

A synopsis of the sawflies (Hymenoptera: Symphyta) of America south of the United States: introduction, Xyelidae, Pamphiliidae, Cimbicidae, Diprionidae, Xiphydriidae, Siricidae, Orussidae, Cephidae

DAVID R. SMITH Systematic Entomology Laboratory, BBH, Agricultural Research Service, U.S. Department of Agriculture, c/o National Museum of Natural History, Washington, D.C.

ABSTRACT. Eight families of Symphyta for the Western Hemisphere south of the United States are reviewed: Xyelidae (one genus, two species), Pamphiliidae (one genus, four species), Cimbicidae (five genera, nine species), Diprionidae (three genera, thirteen species), Xiphydriidae (four genera, seventeen species), Siricidae (six genera, nine species), Orussidae (five genera, twelve species), and Cephidae (one genus, one species). New taxa are *Acantholyda nigrostigmata* (Pamphiliidae); *Zadiprion falsus*, *Neodiprion bicolor*, *N. equalis*, *N. omosus* (Diprionidae); *Derecyrtia circularis*, *Steirocephala lateralba* (Xiphydriidae); *Sirotremex*, *S. flammus* (Siricidae); and *Ophrynopus depressatus*, *O. platmanni* (Orussidae). *Lopesiana* is a new name for *Lopesia* Conde (Cimbicidae). Three new combinations and six new synonyms are proposed. The Xyelidae, Pamphiliidae, Diprionidae, Siricidae and Cephidae are primarily northern groups with southern extensions into Mexico, Central America and/or Cuba. The Cimbicidae, Xiphydriidae and Orussidae are more generally distributed throughout the neotropics. Keys to families, genera and species are provided.

Introduction

The suborder Symphyta, commonly known as sawflies and horntails, occurs throughout the Neotropical Region, here intended to mean all areas of the Western Hemisphere south of the United States. The border of the United States and Mexico is arbitrarily chosen so that this paper will complement other sawfly studies and catalogues of the sawflies of North America north of Mexico. All sawflies are plant feeders in the larval stage, except those of Orussidae, and

many are or are of potential economic importance. Hosts include: a large number of plants, including forest and ornamental trees, shrubs, and agricultural crops. This paper includes the introduction and the smaller families; the families Pergidae, Argidae and Tenthredinidae will be treated separately.

The neotropical sawfly fauna is not as well known as the nearctic fauna or that of some other regions of the world even though the total number of species occurring there approximates or surpasses the number in the Nearctic Region. Sawflies are less commonly collected in the neotropics and are not found in numbers as they are in subarctic and temperate North America.

Correspondence: Dr David R. Smith, Systematic Entomology Laboratory, c/o U.S. National Museum NHB 168, Washington, D.C., 20560, U.S.A.

Many more species are known from only one or several specimens, and many have not been studied since they were described 80 or more years ago. Even though a number of authors have worked on the neotropical fauna, the work has been haphazard, many of the contributions consisting of descriptions of species in certain collections or results of certain expeditions to Mexico, Central or South America. The information and descriptions are widely scattered, mostly in European and North and South American journals, and specimens available for study are even more widely dispersed in numerous collections. No one has attempted to consolidate all the available information, or make a thorough study of a large accumulation of specimens and make available a classification that will allow generic and specific identifications. I hope this paper will fill the need for a comprehensive, basic treatment. Because of the difficulties involved in seeing types and the time required for their study, I cannot give keys to many species. Revisions of certain genera or higher groups are research projects in themselves. Keys to all families, subfamilies and genera, however, are included, including catalogue sections listing the species (with known information and references) in their proper genus. This is an attempt to accumulate and synthesize all old and new information concerning the neotropical fauna and present the results in a single basic work.

History. The first sawfly described from the neotropics was *Tenthredo americana* by Linnaeus in 1758 and is now known as *Incalia americana* (Pergidae: Syzygoniinae). DeGeer (1773), Fabricius (1793, 1804), Lepeletier (1823) and Lepeletier & Serville (1828) added several species, but Klug (1808-34) was the first to treat a large number of species. In his last paper (1834), Klug described a large number of Argidae. Subsequently, in the middle of the nineteenth century, a few taxa were described by Spinola (1840, 1851a, b), Guérin (1844), Brullé (1846) Westwood (1835, 1874), Costa (1864), Holmgren (1868) and Philippi (1871, 1873), but during the latter part of the century the interest in the fauna increased. The major contributors were Norton (1867-72), Kirby (1882-89) and Cameron (1882-1911). Norton treated mostly Mexican species, and Cameron's major work was the Symphyta section of the *Biologia Centrali-Americana* (1883). Many other authors

have contributed to the knowledge of neotropical sawflies through the turn of the century to the present, though studies were limited to specimens present in their respective collections or were reports of results of certain expeditions to South America. More notable among these were papers by Mocsáry (1909), Jörgensen (1913), Enderlein (1919, 1920) and Forsius (1925). The two most prominent workers were Konow and Malaise; more than half the known taxa are results of their work. Konow published many papers from 1885 to 1908 in which he described numerous species in almost all the families from all parts of the neotropics. Malaise worked from 1935 to 1964 on many groups of sawflies and also worked toward a classification refining much of the previous work, thus accounting for many of the genera. In addition, he presented several valuable keys, especially keys to many of the genera of Selandriinae (Tenthredinidae) (1942, 1954, 1963), to species of *Waldheimia* and *Probleta* (Tenthredinidae) (1949), *Atomacera* (Argidae) (1942), and to a number of other smaller genera. Malaise's work was the most significant and useful study on the sawfly fauna of this region.

Habits. All Symphyta, except the Orussidae which are parasitic on other wood-boring insects, are plant feeders in the larval stage. The larvae may feed externally on the foliage of the host, mine leaves, bore in stems or twigs, form stem, leaf, petiole, or bud galls, bore in fruit, or bore in wood. Hosts are known for only a small percentage of species in the neotropics, and there are only a few complete biological studies. One of the earliest was that of Curtis (1844), who described the social habits of *Dielocerus formosus* (Klug) (Argidae). Other publications with biological information include those by Pyenson (1940) for species on guava; Wille (1943) for species on potato; Alvarado (1938, 1939), Hernández (1930), Lara & Ortiz (1969) and Olmedo (1932) for species on conifers; Janvier (1933) for a species imported from Chile to New Zealand for biological control of *Acaena*; Azevedo Marques (1933) on *Perreyia lepida* Brullé (Pergidae); Costa Lima (1927) on *Dielocerus formosus*; Dias (1975, 1976) on *Themos olfersii* (Klug) and *Dielocerus diasi* Smith (Argidae); and Kimsey & Smith (1985) on some species from Panama. A number of authors have presented information concerning *Caliroa cerasi* (L.) (Tenthredinidae), an intro-

duced pest of pear and other rosaceous plants. All host, biological and larval information will be given under the respective species. A host index will be included after the last part.

Relationships. Most genera and species of sawflies in the neotropics are endemic, but relationships with other faunal elements of the world are apparent. Nearctic elements, such as the conifer-associated forms of Xyelidae, Pamphiliidae, Diprionidae and Siricidae extend south into Mexico and Central America. Some groups found in southern South America are more clearly related to North American and palearctic forms than to other South American groups: the tenthredinid genera *Notofenusia* and *Periclista* of Chile and southern Argentina, *Brasinusa* of southern Brazil and Argentina, *Pristiphora* of southern Brazil, and *Nematus* of Argentina are found in or have counterparts in the temperate regions of North America and Eurasia. Genera such as *Acordulecera* (Pergidae) and *Atomacera*, *Sphacophilus* and *Schizocerella* (Argidae) are widespread in the neotropics but have representatives extending as far north as southern Canada. Relationships with the Australian fauna are most evident in the families Pergidae, Xiphodriidae and Orussidae. Three subfamilies of Pergidae, Philomastiginae, Pergulinae and Perreyiinae, have representatives in South America, Australia and New Guinea; the subfamily Derecyrtinae of the Xiphodriidae is found in Australia and South America, and one genus of Orussidae, *Guiglia*, is found in Chile, Australia and New Zealand. The genera *Probleta* and *Protoprobleta* (Tenthredinidae) and *Scobina* (Argidae) show some similarities to the Ethiopian genus *Xenapates* and African representatives of *Arge*, respectively. The tribe Leptorussini (Orussidae) has related genera in Australia, Chile and Africa. Sawflies are scarce in the West Indies, but those present in Cuba are more similar to the nearctic fauna, whereas those found on other islands (Puerto Rico, Hispaniola, Virgin Islands, Grenada, Dominica) belong to groups that are predominant in Central and South America.

Format

Keys to families, subfamilies, genera, and in some instances species, are given including descriptions and discussions of each. Within

each genus a catalogue section is presented listing the species included together with all known references to and any additional notes, hosts or biological information about the species. This section is arranged as follows:

Species name, Author. Distribution.

*Original combination, author, year, reference, sex or sexes described, 'quote from original description of type locality or localities' (location of type, sex of type) - additional references under this combination.

Synonymy and/or different combinations and any additional references using same combination.

Host plants.

Any remarks pertinent to the species.

Many entries will not have all of this information. If pertinent, new combinations or new species will be inserted between the author and distribution. The distributions are given by country, and states, provinces or territories are added in parentheses, especially for the larger countries. An asterisk (*) in front of the original combination indicates that I have examined the type. I have not been able to verify the location of all the types, so in some cases I have given the place where the type may be or where the author stated it to be; occasionally this is left blank. Host plants are reported by the name used in the literature; a citation 'host a, b', etc., is given in parentheses after the citation in which that host appears. The remarks are my own comments, many times concerning necessary lectotype designations.

