8, 1920; Normal.

Disposition of Paratypes.—Paratypes have been deposited at the U.S. National Museum, Canadian National Collection, Museum of Comparative Zoology, Harvard University, University of California at Berkeley, Ohio State University, Illinois Natural History Survey, University of Wisconsin, Cornell University, and Pennsylvania State University.

Distribution.—Wisconsin to Quebec south to Illinois and Virginia (fig. 6, B).

Host.—Adults of this species have been taken on false Solomons-seal (*Smilacina*) and true Solomons-seal (*Polygonatum*).

Larva.—Unknown. The larva may be the one described as species 1.

Discussion.—This species is most closely allied to *fumipennis*, but it may be separated from it by lancet characters. Its seasonal occurrence in relation to *fumipennis* is discussed under the latter species.

The name is derived from the probable host plant, *Smilacina racemosa*.

Unplaced Names of *Phymatocera*

Phymatocera rusculla (MacGillivray)

Monophadnus ruscullus MacGillivray, 1923a, p. 80, : ; Frison, 1927, p. 253.
Phymatocera ruscullus, Ross, 1951, p. 64.

The type of this species is a male and has the outer tooth of the tarsal claw small, not bent over, and the inner tooth small. It is probably conspecific with either *P. similata* or *P. offensa*, but since the males of these two species could not be separated and since both species have been collected near the type locality of *rusculla*, it is impossible to place this species at present.

The type is at the Illinois Natural History Survey and bears the data "Mary's Peak, Middlekauff."

Phymatocera zabriskiei (MacGillivray), new combination

Melanostandria zabriskiei Ashmead, in Smith, J. B., 1900, p. 606; Ross, 1937, p. 100. *Nomen nudum*.
Melanostandria zabriskiei MacGillivray, 1909, p. 404 (= *fumipennis* Norton); Burks, 1958, p. 15.

MacGillivray, who inadvertently received credit for this species, based its identity on one specimen bearing Ashmead's label and considered it as being the same as *fumipennis* (Norton). This specimen, which was supposedly in the U.S. National Museum collection, was not found, and it is impossible to determine which species it may belong to because of the similarity of the species

of *Phymatocera* and the use of different specific characters than those used by the early sawfly workers.

Genus PARACHARACTUS MacGillivray

Paracharactus MacGillivray, 1908a, p. 292; MacGillivray, 1916, p. 150; Malaise, 1933, p. 59; Ross, 1937, p. 97; Ross, 1951, p. 63; Takeuchi, 1952, p. 46; Benson, 1954, p. 282.

Type: *Paracharactus obscuratus* MacGillivray. Original designation.

Dicrostema Benson, 1952, p. 101. New synonymy.

Type: *Selandria gracilicornis* Zaddach. Original designation.

Description.—Antenna filiform, slender, with segments not expanded at apices and segments 3 and 4 subequal in length, or fourth segment slightly longer than third segment (pl. III, 48, 49). Clypeus truncate; malar space as wide as diameter of front ocellus or less than one-half diameter of front ocellus; postorbital groove indistinct; postgenal carina usually faintly developed below eye or, at times, extending for about one-half length of eye. Prepectus indistinct or present as raised shoulder, separated from mesepisternum by furrow. Tarsal claw simple or with small inner tooth. Wings hyaline to moderately infusate. Forewing with stub of 2A and 3A straight or furcate at apex (pl. I, 1, 7). Hindwing with crossvein *m-cu* present, enclosing cell *M*.

The discussion concerning the relationship of this genus to *Phymatocera* has been explained under the latter.

There are three Nearctic species and three or four Palaearctic species. The Palaearctic species belonging here include *P. longicornis* (Hartig), *P. hyalinus* (Hartig), and *P. gracilicornis* (Zaddach). Benson (1952) erected the genus *Dicrostema* for *gracilicornis* and stated that it was distinguished from *Paracharactus* by the curved-up stub of 2A and 3A of the forewing. This character is rather variable in the Nearctic species. The other characters presented by Benson for *Dicrostema* are similar to those for *Paracharactus* except for the malar space being as wide as the diameter of the front ocellus. Consequently, I see no basis on which to keep *Dicrostema* separate.

The European *gracilicornis* feeds on *Adoxa*. The hosts of the North American species are not certain, but they may feed on grasses and sedges.

Larva.—The larva of what may be *P. niger* was taken from *Carex* at Seymour, Ill. It bears a striking resemblance to *Eutomostethus* species in that there is a distinct protuberance above each forecoxa. The larva, however, does not fit the description of either *Eutomostethus* species known to occur in North America as described by Lorenz and Kraus (1957); also, *Eutomostethus* has not been recorded from Illinois. This larva is described under *niger*.

Key to *Paracharactus* Species

- | | |
|----------------|---|
| 1. Female..... | 2 |
| Male..... | 4 |

2. Upper posterior margin of mesepisternum with elevated ridge; prepectus distinct; thorax black with tegula white; eastern
P. niger (Harrington)
 Upper posterior margin of mesepisternum rounded, without ridge; prepectus present or absent; thorax usually with considerable rufous markings, if black then tegulae are black and it is from the west----- 3
3. Thorax always partly rufous; eastern----- *P. rudis* (Norton)
 Thorax partly rufous or entirely black; western----- *P. montivagus* (Cresson)
4. Thorax with some rufous markings; genitalia with inner extension of harpe rounded and bulbous (pl. IX, 204); eastern----- *P. rudis* (Norton)
 Thorax always entirely black; genitalia with inner extension of harpe narrow (pl. IX, 202); western----- *P. montivagus* (Cresson)

Descriptions of *Paracharactus* Species

Paracharactus montivagus (Cresson), new combination

- Selundria montivaga* Cresson, 1880a, p. 13, ♀; Provancher, 1886, p. 26; Cresson, 1916, p. 6; Ross, 1951, p. 63 (*P. rudis* Norton).
Phymatocera montivaga, Kirby, 1882, p. 165; Dalla Torre, 1894, p. 178.
Rhadinoceraca montivaga, Konow, 1905, p. 81.
Selundria scelestus Cresson, 1880a, p. 14, ♂; Dalla Torre, 1894, p. 165; Konow, 1905, p. 87; Cresson, 1916, p. 8. New synonymy.
Rhadinoceraca scelestus, Ross, 1951, p. 64.

Female.—Average length, 6.8 mm. Head and antenna black with labrum white and clypeus sometimes rufous. Thorax entirely black or rufous with upper angles of pronotum and tegula white and scutellum, posttergite, pectus, and metathorax black. Legs black with outer surface of each tibia white. Abdomen black. Wings lightly to moderately infuscate.

Postgenal carina indistinct or distinct and extending halfway up outer margin of eye; malar space less than one-half diameter of front ocellus. Prepectus present as raised shoulder, separated from mesepisternum by furrow, sometimes indistinct; upper posterior margin of mesepisternum rounded. Tarsal claw with minute inner tooth. Forewing with stub of 2A and 3A straight or furcate at apex. Sheath straight above, rounded below (pl. IV, 92). Lancet with serrulae flat and serrate (pl. VII, 148, 149).

Male.—Average length, 6.3 mm. Entirely black; each tibia with light areas on outer surface. Structure as for female except antenna, which is longer in relation to body, laterally flattened, and has fourth segment longer than third segment. Genitalia with penis valve rectangular (pl. IX, 203); inner extension of harpe narrow and parallel sided (pl. IX, 202).

Holotypes.—Both *montivaga* Cresson (type No. 197 ♀) and *scelestus* Cresson (type No. 360 ♂) are at the Academy of Natural Sciences of Philadelphia. They both bear a label reading "Nev."

Distribution.—Western North America, west of the Rocky Mountains (fig. 7, A).

North American Records.—*California*: Forestville, May 20, 1936, A. T. McClay; San Diego, April 23, 1879; San Bernardino, 985', April 17, 1879; Portola St. Pk., San Mateo Co., May 7, 1950; Colfax, May 20, 1953, R. M. Bohart; Olema, Marin Co., March 18, 1960, L. A. Stange; Applegate, April 11, 1951, E. I. Schlinger; Elk Grove, Sacramento Co., April 18, 1952, May 2, 1952, May 18,

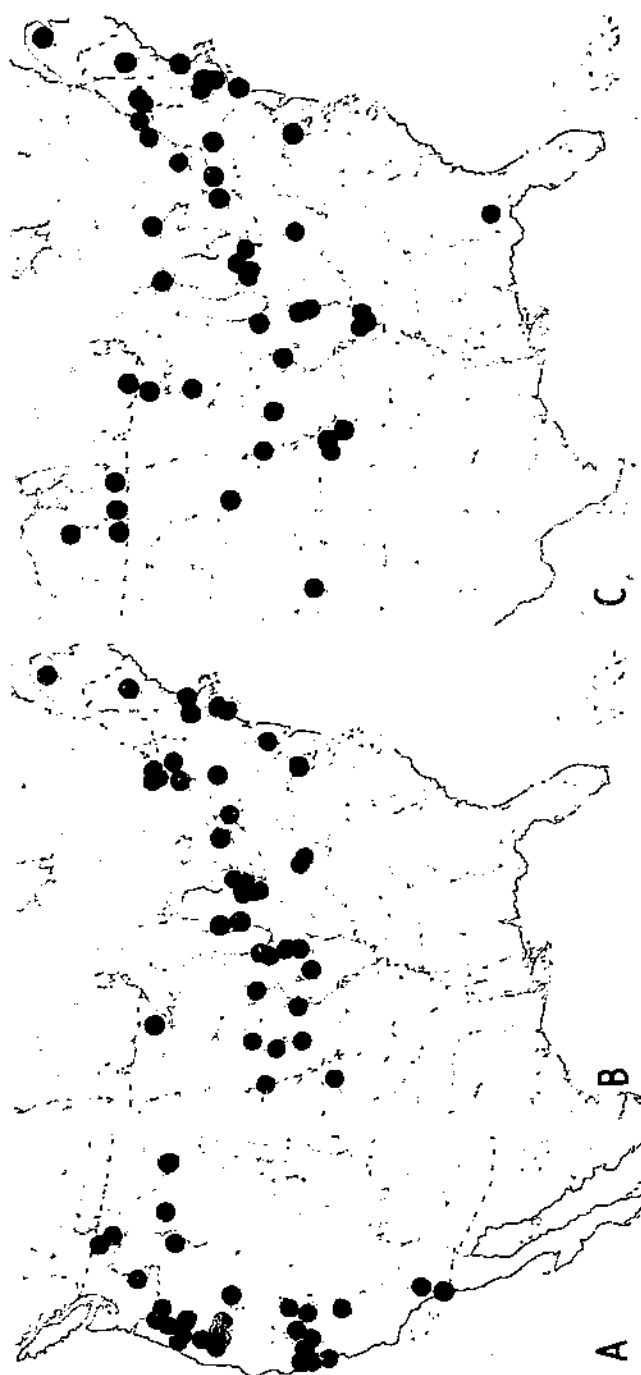


FIGURE 7.—Distribution of (A) *Parachanachus montivagus*, (B) *niger*, and (C) *rudis*.

1952, E. C. Carlson; Woodfords, May 7, 1959, May 5, 1959, collected from grass, July 29, 1959, R. P. Allen; Yosemite Park, Mariposa Co., May 12, 1959, R. P. Allen; Oakville, Napa Co., April 11, 1957, *Alnus* sp., R. P. Allen; Riverton, April 28, 1961, M. E. Irwin; Markleeville, Alpine Co., May 6, 1959, ex mixed grasses, R. P. Allen, May 30, 1957, ex grasses, R. P. Allen. *Idaho*: Lochsa River, 8 mi. N. E. Lowell, Clearwater Co., April 25, 1963, A. R. Gittins and W. F. Barr. *Montana*: "Montana." *Nevada*: "Nev."; 3 mi. N. Crystal Bay, Washoe Co., June 14, 1964, D. R. Smith and C. W. Baker. *Oregon*: Benton Co., Mary's Peak, meadow, sweeping, June 12, 1962, June 26, 1962, D. R. Smith, meadow, July 6, 1963, June 24, 1962, D. & L. Mays, 4000', May 23, 1954, F. F. Hasbrouck, 4000', July 25, 1962, G. C. Eickwort, 4000', June 27, 1962, R. L. Fischer, 3500', June 1, 1946, H. A. Scullen, June 21, 1942, G. R. Ferguson, 3900', June 9, 1957, B. Malkin, 3800', May 25, 1952, B. Malkin and V. E. Thatcher, June 18, 1963, sweeping, C. W. Baker, May 18, 1963, 10:00, rotary trap, May 29, 1938; Corvallis, April 1, 1959, P. F. Torchio, April 10, 1936, G. R. Ferguson, June 27, 1962, R. W. Matthews; Buckhorn Mineral Springs, 11 mi. E. S. E. Ashland, Jackson Co., 2800', May 19, 1960, D. R. Smith; Tombstone Prairie, Linn Co., July 1, 1962, D. & L. Mays; 4 mi. W. Selma, Josephine Co., May 18, 1962, D. R. Smith; Weeme, Clackamas Co., May 30, 1957, E. I. Schlinger; 12 mi. W. Adel, Lake Co., May 17, 1957, F. F. Hasbrouck; Salem, April 21, 1949, J. E. Davis; Sun Cr., Klamath Co., June 14, 1962, J. D. Vertrees; Lake Wallowa, June 15, 1938, E. C. VanDyke; Oswego, May 7, 1959, weeds, H. Porter; Sulphur Springs, 7 mi. N. Corvallis, April 23, 1963, D. R. Smith; 5 mi. E. N. E. Copper, French Gulch Road, Jackson Co., 2550', May 22, 1964, D. R. Smith; 4 mi. S. Canyonville, rest area, Douglas Co., May 21, 1964, D. R. Smith. *Washington*: Yakima, June 1, 1931, A. R. Rolfe; Lost Lake, Stevens Co., 3600', June 18, 1954, B. Malkin and D. Boddy; Bonaparte Lake, Okanagon Co., 3600', June 18, 1954, B. Malkin and D. Boddy.

Host.—Unknown. The adults are most commonly collected by sweeping grasses in fields and meadows.

Larva.—Unknown.

Discussion.—There is considerable color and structural variation within this species. All the males that were examined were entirely black, whereas the females ranged from entirely black (usually in the north and at higher elevations) to black with the thorax largely rufous (usually in the south and at lower elevations). The wings varied from being moderately infusate to nearly hyaline in both sexes. The structural variation is evident by the postgenal carina, which is scarcely developed or very distinct; the stub of 2A and 3A of the forewing, which is either straight or furcate; the prepectus, which is either distinct or scarcely developed; and the tarsal claw, which has a distinct or indistinct inner tooth.

Many specimens may be confused with the western *Phymato-cera*, but they may be separated by the rectangular penis valve and

long inner extension of the harpe of the male and by the flat, serrate serrulae of the lancet of the female.

This species is close to *rudis*; the main differentiating character is the more slender inner extension of the harpe of the male, but color may be used in many cases. No structural character could be found to separate the females of *montivagus* from those of *rudis*.

Paracharactus niger (Harrington)

Phymatocera nigra Harrington, 1889, p. 96, ♀; Dalla Torre, 1894, p. 178.

Rhadinocera nigra, Konow, 1905, p. 81.

Neoparcophora nigra, MacGillivray, 1916, p. 144.

Paracharactus niger, Ross, 1951, p. 63.

Monophadnus distinctus MacGillivray, 1908a, p. 291, ♀; MacGillivray, 1916, p. 150; Frison, 1927, p. 253; Ross, 1951, p. 63 (= *niger* Harrington).

Tomostethus nortonii MacGillivray, 1908a, p. 291, ♀; MacGillivray, 1916, p. 148; Frison, 1927, p. 267; Ross, 1951, p. 63 (= *niger* Harrington).

Female.—Average length, 6.8 mm. Entirely black with labrum, lateral portions of clypeus, tegula, extreme apex of each femur, and each tibia white. Wings hyaline.

Postgenal carina present, extending halfway up outer margin of eye; malar space equal to about one-half diameter of front ocellus. Prepectus present as raised shoulder, separated from mesepisternum by furrow; upper posterior margin of mesepisternum with carina or ridge. Tarsal claw simple. Forewing with stub of 2A and 3A straight at apex. Sheath straight above, rounded below (pl. IV, 92). Lancet with serrulae slightly rounded, with distinct subbasal teeth (pl. VII, 150).

Male.—Unknown.

Holotypes.—*P. nigra* Harrington is in the Canadian National Collection and bears the labels "♀" and "No. 179." Two paratypes are associated with this species, one of which is the same species, the other a new species of *Monophadnoides*. Both MacGillivray types are at the Illinois Natural History Survey. *M. distinctus* (♀) has the data "Lake Forest, Ill., J. G. Needham," and *T. nortonii* (♀) has the data "Ames, Ia., 424."

Distribution.—Eastern North America (fig. 7, B).

North American Records.—*Connecticut*: Branford, April 29, 1951, May 7, 1951, J. B. Kring, May 1, 1951; Storrs, May 4, 1958, H. W. Smith. *Illinois*: Seymour, April 25, 1930, May 1, 1929, H. H. Ross; Sherman, April 20, 1930, H. H. Ross; Chebanse, April 24, 1929, Frison and Ross; Rantoul, April 24, 1929, Frison and Ross; Ogden, April 16, 1929, Frison and Ross; Elgin, bot. gardens, April 25, 1941, Ross and Burks; Antioch, May 21, 1941, Sta. 75; Zion, May 16, 1936, Ross and Mohr. *Iowa*: Thompson, May 18, 1928, C. S. Walley; Ames, May 10, 1947, A. R. Brooks, May 7, 1951, W. Claycomb, May 11, 1953, H. C. Cox, May 3, 1952, May 6, 1952, W. Kwolek, May 7, 1956, E. E. Glass, May 11, 1950, April 20, 1942, W. L. Downes; Mt. Pleasant, May 1, 1933, Simman; Leon, April 27, 1952; Sioux City, Stone St. Pk., May 12, 1956, J. L. Laffoon; Ledges St. Pk., May 7, 1948, May 16, 1947,

May 1, 1957, May 7, 1956, May 11, 1950, May 6, 1958, J. L. Laffoon, May 6, 1958, J. Sinning, May 14, 1949, Hendrickson. *Kansas*: Riley Co., from vegetation along streambank, April 25, 1952, L. O. Warren, April 24, 1952, J. H. Schesser. *Maine*: Penobscot Co., 3 mi. N. Passadumkeag, May 26, 1966, D. R. Smith; Piscataquis Co., Brownville Junction, May 27, 1966, D. R. Smith. *Maryland*: Glen Echo, R. M. Fouts. *Massachusetts*: Riverside, April. *Michigan*: Jackson, Jackson Co., May 17, 1959, H. D. N.; East Lansing, May 4, 1938; 13 mi. N. Lapeer, May 30, 1938, C. Sabrosky; Ann Arbor, Washtenaw Co., May 18, 1918, T. H. Hubbell; Cavanaugh Lake, Washtenaw Co., May 24, 1919, T. H. Hubbell; Little Manistee River nr. Peacock, May 10, 1940, Ross and Frison; Bailey, May 9, 1940, Frison and Burks; Pittsford, Hillsdale Co., May 16, 1959, H. D. N. *Minnesota*: Eaglesnest, June 1, 1959, W. V. Baldauf. *New Hampshire*: Alstead, August 5, 1904; Hampton, May 7, 8, 11, 1936, May 19, 1918, S. A. Shaw. *New York*: Ithaca, Fall Creek, April 30, 1949, J. C. Martin; Canton, May 17, 1929, J. Buys; Hamburg, June 12, 1909, M. C. VanDuzee. *Ohio*: Columbus, April 27, 1920, A. E. Miller, April 28, 1902, Bridwell; Sciota River, April 25, 1941, G. R. Ferguson; Hocking Co., May 192-, C. H. Kennedy. *Ontario*: Ottawa, May 16, 1914, O. Peck; Merivale, May 16, 1941, O. Peck; Constance Bay, April 29, 1941, O. Peck; Almonte, May 18, 1951, E. H. N. Smith; Chatterton, May 29, 1956, J. C. Martin; Rockport, May 12, 1959, J. R. Vockeroth; Marmora, May 23, 1952, May 26, 1952, J. R. McGillis, May 23, 1952, R. Lambert, May 23, 25, 1952, J. C. Mitchell. *Pennsylvania*: Roxboro, April 28; Phila.; Germantown, April 22, 1908. *Quebec*: Hull, May 17, 1903; Thunder River, April 17, 1930, W. J. Brown; Cascapedia, April 10, 1933, W. J. Brown; Burbridge, May 29, 1937, O. Peck. *Wisconsin*: Grant Co., June 7, 1951.

Host.—This species probably feeds on sedges. The larva described was feeding on *Carex*.

Larva.—The larva described here was taken from *Carex* at Seymour, Ill. Adults of *niger* were collected in the same locality during the same year the larvae were collected and during the year after. They were not associated by rearing.

In late instar, body whitish; head capsule brown; ocularium and apical one-third of mandible black.

Head with scattered hairs. Clypeus with two setae on each side. Labrum cleft for one-third its medial length; three setae on each side of outer surface; epipharynx with about 10 spines located in arcuate row on each anterior half (pl. XV, 297). Mandibles each with one seta on outer lateral margin; left mandible with two ventral teeth and four lateral teeth (pl. XV, 300); right mandible with two ventral teeth and four lateral teeth (pl. XV, 299). Maxillary palpus four-segmented; second segment with one seta on outer surface; palpifer with four setae; lacinia with nine to 11 short spines (pl. XV, 298). Labial palpus three-segmented; prementum with three setae on each side; second segment of labial palpus with three or four setae.

Thorax with minute glandulae on prothorax and annulets of mesothorax and metathorax; distinct protuberant lobe above each

forecoxa (pl. XV, 301). Thoracic legs normal; femur longer than tibia; setae on inner margin of segments of each leg; three or four larger spines on inner margin of each coxa. Sterna of each thoracic segment with pair of setiferous tubercles.

Abdominal segments 1 through 8 each with six dorsal annulets. Annulets 2 and 4 with minute glandulae of same color as rest of body; annulets 1, 3, 5, and 6 without glandulae. Ninth segment with several glandulae on fourth annulet. Tenth segment with minute glandulae on posterior edge of tergum; suranal and subanal areas with numerous setae.

Discussion.—This species may be separated from both other species of *Paracharactus* by the presence of the ridge on the upper posterior margin of the mesepisternum and the entirely black coloration with white tegulae. This is probably a parthenogenetic species since no males were found among the large series examined.

Paracharactus rudis (Norton)

Selandria rudis Norton, 1861, p. 221, ♀; Norton, 1867, p. 251.

Phymatocera rudis, Dalla Torre, 1894, p. 178.

Rhadinnocera rudis, Konow, 1905, p. 81.

Paracharactus rudis, MacGillivray, 1916, p. 150; Ross, 1951, p. 63.

Selandria rufula Norton 1861, p. 221, ♂; Norton, 1867, p. 251. New synonymy.

Phymatocera rufula, Dalla Torre, 1894, p. 178; MacGillivray, 1916, p. 150; Ross, 1951, p. 64.

Rhadinnocera rufula, Konow, 1905, p. 81.

Paracharactus obscuratus MacGillivray, 1908a, p. 293, ♀; Frison, 1927, p. 255; Ross, 1951, p. 63 (= *rudis* Norton).

Female.—Average length, 6.5 mm. Antenna black. Head black with labrum, clypeus, and supraclypeal area white to rufous. Thorax rufous with pectus, scutellum, and metathorax black. Legs black with each tibia whitish. Abdomen black. Wings hyaline.

Postgenal carina present, extending for about one-fourth length of eye; malar space less than one-half diameter of front ocellus. Prepectus indistinct or present as raised shoulder, separated from mesepisternum by furrow; upper posterior margin of mesepisternum rounded, without ridge. Tarsal claw with minute inner tooth. Forewing with stub of 2A and 3A straight at apex. Sheath straight above, rounded below (pl. IV, 92). Lancet with serrulae flat and serrate (pl. VII, 148, 149).

Male.—Average length, 6.0 mm. Color similar to that of female. Structure similar to that of female except antenna, which is longer, laterally flattened, and with fourth segment longer than third segment. Genitalia with penis valve rectangular (pl. IX, 205); inner extension of harpe with sides rounded, giving it bulbous appearance (pl. IX, 204).

Holotypes.—The type of *S. rudis* Norton has not been located. In his original description, Norton (1861) stated that he saw "One specimen received from Mr. Packard, Brunswick, Me." The use of this name is based on specimens in the Academy of Natural Sciences of Philadelphia, which were probably determined by Norton and which agree with Norton's original description. There is one specimen at the Philadelphia Academy with the labels "type ?" and "*Selandria rufula* Nort." In describing *rufula*,

Norton (1861) saw only one specimen from Farmington, Conn. The type cannot be located at any other institution; therefore, after comparison with the original description, this specimen () is here accepted as the type of *rufula*. The type of *P. obscuratus* MacGillivray () is at the Illinois Natural History Survey and bears the data "W. Springfield, Mass."

Distribution.—Eastern North America, east of the Rocky Mountains (fig. 7, C).

North American Records.—*Colorado*: Boulder, June 10, 1961, 5400', B. H. Poole; 4.5 mi. N. Boulder, June 10, 1961, 5500', J. R. Stainer; Boulder, Flagstaff Cn., 5800', June 10, 1961, C. H. Mann; Eldora, July 3, 1961, J. G. Chilkott. *Connecticut*: Hartford, May 27, 1894; Farmington, May 16, 1933, M. P. Zappe. *Georgia*: Thomasville, March 29, 1938, P. W. Fattig. *Illinois*: Urbana, Brownfield Woods, April 22, 1933, E. Ray, April 29, 1920; Urbana, April 18, 1918, cottonwoods; Halfday, May 19, 1944, Ross and Sanderson; Newcomb, May 11, 1929, A. R. Park; Rock Island, May 19, 1934, Ross and Mohr; Algonquin, June 3, 1909, May 26, 1908, June 8, 1907, Nason; Dongola, May 9, 1917, on senecio; Foley's Woods, S. W. of Paris, April 22, 1949, Ross and Stannard; Golconda, April 30, 1940, Mohr and Burks; Alto Pass, onion strings, May 14, 1940, B. D. Burks. *Iowa*: Ames, April 29, 1942, E. M. Darrow, May 13, 1949, May 14, 1950, May 11, 1950, W. L. Downes, May 10, 1949, J. Stahl, May 10, 1953, F. N. Hamerstrom, April 24, 1949, Swentair, May 11, 1953, G. L. Bush, April 24, 1946, V. S. Hagen, May 4, 1950, W. Gennill, May 24, 1948, J. Laffoon, April 25, 1946, J. Henley, May 13, 1953, R. Didriksen, May 5, 1932, H. Hixon, May 9, 1927, May, 1896, May 11, 1897; Stone St. Pk., Sioux City, May 12, 1956, J. L. Laffoon; Sioux City, May 10, 1928, C. Ainslie; Ledges St. Pk., Boone Co., May 10, 1952, R. O. Dirksen. *Kansas*: Onaga, Crevecoeur; Riley Co., April 30, 1952, April 25, 1952, from vegetation along streambank, L. O. Warren, April 21, 1953, F. A. Lawson; Pottawatomie Co., May 10, 1952, L. O. Warren; Baldwin, J. C. Bridwell. *Maine*: Guerette, June 16, ex fir; Greenville, June 17. *Manitoba*: Aweme, June, 1912, N. Criddle, June 2, 3, 4, 1926, R. D. Bird, June 5, 1923, R. M. White; Ninette, June 13, 1958, C. D. F. Miller; 5 mi. S. W. Shilo, June 8, 1958, R. B. Madge. *Maryland*: Plummors Island, April 29, 1915, J. C. Crawford, May 16, 1902, R. P. Currie; near Plummors Island, May 14, 1915, R. C. Shannon; Cabin John, May 26, 1943, Cortez and Townes. *Massachusetts*: Mt. Greylock, June 15, 1906, C. V. Johnson. *Michigan*: Sault Ste. Marie, August, 1946, Gaskius; Ann Arbor, Washtenaw Co., May, 1917, M. H. Hatch, May 20, 1921, T. H. Hubbell; Battle Creek; Ag. Coll., May 6, 1896, May 18, 1887; Gull Lake Biol. Sta., Kalamazoo Co., May 14, 1955, A. D. Dawson; East Lansing, May 13, 1940. *Minnesota*: Eaglesnest, May 31, 1961, May 29, 1959, W. V. Baldauf. *New Hampshire*: Hampton, June 23, 1920, S. A. Shaw. *New York*: Niagara Falls, May 16, 1909, M. C. VanDuzee; Flatbush, June 1, 1891, J. L. Zabriskie; Ithaca, May 18, 1895; Ithaca, 6 mile Creek, May 5, 1951, J. C. Martin, May 23, 1936, H. K. Townes; Taughannock Falls, April 30, 1945, J. C. Martin. *Ohio*: Franklin Co., May 21, 1952,

H. V. Weems, Jr. *Ontario*: Simcoe, May 29, 1939, G. E. Shewell; S. Marsh, May 20, 1937, O. Peck; Ottawa, W. H. Harrington, May 24, 1957, J. G. Chilcott; Marmora, May 31, 1952, J. R. McGillis, May 18, 1951, E. H. N. Smith; Poonamalee, June 10, 1949, J. C. Martin; Emo, June 28, 1960, S. M. Clark. *Quebec*: La Trappe, May, 1936; Laniel, June 9, 1939, J. L. Hitchon; Knowlton, June 14, 1928, J. A. Adams; Ile de Montreal, May 20, 1906, Beaulieu; Burbridge, May 30, 1932, O. Peck, June 6, 1937, F. A. Urquhart; Cascapedia, June 22, 1933, W. J. Brown; Harrington Lk., Gatineau Pk., May 30, 1954, W. R. Coyles; Roundtop Mt., Sutton, 1300', July 5, 1963, J. R. Vockeroth. *Saskatchewan*: Oxbow, June 15, 1907, F. K. Knab; Canora, June 13, 1954, Brooks and Wallace. *South Dakota*: "S. Dak." *Wisconsin*: Amery, June 3, 1916, J. G. Sanders.

Host.—Unknown. Adults are most commonly collected by sweeping grasses and other vegetation in fields and meadows.

Larva.—Unknown.

Discussion.—This species may be separated from *niger* by the partly rufous thorax and the lack of a ridge on the upper posterior margin of the mesepisternum and from *montivagus* by the more bulbous extension of the harpe of the male genitalia.

The amount of rufous coloration on the thorax in the females is rather constant; however, in the males the thorax may be almost entirely black. Although this is a commonly collected species, nothing is known about its host, habits, or larva.

Genus RHADINOCERAEA Konow

Rhadinoceraea Konow, 1886, p. 184, 211; Dalla Torre, 1894, p. 179; Ashmead, 1898b, p. 128; Konow, 1905, p. 81; Rohwer, 1911c, p. 224; Enslin, 1914, p. 279; MacGillivray, 1916, p. 144; Enslin, 1920, p. 316; Dittrich, 1924, p. 629; Malaise, 1933, p. 59; Ross, 1937, p. 95; Berland, 1947, p. 242; Ross, 1951, p. 64; Benson, 1952, p. 101; Takeuchi, 1952, p. 44; Lorenz and Kraus, 1957, p. 118; Burks, 1958, p. 15.

Type: *Tenthredo* (*Allantus*) *micans* Klug. Designated by Rohwer (1911a).

Description.—Antenna filiform, slender, or stout with second segment as wide as long and third segment subequal to or slightly longer than fourth segment (pl. III, 50-52). Clypeus truncate; postgenal carina absent; postorbital groove absent or distinct and deep, ending in pit halfway down eye; malar space linear or as wide as diameter of front ocellus. Prepectus absent. Tarsal claw simple or with small inner tooth (pl. II, 13, 16). Forewing with stub of 2A and 3A furcate at apex (pl. I, 7). Hindwing with cross-vein *m-cu* present, enclosing cell *M*.

This genus is divided into two subgenera, *Rhadinoceraea* and *Veratra*, new subgenus. *Rhadinoceraea* includes the European species and a group of species from the Southwestern United States, all of which have a deep postorbital groove and pit and a small inner tooth of the tarsal claw; the larvae are associated with Iridaceae and Liliaceae. The subgenus *Veratra* includes those species without a postorbital groove and pit and with simple tarsal claws, and the larvae are associated with Liliaceae, specifically *Veratrum*.

Key to *Rhadinoceraea* Subgenera and Species

ADULTS

1. Tarsal claw with small inner tooth (pl. II, 16); deep postorbital groove present, ending in pit halfway down eye; malar space linear, or less than one-half diameter of front ocellus (subgenus *Rhadinoceraea*) 2
 Tarsal claw simple; postorbital groove and pit absent; malar space as wide as diameter of front ocellus (subgenus *Veratra*) ----- 7
2. Female ----- 3
 Male ----- 6
3. Lancet with lateral spines absent (pl. VII, 153) ----- *R. nigra* (Rohwer) 4
 Lancet with lateral spines present (pl. VII, 151, 152, 154) ----- 4
4. Lancet with lateral spines slender and long, equal to one-fourth or more width of segment (pl. VII, 151); clypeus brownish
 R. brysonensis, n. sp.
 Lancet with lateral spines short and stout, equal to one-fifth or less width of segment (pl. VII, 152, 154); clypeus black ----- 5
5. Lancet with one row of spines on each segment (pl. VII, 152)
 R. stenidium, n. sp.
 Lancet with two rows of spines on each segment (pl. VII, 154)
 R. utahensis, n. sp.
6. Penis valve rounded at apex (pl. IX, 207); southern California
 R. nigra (Rohwer)
 Penis valve truncate at apex (pl. X, 209); northern Utah
 R. utahensis, n. sp.
7. Female ----- 8
 Male ----- 11
8. Sheath long, evenly rounded at apex (pl. IV, 98); Appalachian region of eastern North America ----- *R. nubilipennis* (Norton)
 Sheath shorter, straight above, rounded below (pl. IV, 95-97); west of Rocky Mountains ----- 9
9. Lancet with serrulae rounded at apices, with few distinct subbasal teeth (pl. VII, 156); antenna entirely black ----- *R. insularis* (Kincaid)
 Lancet with serrulae pointed or flattened at apices, with distinct subbasal teeth (pl. VII, 155, 157); antenna entirely black or black and ventrally whitish ----- 10
10. Antenna black with ventral side whitish; serrulae of lancet shallow, asymmetrical with greater number of posterior than anterior subbasal teeth (pl. VII, 155) ----- *R. aldrichi* (MacGillivray)
 Antenna entirely black; serrulae of lancet deeper, symmetrical, with equal number of anterior and posterior subbasal teeth (pl. VII, 157)
 R. jacintensis, n. sp.
11. Penis valve narrow and curved dorsally (pl. X, 217); Appalachian region of eastern North America ----- *R. nubilipennis* (Norton)
 Penis valve wide, rounded or truncate, not narrow and curved (pl. X, 211, 213, 215); west of Rocky Mountains ----- 12
12. Penis valve truncate and slanted at apex (pl. X, 211); ventral side of antennal segments whitish ----- *R. aldrichi* (MacGillivray)
 Penis valve rounded at apex (pl. X, 213, 215); antenna entirely black 13
13. Northern California and northward ----- *R. insularis* (Kincaid)
 Southern California ----- *R. jacintensis*, n. sp.

Subgenus RHADINOCERAEA Konow

Description.—Segments of antenna short and stout, usually not more than twice as long as wide; third segment slightly longer than fourth segment in length (pl. III, 50). Clypeus truncate; postgenal carina absent; postorbital groove deep, ending in pit halfway down eye; malar space absent or less than one-half diameter of front ocellus. Prepectus absent. Tarsal claw with small inner tooth (pl. II, 16). Forewing with stub of 2A and 3A furcate

at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Wings moderately infusate.

In the Nearctic region there are four species in this subgenus, all confined to Utah and southern California. Oddly enough, they are more closely related to the Palaearctic species than are the more northern forms of the other subgenus.

Little is known of the Nearctic species and only a few have been taken. The larvae are not known, and the host for one species, *nigra*, is indicated only by the labels on the adults, which read "larva on *Calochortus venustus*."

The European species include *R. micans* (Klug), *R. reitteri* (Konow), and *R. bensoni* Beneš. Their known hosts include *Iris* species (Benson, 1952; Beneš, 1961a, 1961b).

Descriptions of *Rhadinoceraea* Species

Rhadinoceraea (*Rhadinoceraea*) *brysonensis*, new species

Female.—Length, 8.0 mm. Entirely black with clypeus brownish and narrow white margin on posterior edge of each abdominal segment. Wings moderately infusate.

Antenna short and stout, third segment slightly longer than fourth segment; segments beyond third never more than twice as long as wide (pl. III, 50). Clypeus truncate; postgenal carina absent; postorbital groove deep, ending in pit halfway down eye; malar space linear. Prepectus absent. Tarsal claw with small inner tooth (pl. II, 16). Forewing with stub of 2A and 3A furcate at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, slightly rounded below (pl. IV, 94). Lancet with lateral spines long and slender, one-fourth or more width of segment (pl. VII, 151).

Male.—Unknown.

Holotype.—Female, Bryson, Calif., April 27, 1917, E. P. VanDuzee. Deposited at the Illinois Natural History Survey.

Distribution.—Known only from California (fig. 8, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species resembles the other species in this subgenus, but it may be separated by the long, slender, lateral spines of the lancet. It is known only from the type. The name is derived from the type locality.

Rhadinoceraea (*Rhadinoceraea*) *ctenidium*, new species

Female.—Length, 8.2 mm. Entirely black with narrow white margin on posterior edge of each abdominal segment. Wings moderately infusate.

Antenna short and stout, third segment slightly longer than fourth segment; segments beyond third never more than twice as long as wide (pl. III, 50). Clypeus truncate; postgenal carina absent; postorbital groove deep, ending in pit halfway down eye; malar space linear. Prepectus absent. Tarsal claw with small inner tooth (pl. II, 16). Forewing with stub of 2A and 3A furcate at

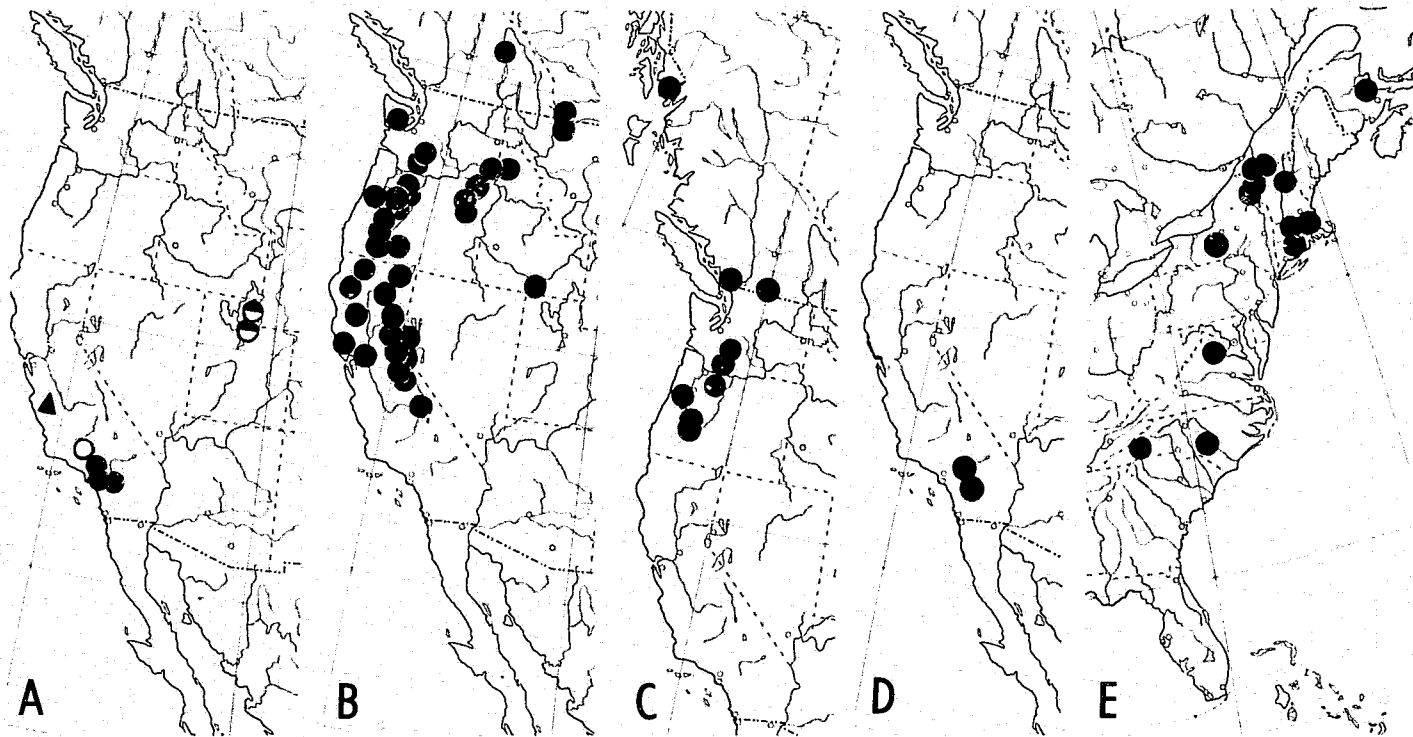


FIGURE 8.—Distribution of (A) *Rhadinoceraea nigra* (solid circles), *utahensis* (half circles), *ctenidium* (open circle), and *brysonensis* (triangle), (B) *aldrichi*, (C) *insularis*, (D) *jacintensis*, and (E) *nubilipennis*.

apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath long, straight above, slightly rounded below (pl. IV, 94). Lancet with one row of short, thick lateral spines on each segment, spines one-fifth or less width of segment (pl. VII, 152).

Male.—Unknown.

Holotype.—Female, Mt. Pinos, Kern Co., Calif., 8900', June 12, 1960, L. M. Martin. Deposited at the Los Angeles County Museum.

Paratype.—One female, same data as the holotype. Deposited with the holotype.

Distribution.—Known only from California (fig. 8, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is known from only two specimens. It resembles *utahensis* and *brysonensis*, but it may be separated from *brysonensis* by the short lateral spines of the lancet and from *utahensis* by the single row of spines instead of two.

The name is derived from the Greek word *ktenos* because of the comblike lateral armature of the lancet.

Rhadinoceraea (Rhadinoceraea) nigra (Rohwer)

Paracharactus niger Rohwer, 1912, p. 231, ♀.
Rhadinoceraea nigra, Ross, 1951, p. 64.

Female.—Average length, 8.0 mm. Entirely black with narrow white band on posterior margin of each abdominal segment. Wings moderately infusate.

Sheath long and narrow, straight above, rounded below (pl. IV, 94). Lancet without lateral spines (pl. VII, 153).

Male.—Average length, 7.7 mm. Color as for female. Structure as for female except for antenna, which has third segment subequal in length to fourth segment. Penis valve rounded at apex (pl. IX, 207); harpe covered with coarse hairs, harpe and parapsis as in plate IX, 206.

Holotype.—The type (♀) is at the U.S. National Museum, No. 44588. The label reads "Los Angeles Co., Calif., Pasadena, April 10, 1909, F. Grinnel, Jr."

Distribution.—Southern California (fig. 8, A).

North American Records.—California: Los Angeles Co., January 30, larva on *Calochortus venustus*, February, larva on *Calochortus venustus*; San Francisquito Canyon, April 2, 1953; 8 mi. E. Sunnymead, Riverside Co., June 12, 1958, J. C. Ball.

Host.—The larvae may feed on *Calochortus* as indicated by the labels on the adult specimens.

Larva.—Unknown.

Discussion.—Although this species resembles other members of this subgenus, it is easily separated by the lack of lateral spines on the lancet of the female. The male may be separated from that of *utahensis* by those characters given in the description and key.

Rhadinoceraca (Rhadinoceraca) utahensis, new species

Female. Length, 8.0 mm. Entirely black with narrow white margin on posterior edge of each abdominal segment. Wings moderately infusate.

Antenna short and stout, third segment slightly longer than fourth segment; segments beyond third never more than twice as long as wide (pl. III, 50). Clypeus truncate; postgenal carina absent; postorbital groove deep, ending in pit halfway down eye; malar space linear. Prepectus absent. Tarsal claw with small inner tooth (pl. II, 16). Forewing with stub of 2A and 3A furcate at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below (pl. IV, 94). Lancet with two rows of short, stout lateral spines on each segment never more than one-fifth as wide as segment (pl. VII, 154).

Male.—Length, 7.7 mm. Color similar to that of female. Structure as in female except for antenna, which has third and fourth segments subequal in length. Harpe with inner margin slightly angulate, covered with erect coarse hairs (pl. X, 208); parapenis as high or higher than wide (pl. X, 208); penis valve with apical margin truncate (pl. X, 209).

Holotype.—Female, Logan, Utah, May 8, 1941, Don Fronk and R. B. Burnham. Deposited at the U.S. National Museum with the permission of G. F. Knowlton and W. J. Hanson of Utah State University. U.S.N.M. type No. 69154.

Allotype.—Male, Logan, Utah, April 28, 1949, W. J. Hanson. Deposited with the holotype.

Paratypes.—*Utah*: Logan, May 15, 1948, W. B. Lattimore (1 ♀); Dry Canyon, Salt Lake Co., March 24, 1954, J. L. Eastin (1 ♂); Salt Lake City, May 2, 1956, J. L. Eastin (1 ♂); Green Canyon, May 9, 1963, Ernie Dean (1 ♀); Wellsville, May 14, 1966, Wm. Bachow (1 ♂); Logan, May 10, 1951, E. A. Cross (1 ♂).

Disposition of Paratypes.—The paratypes have been deposited at Utah State University.

Distribution.—Northern Utah (fig. 8, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is most closely related to *ctenidium* from southern California, but it may be distinguished from it by the two rows of spines on each segment of the lancet. The characters of the male genitalia will separate the males from *nigra*. This is the most northern species of this subgenus in North America. The name is derived from the type locality.

Subgenus VERATRA, new subgenus

Type: *Selandria nubilipennis* Norton.

Description.—Antenna short and stout; third segment subequal in length or only slightly longer than fourth segment; segments beyond second approximately two times longer than wide (pl. III, 51, 52). Clypeus truncate; postgenal carina absent; postorbital groove and pit absent; malar space approximately as wide as

diameter of front ocellus. Prepectus absent. Tarsal claw simple (pl. II, 13). Forewing with stub of 2A and 3A furcate at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Wings moderately infusate to hyaline.

Members of this subgenus are easily distinguished from those of the typical subgenus by the lack of a postorbital groove and pit and the simple tarsal claw. There are four Nearctic species, all of which are probably associated with false-hellebore (*Veratrum*). At least one European species, *R. nodicornis* (Konow), belongs here.

Larva.—The larvae of two species are known, *R. aldrichi* (MacGillivray) and *R. nubilipennis* (Norton). Yuasa (1922) included a description of *nubilipennis* under the generic name *Monophadnus*. Lorenz and Kraus (1957) described the larva of *nodicornis* (Konow).

The larvae of this genus may be recognized by the six-annulate abdominal segments, the presence of small or large conical tubercles on the body, the darkly winged spiracles, and the presence of only one tubercle on each postspiracular and subspiracular lobe. The larvae will be described in detail under the species.

Key to *Veratra* Species

LARVAE

1. Body tubercles small; annulets 2 and 4 of abdominal segments 1 through 8 each with three tubercles on each side (pl. XIV, 292); surpedal lobe without tubercle (pl. XIV, 292); lacinia of maxilla with eight to 10 spines (pl. XIV, 290); west of Rocky Mountains

R. aldrichi (MacGillivray)

- Body tubercles large and conical; annulets 2 and 4 of abdominal segments 1 through 8 each with two tubercles on each side (pl. XIV, 296); surpedal lobe with one tubercle (pl. XIV, 296); lacinia of maxilla with five to seven spines (pl. XIV, 295); eastern North America

R. nubilipennis (Norton)

Descriptions of *Veratra* Species

Rhadinoceraca (*Veratra*) *aldrichi* (MacGillivray)

Pareophora aldrichi MacGillivray, 1923c, p. 28, ♀; Frison, 1927, p. 255.
Rhadinoceraca aldrichi, Ross, 1951, p. 64.

Female.—Average length, 6.5 mm. Entirely black with ventral surface of antenna and foretibia and midtibia whitish. Wings lightly infusate.

Antenna with third segment subequal in length to or very slightly longer than fourth segment (pl. III, 52). Malar space approximately as wide as diameter of front ocellus. Sheath straight above, rounded below (pl. IV, 95). Lancet with serrulae flattened at apices, asymmetrical, with four to five anterior subbasal teeth and seven to nine posterior subbasal teeth (pl. VII, 155).

Male.—Average length, 6.3 mm. Color as for female. Structure as for female. Penis valve truncate and slanted at apex (pl. X, 211). Harpe and parapenis as in plate X, 210.

Holotype.—The type (2) is located at the Illinois Natural History Survey and bears the data "Peck, Idaho, J. M. Aldrich, on Solomons Seal."

Distribution.—Western North America from British Columbia to central California, east to central Idaho and western Alberta (fig. 8, B).