All literature to neotropical taxa are given. Some genera such as *Nematus*, *Empria*, *Xyela*, *Caliroa*, and some in the Siricidae, are not treated fully because they are predominately nearctic taxa, may involve numerous references, and are treated more completely elsewhere; references are given concerning additional information. I have attempted to place all species in their proper genus according to this study, but this is a difficult task because the original literature does not contain the necessary information currently used to separate taxa and because types are located in widely scattered museums. Those I could not place are put in an 'unplaced taxa' category at the end of certain groups.

Location of types or other references to collections in which specimens are found are indicated by a place name or name of a personal

collection. These are as follows: Ames: Iowa State University, Ames, Iowa, U.S.A.; Basel: Naturhistorisches Museum, Basel, Switzerland; Belém: Instituto Nacional de Pesquisas da Amazônia, Museu Paraense Emílio Goeldi, Belém, Pará, Brasil; Berkeley: University of California, Berkeley, California, U.S.A.; Berlin: Museum für Naturkunde der Humboldt-Universität zu Berlin, Deutsche Demokratische Republik; Brasília: Universidade de Brasília, D.F., Brasil; Brasília, IBGE: Coleção Zoológica da Reserva Ecológica, Instituto Brasileiro de Geografia e Estatística, Divisão de Ecologia Animal, Brasília, D.F., Brasil; Bruxelles: Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium; Budapest: Természettudományi, Museum Allattára, Budapest, Hungary; Buenos Aires: Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; Cambridge: Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.; Campinas: Instituto Agronômico, Campinas, São Paulo, Brasil; Canberra: Commonwealth Scientific and Industrial Research Organization; Australia (ex Macleay Museum, Sydney, indicates specimens are on loan to the CSIRO); Champaign: Illinois State Natural History Survey, Champaign, Illinois, U.S.A.; Chapingo: Instituto Nacional de Investigaciones Agrícolas, Chapingo, Mexico; Chicago: Field Museum of Natural History, Chicago, Illinois, U.S.A.; Fabricius Coll: Collection Fabricius, Universitets Zoologiske Museum, Copenhagen, Denmark; Townes Coll.: H. and M.² Townes, American Entomological Institute, Gainesville, Florida, U.S.A.; College Station: Texas A. & M. University, College Station, Texas, U.S.A.; Columbus: Ohio State University, Columbus, Ohio, U.S.A.; Concepcion: Universidad de Concepcion, Concepcion, Chile; Corvallis: Oregon State University, Corvallis, Oregon, U.S.A.; Curitiba: Universidade Federal do Paraná, Curitiba, Paraná, Brasil; Davis: University of California, Davis, California, U.S.A.; Eberswalde: Institute für Pflanzenschutzforschung Kleinmachnow, Abteilung Taxonomie der Insekten, Eberswalde, Deutsche Demokratische Republik; East Lansing: Michigan State University, East Lansing, Michigan, U.S.A.; Fritz Coll.: Manfredo A. Fritz, Salta, Argentina; Gainesville: Florida Department of Agriculture, Florida State Col-

lection of Arthropods, Gainesville, Florida, U.S.A.; Genève: Muséum d'Histoire Naturelle, Genève, Switzerland; Hamburg: Zoologisches Museum, Bundesrepublik Deutschland; Honolulu: Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.; Ithaca: Cornell University, Ithaca, New York, U.S.A.; La Plata: Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, Argentina; Lawrence: University of Kansas, Lawrence, Kansas, U.S.A.; Leningrad: Zoological Institute, Academy of Sciences of the U.S.S.R., Leningrad, U.S.S.R.; Linn. Soc. London: Linnean Society of London, U.K.; Logan: Utah State University, Logan, Utah, U.S.A.; London: British Museum (Natural History), London, U.K.; Los Angeles: Los Angeles County Museum of Natural History, Los Angeles, California, U.S.A.; Madrid: Instituto Español de Entomología, Madrid, Spain; Manaus: Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brasil; Maracay: Universidad Central de Venezuela, Instituto de Zoología Agrícola, Maracay, Venezuela; München: Zoologische Staatssammlung, Entomologische Abteilung, Bundesrepublik Deutschland; Napoli: Istituto Museo di Zoologica della Università di Napoli, Italy; New Haven: Peabody Museum of Natural History, Yale University, New Haven, Connecticut, U.S.A.; New York: American Museum of Natural History, New York, New York, U.S.A.; Onore Coll.: Fr. Giovanni Onore, Pontificia Universidad Católica del Ecuador, Quito, Ecuador; Ottawa: Biosystematics Research Institute, Agriculture Canada, Ottawa, Ontario, Canada (Canadian National Collection); Oxford: Hope Entomological Collections, University Museum, Oxford, U.K.; Pagliano Coll.: Guido Pagliano, Istituto di Entomologia Agraria e Apicoltura, Università, Torino, Italy; Paris: Muséum National d'Histoire Naturelle, Paris, France; Philadelphia: Academy of Natural Sciences, Philadelphia, Pennsylvania, U.S.A.; Pittsburgh: Carnegie Museum, Pittsburgh, Pennsylvania, U.S.A.; Rio de Janeiro: Ministério da Educação e Cultura, Universidade Federal Rural do Rio de Janeiro, Brasil; Rio de Janeiro, OC: Ministério da Saúde, Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brasil; Riverside: University of California, Riverside, California, U.S.A.; St Foy: Université Laval, Ste-Foy, Québec, Canada; San Francisco:

California Academy of Sciences, San Francisco, California, U.S.A.; Santiago: Universidad de Chile, Santiago, Chile; São Paulo: Museu de Zoologia da Universidade de São Paulo, Brasil; Stockholm: Naturhistoriska Riksmuseet, Stockholm, Sweden; Torino: Museo ed Istituto de Zoologia, Sistematica della Università di Torino, Italy; Tucumán: Universidad Nacional de Tucumán, Fundación-Instituto Miguel Lillo, Tucumán, Argentina; Valdivia: Universidad Austral de Chile, Departamento de Silvicultura, Valdivia, Chile; Versailles: Station Centrale de Zoologie, CNRA, Versailles, France; Warszawa: Polska Akademia Nauk, Instytut Zoologii, Warszawa, Poland; Washington: National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.

A number of workers have contributed to the knowledge of neotropical sawflies, and it is important for future researchers to know where their specimens are deposited. Though location of types is given for most species, the depositories and some associated information regarding the collections of most contributors are as follows: Ashmead: types in Washington; one in San Francisco; Benson: many types are in London except where noted (see Quinlan, 1974 for taxa described by Benson); Brèthes: some are at Buenos Aires – those described in 1927 are at Eberswalde; Brullé: types at Paris; du Buysson: types at Paris; Cameron: types at London, except a few, where noted, at Genève; Conde: for those described with Benson, see Quinlan (1974) a few other types are at São Paulo; some I have not been able to locate; Conde worked in Riga, Latvia; Costa: types at Napoli; Cresson: types at Philadelphia; see Cresson (1916) for list of Cresson types at Philadelphia and Smith (1971b) for neotropical species described by Cresson; Enderlein: types at Warszawa; some could not be located; Forsius: types of species described from South America (1925) are at Stockholm; Jörgensen: types at La Plata; Kirby: types at London; Klug: types at Berlin; Konow: most types are at Eberswalde, see Oehlke & Wudowenz (1984) for list of types at Eberswalde; a few, where noted, are at Bruxelles, Madrid, Budapest, Buenos Aires, and Stockholm; Mallach: types at Berlin; Mocsáry: types at Budapest; Norton: types at Philadelphia and Genève (see Cresson, 1928, for list of types at Philadelphia and Smith, 1971b, for neotropi-

cal species described by Norton); Perty: types of those species described in *Delectus animalium articulorum . . . Brasiliam* (1830–34) are at München; Philippi: types of Xiphydriidae are at Ithaca [According to L. L. Pechuman (personal correspondence), when Bradley 'was in Santiago on this trip (Cornell Expedition to South America in 1919–1920) the person in charge of the insect collection told him they were not properly funded to look after the collection and suggested that the types be removed to Cornell. Bradley didn't feel this was the right thing to do but was persuaded to take with him types in some groups in which he was especially interested.']; Rohwer: types at Washington, a few are at Berlin; Schrottky: types of species described from the Jörgensen collection are at La Plata. [According to Malaise (1939) 'All the types of Schrottky have been destroyed in a civil war'; this may apply to those not in the Jörgensen collection.]; Smith, D.R.: many types at Washington; location of types always given after descriptions; Smith, F.: types at London; Spinola: some types at Torino, other may be at Paris; concerning those at Torino, M. Zunino (personal correspondence) stated that the name labels are present for some species, but the specimens are missing; Strand: types at Paris; Westwood: types at Oxford or London; some have not been located.