North American Records.—*Alberta*: Waterton Lakes, July 12, 1923, J. McDunnough; Waterton, July 12, 1923, E. H. Strickland. *British Columbia*: N. Peak, Jude Pass, Mt. Revelstoke Nat. Pk., 7400', July 16, 1952, G. P. Holland. *California*: Telephone Campground, Black Butte, Glenn Co., 6800', June 19, 1956, *Veratrum californicum*, J. Powell; Chester, June 4, 1960, D. J. and J. N. Knoll; 3 mi. S. E. Mt. Lassen, July 8, 1955, *Veratrum*, J. W. MacSwain; Modoc Co., May 31, 1938, *Veratrum californicum*, K. A. Salman; Leland Meadow, Tuolumne Co., July 1, 1957, A. E. Pritchard; Castle Lake, Siskiyou Co., July 2, 1953, 5200', H. P. Chandler; Mammoth Lake, July 12, 1933; Trinity Co., May 20, 1934, 6000'; Susan R. Camp, Lassen Co., July 10, 1949, D. Cox; Robertson Flat, Placer Co., July 4, 1956, R. E. Darby; Carson Pass, Alpine Co., July 10, 1960, M. L. Rice; Buck's Lake, Plumas Co., June 23, 1949, H. A. Hunt; Donner Memorial Park, Truckee, May 30, 1957, C. S. Moore; Echo Lake, El Dorado Co., July 3, 6, 7, 1953, July 14, 19, 1956, July 3, 7, 15, 1962, W. W. Middlekauff; 4 mi. W. Plantation, Sonoma Co., March 3, 4, 5, 8, 9, 1956, March 6, 21, 1957, D. Burdick; Yosemite Nat. Pk., Yosemite Valley, July 10, 1935, *Veratrum californicum*, June 27, 1921, E. C. Van Dyke; Bloods, 7000', June 23, 1930; Davis, July 13, 1926, F. H. Wymore; Alta Meadows, Sequoia Nat. Pk., July 19, 1907, J. C. Bradley. *Idaho*: Rock Creek Canyon, Cassia Co., May 13, 1954, H. E. Cott; 3 mi. E. Moscow, March 24, 1957, C. J. Peterson; Peck, April 8, on Solomons-seal. *Montana*: Glacier Nat. Pk., June 29, 1956, on leaf of hellebore, Alice and J. G. Edwards. *Nevada*: "Nev."; 3 mi. N. Crystal Bay, Washoe Co., June 14, 1964, on *Veratrum*, D. R. Smith and C. W. Baker; Mt. Rose, Washoe Co., 8900', June 14, 1964, on *Veratrum*, D. R. Smith and C. W. Baker. *Oregon*: 15 mi. E. Mt. Hood, May 12, 1959, false hellebore, K. Goeden; Bear Springs, Wasco Co., May 21, 1959, swamp, K. Goeden; Monument Peak, 8 mi. E. S. E. Gates, Linn Co., meadow, 4050', June 16, 1960, J. D. Lattin; Big Meadows, N. Santiam Pass, June 5, 1954, rotting duff, V. D. Roth; Corvallis, April 14, 1960, K. G. Swenson; McDonald Forest, 5 mi. N. W. Corvallis, May 19, 1955, P. O. Ritcher, April 22, 1962, from *Veratrum*, D. R. Smith, April 23, 1963, from *Veratrum*, D. R. Smith; 20 mi. S. E. Oakridge, Lane Co., May 21, 1958, P. O. Ritcher, R. K. Eppley, June 13, 1962, June 1, 1962, on *Veratrum*, D. R. Smith, June 13, 1964, on *Veratrum*, D. R. Smith and C. W. Baker; Crater Lake Nat. Pk., Park Hq., July 12, 1955, D. H. Huntington; Crater Lake, July 13, 1923, F. H. Wymore, August, 1935, J. S. B.; Launch Cr., Dixie Pass, Blue Mtns., Grant Co., 4800', June 1, 1957, B. Malkin; 20 mi. S. W. LaGrande, 4-5000', May 11, 1930, taken on *Veratrum*; Bone Springs, Blue Mtns., May 7, 1938, E. C. Van Dyke; 10 mi. N. W. Pinehurst, Jackson Co., May 5, 1962, on *Veratrum*, D. R. Smith;

Sulfur Springs, 10 mi. N. W. Corvallis, April 4, 1963, D. R. Smith, April 13, 1963; Gearhart Mtn., 10 mi. N. E. Bly, Klamath Co., alpine meadow, below summit, Boulder Cr., 7000', July 1, 1964, on *Veratrum*, J. Lattin, T. Schuh, and J. Schuh; 2 mi. W. Langdon Lk., Umatilla Co., June 4, 1964, false hellebore, K. Goeden. *Washington*: Paradise Valley, Rainier Nat. Pk., July 17, 1936, E. C. VanDyke; Sunrise Peak, Rainier Nat. Pk., July 23, 1936, E. C. VanDyke; Blue Mtns., July, 1896, C. V. Piper; Pullman, May 10, 1899, C. V. Piper; Mt. Adams, July 26, 1932, A. B. Rolfs; Rainier Nat. Pk. near Yakima Park, subalpine forest, July 14, 1945; Lake Cushman, Mason Co., June 29, 1919, F. M. Gaige.

Host.—The larva feeds on *Veratrum californicum* Durand, *V. viride* Ait., and probably other species of false-hellebore. Although the collection data on the type series indicate that they were taken from Solomons-seal, all the other records, as well as rearings by the author, have shown that the host is false-hellebore. The collector of the type series may have taken the adults from Solomons-seal or misidentified the host plant.

Larva.—The larva of this species is described here for the first time.

In late instar, head capsule, segments of mouth parts, mandible, spiracles, body tubercles, and segments of thoracic legs black; clypeus white. Remaining part of body green when alive with dark lateral stripe on each side.

Clypeus with two setae on each side. Labrum with narrow central emargination; three setae on each side; epipharynx with about nine spines located in arcuate row on each half (pl. XIV, 289). Left mandible with two ventral teeth and three sharp and one truncate lateral teeth (pl. XIV, 288); right mandible with one large and two small ventral teeth, two sharp and one truncate lateral teeth, and two molar teeth (pl. XIV, 287); each mandible with one seta on outer surface. Maxillary palpus four-segmented; second segment with one seta on outer margin; palpifer with five setae; lacinia with nine or 10 spines (pl. XIV, 290). Labial palpus three-segmented; prementum with three setae on each side; second labial palpal segment with two setae.

Thorax with tubercles arranged as in plate XIV, 293. Thoracic legs normal; femur longer than tibia; numerous setae on inner surface of each leg. Pair of setiferous lobes on sternum of each thoracic segment.

Abdominal segments 1 through 8 each with six dorsal annulets. Annulets 1, 3, 5, and 6 without tubercles; annulets 2 and 4 each with three tubercles on each side; first and second postspiracular lobes each with one tubercle; subspiracular lobe usually with two tubercles; surpedal lobe without tubercles (typical segment shown in pl. XIV, 292). Ninth abdominal segment usually with two tubercles on each side of second annulet and three tubercles on each side of fourth annulet (pl. XIV, 291); 10th abdominal tergum usually with four or six tubercles, suranal and subanal areas densely covered with setae. All spiracles distinctly and darkly winged. Number of tubercles as described may vary as to number, but this is usual number and position.

The earlier instars differ primarily in lacking distinct tubercles or the tubercles are lighter and in lacking the lateral dark stripe.

This species may be distinguished from *nubilipennis* by those characters given in the key.

Discussion.—This species may be recognized by the white ventral surface of the antenna, but the most reliable character is the low, serrate serrulae of the female lancet.

The adults fly early in the spring and were taken from the last of March through April near Corvallis, Oreg., at an altitude of about 800 feet. They emerge at the time the host plant is sprouting and the leaves are beginning to separate from the stem. Adults were taken on Willamette Pass, Oreg., at an altitude of 4,500 feet before the winter snow had melted. The adults were easily collected on the leaves and in the leaf axils, and on a cloudy day they could be picked off in numbers. At times three or four adults per plant were found.

Copulation takes place soon after emergence. Their position is the usual end-to-end type of the tenthredinids as described by Rohwer (1915) for *Phymatocera*. In some cases this lasted as long as 30 minutes. Later the female begins to oviposit by carving a chamber in the leaf tissue and inserting the eggs. This is usually done on the underside of the leaf where the eggs appear as small white swellings and are arranged in rows of several to 12 eggs, parallel with the venation of the leaf. The female will lay several rows of eggs, the usual total averaging 25 eggs.

In about 10 days the larvae hatch and immediately begin feeding. They mine out the leaf tissue by feeding on the underside of the leaf and leave the leaf riddled with irregular holes. There are five feeding instars and the sixth nonfeeding instar or prepupal stage, which searches for a pupation site. The place of pupation was not located, and rearings were not successful beyond this stage. Probably they need a special medium for pupation, such as rotting wood or stems of dying plants. The time from hatching to the prepupal stage was about 5 weeks. The time from adult emergence to the prepupal stage was about 3 months at 800 feet and about 2 months at 4,500 feet. The emergence time at the higher elevation lagged about 2 months behind that at the lower elevation.

Rhadinoceraca (Veraltra) insularis (Kincaid)

Monophadnus insularis Kincaid, 1900, p. 346, : .

Rhadinoceraca insularis, Ross, 1951, p. 64.

Female.—Average length, 6.3 mm. Entirely black with apex of foretibia whitish. Wings lightly infuscate.

Antenna with third segment subequal in length to fourth segment; segments beyond third about three times as long as wide (pl. III, 51). Sheath straight above, rounded below (pl. IV, 96). Lancet with serrulae rounded, symmetrical, subbasal teeth indistinct (pl. VII, 156).

Male.—Average length, 6.0 mm. Color and structure as for female. Penis valve oblong in appearance and rounded at apex (pl. X, 213). Harpe and parapenis as in plate X, 212.

Holotype.—The type (♂) is at the U.S. National Museum, No. 5283, and bears the data "Metlakahla, Alaska, June 4, 1899, Harriman Expedition '99, T. Kincaid, collector."

Distribution.—West coast of North America from Alaska to central California (fig. 8, C).

North American Records.—*Alaska*: Metlakahla, June 4, 1899, T. Kincaid. *British Columbia*: Hedley, July 7, 1923, C. B. Garrett; Grouse Mt., Vancouver, 3000', August 22, 1933, host—*Veratrum viride*, C. R. Hopping. *California*: Lily Lake, Marin Co., March 5, 1956, J. Powell and J. Herring. *Oregon*: Bradley Cr., Douglas Co., June 23, 1956, J. D. Vertrees; 5 mi. N. W. Corvallis, April 22, 1962, D. R. Smith; 20 mi. S. Oakridge, Lane Co., June 13, 1962, D. R. Smith; Still Creek Forest Camp, 1 mi. E. Government Camp nr. Mt. Hood, July 14, 1956, P. O. Ritcher. *Washington*: Mt. Adams, July 26, 1932, G. R. Rolfs; Mt. Rainier, July 4, 1937, H. Benion; Mt. Rainier, Sunrise, 6400', July 30, 1933, J. Wilcox.

Host.—Collection records indicate this species also feeds on *Veratrum viride* Ait. and other species of false-hellebore.

Larva.—Unknown.

Discussion.—This species is close to *aldrichi*, but it differs by the entirely black antenna, rounded serrulae of the female lancet, and rounded penis valve of the male. Specimens of *insularis* have been collected under the same conditions and at some of the same localities as *aldrichi*, but it appears to be more northern in distribution and found at higher altitudes.

Rhadinoceraca (Veratra) jacintensis, new species

Female.—Length, 6.1 mm. Entirely black with foretibia and apex of forefemur light brown to white. Wings lightly infusate.

Antenna with third and fourth segments subequal in length; segments beyond third at least three times longer than wide (pl. III, 51). Clypeus truncate; postgenal carina absent; postorbital groove and pit absent; malar space equal to diameter of front ocellus. Prepectus absent. Tarsal claw simple. Forewing with stub of 2A and 3A furcate at apex. Hindwing with crossvein *m-cu* present, enclosing cell M. Sheath straight above, rounded below (pl. IV, 97). Lancet with serrulae pointed, with five or six anterior and posterior subbasal teeth (pl. VII, 157).

Male.—Length, 5.9 mm. In color and structure similar to female. Penis valve evenly rounded at apex (pl. X, 215). Harpe and parapsis as in plate X, 214.

Holotype.—Female, Tahquitz Valley, San Jacinto Mtns., Calif., June 3, 1940, W. L. Swisher. Deposited at the Los Angeles County Museum.

Allotype.—Male. Same data as the holotype. Deposited with the holotype.

Paratypes.—*California*: Same data as for holotype (2 ♀♀); Santa Barbara Co., Bear Valley, June 1, 1928, E. C. VanDyke (1 ♂).

Disposition of Paratypes.—Paratypes have been deposited at the Los Angeles County Museum and the California Academy of Sciences.

Distribution.—Southern California (fig. 8, *D*).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is very close to *insularis*, but it may be distinguished by the pointed serrulae and distinct subbasal teeth of the lancet and the more evenly rounded penis valve. It is also found far south of the known range of *insularis*. The name is derived from the type locality.

Rhadinoceraea (Veratra) nubilipennis (Norton)

Selandria nubilipennis Norton, 1867, p. 252, ♂, ♀; Cresson, 1928, p. 8.

Phymatocera nubilipennis, Kirby, 1882, p. 165; Dalla Torre, 1894, p. 178.

Ardis nubilipennis, Konow, 1905, p. 81.

Monophadnus nubilipennis, MacGillivray, 1916, p. 150; MacGillivray, 1921, p. 23; Yuasa, 1922, p. 94; Benson, 1930, p. 107.

Rhadinoceraea nubilipennis, Ross, 1951, p. 64.

Neoparcophora scelestus MacGillivray, 1908a, p. 289, ♀; MacGillivray, 1916, p. 144; Frison, 1927, p. 254; Ross, 1951, p. 64 (= *nubilipennis* Norton).

Monophadnus planus MacGillivray, 1921, p. 23, ♂; Frison, 1927, p. 253; Benson, 1930, p. 107; Ross, 1951, p. 64 (= *nubilipennis* Norton).

Monophadnus rapularis Benson, 1930, p. 107 (new name for *planus* MacGillivray, which is preoccupied by *Monophadnus planus* Klug).

Female.—Average length, 8.0 mm. Entirely black with outer surface of front tibia whitish. Wings moderately infusate.

Antenna with third segment slightly longer than fourth segment, segments beyond third more than twice as long as wide (pl. III, 51). Malar space equal to one-half diameter of front ocellus. Sheath long, broadly rounded at apex (pl. IV, 98). Lancet with lobes low, rounded, subbasal teeth distinct with at least two anterior subbasal teeth extending above ventral margin of lancet (pl. VII, 158).

Male.—Average length, 7.7 mm. Color and structure as for female. Penis valve narrow and curved dorsally at apex (pl. X, 217); harpe and parapenis as in plate X, 216.

Holotypes.—*S. nubilipennis* Norton (♀) is type No. 10346 at the Academy of Natural Sciences of Philadelphia; the label reads "Mass." The MacGillivray types are at the Illinois Natural History Survey. The label on *N. scelestus* (♀) reads "Black Mtns., N. C., VI," and the label on *M. planus* (♂) reads "Franconia, N. H., Mrs. A. T. Slosson."

Distribution.—Eastern North America from southeastern Canada to North Carolina, not extending west of Appalachian Mountains (fig. 8, *E*).

North American Records.—*Connecticut*: Storrs, May, 1954, E. Alven. *Massachusetts*: Boston; Central Massachusetts. *New Brunswick*: Harcourt, May 13, 1917, M. B. D. *New Hampshire*: Franconia, A. T. Slosson. *New York*: Lake Tear, Essex Co., 4300-4600', July 20, 1920; Ringwood, Ithaca, June 26, 1920; Ithaca, June 25, 1917; top of Mt. Whiteface, July 7, 1922, J. M. Aldrich; Indian Falls, Mt. Marcy, June 10, 1942, H. Dietrich; Northampton, June 20, 1914, D. B. Young. *North Carolina*: Black Mts., May; summit of Black Mts., July 2-5, 1906, W. Beutenmuller; Mt.

Mitchell, mid-June, 1924, above 4000', F. Sherman; Fayetteville, May 6, 1940. *Quebec*: Covey Hill, June 17, 1924, C. H. Curran; Knowlton, May 10, 1930, L. J. Milne; Bolton Clan, May 5, 1936, G. S. Walley. *Virginia*: Shenandoah Nat. Pk., Thornton River, May 8, 1966, O. and R. Flint.

Host.—Larvae of this species feed on *Veratrum viride* Ait.

Larva.—Yuasa (1922) included a description of the larva under the generic name *Monophadnus*.

In late instar, head, segments of mouth parts, mandible, segments of thoracic legs, spiracles, and tubercles black; clypeus usually whitish. Tubercles large and conical, rest of body green, without dark lateral stripe.

Clypeus with two setae on each side. Labrum with two setae on each side, with narrow central emargination; epipharynx with nine or 10 spines located in arcuate row on each half (pl. XIV, 291). Mandibles each with one seta on outer lateral surface; mandibles similar to those of *aldrichi* (pl. XIV, 287, 288). Maxillary palpus four-segmented; second palpal segment with one seta on outer margin; palpifer with five setae; stipes with one seta; lacinia with about six spines (pl. XIV, 295). Labial palpus three-segmented; second palpal segment with two setae; prementum with three setae on each side.

Thorax with tubercles arranged similarly to those of *aldrichi* (pl. XIV, 293). Thoracic legs normal; femur longer than tibia; setae numerous on inner margins of legs. Each thoracic sternum with pair of setiferous tubercles. Prothoracic spiracle distinctly winged.

Abdominal segments 1 through 8 each with six dorsal annulets (typical segment shown in pl. XIV, 296). Annulets 1, 3, 5, and 6 without tubercles; annulets 2 and 4 each with two tubercles on each side; first and second postspiracular lobes, subspiracular lobe, and surpedal lobe each with one tubercle. Spiracles distinctly winged. Ninth and 10th segments similar to those of *aldrichi* (pl. XIV, 291).

Discussion.—This is the only member of *Rhadinoceraea* known to occur in eastern North America. The female is easily separated by the long sheath and the distinctive lancet, and the male may be separated by the long, narrow, curved, penis valve.

Genus LAGONIS Ross

Lagonis Ross, 1937, p. 99; Ross, 1951, p. 63.

Type: *Scandria nevadensis* Cresson. Original designation.

Description.—Antenna filiform with second segment as wide as long and third and fourth segments subequal in length (pl. III, 49). Clypeus shallowly emarginate; postorbital groove absent; postgenal carina present, developed only slightly below eye; malar space as wide as diameter of front ocellus. Prepectus absent. Tarsal claw with small inner tooth (pl. II, 14). Forewing stub of 2A and 3A markedly turned up at apex, nearly meeting 1A (pl. I, 6). Hindwing with crossvein *m-cu* present, enclosing cell *M*. Posterior

part of scutellum and upper half of mesepisternum with large craterlike punctures.

The one Nearctic member of this genus, *nevadensis*, may be immediately recognized by the large punctures of the scutellum and mesepisternum. This genus may be distinguished from *Monophadnus* by the small inner tooth of the tarsal claw and the upturned vein 2A and 3A, from *Paracharaetus* by the wider malar space and the presence of punctures, and from *Phymatocera* and *Rhadinocerata* by the simple upturned 2A and 3A vein, presence of punctures, and more slender antenna.

A paratype of the Japanese species *Rhadinocerata opacicollis* Malaise is in the U.S. National Museum. Takeuchi (1952) also placed it in this genus, but it belongs in *Lagonis* (new combination). Okutani (1956) reported *opacicollis* to feed on *Sambucus*, the same host for the North American *nevadensis*.

Larva.—The larva for the one Nearctic species is known and is described under the species. The distinct larval form substantiates the status of this genus. It is close to *Rhadinocerata* in having setae on the second segment of the labial palpus, but the numerous light-colored tubercles will immediately separate it. The mandibles as well as the tubercle pattern are very distinctive.

Description of *Lagonis* Species

Lagonis nevadensis (Cresson)

- Sclandron nevadensis* Cresson, 1880a, p. 13, ♀; Cresson, 1916, p. 6.
Phymatocera nevadensis, Kirby, 1882, p. 165; Dalla Torre, 1894, p. 178.
Rhadinocerata nevadensis, Konow, 1905, p. 81.
Lagonis nevadensis, Ross, 1937, p. 100; Ross, 1951, p. 63.
Paracharaetus hirsutus Rohwer, 1912, p. 230, ♀; Ross, 1937, p. 100 (♂ *nevadensis* Cresson).

Female.—Average length, 8.2 mm. Head and antenna black, clypeus white. Thorax black with pronotum, mesepisternum, prescutum, and lateral lobes rufous; northern specimens sometimes entirely black. Legs black; extreme apex of each femur, outer surface of each tibia, and foretarsus white; midtarsus and hindtarsus infuscate. Abdomen black with narrow white margin on posterior part of each abdominal segment. Wings hyaline.

Large craterlike punctures present on posterior half of scutellum and upper half of mesepisternum. Sheath straight above, rounded below (pl. IV, 99). Lancet with serrulae flat with sub-basal teeth distinct; long narrow spines conspicuous as lateral armature (pl. VIII, 159).

Male.—Average length, 7.6 mm. Color similar to that of female except for mesepisternum and prescutum, which are black. Structure similar to that of female. Eighth abdominal tergite nearly divided mesally by narrow emargination extending from posterior margin of segment. Penis valve quadrate (pl. X, 219); harpe and parapenis as in plate X, 218.

Holotypes.—*S. nevadensis* Cresson (♂) is type No. 198 at the Academy of Natural Sciences of Philadelphia and bears a label

reading "Nev." *P. leucostomus* Rohwer (:) is at the U.S. National Museum, type No. 14557, and bears the data "Claremont, Cal., Baker."

Distribution.—Western North America from British Columbia to southern California and east to Alberta and Wyoming (fig. 9, A).

North American Records.—*Alberta*: Waterton, June 12, 1923, E. H. Strickland. *British Columbia*: Vernon, April 15, 1934, reared from larvae, host—*Sambucus racemosa*, G. R. Hopping; Armstrong, May 30, 1929, M. H. Rahmann; Vancouver, Seymour Cr., May 12, 1931, H. B. Leach; Harrison, June 8, 1927, H. H. Ross; Keremeos, May 22, 1959, L. A. Kelton; Mt. Revelstoke, July 21, 1952, 6000', G. P. Holland. *California*: Davis, April 15, 1957, H. W. Michalk, April 12, 1947, B. Stevens, April 8, 1956, W. H. Lange, May 8, 1961, P. Paige, April 23, 1936, April 6, 1936, R. M. Bohart, May 3, 1961, F. D. Parker, April 25, 1961, April 8, 1961, April 27, 1963, ex *Sambucus*, F. D. Parker, March, 1931; Sacramento, April 21, 1947, May 1, 1949, March 19, 1947, A. T. McCloy, April 25, 1950, E. C. Carlson, April 14, 1951, elderberry; Santa Barbara, March 2, 1935, B. E. White; Ono, Shasta Co., April 8, 1931, E. C. Van Dyke; San Jose, July 7, 1928, L. M. Smith; Los Angeles, April 4, 1919; Berkeley, April 12, 1934, April 26, 1935; Kelseyville, April 17, 1949, W. H. Lange; Carson Pass, Alpine Co., July 17, 1962, C. L. Bolton; Contra Costa Co., E. C. VanDyke; Alameda Co.; Strawberry Cyn., Sacramento Co., April 12, 1957, T. H. Ganteinbein; Carmichael, Sacramento Co., April 12, 1957; Adobe Cr., 22 mi. W. Patterson, Stanislaus Co., April 23, 1944, H. B. Leach; Stevens Cr. area, Santa Clara Co., April 1, 1957, F. Santana; Goose Lk., Modoc Co., May 24, 1944, R. M. Bohart; Pinnacles Nat. Mon., April 6, 1951, W. H. Lange; Yosemite N. P., 3830–4000', May 19, 1938, R. M. Bohart; Dunlap, Fresno Co., April, 1950, J. C. Hall; Glendale, Los Angeles Co., March 26, 1947, E. Saldinger; 5 mi. W. Foresthill, Placer Co., May 6, 1962, W. H. Lange; Greene Valley, Solano Co., March 29, 1960, S. F. Bailey; Putah Cyn., Yolo Co., April 9, 1961, M. E. Irwin; Alum Rock Park, Santa Clara Co., April 3, 1957, R. K. Eppley, March 10, 1956, D. J. Burdick. *Idaho*: Webb, Nez Perce Co., May 15, 1951, W. F. Barr; Krassel, June 6, 1957, in flight, M. M. Furniss. *Nevada*: "Nev." *Oregon*: Salem, April 21, 1949, J. E. Davis; Moffet Mead, Blue Mtns., May 17, 1928, E. C. VanDyke; Umatilla Co., Wildwoman Springs, 3 mi. E. N. E. Tollgate, 5100', July 11, 1964, T. Schuh and J. D. Lattin. *Utah*: Logan, May 13, 1940, A. B. Haws. *Wyoming*: Grand Teton N. Pk., July, 1947, R. M. Bohart.

Host.—Larvae of this species feed on species of *Sambucus*.

Larva.—The larvae were numerous on elderberry during the last part of April and in May at Davis, Calif., and were collected and sent to me by Frank D. Parker. They were not associated by rearing.

In late instar, body entirely green, tubercles of same color as rest of body. Head and spiracles light brown. Ocularium and apical one-third of mandible black.

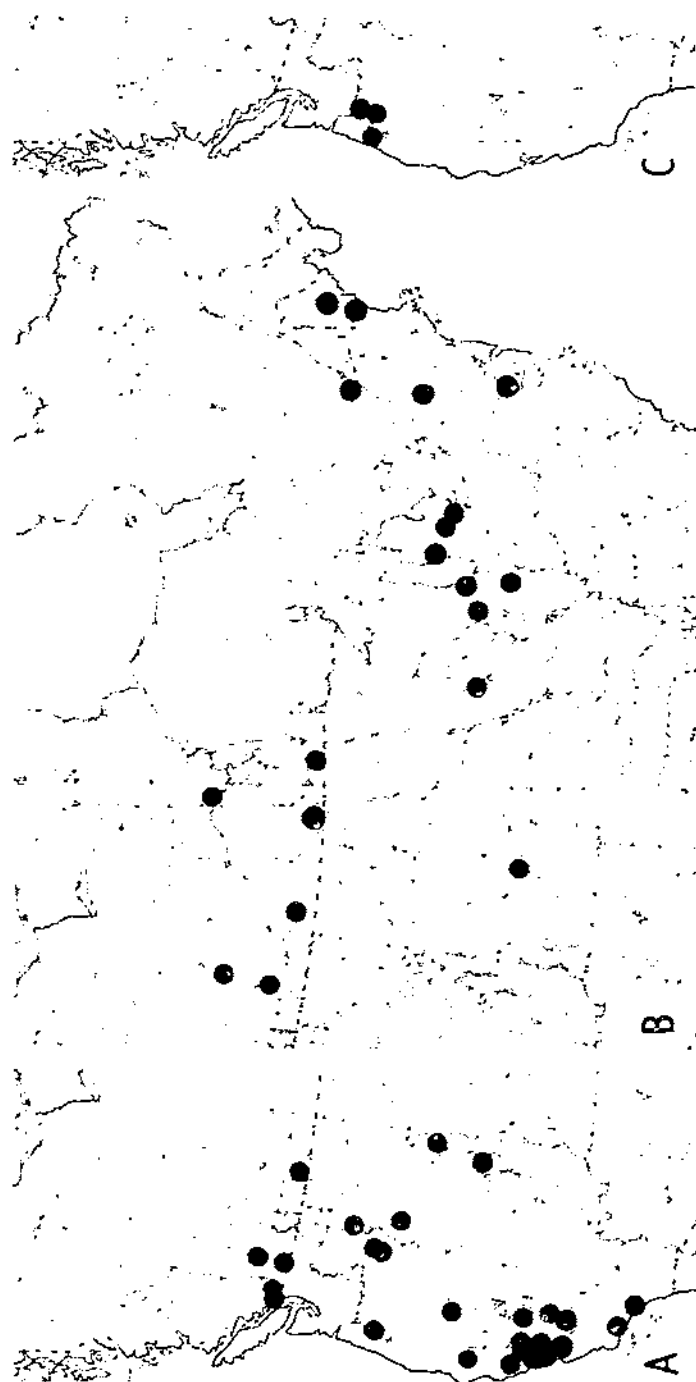


FIGURE 9.—Distribution of (A) *Lagonis nevadensis*, (B) *Monophadnus nevadensis*, and (C) *M. assaricus*.

Clypeus with two setae on each side. Labrum usually with two setae on each side (in a few cases, three were present); shallow central emargination present; epipharynx with 10 to 12 spines located in arcuate row on each anterolateral half (pl. XVI, 318). Each mandible with one seta on outer lateral surface; left mandible with three ventral teeth and two sharp and one truncate lateral teeth (pl. XVI, 317); right mandible with three ventral teeth, one sharp and one truncate lateral teeth, and one molar tooth (pl. XVI, 316). Maxillary palpus four-segmented; one seta on outer margin of second segment; palpifer with three setae; stipes with one seta; lacinia with 10 to 11 spines (pl. XVI, 319). Labial palpus three-segmented; second segment with two setae; prementum with three setae on each side.

Thorax with tubercles arranged as in plate XVI, 315. Prothoracic spiracle not winged. Each thoracic sternum with pair of setiferous tubercles. Thoracic legs normal; femur longer than tibia; setae present on all surfaces of each segment.

Abdominal segments 1 through 8 each with six dorsal annulets (typical segment shown in pl. XVI, 314). Annulets 1, 3, 5, and 6 without tubercles; annulet 2 with three or four pairs of tubercles on each side, at times they may be single; annulet 4 with four pairs of tubercles on each side; first postspiracular lobe with one tubercle; second postspiracular lobe with two tubercles; subspiracular lobe with row of seven to nine tubercles; surpedal lobe with row of seven to nine tubercles. Inner lower surface of each proleg with several setae. Ninth abdominal segment and 10th abdominal segment as in plate XVI, 313. Tenth abdominal tergum with posterior row of numerous tubercles.

Discussion.—The thorax varies from largely rufous in the southern part of the range of this species to entirely black in the northern part. Both sexes are easily recognized by the large punctures of the scutellum and mesepisternum, which are lacking in the species of all closely related genera.

Genus *MONOPHADNUS* Hartig

Tenthredo subgenus *Monophadnus* Hartig, 1837, p. 271.

Selandria subgenus *Monophadnus* Hartig, Norton, 1867, p. 250; Cresson, 1880b, p. 59.

Monophadnus Hartig, Konow, 1886, p. 244; Dalla Torre, 1894, p. 160; Konow, 1898, p. 231; Ashmead, 1898a, p. 253; Konow, 1903b, p. 170; Konow, 1905, p. 85; Rohwer, 1911c, p. 224; Enslin, 1914, p. 289; MacGillivray, 1916, p. 148; Dittrich, 1924, p. 627; Malaise, 1935, p. 167; Ross, 1937, p. 98; Berland, 1947, p. 251; Pasteels, 1948, p. 187; Ross, 1951, p. 67; Benson, 1952, p. 101; Takeuchi, 1952, p. 54; Benson, 1954, p. 281; Lorenz and Kraus, 1957, p. 119.

Type: *Tenthredo albipennis* Gmelin. Designated by Ashmead (1898a).

Monophadnus subgenus *Doderia* Malaise, 1935, p. 167; Pasteels, 1948, p. 187 (*Monophadnus* Hartig).

Type: *Tenthredo (Allantus) spinolae* Klug. Original designation.

Description.—Antenna short and stout with second segment as wide as long or longer than wide and third segment longer than fourth segment (pl. III, 53-57). Clypeus truncate; malar space as narrow as or narrower than one-half diameter of front ocellus;

postorbital groove present or absent; postgenal carina developed part way below eye, never exceeding one-fourth length of eye. Prepectus absent or only slightly indicated by upturned margin of anterior edge of mesepisternum, but not separated from latter by groove or suture. Tarsal claw simple, with small inner tooth, or with inner tooth nearly subequal in length to outer tooth; basal lobe absent (pl. II, 13, 14, 15). Forewing with stub of 2A and 3A straight (pl. I, 1). Hindwing with crossvein *m-cu* present, enclosing cell *M*. Penis valve of male genitalia without lateral spine or basal lobe (pl. X, 221, 223, 225, 227, 229).

This genus is close to *Phymatocera*, *Paracharactus*, *Rhadinoceraea*, and *Lagonis*, but may be separated by the straight 2A and 3A vein of the forewing and the third antennal segment being longer than the fourth segment. Superficially it also resembles *Monophadnus*, but *Monophadnus* lacks the basal lobe of the tarsal claw, retains cell *M* of the hindwing, and lacks the lateral spine on the penis valve in the male genitalia. Various species in this genus have been put in *Blennocampa* on the basis of the presence of the inner tooth of the tarsal claw; however, in evaluating other characters on which this genus is based, the tarsal claw was found to be rather variable. The main character of the tarsal claw is the lack of a basal lobe.

Monophadnus previously had been placed in the *Blennocampini* by Benson (1938) and Takeuchi (1952), but the larval characters and the resemblance of the male genitalia associate this genus with the *Phymatocerini*.

Seven Nearctic species are in this genus and probably about six Palearctic species. The larvae are associated with *Ranunculus*.

Larva.—Larvae are known for *pallidus*, *aequalis*, and possibly *californicus*. The larval association with *californicus* is by host relationship only. Since I have not seen the larva of *pallidus* and the larva of *californicus* is questionable, generic characters are not given. The larval characters of *aequalis*, however, substantiate the close relationship of this genus to *Phymatocera* and *Rhadinoceraea*, and the placement of this genus in the *Phymatocerini*.

Keys to *Monophadnus* Species

ADULTS

- | | |
|--|---|
| 1. Female..... | 2 |
| Male..... | 8 |
| 2. Tarsal claw simple (pl. II, 13)..... | 3 |
| Tarsal claw with large or small inner tooth (pl. II, 14, 15)..... | 6 |
| 3. Abdomen and mesopleuron mostly light rufous or reddish brown | |
| <i>M. lattini</i> , n. sp. | |
| Mesopleuron black; abdomen at most with narrow white margin on posterior edge of each segment..... | 4 |
| 4. Narrow white band present on posterior edge of each abdominal segment; antenna with third segment $1\frac{1}{2}$ times or less length of fourth segment (pl. III, 56); basal plates widely separated medially, leaving wide membranous area (pl. II, 23)..... | |
| <i>M. assaracus</i> MacGillivray | |
| Abdomen entirely black; antenna with third segment nearly twice length of fourth segment and subequal to fourth plus fifth segments (pl. III, 53); basal plates not widely separated (pl. II, 24)..... | 5 |

5. Tegula white; upper angles of pronotum reddish brown; sheath truncate at apex (pl. IV, 100); serrulae of lancet rounded (pl. VIII, 160)
M. aequalis MacGillivray
- Tegula reddish brown or black; upper angles of pronotum black; sheath rounded at apex (pl. V, 106); serrulae of lancet pointed (pl. VIII, 166)-----*M. pallescens* (Gmelin)
6. Tarsal claw with small inner tooth (pl. II, 14); tegula white; eastern North America-----*M. bakeri*, n. sp.
- Tarsal claw with long inner tooth, nearly subequal in length to outer tooth (pl. II, 15); tegula black; western North America----- 7
7. Sheath large and rounded, usually slanting upward (pl. V, 104); medial part of lancet with low, rounded serrulae (pl. VIII, 164)
M. contortus (MacGillivray)
- Sheath smaller, pointed, ventral and dorsal margins meeting at median apex (pl. V, 103); lancet with serrulae flat (pl. VIII, 163)
M. californicus (Rohwer)
8. Tarsal claw simple (pl. II, 13)----- 9
- Tarsal claw with inner tooth (pl. II, 14, 15)----- 11
9. Abdomen with several tergites rufous or reddish brown-----*M. lattini*, n. sp.
- Abdomen black, at most with narrow white margin on posterior edge of each segment----- 10
10. Basal plates widely separated mesally, leaving wide membranous area (pl. II, 23); narrow white margin on posterior edge of each abdominal segment usually present; parapenis longer than wide (pl. X, 222); western North America-----*M. assaracus* MacGillivray
- Basal plates not widely separated (pl. II, 24); abdomen entirely black; parapenis as wide as or wider than long (pl. X, 220); eastern North America-----*M. aequalis* MacGillivray
11. Harpe oblong (pl. X, 226); penis valve with dorsal margin concave, ventral margin with rather angulate corners (pl. X, 227); usually from California-Oregon border northward-----*M. contortus* (MacGillivray)
- Harpe rounded (pl. X, 224); penis valve with dorsal margin straight, ventral margin rounded, without angulate corners (pl. X, 225); usually from California-Oregon border southward
M. californicus (Rohwer)

LARVAE

1. Head entirely black-----*M. pallescens* (Gmelin)
- Head brown or yellow with dark brown spot on each side of vertex----- 2
2. Head brown with ocellarium black; tubercles usually dark
M. californicus (Rohwer) (?)
- Head yellow with brown spot on each side of vertex; tubercles of body small, of same color as body-----*M. aequalis* MacGillivray

Descriptions of *Monophadnus* Species*Monophadnus aequalis* MacGillivray

- Monophadnus aequalis* MacGillivray, 1908a, p. 292, ♀; MacGillivray, 1916, p. 150; Frison, 1927, p. 253; Ross, 1951, p. 67; Benson, 1962, p. 391 (= *pallescens* Gmelin [!]).
- Monophadnus plicatus* MacGillivray, 1908a, p. 292, ♂, ♀; MacGillivray, 1916, p. 150; Frison, 1927, p. 253; Ross, 1951, p. 67 (= *aequalis* MacGillivray).
- Monophadnus transversus* MacGillivray, 1908a, p. 292, ♀; MacGillivray, 1916, p. 150; Frison, 1927, p. 253; Ross, 1951, p. 67 (= *aequalis* MacGillivray).
- Monophadnus truncatus* Rohwer, 1912, p. 232, ♀; Ross, 1951, p. 67 (= *aequalis* MacGillivray).

Female.—Average length, 6.8 mm. Head and antenna black. Thorax black with tegula white and upper angles of pronotum reddish brown. Legs black with extreme apex of each femur, each tibia, and each tarsus white; tarsi infusate apically. Abdomen

black with very narrow white margin on posterior edge of each segment. Wings hyaline.

Antenna short and stout, second segment longer than wide, third segment subequal in length to fourth plus fifth segments (pl. III, 53). Head with vertex and upper inner orbits shining, remainder roughened, dull, and lightly punctate. Malar space equal to one-half diameter of front ocellus. Thorax with dorsum and mesopleuron finely punctate, scutellum and prothorax more densely so; pectus smooth and shining. Tarsal claw simple. Basal plates not widely divided mesally, only small membranous area present (pl. II, 24). Sheath straight above, rounded below, obliquely truncate at apex (pl. IV, 100). Lancet with serrulae low and rounded, without distinct subbasal teeth (pl. VIII, 160).

Male.—Average length, 6.5 mm. Color similar to that of female except for tegula, which is darker, and pronotum, which is entirely black. Structure similar to that of female. Parapenis as wide as or wider than long (pl. X, 220); harpe and penis valve as in plate X, 220 and 221.

Holotypes.—The MacGillivray types are all at the Illinois Natural History Survey. Their labels read as follows: *M. aequalis* (♀), "Ithaca, N.Y., May 3, 1896"; *M. plicatus* (♀), "Ames, Ia."; *M. transversus* (♀), "Mich." *M. truncatus* Rohwer (♀) is type No. 14553 at the U.S. National Museum and bears the data "Oxbow, Sask., April 1, 1907, Fred K. Knab, collector."

Distribution.—Alberta to Quebec south to Colorado, Illinois, and Maryland (fig. 9, B). It does not occur west of the Rocky Mountains.

North American Records.—*Alberta*: Gull Lake, June 24, 1929, E. H. Strickland; Bilby, June 19, 1924, G. Salt; High River, June 25, 1927, O. Bryant. *Colorado*: Ft. Collins, June 6, 1899; "Colo.," collection C. F. Baker. *Illinois*: White Pines St. Pk., April 18, 1931, T. H. Frison; Halfday, May 19, 1944, Ross and Sanderson; White Heath, April 28, 1916, on flowers of *Claytonia*, April 28, 1929, C. C. Goff, April 25, 1915; Cary, April 13, 1945, on anemone, H. H. Ross; Zion, Dunes Park, May 21, 1942, Ross and Riegel. *Iowa*: Ames, April 26, 1897. *Maine*: Kennebec Co., 5 mi. N. Litchfield, May 24, 1966, D. R. Smith; Piscataquis Co., Brownville Junction, May 27, 1966, D. R. Smith. *Manitoba*: Aweme, July, 1912, S. Criddle; Wanless, July 2, 1961, H. E. Milliron. *Maryland*: Glen Echo, May 19, R. M. Fouts; Plummerville Island, April 27, H. S. Barber. *Michigan*: East Lansing, April 29, 1942, C. Sabrosky; Ann Arbor, Washtenaw Co., May 3, 1918, F. M. Gaige; White River, White Cloud, May 29, 1939, Frison and Ross; Barton Marsh, Ann Arbor, Washtenaw Co., May 22, 1919, T. H. Hubbell; Ag. Coll., May 27, 1920, L. J. Bottimer. *New York*: Ithaca, May 8, 1915, May 3, 1896. *Ontario*: Ottawa, May 11, 18; Bells Corners, May 17, 1945, O. Peck. *Quebec*: Beech Grove, May 15, 1951, J. F. McAlpine; Hull, May 31, 1903. *Saskatchewan*: Swift Current, June 21, 1937, A. H. Sparrow; Oxbow, April 1, 1907, F. K. Knab.

Host.—Larvae of what probably are this species have been taken from *Ranunculus* in Illinois by Ross and Sanderson. Closely related European species feed on *Ranunculus*.

Larva.—The larva described here was taken from *Ranunculus* at Cary, Ill. It is not associated by rearing, but adults of *aequalis* were taken from the same locality during the same year. The association of closely related species of this genus with *Ranunculus* and the similarity of this larva to other *Monophadnus* species, as described by Lorenz and Kraus (1957), also support this association.

In late instar, entirely light creamy white, small tubercles same color as rest of body; head yellowish with one large brown spot on each side of vertex; ocellarium black.

Clypeus with two setae on each side. Labrum with three setae on each side; narrow central emargination present; epipharynx with nine or 10 spines located in arcuate row on each half (pl. XV, 309). Each mandible with one seta on outer lateral surface; left mandible with three sharp ventral teeth and two sharp and one truncate lateral teeth (pl. XV, 308); right mandible with three ventral teeth, two sharp and one truncate lateral teeth, and one molar tooth (pl. XV, 307). Maxillary palpus four-segmented; second segment of palpus with one seta on outer margin; palpifer with three setae; lacinia with nine to 10 spines (pl. XV, 310). Labial palpus three-segmented; prementum with three setae on each half.

Glandubae of thorax arranged as in plate XV, 312, varying slightly as to number on each annulet and lobe. Thoracic legs normal; femur longer than tibia; setae on inner margins of each leg.

Abdominal segments 1 through 8 each with six dorsal annulets (typical segment shown in pl. XV, 311). Annulets 1, 3, 5, and 6 without glandubae; annulet 2 with three glandubae on each side; annulet 4 with two glandubae on each side; each postspiracular lobe and surpedal lobe with one glanduba; subspiracular lobe with two or three glandubae. Ninth segment with glandubae approximately as for other segments. Tenth tergum with six to eight glandubae located centrally; setae numerous on subanal and suranal areas.

The dark spots on the head will immediately separate this larva. Lorenz and Kraus (1957) stated that the head is entirely black in *pallescens*.

Discussion.—This species is closely related to but distinct from *pallescens*, and the differentiating characters were probably not clear to Benson (1962) when he synonymized it with *pallescens*. The females may be separated by the obliquely truncate sheath, rounded serrulae of the lancet, the roughened thorax, and the light-colored upper angles of the pronotum and tegula. The males may be separated by coloration and genitalia.

Monophadnus assaracus MacGillivray

Monophadnus assaracus MacGillivray, 1923c, p. 26, ♂; Frison, 1927, p. 253; Ross, 1951, p. 67.

Female.—Average length, 6.9 mm. Head and antenna black. Thorax black with tegula white. Legs black with extreme apex of each femur and base of each tibia white. Abdomen black with narrow white margin on posterior edge of each segment, which is sometimes wider mesally. Wings hyaline.

Antenna with second segment as wide as long, third segment longer than fourth segment but only $1\frac{1}{2}$ times its length (pl. III, 56). Malar space equal to one-half diameter of front ocellus. Head smooth and shining except for very fine punctures, most noticeable on clypeus and postorbital areas. Thorax shining, with dorsum and mesopleuron finely punctate, pronotum and hindmargin of scutellum more densely so. Prescutum and scutellum separated from lateral lobes by very deep furrows; lateral lobes distinctly protuberant and raised above rest of thorax. Tarsal claw simple. Basal plates widely separated mesally, leaving large membranous area (pl. II, 23). Sheath straight above, rounded below (pl. V, 101). Lancet with serrulae low and rounded (pl. VIII, 161).

Male.—Average length, 6.5 mm. In color and structure similar to female. Parapenis higher than wide (pl. X, 222); harpe and penis valve as in plate X, 222 and 223.

Holotype.—The type (♂) is located at the Illinois Natural History Survey and bears the data "Rock Creek, Oregon, March 19."

Distribution.—Known only from Oregon (fig. 9, C).

North American Records.—Oregon: Mary's Peak, April 28, 1963, April 29, 1963, May 12, 1963, rotary trap; N. Santiam River, 10 mi. N. Hwy. 20, Linn Co., June 24, 1954, J. C. Downy; Bagby Hot Springs, Clackamas Co., May 5, 1962, K. Goeden.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species may be separated from the other species of this genus with simple tarsal claws by its coloration, antenna, basal plates, and genitalia. It is the only known western species besides *pallenscens* to have a simple tarsal claw. Among the several specimens at hand, the white margin on the posterior edge of the abdominal segments varied as to width, the tegula was either white or dark brown, and the upper angles of the pronotum were either dark brown or black.

Monophadnus bakeri, new species

Female.—Length, 6.7 mm. Head and antenna black; labrum light. Thorax black with tegula white. Legs black with first segment of each midtrochanter and hindtrochanter, extreme apex of each femur, all tibiae, and all tarsi white; tarsi infuscate apically. Abdomen black. Wings hyaline.

Antenna with second segment as wide as long; third segment longer than fourth but less than segments 4 plus 5 (pl. III, 54). Head shining, finely punctate, more densely so on frons, parantennal fields, genal areas, and clypeus. Clypeus truncate; postorbital groove indistinct; postgenal carina only slightly developed

below eye; malar space nearly linear, less than one-half diameter of front ocellus. Thorax smooth and shining, very finely punctate; pronotum and posterior margin of scutellum more densely punctate. Prepectus absent. Tarsal claw with very small inner tooth (pl. II, 14); basal lobe absent. Basal plates not widely divided on meson, only small membranous area present (pl. II, 24). Sheath straight above, rounded below (pl. V, 102). Lancet with serrulae low and pointed, apex of serrulae flat; subbasal teeth distinct (pl. VIII, 162).

Male.—Unknown.

Holotype.—Female, White Heath, Ill., April 25, 1915. Deposited at the Illinois Natural History Survey.

Paratypes.—*Kansas*: Lawrence, April 18, 1938, L. J. Lipovsky (1 ♀). *Maryland*: Plummers Island, June 1, 1913, H. S. Barber (1 ♀). *Montana*: "Montana" (1 ♀). *Virginia*: Great Falls, April 30, collection N. Banks (1 ♀).

Disposition of Paratypes.—Paratypes have been deposited at the Illinois Natural History Survey, U.S. National Museum, and Museum of Comparative Zoology, Harvard University.

Distribution.—Maryland west to Kansas and Montana (fig. 10, A). Although only a few specimens are available, this species is apparently widespread.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This is the only species in this genus with the small inner tooth of the tarsal claw as opposed to those with the simple tarsal claw and those with the long inner tooth. Coloration, antenna, basal plates, and genitalia will also serve to separate it from other members of this genus. Several specimens were examined from widely separated localities; all were constant in their coloration and structure.

This species is named after Charles W. Baker, Department of Biological Sciences, California State Polytechnic College, San Luis Obispo.

Monophadnus californicus (Rohwer), new combination

Nrocharactus californicus Rohwer, 1909a, p. 89, ♀; Stannard, 1949, p. 38.

Paracharactus californicus, Rohwer, 1912, p. 231.

Monophadnoides conductus MacGillivray, 1923c, p. 24, ♀; Frison, 1927, p. 252.

New synonymy.

Biennocampa conducta, Ross, 1951, p. 67.

Female.—Average length, 7.3 mm. Entirely black with extreme apex of each femur, each tibia, and each tarsus white; narrow margin on posterior edge of each abdominal segment white. Wings moderately infusate.

Antenna with second segment as wide as long, third segment longer than fourth segment but less than length of segments 4 plus 5 (pl. III, 55). Head smooth and shining; clypeus roughened. Postgenal carina faintly indicated below eye; postorbital groove distinct with small punctures; malar space equal to one-half diameter of front ocellus. Thorax smooth and shining, fine scattered

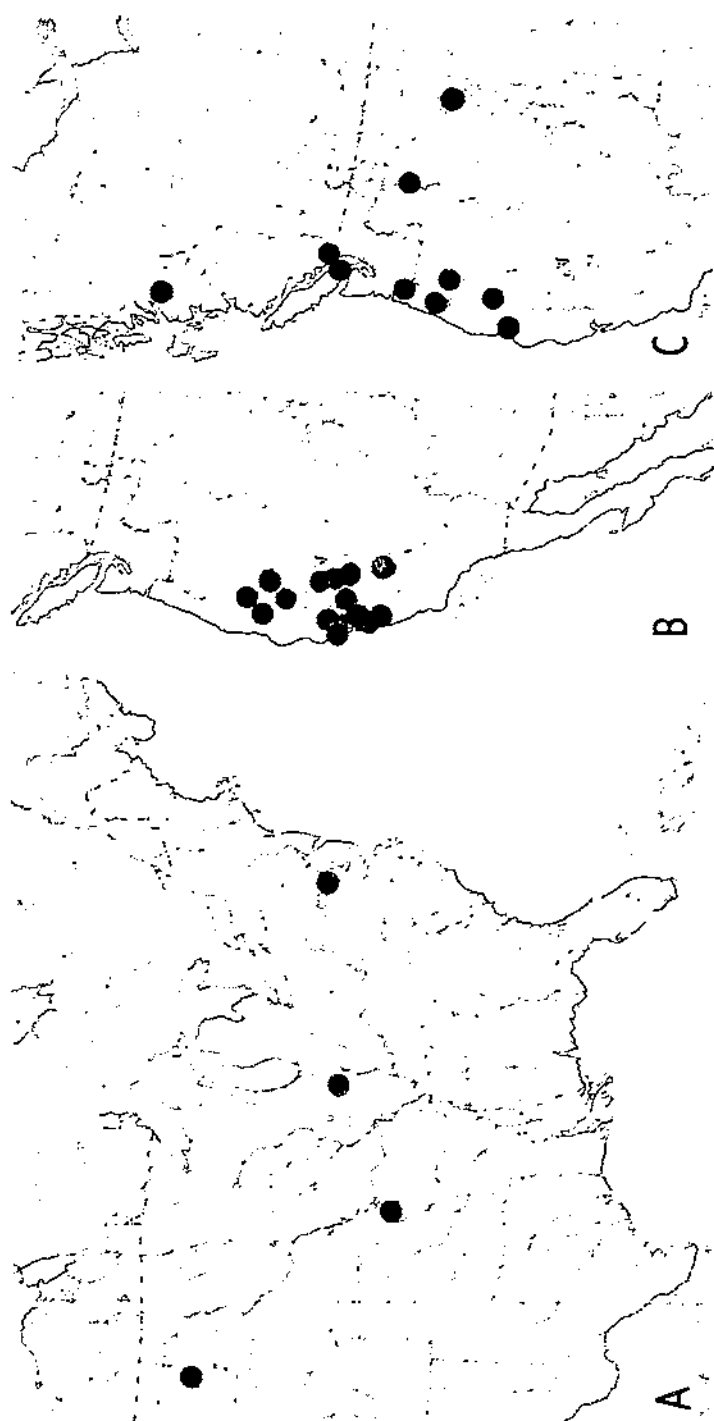


FIGURE 10.—Distribution of (A) *Monophthalmus bakeri*, (B) *californicus*, and (C) *contortus*.

punctures on dorsum, mesopleuron, and pectus; pronotum more densely punctate, roughened; several large punctures on posterior edge of scutellum and posttergite. Prepectus indicated by upturned margin of anterior edge of mesepisternum but not separated by suture or furrow. Tarsal claw with long inner tooth, nearly subequal in length to outer tooth; basal lobe absent (pl. II, 15). Basal plates not widely separated on meson, only small membranous area present (pl. II, 24). Sheath with lower margin slightly curved, upper margin straight, then abruptly curved near apex forming obliquely truncate margin above (pl. V, 103). Lancet with serrulae flat; subbasal teeth distinct (pl. VIII, 163).