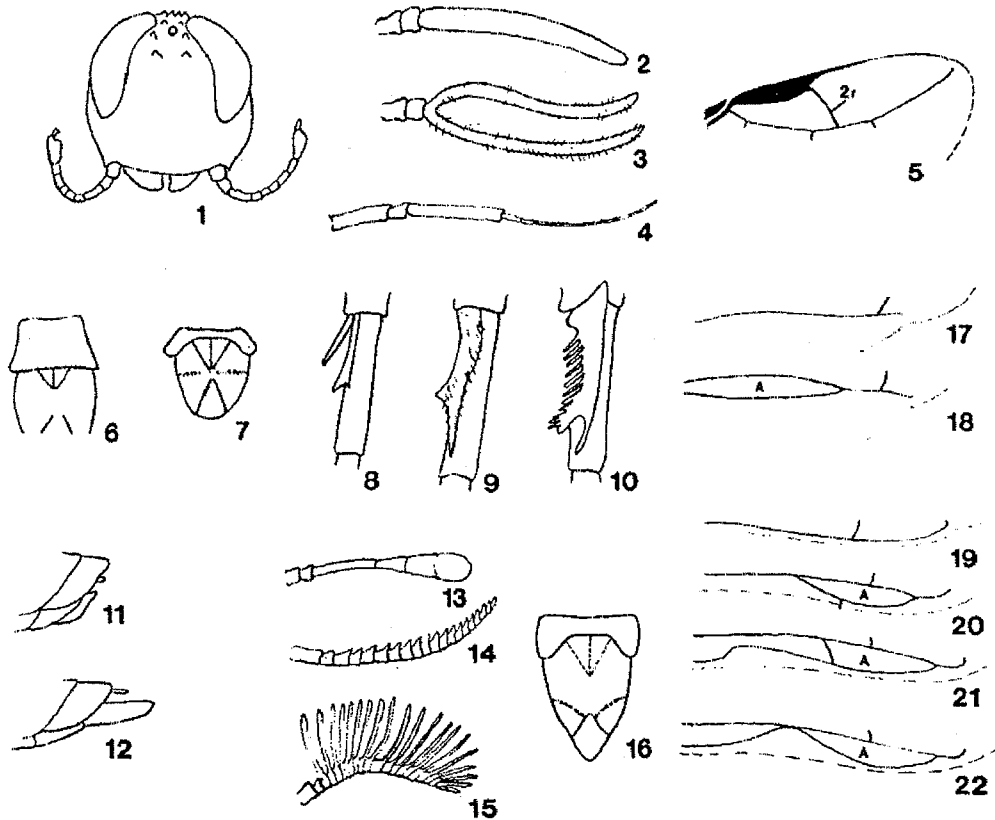
I have examined over 15,000 specimens of Symphyta for this study, and I am very grateful to those mentioned in the acknowledgments for their time and efforts in sending specimens and/or other information of value.

The terminology is largely based on Ross (1937). Significant terms for distinguishing taxa are referred to in the illustrations.

Key to Families of Symphyta of the Western Hemisphere

- 1 Antenna inserted on ventral side of head, below lower margin of eyes and below apparent clypeus (Fig. 1); widespread. Orussidae
- Antenna inserted on anterior aspect of head, above clypeus and between eyes. 2
- 2 Antennal flagellum with a single, long segment, this segment bifurcate in some males (Figs. 2, 3); widespread. Argidae
- Antennal flagellum with 3 or more segments . . . 3

- 3 Antennal flagellum with first segment long, stout, surmounted by a slender filament composed of 9-25 segments (Fig. 4); North America to Mexico
Xyelidae
- Antennal flagellum without such a filament 4
- 4 Forewing with a radial crossvein (2r, Fig. 5) 5
- Forewing without a radial crossvein (Fig. 82) 11
- 5 Posterior margin of pronotum almost straight, at most slightly sinuate (Fig. 6) 6
- Posterior margin of pronotum distinctly emarginated (Fig. 7) 8
- 6 Foretibia with 2 apical spurs (Fig. 8); female ovipositor short, not extending beyond apex of abdomen (Fig. 11); somewhat dorsoventrally flattened; North America to Mexico . . . Pamphiliidae
- Foretibia with 1 apical spur (Figs. 9, 10); female ovipositor long, extending beyond apex of abdomen (Fig. 12); body cylindrical 7
- 7 Apical spur of foretibia with inner margin simple (Fig. 9); cenchri absent; abdomen slightly constricted at base; pedicel shorter than length of first flagellar segment; North America to Mexico
Cephididae
- Apical spur of foretibia with inner margin serrate (Fig. 10); cenchri present; abdomen not constricted at base; pedicel subequal in length to first flagellar segment; western United States
Anaxyelidae
- 8 Antenna capitate, 5-6 segmented (Fig. 13); abdomen usually carinate on ventrolateral sides; usually large and robust (foretibia with 2 apical spines); widespread Cimbicidae



FIGS. 1-22. Characters used in key to families. 1, Head of Orussidae, front view. 2, Female antenna, Argidae. 3, Male antenna, Argidae. 4, Antenna, Xyelidae. 5, Anteroapical region of forewing showing crossvein 2r. 6, Dorsum of thorax, Cephidae. 7, Dorsum of thorax, Xiphydriidae. 8, Apical spurs of fore tibia, Diprionidae. 9, Apical spur of fore tibia, Cephidae. 10, Apical spur of fore tibia, Anaxyelidae. 11, Apex of abdomen and sheath, Pamphiliidae. 12, Apex of abdomen and sheath, Xiphydriidae. 13, Antenna, Cimbicidae. 14, Female antenna, Diprionidae. 15, Male antenna, Diprionidae. 16, Dorsum of thorax, Siricidae. 17, Absence of anal cell of hindwing. 18, Presence of anal cell of hindwing. 19, Absence of anal cell of forewing. 20-22, Presence of anal cell of forewing, different types.

- Antenna filiform, occasionally slightly serrate or subclavate, 7 or more segmented (Figs. 14, 15); abdomen not carinate on sides; usually slender and more cylindrical 9
- 9 Foretibia with 2 apical spurs (Fig. 8); antenna 7-12 segmented, most commonly 9-segmented; widespread Tenthredinidae (in part)
- Foretibia with 1 or 2 apical spurs (2 in Xiphydriidae, but second one very small and difficult to see); antenna 13-25 segmented, usually 20-25 segmented 10
- 10 Pronotum reduced to narrow collar on meson; lateral lobes of mesonotum divided by transverse ridges (Fig. 7); cervical sclerites elongated, necklike (Fig. 86); female ovipositor broad, blade-like; widespread Xiphydriidae (in part)
- Pronotum long on meson, not reduced; lateral lobes of mesonotum divided by diagonal furrows (Fig. 16); cervical sclerites not elongated, short; ovipositor long, needlelike; North America to northern Central America, Cuba; introduced into Chile, Brazil? Siricidae
- 11 Hindwing without anal cell (Fig. 17); forewing with anal cell petiolate or absent (Figs. 19, 20); antenna various, short and 5-6-segmented or with up to 25 segments, rarely 9-segmented, and either filiform, serrate, or pectinate; widespread. Pergidae
- Hindwing with anal cell (Fig. 18); forewing with anal cell always present, either petiolate, or complete and with or without an anal crossvein (Figs. 20-22); antenna 7-12 segmented or 15-25 segmented 12
- 12 Antenna 7-12 segmented, most commonly 9-segmented; widespread Tenthredinidae (in part)
- Antenna with 15 or more segments 13
- 13 Antenna filiform (Fig. 84); foretibia with 2 apical spurs but inner spur very short and difficult to see Xiphydriidae (in part)
- Antenna serrate in female (Fig. 14), pectinate in male (Fig. 15), both apical foretibial spurs long; North America to Central America; Cuba Diprionidae

Superfamily MEGALODONTOIDEA

Family XYELIDAE

Antenna with 9- to 25-segmented slender filament surmounted on stouter third segment (Fig. 25). Mid- and hind tibiae with preapical spines; fore tibia with 2 apical spurs. Mesonotum with prescutum and scutellum distinct, mesonotum not divided transversely.

This family is represented by one genus, *Xyela*, in the pine forests of Mexico. The family is holarctic and has five North America genera which were separated by Ross (1932, 1937). The

larvae were separated by Smith (1967). Smith (1978) catalogued the world fauna.

Subfamily XYELINAE

Genus *Xyela* Dalman

Pinicola Brébisson, 1818: 116. Preoccupied by *Pinicola* Vieillot, 1807.

Type species: *Pinicola julii* Brébisson. Desig. by Rohwer, 1911.

Xyela Dalman, 1819: 122.

Type species: *Xyela pusilla* Dalman. Desig. by Curtis, 1824.

See Smith (1978) for further generic synonymy.

Xyela is recognized by the 9-segmented antennal filament, which is as long as or longer than the third antennal segment (Fig. 25), and the subcosta (SCI) of the forewing, which is either appressed to or distinct from the radius (R) and joins the costa (C) before the separation of the radial sector (RS) from the radius (R) (Fig. 23). The species are small, usually 3-4 mm long, and the female has a long ovipositor that extends beyond the apex of the abdomen (Fig. 24).

The genus is holarctic and occurs wherever pines (*Pinus* spp.) are found in North America. It is probably coextensive with pines south of the United States, but very few specimens have been collected. Larvae of most species live and feed in the developing staminate cones. Adults are very short lived, occur early in the spring in temperate regions, and their emergence usually coincides with available food, commonly *Salix* spp., *Alnus* spp., or *Betula* spp. catkins or in flowers of other plants. Adults are sometimes found in numbers on these other plants in the vicinity of pines. Burdick (1961) revised *Xyela* for North America and also gave some biological information, but he did not see specimens from Mexico.

SPECIES

Unidentified spp. -- Mexico (Durango, Michoacán)

I have seen four specimens, two from Durango (El Salto, 9000 ft; 25 miles W Durango, 7500 ft) and two intercepted by U.S. Plant Quarantine, one at Nogales, Arizona, from Mexico, and the other at Laredo, Texas, from Apatzingan, Michoacán. The four speci-

mens represent two species. Further collections are needed to determine whether these represent distinct species or fall within the range of variation of northern species.

Family PAMPHILIIDAE

Antenna long, setaceous, with 20-30 segments (Fig. 27). Forewing with radial crossvein (2r, Fig. 26); posterior margin of pronotum almost straight; mesonotum with prescutum and scutellum distinct, mesonotum not divided transversely. Fore tibia with 2 apical spurs; mid- and hind tibiae with preapical spines. Female ovipositor short, not exceeding apex of abdomen (Fig. 11). Head and body somewhat dorso-ventrally flattened.