Male.—Average length, 6.8 mm. In color and structure similar to female. Harpe almost evenly rounded, not oval (pl. X, 224); penis valve with dorsal margin flat, not distinctly concave (pl. X, 225).

Holotypes.—*M. californicus* Rohwer (?) is type No. 14556 at the U.S. National Museum and bears the data "Palo Alto, Cal., Feb. 29, 1892." The type of *M. conductus* MacGillivray (?) is at the Illinois Natural History Survey and bears the data "Sta. Clara Co., Calif., May, 1902, Coleman."

Distribution.—Confined to extreme southern Oregon and California (fig. 10, B).

North American Records.—California: Dunsuir, May 21, 1936, G. H. and J. L. Sperry; Hills back of Oakland, March 22, 1940, E. Zimmerman; Shingletown, Shasta Co., June 2, 1941, *Ranunculus*; Forestville, April 20, 1933, A. T. McClay; Stan. U., April 3, 1915, from *Ranunculus* sweepings, H. Morrison; Modoc Nat. For., June 11, 1933, K. A. Salman; Berkeley, February 23, 1945, W. W. Middlekauff, March, 1934, R. M. Bohart; Sobre Vista, Sonoma Co., April 30, 1911, J. A. Kusche; Truckee, June 10, 1953, A. D. Telford; Markleeville, Alpine Co., May 29, 1959, May 29, 1957, grass, R. P. Allen; Cabin, May 30, 1956, R. E. Darby; Calistoga, March 18, 1947, R. M. Bohart; Siskiyou Co.; Redwood City, March 30, 1943, P. H. Arnaud; Petaluma, May 18, 1946, T. O. Thatcher; Lake Tahoe, June 19, 1936, R. M. Bohart; Oakland, April 17, 1937, E. S. Ross; Colusa Co., Rumsey Cn., April 1, 1961, J. Gantenbein; Alta Meadow, Sequoia Nat. Pk., 9000', July 19, 1907, J. C. Bradley; Elk Grove, Sacramento Co., April 2, 1952, E. C. Carlson; Monterey Co., April 5, 1904, *Pinus radiata*, Coleman. Oregon: Pinehurst, Jackson Co., 3375', May 19, 1960, D. R. Smith.

Host.—Collection records indicate it may be found on *Ranunculus*. This agrees with the known host for some other members of this genus.

Larva.—The larva described here was taken from *Ranunculus* at Sonoma, Calif. It was not associated by rearing. However, *californicus* is the only known *Monophadnus* from this region, *Ranunculus* is the host for some closely related species, adults of *californicus* have been collected from *Ranunculus*, and the larva is close to other known *Monophadnus* larvae.

In late instar, body creamy white; head capsule, tubercles, segments of thoracic legs, and spiracles brown; ocularium black.

Clypeus with two setae on each side. Labrum with three setae on each side; narrow central emargination present; epipharynx similar to that of *aqualis* (pl. XV, 309). Each mandible with one seta on outer lateral margin; left and right mandibles similar to those of *aqualis* (pl. XV, 307, 308). Maxillary palpus four-segmented; second segment of palpus with one seta on outer margin; palpifer with three setae; galea conical; lacinia with nine to 10 spines. Labial palpus three-segmented; prementum with three setae on each side.

Thoracic legs normal; femur longer than tibia; setae mainly confined to inner margins of legs. Each thoracic sternum with pair of setiferous tubercles. Tubercles of thorax arranged similarly to those of *aqualis* (pl. XV, 312).

Abdominal segments 1 through 8 each with six dorsal annulets. Spiracles lightly winged. Glandulae or tubercles long and slender, darkened. Annulets 1, 3, 5, and 6 without tubercles; annulet 2 with four or five tubercles on each side; annulet 4 with four to six tubercles on each side; first postspiracular lobe with one or two tubercles; second postspiracular lobe with two to four tubercles; subspiracular lobe with two to five tubercles; surpedal lobe with three or four tubercles. Ninth segment similar to that of *aqualis*. Tenth tergum with 16-20 tubercles scattered on its surface and one tubercle above each proleg. Subanal and suranal areas with numerous setae.

The entirely brown head, more numerous and darkened tubercles, especially on the 10th tergum, and distribution will separate this larva from other known larvae of this genus.

Discussion.—This species may be recognized by the long inner tooth of the tarsal claw and may be separated from its closest relative, *contortus*, by the lancet, sheath shape, and characters of the male genitalia.

Monophadnus contortus (MacGillivray), new combination

Monophadnoides contorta MacGillivray, 1923a, p. 78, ♀; Frison, 1927, p. 252.

Blennocampa contorta, Ross, 1951, p. 67.

Monophadnus aeratus MacGillivray, 1923a, p. 79, ♂; Frison, 1927, p. 253; Ross, 1951, p. 67. New synonymy.

Aphanisus obsitus MacGillivray, 1923c, p. 7, ♀; Frison, 1927, p. 237; Ross, 1951, p. 67 (*contorta* MacGillivray).

Aphanisus occiduus MacGillivray, 1923c, p. 7, ♀; Frison, 1927, p. 237; Ross, 1951, p. 67 (*contorta* MacGillivray).

Female.—Average length, 7.4 mm. Entirely black with extreme apex of each femur and base of each tibia white. Wings moderately infusate.

Antenna with second segment as long as wide, third segment longer than fourth segment but shorter than segments 4 plus 5 (pl. III, 55). Head shining, finely punctate especially on genal areas; clypeus roughened. Postorbital groove distinct; postgenal carina developed below eye; malar space equal to one-half diameter of front ocellus. Thorax shining; dorsum and mesopleuron finely punctate; pronotum densely punctate; posterior margin of scutellum and posttergite with several large punctures; pectus

smooth and shining. Prepectus indicated by upturned margin of anterior edge of mesepisternum but not separated by suture or furrow. Tarsal claw with long inner tooth, nearly subequal to outer tooth in length; basal lobe absent (pl. II, 15). Basal plates not widely divided on meson, only small membranous area present (pl. II, 24). Sheath long and evenly rounded at apex, usually distinctly slanted upward (pl. V, 104). Lancet with serrulae low and rounded with subbasal teeth distinct (pl. VIII, 164).

Male.—Average length, 6.8 mm. In color and structure similar to female. Harpe oblong (pl. X, 226); penis valve with dorsal margin concave (pl. X, 227).

Holotypes.—All the MacGillivray types are at the Illinois Natural History Survey. They bear the following data, respectively: *M. contorta* (♀), "Corvallis, May 7, Ballard Collection"; *M. aeratus* (♂), "Corvallis, April 13, Gooding Collection"; *A. obsitus* (♀), "Moscow, Idaho"; and *A. occidentalis* (♀), "Juliaetta, Idaho."

Distribution.—Yukon Territory south to northern California and east to Montana (fig. 10, C).

North American Records.—*British Columbia*: Langley Pr., May 11, 1929, R. Graham; Holtic. June 4, 1926, Ginoble; Horne Lk., June 4, 1955, R. Coyle; Port Hammond, May 13, 1919, W. B. Anderson; Victoria, V. I., April, 1886, Taylor; Kitsumkalum Lk., 20 mi. N. Terrace, May 31, 1960, W. W. Moss. *California*: Orleans, Humboldt Co., May 7, 1962, *P. menziesii*, T. W. Koerber. *Idaho*: Moscow; Juliaetta. *Montana*: Gallatin Co., May 17, 1932. *Oregon*: Corvallis, April 6, 18, 1935, G. Ferguson, May 7, 1938, A. T. McClay, May 6, 1955, G. Bennett; Columbia, May 19, 1962; Mary's Peak, May 12, 1963, May 14, 1964, rotary trap; Indian Ford Cr., 6 mi. N. W. Sisters, Deschutes Co., May 17, 1963, D. R. Smith; Little Squaw Lk., 7 mi. E. Copper, Jackson Co., 3200', R3W, T41S, Sec. 2, May 22, 1964, D. R. Smith. *Yukon Territory*: Westholm, May 3, 1917, A. E. Cameron.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species and *californicus* may be separated from other members of this genus by the long inner tooth of the tarsal claw. This species may be separated from *californicus* by the sheath shape and lancet of the female and the genitalia of the male. The range is more northern. It is found from the Oregon-California border northward, whereas *californicus* is found south of this region.

Monophadnus lattini, new species

Female.—Length, 6.5 mm. Head and antenna black with clypeus and mouth parts orange yellow. Thorax with dorsum of mesothorax, except scutellum, pectus and metapleuron black, remainder whitish to orange yellow. Legs with each coxa, trochanter, and femur orange yellow; each tibia and tarsus whitish with tarsi infusate apically. Abdomen mostly orange yellow with infusate areas on lateral margins, apical segments, and sheath; narrow

white band present on posterior margin of each segment. Wings hyaline.

Antenna with second segment as wide as long, third segment longer than fourth segment but not as long as fourth plus fifth segments (pl. III, 56). Head mostly shining with finely punctate areas on paraantennal fields and genal area; clypeus roughened. Clypeus truncate; postorbital groove present, with small punctures; postgenal carina developed below eye; malar space equal to one-half diameter of front ocellus. Thorax mostly shining, finely punctate, more densely so on pronotum and posterior margin of scutellum. Prepectus absent. Tarsal claw simple. Basal plates widely divided on meson, leaving large membranous area (pl. II, 23). Forewing with stub of 2A and 3A straight at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below (pl. V, 105). Lancet with serrulae flat, sub-basal teeth distinct (pl. VIII, 165).

Male.—Length, 6.3 mm. Head and antenna black. Thorax black with tegula and upper angles of pronotum light rufous. Legs with each coxa, trochanter, and most of each femur black; extreme apex of each femur, tibia, and tarsus whitish; tarsi infuscate apically. Abdomen mostly black with some orange areas on central terga and narrow white band on posterior margin of each segment.

Structure similar to that of female. Parapenis higher than wide (pl. X, 228); harpe and penis valve as in plate X, 228 and 229.

Holotype.—Female, Madison, Wis., May 2, 1930. Deposited at the Illinois Natural History Survey.

Allotype.—Male, Madison, Wis., May 2, 1927, Chas. L. Fluke. Deposited with the holotype.

Paratypes.—*Connecticut*: Lyme, March 18, W. S. Fisher (1♀). *Manitoba*: Aweme, May 6, 1925, R. D. Bird (1♀); Aweme, May 1, 1922, R. M. White (1♀); Aweme, May 20, 1935, R. D. Bird (1♀); Aweme, May 1, 1925, W. Criddle (1♀). *Massachusetts*: Wellesley, May 16, 1900, Chas. L. Fluke (1♀). *Minnesota*: Itasca Park, May 23, 1937, sweeping, H. R. Dodge (1♂). *New Hampshire*: Hampton, May 1, 1910, S. A. Shaw (1♀). *Wisconsin*: Madison, May 6, 1923 (1♀).

Disposition of Paratypes.—Paratypes have been deposited at the Illinois Natural History Survey, Canadian National Collection, U.S. National Museum, and the University of Wisconsin.

Distribution.—Northern United States and southern Canada from Minnesota to New England (fig. 11, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species most closely resembles the western *assaracus* on the basis of antennae, basal plates, and male genitalia. It is easily separated from this species and the others, however, by its coloration and the low, flat serrulae of the female lancet.

This species is named after John D. Lattin, associate professor of Entomology at Oregon State University.

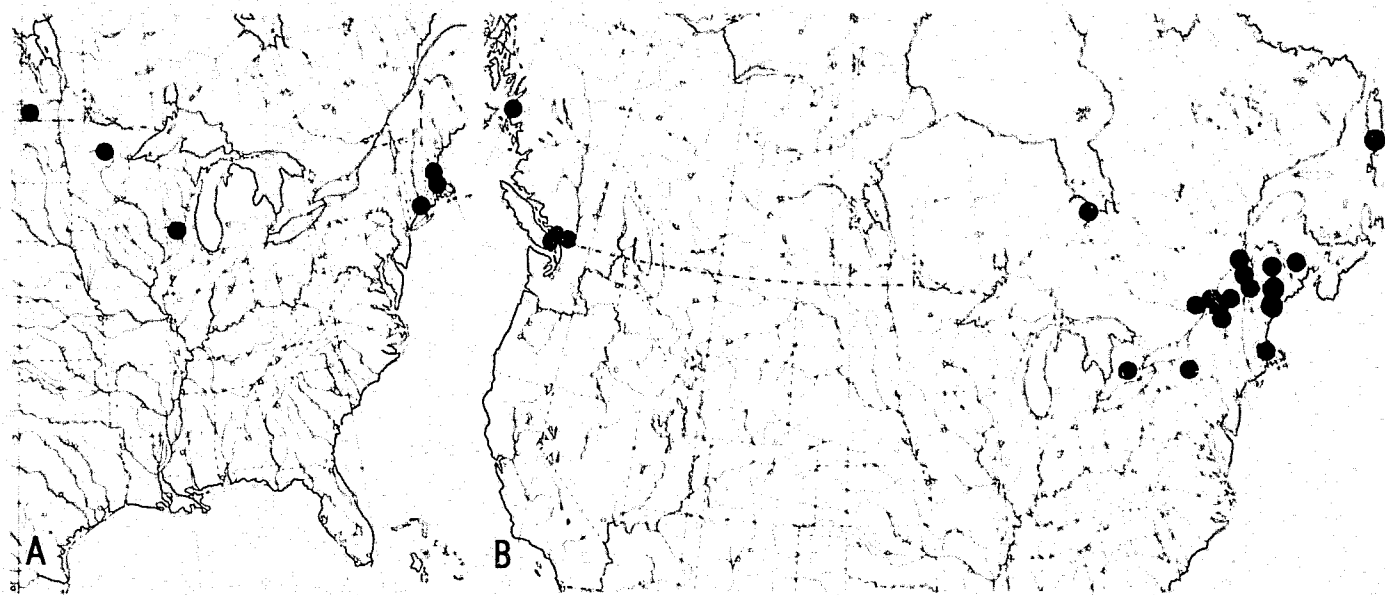


FIGURE 11.--Distribution of (A) *Monophadnus lattini* and (B) *pallescens*.

Monophadnus pallescens (Gmelin)

- Tenthredo albipes* Gmelin, 1790, p. 2667; Klug, 1814, p. 67; Hartig, 1837, p. 272; Eversmann, 1847, p. 31; Kriechbaumer, 1884, p. 112. Preoccupied by *Tenthredo albipes* Geoffroy, 1781.
- Selandria albipes*, Stephens, 1835, p. 49; Vollenhoven, 1876, p. 270.
- Monophadnus albipes*, Kaltenbach, 1867, p. 71; Kaltenbach, 1874, p. 9; Konow, 1886, p. 246; Dalla Torre, 1894, p. 160; Konow, 1905, p. 86; Crevecoeur and Maréchal, 1938, p. 495.
- Blennocampa albipes*, Thomson, 1870, p. 281; Cameron, 1877a, p. 57; André, 1881, p. 313; Cameron, 1882, p. 240; Brischke, 1883, p. 279.
- Tenthredo pallescens* Gmelin, 1790, p. 2668.
- Monophadnus pallescens*, Enslin, 1914, p. 293; Malaise, 1935, p. 167; Crevecoeur and Maréchal, 1938, p. 495; Berland, 1947, p. 255; Pasteels, 1948, p. 188; Benson, 1952, p. 101; Benson, 1954, p. 281; Benson, 1962, p. 391.
- Selandria tiliac* Norton, 1861, p. 221, = ; Norton, 1867, p. 250; Provancher, 1878, p. 99; Thomas, 1881, p. 67 (?); Provancher, 1883, p. 201; Packard, 1890, p. 480; Ross, 1951, p. 69. New synonymy.
- Monophadnus tiliac*, Provancher, 1888, p. 350; Dalla Torre, 1894, p. 165; MacGillivray, 1916, p. 150.
- Ardis tiliac*, Konow, 1905, p. 81.
- Monophadnus bipunctatus* MacGillivray, 1908a, p. 292, ♀; MacGillivray, 1916, p. 150; Frison, 1927, p. 253; Ross, 1951, p. 67 (= *acqualis* MacGillivray). New synonymy.
- Monophadnus furvus* Benson, 1930, p. 107. New name for *M. bipunctatus* MacGillivray, preoccupied by *Monophadnus bipunctatus* Klug, Taschenberg, 1866. (Note: *M. furvus* Benson is preoccupied by *Monophadnus furvus* Konow, 1898.)

The European synonymy is not given here. Enslin (1914) listed *Tenthredo morio* Rossi, *Blennocampa emarginata* Thomson, and *Monophadnus rosarum* Konow nec Brischke as synonyms as well as *Tenthredo waltheimi* Gimmerthal. Benson (1952) considered the last one a good species of *Monophadnoides*. Gmelin's species, *pallescens*, is here based on Enslin's (1914) interpretation and specimens determined by Benson.

Female.—Average length, 6.7 mm. Head and antenna black. Thorax black with tegula dull white to reddish brown. Legs with each coxa, trochanter, and most of each femur black; extreme apex of each femur and each tibia white; each tarsus white, infuscate apically. Abdomen black. Wings hyaline to very lightly infuscate.

Antenna with second segment slightly longer than wide; third segment subequal in length to fourth plus fifth segments (pl. III, 57). Head generally roughened and lightly punctate, shiny areas on vertex and upper inner orbits. Postorbital groove present; malar space less than one-half diameter of front ocellus; postgenal carina developed below eye. Thorax shining, fine punctures on dorsum with pronotum and posterior margin of scutellum more densely punctate; mesopleuron and pectus smooth. Tarsal claw simple. Basal plates not widely divided on meson, only small membranous area present (pl. II, 24). Sheath straight above, rounded below (pl. V, 106). Lancet with lobes low, pointed, with anterior and posterior subbasal teeth distinct (pl. VIII, 166).

Male.—None available. No males have been seen from North America, and Benson (1952) reported that they are very rare in Europe.

Holotypes.—*S. tiliae* Norton (♀) is at the Museum of Comparative Zoology and bears the labels "Type 14000" and "*Selandria tiliae* N., Ct. 2." *M. bipunctatus* MacGillivray (♀) is at the Illinois Natural History Survey and bears the data "Ithaca, N.Y., May 9, 1895." The location of the types of *albipes* and *pallescens* is not known.

Distribution.—Eastern North America, British Columbia (fig. 11, B), and Palaearctic region from Europe to Siberia.

North American Records.—*British Columbia*: Cowichan Bay, June 2, 1959, E. E. MacDougall; Mission City, June 3, 1953, W. R. M. Mason; Horseshoe Bay, 0-300', May 26, 29, 1961, J. R. Vockeroth; Agassiz, August 15, 1919, P. Vroom; Prince Rupert, June 4, 1960, B. Henning, June 4, 1960, marshy hilltop, J. G. Chittcott; Duncan, June 9, 1955, G. E. Shewell; Ruskin, June 26, 1953, W. R. M. Mason. *Maine*: Masardis, June 3, 1958, beaten ex fir; Augusta, June 7 1946, A. E. Brower; 5 mi. W. Orono, May 26, 1966, D. R. Smith. *Massachusetts*: Cambridge, April 23, 1949, at lite, W. L. Brown; Cohasset, May 8. *New Brunswick*: Fredericton, June 22, 1933, C. E. Atwood. *Newfoundland*: 12 mi. N. W. Cormack, June 29, 1966, D. R. Smith. *New York*: Ausable Chasm, July 1, 1923; McLean, May 31, 1897, July 29, 1915; Ithaca, May 28, 1898, May 11, 1915. *Ontario*: Crosier, June 4, 1960, Kelton and Whitney; Eagle River, August 11, 1960, Kelton and Whitney; Moose Factory, June 9, 11, 15, 16, 18, 1949, D. P. Williams; Ottawa, June 10, May 24, 1895; Beachville, May 29, 1926, G. S. Walley. *Quebec*: St. Sylvestrie, em. July 10, 1911; Hull, May 16, 1901, May 31, 1902; Megantic, June 18, 1923, C. H. Curran; Woburn, June 19, 1923, C. H. Curran; Mt. Lyall, 1500', July 3, 1933, W. J. Brown; Hemmingford, June 18, 1917, J. I. Beaulne, May 6, 1926, T. Armstrong; Montreal, May 18, 1915, J. I. Beaulne, June 17, 1906, June 15, 1902, June 15; Montreal Island, June 3, 1905; St. Martin, May 14, 1924, J. W. Buckle; Knowlton, June 20, 1927, G. S. Walley; Wright, May 29, 1933, G. S. Walley; St. Hilaire, March 24, 1899; Breckenbridge, June 7, 1959, C. H. Mann.

Host.—Benson (1952) reported this species feeding on *Ranunculus acris* L. and *repens* L. in Europe. No host has been recorded for North America, but it probably feeds on *Ranunculus* here too. In the original description of *tiliae*, Norton (1861) mentioned that it was taken from linden: "Taken in June for several years, on the linden (*Tilia americana*). Larvae not known, but I have often noticed the leaves eaten with irregular holes, as in the case of *S. rubi*." The damage mentioned by Norton could well be that of a number of other sawflies, which are known to feed on linden. Packard (1890) also reported *tiliae* to feed on linden.

Larva.—I have not seen the larva of this species. Lorenz and Kraus (1957) included it in their key to *Monophadnus* larvae, but apparently they did not see the larva either. Their basis for separation of the species is the entirely black head, and this is based on Kaltentbach (1874). If this is the case, this will differentiate it from the other two known North American larvae. Vollenhoven (1876) and Cameron (1882) illustrated the larva as having a

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dark, broad, transverse stripe covering the vertex and genal areas.

One adult is in the U.S. National Museum collection and it was reared by Dyar. In his notebook is the following unpublished description of the larva: "A green species swept off grass or weeds. Neatly six-annulate, head pale with a blackish tinge, eye black. Body uniform emerald-bluish green, no marks at all, all the annulets neatly lined [livid ?] with smoky blackish over the dorsum.—Food plant unknown." This disagrees slightly with Lorenz and Kraus (1957), but the stage discussed is unknown.

Discussion.—This species is most closely related to *aequalis* and may be confused with that species. However, *pallescens* always has an entirely black pronotum, usually brownish tegulae, and the lobes of the lancet are pointed, not rounded.

Norton's (1861) description of *tiliae* fits perfectly the type labeled as this species at the Museum of Comparative Zoology. Norton also described the male, but this was not seen. No males have been seen from North America, and they are rare in Europe. Probably Norton confused several species while making this description, since he said he had 41 females and 2 males. This series probably represented several species and the confusion was probably due to the close superficial resemblance between species of this genus and those of *Monophadnoides* or related genera.

Genus STETHOMOSTUS Benson

Stethomostus Benson, 1929, p. 111; Benson, 1940, p. 208; Ross, 1951, p. 63; Benson, 1952, p. 100; Takeuchi, 1952, p. 52; Lorenz and Kraus, 1957, p. 117. Type: *Tenthredo fuliginosa* Schrank. Original designation.

Description.—Antenna short and stocky; second segment longer than wide; third segment longer than fourth segment (pl. III, 58). Clypeus truncate; malar space equal to one-half diameter of front ocellus; postorbital groove absent; postgenal carina developed for only short distance below eye. Prepectus present as raised shoulder, separated from mesepisternum by furrow (pl. II, 28). Tarsal claw simple; front tibial spur furcate at apex (pl. II, 31). Forewing with stub of 2A and 3A straight at apex (pl. I, 1). Hindwing with crossvein *m-cu* absent, leaving cell *M* open.

The members of this genus resemble those of *Eutomostethus*, but they may be separated by the furcate front tibial spur and the straight stub of 2A and 3A of the forewing.

The known host is *Ranunculus*. Lorenz and Kraus (1957) described the larva of *fuliginosus*.

Two Palaearctic species are in this genus, one of which has been introduced into North America. The species not treated here is *funereus* (Klug).

Description of *Stethomostus* Species

Stethomostus fuliginosus (Schrank)

Tenthredo fuliginosa Schrank, 1781, p. 334; Villers, 1789, p. 104; Gmelin, 1790, p. 2664; Christ, 1791, p. 449; Bouché, 1834, p. 136; Dahlbom, 1835, p. 11. *Selandria fuliginosa*, Stephens, 1835, p. 49.

- Blennocampa fuliginosa*, Kaltenbach, 1874, p. 723 (?); Cameron, 1877a, p. 56; Brischke and Zaddach, 1883, p. 278.
Tomostethus fuliginosus, Konow, 1886, p. 214; Konow, 1905, p. 82; Enslein, 1914, p. 288; Conde, 1937, p. 107; Ceballos, 1941, p. 45; Berland, 1947, p. 250.
Phymatocera fuliginosa, Dalla Torre, 1894, p. 177.
Stethostethus fuliginosus, Benson, 1939, p. 111; Ross, 1951, p. 63; Benson, 1952, p. 100; Takeuchi, 1952, p. 52; Lorenz and Kraus, 1957, p. 117; Diniz, 1960, p. 14; Dadurian, 1962, p. 81.
Monophadnus fukaii Rohwer, 1910, p. 108, ♂, ♀; Takeuchi, 1952, p. 52 (= *fuliginosa* Schrank).

The type of *fukaii* Rohwer was examined, and the synonymy presented by Takeuchi (1952) is here confirmed.

The European synonymy is not presented here. Enslein (1914) listed two synonyms, *Tenthredo fuscus* Lepeletier and *T. frazzini* Lepeletier. The species is accepted here as interpreted by Enslein (1914) and Benson (1939) and on the basis of specimens determined by Benson.

Female.—Average length, 6.5 mm. Entirely black with outer surface of foretibia whitish. Wings with basal two-thirds darkly infusate, apical one-third hyaline.

Head and body smooth and shining; pronotum finely punctate; prepectal furrow and hindmargin of scutellum with large punctures. Sheath straight above, rounded below (pl. V, 107). Lancet with serrulae pointed, central ones with about four anterior sub-basal teeth and about 10 posterior subbasal teeth, this number decreasing toward apex (pl. VIII, 167).

Male.—Average length, 6.3 mm. Color similar to that of female, except for extreme apex of forefemur and base of foretibia, which are somewhat white. Structure similar to that of female. Penis valve rectangular in shape (pl. X, 231); harpe and parapenis as in plate X, 230.

Holotype.—The type of *M. fukaii* Rohwer (♀) is at the U.S. National Museum, No. 13325, and bears the data "Konosu Santama, Japan, April 14, T. Fukai collector, No. 3." The location of the type of *fuliginosa* is not known.

Distribution.—All Europe, Japan; in North America from New Brunswick and New York west to Michigan (fig. 12, A).

North American Records.—**Maine:** Augusta, May 31, June 1, 15, 21, 22, 1946, August 19, 1937, July 14, 1945, July 15, 1944, June 9, 1943, July 4, 1946 (on wild cherry), July 5, 1946 (on marsh grass), August 13, 1945 (on marigold), June 15, 1943 (resting on maple), July 14, 1943 (resting on beans), August 2, 1942 (on *Picea*), June 8, 1944 (ex spruce), A. E. Brower; Mount Desert Is., June 19, 1934. A. E. Brower; Rangeley, June 16; Tramway, July 14; Old Town, July 1, 1939, sweeping, Wing.
Massachusetts: Forest Hills; Melrose Hills, May 18, 20, 1922, bred, butterfly; Ipswich, July 23, D. H. Black; Amherst, May 10, 1949, Hunter.
Michigan: E. Lansing, May 20, 1941, C. Sabrosky.
New Brunswick: Wawig, July 7, 1938, J. N. Freeman; Jaquet River, July 7, 1940, G. S. Walley; Tabusintac, June 13, 1938, W. J. Brown; St. Andrews, August 8, 1957, G. E. Shewell; Fredericton,

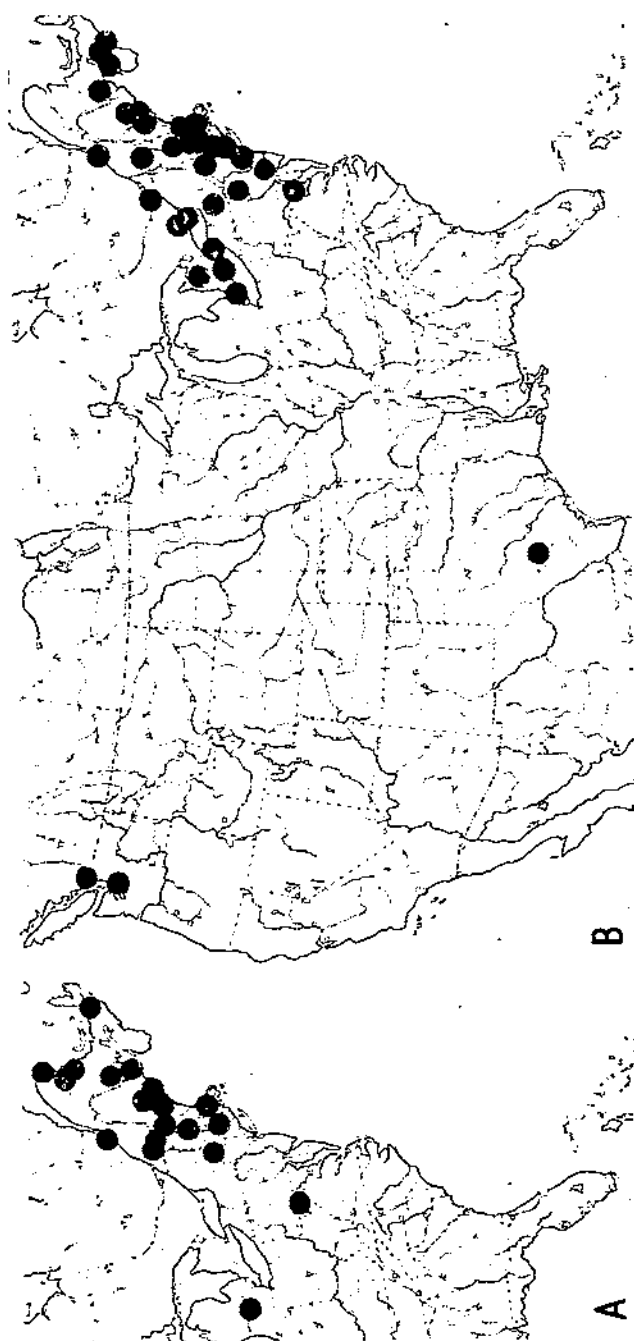


FIGURE 12.—Distribution of (A) *Stelhomostus fuliginosus* and (B) *Eutomostethus ephippium*.

June 6, 19, 1956, D. D. Pond; Lincoln, June 27, 1956, D. D. Pond. *New Hampshire*: Hanover, August 30, 1930; Mt. Washington, June 23, 1941, Frison and Ross. *New York*: Sloanville, August 3, 1955, J. C. Martin. *Nova Scotia*: 5 mi. E. Antigonish, June 24, 1966, D. R. Smith. *Quebec*: Magog, July 25, 26, 1938, H. A. N. Munro; Ministers Is., June 2, 1955, D. D. Pond; Gaspé, June 26, 1954, W. J. Brown, June 22, 25, 1954, J. R. Vockeroth; Lac Mandor, Ste. Flore, May 26, 1951, August 3, 1951, E. G. Munroe; Kirks Ferry, June 25, 1951, S. M. Clark; Pelletier Stn., August 16, 1957, 1000', W. R. M. Mason; Farnham, June 5, 1963, J. R. Vockeroth; Cap Rouge, July 7, 1953, R. Lambert, August 4, 1955, O. Peck; Bonaventure Is., July 14, 1954, W. J. Brown.

Host.—Adults have been bred from larvae on buttercup in Massachusetts. In Europe its known host is also *Ranunculus*.

Larva.—I have not seen larvae of this species. Lorenz and Kraus (1957) included it in their key and based their description on that by Brischke (1883). The only character by which they separate it from the larvae of *Eutomostethus* and *Tomostethus* is the black head capsule. I have not included it in my key to larvae.

Discussion.—This species superficially resembles those of *Eutomostethus*, but it may be separated by its entirely dark coloration, the furcate front tibial spur, and the straight 2A and 3A vein of the forewing. The prepectus, with distinct punctures in the prepectal furrow, and the third antennal segment being longer than the fourth segment are other diagnostic characters.

Genus EUTOMOSTETHUS Enslin

Tomostethus subgenus *Eutomostethus* Enslin, 1914, p. 286; Malaise, 1934, p. 472; Berland, 1947, p. 247.

Eutomostethus Enslin, Ross, 1937, p. 97; Benson, 1938, p. 367; Benson, 1940, p. 208; Ross, 1951, p. 63; Benson, 1952, p. 99; Takeuchi, 1952, p. 46; Lorenz and Kraus, 1957, p. 115.

Type: *Tenthredo luteiventris* Klug. Original designation.

Tomostethus subgenus *Atomostethus* Enslin, 1914, p. 287; Berland, 1947, p. 249; Ross, 1951, p. 97 (= *Eutomostethus* Enslin).

Type: *Tenthredo ephippium* Panzer. Original designation.

Tomostethopsis Sato, 1928, p. 178; Takeuchi, 1952, p. 46 (= *Eutomostethus* Enslin).

Type: *Tomostethopsis metallicus* Sato. Original designation.

Forsia Malaise, 1932, p. 29; Takeuchi, 1952, p. 46 (= *Eutomostethus* Enslin).

Type: *Forsia tomostethi* Malaise. Original designation.

Description.—Antenna short and stocky; second segment as wide as long; third segment longer than fourth segment (pl. III, 58). Clypeus truncate; postgenal carina well developed, extending nearly as far as top of eye; postorbital groove indistinct; malar space narrower than diameter of front ocellus. Prepectus present as raised shoulder, separated from mesepisternum by furrow (pl. II, 28). Tarsal claw simple or with small inner tooth; front tibial spur simple, not furcate at apex (pl. II, 30). Forewing with stub of 2A and 3A curved up at apex (pl. I, 6). Hindwing with cross-vein *m-cu* present or absent, leaving cell *M* open or closed.

Eutomostethus and *Atomostethus* were separated on the basis of the presence or absence of cell *M* in the hindwing. They both

seem to be closely related, however, and on the basis of the two Nearctic species their status cannot be evaluated. The most diagnostic character for this genus is the simple front tibial spur.

There are 25 or 30 species included in this genus, most of which are centered in eastern Asia. Two species, *luteiventris* (Klug) and *ephippium* (Panzer), are known to occur in North America, and they may have been introduced.

Larva.—The larvae feed on grasses and sedges, and the larvae of both species known to occur in North America were described by Lorenz and Kraus (1957). They are distinctive in that the lobe above the prothoracic leg is strongly protuberant (pl. XV, 301), the head is not entirely black as in *Stethomostus*, and there are three setae on each half of the clypeus. They may be separated from other Nearctic larvae by the general key to larvae (p. 17). The key to larvae is from Lorenz and Kraus (1957).

Keys to *Eutomostethus* Species

ADULTS

1. Thorax entirely black; abdomen partly orange; tarsal claw simple; hindwing with cell *M* present.....*E. luteiventris* (Klug)
 Thorax partly rufous; abdomen entirely black; tarsal claw with small inner tooth; hindwing with cell *M* absent.....*E. ephippium* (Panzer)

LARVAE

1. Head mottled with dark spots and light spots, dark areas not completely black.....*E. luteiventris* (Klug)
 Head entirely yellow.....*E. ephippium* (Panzer)

Descriptions of *Eutomostethus* Species

Eutomostethus ephippium (Panzer)

- Tenthredo ephippium* Panzer, 1798, p. 5, ♀; Latreille, 1805, p. 133; Panzer, 1806, p. 38; Latreille, 1807, p. 230; Klug, 1814, p. 61; Lepeletier, 1823, p. 110; Hartig, 1837, p. 270; Eversmann, 1847, p. 30.
Hylotoma ephippium, Fabricius, 1804, p. 27; Fallén, 1807, p. 207; Klug, 1807, p. 71; Klug, 1819, p. 73.
Allantus ephippium, Jurine, 1807, p. 56.
Phyllotoma ephippium, Fallén, 1829, p. 33.
Selandria ephippium, Stephens, 1835, p. 48; Blanchard, 1840, p. 240.
Blennocampa ephippium, Costa, 1859, p. 47; Taschenberg, 1866, p. 18; Thomson, 1871, p. 213; Cameron, 1877a, p. 56; André, 1880, p. 310; Cameron, 1882, p. 248; Brischke and Zaddach, 1883, p. 278.
Tomostethus ephippium, Konow, 1886, p. 214; Dalla Torre, 1894, p. 174; Enslin, 1914, p. 289; Ross, 1932a, p. 249; Berland, 1947, p. 250.
Eutomostethus ephippium, Ross, 1937, p. 96; Ross, 1951, p. 63; Benson, 1952, p. 101; Lorenz and Kraus, 1957, p. 116.
Tenthredo inhabilis Harris, 1835, p. 583. *Nomen nudum*.
Selandria inhabilis Norton, 1861, p. 220, ♀; Norton, 1867, p. 246; Provancher, 1886, p. 26; Ross, 1932a, p. 249 (= *ephippium* Panzer).
Blennocampa inhabilis, Dalla Torre, 1894, p. 171.
Tomostethus inhabilis, Konow, 1905, p. 82; MacGillivray, 1916, p. 148; Britton, 1925, p. 342; Britton, 1926, p. 323.

The European synonymy is not presented here. Enslein (1914) gave *Tenthredo dubius* Gmelin *nec* Ström and *Tenthredo ovatus* Schrank *nec* L. as synonyms. Benson (1952) gave *T. dubius* Gmelin and black form = *cinereipes* Klug, Cameron *nec* Klug as synonyms. This species is here interpreted in the sense of Enslein (1914) and from specimens identified by Benson.

Female.—Average length, 6.5 mm. Antenna and head black. Thorax black with pronotum, prescutum, lateral lobes, and mesopleuron rufous. Legs black with extreme apex of each femur and most of each tibia whitish. Abdomen black. Wings moderately infusate.

Head shining on vertex and upper orbital areas roughened; malar space less than one-half diameter of front ocellus. Thorax smooth and shining with large punctures in prepectal furrow and on posterior margin of scutellum. Tarsal claw with small inner tooth (pl. II, 14). Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath straight above, rounded below (pl. V, 108). Lancet with serrulae pointed, symmetrical, with equal number of anterior and posterior subbasal teeth (pl. VIII, 168).

Male.—Unknown.

Holotypes.—*S. inhabilis* Norton is in the Harris collection at the Museum of Comparative Zoology. There are two specimens (♀ ♀), both the same, and each bearing the labels "MCZ Type 26313" and "82." One has been designated as the lectotype. Panzer's types are probably in the Zoological Museum of Berlin.

Distribution.—In North America from Ontario to Nova Scotia and Maryland; Texas; British Columbia and Washington (fig. 12, B). All Europe, North Africa, Asia Minor to Himalayas.

North American Records.—*British Columbia*: Langford, May 14, 1964, on grass and in flight; Langley, July 17, 1959, L. A. Kelton; Royal Oak, May, 1959, L. A. Kelton; Mission City, July 18, 1953, G. J. Spenser; Hatzig Lake, July 20, 1953, W. R. M. Mason; Cultus Lake, July 17, 21, 29, 1948, H. R. Foxlee; MacGillivray Creek, Game Preserve nr. Chilliwack, July 27, 1953, W. R. M. Mason. *Connecticut*: Windsor, May 17, 1956, J. B. Kring; Branford, June 2, 1951, J. B. Kring; New Haven, May 9, 1921, M. P. Zappe, May 15, 1905, B. H. Walden; Lyme, May 20, 1918, W. S. Fisher; Storrs, May 13, 1958, M. Glazier, May 13, 1954, D. Strong, May 23, 1953, H. W. Smith. *Maine*: Orono, June 12, 1913, May 31, 1914, H. M. Parshley; Augusta, May 30, 31, 1946, May 27, 1947, A. E. Brower; Piscataquis Co., Brownville Junction, May 27, 1966, D. R. Smith; Waldo Co., 5 mi. N. Belfast, May 25, 1966, D. R. Smith. *Maryland*: College Park, May 11, 1940, W. H. Anderson; Cabin John, April 30, 1965, April 21, May 7, 1966, D. R. Smith; 3 mi. W. Seneca, May 3, 1966, D. R. Smith; 3 mi. S.E. Beltsville, May 8, 1966. *Massachusetts*: Forest Hills, June 1, 1926, G. Salt; Arlington, May 20, 1920, C. S. Anderson; Fall River, May 6, 1905; Amherst, May 25, 1928, K. A. Salman, May 13, 1949, Clayton, April 25, 1949, Nardi; Chicopee, May, 1897; Boston, May 25, 1893, on a pear leaf; Riverside, May 14, 22, 1944; So. Hadley, May 15, 1936, M. Chapman. *New Brun-*

wick: Fredericton, May 20, 1921. *New Hampshire*: Hanover; Jaffrey, May 21, 1956, C. W. Johnson; Hampton, May 8, 27, 1909, May 25, 1904, May 28, 1919, S. A. Shaw. *New Jersey*: Edgewater, May 12, 1916; Chesilhurst, June 3, 1939, H. K. Townes. *New York*: Taughannock Falls, Ithaca, May 16, 1951, J. C. Martin; 6 mile Cr., Ithaca, May 8, 1949; Ithaca, May 31, 1951, June 5, 1952, J. C. Martin, May 9, 17, 1936, H. K. Townes; McLean Bogs, McLean, May 25, 1951, J. C. Martin; Karner, May 22-25, 1916; Albany, June, 1906, May 6, 1913; Labrador Lake, Cortland Co., May 14, 1921; Little Neck, L. I., May 3, 1925, on skunk cabbage, F. N. Schott; Larchmont, April 6, 1938, on *Lilium giganteum*. *Nova Scotia*: Halifax, 1898, 1899, W. H. H.; Kentville, June 3, 1923, R. P. Gorham; Bridgetown, June 11, 1913, G. E. Sanders. *Ontario*: Wallaceburg, June 3, 1957, J. G. Chilcott; Durham, June 14, 1962, Kelton and Thorpe; Bells Corners, May 18, 1961, B. Poole; St. Catharines, May 30, 1961, Kelton and Brumpton; Tilsonburg, June 3, 1961, Kelton and Brumpton; Chatterton, May 24, 1954, J. C. Martin; Merivale, May 30, 1952, W. R. Mason, May 30, 1952, R. Lambert; Normandale, May 27, 28, 29, 1956, J. R. Lonsway, 42°42', 80°19', May 18, 21, 27, 1956, J. R. Vockeroth; Marmora, May 18, 27, 1952, June 7, 1952, J. R. Vockeroth, May 26, 1952, J. R. McGillis, May 19, 22, 23, 26, 1952, R. Lambert; Belleville, May 14, 1942, M. Thompson; Kinburn, May 29, 1957, J. E. Martin; Ottawa, May 31, 1943, June 8, 1943, May 12, 1948, G. S. Walley, June 1, 7, 1939, June 3, 1940, May 30, 1940, May 23, 24, 1944, May 15, 16, 29, 1941, May 28, 1942, O. Peck, May 21, 1928, W. J. Brown, May 30, 1927, J. H. McDunnough, May 28, 1955, R. Lambert, May 24, 1957, May 26, 1958, J. G. Chilcott, April 28, 1958, A. R. Brooks, June 2, 6, 1958, J. R. Vockeroth. *Pennsylvania*: Chestnut Hill, May 19, 1919, G. M. Greene; Laporte, June 4, J. N. Knull. *Quebec*: Knowlton, June 3, 1929, L. J. Milne; Brome, May 31, 1936, G. S. Walley; St. Johns, May 27, 1906, G. Chagnon, June 1, 1902; Cottage Beaulieu, July 18, 1908; Magog, May 25, 1936, G. S. Walley; Breckenbridge, June 8, 1959, at light, C. H. Mann; Meach Lake, May 28, 1962, S. M. Clark; Hull, June 20, 1954, J. R. Vockeroth; Harrington Lk., Gatineau Park, May 26, 1954, E. E. Sterns, May 30, 1954, J. E. H. Martin, June 3, 1954, R. McCondochie, June 10, 1954, W. R. Richards, May 30, 1954, W. R. Coyles; Cap Rouge, July 7, 1953, O. Peck; Alymer, May 31, 1952, June 2, 1952, R. S. Bigelow. *Texas*: Kerrville, June 14, 1948, C. W. Sabrosky. *Washington*: Seattle, April 27, 1936, C. B. N.

Host.—There are no host records for North America. In Europe the larvae feed on *Poa* and other soft Gramineae (Benson, 1952), and judging from the collection sites this is probably the case in this region.

Larva.—I have not seen the larva of this species. The following short description is from Lorenz and Kraus (1957).

Head entirely yellow. Body light with dorsal and lateral longitudinal dark lines. Clypeus with three setae on each side. Labrum with three to four setae on each side; very shallowly and broadly emarginate. Each mandible with one seta on outer lateral surface.

Lobe above each thoracic leg strongly protuberant (pl. XV, 301). Thoracic leg with femur longer than tibia. Abdominal segments each with six dorsal annulets; annulets 2 and 4 each with small glandubac, which are concolorous with rest of body.

The diagnostic characters of the larva seem to be the protuberant lobe above each prothoracic leg and the entirely yellow head.

Discussion.—This species may easily be separated from *luteiventris* by the rufous thorax, small inner tooth of the tarsal claw, and the absence of cell *M* in the hindwing. In Europe there is a black form that is most common in the northern parts of its range, whereas the red form is most common in the southern parts. Only the red form has been found in North America.

This is probably an introduced species. It is most common around the eastern seaports and known only from Vancouver and Seattle in the West. Its host in Europe is common in this country, and it is also a parthenogenetic species, both of which would lead to rapid establishment. The Texas record is considerably out of its known range and is questionable.

Eutomostethus luteiventris (Klug)

Tenthredo luteiventris Klug, 1814, p. 56, ♂, ♀; Hartig, 1837, p. 271; Eversmann, 1847, p. 30; Kriechbaumer, 1884, p. 107.

Selandria luteiventris, Stephens, 1835, p. 31.

Monophadnus luteiventris, Kirby, 1882, p. 169; Stein, 1887, p. 166.

Tomostethus luteiventris, Dalla Torre, 1894, p. 176; Konow, 1905, p. 83; Enslin, 1914, p. 287; Conde, 1934, p. 182; Ross, 1932a, p. 248; Berland, 1947, p. 248.

Eutomostethus luteiventris, Ross, 1937, p. 97; Benson, 1940, p. 208; Ross, 1951, p. 63; Benson, 1952, p. 100; Lorenz and Kraus, 1957, p. 115.

The European synonymy is not presented here. Enslin (1914) gave *Tenthredo assimilis* Fallén, in part, and *Tenthredo fuscipennis* Lepeletier as synonyms. The species as given here is as interpreted by Enslin (1914) and from specimens identified by Benson.

Female.—Average length, 6.2 mm. Antenna, head, and thorax black. Legs black with apical half of forefemur and all midfemur, hindfemur, tibia, and tarsi orange. Abdomen orange with basal plates, second tergum, apical segments, and sheath black, median dark stripe sometimes present on dorsum. Wings moderately infusate.

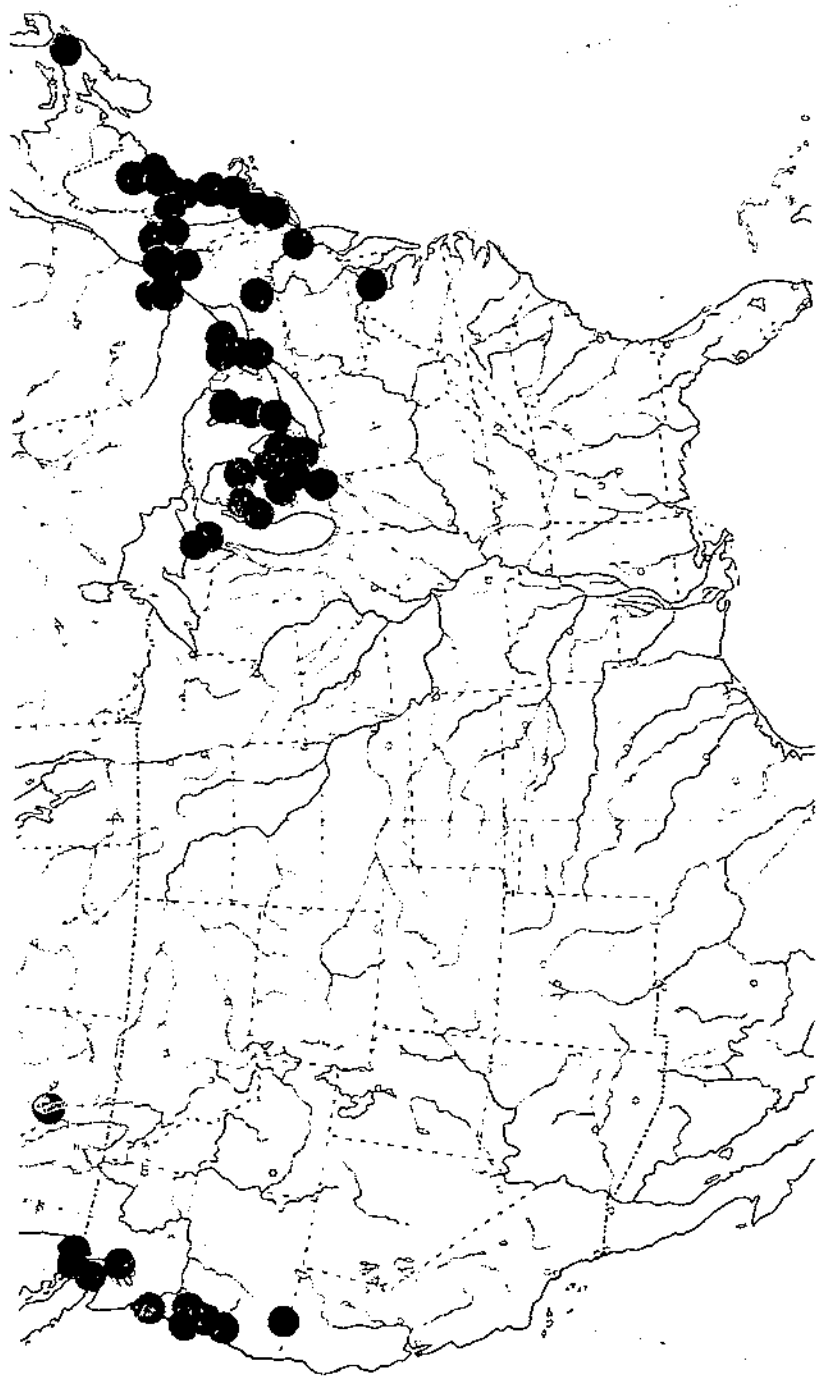
Head moderately shining, slightly rugose around ocellar area; malar space less than one-half diameter of front ocellus. Thorax smooth and shining with large punctures present in prepectal groove and on posterior half of scutellum. Tarsal claw simple. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below (pl. V, 109). Lancet with serrulae pointed, asymmetrical, with four or five posterior subbasal teeth (pl. VIII, 169).

Male.—Unknown.

Holotype.—Klug's types are probably at the Zoological Museum of Berlin.

Distribution.—Ontario and New Jersey west to Michigan; British Columbia and Alberta to southern Oregon (fig. 13). All Europe.

North American Records.—*Alberta*: Banff, May 26, 1960, 4455', spruce forest, J. G. Chilcott. *British Columbia*: Goldstream, June 3, 1964, grass; Miracle Beach nr. Oyster River, June 11, 13, 1955, J. R. McGillis; Mission City, June 8, 1953, W. R. M. Mason; Duncan, June 9, 1955, J. R. McGillis; Bowser, June 5, 1955, R. Coyles; Vancouver, May 31, 1931, Seymour Mt., 4700', on snow, H. B. Leech, May 12, 1931, Seymour Cr., H. B. Leech. *Connecticut*: Branford, April 23, 26, 29, 1951, J. B. Krings; Storrs, May, 1935, K. M. S.; South Meriden, June 8, 1939, H. L. Johnson. *Maine*: Augusta, May 26, 1935, July 4, 1939, June 19, 1943, June 6, 1957 (sweeping old field), May 31, June 1, 22, 1946, A. E. Brower; Passadumkeag, June 7, 1941, A. E. Brower; Hartford, June 14, 1961, A. E. Brower; 5 mi. W. Orono, May 26, 1966, D. R. Smith; Piscataquis Co., Brownville Junction, May 27, 1966, D. R. Smith; Kennebec Co., South China, May 25, 1966, D. R. Smith; Waldo Co., 5 mi. N. Belfast, May 25, 1966, D. R. Smith; Penobscot Co., 3 mi. N. Passadumkeag, May 26, 1966, D. R. Smith. *Maryland*: Cabin John, along river, May 3, 7, 1966, D. R. Smith; 3 mi. W. Seneca, May 3, 1966, D. R. Smith. *Massachusetts*: Frammingham, May, 1916, C. A. Frost; Amherst, May 30, 1928, May 10, 1929, K. A. Salman; Lowell, May 24, 1915, H. A. Preston. *Michigan*: 13 mi. N. Lapeer, May 30, 1937, C. Sabrosky; East Lansing, June 2, 1937, May 28, 1937, May 19, 1941, C. Sabrosky, May 8, 1963, R. B. Wilson, May 5, 1962, G. Eickwort; Saginaw Co., June, 1940, C. Sabrosky; Vassar, May 20, 1936, Frison and Ross; Eaton Co., May 15, 1948, R. Fischer; Lake City, June 17, 1948, D. Bray, July 3, 1950, G. Guyer; Little Manistee Riv., nr. Peacock, May 10, 1940, Frison and Ross; Midland Co., May 29, 1937, R. R. Dreisbach; Lapeer Co., May 30, 1937, Dreisbach; Kalamazoo, May 10, 1936, C. Sabrosky; Ann Arbor, Pittsfield Ponds, Washtenaw Co., May 20, 1918, T. H. Hubbell; 1st Sister Lake, Ann Arbor, Washtenaw Co., May 18, 1919, T. H. Hubbell; Kinderhook, Branch Co., May 30, 1942, C. Sabrosky; Negaunee, Marquette Co., June 15, 1957, R. W. Hodges; Flat River Game Area, Montcalm Co., May 14, 1955, R. L. Fischer; Ogemaw Co., June 1, 1957, R. A. Scheibner; Roscommon Co., Houghton Lake, May 21, 1955, R. W. Hodges; Eaton Rapids, Eaton Co., May 24, 1959, R. A. Scheibner; Escanaba, Delta Co., June 25, 1958, R. A. Scheibner. *New Hampshire*: Hampton, May 11, 1936, May 28, 1925, June 4, 1919, S. A. Shaw. *New Jersey*: Mendham, June 1, 1923, J. M. Shott. *New York*: Slaterville Springs, May 21, 1951, J. C. Martin; McLean Bogs, McLean, May 25, 1951, J. C. Martin; Lockport, May 30, 1950, L. L. Pechuman; Indian Falls, Mt. Marcy, June 10, 1942, H. Dietrich; Ithaca, May 20, 1947, H. E. Evans, June 11, 1935, May 17, 1936, H. K. Townes, June 6, 1937, Ries and Davis, June 1, 1925. *Nova Scotia*: 5 mi. E. Antigonish, June 26, 1966, D. R. Smith. *Ontario*: Owen Sound, June 15, 1961, Kelton and Brumpton; Listowel, May 27, 1962, Kelton and Thorpe; Grassie, May 31, 1962, Kelton and Thorpe; Collingwood,

FIGURE 13.—Distribution of *Eutomostethus interventris*.

June 13, 1962, Kelton and Thorpe; Brighton, May 18, 1955, J. C. Martin; Marmora, May 27, 1952, J. C. Mitchell, June 16, 1952, J. R. McGillis; Normandale, May 28, 1956, J. R. Lonsway; St. Williams, May 23, 1956, 42° 40', 80° 25', J. R. Vockeroth; Blackburn, May 23, 1953, G. E. Ball; Millbrook, May 26, 1962, Kelton and Thorpe; Rockport, May 12, 1959, J. R. Vockeroth; Mer Bleue, May 19, 1938, G. S. Hobbs, May 16, 1938, G. E. Shewell; Bothwell, May 29, 1929, G. S. Walley; Strathroy, 1927, H. F. Hudson; Merivale, May 16, 1941, O. Peck; Ottawa, May 29, 1941, May 16, 23, 24, 1944, O. Peck, June 7, 1940, E. G. Lester, May 11, 1948, A. R. Brooks, June 11, 1946, G. S. Walley. *Oregon*: McMinnville, Peavine Ridge, Yamhill Co., May 30, 1958, on *Equisetum*, K. M. Fender; 4 mi. W. Wren, Benton Co., May 11, 1960, P. F. Torchio; Corvallis, Benton Co., April, 1959, P. F. Torchio; bog, 1 mi. W. Sand Lake, Tillamook Co., July 7, 1962, D. R. Smith; Falls City, Polk Co., May 11, 1960, D. R. Smith; Little Squaw Lake, 7 mi. E. Copper, Jackson Co., 3200', R3W, T41S, Sec. 2, May 22, 1964, D. R. Smith; bog near Noti, Lane Co., May 18, 1964, J. D. Lattin; Corvallis, Avery Park, ex grasses, June 5, 1964, T. Marsh. *Quebec*: Harrington Lake, Gatineau Pk., June 10, 1954, H. J. Huckel; Wakefield, June 20, 1946, G. S. Walley; Granby, July 2, 1941, P. E. Mercier; Farnham, June 5, 1963, J. R. Vockeroth; Mt. Orford, 1200', June 5, 1963, J. R. Vockeroth; Hull, May 30, 1957, J. G. Chittcott. *Vermont*: Essex Co., 4 mi. E. Concord, May 22, 1966, D. R. Smith. *Washington*: Nehcotte, May 2, 1954, June 20, 1955, May 3, 1953; Parkcreek Park, Seattle, May 23, 1939, E. C. C.; Lake Tapps, June 11, 1936, J. Wilcox; Seattle, May, 1953, B. Malkin; Lk. Semamish St. Pk., King Co., May 23, 1953, B. Malkin and C. Taylor; 8 mi. S. Naselle, Pacific Co., May 30, 1964, *Juncus* sp., K. Goeden; Ashford, July 10, 1940, H. and M. Townes.

Host.—In England the larvae bore in the sterile shoots of *Juncus* and remain there until the last instar, when they emerge and feed externally (Benson, 1952). Judging from the collection sites, especially in Oregon, it probably has the same habits in this region.

Larva.—I have not seen the larva of this species. It was described by Lorenz and Kraus (1957) and seems to differ from *ephippium* by the coloration of the head, which is darker and mottled. The head is illustrated by Lorenz and Kraus.

Discussion.—This species is easily distinguished from *ephippium* by the black thorax and orange abdomen, the simple tarsal claw, and the presence of cell *M* in the hindwing. This is probably an introduced species.

Tribe BLENNOCAMPINI Konow

Blennocampides Konow, 1890, p. 231 (in part); Konow, 1905, p. 76 (in part).
Blennocampini Rohwer, 1911c, p. 223 (in part); Enslin, 1914, p. 263 (in part);
Benson, 1938, p. 367 (in part); Ross, 1951, p. 62 (in part); Benson, 1952,
p. 97 (in part); Takeuchi, 1952, p. 43 (in part).
Periclistini Takeuchi, 1952, p. 42. New synonymy.

Benson (1938) included all those genera in this tribe that were not included in the other tribes he proposed. Later Ross (1951) and Benson (1952) included all the Blennocampinae in this one tribe except for the Lycaotini. Takeuchi (1952) separated this tribe from the Periclistini, which he proposed; however, the two are considered the same here.

This tribe represents a distinct branch on the basis of both adult and larval characters. All the larvae are spiniform and have reduced annulation of the abdominal segments. The adult characters vary, the tarsal claw ranging from simple to those with a long inner tooth and a basal lobe, and vein 2A and 3A of the forewing is either curved up or straight at its apex. The most constant adult character is the penis valve of the male genitalia, which has a dorsal lobe and a lateral spine in all the species except some in *Ardis* and *Periclista*. This is also the only tribe in which vein *M* meets *Rs* + *M* slightly before their junction with *Sc* + *R*, an apparently generalized character present only in *Eupareophora* and some *Periclista*. In general, the most specialized members of this tribe have vein 2A and 3A straight, tarsal claw with an inner tooth and basal lobe, and lateral armature on the penis valve well developed, whereas the more generalized members have vein 2A and 3A curved up, simple tarsal claws, lateral armature on the penis valve absent, and vein *M* and *Rs* + *M* meeting before their junction with *Sc* + *R*.

The known hosts for this tribe are all dicotyledonous plants.

Description.—Vein 2A and 3A of forewing curved up or straight at apex; vein *M* joins *Rs* + *M* at or slightly before their junction with *Sc* + *R*; veins *M* and 1*m-cu* parallel. Hindwing with cross-vein *m-cu* present or absent, leaving cell *M* closed or open. Tarsal claw simple, with inner tooth or with inner tooth plus basal lobe. Prepectus absent. Penis valve with dorsal lobe and lateral spine usually present. Larva with abdominal segments 1 through 8 each with four or five dorsal annulets; body ornamentation consists of long or short spines, some of which are branched (*Ardis* lacks any ornamentation, being an internal feeder).

Genera Included.—*Ardis*, *Monardis*, *Apareophora*, *Eupareophora*, *Periclista*, and *Monophadnoides*. *Blennocampa* occurs only in the Palaearctic region.

Genus ARDIS Konow

Ardis Konow, 1886, p. 184, 188; Dalla Torre, 1894, p. 180; Konow, 1905, p. 80; Rohwer, 1911a, p. 74; Enslin, 1914, p. 282; Ross, 1937, p. 99; Berland, 1947, p. 243; Ross, 1951, p. 66; Benson, 1952, p. 102; Takeuchi, 1952, p. 47; Lorenz and Kraus, 1957, p. 121.

Type: *Tenthredo* (*Allantus*) *bipunctata* Klug. Designated by Rohwer (1911a). Valco Ross, 1937, p. 99; Ross, 1951, p. 66 (= *Ardis* Konow).

Type: *Selandria irrogata* Cresson. Original designation.

Description.—Antenna short and stocky, second segment as wide as long, third segment longer than fourth segment (pl. III, 59). Clypeus truncate; malar space as wide as or slightly narrower than diameter of front ocellus; postgenal carina absent;

postorbital groove distinct and deep, with large craterlike punctures (pl. II, 10). Prepectus absent. Tarsal claw with long inner tooth, subequal in length to outer tooth; basal lobe present (pl. II, 20). Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); vein *Rs* + *M* joins *M* at junction of *Sc* + *R* (pl. I, 1). Hindwing with crossvein *m-cu* present, enclosing cell *M*.

This genus is characterized by the deep postorbital groove. *Eupareophora* also has the postorbital groove, but has simple tarsal claws and *Rs* + *M* joins *M* before their junction with *Sc* + *R*.

Two North American species are in this genus, *atrata* (Harrington), which is confined to the Northwest, and *brunniventris* (Hartig), which is Holarctic and transcontinental. One other species, *sulcata* (Cameron), is known from Europe.

Larva.—The larvae of *sulcata* and *brunniventris* are shoot borers in roses, but the habits of *atrata* are not known. Smith (1966b) gave some characters to differentiate the two known larvae of *Ardis* and for their separation from *Cladardis elongatula* (Klug), a European species that is also a shoot borer in roses.

Key to *Ardis* Species

1. Tegula and upper angles of pronotum white; female with long, slender, dorsoapical projection on sheath (pl. V, 112).—*A. brunniventris* (Hartig)
- Tegula and upper angles of pronotum brownish or black; female without dorsoapical projection on sheath (pl. V, 113).—*A. atrata* (Harrington)

Descriptions of *Ardis* Species

Ardis atrata (Harrington), new combination

Monophadnus atratus Harrington, 1894, p. 193, ♂.

Monophadnoides circina MacGillivray, 1923c, p. 24, ♂; Frison, 1927, p. 252.

New synonymy.

Ardis circina, Ross, 1951, p. 66.

Paracharactus obtentus MacGillivray, 1923c, p. 28, ♀; Frison, 1927, p. 255.

New synonymy.

Ardis obtenta, Ross, 1951, p. 66.

Female.—Average length, 6.7 mm. Entirely black with tegula and hindmargin of pronotum usually brownish, and extreme apex of each femur, each tibia, each tarsus, and very narrow band on posterior margin of each abdominal segment white. Wings hyaline.

Malar space slightly less than diameter of front ocellus. Sheath straight above, rounded below, without dorsoapical projection (pl. V, 113). Lancet with serrulae lobelike, evenly rounded, close together, and with distinct subbasal teeth (pl. VIII, 170).

Male.—Average length, 6.5 mm. In color and structure similar to female. Penis valve oblong, with short lateral spine and blunt dorsal lobe (pl. X, 233); harpe and parapsis as in plate X, 232.

Holotypes.—*M. atratus* Harrington (♂) is type No. 86 at the Canadian National Collection and bears the data "V. I. T." The MacGillivray types are at the Illinois Natural History Survey.

M. circina (♂) bears the data "5-3-97, T. Kincaid, collector," and *P. obtentus* (♀) has the data "Corvallis, Or., May 5, 1901."

Distribution.—Known from British Columbia, Washington, Oregon, and California (fig. 14, A).

North American Records.—*British Columbia*: Agassiz, April 30, 1927, H. H. Ross; Vernon, May 9, 1908; Bowser, May 31, 1955, J. R. McGillis; Robson, May 7, 20, 1947, May 25, 26, 1948, May 22–30, 1950, June 8–10, 1950, H. R. Foxlee; Cowichan Bay, June 2, 1959, L. A. Kelton; Oliver, May 10, 1923, E. R. Buckell; Royal Oak, June 3, 1959, L. A. Kelton; Saanich, May 20, 1929, W. H. A. Preece; Modern Lk., 10 mi. N. Oliver, May 22, 1959, R. Madge; Victoria, May 6, 1919, W. Downes. *California*: Inyo Co., Glacier Lodge, 11 mi. E. Big Pine, 7000', June 13, 1965, ex *Rosa woodsii* v. *ultra-montana*, E. L. Smith. *Oregon*: Corvallis, May 1, 1929, V. T. Shattuck, April 20, 1927, H. A. Scullen; Hood River, April 15, Childs; Talent, May 8, 1936, on wild rose, L. G. Gentner; Troutdale, April 25, 1941, on wild rose, P. M. Eide. *Washington*: Pleasant Valley, Stevens Co., May 4, 1957, A. R. Gittins; Woodland, April 25, 1941, on wild rose, P. M. Eide.

Host.—Unknown. Adults have been collected from rose.

Larva.—Unknown.

Discussion.—The female is easily distinguished from *brunniventris* by the lack of the dorsoapical projection of the sheath, and in the male by the more slender and oblong penis valve. In both sexes the tegula and upper angles of the pronotum are brownish or black, not white as in *brunniventris*.

Ardis brunniventris (Hartig)

Tenthredo (*Allantus*) *bipunctata* Klug, 1814, p. 215, ♀; Hartig, 1837, p. 274; Kriechbaumer, 1884, p. 200; Enslin, 1914, p. 383 (= *brunniventris* Hartig). Preoccupied by *Tenthredo bipunctata* Gmelin (1790).

Monophadnus bipunctatus, Taschenberg, 1866, p. 18.

Blennocampa bipunctata, Thomson, 1870, p. 279; Thomson, 1871, p. 208; Cameron, 1877a, p. 56; Cameron, 1877b, p. 108; Cameron, 1880, p. 266; André, 1881, p. 301; Cameron, 1882, p. 242; Brischke and Zaddach, 1883, p. 274; André, 1889, p. 286.

Ardis bipunctata, Konow, 1886, p. 188; Dalla Torre, 1894, p. 180; Konow, 1905, p. 81.

Tenthredo (*Monophadnus*) *brunniventris* Hartig, 1837, p. 274, ♀.

Blennocampa brunniventris, André, 1881, p. 304.

Ardis brunniventris, Enslin, 1914, p. 283; Conde, 1934, p. 182; Crevecoeur and Maréchal, 1938, p. 494; Hardouin, 1943, p. 104; Berland, 1947, p. 244; Benson, 1952, p. 102; Takeuchi, 1952, p. 47; Lorenz and Kraus, 1957, p. 121; Smith, 1965, p. 9; Smith, 1966b, p. 1292.

Ardis sulcata of auctt., nec Cameron, Eide, 1948, p. 819; Ross, 1951, p. 66; Middlekauff, 1958, p. 202; Benson, 1962, p. 390; Smith, 1965, p. 9 (= *brunniventris* Hartig).

Selandria irrogata Cresson, 1880a, p. 13, ♀; Dalla Torre, 1894, p. 163; Cresson, 1916, p. 5; Smith, 1965, p. 9 (= *brunniventris* Hartig).

Monophadnus irrogata, Konow, 1905, p. 86.

Valco irrogata, Ross, 1937, p. 99.

Ardis irrogata, Ross, 1951, p. 66.

Aphanisus odoratus MacGillivray, 1908a, p. 296, ♀; MacGillivray, 1916, p. 154; Frison, 1927, p. 237; Smith, 1965, p. 9 (= *brunniventris* Hartig).

Ardis odoratus, Ross, 1951, p. 66.

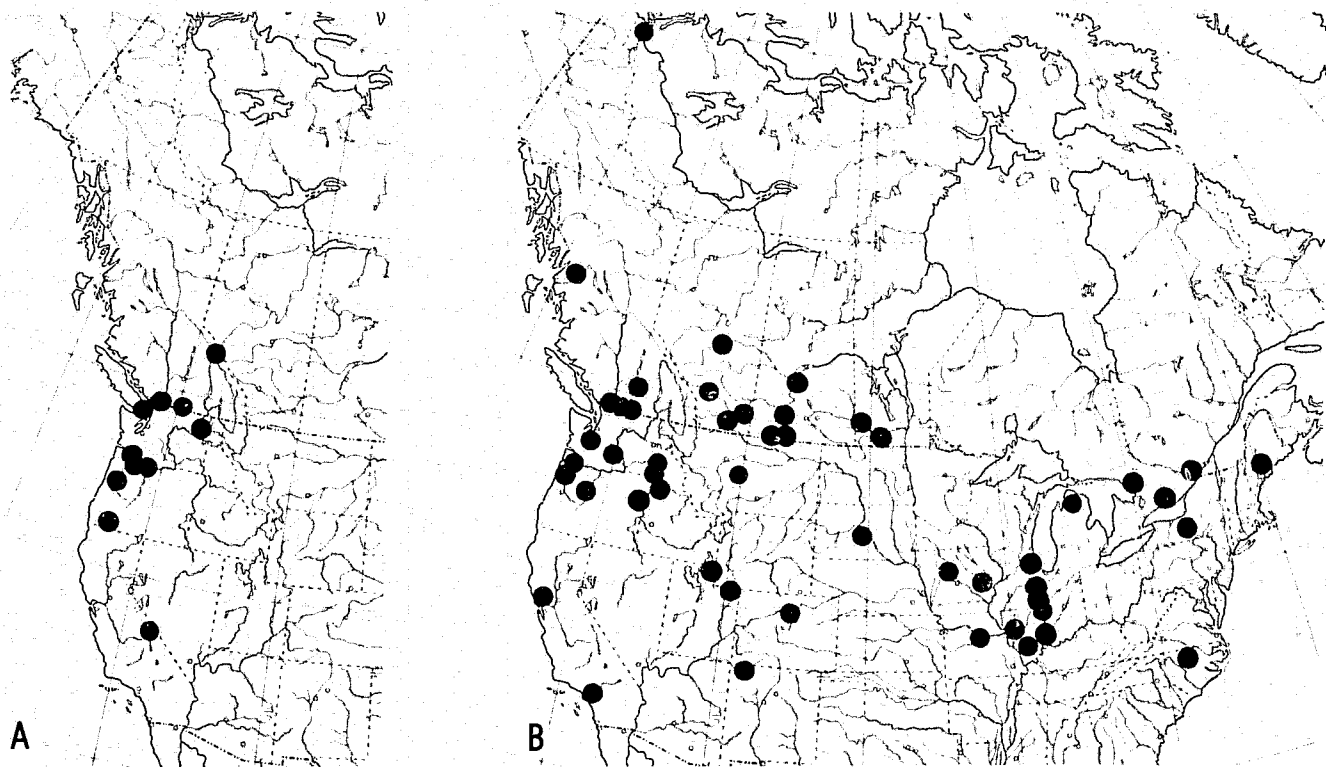


FIGURE 14.—Distribution of (A) *Ardis atrata* and (B) *brunniventris*.

Aphanisus parallelus MacGillivray, 1923c, p. 7, ♀; Frison, 1927, p. 237; Smith, 1965, p. 9 (= *brunniventris* Hartig).
Ardis parallela, Ross, 1951, p. 66.

The synonymy of *bipunctata* is generally accepted and is based on Enslin (1914) as is the interpretation of this species. Other European synonymy is not presented here.

Female.—Average length, 6.4 mm. Entirely black with tegula, upper angles of pronotum, extreme apex of each femur, each tibia, and each tarsus white; parts of each tibia and tarsus infusate. Wings hyaline.

Malar space as wide as diameter of front ocellus. Sheath straight above, rounded below, with long, slender, dorsoapical projection (pl. V, 112). Lancet with serrulae flat, with one anterior subbasal tooth and seven or eight posterior subbasal teeth (pl. VIII, 171).

Male.—Average length, 6.4 mm. Color and structure as for female. Penis valve quadrate, with lateral spine near apex and without dorsal lobe (pl. X, 235); harpe and parapenis as in plate X, 234.

Holotypes.—*S. irrogata* Cresson (♀) is type No. 194 at the Academy of Natural Sciences of Philadelphia and bears the data "Colo." MacGillivray's types are at the Illinois Natural History Survey. They bear the following data: *A. odoratus* (♀), "Ithaca, N.Y., May 11, 1898"; *A. parallelus* (♀), "Colo." Klug's types are probably at the Zoological Museum of Berlin. Hartig's types are at the Zoological Museum of Munich.

Distribution.—Widely distributed over North America from Northwest Territories to southern California east to Quebec, Maine, and North Carolina (fig. 14, B); all Europe to Siberia and Japan.

North American Records.—*Alberta*: Websman, July 1, 1931, E. H. Strickland; Edmonton, June 13, 1929, E. H. Strickland; Medicine Hat, June 1, 1952, A. R. Brooks; Calgary, May 26, 1924, G. Salt; Lethbridge, June 22, 1956, O. Peck. *British Columbia*: Salmon Arm, May 7, 1933, H. Leech; Agassiz, May 16, 1927, H. H. Ross; Summerland, May 30, 1951, on cultivated rose, W. Snow; Agassiz, April 4, 1960, in rose stem tip, R. Glendinning; Oliver, May 6, 1923, C. B. Garrett, May 15, 1959, swept from rose, R. Madge; Anarchist Mt., Osoyoos, May 20, 1959, L. A. Kelton; E. entrance, Manning Pk., May 31, 1959, R. E. Leech; Kleanza Cr., 14 mi. E. Terrace, June 17, 1960, J. G. Chilcott; Lakelse nr. Terrace, June 27, 1960, grass and ledum, W. W. Moss; Trinity Valley, May 21, 1959, R. Madge; Ruskin, June 26, 1953, G. J. Spenser; Wynndel, May 10, 1958, H. and A. Howden. *California*: Soda Cr., Napa Co., April 12, 1937, reared from rose buds, H. H. Kiefer; Redlands, F. R. Cole. *Colorado*: "Colo."; State Bridge, nr. Bond, 7000', June 24–25, 1961, B. H. Poole. *Idaho*: Moscow, J. M. A.; Lewiston Grade, Lewiston, April 23, 1958, M. D. Bentley, April 27, 1938, H. L. Harris; Idaho Co., Riggins, April 3, 1958, on Syringa, A. R. Gittins; Cottonwood Cr., Myrtle, Nez Perce Co., April 28, 1961, W. F. Barr. *Illinois*: Oakwood,

May 9, 1930, T. H. Frison; Mt. Carmel, April 15, 1930, Frison and Ross; Cary, May 3, 1945, J. A. Ross; Dubois, April 24, 1914, creek valley, May 22, 1917; West Union, April 14, 1930, Frison and Ross; Seymour, April 13, 1929, R. R. Park; Eddyville, June 7, 1946, Mohr and Burks; St. Jacobs, April 13, 1941, Ross and Mohr; Onarga, April 24, 1929, Frison and Ross. *Iowa*: Iowa City, April 24, 1915, Stoner; Ames, May 25, 1952, R. R. Whitney. *Maine*: Augusta, May 13, 1943, resting on rose, A. E. Brower. *Manitoba*: Birtle, July 14, 1928, R. D. Bird; Aweme, May 10, 1928, host *Rosa*, N. Criddle, May 20, 1925, May 17, 1926, R. D. Bird. *Michigan*: Douglas Lake, July, C. H. Kennedy. *Missouri*: "Mo.," C. V. Riley Collection. *Montana*: "Montana," *New Mexico*: Aztec, April 17, 1899, C. F. Baker. *New York*: Ithaca, May 11, 1898. *North Carolina*: Spring Hope, May 25, 1925, C. S. Brimley. *Northwest Territories*: Aklavik, July 15, 1931, Bryant. *Ontario*: Waubamie, July 10, 1915, H. S. Parrish; Perry Island, July, 1915, H. S. Parrish; Aylmer, April 23, 1945, swept from rose, G. S. Walley; Marmora, May 26, 1952, J. R. McGillis, April 24, 1952, J. F. McAlpine. *Oregon*: Banks, April 9, 1942, on wild rose, P. M. Eide; Tumalo St. Pk., Deschutes Co., July 13, 1961, D. R. Smith; Grande Ronde, Polk Co., May 2, 1962, snowberry, K. Goeden; Powder River, May 11, 1899. *Quebec*: Wright, May 17, 1932, W. J. Brown. *South Dakota*: Pierre, Farm Island, June 17, 1937, H. C. Severin. *Utah*: Logan, April 21, 1943, G. F. Knowlton and D. R. Maddock; Manila, July 25, 1925, L. Coons; Paradise, April 28, 1957, W. Besseth. *Washington*: Puyallup, reared from rose tip, larva coll. May 19, 1941, em. March 17, 1942, P. M. Eide; Sumner, May 11, 1942, manetti, P. M. Eide; Fort Lewis, Pierce Co., April 17, 1946, P. H. Arnaud; Yakima, June 1, 1951, A. R. Rolfs; Alderton, from rose tip, em. March 17, 20, 25, 27, 1942, on manetti, May 11, 1942, caught ovipositing on manetti tip, March 31, 1942, on manetti, April 19, 1942, P. M. Eide.

Host.—The larva bores and feeds in the shoots of wild and cultivated roses (Eide, 1948; Middlekauff, 1958).

Larva.—The larva of this species has undergone certain adaptations that make it distinct from the larvae of other members of this subfamily. Lorenz and Kraus (1957) and Smith (1966b) described this larva.

The larva is easily recognized by the reduction of the prolegs, the four-annulate abdominal segments, the broad, flat 10th abdominal tergum, and the presence of a pair of subanal protuberances.

In late instar, head, thoracic legs, and 10th abdominal tergum lightly sclerotized; rest of body white, without plates or setae.

Clypeus without setae. Labrum without setae; narrow, shallow central emargination present; epipharynx with three or four spines on each half (pl. XV, 304). Left mandible with four sharp and one truncate lateral teeth (pl. XV, 303); right mandible with three sharp and one truncate lateral teeth (pl. XV, 302). Maxillary palp four-segmented; second maxillary segment without setae; palpifer with three setae; stipes with three setae; galea conical; lacinia with five spines, outermost one located on sepa-

rate fingerlike extension (pl. XV, 305). Labial palpus three-segmented.

Thorax without spines, plates, or setae. Thoracic legs normal, femur longer than tibia.

Abdominal segments 1 through 8 each with four dorsal annulets; without spines, plates, or setae. Ninth segment with lightly sclerotized plate on tergum. Tenth tergum with medial length equal to one-half basal width. Setiferous subanal protuberances present; without spines or setae between protuberances.

Discussion.—The female of this species is easily recognized by the dorsoapical projection of the sheath. The male may be recognized by the quadrate penis valve, which lacks a dorsal lobe. Both sexes have the tegula and upper angles of the pronotum white.

For a long time the species in this country was believed to be *A. sulcata* (Cameron). This was found to be based on a misidentification, and the correction was made by Smith (1965). This was also believed to be an introduced species; however, its wide distribution and early collection records in this country seem to support its position as a true Holarctic species.

This species may be of minor economic importance by its feeding habits in the tips of roses. It has been called the "rose tip sawfly" and a discussion of its biology was given by Eide (1948).

Genus MONARDIS Enslin

Monardis Enslin, 1914, p. 284; Berland, 1947, p. 244; Lorenz and Kraus, 1957, p. 123.

Type: *Tenthredo plana* Klug. Monotypic.

Description.—Antenna short and stocky, second segment as wide as long, third segment longer than fourth segment (pl. III, 59). Clypeus truncate; malar space as wide as diameter of front ocellus; postorbital groove absent; postgenal carina absent; eye small, located some distance from posterior margin of head (pl. II, 11). Prepectus absent. Tarsal claw simple. Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); vein *Rs* + *M* joins *M* at junction of *Sc* + *R* (pl. I, 1). Hindwing with crossvein *m-cu* present, enclosing cell *M*. Wings darkly infusate.

This genus is close to *Apareophora*, *Ardis*, and *Pareophora* and possesses some characters of each. At present, however, it seems best to treat it as a distinct genus. *Monardis* may be separated from *Apareophora* by the presence of cell *M* in the hindwing and the short dorsoapical extension of the female sheath, from *Ardis* by the lack of a postorbital groove and simple tarsal claw, and from *Pareophora* by the simple tarsal claw and shorter malar space.

There is only one species known for North America. The genus is represented in Europe by the type species, which feeds on *Rosa*. The host and larva for the Nearctic species are unknown.

Description of *Monardis* Species

Monardis pulla, new species

Female.—Average length, 6.8 mm. Entirely black with light areas on extreme apex of each femur and extreme base of each tibia. Head and body covered with fine white pubescence. Wings darkly infusate.

Antenna short and stout, second segment as wide as long, third segment longer than fourth segment (pl. III, 59). Clypeus truncate; malar space as wide as diameter of front ocellus; postorbital groove absent; postgenal carina absent; eye small, located some distance from posterior margin of head (pl. II, 11). Several large punctures present on hindmargin of scutellum. Prepectus absent. Tarsal claw simple. Forewing with stub of 2A and 3A curved up at apex; vein *Rs* + *M* joins *M* at junction of *Sc* + *R*. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below, small blunt projection at dorsoapical margin (pl. V, 110, 111). Lancet with serrulae lobelike and quadrate, with about six posterior subbasal teeth (pl. VIII, 174).

Male.—Unknown.

Holotype.—Female, Logan Canyon, Utah, May 29, 1933, G. F. Knowlton and E. W. Anthony. Deposited at the Illinois Natural History Survey.

Paratypes.—*Alberta*: Waterton, June 18, 1956, E. E. Sterns (1♀). *British Columbia*: Vernon (1♀); Robson, April 15, 1947, H. R. Foxlee (1♀). *Colorado*: "Colo." (1♀). *Idaho*: 2 mi. N. Melba, Canyon Co., July 5, 1957, carrot flower, H. W. Homan (1♀); Moscow, Viola Grade, 3000', April 29, 1935, W. E. Shull (1♀); Latah Co., Section 9, May 15, 1957, J. R. Grabad (1♀); Almo, Cassia Co., June 12, 1953, H. E. Cott (1♀). *Montana*: Gallatin Co., July 1, 1932 (1♀). *Saskatchewan*: Saskatoon, May 13, 1949, A. R. Brooks (1♀); Roche-Percée, July 4–8, 1927, E. and S. Criddle (1♀). *Utah*: Logan Canyon, May 29, 1933, G. F. Knowlton and E. W. Anthony (1♀); Logan, May 25, 1933, T. O. Thatcher (1♀).

Disposition of Paratypes.—Paratypes have been deposited at the U.S. National Museum, Illinois Natural History Survey, Canadian National Collection, Utah State University, and University of Idaho.

Distribution.—Rocky Mountain region from British Columbia and Saskatchewan south to Utah and Colorado (fig. 15, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species may be separated from members of closely related genera by the darkly infusate wings, the short dorsoapical projection of the female sheath, the presence of cell *M* in the hindwing, and the simple tarsal claw.

The name is derived from the Latin word *pullus* meaning dark colored or blackish.

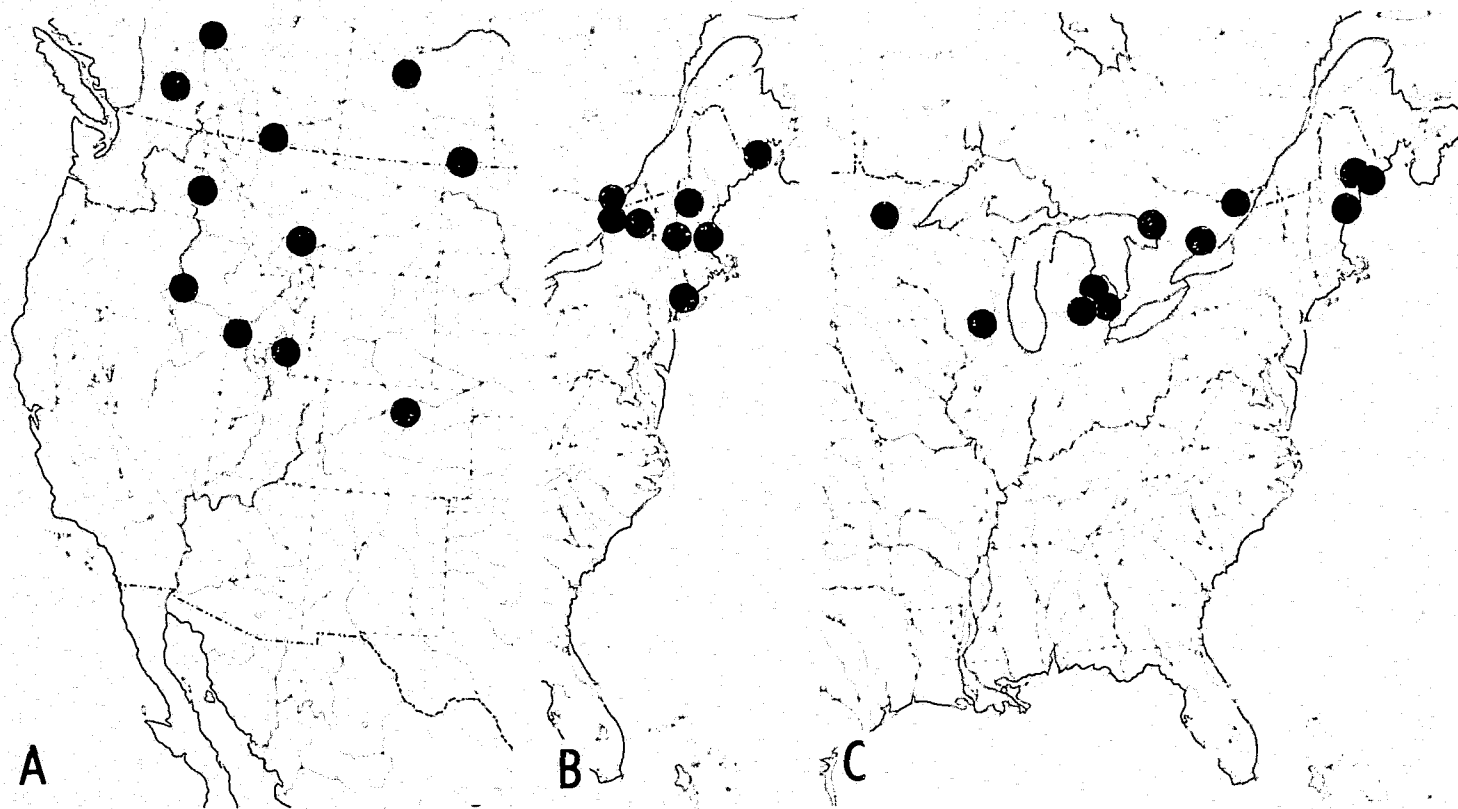


FIGURE 15.—Distribution of (A) *Monardis pulla*, (B) *Aparcophora dyari*, and (C) *A. rossi*.

Genus APAREOPHORA Sato

Apareophora Sato, 1928, p. 185; Takeuchi, 1952, p. 49; Malaise, 1964, p. 25; Togashi, 1964, p. 403.

Type: *Apareophora forsythiae* Sato. Original designation.

Description.—Antenna short and stocky, second segment as wide as long, third segment longer than fourth segment (pl. III, 59). Clypeus truncate; malar space slightly less than diameter of front ocellus; postorbital groove absent; postgenal carina absent; eye small, removed some distance from posterior margin of head (pl. II, 11). Prepectus absent. Tarsal claw simple. Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); vein *Rs* + *M* joins *M* at junction with *Sc* + *R* (pl. I, 1). Hindwing with crossvein *m-cu* absent, leaving cell *M* open.

One of the species in this genus was previously placed in the genus *Pareophora* Konow. The main features separating this genus from *Pareophora* are that in *Apareophora* the second antennal segment is as wide as long, the tarsal claw is simple, the malar space is not wider than the diameter of the front ocellus, and the hindwing has cell *M* absent. This genus is known from eastern Asia and North America. Sato (1928) described two species from Korea, and Togashi (1964) included two species from Japan in his revision of the Japanese species of this genus. *A. forsythiae* Sato of Korea feeds on *Forsythia*, and *A. japonica* Takeuchi of Japan is known to feed on *Spiraea japonica* L. f. The host is known for one North American species, *A. dyari*, which was reared from *Spiraea salicifolia* L. by Dyar (1859a). No larvae were available for examination.

Malaise (1964) synonymized *Aphymatocera* Sato (1928) with this genus on the assumption that Sato had separated the two genera only on the basis of *Rs* + *M* joining *M* just before *Sc* + *R* in *Aphymatocera*. Malaise overlooked several points. Sato included *Aphymatocera* in the subfamily Phymatocerinae as defined by Rohwer (1911c), who separated this subfamily by the presence of the prepectus, which is lacking in *Apareophora*. Also in *Aphymatocera*, Sato described the stub of 2A and 3A of the forewing as being straight and the third and fourth antennal segments being subequal neither of which is true in *Apareophora*. Considering these points, I see no reason to consider these genera as being the same.

Key to *Apareophora* Species

- | | |
|---|--------------------------|
| 1. Female..... | 2 |
| Male..... | 3 |
| 2. Tegula white; serrulae of lancet rounded and lobelike (pl. VIII, 172) | |
| <i>A. dyari</i> (Benson) | |
| Tegula black; serrulae of lancet flat, each with about six fine teeth (pl. VIII, 173)..... | <i>A. rossi</i> , n. sp. |
| 3. Penis valve with lateral spine short and near center; dorsal lobe protuberant and distinct (pl. X, 237); tegula usually white..... | <i>A. dyari</i> (Benson) |
| Penis valve with lateral spine near apex, dorsal lobe short, more evenly rounded (pl. X, 239); tegula black..... | <i>A. rossi</i> , n. sp. |

Descriptions of *Apareophora* Species*Apareophora dyari* (Benson), new combination

- Blennocampa spiraeae* Dyar, 1895a, p. 194, ♂, ♀, larva; Dyar, 1899, p. 220; MacGillivray, 1916, p. 155; Yuasa, 1922, p. 93. (Preoccupied by *Blennocampa spiraeae* Brinckhe and Zaddach, 1883.)
Pareophora spiraeae, Ross, 1951, p. 64.
Blennocampa dyari Benson, 1930, p. 107 (new name for *spiraeae* Dyar).

Female.—Average length, 6.7 mm. Entirely black with tegula, extreme apex of each femur, each tibia, and each tarsus white. Wings hyaline.

Sheath long and broadly rounded at apex (pl. V, 114). Lancet with serrulae rounded and lobelike, without subbasal teeth (pl. VIII, 172).

Male.—Average length, 6.5 mm. Color similar to that of female except tegula, which may be black. Structure similar to that of female. Harpe oblong (pl. X, 236); penis valve with lateral spine short and near center and with dorsal lobe protuberant and distinct (pl. X, 237), parapenis as in plate X, 236.

Holotype.—*B. spiraeae* Dyar (♀) is type No. 41261 at the U.S. National Museum. Although the specimen bears a label reading only "3K," the locality mentioned in the original description is Keene Valley, N.Y.

Distribution.—Southeastern Canada and Northeastern United States (fig. 15, B).

North American Records.—*Connecticut*: Orange, May 3, 1962, M. P. Zappe. *New Brunswick*: Charlotte Co., May 20, 1963, G. W. Wood, May 26, 1951, May 20, 28, 1952, May 17, 1955, W. T. A. Neilson. *New Hampshire*: Hanover, May 14, 1961; Hampton, May 7, 1936, S. A. Shaw; Coos Co., 3 mi. E. Shelburne, May 22, 1966, D. R. Smith. *New York*: Keene Valley. *Ontario*: Ottawa, May 8; Merivale, May 3, 1936, O. Peck; Spencerville, Limerick Forest, May 19, 1955, R. Lambert. *Quebec*: Beech Grove, May 15, 1951, J. F. McAlpine. *Vermont*: Union Vill., May 5, 1963, K. W. Cooper.

Host.—Dyar reared this species from *Spiraea salicifolia* L.

Larva.—Dyar (1895) described the larva in the original description of this species, and Yuasa (1922) also described it. I have not seen the larva and was unable to find the specimens on which these descriptions were based.

Dyar (1895a) described the head as being "Pale greenish, not shining, mouth brown, ocellus covered by a black spot." The abdomen has "several little white pointed elevations, like sharp teeth with two cusps; two of them ad-dorsal on each segment, two sub-dorsal, a single one-cusped dot laterally anteriorly, three in a triangle stigmatically posteriorly and six on sub-ventral fold. Body pale bluish-green, not shining, closely like the leaf in color." Yuasa's (1922) description is similar except that he stated that the abdominal segments have six annulets. Dyar's notebook (unpublished) includes a sketch by Dyar of one of the abdominal segments, which shows the segment with five annulets and the spines on the second and fourth annulet. It is likely that there

are five annulets, judging from the descriptions and the position of this species in relation to other species and genera of this subfamily.

Discussion.—This species is not common in collections. It may be separated from *rossi* by the white tegula, lobelike serrulae of the female lancet, and characters of the male genitalia.

Aparcophora rossi, new species

Female.—Length, 6.7 mm. Entirely black with labrum, extreme apex of each femur, foretibia, midtibia, foretarsus, and midtarsus white. Wings hyaline.

Antenna short and stout, second segment as wide as long, third segment longer than fourth segment (pl. III, 59). Clypeus truncate; malar space slightly less than diameter of front ocellus; postorbital groove absent; postgenal carina absent; eye small, located some distance from posterior margin of head (pl. II, 11). Prepectus absent. Tarsal claw simple. Forewing with stub of 2A and 3A curved up at apex; *Rs* + *M* joins *M* at junction of *Sc* + *R*. Hindwing with cross vein *m-cu* absent, leaving cell *M* open. Sheath long and rounded at apex (pl. V, 115). Lancet with serrulae flat, each serrula with about six distinct subbasal teeth (pl. VIII, 173).

Male.—Length, 6.6 mm. In color and structure similar to female. Harpe almost evenly rounded (pl. X, 238); penis valve with lateral spine near apex, and with dorsal lobe small and evenly rounded (pl. X, 239); parapenis as in plate X, 238.

Holotype.—Female, Bath, Mich., June 6, 1940, C. W. Sabrosky. Deposited at the Illinois Natural History Survey.

Allotype.—Male, same data as for female. Deposited with the holotype.

Paratypes. *Maine:* Bar Harbor, May, 1941, bred with 564 *Diprion simile* ex *Pinus strobus* (1 ♀); Brunswick, June 9, 1965, L. Lipovsky (1 ♀); Penobscot Co., 3 mi. N. Passadumkeag, May 26, 1966, D. R. Smith (1 ♀). *Michigan:* Bath, June 6, 1940, C. W. Sabrosky (5 : :); Bay City, May 20, 1936, Frison and Ross (1 : , 1 :); 13 mi. N. Lapeer, May 31, 1937, C. W. Sabrosky (1 :); E. Lansing, May 25, 1937, C. W. Sabrosky (1 :); Bath, June 6, 1940 (2 : :). *Minnesota:* Itasca Park, June 3, 1957, sweeping, H. R. Dodge (1 ♀). *Ontario:* Parry Sound, July 15, H. S. Parish (1 :); Blackburn, May 20, 1941, O. Peck (1 ♀); S. Marsh, May 3, 1945, O. Peck (1 ♀); Marmora, May 26, 1952, R. Lambert (1 :). *Wisconsin:* Madison, May 23, 1919, L. G. Gentner, (1 : , 1 ♀).

Disposition of Paratypes.—Paratypes have been deposited at the U.S. National Museum, Canadian National Collection, Illinois Natural History Survey, Michigan State University, University of Wisconsin, and Entomology Laboratory, Maine Forest Service, Augusta.

Distribution.—Southern Canada and Northern United States from Minnesota to Maine (fig. 15, C).

Host.—Unknown.

Larva.—Unknown.

Discussion.—The tegula, which is always black, and the male and female genitalic characters will distinguish this species.

This species is named after H. H. Ross of the Illinois Natural History Survey.

Genus EUPAREOPHORA Enslin

Eupareophora Enslin, 1914, p. 283; Berland, 1947, p. 234.

Type: *Blennocampa exarmata* Thomson. Monotypic.

Description.—Antenna short and stout; second segment wider than long; third segment longer than fourth segment (pl. III, 60). Clypeus truncate or very slightly emarginate; malar space as wide as diameter of front ocellus; postgenal carina absent; postorbital groove present and deep, with large indistinct punctures. Eye large, posterior margin very close to and parallel with posterior margin of head in lateral view (pl. II, 10). Prepectus absent. Tarsal claw simple. Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); vein *Rs* + *M* joins *M* before *M* joins *Sc* + *R* (pl. I, 3). Hindwing with crossvein *m-cu* present, enclosing cell *M*.

The large eye, postorbital groove, wing venation, and tarsal claw will separate this genus from others.

This genus is represented in North America by one species, *parca* (Cresson), which has most commonly been known as *Pareophora minuta* (MacGillivray). The type of the genus is the only other species, a rare European form.

Description of *Eupareophora* Species

Eupareophora parca (Cresson), new combination

Selandria parca Cresson, 1880a, p. 13, ♂; Dalla Torre, 1894, p. 164; Cresson, 1916, p. 7.

Monophadnus parvus, Konow, 1905, p. 86.

Ardis parca, Ross, 1951, p. 66.

Selandria sp., Packard, 1890, p. 545.

Periclista chionanthi Dyar, 1898, p. 132, ♀, larva; MacGillivray, 1916, p. 147.

New synonymy.

Ardis chionanthi, Stannard, 1949, p. 38; Ross, 1951, p. 66.

Monophadnus minutus MacGillivray, 1908a, p. 291, ♀; MacGillivray, 1916, p. 150; Frison, 1927, p. 253. **New synonymy.**

Parcophora minuta, Ross, 1937, p. 99; Ross, 1951, p. 63; Maxwell, 1955, p. 88.

Pareophora guana MacGillivray, 1923c, p. 28, ♂; Frison, 1927, p. 255; Ross, 1937, p. 99 (= *minutus* MacGillivray). **New synonymy.**

Pareophora guana MacGillivray, 1923b, p. 54, ♀; Frison, 1927, p. 255; Ross, 1937, p. 99 (= *minutus* MacGillivray). **New synonymy.**

Female.—Average length, 6.2 mm. Antenna and head black. Thorax black with tegula and upper angles of pronotum white to light rufous or nearly black. Legs black with extreme apex of each femur, each tibia, and each tarsus whitish. Abdomen black. Wings hyaline.