The Pamphiliidae are holarctic with one genus extending south into Mexico. Two subfamilies are found in North America, the Cephalciinae, which are associated with conifers, and the Pamphiliinae, which are associated with angio-

spermous trees and shrubs. Middlekauff (1958) keyed the North America genera. Klima (1937b) catalogued the world species. Only the subfamily associated with conifers has been found south of the United States. Members of the family are often called web-spinning sawflies because the larvae live solitarily or socially in a web or in a rolled leaf held by silk.

Subfamily CEPHALCIINAE

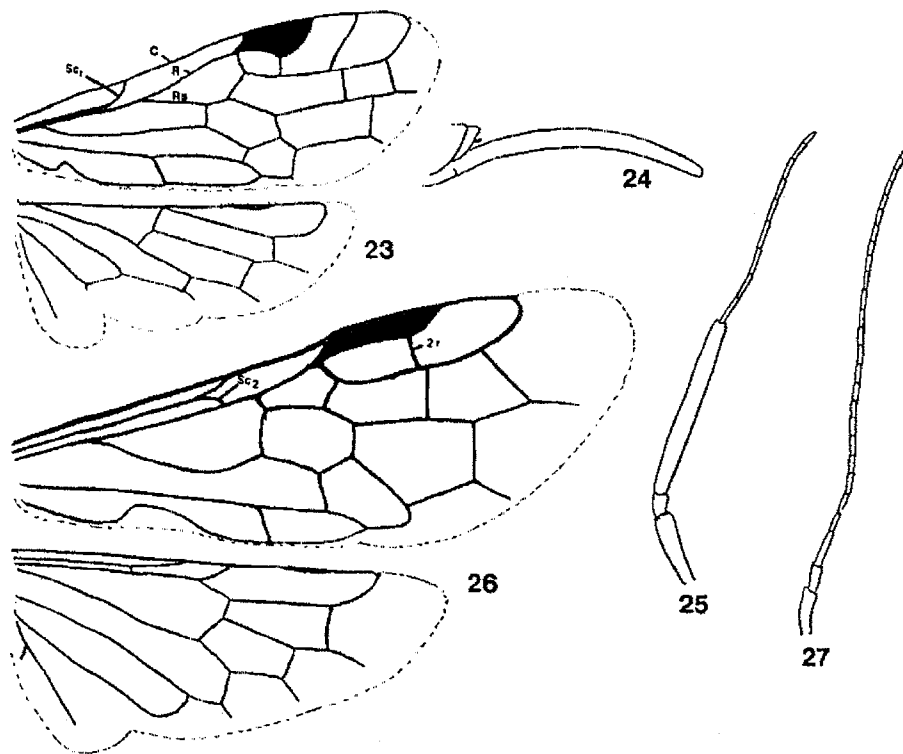
Genus *Acantholyda* A. Costa

Acanthocnema A. Costa, 1859: 2. No species included. Suppressed, Internatl. Comm. Zool. Nomencl., Opinion 290, 1954.

Type species: *Tenthredo erythrocephala* Linnaeus. Desig. by Benson, 1945.

Acantholyda A. Costa, 1894: 232.

Type species: *Tenthredo erythrocephala* Linnaeus. Desig. by Rohwer, 1911a.



FIGS. 23-27. Xyelidae and Pamphiliidae. 23, Forewing and hindwing, *Xyela* sp. 24, Female sheath, *Xyela* sp. 25, Antenna, *Xyela* sp. 26, Forewing and hindwing, *Acantholyda* sp. 27, Antenna, *Acantholyda* sp.

Acantholyda is separated from other genera of Pamphiliidae by the presence of a preapical spine on the fore tibia and the presence of SC2 in the forewing (Fig. 26). Species are associated with pines (*Pinus* spp.) and other conifers throughout North America and Eurasia, and the larvae live and feed on the host foliage in webs of their own making. Four specimens, possibly representing four species, have been collected in Mexico. More species will undoubtedly be found because of the prevalence of suitable host plants. Middlekauff (1958) keyed the North American species and gave some biological notes. He did not see specimens from Mexico, but noted those described by Norton. For further specimens collected in Mexico or Central America, Middlekauff's 1958 key should be consulted in addition to the one below.

Two subgenera are recognized, the typical subgenus and the subgenus *Itycorsia* Konow. Only the latter occurs in Mexico.

Subgenus *Itycorsia* Konow

Itycorsia Konow, 1897d: 13.

Type species: *Tenthredo hieroglyphica* Christ. Desig. by Rohwer, 1910.

This subgenus is separated by the presence of a postgenal carina (absent in the typical subgenus) and the usual absence of a spur or stub on the anal cell of the hindwing (usually present in the typical subgenus).

Key to species

- 1 Abdomen black dorsally with a lateral white line; antenna black or with tip of each segment narrowly whitish; wings hyaline, stigma pale; legs with coxae, trochanters, and femora mostly whitish (coxae and trochanters bordered with black, fore- and mid-femora blackish dorsally, and hind femur blackish laterally); tibiae and tarsi reddish brown
credita (Norton), *albomarginata* (Cresson)
- Abdomen mostly reddish or yellowish; antenna with apical half of third segment and segments 4-10 white, rest black; wings yellowish with stigma black; legs black, or black with tibiae and tarsi yellowish red 2
- 2 Head black with small white supraocular spot and small white genal spot; thorax black; legs black; para-antennal fields smooth, without pits or setae
nigrostigmata, sp.n.
- Head and thorax with extensive yellow markings, including areas above ocelli and antennae, posterior

margin of pronotum, spot on mesopleuron, and V-mark on mesoprescutum; tibiae and tarsi yellow red; para-antennal fields pitted and with setae
variegata (Norton)

SPECIES

albomarginata (Cresson) - Canada (British Columbia); U.S.A. (Alaska, Pacific coast to Montana, Michigan, Colorado); Mexico (Morelos).

Lyda albomarginata Cresson, 1880a: 30. ♀. 'Colorado' (Philadelphia, ♀).

See Middlekauff (1958) for synonymy. One specimen at San Francisco is labelled 'Cuernavaca, Mexico, 4-IX-1902'. I cannot distinguish it from specimens of *albomarginata* from western U.S. and Canada. Comparison of this specimen with Norton's description of *credita* revealed no significant differences, and the two may be synonymous. I list them separately, however, hoping that additional material will eventually clarify this problem. Adults of *albomarginata* have been captured from *Pinus* spp. (Middlekauff, 1958).

credita (Norton) - Mexico

Lyda credita Norton, 1869: 334. ♂. 'Mexico' (). Konow, 1903: 54, 64 (♀, ♂; Mexico, New York; *marginiventris* Cresson as a syn. [*marginiventris* is a distinct species, Konow's description of the ♀ from New York was based on Cresson's species]). Konow, 1905a: 8.

Pamphilius creditus: Kirby, 1882: 346. Cameron, 1883: 67. Dalla Torre, 1894: 425.

Acantholyda credita: Klima, 1937b: 12. Middlekauff, 1958: 131-132. Smith 1971b: 522 (type not located).

See notes under *albomarginata*; the two may eventually prove to be synonymous.

nigrostigmata Smith, sp.n. - Mexico (Durango).

Acantholyda (Itycorsia) nigrostigmata Smith. Female. Length 14.0 mm. Black with abdominal segments 2-7 rufous and following white to yellowish: apical half of third antennal segment,

segments 4–9 entirely, and segment 10 infuscate; small supraocular spot; small genal spot on lower, outer eye margin; tarsal pulvillar pads; extreme bases of fore- and midtibiae. Wings yellowish with veins yellow to orange and stigma contrastingly black. Clypeus elevated into triangularly shaped projection at centre; genal carina present; interantennal area rounded, not carinate; malar space linear; third antennal segment subequal in length to segments 4 and 5 combined; para-antennal fields smooth, moderately shining, without pits or setae; head punctate, punctures separated by moderately shining interspaces, sparser on genae and behind eyes above; clypeus punctate. Thorax punctate, punctures separated by moderately shining interspaces, sparse on mesosternum and central areas of anterior and lateral lobes of mesonotum. Black hairs covering head and thorax. Hind basitarsus subequal in length to following 2 tarsal segments combined.

Male. Unknown.

Holotype. ♀, MEXICO: Durango, 10 miles W El Salto, 9000 ft, 7.vii.1984 (Kelton) (Ottawa).

Discussion. *Acantholyda terminalis* (Cresson) from western North America appears close to this species in coloration, but *terminalis* has black antennae, infuscated wings and black veins, and a sharp interantennal carina. The nearly entirely black head, thorax and legs, mostly red abdomen, white band on the antennae, and yellow wings and veins with a black stigma will separate *nigrostromata*.

variegata (Norton) – Mexico (Veracruz)

**Lyda variegata* Norton, 1869: 335. ♂=♀. 'Cordova, Mexico' (Genève, ♀). Konow, 1903: 54, 113–114 (♀, ♂: Mexico, California; *bucephala* Cresson as a syn. [*bucephala* is a distinct species found in western North America; Konow's description of the ♂ from California is based on Cresson's species]). Konow, 1905a: 8.

Pamphilius variegatus: Kirby, 1882: 346. Cameron, 1883: 67. Dalla Torre, 1894: 441.

Acantholyda variegata: Klima, 1937b: 10. Middlekauff, 1951: 9. Middlekauff, 1958: 132 (Norton described ♀, not ♂). Smith, 1971b: 522–523 (♀ type).

Superfamily TENTHREDINOIDEA

Family CIMBICIDAE

Antenna capitate, 5–6 segmented (Figs. 32–35). Lateral margins of abdomen usually angulate or carinate. Mesosternal–pleural suture of thorax absent. Forewing with anal crossvein or vein 2A+3A meeting 1A at centre; radial crossvein present (Figs. 28, 29). Hindwing with enclosed cells (Fig. 29). Posterior margin of pronotum emarginated. Hind tibia lacks preapical spines.