Clypeus shallowly emarginate. Posterior margin of scutellum with several large punctures. Sheath short and broadly rounded

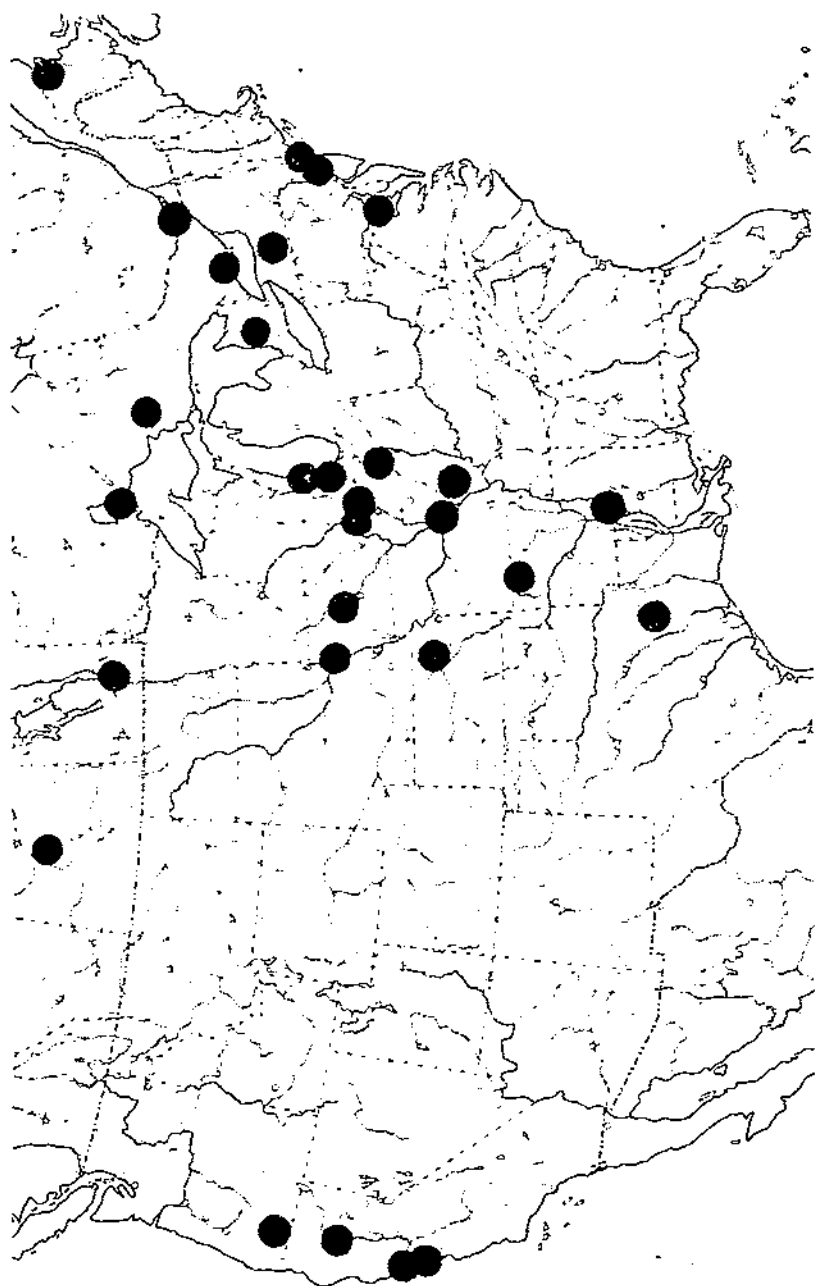
at apex (pl. V, 116). Lancet with serrulae low and rounded, each with 10 to 15 fine teeth (pl. VIII, 175).

Male.—Average length, 5.8 mm. In color and structure similar to female. Penis valve with dorsal lobe and lateral spine near apex (pl. XI, 241); harpe and parapenis as in plate XI, 240.

Holotypes.—*S. parca* Cresson (♂) is type No. 357 at the Academy of Natural Sciences of Philadelphia and bears the data "Tex." *P. chionanthi* Dyar (♀) is type No. 4023 at the U.S. National Museum and is without locality labels. MacGillivray's types are at the Illinois Natural History Survey and have the following data, respectively: *M. minutus* (♀), "Milw. Co., Wisc., June 4, 1902, C. E. S."; *P. guana* (♂), "Algonquin, Ill."; and *P. guana* (♀), "Marion Co., Ark., May 2, 1897, F. M. McE."

Distribution.—New Brunswick to Maryland, west to Texas and Saskatchewan; northern California and southern Oregon (fig. 16).

North American Records.—**Arkansas:** Marion Co., May 2, 1897, F. M. McE. **California:** Marin Co., Phoenix Lake, June 31, 1961, D. Q. Cavagnato; Red Bluff, March 23, 1951, on ash, Kane and Olsen; San Mateo, April 8, 1959, W. H. Lange. **Illinois:** Algonquin, May 12, 1903, Nason; St. Joseph, May 4, 1913, May 3, 1914, salt fork; DuBois, April 24, 1914, creek valley; Bradford, April 27, 1954, M. W. Sanderson; Andover, April 27, 1954, M. W. Sanderson. **Iowa:** Sioux City, April 29, 1929, C. N. Ainslie; Ames, May 6, 1950, W. L. Downes, May 7, 1951, Howard, May 3, 1953, D. Muller, September, 1942, M. C. Park; Ledges St. Pk., Boone Co., May 1, 1957, N. M. Chivers, May 4, 1952, J. Laffoon. **Kansas:** Riley Co., April 28, F. Marlatt. **Manitoba:** Carmen, em. March 2, 1951, green ash. **Maryland:** Wheaton, May 10, 1956, on ash, adults April 27, 1957, B. D. Burks. **Mississippi:** Stoneville, November 11, 1963, pecan, R. C. Norris. **Missouri:** Kirkwood. **New Brunswick:** Tetagouche Falls, em. March 8, 12, 15, 1965, white ash. **New Jersey:** Somerville, May 6, 1932, *Fraxinus americana*. **New York:** Chappaqua, May 7, 1925; Honeoye L., May 14, 1933. **Ontario:** Willard Lake, April 16, 1939, black ash; Donnoch, March 30, 1951, black ash; Hurkett, March 19, 26, 1952, April 3, 1952, black ash; Nipigon, March 25, 19, 26, 1952, black ash; Northland, March 26, 1952, black ash; Chapleau, March 7, 21, 1955, black ash, March 7, 9, 1955, green ash; Ottawa, May 24, 1923, G. S. Walley, March 8, 20, 1952, ash; Hazoldean, March 12, 1941, March 21, 1947, March 26, green ash; Orton Mills, Lake Simcoe, March 10, 1955, black ash; White River, March 21, 1955, black ash; Gogama, February 27, 1962, March 5, 9, 1962, *Fraxinus nigra*; Ouimet, March 19, 1952, black ash; Angus, April 3, 1947, white spruce cones; forestry sta., Petawawa, May 28, 1959, J. R. Vockeroth; Bells Corners, March 23, 1950, white spruce cones; Marmora, May 26, 1952, R. Lambert; Merivale, May 22, 1947, O. Peck; Chatterton, May 24, 1954, J. C. Martin. **Oregon:** "Oregon," Koebel. **Quebec:** Harrington Lk., Gatineau Pk., May 31, 1954, R. McCondochie. **Saskatchewan:** Tessier, em. March 1, 1951, ash; Sutherland, em. June 5, 1945, March 27, 1950, March

FIGURE 16.—Distribution of *Expareophora parca*.

22, 1957, ash. *Texas*: "Tex." Belfrage. *Wisconsin*: Milwaukee Co., June 4, 1902, C. E. S.

Host.—*Fraxinus americana* L., *F. nigra* Marsh., *F. oregona* Nutt., and probably other species of ash. Adults of this species have been reared from larvae feeding on pecan (*Carya illinoensis* (Wangenh.) K. Koch) in Mississippi. Dyar (1898) reported that the larvae feed on white fringe (*Chionanthus*).

Larva.—Dyar (1898) described the larva of this species in his description of *chionanthi*. The larva has long been confused with the larvae of *Periclista*, resembling the latter by the numerous long furcate spines on the body; however, the larva of *parca* may be separated from all known larvae of *Periclista* by the structure of the spines on the subspiracular lobe. *Periclista* has one bifurcate spine and one simple spine on this lobe, whereas *parca* has two bifurcate spines.

In late instar, head, spiracles, and spines on annulets entirely black; spines of spiracular and surpedal lobes black only at tips. Light-black dorsolateral longitudinal line present on each side of body.

Clypeus with two setae on each side. Labrum with two or three setae on each side; shallow central emargination present; epipharynx with five or six spines located in arcuate row on each anterolateral half (pl. XVIII, 337). Each mandible with one seta on outer lateral surface; left mandible with two sharp ventral teeth and three sharp and one truncate lateral teeth (pl. XVIII, 336); right mandible with two ventral teeth, two sharp and one truncate lateral teeth, and one molar tooth (pl. XVIII, 335). Maxillary palpus four-segmented; second segment of palpus with one seta on outer margin; palpifer with three setae; stipes with two setae; galea conical; lacinia with four or five stout spines (pl. XVIII, 338). Labial palpus three-segmented; prementum with three setae on each half.

Thorax with spines arranged as in plate XVIII, 341. Thoracic legs normal; femur longer than tibia; setae present on all surfaces of each leg.

Abdominal segments 1 through 8 each with five dorsal annulets; annulets 1, 3, and 5 without spines; annulets 2 and 4 each with two bifurcate spines on each side; postspiracular lobe with one bifurcate spine; subspiracular lobe with two bifurcate spines; surpedal lobe with two simple spines (typical segment shown in pl. XVIII, 340). Ninth abdominal segment with spines arranged as in plate XVIII, 339. Tenth tergum with transverse row of six spines, two central spines bifurcate, others simple (pl. XVIII, 339).

Discussion.—This species has previously been known in literature as *Pareophora minuta* (MacGillivray). Other species now considered synonymous with *parca* were placed in the genus *Ardis* by Ross (1951) because of the presence of the postorbital groove; however, *Eupareophora* also possesses this character. *Eupareophora* may be separated from *Ardis* by the simple tarsal claw and wing venation, and from *Pareophora* by the simple tarsal claw, postorbital groove, large eye, and wing venation.

Dyar (1898) described *chionanthi* from two specimens, the type, and another specimen that is *Periclista subtruncata* Dyar. The host *Chionanthus* is based on the rearing of these two specimens and remains somewhat dubious.

Two races may exist here, one on *Fraxinus* and the other on pecan; however, no differences could be found between the adults and larvae taken from these two hosts.

Genus PERICLISTA Konow

Periclista Konow, 1886, p. 186; Stannard, 1949, p. 7; Stannard, 1951, p. 65; Benson, 1952, p. 100; Takeuchi, 1952, p. 48; Lorenz and Kraus, 1957, p. 124; Malaise, 1964, p. 22.

Type: *Tenthredo* (*Allantus*) *lineolata* Klug. Designated by Rohwer (1911a). *Mogerus* MacGillivray, 1895, p. 281. New name proposed unnecessarily for *Periclista* Konow.

Isodyctium Ashmead, 1898b, p. 127.

Type: *Mogerus caryicolus* Dyar. Original designation.

Apericlista Enslin, 1914, p. 265; Malaise, 1964, p. 21 (genus reestablished).
Synonymy reestablished.

Type: *Tenthredo albipennis* Zaddach. Original designation.

Neoclista Malaise, 1964, p. 22. New synonymy.

Type: *Periclista andrei* Konow. Original designation.

This genus was revised by Stannard (1949), who gave a key to species and descriptions for the North American species. Only additional information gathered since this revision is presented here. The references to the original descriptions are given, and any references pertaining to the species since Stannard's revision are cited.

Description.—Antenna short and stocky; second segment about as wide as long; third segment longer than fourth segment (pl. III, 59). Clypeus truncate or emarginate; malar space various, wider or narrower than diameter of front ocellus; postorbital groove absent; postgenal carina absent. Prepectus absent; small membranous area usually present on upper part of mesepimeron (absent only in *marginicollis*). Tarsal claw bifid with inner tooth long and nearly subequal in length to outer tooth; basal lobe usually present, at times rounded or indistinct (pl. II, 15, 18, 19). Forewing with stub of 2A and 3A curved up at apex (pl. I, 6); vein *Rs* + *M* usually meeting *M* before junction with *Sc* + *R* (pl. I, 3). Hindwing with crossvein *m-cu* present or absent, leaving cell *M* closed or open. Hindwing of male with peripheral vein in subgenus *Periclista*, without peripheral vein in subgenus *Neocharactus*.

Species of this genus may be distinguished by the curved-up vein 2A and 3A of the forewing, the bifid tarsal claw, the membranous area of the mesepimeron, and the presence of a peripheral vein in the hindwing of the males in the subgenus *Periclista*.

Malaise (1964) reestablished the genus *Apericlista* using the following characters: (1) Absence of cell *M* in hindwing; (2) inner margins of eyes converging downward; (3) lateral antennal furrows distinct and uninterrupted; (4) malar space shorter than diameter of front ocellus in female; linear in male; (5) pedicellus little longer than broad at apex; and (6) distance between eyes

below subequal to length of eye. Then on the same page he proposed another genus, *Neoclista*, based on the following characters: (1) Hindwing with cell *M* present; (2) inner margins of eyes subparallel; (3) distance between eyes longer than length of eye; (4) antennal furrows shallow; (5) malar space as long as diameter of front ocellus; and (6) scape and pedicellus conical. Those *Periclista* species not possessing the above combination of characters would evidently fall into the genus *Periclista*.

Malaise was obviously not aware of the Nearctic fauna, which includes the bulk of the world species, and the variation of characters within the species complexes as proposed by Stannard (1949). Most of the characters used by Malaise are good only for species separation and vary considerably within these species complexes. Malaise considers the middle cell of the hindwing to be a very important taxonomic tool. This is not rejected; it is an obvious character that is satisfactory for separation of some genera but varies in others (e.g., *Eutomostethus*, *Monophadnoides*). The width of the malar space is used to separate species within the *Lineolata* complex; therefore, it cannot be utilized on the generic level in this case. Stannard (1949) stated that the sculpturing of the head varied considerably and was not useful as a morphological character. Also, the other characters that Malaise uses do not substantiate splitting of this genus.

The characters outlined in the generic description serve to differentiate this genus, and on the basis of these a uniform, compact group is formed. This is also substantiated by the habits and characters of the known larvae. If separate genera were to be established on the basis of those characters outlined by Malaise, the result would be about six genera, each with one or two species and each established with the use of all combinations of characters. There would be an assemblage of genera composed of distantly related species, some of which would be more closely related to members of other genera, and these would not reflect the true relationships of the species involved.

There are 19 species of *Periclista* in North America and four in Europe. Various species of *Quercus* constitute the host plant, although one species, *marginicollis*, feeds on *Carya*.

Larva.—The larvae of *Periclista* were first treated by Dyar (1898), who gave a key to the species known to him at that time. Unfortunately much of his larval collection cannot be located, and specimens that are located are in such poor condition that it would not be worthwhile to describe them in detail. The changes in taxonomy and a different concept of subgeneric and generic characters make Dyar's key considerably out of date.

Yuasa (1922) also included *Periclista* and *Isodyctium* in his key to the genera of Blennocampinae, but he did not include a key to species.

The larvae of only two species of *Periclista* can presently be identified with certainty; these are *linea* and *marginicollis*. I have been able to separate 10 larval forms from the material I have seen. Beer (1955) examined four larval forms taken from *Quercus agrifolium* at Berkeley, Calif., but only one was identified through

his rearings. I see no point in making a key to the unidentified larval forms examined; however, the following characters may permit specific identification of the larvae when they are associated with the adult: Number of spines on second annulet of each abdominal segment; number of annulets of each abdominal segment; number of postspiracular lobes of each abdominal segment; number of spines on postspiracular lobes; number and arrangement of spines on 10th abdominal tergum; number and arrangement of spines on thorax; mandibles; number and shape of spines on lacinia; and to some extent coloration of head and body.

It is interesting to note that, from the information available from Dyar (1898) and Beer (1955), those species of the *Lineolata* complex have two spines on the second annulet of each abdominal segment and those of the *Melanocephala* complex have three spines on the second annulet. When more larvae are definitely associated, it will be interesting to see how the larval characters substantiate the present concept of species relationships.

Periclista larvae may be separated by the following combination of characters: Abdominal segments 1 through 8 each with four or five dorsal annulets; annulets 2 and 4 of abdominal segments 1 through 8 each with bifurcate or sometimes trifurcate spines; one or two postspiracular lobes present and with spines; subspiracular lobe with anterior spine bifurcate, posterior spine simple; surpedal lobe with two simple spines (pl. XIX, 354). Tenth abdominal tergum with simple, bifurcate, or trifurcate spines on margin; central compound spine absent.

The spines of the subspiracular lobe and the surpedal lobe are the characters by which *Periclista* larvae may be separated from other spiniform blennocampine larvae.

Subgenus PERICLISTA Konow

Descriptions of *Periclista* Species

LINEOLATA COMPLEX

There are two eastern and three western species in the *Lineolata* complex.

Periclista albicollis (Norton)

Selandria albicollis Norton, 1872, p. 85, ♂.

Periclista albicollis, Stannard, 1949, p. 18; Stannard, 1951, p. 65; Raizenne, 1957, p. 40.

Periclista emarginata Dyar, nec MacGillivray, 1898, p. 131.

Periclista quercus Rohwer, 1912, p. 232, ♂, ♀.

Hindwing with cell *M* present.

New Host Records.—*Quercus ilicifolia* Wangenh., *Q. rubra* L., and *Q. macrocarpa* Michx.

New Records.—Iowa, Kansas, Louisiana, Maine, Manitoba, Maryland, New Hampshire, Ontario, Pennsylvania, and Virginia.

Larva.—The larva was described by Dyar (1898) as having "two spines on the second annulet," "dorsum entirely green," and

"head and spines black." Dyar also described the larva under the name *emarginata* MacGillivray.

Periclista linea Stannard

Periclista linea Stannard, 1949, p. 19, ♂, ♀; Stannard, 1951, p. 65; Beer, 1955, pp. 19-26.

Hindwing with cell *M* present.

Host.—*Quercus agrifolia* Née.

New Records.—Additional records from California and Oregon.

Larva.—Beer (1955) described the larva of this species in detail and discussed the biology of this species. The description and illustrations by Beer make this western species readily identifiable.

Periclista media (Norton)

Selandria media Norton, 1864, p. 9, ♂, ♀.

Periclista media, Stannard, 1949, p. 16; Stannard, 1951, p. 65.

Selandria (*Hoplocampa*) *floridana* Cresson, 1880a, p. 12, ♂.

Periclista purpuridorsum Dyar, 1898, p. 129, ♂, ♀.

Periclista confusa MacGillivray, 1908a, p. 291, ♀.

Periclista similis Rohwer, p. 155, ♀.

Hindwing with cell *M* present.

New Records.—Iowa, New Hampshire.

Larva.—Dyar (1898) described the larva of this species as having "two spines on the second annulet," and being "all green, at least in the last stage." Middleton (1922) described the larva of *similis* Rohwer and illustrated the maxilla and third abdominal segment. His more detailed description is similar to Dyar's description of *purpuridorsum*.

Periclista naranga Stannard

Periclista naranga Stannard, 1949, p. 20, ♀; Standard, 1951, p. 65.

Hindwing with cell *M* present.

Larva.—Unknown.

Periclista spicula Stannard

Periclista spicula Stannard, 1949, p. 21, ♂; Stannard, 1951, p. 65.

This species was described from a single male. To date several other males have been seen from California, but the female is still unknown.

Larva.—Unknown.

MELANOCEPHALA COMPLEX

One new species in the *Melanocephala* complex is described, as well as the female of *entella* and the male of *dibuta*. This complex includes seven species.

Periclista bipartita (Cresson)*Selandria bipartita* Cresson, 1880a, p. 12, ♂.*Periclista bipartita*, Stannard, 1949, p. 23; Stannard, 1951, p. 65.*Mogerus emarginatus* MacGillivray, 1895, p. 281, ♂.*Isodyctium murtfeldtii* Dyar, 1898, p. 135, ♀.Hindwing with cell *M* present.**New Record.**—Connecticut.

Larva.—Dyar (1898) described the larva of *murtfeldtii* as having "three spines on the second annulet," "head not spotted, spines mostly pale," and "spines well forked and black at base and tip." Dyar also described the larva of *emarginatus* as having "two spines on the second annulet." However, Dyar's *emarginatus* was not that of MacGillivray's but equal to *albicollis* Norton.

Periclista diluta (Cresson)*Selandria* (*Monophadnus*) *diluta* Cresson, 1880a, p. 12, ♀.*Periclista diluta*, Stannard, 1949, p. 27; Stannard, 1951, p. 65.*Isodyctium subgregarium* Dyar, 1898, p. 134, ♂, ♀.

Female.—Upper part of mesepimeron with small membranous area. Hindwing with cell *M* present or absent.

Male.—Average length, 6.7 mm. In coloration similar to male of *marginicollis* except for following: Usually only anterior lateral parts of clypeus white; mesopleuron may be red brown; mesonotum may be suffused with brown; upper inner orbits may be brownish.

Structure as for female. Harpe as broad as or broader than long with acute lower inner angle (pl. XI, 260); parapenis broad, not noticeably expanded toward center (pl. XI, 260); penis valve with dorsal lobe obsolete (pl. XI, 261).

The male will key out to *marginicollis* (= *caryicolus*) in Stannard's 1949 key. It may be separated from *marginicollis* by the presence of the membranous area on the upper part of the mesepimeron, the shorter and broader harpe, the broader parapenis, and the shape of the penis valve.

New Records.—Connecticut, Florida, Maine, Ontario, Texas, Wisconsin.

Larva.—Dyar included *diluta* in his 1898 key as having "two spines on the second annulet." He also described *subgregarium* but as having "three spines on the second annulet." There may have been a mixup in the identification of these species. Dyar (1898) used *diluta* in his key on the basis of a brief description from "Riley's notes in Packard's Forest Insects (5th Rept. U.S. Ent. Comm., p. 206)." Dyar also stated: "The bred flies in collection U.S. Nat. Mus., have the lanceolate cell of hind wings unusually long, though still shortly petiolate at tip." There is one specimen of *P. albicollis* in the U.S. National Museum collection with the data "C. V. Riley Collection," "bred, willow." This may be the specimen to which Dyar is referring. However, there is also a specimen with the data "C. V. Riley collection," "larva on oak,

green with black branching spines, 3-29-79," "*Monophadnus dilutus* Cr.," which is *Perichista inaequidens* (Norton). I am not able to tell which species Dyar actually included in his key or to which specimen Riley was referring.

Discussion.—This species is close to *marginicollis*, but it is not known to feed on hickory. The female is entirely orange yellow, the apex of the sheath is truncate, and there is a membranous area on the upper part of the mesepimeron.

Perichista entella MacGillivray

Perichista entella MacGillivray, 1923c, p. 29, ♂; Stannard, 1949, p. 26; Stannard, 1951, p. 65.

Female.—Length, 6.9 mm. Antenna and head black with labrum white. Thorax black with tegula, upper angles of pronotum, stripe on posterior margin of mesepimeron, and posterior margin of mesepisternum white; mesopleuron, outer margins of prescutum, outer margins of lateral lobes, and anterior margin of scutellum red brown. Legs mostly light brown, with base of each coxa, first segment of each trochanter, and base of each femur black. Abdomen black, suffused with various amounts of red brown and white on each segment. Wings hyaline.

Clypeus emarginate. Tarsal claw with inner tooth subequal to outer tooth in length and with basal lobe present (pl. II, 18). Upper part of mesepimeron with small membranous area. Hindwing with cell *M* present. Sheath pointed, truncate at apex (pl. VI, 132). Lancet with serrulae flat, with only one anterior sub-basal tooth; similar to *marginicollis*.

This female will key out to *marginicollis* (= *caryicolus*) in Stannard's 1949 key. It may be separated from *marginicollis* by the emarginate and black clypeus, the presence of a membranous area on the upper part of the mesepimeron, the presence of cell *M* in the hindwing, and the truncate apical part of the sheath. It may be separated from *diluta* and *rileyi* by the emarginate clypeus, entirely black head, and mostly black thorax and abdomen.

Host.—Adults have been taken from *Quercus*.

New Records.—California. Additional specimens have also been seen from Oregon.

Larva.—Unknown.

Discussion.—Stannard regarded this species as the western counterpart of *marginicollis*, differing by its feeding habits and emargination of the clypeus. The female seems to be most closely related to *diluta* by the sheath shape and membranous area of the mesepimeron. Stannard's contention that this is a distinct species, however, is here confirmed.

Perichista marginicollis (Norton)

Selandria marginicollis Norton, 1861, p. 220, ♀; Smith, 1966a, p. 249.

Perichista marginicollis, Stannard, 1949, p. 37; Stannard, 1951, p. 65; Smith, 1966a, p. 249.

Megeris caryicolus Dyar, 1897, p. 193, ♂, ♀; Smith, 1966a, p. 249 (= *marginicollis* Norton).

Periclista caryicola, Stannard, 1949, p. 24; Stannard, 1951, p. 65; Raizenne, 1957, p. 40.

Is(i)odyctium atratum MacGillivray, 1908a, p. 290, ♀.

Periclista hickoriae Rohwer, 1917, p. 154, ♀.

Periclista xanthognatha Rohwer, 1917, p. 156, ♀; Smith, 1966a, p. 249 (= *marginicollis* Norton. Transferred from *P. inaequidens* (Norton).)

Periclista plesia Rohwer, 1920, p. 211, ♀.

Periclista pecanivora Rohwer, 1920, p. 212, ♀.

Upper part of mesepimeron completely sclerotized, without small membranous area. Hindwing with cell *M* absent.

New Records.—Florida, Kansas, Louisiana, Maryland, Michigan, Oklahoma.

This species has previously been known as *caryicola* (Dyar); however, Smith (1966a) correctly placed the name "*marginicollis* Norton," which has precedence by priority. This is the only species of this genus known to feed on hickory and pecan. The absence of the membranous area of the epimeron serves as a desirable character to distinguish this species, especially the males, which are very close to *diluta* in coloration.

Larva.—Dyar (1893) described the larva of *caryicola* as having "three spines on the second annulet," "head not spotted, spines mostly pale," and "spines more or less degenerate in last stage." Middleton (1922) described the larva of *hickoriae* Rohwer. His description is similar to the one below.

In late instar, head brownish, ocularium black. Body entirely light creamy colored; spines light, same color as body but darker at tips.

Clypeus with two setae on each side. Labrum with two setae on each side; very shallow central emargination present; epipharynx with 10 to 12 spines located in arcuate row on each half (pl. XIX, 351). Each mandible with one seta on outer lateral margin; left mandible with three ventral teeth and three sharp and one truncate lateral teeth (pl. XIX, 350); right mandible with two ventral teeth, two sharp and one truncate lateral teeth, and one molar tooth (pl. XIX, 349). Maxillary palpus four-segmented; second palpal segment with one seta on outer surface; palpifer with four setae; stipes with two setae; lacinia with 11 to 12 stout spines (pl. XIX, 352). Labial palpus three-segmented; prementum with three setae on each side.

Spines of thorax arranged as in plate XIX, 355. Thoracic legs normal, femur longer than tibia; setae numerous on all surfaces of each leg.

Abdominal segments 1 through 8 each with five dorsal annulets (typical segment shown in pl. XIX, 354). Annulets 1, 3, 5 without spines; annulet 2 with three bifurcate spines on each side, the lower spine sometimes simple; annulet 4 with two bifurcate spines on each side; spines short, stout, their branches bent over sharply; first postspiracular lobe with one simple spine; second postspiracular lobe with one bifurcate spine; subspiracular lobe with anterior spine bifurcate, posterior spine simple; surpedal lobe with two simple spines.

Ninth abdominal segment with spines arranged as in plate XIX, 353. Tenth abdominal tergum with row of six spines on posterior margin, each of which are usually bifurcate (pl. XIX, 353). Subanal and suranal areas with numerous setae.

Since this is the only known *Periclista* to feed on hickory and since it also fits the description of this species by Dyar (1898) and Middleton (1922), the identification appears to be certain.

Periclista rileyi (Cresson)

Selandria (*Monophadnus*) *rileyi* Cresson, 1880a, p. 13, ♀.

Periclista rileyi, Stannard, 1949, p. 28; Stannard, 1951, p. 65.

Isodyctium floridense Dyar, 1898, p. 134, ♀.

Hindwing with cell *M* present.

New Record.—Texas.

This species is distinguished from *diluta* only by the darker frons and whiter inner orbits of the eyes. Several specimens have been seen that are intermediates; however, insufficient material limits an evaluation of their status.

Larva.—Unknown.

Periclista stannardi, new species

Female.—Length, 6.8 mm. Antenna and head black with clypeus and labrum white. Thorax black with tegula, upper angles of pronotum, line on posterior margin of mesepisternum, and spot on metapleuron white and with spot on prepectal area of mesepisternum, line on posterior margin of mesepimeron, outer margins of prescutum, outer and inner margins of lateral lobes, and anterior one-half of scutellum red brown. Legs light red brown with base of each coxa, first segment of each trochanter, base of each forefemur and midfemur, and most of hindfemur black; each tibia and tarsus infuscate. Abdomen usually black suffused with red brown and white on each segment; sheath black. Wings hyaline.

Antenna with second segment as wide as long; third segment longer than fourth segment (pl. III, 59). Clypeus slightly emarginate; malar space wider than diameter of front ocellus; postorbital groove absent; postgenal carina absent. Prepectus absent; upper part of mesepimeron with small membranous area. Tarsal claw with inner tooth subequal in length to outer tooth; basal lobe present. Forewing with stub of 2A and 3A curved up at apex; vein *Rs* + *M* meets *M* before junction with *Sc* + *R*. Hindwing with crossvein *m-cu* present, enclosing cell *M*; anal cell without petiole. Sheath very broadly truncate at apex (pl. VI, 131). Lancet similar to that of *marginicollis*; serrula each with one anterior subbasal tooth.

Male.—Unknown.

Holotype.—Female, Kerrville, Tex., March 30, 1959, W. R. M. Mason. Deposited in the Canadian National Collection.

Paratypes.—*Iowa*: Ames, May 1, 1923, R. A. G. (♀). *Texas*: Kerrville, April 10, 1959, W. R. M. Mason (1♀).

Disposition of Paratypes.—Paratypes have been deposited at Iowa State University and the Canadian National Collection.

Distribution.—Texas and Iowa.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species will key to *marginicollis* (= *caryicola*) in Stannard's 1949 key. It is easily distinguished from that species by the broadly truncate sheath, the presence of cell *M* in the hindwing, and the presence of the membranous area of the mesepimeron. It differs from *diluta* and *rileyi* by the sheath shape and darker coloration. The white clypeus and truncate sheath will separate it from *entella*.

This species is named after L. J. Stannard of the Illinois Natural History Survey who revised this genus for North America.

Periclista sulfurana Stannard

Periclista sulfurana Stannard, 1949, p. 28, ♂, ♀; Stannard, 1951, p. 66.

Hindwing with cell *M* present.

This species closely resembles *diluta*, but it is separated by the presence of more than one anterior subbasal tooth on each serrula of the lancet.

Larva.—Unknown.

CALIFORNICA COMPLEX

This complex includes three species that are all limited in distribution to the west coast of North America.

Periclista californica Rohwer

Periclista californica Rohwer, 1917, p. 154, ♀; Stannard, 1949, p. 30; Stannard, 1951, p. 65.

Hindwing with cell *M* present.

New Records.—Additional specimens have been seen from California.

Larva.—Unknown.

Periclista electa MacGillivray

Periclista electa MacGillivray, 1923a, p. 80, ♂; Stannard, 1949, p. 31; Stannard, 1951, p. 65.

Hindwing with cell *M* present.

New Records.—Additional specimens have been seen from California and Oregon.

Larva.—Unknown.

Periclista vergorba Stannard

Periclista vergorba Stannard, 1949, p. 32, ♀; Stannard, 1951, p. 66.

Hindwing with cell *M* present.

New Records.—Several more specimens from California have been examined that fit the color pattern of this species.

Larva.—Unknown.

Discussion.—This species is separated from *electa* on the basis of the red-orange abdomen; however, the color of the abdomen of *electa* varies considerably. Stannard uses the position of *2r* of the forewing as a distinguishing character. I have not used this character since its placement in relation to *3r-m* varies within species. Larger series will be needed to evaluate the status of this species. It may be only a color variation of *electa*.

Subgenus NEOCHARACTUS MacGillivray

Neocharactus MacGillivray, 1908a, p. 293; Stannard, 1949, pp. 31-37; Stannard, 1951, p. 66; Burks, 1958, p. 15.

Type: *Neocharactus bakeri* MacGillivray. Monotypic.

Aphanisus MacGillivray, 1908a, p. 295.

Type: *Aphanisus lobatus* MacGillivray. Original designation.

There are four species in this subgenus, two of which are western and two eastern. Stannard (1949) defined this group.

Descriptions of *Periclista* Species

Periclista inaequidens (Norton)

Selandria inaequidens Norton, 1872, p. 84, ♀.

Periclista inaequidens, Stannard, 1949, p. 33; Stannard, 1951, p. 66.

Isodyctium infrequens Dyar, 1898, p. 134, ♀.

Hindwing with cell *M* present.

New Record: New Hampshire.

Periclista xanthognatha Rohwer, 1917, was listed as a synonym of this species, but was transferred to *marginicollis* (Norton) by Smith (1966a).

Larva.—Dyar (1898) described the larva of *infrequens* as having "three spines on the second annulet," "head not spotted," and "spines only black at tips."

Periclista occidentalis Rohwer

Periclista occidentalis Rohwer, 1909c, p. 398, ♂, ♀; Stannard, 1949, p. 36; Stannard, 1951, p. 66.

Hindwing with cell *M* present.

New Records.—Additional specimens from California have been examined. I took a series of this species from *Quercus agrifolia* Née.

Larva.—Unknown.

Periclista pallipes (Provancher), new combination

Monophadnus pallipes Provancher, 1895, p. 80, ♂, ♀; Gahan and Rohwer, 1917-18, p. 103; Burks, 1958, p. 15.

Neocharactus bakeri MacGillivray, 1908a, p. 293, ♂. *New synonymy.*

Periclista bakeri, Stannard, 1949, p. 35; Stannard, 1951, p. 66.

Periclista leucostoma Rohwer, 1909c, p. 397, ♂, ♀. *New synonymy.*

Hindwing with cell *M* present.

New Records.—Many new records from California. I collected a series of this species by beating *Quercus agrifolia* Née. Adults of *occidentalis* were taken on the same tree.

Larva.—Unknown.

Holotype.—Provancher's type (♀) is located at the Museum of Quebec, Laval University, and it bears the yellow label "1675" with the name label "*Monophadnus pallipes* Prov., Cal." This is undoubtedly the specimen Gahan and Rohwer (1917-18) designated as the lectotype, and it is here considered as the type.

Periclista subtruncata Dyar

Periclista subtruncata Dyar, 1898, p. 131, ♀; Stannard, 1949, p. 34; Stannard, 1951, p. 66.

Aphanisus lobatus MacGillivray, 1908a, p. 295, ♀.

Aphanisus muricatus MacGillivray, 1908a, p. 296, ♀.

Hindwing with cell *M* present.

New Records.—Indiana, Louisiana, South Carolina, Virginia.

Larva.—Dyar (1898) described the larva as having "two spines on the second annulet," "dorsum entirely green," "head and spines partly or wholly green," and "clypeus brownish, terminal spines dusky on the tips."

Unplaced Name of *Periclista*

Periclista mutabilis Konow

Periclista mutabilis Konow, 1904, p. 241, ♂, ♀; Stannard, 1949, p. 37; Stannard, 1951, p. 65.

This species was described from Texas. It will be impossible to place until the type is examined.

Genus MONOPHADNOIDES Ashmead

Monophadnoides Ashmead, 1898a, p. 253; Konow, 1905, p. 85 (= *Monophadnus* Hartig); MacGillivray, 1916, p. 151; Ross, 1937, p. 100 (= *Blennocampa* Hartig); Ross, 1951, p. 68; Benson, 1952, p. 101; Takeuchi, 1952, p. 48; Lorenz and Kraus, 1957, p. 125.

Type: *Monophadnus rubi* Harris. Original designation.

Claremontia Rohwer, 1909c, p. 397; Ross, 1937, p. 100; Ross, 1951, p. 66; Malaise, 1964, p. 30. *New synonymy.*

Type: *Claremontia typica* Rohwer. Original designation.

Monophadnus subgenus *Pseudomonophadnus* Malaise, 1935, p. 167; Ross, 1951, p. 68 (= *Monophadnoides* Ashmead).

Pseudomonophadnus Malaise, 1944, p. 1; Pasteels, 1948, p. 187.

Type: *Tenthredo geniculata* Hartig. Original designation.

Monophadnus subgenus *Pseudoblennocampa* Malaise, 1935, p. 167; Pasteels, 1948, p. 188; Ross, 1951, p. 67 (= *Claremontia* Rohwer); Malaise, 1964, p. 30. *New synonymy.*

Type: *Tenthredo* (*Allantus*) *tenuicornis* Klug. Original designation.

Description.—Antenna various, long and filiform or short and stout; second segment as wide as long; third segment subequal in length to fourth segment, $1\frac{1}{2}$ times length of fourth segment, or subequal in length to segments 4 plus 5 (pl. III, 61–66). Clypeus truncate or slightly emarginate; malar space linear or equal to diameter of front ocellus; postorbital groove absent or indistinct; postgenal carina absent or indistinctly indicated below eye. Prepectus absent. Tarsal claw with long inner tooth, which may be either subequal in length and appressed to outer tooth or shorter than outer tooth and situated some distance from it; basal lobe always present, sometimes not obvious (pl. II, 18, 19, 21). Forewing with stub of 2A and 3A straight at apex (pl. I, 1). Hindwing with crossvein *m-cu* present or absent, leaving cell *M* closed or open. Penis valve of male genitalia with lateral spine and dorsal lobe (pl. XI, 243, 245, 247, 251). Lancet of female with serrulae lobelike, without teeth or with very few distinct subbasal teeth (pl. IX, 181–187).

There is considerable variation in many of these generic characters, but the members of this group all appear to be very closely related. This relationship is based on the tarsal claw, which is always bifid and with a basal lobe, vein 2A and 3A of the forewing, which is always straight, and the male and female genitalia. The similarity of the known larvae also supports this relationship, as shown by Lorenz and Kraus (1957).

This genus could be separated into several genera or subgenera using the relative length of the antennal segments, length and position of the inner tooth of the tarsal claw, presence or absence of cell *M* of the hindwing, or width of the malar space as characters. I see no reason to do this. On the same basis, the genera *Periclista* and *Monophadnus* could also be split, a tendency that has been followed too often in the past. In doing so, relationships would be lost, and the taxonomy would become too cumbersome by using so many superfluous names.

Claremontia was previously separated by the third and fourth antennal segments being subequal in length and the tarsal claw lacking a basal lobe. Ross (1937) overlooked the basal lobe of the tarsal claw, and Malaise (1964) reestablished his genus *Pseudoblennocampa* partially on this basis. The species that have been included in *Claremontia* do, in fact, have a basal lobe, and the two genera are here considered the same as *Monophadnoides*.

The genus *Monophadnoides* itself has been variously placed. Konow (1905) considered it congeneric with *Monophadnus* and Ross (1937) and Takeuchi (1952) considered it congeneric with *Blennocampa*. *Monophadnus* is rather distinct, as shown by characters in the key to genera, and is more closely related to the genera of the tribe Phymatocerini. *Blennocampa* is separated on the basis of veins *M* and *m-cu* of the forewing converging toward the stigma, the second antennal segment being longer than wide, and the habit of living in the rolled-back margins of rose leaves in the larval stage. Lorenz and Kraus (1957) also separated the larva of the single species of *Blennocampa* from all the known larvae of *Monophadnoides*. Benson (1952) contributed significantly toward

the stabilizing of these genera, and this study of the Nearctic forms more than substantiates his position.

This genus has about 20 species known from the world. Benson (1952) included seven species from England, and seven species are known from North America. The larva and host for only one North American species are known, the Holarctic *geniculatus* (Hartig) that feeds on *Rubus*.

Key to *Monophadnoides* Species

1. Female..... 2
Male..... 8
2. Tarsal claw with inner tooth long, subequal in length to outer tooth and usually appressed to it, basal lobe distinct (pl. II, 21); outer orbits smooth and shining; hindwing with cell *M* present
M. geniculatus (Hartig)
- Tarsal claw with inner tooth shorter than outer tooth and situated halfway between basal lobe and outer tooth, basal lobe always present but not always obvious (pl. II, 18, 19); outer orbits roughened and shagreened; hindwing with cell *M* absent..... 3
3. Third antennal segment subequal in length to fourth segment (pl. III, 65); antenna long and slender, usually more than twice width of head..... 4
Third antennal segment longer than fourth segment (pl. III, 61-64); antenna short and stout, usually less than twice width of head..... 5
4. Thorax entirely black; west coast..... *M. typicus* (Rohwer)
Tegula white; pronotum mostly light rufous; eastern *M. quebecensis*, n. sp.
5. Tegula white; pronotum mostly light rufous; antenna with segments not expanded at apices, third segment $1\frac{1}{2}$ times length of fourth segment or less (pl. III, 62); sheath straight above, nearly truncate at apex (pl. V, 118)..... *M. conspicuatus* MacGillivray
Tegula whitish or black; pronotum black; antenna with segments either expanded or not expanded at apices, third segment nearly twice length of fourth segment or less than $1\frac{1}{2}$ times length of fourth segment (pl. III, 61, 64, 66); sheath slightly rounded above, not truncate at apex (pl. V, 117, 122, 125)..... 6
6. Antenna with segments slightly expanded at apices, third segment nearly twice length of fourth segment, segments 4 to 9 less than twice as long as wide (pl. III, 64); tegula white to brownish
M. pauper (Provancher)
Antenna with segments not expanded at apices, third segment less than $1\frac{1}{2}$ times length of fourth segment, segments 4 to 9 usually twice as long as wide (pl. III, 61, 66); tegula black or brownish..... 7
7. Antenna slender, length equal to more than $1\frac{1}{2}$ times width of head (pl. III, 61); tegula brown or black; lancet with serrulae directed anteriorly (pl. IX, 181); west coast..... *M. atratus* (MacGillivray)
Antenna stout, length less than $1\frac{1}{2}$ times width of head (pl. III, 66); tegula black; lancet with serrulae directed downward (pl. IX, 187); eastern..... *M. osgoodi*, n. sp.
8. Tarsal claw with inner tooth long, subequal in length to outer tooth and usually appressed to it, basal lobe distinct (pl. II, 21); outer orbits smooth and shining; hindwing with cell *M* present
M. geniculatus (Hartig)
- Tarsal claw with inner tooth shorter than outer tooth and situated halfway between basal lobe and outer tooth, basal lobe always present but not always obvious (pl. II, 18, 19); outer orbits roughened and shagreened; hindwing with cell *M* absent..... 9
9. Antenna with third segment subequal in length to fourth segment (pl. III, 65)..... *M. typicus* (Rohwer)
Antenna with third segment longer than fourth segment..... 10

10. Antenna with third segment more than $1\frac{1}{2}$ times length of fourth segment (pl. III, 64); antenna less than $1\frac{1}{2}$ times width of head; tegula usually brownish; east of Rocky Mountains

M. pauper (Provancher)

- Antenna with third segment less than $1\frac{1}{2}$ times length of fourth segment (pl. III, 61); antenna nearly twice width of head; tegula black; west coast

M. atratus (MacGillivray)

Descriptions of *Monophadnoides* Species

Monophadnoides atratus (MacGillivray), new combination

Blennocampa atrata MacGillivray, 1893, p. 239, ♀; Konow, 1905, p. 83; Frison, 1927, p. 238; Ross, 1951, p. 67.

Erythraspides ashmeadi Kincaid, 1900, p. 345, ♂, ♀; Ross, 1951, p. 67 (= *atrata* MacGillivray).

Blennocampa ashmeadi, Konow, 1905, p. 83.

Female.—Average length, 6.9 mm. Entirely black with extreme apex of each femur and basal one-half of hindtibia whitish; tegula may be light brown. Wings lightly infuscate.

Antenna long and slender, length equal to more than $1\frac{1}{2}$ times width of head, third segment $1\frac{1}{2}$ times or less length of fourth segment, fourth to ninth segments more than twice as long as wide, segments not expanded at apices (pl. III, 61). Outer orbits roughened and shagreened; malar space less than one-half diameter of front ocellus; postorbital groove indistinct; postgenal carina absent or only slightly indicated below eye. Tarsal claw with inner tooth shorter than outer tooth and situated halfway between outer tooth and basal lobe (pl. II, 18). Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath with upper and lower margins curved, terminating in blunt point at apex (pl. V, 117). Lancet with serrulae lobelike with three or four anterior subbasal teeth and several very fine posterior subbasal teeth; distinct notch separates ventral margin of lancet from anterior margin of each serrula; serrulae directed anteriorly (pl. IX, 181).

Male.—Average length, 6.4 mm. In color and structure similar to female. Harpe elongate (pl. XI, 242); penis valve and parapenis as in plate XI, 242 and 243.

Holotypes.—The type of *B. atrata* MacGillivray (♀) is at the Illinois Natural History Survey and bears the data "Olympia, Wash., T. Kincaid, 5-7-93." *E. ashmeadi* Kincaid (♀) is type No. 5282 at the U.S. National Museum and bears the data "Sitka, Alaska, June 16, 1899, Harriman Expedition, '99, T. Kincaid, collector."

Distribution.—West coast region from Alaska to Oregon (fig. 17, A).

North American Records.—*Alaska*: Sitka, June 16, 1899, Harriman Expedition, T. Kincaid. *British Columbia*: Vancouver, March 30, 1926, April 13, 1931, H. H. Ross; Univ. Campus, Vancouver, April 18, 1959, G. Scudder; Robson, May 22-30, 1950, H. R. Foxlee; Gt. Central L., April 16, 1941, K. Graham. *Northwest Territories*: Norman Wells, May 25, 1953, C. D. Bird. *Oregon*: Boyer, April 11, 1936, shrub; Still Cr. Forest Camp, 1 mi. E. Government

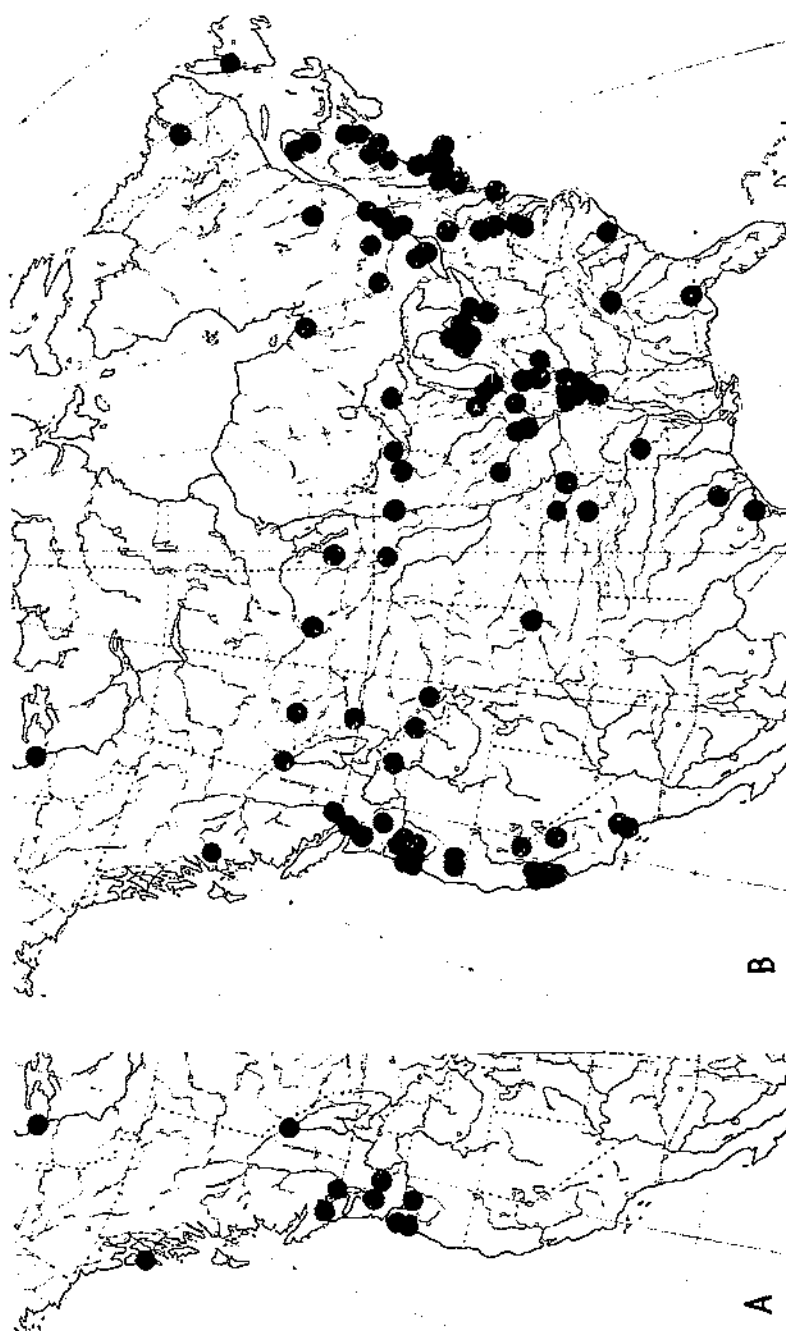


FIGURE 17.—Distribution of (A) *Monophadnoides atratus* and (B) *periculatus*.

Camp, July 14, 1956, F. F. Hasbrouck; 2 mi. W. Harlan, Lincoln Co., 250', April 7, 1960; Netarts Bay, April 7, 1962, J. Schuh; Rockaway, April 6, 1940, on willow, K. Gray and J. Schuh. *Washington*: Bumping Lake, Yakima Co., May 20, 1940, G. R. Ferguson; Olympia, April 5, 1895, T. Kincaid.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is closely allied to *pauper* and *osgoodi*, but it may be separated by its longer and more slender antenna, the black or brownish tegula, the longer sheath, and characters of the male and female genitalia.

Monophadnoides conspiculatus MacGillivray

Monophadnoides conspiculatus MacGillivray, 1908a, p. 293, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252.

Blennocampa conspiculata, Ross, 1951, p. 67.

Female.—Average length, 6.5 mm. Antenna and head black with labrum light. Thorax black with tegula white and most of pronotum light rufous. Legs with each coxa and trochanter black; each femur, tibia, and tarsus light rufous to white; each tarsus infusate. Abdomen black. Wings lightly infusate.

Antenna short and stout, length equal to $1\frac{1}{2}$ times width of head, third segment slightly less than $1\frac{1}{2}$ times length of fourth segment, segments 4 to 9 about twice as long as wide, segments not expanded at apices (pl. III, 62). Outer orbits roughened and shagreened; malar space less than one-half diameter of front ocellus; postorbital groove indistinct; postgenal carina slightly indicated below eye. Tarsal claw with inner tooth shorter than outer tooth and situated halfway between outer tooth and basal lobe (pl. II, 19). Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath straight above, nearly truncate at apex (pl. V, 118). Lancet with serrulae truncate; small notch separates ventral margin of lancet from anterior margin of each serrula; serrulae directed anteriorly (pl. IX, 182).

Male.—Unknown. I have seen several unassociated males that may be this species, but there is no associated material available.

Holotype.—The type (♀) is located at the Illinois Natural History Survey and bears the data "Ithaca, N.Y."

Distribution.—Eastern North America from Quebec and Nova Scotia to North Carolina (fig. 18, A).

North American Records.—*Maryland*: Cabin John, April 28, 1912, Knab and Malloch. *New York*: Ithaca, May. *North Carolina*: Balsam, April 24, 1938, Ross and Burks; Highlands, May 8, 1957, W. J. Brown. *Nova Scotia*: Grand R., July 6, 1931, M. L. Prebble. *Ontario*: Bells Corners, May 17, 1945, O. Peck. *Quebec*: Old Chelsea, May 30, 1952, J. F. McAlpine; Cascapedia R., June 17, 1934, C. C. Smith. *Tennessee*: Great Smoky Mt. Nat. Pk., May 20, 1957, W. R. M. Mason. *Virginia*: Arlington, collection W. H. Ashmead. *West Virginia*: "W. Va.," A. D. Hopkins.

Host.—Unknown.

Larva.—Unknown.

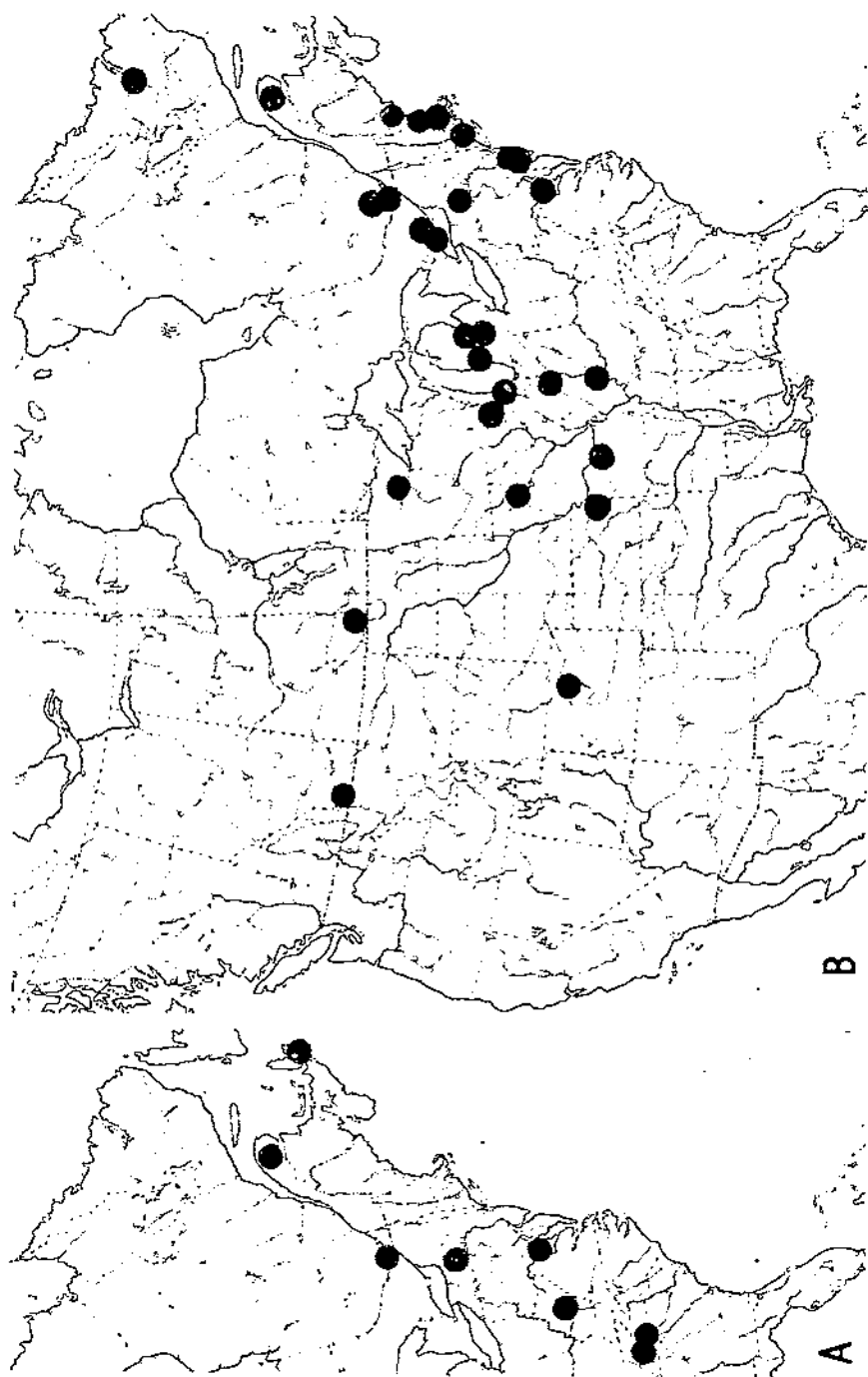


FIGURE 18.—Distribution of (A) *Monophadnoides conspicuatus* and (B) *pauper*.

Discussion.—This is a rather distinct species and may be recognized by the light-colored pronotum and the unusual sheath shape. It is not a commonly collected species.

Monophadnoides geniculatus (Hartig)

- Tenthredo geniculatus* Hartig, 1837, p. 274; Eversmann, 1847, p. 31.
Monophadnus geniculatus, Kaltenbach, 1867, p. 105; Kaltenbach, 1874, pp. 231, 237, 242; Konow, 1886, p. 244; Dalla Torre, 1894, p. 162; Konow, 1905, p. 86; Enslin, 1914, p. 292; Conde, 1934, p. 185; Malaise, 1935, p. 167; Berland, 1947, p. 254.
Blennocampa geniculata, Thomson, 1870, p. 282; Thomson, 1871, p. 218; Cameron, 1877a, p. 57; André, 1881, p. 308; Cameron, 1882, p. 236; Brischke and Zaddach, 1883, p. 279; Benson, 1940, p. 207.
Pseudomonophadnus geniculatus, Pasteels, 1948, p. 188.
Monophadnoides geniculatus, Ross, 1951, p. 68; Benson, 1952, p. 104; Maxwell, 1955, p. 114; Lorenz and Kraus, 1957, p. 127; Benson, 1963, p. 252.
Selandria (Hoplocampa) rubi Harris, 1845, p. 13; Harris, 1850, p. 33; Harris, 1860, p. 235; Norton, 1867, p. 249; Riley, 1869, p. 52; Saunders, 1873, p. 101; Thomas, 1875, p. 61; Provancher, 1878, p. 99; Thomas, 1881, p. 67; Saunders, 1884, p. 209; Saunders, 1885, p. 1; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Eriocampa rubi, Kirby, 1882, p. 175.
Monophadnus rubi, Provancher, 1888, p. 350; Dalla Torre, 1894, p. 165; Dyar, 1895c, p. 200; Dyar, 1898, p. 137; Konow, 1905, p. 86.
Monophadnoides rubi, Ashmead, 1898a, p. 253; MacGillivray, 1916, p. 153; Yuasa, 1922, p. 95; Lameere, 1938, p. 416; Zeller and Schuh, 1944, p. 43; Peterson, 1956, p. 268.
Blennocampa rubi, Ross, 1937, p. 98; Smith, 1943, p. 385.
Selandria nigella Cresson, 1880a, p. 12, ♀; Cresson, 1916, p. 6; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnus nigella, Dalla Torre, 1894, p. 164; Konow, 1905, p. 86.
Monophadnus hudsonicus Kirby, 1882, p. 176, ♂; Dalla Torre, 1894, p. 163; Konow, 1905, p. 86; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnus atricornis MacGillivray, 1893, p. 239, ♀; Konow, 1905, p. 86 (*atricornis*); Frison, 1927, p. 253; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Blennocampa gillettei Weldon, 1907, p. 304, ♀; Rohwer, 1909a, p. 89; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides conspicius MacGillivray, 1908a, p. 293, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides consobrinus MacGillivray, 1908a, p. 294, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides concessus MacGillivray, 1908a, p. 294, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides crassus MacGillivray, 1908a, p. 294, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 253; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides conspersus MacGillivray, 1908a, p. 294, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides costalis MacGillivray, 1908a, p. 295, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides coracinus MacGillivray, 1908a, p. 295, ♂; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides collaris MacGillivray, 1908a, p. 295, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Aphanisus nigrinus MacGillivray, 1908a, p. 296, ♀; MacGillivray, 1916, p. 154; Frison, 1927, p. 237; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Aphanisus lenis Rohwer, 1909c, p. 399, ♂, ♀; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides corytus MacGillivray, 1923a, p. 79, ♂; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides consonus MacGillivray, 1923c, p. 25, ♀; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).

- Monophadnoides constitutus* MacGillivray, 1923c, p. 25, ♀; Frison, 1927, p. 252; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides curiosus MacGillivray, 1923c, p. 25, ♀; Frison, 1927, p. 253; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides kincaidi MacGillivray, 1923c, p. 26, ♀; Frison, 1927, p. 253; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Monophadnoides shawi MacGillivray, 1923c, p. 26, ♂, ♀; Frison, 1927, p. 253; Ross, 1951, p. 68 (= *geniculatus* Hartig).
Paracharactus obversus MacGillivray, 1923c, p. 28, ♀; Frison, 1927, p. 255; Ross, 1951, p. 68 (= *geniculatus* Hartig).

Female.—Average length, 6.5 mm. The coloration of this species is extremely variable throughout its range. There seem to be three primary color forms, and they are described separately. Although many specimens fit them, intermediate forms are often encountered.

(1) Entirely black with tegula usually brownish, and legs beyond extreme apex of femur whitish. Most common in West and Palaearctic region.

(2) Antenna and head black; clypeus may be light rufous. Thorax black with tegula and upper angles of pronotum white to light rufous. Legs beyond extreme apex of femur whitish. Abdomen black. Most common east of Rocky Mountains, and in this region it is most common in southern part of its range becoming less abundant north into Canada.

(3) Antenna and head black; clypeus may be light rufous. Thorax black with tegula white and upper angles of pronotum and, at times, areas on mesonotum rufous. Legs beyond extreme apex of femur whitish. Abdomen with various amounts of rufous, usually on central segments. Occurs in southern California, becoming less abundant in northern California, and also east of Rocky Mountains, where it is most abundant in northern part of its range from Northern United States northward.

Antenna short and stout, about $1\frac{1}{2}$ times width of head; third segment equal to $1\frac{1}{2}$ times length of fourth segment; segments 4 to 9 usually less than twice as long as wide; segments not expanded at apices (pl. III, 63). Outer orbits smooth and shining; clypeus truncate; malar space less than one-half diameter of front ocellus; postorbital groove indistinct; postgenal carina absent. Tarsal claw with inner tooth long, subequal to outer tooth in length and distinctly closer to outer tooth than basal lobe, sometimes appressed and nearly lateral to outer tooth (pl. II, 21). Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath various, usually straight above, rounded below and at apex (pl. V, 119), but sometimes short and nearly truncate at apex (pl. V, 121) or with apex acute (pl. V, 120). Lancet with 10 or 11 distinctly long and rounded lobelike serrulae, without subbasal teeth; each serrula separated from ventral margin of lancet by distinct notch on its anterior and posterior sides (pl. IX, 183).

Male.—Average length, 6.1 mm. Coloration follows pattern of female. Structure similar to that of female. Genitalia as in plate XI, 246, and 247. Penis valve with lateral spine and long dorsal lobe (pl. XI, 247).

Holotypes.—All MacGillivray's types are at the Illinois Natural

History Survey. They bear the following data, respectively: *atracornis* (♀), "Olympia, Wash., April 30, 1890, T. Kincaid"; *nigritus* (♀), "Riverton, N.J., 5-7-98"; *collaris* (♀), "Ithaca, N.Y., June 30, 1895, G. F. Atkinson"; *concessus* (♀), "Ithaca, N.Y., May 27, 1897"; *consobrinus* (♀), "Durham, N.H., W. and F."; *conspersus* (♀), "Ithaca, N.Y., May 27, 1898"; *conspicuous* (♀), "McLean, N.Y., May 31, 1897"; *coracinus* (♂), "Wellesley, Mass., May 27, 1891"; *costalis* (♀), "Wellesley, Mass., June 8, 1891"; *crassus* (♀), "Durham, N.H., 1397, W. and F."; *corytus* (♂), "Corvallis, Oregon, April 1918, A. L. Lovett"; *consonus* (♀), "4-17-96, T. Kincaid collector"; *constitutus* (♀), "Ottawa, May 8, 1912"; *curiosus* (♀), "May 15, 1897, T. Kincaid, collector"; *kincaidi* (♀), "April 7, 1895, T. Kincaid, collector"; *shawii* (♀), "Hampton, N.H., May 16, 1904, S. A. Shaw"; *obversus* (♀), "Corvallis, Oregon, May 10, 1912, H. S. Walters." *S. nigella* Cresson (♀) is type No. 199 at the Academy of Natural Sciences of Philadelphia and bears the data "Nev." *B. gillettii* Weldon (♀) is type No. 27724 at the U.S. National Museum and has the data "Colo." *S. rubi* Harris is type No. 26311 in the Harris collection at the Museum of Comparative Zoology; there are no data, and only the thorax remains on the pin. The type of *M. hudsonicus* Kirby (♂) is at the British Museum. The type of *A. lenis* Rohwer has not been located. Hartig's types are probably in the Zoological Museum of Munich.

Distribution.—Widespread throughout North America (fig. 17, B); Europe and Asia.

North American Records.—*Alberta*: Gull Lake, June 7, 14, 1929, E. H. Strickland; Waterton, June 18, 1956, E. E. Sterns; Bilby, June 13, 1924, G. Salt. *Arkansas*: Hot Springs Natl. Pk., March 23, 1962, B. C. Marshall. *British Columbia*: Steelhead, June 1, 21, 1933, July 5, 22, 1933, H. B. Leech; 4 mi. N. Hope, Fraser River, June 1, 1957; Cultus Lake, July 9, 12, 17, 1948, H. R. Foxlee; Royal Park, April 29, 1917, R. C. Treherne; Robson, May 5, 13, 1947, June 15, 1947, May 28, 30, 1948, May 15, 24, 1949, June 6, 1949, May 15, 22-30, 1950, June 23, 1950, August 4, 1950, H. R. Foxlee; 6 mi. S. Terrace, June 7, 1960, C. H. Mann; Terrace, May 31, 1960, 220', B. Heming, June 1, 1960, G. E. Shewell; Kitsumkalum L., 20 mi. N. W. Terrace, May 31, 1960, 500', W. W. Moss; 6 mi. E. Terrace, June 17, 1960, W. W. Moss; Gagnon Rd., 6 mi. W. Terrace, 200', June 20, 1960, B. Heming, June 8, 1960, J. G. Chhillcott. *California*: Berkeley, May 14, 1915, M. C. Van Duzee, March 14, 1931, May 4, 1936, March 10, 1934; Yosemite Val., June 11, 1921, E. C. VanDyke; Los Angeles Co., March; Sta. Cruz Mts., A. Koebele; nr. Hidden Springs, San Gabriel Mts. Los Angeles Co., March 2, 1955, C. L. Hogue; Fieldbrook, May 19, 1908, H. S. Barber; Putah Cyn., Yolo Co., March 20, 1960, F. D. Parker; Oakland, May 21, 1937, E. S. Ross; Mt. Davidson, San Francisco Co., April 5, 1954, E. I. Schlinger; Dutch Flat, Placer Co., May 2, 1954, E. I. Schlinger; Fairfax, Marin Co., April 2, 1954, H. L. Mathis; Alameda Co., berry; Highland Dist., Santa Cruz Co., May 5, 1956. *Colorado*: "Colo."; C. U. Exp., March 28, 1894, March 30, 1914. *Connecticut*: Windsor, May 11, 21, 1956,

J. B. Kring; Wellingford, June 5, 1956, J. B. Kring; Storrs, May, 1935, K. M. S.; New Haven, May 30, 1912, W. E. Britton; Hamden, June 7, 1919, M. P. Zappe; Lyme, flying, June 18, 1918, W. Middleton. *Georgia*: Thomasville, March 29, 1938, P. W. Fattig. *Idaho*: Moscow, Moscow Mt., June 22, 1959, 4000', R. B. Hawkes. *Illinois*: Casey, July 18, 1950, H. H. Ross; Harrison, April 21, 1954, M. W. S.; Carbondale, May 27, 1910; Willow Springs, June 18, 1943, Ross and Sanderson; Muncie, April 16, 1929, Frison and Ross; Putnam, May 5, 1929, T. H. Frison; Warsaw; Sherman, April 20, 1930, H. H. Ross; Mt. Carmel, April 15, 1930, Frison and Ross; Wolf Lake, May 5, 1933, H. L. Dozier; Pulaski, May 25, 1932, H. L. Dozier; Urbana, April 28, 1932, P. O. Ritcher, April 16, 1916; Urbana, Brownfield Woods, May 1, 1919; Orland Park, June 10, 1943, Ross and Sanderson; Snyder, April 14, 1930, Frison and Ross; Bilett, May 1, 1942, Mohr and Burks; Garden City, May 15, 1930, Frison and Ross; Dubois, May 23, 1917; Elizabethtown, May 27-31, 1932, H. L. Dozier; Gossett, April 18, 1944, Ross and Sanderson; Robinson, April 14, 1930, Frison and Ross; Grand Tower, April 21, 1914, along river; Algonquin; Eureka, April, 1900. *Indiana*: Brown Co., May 1, 1960, T. G. Marsh. *Iowa*: Mt. Pleasant, May 10, 1934, Card., April 17, 1934, Dodds; Ames, May 2, 1948, J. Laffoon, April 29, 1959, M. J. Mart; Ledges St. Pk., June 20, 1949, Bart. *Kansas*: Manhattan, April 16, 23, 1949, raspberry, J. B. Kring; Baldwin, J. C. Bridwell; Riley Co., April 13, Popenoe; Wichita, April 27, 1916, on raspberry, F. B. Millikan. *Maine*: Orono, May 21, 1913, H. M. Parshley; Augusta, June 7, July 4, 1946, June 22, 1947, A. E. Brower; Mt. Desert Is., May 22, 1933, on raspberry. *Manitoba*: Riding Mt. Pk., June 1, 1938, J. McDunnough. *Maryland*: Glen Echo, R. M. Fouts; Travilah, April, 1900, on raspberry, F. C. Pratt. *Massachusetts*: Forest Hills, June 1, 1926, G. Salt; Chicopee, May 18, 1898, on currant; Lowell, April 15, 1926, May 17, 21, 1926, *Rubus*; Nantucket, July 4, 1904, J. A. Cushman; Melrose, May 20, 1932, *Vaccinium*, May 19, 1925, *Fraxinus*. *Michigan*: Flat River Game Area, Montcalm Co., May 14, 1955, R. L. Fischer; Copper Harbor, Keweenaw Co., June 19, 1957, R. W. Hodges; E. Lansing, May 25, 1937, C. W. Sabrosky, July 1, 1940; Midland Co., May 13, 1938, R. R. Dreisbach; Ag. College, June 9, 1909; 13 mi. N. Lapeer, May 30, 1937, C. W. Sabrosky; Lovell, Au Sable R., May 22, 1936, Frison and Ross; Whittemore, May 21, 1936, Ross and Frison; Bailey, May 9, 1940, Frison and Ross. *Minnesota*: Itasca, May 23, 1937, sweeping, H. R. Dodge; Eaglenest, May 25, 1959, June 1, 1959, May 31, 1961, W. V. Baldauf; Crookston, May 21, 196-, river valley, R. J. Pilfrey; Bena, May 21, 1960, spruce swamp, J. G. Chilcott, W. W. Moss, R. J. Pilfrey. *Missouri*: C. Mo., April, in curculio catcher, C. V. Riley; Charleston, April 16, 1915, G. W. Barber. *Montana*: Bozeman, May 31, 1907; Corvallis, May 16, 1935. *New Brunswick*: Charlotte Co., May 30, 1952, W. T. A. Neilson, May 17, 1951, G. W. Wood; Bathurst, June 13, J. N. Knull; Fredericton, May 20, 1921. *Newfoundland*: Goose Bay, Labrador, June 23, 1948, H. C. Friesen; 5 mi. S. W. Deer Lake, June 28, 1966, D. R. Smith;

28 mi. N. W. Deer Lake, June 29, 1966, D. R. Smith; Gallants, June 27, 1966, D. R. Smith. *New Hampshire*: Hampton, May 15, June 2, 1908, June 30, 1915, S. A. Shaw. *New Jersey*: Lahaway, Ocean Co.; Ocean Co., May. *New York*: Ithaca, June 16, 19, 1918, May 15, 1915; Welcott, July 3, 1922; McLean Bogs Reserve, July 12; Taughannock Falls, April 30, 1949, J. C. Martin; Ringwood, Ithaca, May 8, 1950, J. C. Martin. *North Carolina*: Chadbourn, April 16, 1910, collected on dewberry, E. G., Smyth; Highlands, May 10, 1957, W. R. M. Mason, May 9, 1957, 3800', J. R. Vockeroth; Franklin, May 8, 1957, 2000', W. R. M. Mason. *North Dakota*: Rugby, May 17, 1955, J. R. Vockeroth. *Northwest Territories*: Norman Wells, July 10, 1949, W. R. M. Mason. *Ohio*: Put-in-Bay, S. Bass 1st, June 20-30, 1924. *Ontario*: Jordan, May 9, 23, 1915, June 1, 3, 1915, June 1, 8, 10, 1916, June 4, 6, 13, 30, 1917, W. A. Ross; Ottawa, May 23, 1944, May 20, 1945, O. Peck, May 6, 1914, A. E. Kellett, May 10, 1960, B. S. Heming, May 5, 1942, G. S. Walley, June 8, 1954, May 12, 23, 27, June 1, 13, 14, 24, July 11; Vineland, June 8, 20, 1922, June 7, 1923, June 1, 3, 1925, May 22, 1929, May 30, 1930, May 5, 1938, W. G. Garlick; Merivale, May 25, 1930, J. de Gryse; Moose Factory, June 22, 1949, D. P. Williams; Miner's Bay, May 26, 1931, G. S. Walley; Trenton, May 31, 1896, Evans; Grimsby, June 10, 1916, W. A. Ross; Rondeau Park, July 5, 14, 1962, S. M. Clark; Chatterton, May 24, 1954, June 22, 1956, J. C. Martin; Bells Corners, May 17, 1960, S. M. Clark, May 17, 1945, O. Peck, May 21, 1951, J. F. McAlpine; Crystal Beach, June 1, 1961, Kelton and Brumpton; Marmora, May 11, 1952, J. C. Mitchell, May 24, 1952, R. Lambert, May 9, 1952, J. R. Vockeroth; Blackburn, June 9, 1939, O. Peck; Carp, June 15, 1950, O. Peck; Spencerville, Limerick Forest, May 19, 1954, R. Lambert. *Oregon*: 1 mi. E. Brownsboro, Jackson Co., May 18, 1962, D. R. Smith; Grande Ronde, Polk Co., May 2, 1962, snowberry, K. Goeden; Alsea Mtn., May 13, 1936, R. G. Rosensteil, May 26, 1945; Siletz, June 12, 1963, *Rubus*, N. L. H. Krauss; Mary's Peak, Benton Co., June 1, 12, 1962, D. R. Smith, June 10, 1963, rotary trap; 3 mi. N. E. Summit, Benton Co., April 11, 1962, D. R. Smith; Sulphur Springs, 6 mi. N. Corvallis, April 13, 1963, D. R. Smith, June 16, 1962, *Rubus parviflorus*, D. and L. Mays; Mehama, Marion Co., April 12, 1962, snowberry, K. Goeden; Summit, Benton Co., 650', July 5, 1939, H. A. Scullen; Corvallis, April 12, 1936, G. Ferguson, April, 1930, H. A. Scullen, March, 1959, P. F. Torchio, April 26, 1913, May, 1913, A. L. Lovett; Saddleback Mtn., Lincoln Co., June 2, 1960, J. C. Dirks-Edmunds; North Plains, April 9, 1960, thimbleberry, K. Goeden; Gresham, April 22, 30, 1944, on cultivated raspberry, J. Schuh; Applegate River, 7 mi. S. Grants Pass, Josephine Co., May 18, 1962, D. R. Smith; Rock Creek, 5 mi. W. Philomath, May 2, 1962, D. R. Smith; Dead Indian Soda Springs, 12 mi. S. E. Lake Creek, Jackson Co., 2500', May 21, 1964, D. R. Smith; Bellfountain, Benton Co., June 3, 1964, C. W. Baker; 1 mi. N. W. Bellfountain, Benton Co., June 3, 1964, ex grass, C. W. Baker. *Pennsylvania*: Sunburg; Rockville, May 4, 1920, E. M. Craighead, May 4, 1920, Champlain; Castle Rock, April 3, 1910; Harrisburg, June 8, 1918,

P. R. Meyers. *Quebec*: Hull, April 22, 1923, C. H. Curran, June 6, 1903; Wright, May 17, 1932, W. J. Brown; Burbridge, May 29, 1937, O. Peck; Fairy Lake, May 14, 1927, G. S. Walley; Harrington Harb., July 4, 1929, W. J. Brown; Cascapedia R., June 24, 1933, June 21, 1934, C. C. Smith; Laniel, May 30, 1938, A. R. Hull; Queens Park, Aylmer, July 23, 1924, C. B. Hutchings; Berthierville, July 11, 1940, A. Robert; Harrington Lake, Gati-neau Pk., May 30, 1954, W. R. Coyles; Mistassini Post, June 9, 16, 1956, J. R. Lonsway; Nominigue, June 12, 1941, O. Peck; Aylmer, June 1, 1924, H. L. Viereck; Cherry River, May 26, 1936, G. S. Walley; Montreal, June 10, 1906, G. Chagnon; Kingsmere, June 12, 1953, R. Lambert. *Rhode Island*: Kingston, May 7, 1905. *Saskatchewan*: Pike Lake, June 14, 1956, J. R. Lonsway. *Tennessee*: Burrville, May 19, 1957, H. and A. Howden. *Texas*: College Station, April 21, 1943, H. J. Reinhard; Victoria, March 13, E. A. Schwarz. *Virginia*: Falls Church, June 12-16, J. A. Keleher, April 29, 1922, reared, *Rubus*; E. Falls Church, 1930, S. A. Rohwer. *Washington*: Friday Harbor, June 1, 1906, J. M. A.; Lake Cushman, Mason Co., July 30, 1919, F. M. Gaige; Mt. Rainier, April 7, 1937, H. Benion. *Wisconsin*: Madison, May 25, 1931, C. L. Flake.

Host.—This species has been reared from *Rubus* in North America. In Europe, it is also found on *Geum* and *Filipendula* (Benson, 1952), both also Rosaceae.

Larva.—The larva was first described by Harris (1845). Dyar (1895c) described the larva and included it in his key to the larvae of the Blennocampinae in 1898, and Yuasa (1922) also included a description of this species. Peterson (1956) and Lorenz and Kraus (1957) described this species.

In late instar, head capsule and thoracic legs light brown; body and spines creamy colored, spines usually slightly darker than rest of body. Spines of body long and numerous ranging from simple to some with five branches.

Clypeus with two setae on each side. Labrum with two setae on each side; with shallow central emargination; epipharynx with 10 to 12 spines located in arcuate row on each half (pl. XIX, 344). Each mandible with one seta on outer lateral surface; left mandible with two sharp ventral teeth and three sharp and one truncate lateral teeth (pl. XIX, 343); right mandible with one ventral tooth, three sharp and one truncate lateral teeth, and one molar tooth (pl. XIX, 342). Maxillary palpus four-segmented; second segment of palpus with one seta on outer surface; palpifer with three or four setae; stipes with one or two setae; lacinia with eight to 10 spines (pl. XIX, 345). Labial palpus three-segmented; three setae on each side of prementum.

Thorax with spines arranged as in plate XIX, 348; two spines on each side of prothorax five-branched. Thoracic legs normal; femur longer than tibia; setae numerous on all surfaces.

Abdominal segments 1 through 8 each with five dorsal annulets (typical segment shown in pl. XIX, 347). Annulets 1, 3, and 5 without spines; annulet 2 with three bifurcate spines on each side; annulet 4 with two bifurcate spines on each side; post-

spiracular lobe with one bifurcate spine; subspiracular lobe with two spines, anterior one bifurcate, posterior one simple; surpedal lobe with two spines, anterior one simple, posterior one bifurcate. Spines on ninth and 10th abdominal segments arranged as in plate XIX, 346; 10th tergum with row of eight simple and bifurcate spines on outer margin and central trifurcate spine; suranal and subanal area with numerous setae.

The illustrations show the typical arrangement of spines. The number of branches of each spine and their location sometimes vary from specimen to specimen. The main distinguishing features of this species are the same as the generic characters, as presented by Lorenz and Kraus (1957), and include the central trifurcate spine of the 10th abdominal tergum and the one bifurcate and one simple spine on both the subspiracular and surpedal lobes. Several series of larvae were examined from different parts of the range of this species. Among these there was a slight variation in the relative length of the spines, the number of spines on the lacinia, the number of spines on the epipharynx, and the number of setae on the palpifer and stipes. There was no consistency in this variation however.

Discussion.—At first, it seemed possible that several species might be involved here. The coloration patterns are geographically fairly consistent, but the consistency stops there. Variation in the sheath shape, shape of cell *M* of the hindwing, and differences in the shape of the harpe and penis valves of the male genitalia were not consistent and were even apparent within series taken from the same location. Slight larval differences did not enlighten the situation. The separation of this complex was consequently abandoned and it is here included as an extremely variable species. If sibling species are involved, further biological data and associated adult and larval series will be needed from each section of its geographical range to show this.

The coloration pattern is very constant in the Palaearctic region; however, in North America the color variation seems to be extreme. It is also interesting to note that in the West the red forms are most common in the south and the black forms in the north, whereas in the East the reverse is true.

Monophadnoides osgoodi, new species

Female.—Length, 6.5 mm. Entirely black with extreme apex of each femur, outer surface of each foretibia and midtibia, and extreme base of hindtibia whitish. Wings lightly infuscate.

Antenna short and stout, less than $1\frac{1}{2}$ times width of head; second segment as wide as long; third segment less than $1\frac{1}{2}$ times length of fourth segment; each segment very slightly expanded at apex; sixth to ninth segments less than twice as long as wide (pl. III, 66). Outer orbits roughened and shagreened; clypeus truncate; malar space linear; postorbital groove indicated; postgenal carina absent. Tarsal claw with inner tooth shorter than outer tooth and situated halfway between outer tooth and basal lobe (pl. II, 19). Prepectus absent. Forewing with stub of 2A and 3A straight at apex. Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath slightly arcuate above, round-

ed below, both sides tapering to blunt point at apex near dorsal margin (pl. V, 125). Lancet with serrulae lobelike and directed downward; notch absent between ventral margin of lancet and margins of serrulae (pl. IX, 187).

Male.—Unknown.

Holotype.—Female, 3 mi. E. Shelburne, Coos Co., N.H., May 22, 1966, David R. Smith. Deposited in the U.S. National Museum, type No. 69155.

Paratypes.—*Maine*: Piscataquis Co., Brownville Junction, May 27, 1966, D. R. Smith (1♀). *Ontario*: Rockport, May 9, 1961, C. H. Mann (1♀); Rockport, May 9, 1961, J. Stainer (1♀).

Disposition of Paratypes.—Paratypes have been deposited in the U.S. National Museum and the Canadian National Collection.

Distribution.—Ontario to Maine (fig. 19, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is distinguished by its entirely black color, the third antennal segment less than $1\frac{1}{2}$ times the length of the fourth segment, and characters of the lancet.

This species is named after Charles E. Osgood, a student in entomology at Oregon State University.

Monophadnoides pauper (Provancher), new combination

Selandria paupera Provancher, 1882, p. 293, ♀; Provancher, 1882, p. 742; Gahan and Rohwer, 1917-18, p. 171; Burks, 1958, p. 16.

Blennocampa paupera, Provancher, 1888, p. 350; Dalla Torre, 1894, p. 171; Konow, 1905, p. 84.

Monophadnoides cordatus MacGillivray, 1908a, p. 294, ♀; MacGillivray, 1916, p. 153; Frison, 1927, p. 252. *New synonymy*.

Blennocampa cordata, Ross, 1951, p. 67.

Blennocampa abnorma MacGillivray, 1908a, p. 296, ♂; MacGillivray, 1916, p. 155; Frison, 1927, p. 238; Ross, 1951, p. 67 (= *cordatus* MacGillivray).

New synonymy.

Blennocampa antennata MacGillivray, 1908a, p. 296, ♀; MacGillivray, 1916, p. 155; Frison, 1927, p. 238; Ross, 1951, p. 67 (= *cordatus* MacGillivray).

New synonymy.

Blennocampa adusta MacGillivray, 1908a, p. 297, ♀; MacGillivray, 1916, p. 155; Frison, 1927, p. 238; Ross, 1951, p. 67 (= *cordatus* MacGillivray).

New synonymy.

Blennocampa angulata MacGillivray, 1908a, p. 297, ♀; MacGillivray, 1916, p. 155; Frison, 1927, p. 238; Ross, 1951, p. 67 (= *cordatus* MacGillivray).

New synonymy.

Blennocampa aperta MacGillivray, 1908a, p. 297, ♀; MacGillivray, 1916, p. 155; Frison, 1927, p. 238; Ross, 1951, p. 67 (= *cordatus* MacGillivray).

New synonymy.

Erythrapsides tuckeri Rohwer, 1909b, p. 145, ♀; Ross, 1951, p. 67 (= *cordatus* MacGillivray). *New synonymy*.

Paracharactus nigrisonus Rohwer, 1912, p. 231, ♂. *New synonymy*.

Blennocampa nigrisonus, Ross, 1951, p. 68.

Female.—Average length, 6.4 mm. Antenna and head black. Thorax black with tegula white or brownish. Legs black with extreme apex of each femur, each tibia except extreme apex, and each basitarsus white; remaining tarsal segments black to infusate. Abdomen black. Wings very lightly infusate.

Antenna short and stocky, less than $1\frac{1}{2}$ times width of head; third segment almost twice length of fourth segment; fourth to ninth segments less than twice as long as wide; third to ninth segments suberrate, each slightly expanded at apex (pl. III, 64). Outer orbits roughened and shagreened; postorbital groove indistinct; postgenal carina absent; malar space less than one-half diameter of front ocellus. Tarsal claw with inner tooth shorter than outer tooth in length and situated halfway between outer tooth and basal lobe (pl. II, 19). Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath slightly rounded above and below, terminating in blunt point at apex (pl. V, 122). Lancet with serrulae rounded, with three or four anterior subbasal teeth; notch separates ventral margin of lancet from anterior margin of each serrula (pl. IX, 184).

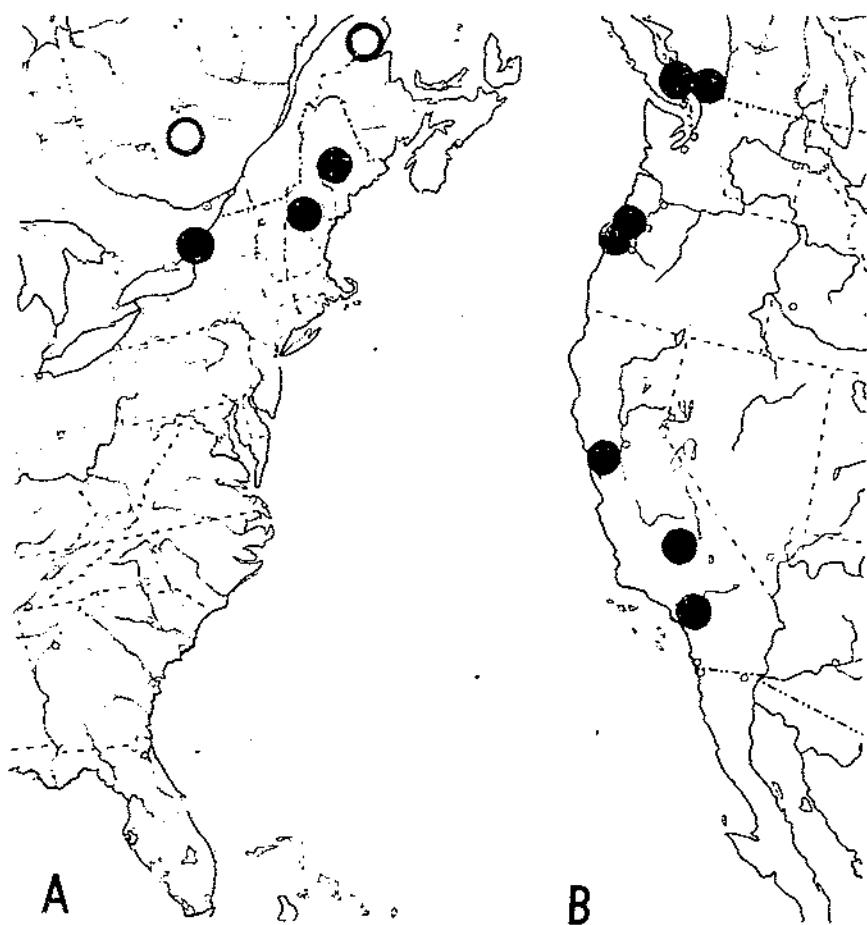


FIGURE 19.—Distribution of (A) *Monophadnoides osgoodi* (solid circles), *quebecensis* (open circles), and (B) *typicus*.

Male.—Average length, 6.0 mm. Color similar to that of female except for tegula, each tarsus, and base of hindtibia, which are black. Antenna slightly longer than that of female in relation to width of head and not as noticeably serrate; segments of same relative dimensions as those of female antenna. Other structures similar to those of female. Penis valve with short lateral spine and dorsal lobe (pl. XI, 245); harpe slightly ovate (pl. XI, 244); parapenis as in plate XI, 244.

Holotypes.—*Selandria paupera* Provancher (♀) is located at the Museum of Quebec, Laval University. It bears a yellow label "696" and a name label "Blennocampa paupera Prov." Provancher (1882) originally described this species under *Selandria*, then later put it in *Blennocampa*; consequently, the latter appears on the name label. Provancher's catalog proves this to be the type. This is probably the specimen Gahan and Rohwer (1917-18) recognized as the lectotype, and it is here considered as the type.

All MacGillivray's types are at the Illinois Natural History Survey. They bear the following data, respectively: *cordatus* (♀), no data; *abnorma* (♂), "Ithaca, N.Y., April 10, 1897"; *antennata* (♀), "Durham, N.H., 1566, W and F"; *acuminata* (♀), "Chicopee, Mass., April 26, 1897"; *adusta* (♀), "Wellesley, Mass., April 21, 1891"; *angulata* (♀), "Wellesley, Mass., April 26, 1892"; *aperta* (♀), "West Haven, Ct., April 25, 1905, E. B. Whittlesey." Rohwer's types are at the U.S. National Museum; *tuckeri* (♀) is type No. 56336 and has the data "Lawrence, Kansas, E. S. Tucker, Apr."; *nigrisomus* (♂) is type No. 14499 and has the data "Oxbow, Sask., May 21, 1907, Fred K. Knab collector."

Distribution.—East of the Rocky Mountains from Alberta and Colorado east to Labrador and Virginia (fig. 18, B).

North American Records.—*Alberta*: Cameron L., W'tn. Natl. Pk., June 19, 1956, E. E. Sterns. *Colorado*: "Colo." collection C. F. Baker. *Connecticut*: West Haven, April 25, 1905, E. B. Whittlesey. *Illinois*: Algonquin, April 27, 1905, Nason; White Heath, April 22, 1917; Mt. Carmel, April 15, 1930, Frison and Ross; Snyder, April 14, 1930, Frison and Ross; Fountain Bluff, May 15, 1932, Frison, Ross, and Mohr. *Iowa*: Fraser, April 23, 1949, J. Laffoon; Ames, April 25, 1944, C. Wings. *Kansas*: Lawrence, April, E. S. Tucker. *Maine*: Devil's Den, Mt. Porter, May 16, 1944, A. E. Brower. *Maryland*: Nr. Plummers Island, April 7, 1915, R. C. Shannon; Plummers Island, May 11, 1911, H. S. Barber, April 5, 1915, R. C. Shannon, April 5, 1914; Cabin John, April 1, 1917, R. M. Fouts; Glen Echo, April 13, 1919, R. M. Fouts; Upper Marlboro, April 20, 1963, *Pinus virginiana*, W. R. M. Mason. *Massachusetts*: Wellesley, April 21, 1891, April 26, 1892, May, 1898; Chicopee, April 26, 1897. *Michigan*: Bailey, May 9, 1940, Frison and Ross; Midland Co., April 21, 1938, R. R. Dreisbach; Bath, April 21, 1955, R. L. Fischer. *Minnesota*: Bena, May 21, 1960, spruce swamp, J. G. Chillcott. *Missouri*: Jefferson City, April 1, 1950, W. W. Dowdy. *Newfoundland*: Goose Bay, Labrador, June 15, 1948, W. W. Judd. *New Hampshire*: Durham; Pittsburg, May 30, 1937, C. A. Frost. *New Jersey*: Glassboro, April 25, 1944, W. F. Rapp, Jr.; Riverton, April 20,

1911. *New York*: McLean, April 26, 1913, H. H. Knight; McLean Bogs Reserve, April 17, 1925, P. P. Babig; Fall Creek, Ithaca, April 30, 1949, J. C. Martin; Taughannock Falls, April 30, 1949, J. C. Martin; 6-mile Cr., Ithaca, May 5, 1951, April 30, 1949, J. C. Martin; Ithaca, April 10, 1897. *Ontario*: Bells Corners, May 1, 1951, J. F. McAlpine, May 14, 1941, G. S. Walley, April 30, 1941, O. Peck; Marmora, April 24, 29, 1952, J. F. McAlpine; Merivale, May 6, 1930, J. J. de Gryse; Port Hope, May 5, 1895; Ottawa, May 8, 9; Co. Hastings, May, 1897, Evans; Kinburn, August 29, 1957, J. E. H. Martin; S. Marsh, April 24, 1952, J. F. McAlpine. *Pennsylvania*: Shingletown, April 24, 1947, S. W. Frost; Rockville, April 24, 1912, E. Doiche; Castle Rock, April 16, 1911, C. T. Greene, April 17, 1908. *Quebec*: Lac Bernard, May 13, 1962, S. M. Clark; Queens Park, Aylmer, April 29, 1924; Maniwaki, May 28, 1937, O. Peck; Burbridge, May 29, 1937, O. Peck; Welch's Bay, Norway B., May 9, 1937, E. G. Lester; Cascapedia R., June 29, 1933, C. C. Smith; Mt. Albert, June 20, 1954, G. P. Holland; Hull, May 7, 1924, C. H. Curran. *Saskatchewan*: Oxbow, May 21, 1907, F. K. Knab. *Wisconsin*: Madison, May 11, 1919.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species may be distinguished from other members of this genus by the short, stout antenna, which has the segments slightly expanded at their apices. Other features include the white tegula, sheath, lancet of the female, and male genitalia. It is most closely related to *atrata*, but the antenna, coloration, and genitalia will separate these two. This is a widely distributed species east of the Rockies. As yet nothing is known of its biology.

Monophadnoides quebecensis, new species

Female.—Length, 6.5 mm. Antenna and head black with labrum light and mandible white at center, blending to red at apex. Thorax black with tegula and upper angles of pronotum light red brown. Legs beyond coxae white to light orange; each tarsus infusate. Abdomen black. Wings hyaline.

Antenna long, filiform, length equal to twice width of head; second segment as wide as long; third and fourth segments subequal in length (pl. III, 65). Outer orbits roughened and shagreened; clypeus slightly emarginate; malar space slightly less than diameter of front ocellus; postgenal carina faintly indicated below eye; postorbital groove absent. Prepectus absent. Tarsal claw with inner tooth shorter than outer tooth and situated halfway between outer tooth and basal lobe; basal lobe present, but not obvious (pl. II, 19). Forewing with stub of 2A and 3A straight at apex. Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath long, straight above, rounded below and at apex and decidedly slanted upward (pl. V, 124). Lance with dorsal margin serrate. Lancet with serrulae lobelike, directed downward; one or two anterior subbasal teeth present, posterior subbasal teeth

absent; notch absent between ventral margin of lancet and margins of serrulae (pl. IX, 186).

Male.—Unknown.

Holotype.—Female, Maniwaki, Quebec, May 28, 1937, O. Peck. Deposited in the Canadian National Collection.

Paratypes.—Quebec: Cascapedia, June 10, 1933, W. J. Brown (1♀). Locality unknown: "10-5," labeled as "Paratype, *Phymatocera nigra* Harrington, ♀, No. 179." (1♀). Paratypes deposited with the holotype.

Distribution.—Known only from Quebec (fig. 19, A).

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is easily separated by the antenna, which is long and filiform with the third and fourth segments subequal in length. In this respect it is most closely related to *typicus*; however, the nearly entirely white legs, white to red-brown tegula and pronotum, and characters of the lancet will separate this species from *typicus*.

The name is derived from the type locality.

Monophadnoides typicus (Rohwer), new combination

Claremontia typica Rohwer, 1909c, p. 397, ♀; Ross, 1937, p. 100; Ross, 1951, p. 67; Malaise, 1964, p. 35.

Female.—Average length, 6.8 mm. Entirely black with extreme apex of each femur and basal part of each tibia whitish. Wings hyaline.

Antenna long and filiform, length equal to slightly more than twice width of head; third and fourth segments subequal in length (pl. III, 65). Outer orbits roughened and shagreened; clypeus slightly emarginate; postorbital groove indistinct; postgenal carina absent; malar space equal to one-half diameter of front ocellus. Tarsal claw with inner tooth nearly subequal in length to outer tooth and situated halfway between outer tooth and basal lobe; basal lobe present, but not obvious (pl. II, 19). Hindwing with crossvein *m-cu* absent, leaving cell *M* open. Sheath long, straight above, rounded below and at apex; not strongly slanted upward (pl. V, 123). Lance with dorsal margin serrate. Lancet with serrulae lobelike, directed anteriorly, with one anterior sub-basal tooth and several indistinct posterior subbasal teeth; small notch separates ventral margin of lancet from anterior margin of serrulae (pl. IX, 185).

Male.—Average length, 6.6 mm. Color and structure as for female. Penis valve with small lateral spine and long, slender dorsal lobe equal to one-half length of valve (pl. XI, 251); harpe and parapenis as in plate XI, 250.

Holotype.—The type (♀) is No. 56335 at the U.S. National Museum. It bears the data "Mountains near Claremont, Calif."

Distribution.—West coast of North America from British Columbia to southern California (fig. 19, B).

North American Records.—British Columbia: Langley, March 22, 1931, K. Graham; Fitzgerald, April 17, 1922, W. R. Canter;

Wellington, April 2, 1903, Rev. G. W. Taylor. *California*: Mtns. nr. Claremont; Berkeley, May 3, 1935; Porterville, July 8, 1931. *Oregon*: Saddleback Mtn., Lincoln Co., March 3, 18, 1960, March 24, 1961, J. C. Dirks-Edmunds; 2 mi. W. Harlan, Lincoln Co., April 9, 1959, P. F. Torchio, April 7, 1960, D. R. Smith; Newport, May 14, 1964, beating spruce, K. Goeden.

Host.—Unknown.

Larva.—Unknown.

Discussion.—This species is easily separated from all other members of this genus by the long, filiform antenna with the third and fourth segments subequal in length and by its entirely black color. The antennal characters place it close to *quebecensis*.

Some of the specimens from the southern part of the range have considerably more white on the legs than do those from Oregon and British Columbia. Malaise (1964) chose to keep this species in a separate genus because he thought it lacked the basal lobe of the tarsal claw. However, the basal lobe is present.

Tribe CERATULINI, new tribe

The single monotypic genus on which this tribe is based is undoubtedly of tropical origin. The obviously serrate antennae make it distinct from all other Blennocampinae. The lack of a lateral spine on the penis valve and the six-annulate abdominal segments of the larva place it close to the Phymatocerini. However, it seems best to treat this species in a separate category.

Description.—Vein 2A and 3A of forewing straight at apex; veins M and 1m-cu parallel. Hindwing with crossvein m-cu present. Tarsal claw with long inner tooth; basal lobe absent. Prepectus absent. Antenna distinctly serrate. Penis valve without dorsal lobe or lateral spine. Larva with abdominal segments 1 through 8 each six-annulet; body ornamentation consisting of large dark plates; thoracic legs relatively reduced.

Genus Included.—*Ceratulus*.

Genus CERATULUS MacGillivray

Ceratulus MacGillivray, 1908b, p. 454; Ross, 1937, p. 100; Ross, 1951, p. 63.
Type: *Ceratulus spectabilis* MacGillivray. Original designation.

Description.—Antenna distinctly serrate; second segment twice as wide as long; fourth segment longer than fifth segment and twice length of third segment; segments 3 to 8 abruptly and widely expanded at apices (pl. IV, 71, 72). Clypeus slightly convex; malar space narrow, less than one-half diameter of front ocellus; postgenal carina absent; postorbital groove absent. Prepectus absent. Tarsal claw bifid, teeth subequal in length and closely appressed to each other (pl. II, 17); basal lobe absent. Forewing with stub of 2A and 3A straight at apex (pl. I, 1). Hindwing with crossvein m-cu present, enclosing cell M.

The serrate antenna of the single species of this genus makes it distinct from all other genera. It is known only from Texas, and the larva feeds on *Cissus incisa* (Nutt.) Desmoul.

Description of *Ceratulus* Species*Ceratulus spectabilis* MacGillivray

Ceratulus spectabilis MacGillivray, 1908b, p. 454, ♂, ♀; Frison, 1927, p. 239; Ross, 1937, p. 100; Ross, 1951, p. 63.

Female.—Average length, 7.4 mm. Entirely bright orange with antenna, narrow margins around each ocellus, extreme apex of each femur, each tibia, each tarsus, wing venation, and sheath black. Wings darkly infusate.

Sheath straight above, rounded below (pl. VI, 127). Lancet with serrulae low, flat, and pointed with distinct subbasal teeth (pl. VIII, 176).

Male.—Average length, 7.0 mm. Color similar to that of female, except for apex of hypandrium and harpe of genitalia, which are black. Structure similar to that of female except for antenna, which is more strongly serrate (pl. IV, 72). Penis valve broad, flat, and rounded, without spines (pl. XI, 253); harpe and parapsis as in plate XI, 252.

Holotype.—The type (♀) is at the U.S. National Museum, No. 12175. It bears the data "Dallas, Texas, October 1, 1908, E. S. Tucker, coll."

Distribution.—Known only from Texas (fig. 20, A).

North American Records.—Texas: Maxwell, July 4, 1930, R. W. Strandtmann; Austin, April 1, 1924, R. H. Painter; Brownsville, June 9, 1932, J. O. Martin, April 1, 1924, J. N. Knull; San Antonio, July 17, 1931, June 21, 1919, G. P. Englehardt, May 12, 1950, ovip. on honeysuckle vine, V. F. Pippin; Dallas, August 6, 1908, *Cissus incisa*, E. S. Tucker, October 1, 1908, E. S. Tucker; College Station, April 27, 1931, October 14, 1936, H. J. Reinhard, August 31, 1936; Dickinson, October 12, 1918, H. S. Barber; Victoria, emer. April 15 to 16, 1920, on *Cissus incisa*, J. D. Mitchell; McAllen, May 9, 1940, on ivy.

Host.—*Cissus incisa* (Nutt.) Desmoul.

Larva.—The larva of this species has not previously been described.

In late instar, body covered with numerous dark plates with small papillae arising from center of each; plates less well marked in early instars. Head, plates of body, thoracic legs, and spiracles dark brown, rest of body light. All spiracles distinctly and darkly winged. Ocularium and apex of mandibles black.

Clypeus with two setae on each side. Labrum with three setae on each side; shallowly emarginate; epipharynx with seven to 10 spines, some clavate, located in arcuate row on each anterolateral half (pl. XVII, 320). Each mandible with one seta on outer lateral surface; left mandible with three ventral teeth and four lateral teeth (pl. XVII, 323); right mandible with four lateral teeth and three molar teeth (pl. XVII, 322). Maxillary palpus four-segmented; second segment of palpus with one seta on outer margin; first segment of palpus with three or four setae; palpifer with two setae; lacinia with nine or 10 spines (pl. XVII, 321).