The Syzygoniinae (Pergidae) resemble Cimbicidae in general habitus because of their large robust size and capitate antennae, but the Syzygoniinae have preapical spines on the tibiae, lack a radial crossvein and anal cell in the forewing, lack closed cells in the hindwing, and have a distinct mesosternal–pleural suture.

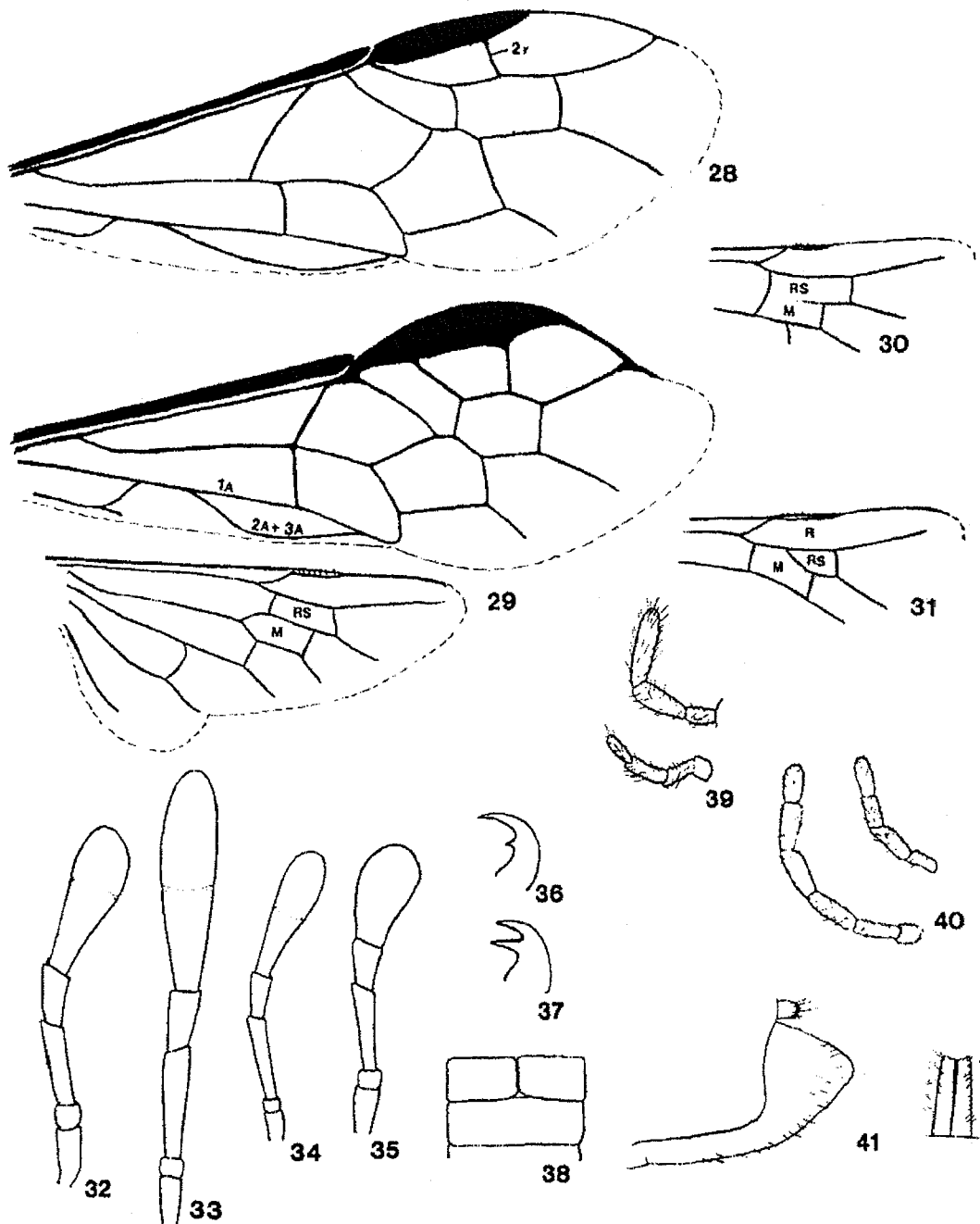
The Cimbicidae are holarctic except for a single subfamily, Pachylostictinae, found in Brazil, Paraguay and Argentina. No representatives have been found between the United States and Brazil. The Pachylostictinae is the only subfamily in the neotropics and is endemic to that region. It is separated from other subfamilies by the contracted anal cell in the forewing, with vein 2A+3A meeting 1A forming basal and apical anal cells; the cervical sclerites which are far apart on the venter; the front and lateral lobes of the mesonotum which are separated by clearly defined furrows; the malar space much shorter than the scape and usually linear; and the eyes which coverage below (not above) or are subparallel and not noticeably enlarged in the male.

Most of the work on neotropical species was by Mallach (1929), Conde (1932, 1937) and Malaise (1939). Conde (1937) gave a key to genera. Members of *Pachylosticta* are more commonly collected than other Cimbicidae because they are large and showy, whereas members of the other genera are rare in collections. Because of the rarity of specimens, the generic units used here appear adequate until study of more material proves otherwise.

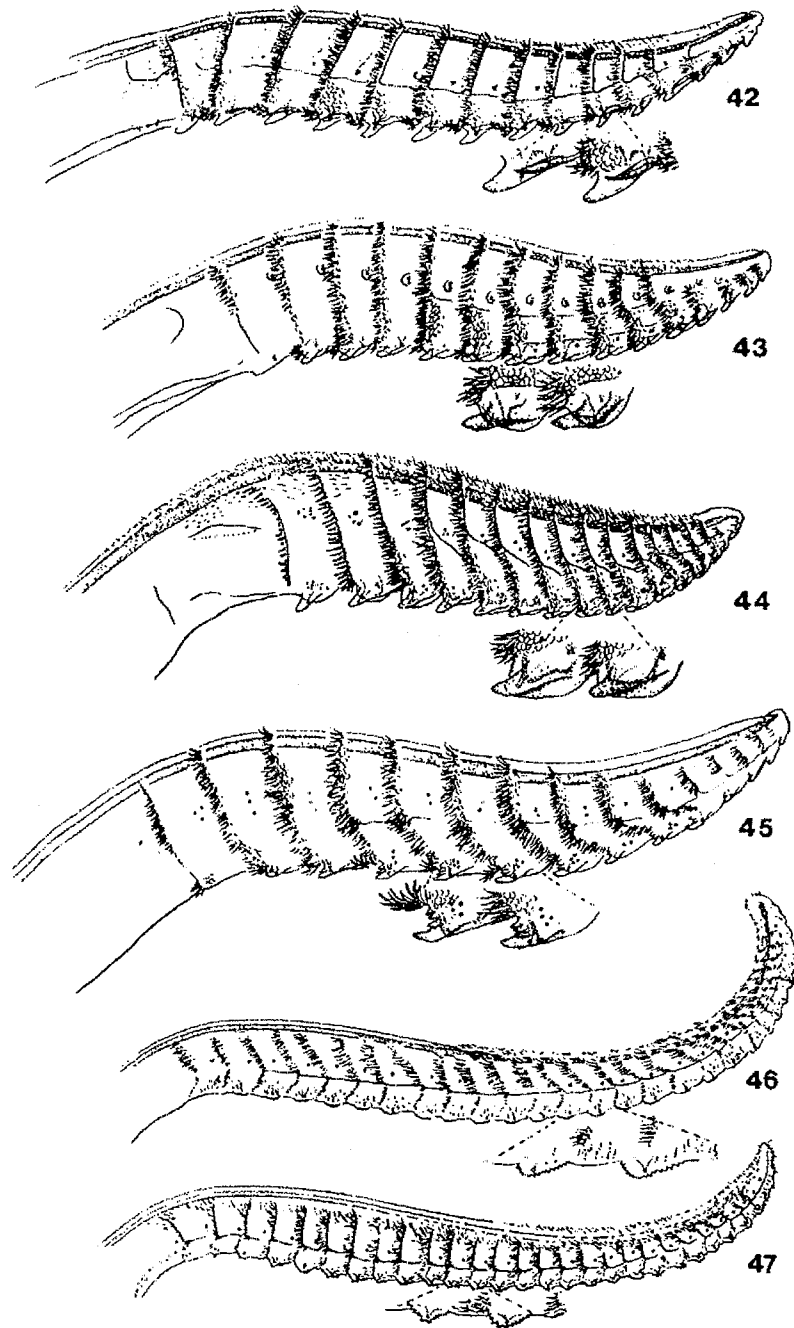
Hosts are not known for this family in South America.

Key to genera

- 1 Mouthparts reduced, maxillary palpus 4-segmented, labial palpus 3-segmented (Fig. 39) 2
- Mouthparts normal, maxillary palpus 6-segmented, labial palpus 4-segmented (Fig. 40) 3



FIGS. 28-41. Cimbicidae. 28, Forewing of female, *Pachylosticta albiventris*. 29, Forewing and hindwing of male, *P. albiventris*. 30, Central cells of hindwing, *Pseudabia fusca*. 31, Central cells of hindwing, *Pseudopachylosticta subflavata*. 32, Antenna, *P. albiventris*. 33, Antenna, *P. fusca*. 34, Antenna, *Brasilabia clypeata*. 35, Antenna, *P. subflavata*. 36, Male tarsal claw, *P. albiventris*. 37, Female tarsal claw, *P. albiventris*. 38, First two abdominal segments, dorsum, *B. clypeata*. 39, Labial and maxillary palpi, *P. albiventris*. 40, Labial and maxillary palpi, *P. fusca*. 41, Sheath, lateral and dorsal, *P. fusca*.