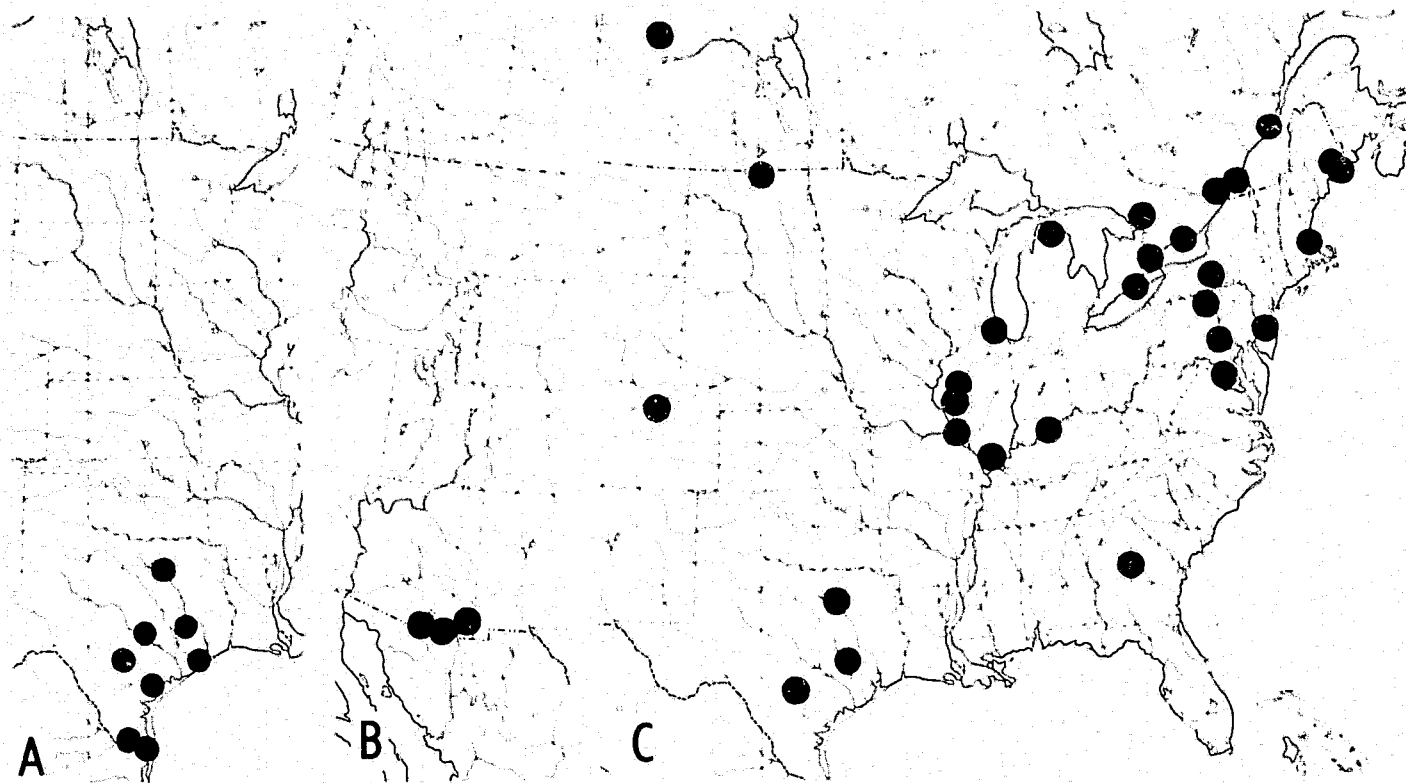


FIGURE 20.—Distribution of (A) *Ceratulus spectabilis*, (B) *Waldheimia bedae*, and (C) *Erythrapiides carbonarius*.

Labial palpus three-segmented; prementum with two setae on each side.

Thorax with darkened plates arranged as in plate XVII, 326. Each sternum with pair of setiferous tubercles. Thoracic legs with trochanter reduced to narrow ring; femur subequal to tibia in length; setae on all surfaces of each segment of each leg. Legs reduced in size in relation to body; forelegs slightly shorter than midlegs and hindlegs.

Abdominal segments 1 through 8 each with six dorsal annulets (typical segment shown in pl. XVII, 325). Annulets 1, 3, 5, and 6 without plates; annulets 2 and 4 each with two plates on each side; first and second postspiracular lobes, subspiracular lobe, and surpedal lobe each with one large plate. Ninth segment with plates arranged as in plate XVII, 324. Tenth tergum with large dorsal plate; suranal and subanal areas with setae (pl. XVII, 324). Each proleg flattened, wide, and produced anteriorly into point.

The illustrations show the typical arrangement of plates on the body. This arrangement may vary slightly by the presence or absence of one or more plates. The larva is easily recognized by the flattened plates, winged spiracles, slightly reduced thoracic legs, and wide prolegs. The larva is very distinct and easily separated from other known larvae of the Blennocampinae.

Discussion.—This is the most distinct species of this subfamily known from North America. It is probably of tropical origin, but nothing resembling it has been seen from regions farther south.

Tribe WALDHEIMIINI, new tribe

Takeuchi (1952) placed the genus *Waldheimia* in the tribe Blennocampini. Most of the members of this group are Neotropical and few of the larvae are known; therefore, it is difficult to determine relationships of this group until the Neotropical fauna is better known. The species included here appear to show affinities to both the Phymatocerini and the Blennocampini.

All the known larvae have six-annulate abdominal segments and the species of *Erythraspides* lack lateral armature on the penis valve, thus appearing close to the Phymatocerini; all the species have a basal lobe on the tarsal claw and the single species of *Halidamia* has a ventral spine on the penis valve, thus appearing close to some species of the Blennocampini. This tribe is set up, however, on the basis of the antenna, which has the apical four segments distinctly reduced, and it seems best to treat these species in a separate group at present. One species, *Erythraspides carbonarius* (Cresson), seems to show a more generalized condition in that the apical four antennal segments are not so distinctly reduced as in the other species, but all other characters place it in this group.

Description.—Vein 2A and 3A of the forewing curved up or straight at apex; vein M and 1m-cu parallel. Hindwing with cross-vein m-cu present or absent. Antenna with four apical segments reduced in length. Tarsal claw with long inner tooth and basal

lobe. Prepectus absent. Penis valve with or without dorsal lobe; lateral spine absent but ventral spine present in *Halidamia*. Larvae with abdominal segments 1 through 8 each with six dorsal annulets; ornamentation of body various, consisting of dark conical protuberances or small glandulae.

Genera Included.—*Waldheimia*, *Erythraspides*, *Halidamia*.

Genus WALDHEIMIA Brullé

Waldheimia Brullé, 1846, p. 665; Norton, 1867, p. 265; Dalla Torre, 1894, p. 139; Konow, 1903b, p. 170; Konow, 1904, p. 242; Konow, 1905, p. 87; Rohwer, 1911b, p. 391; Malaise, 1935, p. 165; Ross, 1937, p. 98; Malaise, 1949, p. 9; Ross, 1951, p. 69; Takeuchi, 1952, p. 52; Togashi, 1963, p. 71.

Type: *Tenthredo brasiliensis* Lepeletier. Original designation.

Description.—Antenna with second segment longer than wide; third segment longer than fourth segment; apical four segments markedly reduced in length, together subequal in length to third segment (pl. III, 67); apical four segments with pale ventral sensory pits. Clypeus slightly convex (pl. II, 26); malar space linear; postorbital groove absent; postgenal carina absent; distance between eyes below shorter than length of eye. Prepectus absent. Tarsal claw bifid, inner tooth slightly wider and longer than outer tooth; basal lobe present (pl. II, 22). Forewing with stub of 2A and 3A straight at apex (pl. I, 1). Hindwing with crossvein *m-cu* present, enclosing cell *M*.

This genus is centered in the Neotropical region and probably consists of 70 or 80 species. Malaise (1949) gave a key to 51 species. The one species described here is the only one known to reach the United States, and it is known only from extreme southern Arizona.

Description of *Waldheimia* Species

Waldheimia bedae, new species

Female.—Length, 8.2 mm. Antenna black with ventral light areas on apical four segments. Head entirely rufous with mouth parts and small area around ocelli black, and labrum white. Thorax black with mesonotum, tegula, pronotum, upper half of mesepisternum, and mesepimeron rufous. Legs and abdomen entirely black. Wings darkly infusate.

Antenna with first and second segments each longer than wide; third segment longer than fourth segment; fourth and fifth segments subequal in length; apical four segments markedly reduced in length, together subequal to third segment (pl. III, 67); apical four segments with pale ventral sensory pits. Clypeus slightly convex; malar space linear; postorbital groove absent; postgenal carina absent; distance between eyes below shorter than length of eye. Prepectus absent. Tarsal claw bifid, inner tooth wider and slightly longer than outer tooth; basal lobe present (pl. II, 22). Hindbasitarsus longer than remaining tarsal segments combined; hindtarsus subequal in length to hindtibia (pl. II, 32). Forewing

with stub of 2A and 3A straight at apex. Hindwing with crossvein *m-cu* present, enclosing cell *M*. Sheath straight above, rounded below (pl. V, 126). Lancet with serrulae low and flat, with three or four anterior subbasal teeth and seven to 10 posterior subbasal teeth (pl. IX, 180).

Male.—Unknown.

Holotype.—Female, Arizona, Carr Canyon, Huachuca Mts., 5300', July 28, 1946, H. A. Scullen. Deposited in the U.S. National Museum, type No. 69156.

Paratypes.—Arizona: Huachuca Mts. (1♀); 5 mi. W. Portal, Chiricahua Mts., August 13, 1958, R. E. Rice (3♀♀); 5 mi. W. Portal, Chiricahua Mts., August 13, 1958, D. D. Linsdale (1♀); Ramsey Canyon, Huachuca Mts., July 28 and 29, 1959, Nutting, Radford, and Sammuels (1♀); Baboquivari Mts., Brown Canyon, August 8, 1953, G. D. Butler (1♀); Sycamore Canyon, nr. Ruby, August 26, 1961, W. L. Nutting (1♀).

Disposition of Paratypes.—Paratypes have been deposited at the U.S. National Museum, Illinois Natural History Survey, University of Arizona, University of California at Davis, and Oregon State University.

Distribution.—Known only from the mountains of southeastern Arizona (fig. 20, B).

Host.—Unknown.

Larva.—Unknown.

Discussion.—The unique and brilliantly contrasting red and black and darkly infusate wings will immediately separate this species from all other North American Blennocampinae. There seems to be no other similar species of *Waldheimia* described.

This species is named after Jan Bedea, a student in entomology at Oregon State University.

Genus *ERYTHRASPIDES* Ashmead

Erythraspides Ashmead, 1898b, p. 128; Konow, 1905, p. 87; Rohwer, 1911c, p. 224; MacGillivray, 1916, p. 155; Ross, 1937, p. 98; Malaise, 1949, p. 34; Ross, 1951, p. 68; Pasteels, 1953, p. 120; Malaise, 1964, p. 29.

Type: *Tenthredo pygmaea* Say. Original designation.

Tumura Pasteels, 1949, p. 57; Pasteels, 1953, p. 120 (= *Erythraspides* Ashmead).

Type: *Tumura luteiventris* Pasteels. Monotypic.

Description.—Antenna short and stocky; second segment longer than wide; third segment longer than fourth segment; apical four segments reduced in length, either noticeably or indistinctly so (pl. III, 68, 69); apical segments usually with ventral light-colored areas. Clypeus slightly convex (pl. II, 26) or truncate; malar space linear; postorbital groove absent; postgenal carina absent. Prepectus absent. Tarsal claw with long inner tooth, nearly subequal in length to outer tooth; basal lobe present (pl. II, 20). Forewing with stub of 2A and 3A straight at apex (pl. I, 1). Hindwing with crossvein *m-cu* absent, leaving cell *M* open; hindwing of male with or without peripheral vein.

This genus is closely related to both *Halidamia* and *Waldheimia*, differing from *Halidamia* by the straight stub of 2A and 3A of the forewing and from *Waldheimia* by the smaller inner tooth of the tarsal claw and the absence of cell *M* in the hindwing. The North American representatives of *Erythraspides* and *Waldheimia* are very few as compared to the numerous species found in the Neotropical region. A study of these Neotropical groups will be necessary in order to further evaluate the present generic groupings. At present it seems best to treat them separately.

There are probably about a dozen species of *Erythraspides* in the world. Pasteels (1953) described three from Africa, and the rest are found in Mexico and South America. There are two species in North America, *vitis* (Harris) and *carbonarius* (Cresson), which feed on *Vitis* and *Oenothera*, respectively. The larvae have been treated for both species; however, that of *carbonarius* was described by Dyar and the specimens are no longer available.

Key to *Erythraspides* Species

1. Entirely black; forewing with basal two-thirds infusate, apical one-third hyaline; apical four antennal segments not markedly reduced (pl. III, 69) ----- *E. carbonarius* (Cresson)
- Head and thorax with white and rufous markings; wings uniformly lightly infusate; apical four antennal segments distinctly reduced in length (pl. III, 68) ----- *E. vitis* (Harris)

Descriptions of *Erythraspides* Species

Erythraspides carbonarius (Cresson)

- Selandria carbonaria* Cresson, 1880a, p. 12, ♀; Cresson, 1916, p. 3.
Blennocampa carbonaria, Dalla Torre, 1894, p. 170; Konow, 1905, p. 84; MacGillivray, 1916, p. 155.
Waldheimia carbonaria, Ross, 1937, p. 98.
Erythraspides carbonaria, Ross, 1951, p. 68.
Selandria parva Cresson, 1880a, p. 12, ♂; Cresson, 1916, p. 7; Ross, 1951, p. 68 (= *carbonaria* Cresson).
Blennocampa parva, Dalla Torre, 1894, p. 171; Konow, 1905, p. 84.
Erythraspides parvus, MacGillivray, 1908a, p. 297; MacGillivray, 1916, p. 156.
Blennocampa abjecta MacGillivray, 1921, p. 22, ♀; Frison, 1927, p. 238; Ross, 1951, p. 68 (= *carbonaria* Cresson).
Blennocampa absona MacGillivray, 1921, p. 22, ♂; Frison, 1927, p. 238; Ross, 1951, p. 68 (= *carbonaria* Cresson).

Female.—Average length, 6.6 mm. Entirely black with apex of each coxa, extreme base of each femur, extreme apex of forefemur and midfemur, entire foretibia and midtibia, and each tarsus whitish. Wings with basal two-thirds moderately infusate, apical one-third hyaline.

Apical four antennal segments reduced in length, but not noticeably so, being subequal to third plus fourth segments combined (pl. III, 69); apical four segments with ventral pale areas. Eye large, but not parallel to or close to hindmargin of head; eyes farther apart at base than length of one. Hindbasitarsus subequal in length to remainder of tarsal segments. Sheath long and broadly rounded at apex (pl. VI, 128). Lancet with basal and central

serrulae low and rounded with fine subbasal teeth; apical serrulae more pronounced (pl. VIII, 177).

Male.—Average length, 6.5 mm. In color and structure similar to female. Hindwing without peripheral vein. Penis valve with dorsal lobe; lateral spine absent (pl. XI, 255); harpe and parapenis as in plate XI, 254.

Holotypes.—Both Cresson types are at the Academy of Natural Sciences of Philadelphia. *S. carbonaria* (♀) is type No. 187 and bears the data "Ga."; *S. parva* (♂) is type No. 389 and bears the data "Col." Both MacGillivray types are at the Illinois Natural History Survey. *B. abjecta* (♀) bears the data "Ithaca, N.Y., Aug. 17," and *B. absona* (♂) bears the data "Orono, Me., August 12, 1913."

Distribution.—Widespread in North America east of the Rocky Mountains; Maine to Georgia west to Texas, Colorado, and Saskatchewan (fig. 20, C).

North American Records.—*Colorado*: "Colo." *Georgia*: "Ga." *Illinois*: Algonquin, Nason; Meredosia, August 22, 1917, sand pit; Havana, May 31, 1933, C. O. Mohr, August 19, 1907, river shore; Hamel, May 6, 1943, Ross and Sanderson; Dongola, May 12, 1916. *Indiana*: Harrison Co., July 21, 1911. *Maine*: Bar Harbor, July 4, 1919, C. W. Johnson; Orono, August 12, 1913. *Maryland*: S. Mtn. near Pine Knob, May 14, 1918, R. H. Van Zwaluwenburg. *Massachusetts*: Beverly, July 18, 1932, *Oenothera*. *Michigan*: Cheboygan Co., July 17, 1942, G. C. Crampton. *Missouri*: Shrewsbury, June 30, 1949, W. Downes. *New Hampshire*: Jefferson (?), June 25, 1895, H. G. Dyar. *New Jersey*: Trenton, May 24. *New York*: Ithaca, July 12, 1918, June 18, 1918, August 20, 1918, August 17. *North Dakota*: Turtle Mtns., August 4, 1920, T. H. Hubbell. *Ontario*: Burks Falls, July 12, 1926, F. P. Ide; Toronto, June 2, 1932, G. C. Crampton; Ottawa, May 30, 1941, O. Peck; Trenton, June 9, 1901, Evans; Simcoe, June 2, 1939, G. E. Shewell; Muskoka, July, 1888, E. P. V. *Pennsylvania*: Mt. Holly Springs, July 4, 1918, R. M. Fouts; Cedar Run, July 12, 1920, J. N. Knull. *Quebec*: Isle de Montreal, August 19, 1906, Beaulieu; Montreal, July 25, 1940, J. Ouellet; Cap Rouge, July 9, 1953, R. Lambert; Ladysmith, July 9, 1953, R. Lambert. *Saskatchewan*: Waskesiu Lake, July 14, 1939, A. R. Brooks. *South Dakota*: Little Bend, August 22, 1927, H. C. Severin. *Texas*: Navasota, April 7, 1959, W. R. M. Mason; Dallas, April 8, 1906, on dewberry, F. C. Bishopp; San Antonio, May 14, 1906, F. C. Pratt; College Station, April 21, 1932, April 17, 1931, May 9, 1945, May 9, 1946, May 1, 1947, April 5, 21, 22, 23, 24, 1947, June 2, 1951, H. J. Reinhard. *Virginia*: Rosslyn, H. H. Smith.

Host.—The larvae feed on *Oenothera*.

Larva.—I have not been able to obtain larvae for study. Dyar reared this species but did not publish data on it. In his unpublished notes he said the larvae were on a "plant like fire weed" on Long Island. He described the head as being whitish with a triangular black patch on the vertex or "resting behind each eye," and a "dusky arc in top of clypeus." He also said that the abdominal

segments are "regularly six-annulate," but he did not mention any spines such as those of the larva of *vitis*.

Discussion.—This species is easily separated from *vitis* by its entirely black color and partial infuscation of the wings. Ross (1937) considered it as a generalized member of this genus. Although the apical antennal segments are not noticeably reduced as in *vitis*, other characters substantiate its placement here.

Erythraspides vitis (Harris)

Tenthredo pygmaea Say, 1824, p. 318, ♂, ♀; Harris, 1835, p. 583; LeConte, 1859, p. 213; Ross, 1951, p. 69. Preoccupied by *Tenthredo pygmaea* Klug, 1814.

Selandria pygmaea, Harris, 1841, p. 380.

Blennocampa pygmaea, Cresson, 1880b, p. 59; Dalla Torre, 1894, p. 172; Konow, 1905, p. 84.

Erythraspides pygmaea, Ashmead, 1898b, p. 128; Dyar, 1898, p. 137; MacGillivray, 1916, p. 156; Britton, 1917, p. 142; Horsfall, 1929, p. 174; Peterson, 1956, p. 268.

Tenthredo vitis Harris, 1835, p. 583. *Nomen nudum*.

Selandria vitis Harris, 1841, p. 378; Norton, 1861, p. 219; Norton, 1867, p. 245; Scudder, 1869, p. 268; Provancher, 1878, p. 98; Thomas, 1881, p. 67; Provancher, 1882, p. 293; Provancher, 1883, pp. 200, 742.

Erythraspides vitis, Ross, 1951, p. 69; Malaise, 1964, p. 29.

Selandria caryae Norton, 1869, p. 224 (adults only, larvae are *Eriocampa juglandis* (Fitch)); Norton, 1872, p. 83; Cresson, 1880a, p. 40; Packard, 1890, p. 338 (adults only, larvae are *Eriocampa juglandis* (Fitch)); Cresson, 1928, p. 4; Ross, 1951, p. 69 (= *vitis* Harris).

Monophadnus caryae, Kirby, 1882, p. 176; Dalla Torre, 1894, p. 161.

Erythraspides caryae, MacGillivray, 1916, p. 156.

Female.—Average length, 6.6 mm. Head and antenna black with clypeus, labrum, paraantennal fields, and supraclypeal area white. Thorax black with dorsum, tegula, pronotum, and upper angles of mesepisternum rufous. Foreleg mostly dull yellow with basal half of coxa black; midleg and hindleg black with each trochanter, base of each tibia, and most of each tarsus dull yellow. Abdomen black. Wings uniformly lightly infuscate.

Apical four antennal segments distinctly reduced, slightly longer than third segment (pl. III, 68); apical four segments with ventral pale areas and sensory pits. Eye large, posterior margin close to and parallel with posterior margin of head; eyes separated at base by distance greater than length of one eye (pl. II, 12). Hindbasitarsus subequal in length to remaining tarsal segments. Sheath straight above, rounded below (pl. VI, 129). Lancet with serrulae flat and serrate, only one anterior subbasal tooth and usually about six posterior subbasal teeth (pl. VIII, 178).

Male.—Average length, 6.3 mm. Color similar to that of female except for black mesepisternum and scutellum. Structure similar to that of female except for hindwing, which has peripheral vein. Penis valve with dorsal lobe and lateral spine (pl. XI, 257); harpe and parapenis as in plate XI, 256.

Holotypes.—Three specimens (♀♀) marked as types of *Selandria vitis* Harris are in the Harris collection at the Museum of Comparative Zoology. Each of these bears the label "MCZ Type 26314" and one has been chosen as the lectotype. On the determina-

tion label next to the specimens and on a separate pin is written "Blennocampa pygmaea Say, vitis Harris type." *S. caryae* Norton (♀) is type No. 10339 at the Academy of Natural Sciences of Philadelphia.

Distribution.—New York to Florida and west to Louisiana and Iowa (fig. 21, A).

North American Records.—*Arkansas*: Washington Co., July 20–24, 1928, on grape, reared by D. Isely. *Florida*: Gainesville, August 16, 1955, on grape, C. N. Patton; Paradise Key, Everglades Nat. Pk., March 23, 1954, K. V. Krombein. *Georgia*: DeWitt, July 24, 1912. *Illinois*: Pulaski, May 24, 1900, sweepings in upland woods; Oakwood, July 1, 1932, J. Alstarlund, June 22, 1933, H. H. Ross. *Iowa*: Des Moines, July 4, 1951, M. Crawley. *Louisiana*: Opelousas, May 7, 1908, on hickory, R. A. Cushman. *New Hampshire*: Mason, July 17, 1923, *Vitis* sp. *New York*: Buffalo, F. P. V. *Pennsylvania*: Montgomery Co.; North East, July 17, 1907, on grape, F. Johnson. *South Carolina*: McClellanville, May 13, 1944, H. and M. Townes. *Virginia*: Falls Church, June 11, 13, 1931; Bluemont, June 18, 1916, J. Knull; Glade Spring, July 27, 1938, on grape leaf, C. R. Willey.

Host.—Larvae feed on grape, *Vitis* spp.

Larva.—Harris (1841) included a description of the larva with his description of this species. Scudder (1869), Dyar (1898), Yuasa (1922), Horsfall (1929), and Peterson (1956) have all treated the larva.

In late instar, head and body tubercles black; dark, broad, longitudinal stripe on dorsum of body; rest of body light, probably green when alive.

Clypeus with two setae on each side. Labrum with two setae on each side; with narrow central emargination; epipharynx with 10 to 12 spines, some furcate, located in arcuate row on each anterolateral half (pl. XVIII, 329). Each mandible with one seta on outer lateral surface; left mandible with four ventral teeth and three sharp and one truncate lateral teeth (pl. XVIII, 328); right mandible with one ventral tooth, three lateral teeth, and four molar teeth (pl. XVIII, 327). Maxillary palpus four-segmented; second palpal segment with two setae on outer margin; palpifer with three setae; stipes with one seta; lacinia with 10 to 11 spines, some furcate (pl. XVIII, 330). Labial palpus three-segmented; two setae on each side of prementum.

Thorax with tubercles arranged as in plate XVIII, 334. Thoracic legs normal; femur longer than tibia; setae numerous on inner surface of each leg.

Abdominal segments 1 through 8 each with six dorsal annulets; annulets 5 and 6 narrow and may appear as one (typical segment shown in pl. XVIII, 333). Large conical tubercles mainly confined to dorsal surface of body. Annulets 1, 3, 5, and 6 without tubercles; annulet 2 with three tubercles on each side; annulet 4 with two tubercles on each side; first and second postspiracular lobes, subspiracular lobe, and surpedal lobe each with one small tubercle concolorous with rest of body. Ninth segment with tubercles arranged as in plate XVIII, 331. Tenth tergum with two large

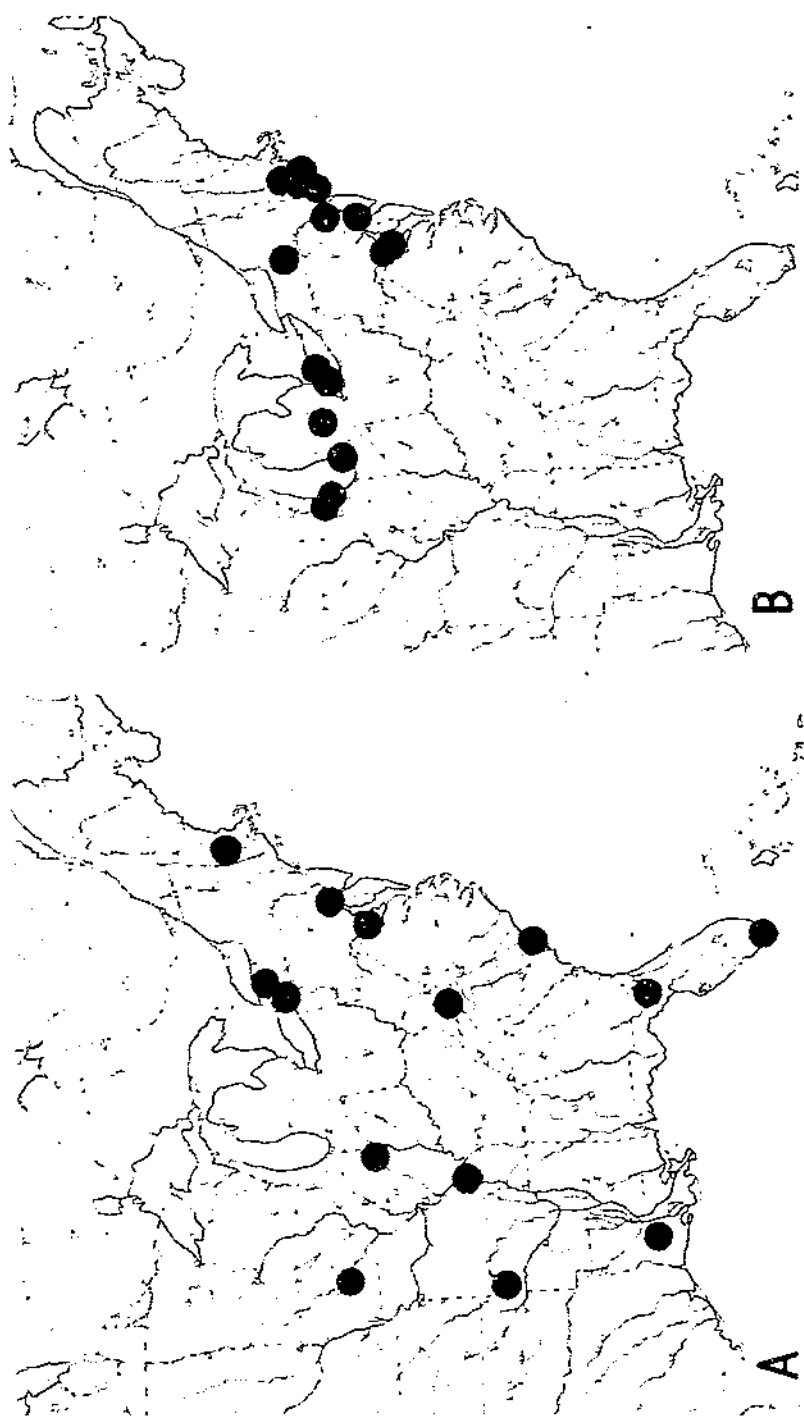


FIGURE 21.—Distribution of (A) *Erythrurispides vilis* and (B) *Haliidamia affinis*.

tubercles located centrally and dark plate at apex; suranal and subanal areas with numerous hairs (pl. XVIII, 331, 332).

This larva is easily recognized by the large conical tubercles on the dorsum of the body.

Discussion.—The antenna, coloration, hyaline wings, and genitalic characters will easily separate this species from *carbonarius*. This species may be of minor economic importance and has received the approved common name "grape sawfly." Horsfall (1929) gave an account of the biology of this species.

In the original description of *caryae*, Norton (1869) described the adults of this species, but the larvae are those of *Eriocampa juglandis* (Fitch). Even though the specimens were supposedly reared from the described larva, Norton mentioned that "4 specimens came forth about Aug. 22, all seemingly very small for so large larvae."

Genus HALIDAMIA Benson

Halidamia Benson, 1939, p. 111; Benson, 1940, p. 207; Pasteels, 1948, p. 187; Ross, 1951, p. 69; Benson, 1952, p. 104.

Type: *Hylotoma affinis* Fallén. Original designation.

Description.—Antenna with apical four segments reduced in length, together subequal in length to second plus third segments; second segment longer than wide; third segment longer than fourth segment (pl. III, 70); segments 6 to 9 each with ventral light-colored area. Clypeus slightly convex (pl. II, 26); malar space linear; postorbital groove absent; postgenal carina absent. Prepectus absent. Tarsal claw cleft, with inner tooth subequal in length to outer tooth; basal lobe present (pl. II, 20). Forewing with stub of 2A and 3A curved up at apex (pl. I, 6). Hindwing with crossvein *m-cu* absent, leaving cell *M* open.

Benson erected this genus primarily on the basis of the up-turned vein 2A and 3A of the forewing. The other *Waldheimiini* have this vein straight.

Only one species is known in this genus, *H. affinis* (Fallén), which has been introduced into North America.

Description of *Halidamia* Species

Halidamia affinis (Fallén)

Hylotoma affinis Fallén, 1807, p. 207.

Phyllotoma affinis, Fallén, 1829, p. 31.

Blennocampa assimilis var. *affinis*, Dalla Torre, 1894, p. 170.

Blennocampa affinis, Konow, 1905, p. 83; Enslein, 1914, p. 294; Conde, 1934, p. 185; Berland, 1947, p. 256.

Halidamia affinis, Benson, 1939, p. 111; Benson, 1940, p. 207; Pasteels, 1948, p. 187; Ross, 1951, p. 69; Benson, 1952, p. 104; Woollatt, 1955, p. 143; Lorenz and Kraus, 1957, p. 122.

The European synonymy is not presented here. The name applied is based on the interpretation of Enslein (1914) and Benson (1939). Enslein (1914) listed *hyalina* Klug, *assimilis* Thomson, and *formosella* Costa as synonyms.

Female.—Average length, 6.5 mm. Head and antenna black except for light spots on ventral side of antennal segments 6 to 9 and white maxillary and labial palpi. Thorax black with edge of tegula, metapleuron, and posterior central edge of mesopleuron orange. Legs entirely orange yellow with tarsi infuscate. Abdomen orange with basal plates, second tergum, apical tergum, and sheath black. Wings lightly infuscate.

Head and body smooth and shining with very fine punctures on head and pronotum and large punctures on posterior margin of scutellum. Sheath long and broadly rounded at apex (pl. VI, 130). Lancet with serrulae low and pointed, with equal number of anterior and posterior subbasal teeth (pl. VIII, 179).

Male.—Average length, 5.0 mm. In color and structure similar to female. Penis valve with long ventral spine curving laterally (pl. XI, 249); parapenis without posterior lobe (pl. XI, 248); harpe as in plate XI, 248.

Holotype.—Fallén's types are at the Zoological Museum, Lund, Sweden.

Distribution.—From Massachusetts and Maryland to Wisconsin (fig. 21, B). All Europe.

North American Records.—*Connecticut*: N. Branford, May 12, 1933, M. P. Zappe; Windsor, May 21, 1956, J. B. Kring. *Maryland*: Bowie, April 21, 1963, *Pinus virginiana*, W. R. M. Mason; Upper Marlboro, April 20, 1963, W. R. M. Mason; Cabin John, April 10, 1965, April 21, 1966, May 3, 7, 1966, D. R. Smith; 3 mi. W. Seneca, May 3, 1966, D. R. Smith. *Michigan*: Pottsville, Eaton Co., May 10, 1959, R. A. Scheibner; East Lansing, May 24, 1957, on alfalfa, H. C. Agarwal, May 15, 1954, R. L. Fischer, May 14, 1962, G. C. Eickwort; Bath, May 23, 1957, R. Scheibner, May 20, 1962, G. C. Eickwort; Watervliet, May 25, 1957, J. B. Tatter; Saubee Lake, Eaton Co., May 10, 1959, R. A. Scheibner. *New Jersey*: Haddon Hts., May 29, 1934, L. J. Bottimer; Warren Co., May 10, 1956, in apple orchard, L. O. Merrill. *New York*: Orient, L.I., June 5, 1948, R. Latham; Cold Spring Harbor, L.I., May 4, 1931; Ithaca, May 14, 1951, J. F. Flynn, May 2, 1951. *Ontario*: Rondeau Park, June 22, 1962, S. M. Clark; Point Pelee, June 4-5, 1961, Kelton and Brumpton. *Wisconsin*: Racine Co., Rochester, June 7, 1966, sticky board trap, pear tree, M. S. Conrad; Jefferson Co., Jefferson, June 7, 1966, sticky board trap, pear tree, M. S. Conrad.

Host.—No host has been recorded in North America. In Europe the larvae feed on *Galium aparine* L. and *G. mollugo* L. (Benson, 1952).

Larva.—I have not seen the larva of this species. Lorenz and Kraus (1957) described it; the following description is taken from their account.

Head yellow brown with dark spot on each side. Body mostly light in color. Clypeus with two setae on each side. Labrum with three or four setae on each side. Mandible with one seta on outer surface. Second segment of maxillary palpus with two setae; palpifer with two to three setae; stipes with one seta. Thoracic legs normal. Abdominal segments 1 through 8 each with six dorsal

annulets; annulets 2 and 4 each with two or three glandubae on each side; spiracular and surpedal lobes without glandubae but with numerous setae.

This species is apparently separated from other European species by having two setae on the second segment of the maxillary palpus and the other characters given above.

Discussion.—This species is easily recognized by the orange abdomen, reduced apical four antennal segments, long sheath, and upturned vein 2A and 3A of the forewing. It is entirely parthenogenetic in the northern parts of its range in Europe and North America. Males occur in the southern part of its range in Europe, and I collected several males of this species in Maryland near Washington, D.C., which is its southernmost known occurrence in North America. Woollatt (1955) reported taking several males in Britain.

Taxa Excluded From Nearctic Fauna

The following taxa have been excluded from the Nearctic fauna. They were recorded as being found in North America by Ross (1951).

Genus BLENNOCAMPA Hartig

Blennocampa Hartig, 1837, p. 266.

Type: *Tenthredo* (*Allantus*) *pusilla* Klug. Designated by Rohwer (1911a).

Ross (1951) included several species in this genus. They were primarily those species of the Blennocampini that had a long inner tooth on the tarsal claw with no basal lobe. These species have been transferred to either *Monophadnus* or *Monophadnoides*. This genus is monotypic, containing only the type species, the larva of which lives in the rolled-back margins of leaves of *Rosa*. It is found throughout Europe to Siberia.

Genus PAREOPHORA Konow

Pareophora Konow, 1886, p. 184, 187.

Type: *Tenthredo* (*Allantus*) *luridiventris* Klug. Designated by Rohwer (1911a).

Ross (1951) included two Nearctic species in this genus. They have been transferred to *Eupareophora* and *Apareophora*. Only one species is in Europe, *P. pruni* (Linnaeus) (= *luridiventris* Klug), and one species, *P. gracilis* Takeuchi, in Japan. Both feed on *Prunus* in the larval stage.

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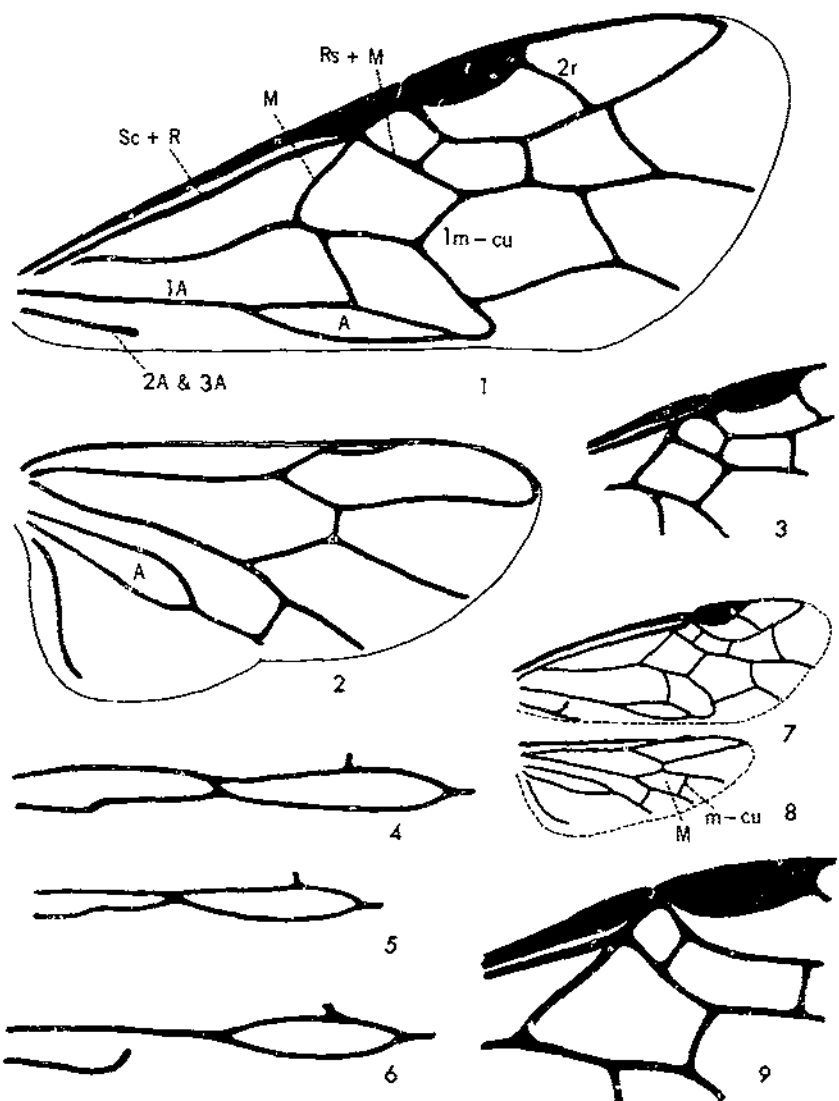
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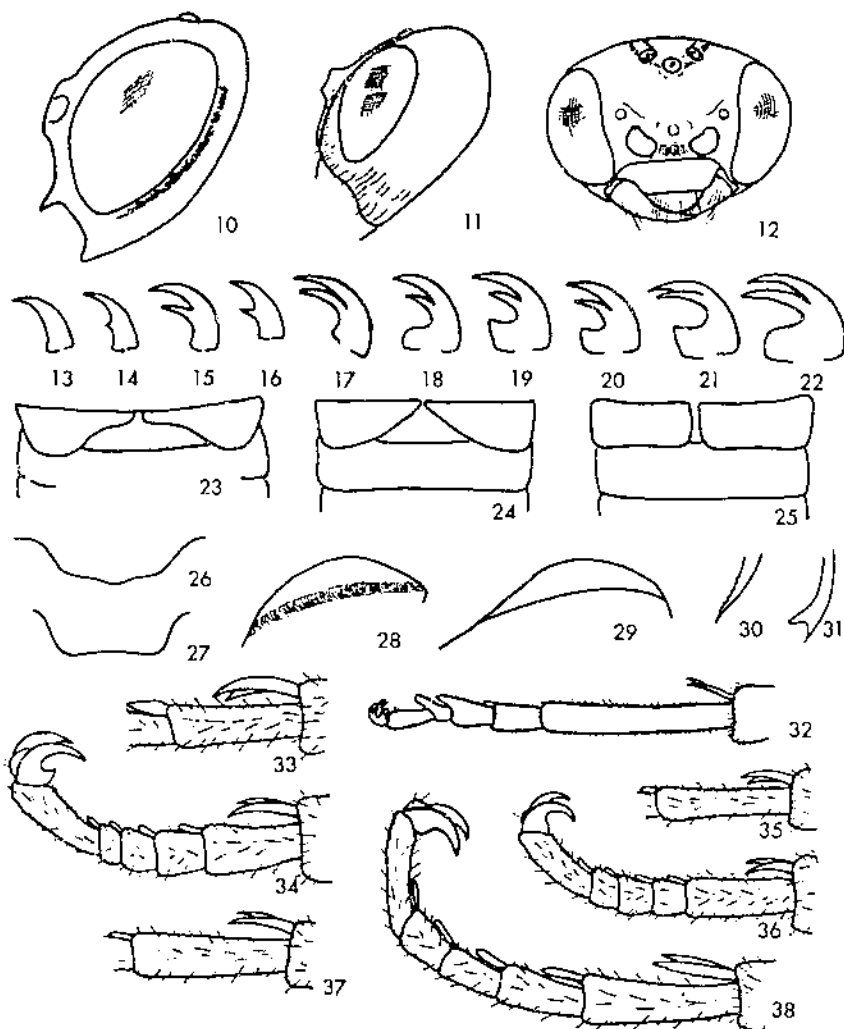
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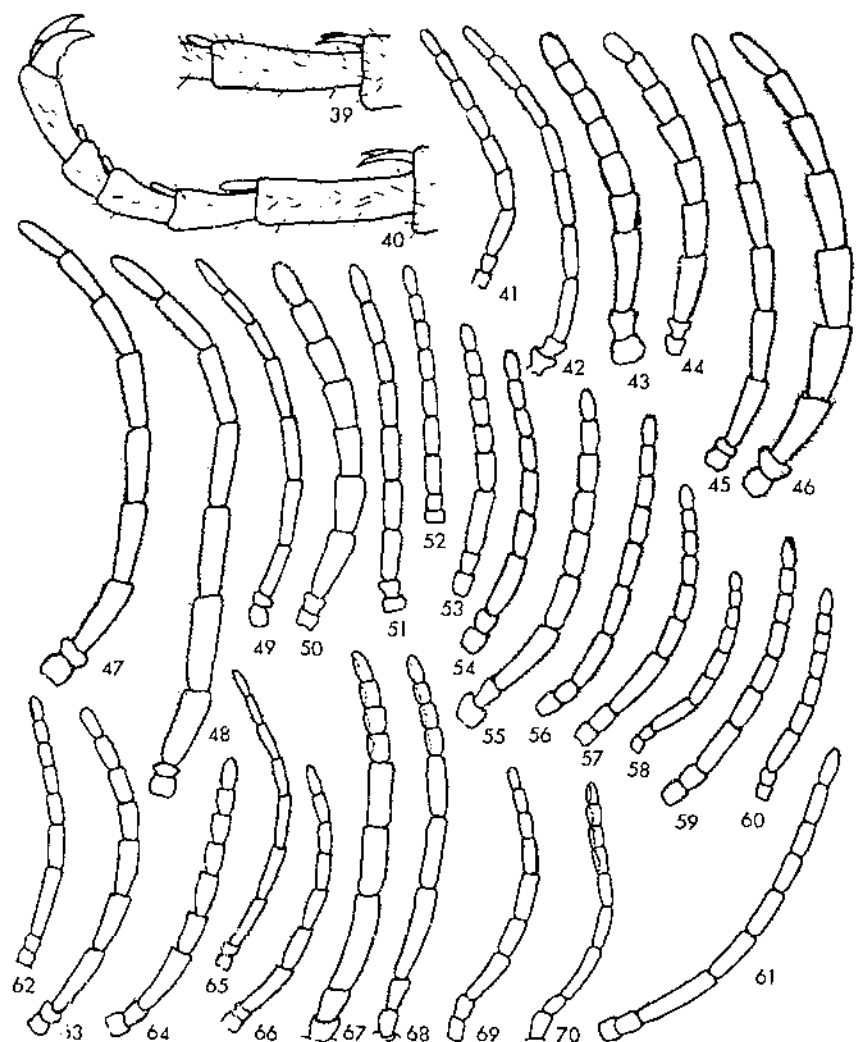
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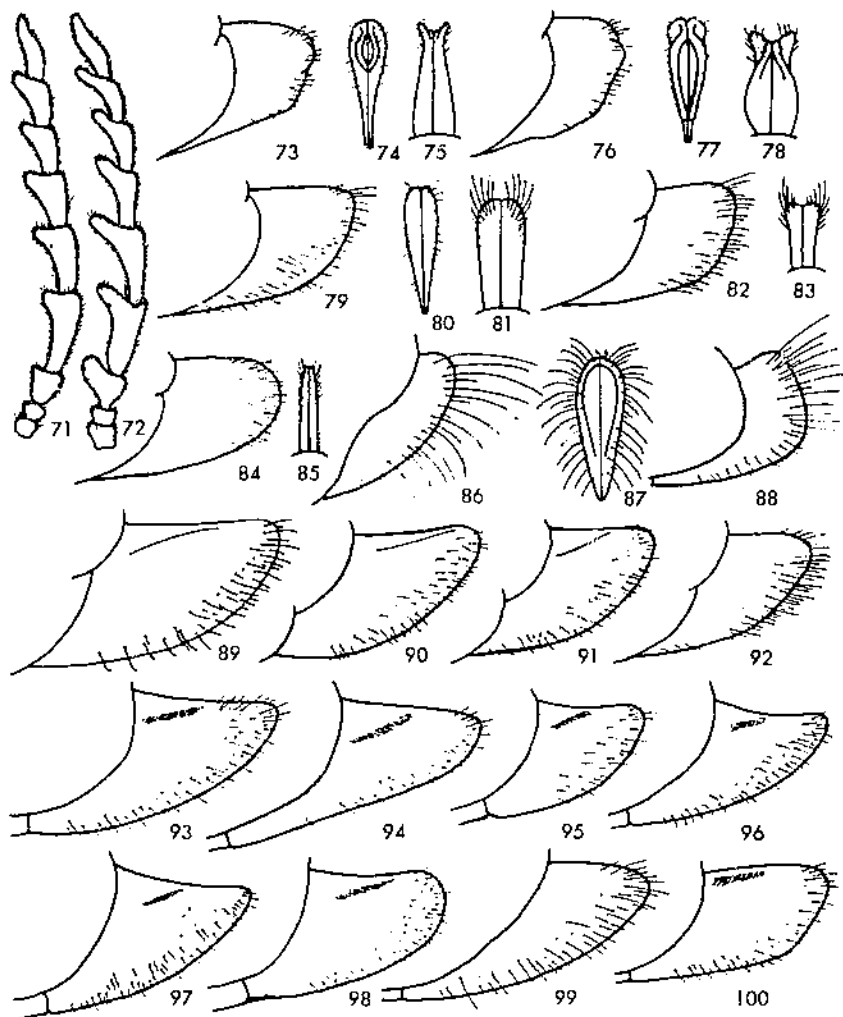
Forewing (1) and hindwing (2) of *Monophadnoides pauper*; forewing of *Eupareophora parca* (3); anal cell of forewing of *Lycaota sodalis* (4), *Blennogeneris spissipes* (5), and *Apareophora rossi* (6); forewing (7) and hindwing (8) of *Rhadinoceraea nigra*; forewing of *Tomostethus multictinctus* (9). [A=anal cell; 1A, 2A, 3A=first to third anal veins; m-cu, 1m-cu=mediocubital crossvein; M=media, medial cell; 2r=second radial crossvein; Rs + M=radial sector and media; Sc + R=subcosta and radius.]



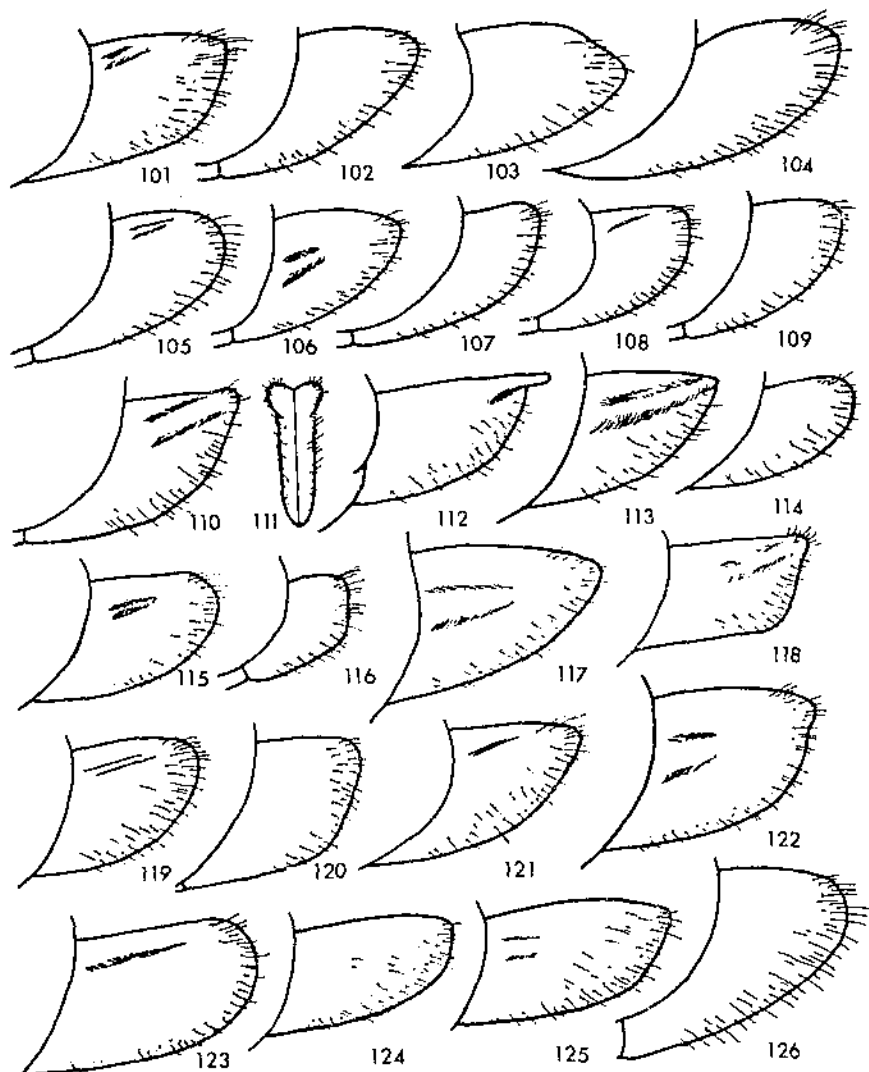
Head, lateral, of *Eupareophora parva* (10) and *Lagonis nevadensis* (11); head, frontal, of *Erythraspides vitis* (12); tarsal claw of *Tomostethus multicinctus* (13), *Tethida cordigera* (14), *Monopadnus contortus* (15), *Phymatocera offensa* (16), *Ceratulus spectabilis* (17), *Monopadnoides atratus* (18), *M. pauper* (19), *Ardis brunneiventris* (20), *Monopadnoides geniculatus* (21), and *Waldheimia bedae* (22); basal plates of *Monopadnus lattini* (23), *M. pallescens* (24), and *Periclista inaequidens* (25); clypeus of *Erythraspides carbonarius* (26) and *Phymatocera fumipennis* (27); prepectus of *Eutomostethus ephippium* (28) and *Tomostethus multicinctus* (29); inner front tibial spur of *Eutomostethus ephippium* (30) and *Stethomoetus fuliginosus* (31); hindtarsus of *Waldheimia bedae* (32); middle tibial spurs and basitarsus (33) and back tibial spurs and hindtarsus (34) of *Blennogeneris spissipes*; middle tibial spurs and basitarsus (35) and back tibial spurs and hindtarsus (36) of *Blennogeneris coloradensis*; middle tibial spurs and basitarsus (37) and back tibial spurs and hindtarsus (38) of *Blennogeneris gittinsi*.