FIGS. 42-47. Cimbicidae, female lancets. 42, *Pachylosticta albiventris*. 43, *P. apicalis*, 44, *P. plaumanni*. 45, *Pseudopachylosticta subflavata*. 46, *Brasilabia clypeata*. 47, *Pseudabia fusca*.

2 Cell Rs of hindwing much smaller than cell M and triangular, cell M below and behind cell Rs with part joining radial cell (Fig. 31); forewing of male normal, not produced forward at stigma
Pseudopachylosticta

- Cells Rs and M of hindwing about equal in size or cell M smaller, cell M located directly below cell Rs and not joining radial cell (Fig. 29); in male, stigma of forewing produced forward (Fig. 29)
Pachylosticta

3 Basal plates (first abdominal tergite) separated on meson by clearly defined suture (Fig. 38) (female lancet long and slender, Fig. 46) *Brasilabia*

- Basal plates entire, completely sclerotized, sometimes with a low, median carina. 4

4 Vein separating cells Rs and M of hindwing partly atrophied (Fig. 30); first antennal segment twice as long as second segment (Fig. 33); hind basitarsus as

long as 2 following tarsal segments combined (female lancet long, Fig. 47) *Pseudabia*

- Vein separating cells Rs and M of hindwing complete; first and second antennal segments subequal in length; hind basitarsus subequal in length to remaining tarsal segments combined (female lancet short, triangular, Fig. 48) *Lopesiana*

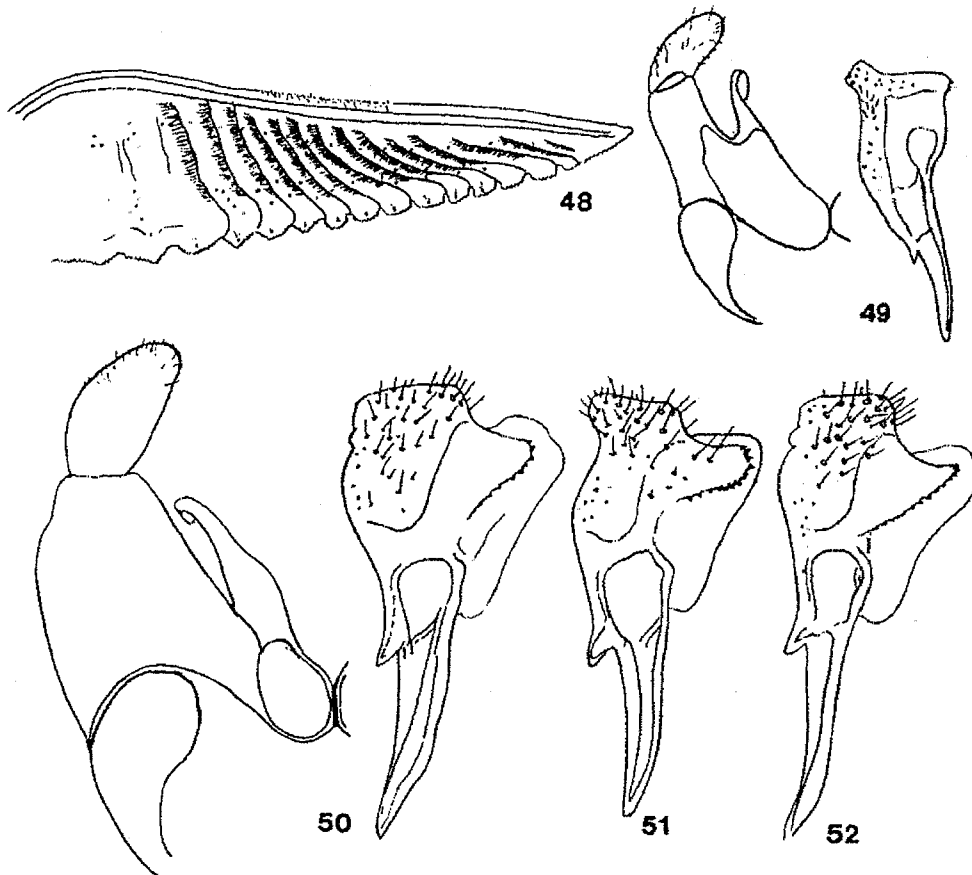
Subfamily PACHYLOSTICTINAE

Genus *Pachylosticta* Klug

Pachylosticta Klug, 1824: 171-172.

Type species: *Pachylosticta tibialis* Klug.
Desig. by Rohwer, 1911a.

Plagiocera Klug, 1834: 227.



FIGS. 48-52. Cimbicidae. 48, Female lancet of *Lopesiana thomasi*. 49, Male genital capsule and aedeagus of *Pseudopachylosticta subflavata*. 50, Male genital capsule and aedeagus of *Pachylosticta violacea*. 51, Aedeagus of *P. albiventris*. 52, Aedeagus of *P. tibialis*. Ventral view, left half of genital capsule and lateral view of aedeagus figured.

Type-species: *Plagiocera thoracica* Klug. Monotypic.

Plagioceros Konow, 1905c: 9. Emendation.

Antenna with first segment 2× longer than second segment; third segment nearly 1½× longer than fourth segment (Fig. 32). Hind basitarsus shorter than remaining tarsal segments combined; inner tooth of tarsal claw of female long, of male short (Figs. 36, 37). Basal plates completely sclerotized, not divided on meson. Stigma of forewing of male unusually produced forward, normal in female (Figs. 28, 29). Cell M of hindwing below cell Rs and not touching radial cell (Fig. 29); vein separating cells Rs and M complete.

Species of *Pachylosticta* are large and robust and are the most commonly collected cimbicids in South America. The projection of the stigma of the male forewing is not found in other cimbicids, and this coupled with the shorter inner tooth of the tarsal claw of the male and completely different coloration shows the extreme sexual dimorphism that resulted in the description of two different genera, *Pachylosticta* and *Plagiocera*. Sexes have not been associated for all species, therefore there may be fewer than listed. Conde (1937) synonymized several species believing that the colour differences were only variations; Malaise (1939) showed that these species were distinct and that colour, coupled with morphological differences in the male genitalia, can be used for separating them. However, Conde (1940) was still sceptical about their separation. In specimens I have seen, the characters used by Malaise appear valid for species separation (differences in male genitalia noted in Figs. 50–52).

Key to species

- 1 Female.....2
- Male.....4
- 2 Wings yellowish with apices infuscated black (thorax and legs entirely orange; basal 4 or 5 abdominal segments orange, rest of abdomen black; head and antenna black) (lancet as in Fig. 43)*apicalis* (Westwood)
- Wings black infuscated, may be paler at apex and sometimes a nearly hyaline spot below stigma ... 3
- 3 Legs entirely yellow orange, tarsi infuscated (orange with head, mesonotum except scutellum, and apical 4 or 5 abdominal segments black) (lancet as in Fig. 44)*plumanni* Malaise

- Legs black, part of coxae may be reddish to yellow (black with red thorax, sometimes blackish marks on mesoprescutum and mesosternum) (lancet as in Fig. 42)*violacea* Klug, *albiventris* Klug
- 4 Legs with tibiae and tarsi white to yellow; mesepimeron and adjacent areas yellowish; aedeagus as in Fig. 52*tibialis* Klug
- Legs black; thorax black.....5
- 5 Basal 4 or 5 abdominal sterna whitish to orange; aedeagus as in Fig. 51*albiventris* Klug
- Abdomen black; aedeagus as in Fig. 50 *violacea* Klug

SPECIES

albiventris Klug – Argentina (Misiones); Brazil (Minas Gerais, Paraná, Rio de Janeiro, Santa Catarina, São Paulo)

Pachylosticta albiventris Klug, 1824: 174. ♂. 'Rio Jan.' (Berlin, ♂). Klug, 1834: 228. Brullé, 1846: 672, Pl. 48, Fig. 4. Kirby, 1882: 18. Kriechbaumer, 1884: 241, 281. Dalla Torre, 1894: 352. Konow, 1905c: 10. Conde, 1937: 15 (as syn. of *tibialis* Klug). Malaise, 1939: 22–23, Fig. 9B (as distinct species; ♂ genitalia figured). Conde, 1940: 27.

Females associated with males taken at the same locality in Santa Catarina are black with the thorax red (sometimes blackish spots on the mesoprescutum and mesosternum), and the fore- and midcoxae and inner surface of the hind coxae reddish to yellow. The wings are black but lighter at their apices and have a hyaline spot below the stigma. They are similar to those of *thoracica* (questionably placed in synonymy of *violacea*). I have not seen females that can be definitely associated with *violacea* or *tibialis*, but they all may be very similar; at present, females cannot be definitely identified. I saw one male with a large, oval, tough, papery cocoon attached, but the label lacked host data.

apicalis (Westwood) – Brazil (Espírito Santo, Paraná, Rio de Janeiro)

**Plagiocera apicalis* Westwood, 1835: 51. ♀. 'America Meridionali. Rio Janeiro' (Oxford, ♀). Kirby, 1882: 17 (syn.: *leachii* Spinola). Dalla Torre, 1894: 352.

Plagioceros apicalis: Konow, 1905c: 9 (syn.: 'Lechi' Spinola).

Plachylosticta apicalis: Konow, 1907: 181, 184.

**Plagiocera Leachii* Spinola, 1840: 134. ♀.
'Brésil' (Torino, ♀).

I have compared the types of *apicalis* and *leachii*, and they are identical. There are three specimens of *apicalis* at Oxford, but only one has a label 'Rio Jan.' and a large red label reading 'Plagiocera apicalis Westw. proceed. Z. Soc.' The other two specimens each bear a label 'Meirs [?] Coll.' Westwood did not state how many specimens he had, but the one with the determination and locality labels must be the type. The type of *leachii* is without legs and antennae and there are no labels, but it was the one sent to me from Torino, agrees with Spinola's description, and for such a distinctive species, the identity is certain; I have put a type label on that specimen.