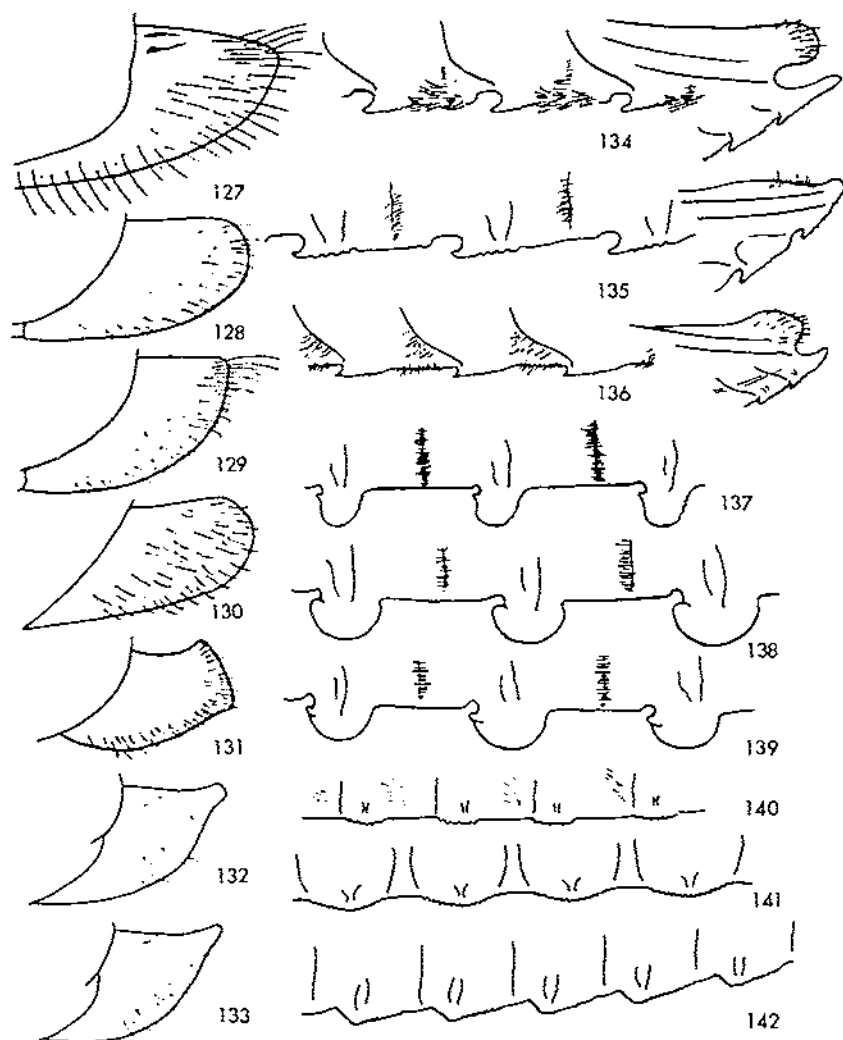
Middle tibial spurs and basitarsus (39) and back tibial spurs and hindtarsus (40) of *Lycaota sodalis*; antenna of *Blennogeneris spissipes* (41), *Lycaota janetae* (42), *Tethida cordigera* (43), *Phymatocera offensa* (44), *P. similata* (45), *P. racemosae* (46), *P. similacinae* (47), *Paracharactus montivagus* male (48) and female (49), *Rhadinoceraea ctenidium* (50), *R. nubilipennis* (51), *R. aldrichi* (52), *Monophadnus aequalis* (53), *M. bakeri* (54), *M. californicus* (55), *M. luttini* (56), *M. pallescens* (57), *Eutomostethus ephippium* (58), *Monardis pulla* (59), *Eupareophora para* (60), *Monophadnoides atratus* (61), *M. conspicuatus* (62), *M. geniculatus* (63), *M. pauper* (64), *M. quebecensis* (65), *M. osgoodi* (66), *Waldheimia bedae* (67), *Erythraspides vitis* (68), *E. carbonarius* (69), and *Halidamia affinis* (70).



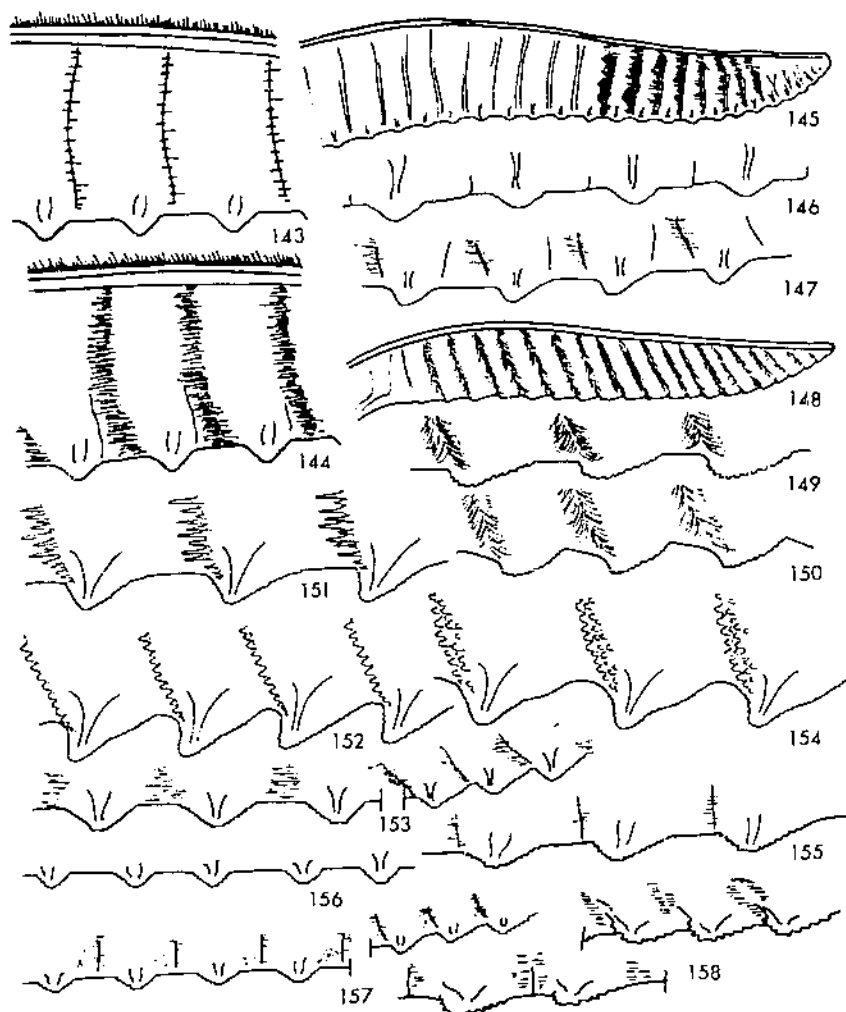
Antenna of *Ceratulus spectabilis* female (71) and male (72); sheath, lateral (73), posterior (74), and dorsal (75), of *Blennogeneris coloradensis*; sheath, lateral (76), posterior (77), and dorsal (78), of *Blennogeneris spissipes*; sheath, lateral (79), posterior (80), and dorsal (81), of *Blennogeneris gittinsi*; sheath, lateral (82) and dorsal (83), of *Lycosta bouquetensis*; sheath, lateral (84) and dorsal (85), of *Lycosta janetae*; sheath, lateral (86) and posterior (87), of *Tethida cordigera*; sheath, lateral, of *Tomostethus multicinctus* (88), *Phymatocera fumipennis* (89), *P. similata* (90), *P. offensa* (91), *Paracharactus montivagus* (92), *Rhadinoceraea nigra* (93), *R. utahensis* (94), *R. aldrichi* (95), *R. insularis* (96), *E. jacintensis* (97), *R. nubilipennis* (98), *Lagonis nevadensis* (99), and *Monophadnus aequalis* (100).



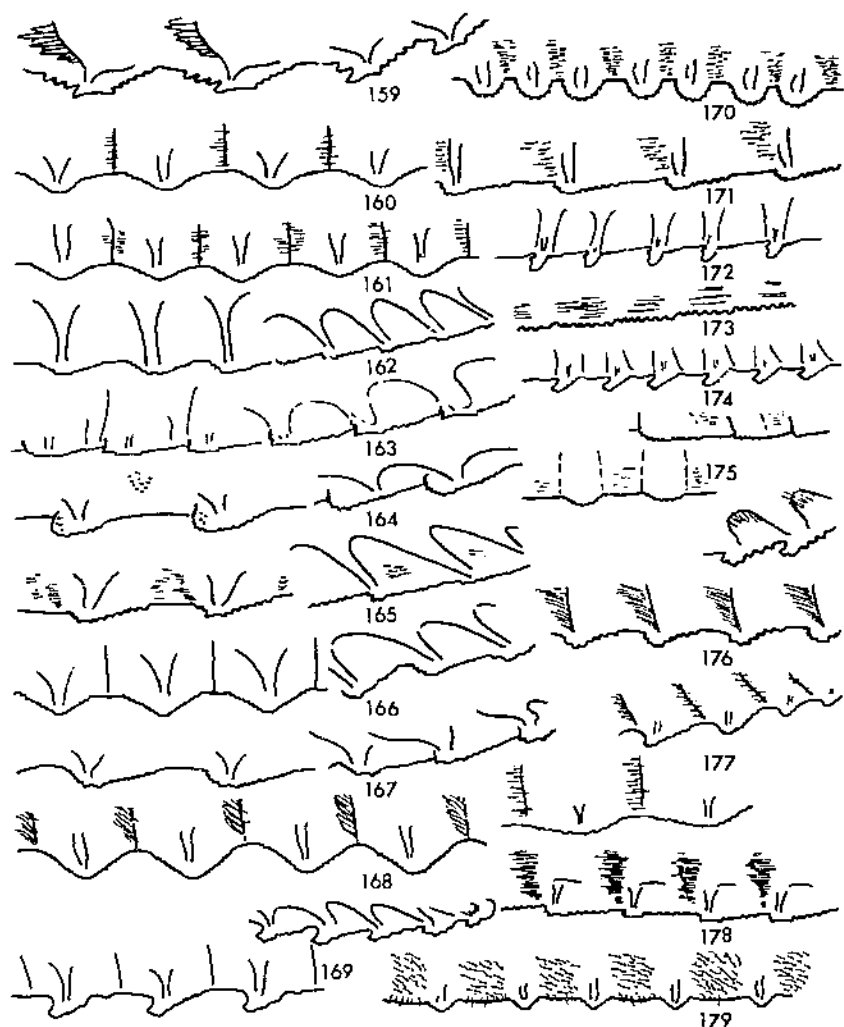
Sheath, lateral, of *Monophadnus assaracus* (101), *M. bakeri* (102), *M. californicus* (103), *M. contortus* (104), *M. lattini* (105), *M. pallescens* (106), *Stethomostus fuliginosus* (107), *Eutomostethus ephippium* (108), and *E. luteiventris* (109); sheath, lateral (110) and posterior (111), of *Monardis pulla*; sheath, lateral, of *Ardis brunniventris* (112), *A. atrata* (113), *Apareophora dyari* (114), *A. rossi* (115), *Eupareophora parca* (116), *Monophadnoides atratus* (117), *M. conspiculatus* (118), *M. geniculatus* (119-121), *M. pauper* (122), *M. typicus* (123), *M. quebecensis* (124), *M. osgoodi* (125), and *Waldheimia bedae* (126).



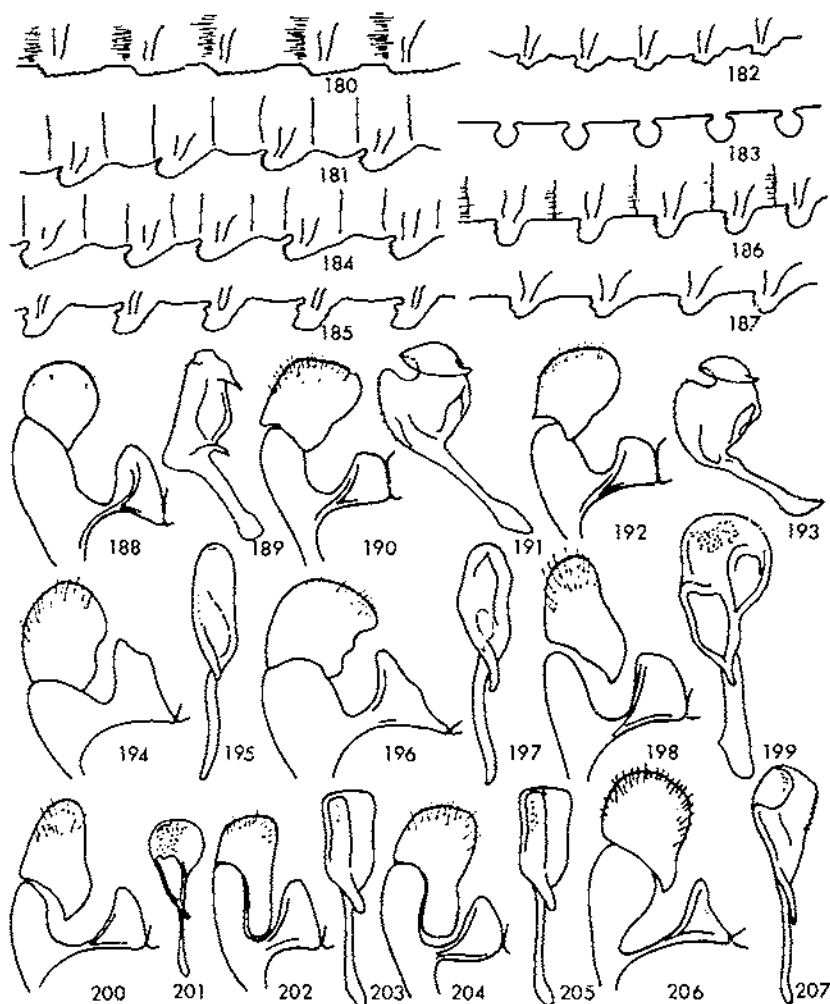
Sheath, lateral, of *Ceratulus spectabilis* (127), *Erythraspides carbonarius* (128), *E. vitis* (129), *Halidamia affinis* (130), *Periclista stannardi* (131), *P. entella* (132), and *P. marginicollis* (133); serrulae and apex of lancet of *Blennogeneris coloradensis* (134), *B. gittinsi* (135), and *B. spissipes* (136); serrulae of *Lycaota bouquetensis* (137), *L. janetae* (138), *L. sodalis* (139), *Tomostethus multicinctus* (140), *Tethida cordigera* (141), and *Phymatocera fumipennis* (142).



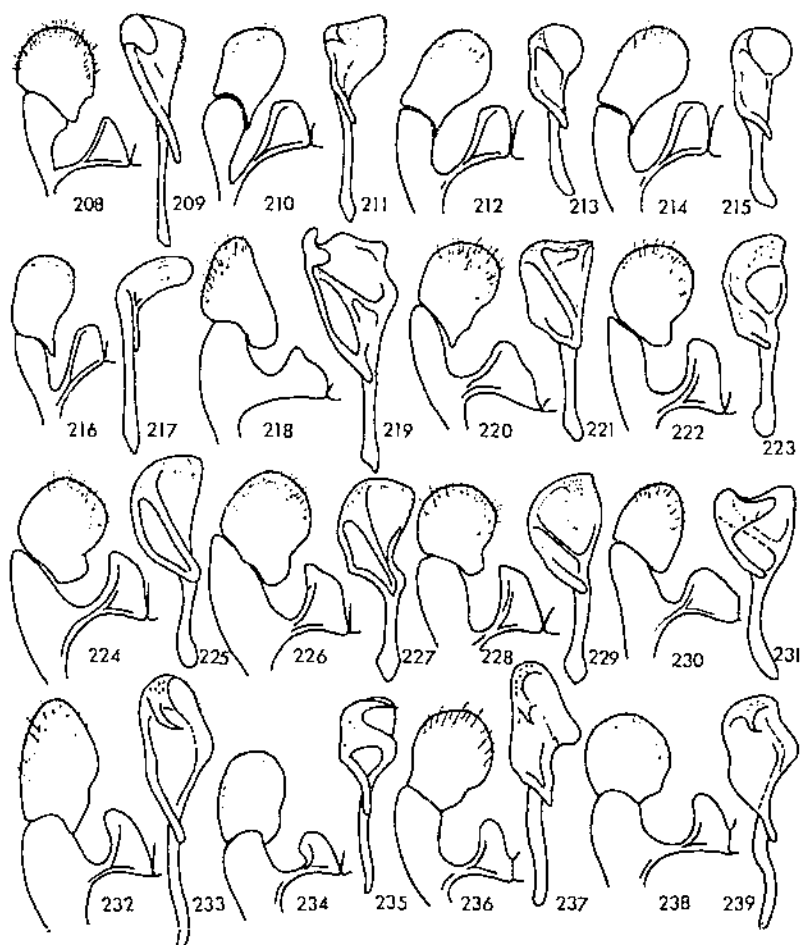
Lancet, central segments, of *Phymatocera offensa* (143) and *P. similata* (144); lancet (145) and serrulae, central (146), of *Phymatocera racemosae*; serrulae, central, of *Phymatocera smilacinae* (147); lancet (148) and serrulae, central (149), of *Paracharactus rudis*; serrulae, central, of *Paracharactus niger* (150), *Rhadinoceraea brysonensis* (151), and *R. clenidium* (152); serrulae, central and apical, of *Rhadinoceraea nigra* (153); serrulae, central, of *Rhadinoceraea utahensis* (154), *R. aldrichi* (155), and *R. insularis* (156); serrulae, central and apical, of *Rhadinoceraea jacintensis* (157) and *R. nubilipennis* (158).



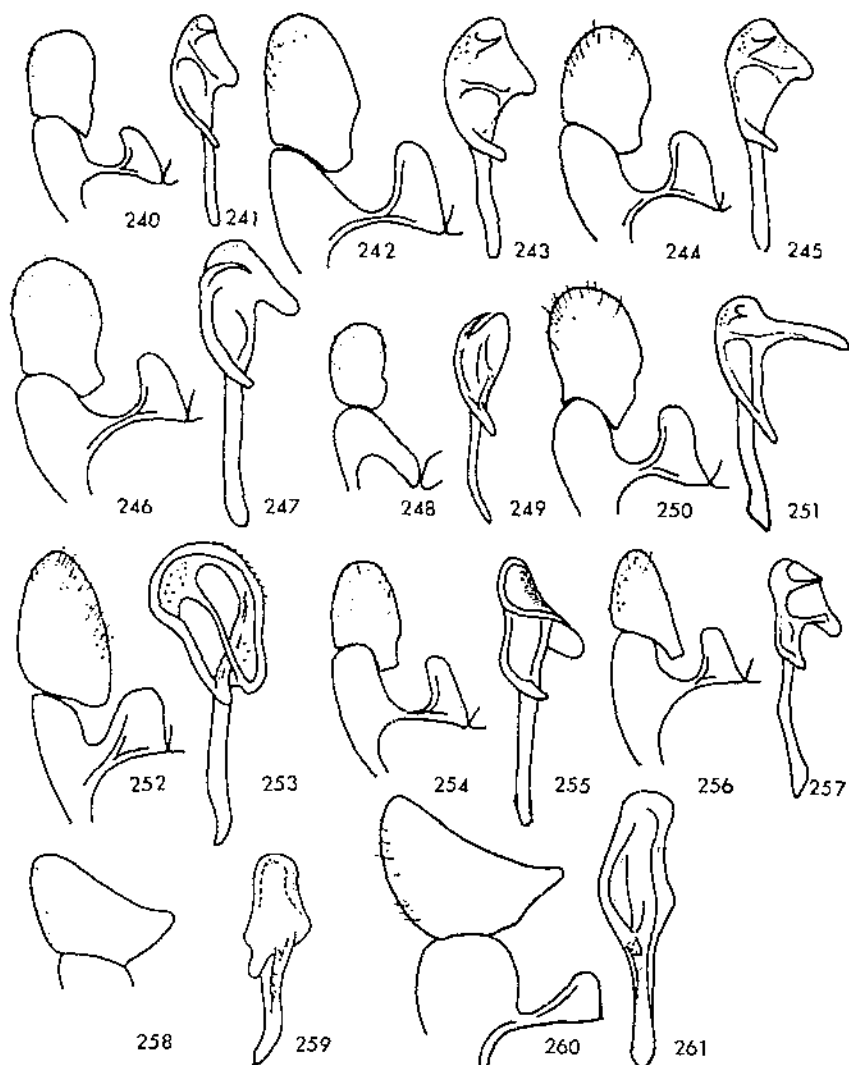
Serrulae, central and apical, of *Lagonis nevadensis* (159); serrulae, central, of *Monophadnus aequalis* (160) and *M. assaracus* (161); serrulae, central and apical, of *Monophadnus bakeri* (162), *M. californicus* (163), *M. contortus* (164), *M. luttini* (165), *M. pallescens* (166), and *Stethomostus fuliginosus* (167); serrulae, central, of *Eutomostethus ephippium* (168); serrulae, central and apical, of *Eutomostethus luteiventris* (169); serrulae, central, of *Ardis atrata* (170), *A. brunniventris* (171), *Apareophora dyari* (172), *A. rossi* (173), and *Monardis pulla* (174); serrulae, central and apical, of *Eupareophora parca* (175), *Ceratulus spectabilis* (176), and *Erythraspides carbonarius* (177); serrulae, central, of *Erythraspides vitis* (178) and *Halidamia affinis* (179).



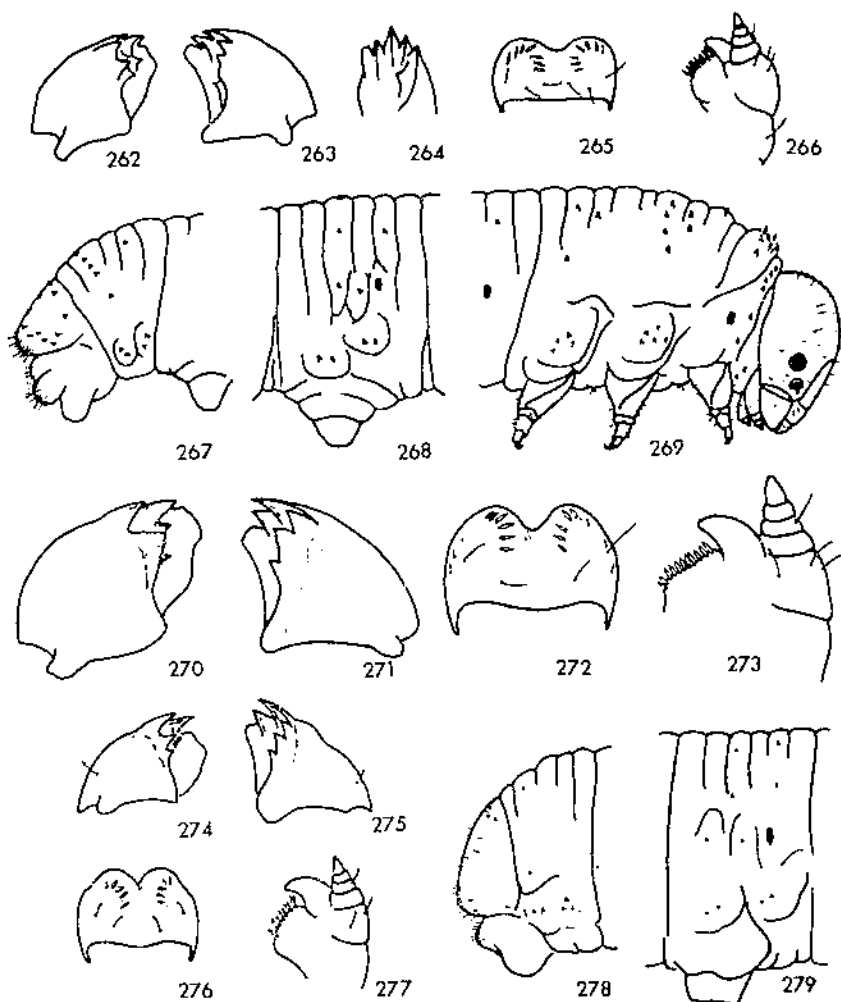
Serrulae, central, of *Waldheimia bedae* (180), *Monophadnoides atratus* (181), *M. conspicuatus* (182), *M. geniculatus* (183), *M. pauper* (184), *M. typicus* (185), *M. quebecensis* (186), and *M. osgoodi* (187); harpe and parapenis (188) and penis valve (189) of *Blennogeneris spissipes*; harpe and parapenis (190) and penis valve (191) of *Lycaota sodalis*; harpe and parapenis (192) and penis valve (193) of *Lycaota janetae*; harpe and parapenis (194) and penis valve (195) of *Tomostethus multicinctus*; harpe and parapenis (196) and penis valve (197) of *Tethida cordigera*; harpe and parapenis (198) and penis valve (199) of *Phymatocera fumipennis*; harpe and parapenis (200) and penis valve (201) of *Phymatocera similata*; harpe and parapenis (202) and penis valve (203) of *Paracharactus montivagus*; harpe and parapenis (204) and penis valve (205) of *Paracharactus rudis*; harpe and parapenis (206) and penis valve (207) of *Rhadinoceraea nigra*.



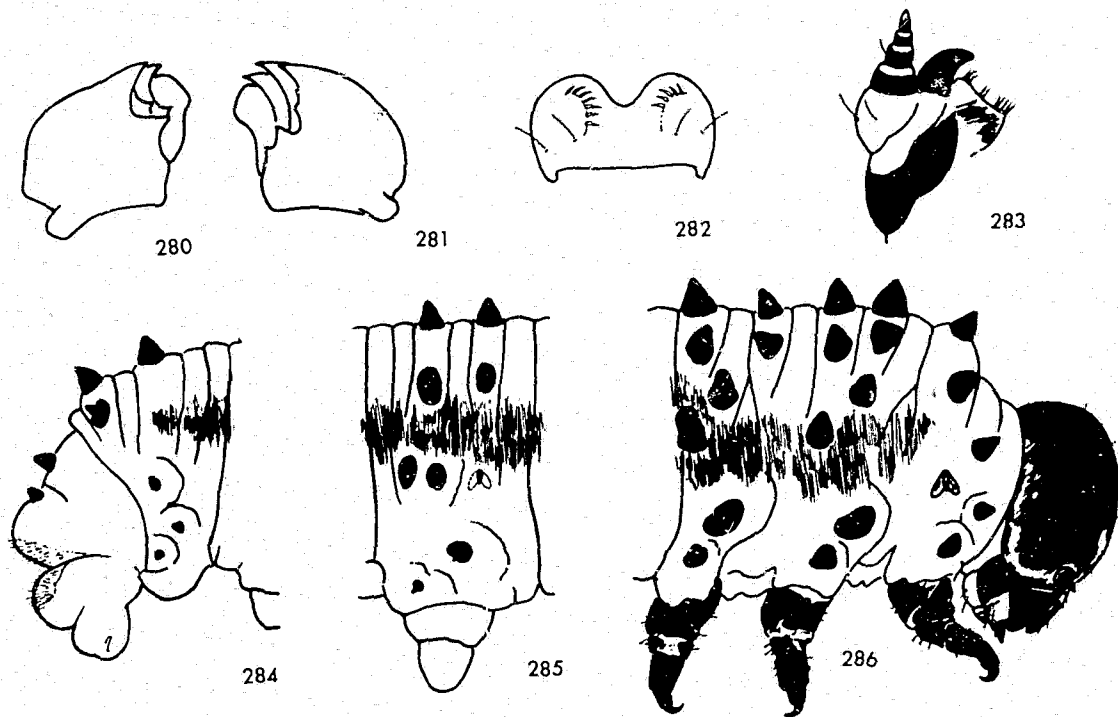
Harpe and parapenis (208) and penis valve (209) of *Rhadinoceraea utahensis*; harpe and parapenis (210) and penis valve (211) of *Rhadinoceraea aldrichi*; harpe and parapenis (212) and penis valve (213) of *Rhadinoceraea insularis*; harpe and parapenis (214) and penis valve (215) of *Rhadinoceraea jucintensis*; harpe and parapenis (216) and penis valve (217) of *Rhadinoceraea nubilipennis*; harpe and parapenis (218) and penis valve (219) of *Lagonis nevadensis*; harpe and parapenis (220) and penis valve (221) of *Monophadnus aequalis*; harpe and parapenis (222) and penis valve (223) of *Monophadnus assaracus*; harpe and parapenis (224) and penis valve (225) of *Monophadnus californicus*; harpe and parapenis (226) and penis valve (227) of *Monophadnus contortus*; harpe and parapenis (228) and penis valve (229) of *Monophadnus lattini*; harpe and parapenis (230) and penis valve (231) of *Stethomostus fuliginosus*; harpe and parapenis (232) and penis valve (233) of *Ardis atrata*; harpe and parapenis (234) and penis valve (235) of *Ardis brunneiventris*; harpe and parapenis (236) and penis valve (237) of *Apareophora dyuri*; harpe and parapenis (238) and penis valve (239) of *Apareophora rossi*.



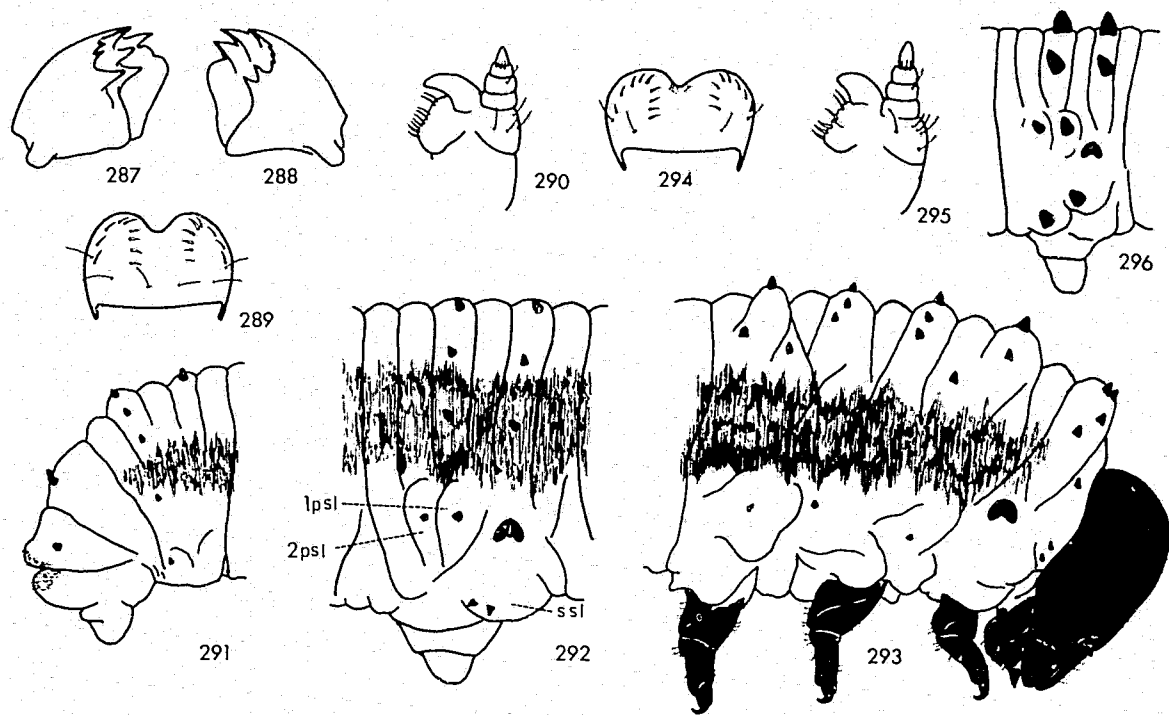
Harpe and parapenis (240) and penis valve (241) of *Eupareophora parca*; harpe and parapenis (242) and penis valve (243) of *Monophadnoides atratus*; harpe and parapenis (244) and penis valve (245) of *Monophadnoides pauper*; harpe and parapenis (246) and penis valve (247) of *Monophadnoides geniculatus*; harpe and parapenis (248) and penis valve (249) of *Halidumia affinis*; harpe and parapenis (250) and penis valve (251) of *Monophadnoides typicus*; harpe and parapenis (252) and penis valve (253) of *Ceratulus spectabilis*; harpe and parapenis (254) and penis valve (255) of *Erythraspides carbonarius*; harpe and parapenis (256) and penis valve (257) of *Erythraspides vitis*; harpe (258) and penis valve (259) of *Periclista marginicollis*; harpe and parapenis (260) and penis valve (261) of *Periclista diluta*.



Blennogeneris spissipes larva: Right mandible, ventral (262); left mandible, ventral (263) and interior (264); epipharynx (265); maxilla, dorsal (266); ninth and tenth (267) and third (268) abdominal segments; head and thorax (269). *Tethida cordigera* larva: Right (270) and left (271) mandibles, ventral; epipharynx (272); maxilla, dorsal (273). *Tomostethus multicinctus* larva: Right (274) and left (275) mandibles, ventral; epipharynx (276); maxilla, dorsal (277); ninth and tenth (278) and third (279) abdominal segments.

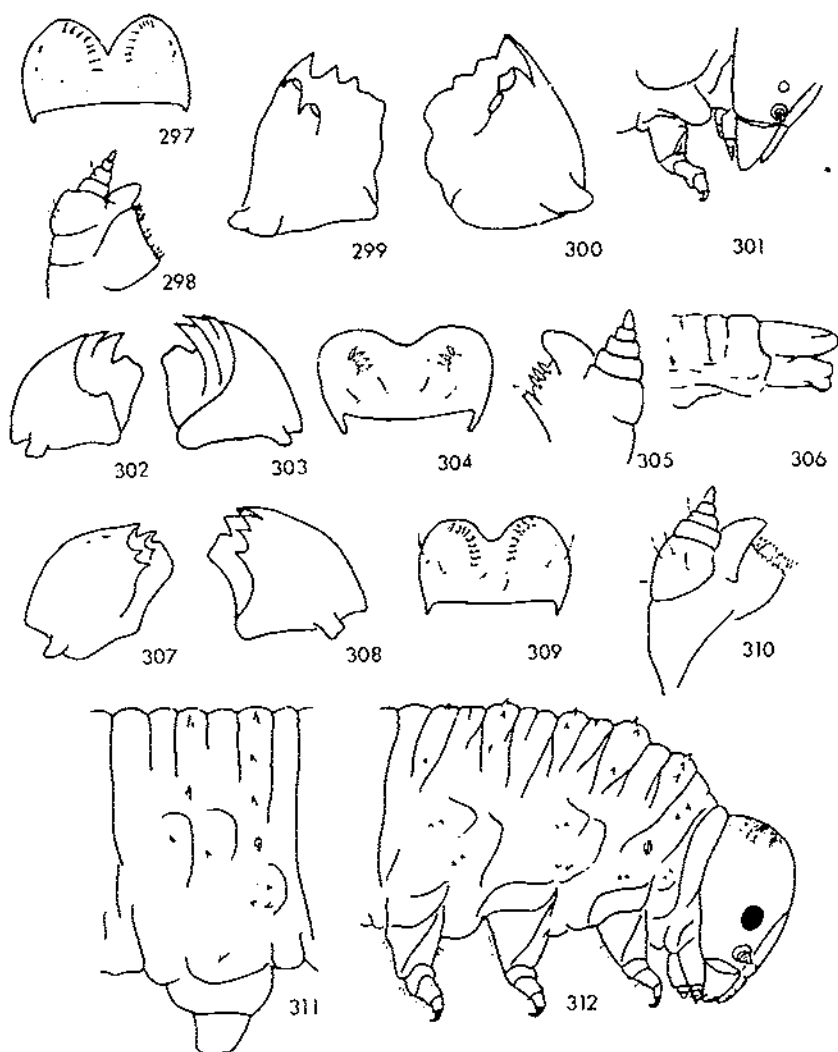


Phymatocera sp. larva: Right (280) and left (281) mandibles, ventral; epipharynx (282); maxilla, dorsal (283); ninth and tenth (284) and third (285) abdominal segments; head and thorax (286).

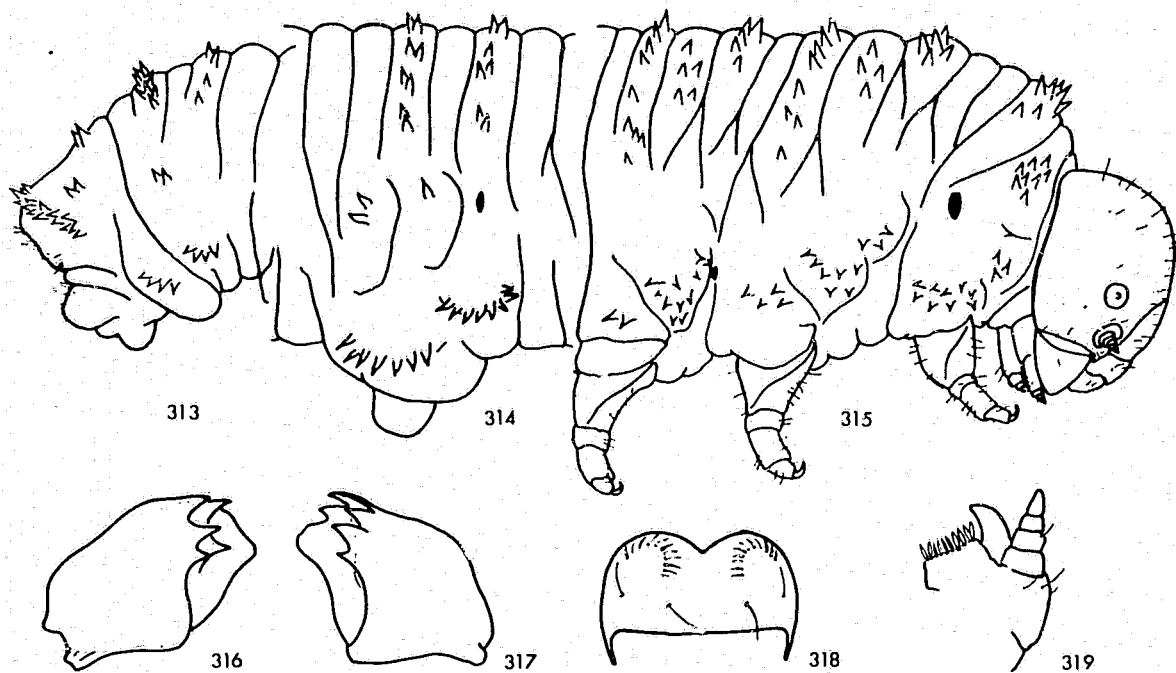


Rhadinoceraea aldrichi larva: Right (287) and left (288) mandibles, ventral; epipharynx (289); maxilla, dorsal (290); ninth and 10th (291) and third (292) abdominal segments; head and thorax (293). *Rhadinoceraea nubilipennis* larva: Epipharynx (294); maxilla, dorsal (295); third abdominal segment (296). [1psl, 2psl=first and second postspiracular lobes; ssl=subspiracular lobe.]

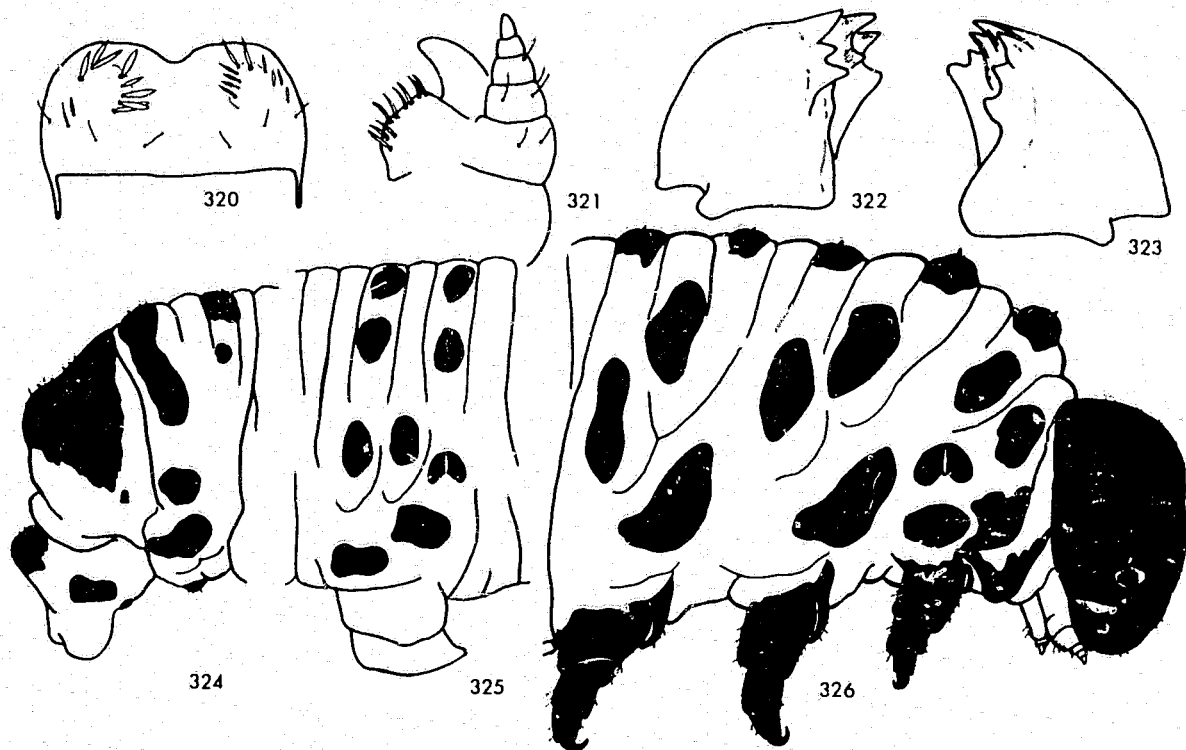
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NEARCTIC SAWFLIES I: BLENNOCAMPINAE ADULTS AND LARVAE CHYMENOPTERA
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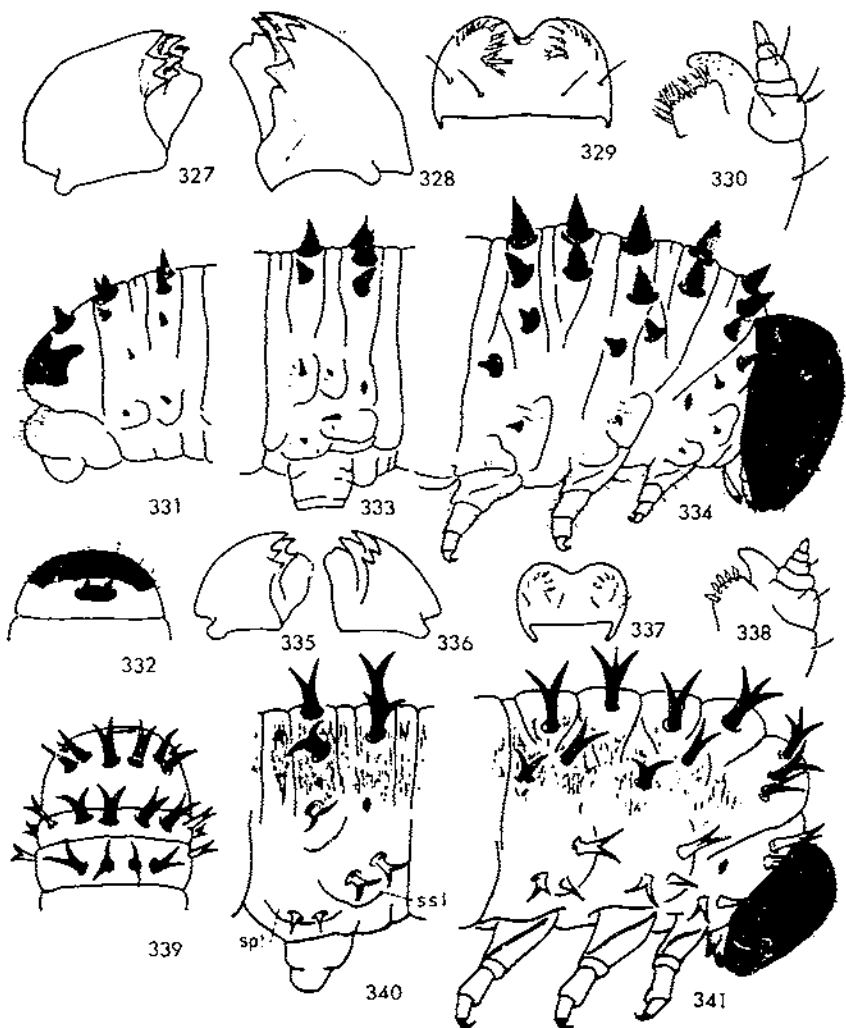
Paracharactus niger larva: Epipharynx (297); maxilla, dorsal (298); right (299) and left (300) mandibles, ventral (mandibles worn); prothoracic leg area (301). *Ardis brunniventris* larva: Right (302) and left (303) mandibles, ventral; epipharynx (304); maxilla, dorsal (305); eighth, ninth, and tenth abdominal segments, lateral (306). *Monophadnus aequalis* larva: Right (307) and left (308) mandibles, ventral; epipharynx (309); maxilla, dorsal (310); third abdominal segment (311); head and thorax (312).



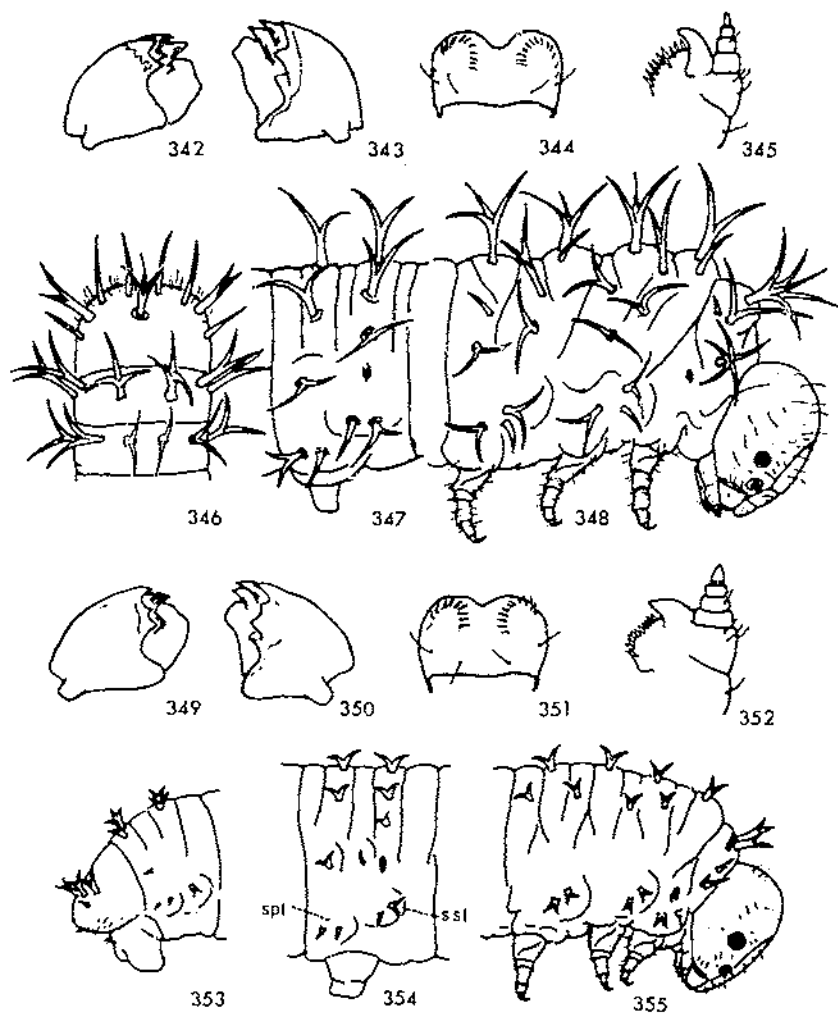
Lagonia nevadensis larva: Ninth and 10th (313) and third (314) abdominal segments; head and thorax (315); right (316) and left (317) mandibles, ventral; epipharynx (318); maxilla, dorsal (319).



Ceratulus spectabilis larva: Epipharynx (320); maxilla, dorsal (321); right (322) and left (323) mandibles, ventral; ninth and 10th (324) and third (325) abdominal segments; head and thorax (326).



Erythraspides vitis larva: Right (327) and left (328) mandibles, ventral; epipharynx (329); maxilla, dorsal (330); ninth and 10th abdominal segments (331); 10th abdominal segment, dorsal (332); third abdominal segment (333); head and thorax (334). *Eupareophora parca* larva: Right (335) and left (336) mandibles, ventral; epipharynx (337); maxilla, dorsal (338); ninth and 10th abdominal segments, dorsal (339); third abdominal segment (340); head and thorax (341). [spl=surpedal lobe; ssl=subspiracular lobe.]



Monophadnoides geniculatus larva: Right (342) and left (343) mandibles, ventral; epipharynx (344); maxilla, dorsal (345); ninth and tenth abdominal segments, dorsal (346); third abdominal segment (347); head and thorax (348). *Pericliata marginicollis* larva: Right (349) and left (350) mandibles, ventral; epipharynx (351); maxilla, dorsal (352); ninth and tenth (353) and third (354) abdominal segments; head and thorax (355). [spl=surpedal lobe; ssl=subspiracular lobe.]

END