***plaumanni* Malaise** – Brazil (Espírito Santo, Santa Catarina)

Pachylosticta plaumanni Malaise, 1939: 28. ♀.
'Brasil, S.ta Cathar., Nova Teutonia'
(Stockholm, ♀).

I have seen two specimens from the type locality. Males of two species of *Pachylosticta* have also been collected in the same area, *albiventris* and *violacea*, but there is no positive association of sexes. One male at Paris labelled 'Et. de Sao Paulo, Val. di Rio Pardo, E. Gounelle, 12-98' has blackish infuscated wings and an orange colour pattern similar to the female and may be the male of this species.

***tibialis* Klug** – Brazil (Rio de Janeiro)

Pachylosticta tibialis Klug, 1824: 173. ♂.
'Brasilia' (Berlin, ♂). Klug, 1834: 228. Kirby, 1882: 18. Kriechbaumer, 1884: 241, 281. Dalla Torre, 1894: 352. Konow, 1905c: 10. Konow, 1907: 181, 183. Conde, 1937: 15 (*albiventris* Klug, *violacea* Klug, and *dilatata* Lepeletier as syn.; distribution of São Paulo may not refer to *tibialis*). Malaise, 1939: 22-23, Fig. 9C (as distinct species; ♂ genitalia fig.). Conde, 1940: 27.

Amasis dilatata Lepeletier & Serville, 1828: 574-575. ♂. 'Brésil' (). Kirby, 1882: 17.

Plagioceros dilatata: Konow, 1905c: 9.

Pachylosticta dilatata: Konow, 1907: 181, 183.

The description of *dilatata* agrees with specimens of *tibialis* and I believe it is safe to regard it as a synonym. I have seen specimens of *tibialis* only from Rio de Janeiro, and they differ from *violacea* and *albiventris* by the white tibiae and tarsi and the light yellowish mesepimeron and adjacent area.

***violacea* Klug** – Argentina (Misiones); Brazil (Espírito Santo, Rio de Janeiro, Paraná, Piauí, São Paulo)

Pachylosticta violacea Klug, 1824: 174. ♂.
'Brasilia' (Berlin, ♂). Klug, 1834: 228. Kirby, 1882: 18. Kriechbaumer, 1884: 241, 281. Dalla Torre, 1894: 352. Konow, 1905c: 10. Konow, 1907: 181, 182 (♀, ♂; syn.: *chalybea* Perty, *thoracicus* Klug). Brèthes, 1927: 335 (Tonantius, Rio Solímoes). Conde, 1932: 441 (♂, Salto Grande). Conde, 1937: 15 (as syn. of *tibialis* Klug). Malaise, 1939: 22-23, Fig. 9A (a distinct species; ♂ genitalia fig.). Conde, 1940: 27.

**Pachylosticta chalybea* Perty, 1833: 129. Pl. 26, Fig. 2. ♂. 'Provincia Piauihensi' (München, ♂). Kirby, 1882: 17. Dalla Torre, 1894: 352. Konow, 1905c: 10.

?*Plagiocera thoracica* Klug, 1834: 228, Pl. 2, Fig. 5. ♀. 'Brasilien' (Berlin, ♀). Kirby, 1882: 17. Kriechbaumer, 1884: 281, Pl. 2, Fig. 5. Dalla Torre, 1894: 352.

Plagioceros thoracica: Konow 1905c: 9.

I saw two males of *chalybea* Perty from München; one is labelled '3, Brasil., P. chalybea Pty', the other 'Piahu'. Perty did not state how many specimens he had, and both are the same species; the specimen with the determination label is hereby designated lectotype, the other a paralectotype. The lectotype is in good condition except for lacking antennae.

Because of the uncertain association of sexes, I am questionably retaining *thoracica* as a synonym. It could be the female of *albiventris* or *tibialis*.

Genus *Pseudopachylosticta* Mallach

Pseudopachylosticta Mallach, 1929: 285.

Type species: *Pseudopachylosticta leucogaster* Mallach. Orig. desig.

Antenna with first segment $2\times$ longer than second segment; third segment nearly $2\times$ longer than fourth segment (Fig. 35). Hind basitarsus shorter than following tarsal segments combined. Basal plates completely sclerotized, not divided mesally. Stigma of forewing of both sexes normal, not protruding (as in Fig. 28). Cell Rs of hindwing small, triangular; cell M large, below and in back of cell Rs and joining radial cell; veins separating cells Rs and M complete (Fig. 31).

The reduced mouthparts are similar to those of *Pachylosticta*, but species of *Pseudopachylosticta* are generally smaller in size, the stigma of the male forewing is normal, and cell M of the hindwing is large and joins the radial cell. The position of the middle cells in the hindwing is unique for this genus.

Pseudopachylosticta occurs in southern Brazil, Paraguay and northern Argentina. There is apparently a single variable species.

SPECIES

subflavata (Kirby) – Argentina (Cordoba, Formosa, Misiones, Salta, Tucumán); Brazil (Mato Grosso do Sul, Piauí); Paraguay

**Amasis subflavata* Kirby, 1882: 17, Pl. 1, Fig. 9. ♂. 'Argentine Republic. Cordoba' (London, ♂). Dalla Torre, 1894: 355. Konow, 1907: 181 (as syn. of *albiventris* Klug).

Plagioceros subflavata: Konow, 1905c: 9.

Pseudopachylosticta subflavata: Conde, 1937: 15.

Pachylosticta albiventris: Konow, 1907: 182 (*subflavata* Kirby as a syn.; misidentification, not *albiventris* Klug). Forsius, 1934: 102 (recognized Konow's mistake).

**Amasis brasiliensis* Mocsáry, 1909: 2. ♂. 'Brasilia: Piahy' (Budapest, ♂). Syn.n.

Pseudopachylosticta brasiliensis: Forsius, 1934: 102, 103 (syn.: *neotropica* Mocsáry). Conde, 1937: 15 (syn.: *leucogaster* Mallach).

**Amasis neotropica* Mocsáry, 1909: 2–3. ♀. 'Paraguay: Asuncion' (Budapest, ♀). Syn.n.

**Pseudopachylosticta leucogaster* Mallach 1929: 286–287, Figs. 1, 3. ♀, ♂. 'San Bernardino' (Berlin, ♀) (also from Mato Grosso; Mallach believed Konow [1907: 182] misidentified this species as *albiventris* Klug). Syn.n.

**Pseudopachylosticta leucogaster* form *atroscutellata* Mallach 1929: 286. ♀. (from same series as *leucogaster*). Syn.n.

**Pseudopachylosticta brunnescens* Mallach 1929: 287. ♀. 'Argentinien (Provinz Salta)' (Berlin, ♀). Syn.n.

I have examined a number of specimens from Argentina, Brazil and Paraguay and believe all the species described above are colour variations of one species. The genitalia are the same for all colour forms (lancet as in Fig. 45; male genitalia as in Fig. 49). The males described as *subflavata*, *brasiliensis* and *leucogaster* are all similar in colour. The main colour variation in the female is the amount of red and black on the mesonotum; the mesonotum varies from being all reddish to nearly all black with only parts of the lateral lobes reddish. Among those species and forms described, *neotropica* and *leucogaster* form *atroscutellata* have the mesonotum orange with the prescutum and scutellum black, and *leucogaster* and *brunnescens* have the mesonotum orange with only the prescutum black. The type of *brunnescens* appears faded, all the areas that are supposed to be black in this species are brownish in this specimen; except for this faded appearance, *brunnescens* has the typical coloration for *subflavata*. A specimen from Corumba, Mato Grosso do Sul, also has the mesopleuron reddish, all the mesonotum reddish, and the basal abdominal segments reddish with the apical segments black; however, it appears to be an extreme colour form.

A paratype of *leucogaster* from Mato Grosso, Brazil, and the specimen described by Mallach (1929) as form *atroscutellata* bear Konow's determination labels reading *albiventris* Klug. Konow's (1907) misidentification may have been based on these specimens.

Genus *Brasilabia* Conde

Brasilabia Conde, 1937: 14.

Type species: *Pseudabia clypealba* Conde. Orig. desig.

Antenna with first segment nearly $2\times$ longer than fourth segment; third segment nearly $2\times$ longer than fourth segment (Fig. 34). Hind basitarsus shorter than following tarsal segments combined, subequal in length to two following segments. Basal plates divided on

meson by suture, leaving narrow membranous area (Fig. 38). Stigma of forewing normal, not protruding (as in Fig. 28). Cell M of hindwing below cell Rs and not joining radial cell; both cells divided by complete vein (Fig. 29).

The unique character for *Brasilabia* is the basal plates which are divided on the meson; in all other genera of Cimbicidae from the neotropics, the basal plates are entire or with a low median carina.

SPECIES

clypealba (Conde) – Brazil (Rio de Janeiro, São Paulo)

**Pseudabia clypealba* Conde, 1932: 439, 440–441, Figs. 4–10. ♀, 'Ypiranga' (São Paulo, ♀). Malaise, 1939: 27.

Brasilabia clypealba: Conde, 1937: 14.

I have seen only one specimen besides the type, that from Rio de Janeiro. Lancet and sheath as in Figs. 41, 46. The type bears a label '9019' and Conde's determination and type labels. According to information associated with Luederwaldt's numbers (U. R. Martins, personal communication), the specimen is from 'São Paulo, I-1906.'

Genus *Lopesiana* Smith, nom.n.

Lopesia Conde, 1937: 15. Preoccupied by *Lopesia* Tavares, 1908.

Type species: *Lopesia thomasi* Conde. Orig. desig.

Antenna with first segment subequal in length to second segment; third segment $1\frac{1}{2}\times$ longer than fourth segment. Malar space linear; clypeus short, $3\times$ broader than long; eyes converging below, lower interocular distance shorter than eye length. Hind basitarsus subequal in length to remaining tarsal segments combined and $2\times$ longer than last segment. Basal plates completely sclerotized, not divided mesally. Stigma of forewing normal, not protruding (as in Fig. 28). Cell M of hindwing below cell Rs and not joining radial cell; cells separated by complete vein (Fig. 29).

The subequal lengths of the first and second antennal segments, long hind basitarsus, short

clypeus, and completely sclerotized basal plates distinguish this genus. According to Conde (1937), the prepectus is not as distinct as in the related genera *Pseudabia* and *Enslinia* (here considered synonymous).

SPECIES

thomasi (Conde) comb.n. – Brazil (Rio de Janeiro)

Lopesia thomasi Conde, 1937: 15–17, Figs. 1, 2. ♀. 'Rio de Janeiro, Jardim Botânico' ().

I have not located the type. Conde stated 'Zu Ehren meines Freundes Frey Thomas benannt, in dessen Besitz sich die Type befindet.' According to the late W. W. Kempf (personal correspondence), the type is not in Borgeier's collection [now at São Paulo], and it is not in the collection of the Instituto Vegetal (National School of Agriculture), Rio de Janeiro. The lancet (Fig. 48) is short and broad, very different from the longer lancets of other South American Cimbicidae. I have seen several specimens from Rio de Janeiro; although I did not see the type, the description and unique lancet identify the species.

Genus *Pseudabia* Schrottky

Pseudabia Schrottky 1910: 168.

Type species: *Pseudabia fusca* Schrottky. Orig. desig.

Enslinia Jörgensen 1913: 254.

Type species: *Enslinia holmbergi* Jörgensen. Monotypic.

Antenna with first segment nearly $2\times$ longer than second segment; third segment $1\frac{1}{2}\times$ longer than fourth segment (Fig. 33). Hind basitarsus equal to length of following two tarsal segments combined. Basal plates entire, not divided on meson. Stigma of forewing normal, not protruding forward (as in Fig. 28). Hindwing with cell M below cell Rs, not joining radial cell; vein dividing cells M and Rs partially atrophied, extending only one third way between cells (Fig. 30).

I believe *Enslinia* is a synonym of *Pseudabia* as Conde (1932, 1937) proposed, even though

Malaise (1939) gave some characters to separate the two genera. Malaise separated them by the relative lengths of the first and fourth antennal segments, punctuation of the scutellum versus that of the rest of the mesonotum, and the enlargement of the head behind the eyes. I have not been able to find the type of *fusca*, but Schrottky's description of *Pseudabia* and *P.fusca* do not differ from specimens of *E.holmbergi* I have examined. The size, coloration and structural characters as given by Schrottky do not differ from those of *holmbergi*, and the type locality of *fusca* is close to the localities from where *holmbergi* has been collected. I also believe that *holmbergi* is a synonym of *fusca* as proposed below.

The partially atrophied vein separating cells Rs and M in the hindwing is found only in *Pseudabia*. This is possibly an aberration, but the vein is atrophied in the several specimens I have seen. The single species of *Pseudabia* is large, about 16 mm long, and mostly metallic green with the labrum, palpi, side of the pronotum, lateral line on the abdomen, and most of the tibia and tarsi pale yellow.

SPECIES

***fusca* Schrottky** – Argentina (Misiones); Brazil (Santa Catarina); Paraguay

Pseudabia fusca Schrottky, 1910: 168. ♀. 'Paraguay, Puerti Bertoni' (). Conde, 1932: 440. Malaise, 1939: 27–28 (compared with *Enslinia holmbergi*).

**Enslinia holmbergi* Jörgensen, 1913: 254–256, Pl. 25, Figs. 1, 2. ♀. 'Monte de Bonpland de Misiones' (La Plata, ♀). Malaise, 1939: 27–28 (compared with *Pseudabia fusca*). Syn.n.

Pseudabia holmbergi: Conde, 1932: 438, 440.

Though the type of *fusca* may be lost, Schrottky's description is identical to specimens of *holmbergi* I have examined. Further collection

data from Jörgensen (1913) is 'volando por la manana, al sol, sobre plantas baja'. Lancet and sheath as in Figs. 41, 47.

Unplaced species of Cimbicidae

Three of the four following species have been recorded from the neotropics, but they can now be excluded. The two Leach species have been recorded by various authors from Haiti or Dominican Republic because of Leach's citation of the type locality as 'insula St. Domingo'. From notes received on the types of these two species (in Canberra), they appear more closely related to nearctic or palearctic species. It is also unlikely that cimbicids occur on Hispaniola. These species are recorded here for reference.

Cimbex klugii Leach, 1817: 105. ♀. 'insula St. Domingo' (Canberra ex Macleay Museum, Sydney, ♀). Lepeletier, 1823: 32 ('In insula Sancto-Domingo'). Cresson, 1880a: 36 ('San Domingo'). Kirby, 1882: 8 ('Haiti'). Dalla Torre, 1894: 374 (San Domingo'). Ashmead, 1900: 367 ('San Domingo'). Konow, 1905c (as syn. of *macleayi*). Smith, 1969: 543 (repeats previous recorded localities).

Plagiocera klugii Bullé, 1846: 672, Pl. 48, Fig. 3. ♀. 'l'Amérique méridionale' (). Kirby, 1882: 17. Dalla Torre, 1894: 352.

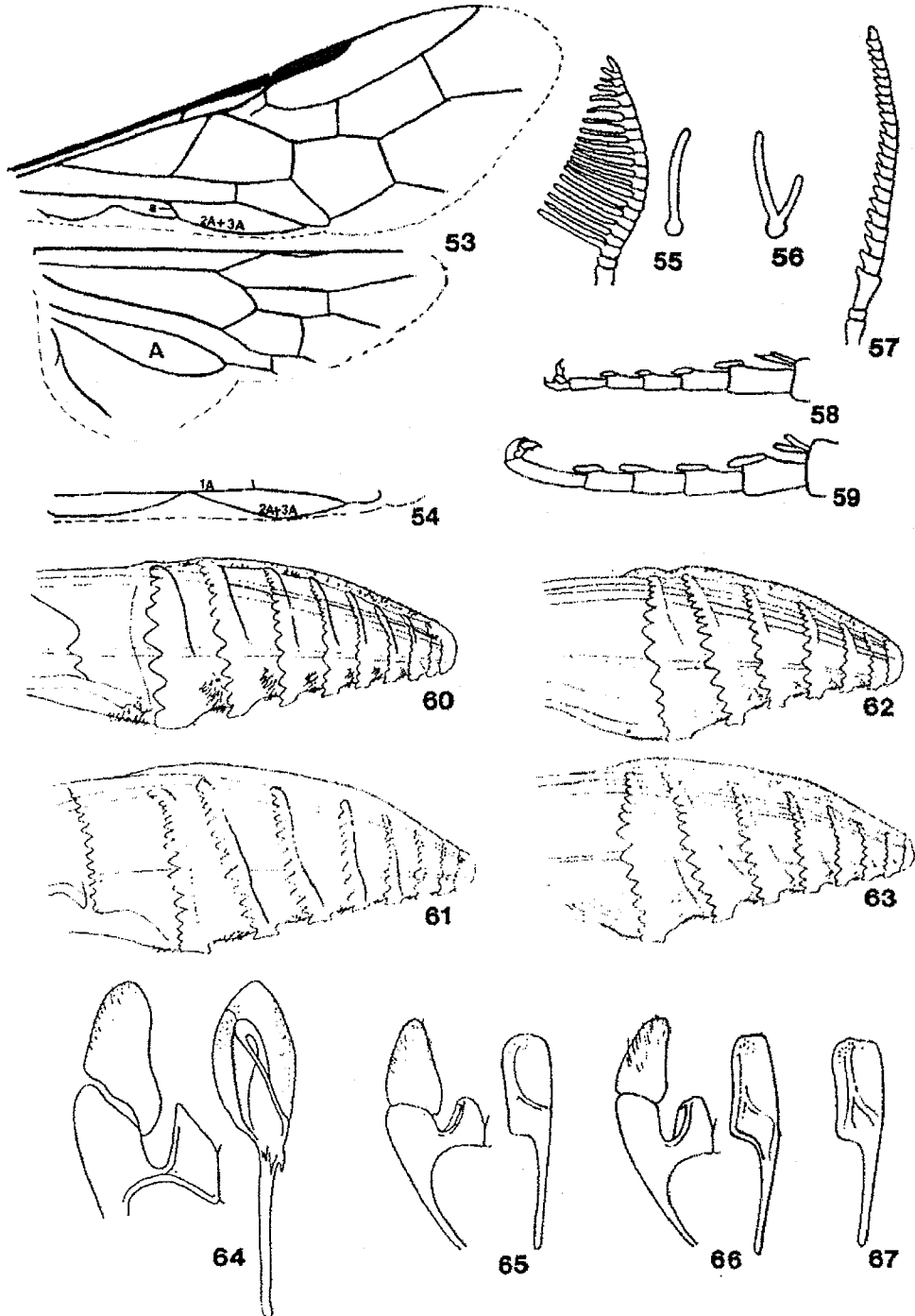
Plagioceros klugi: Konow, 1905c: 9.

Pachylosticta klugi: Konow, 1907: 181, 183.

I have not seen specimens matching the description of *klugii*. Even though it has been placed in *Pachylosticta*, the coloration (black with prothorax yellow on sides, legs yellow with end of tibiae and tarsi black) fits better the species of *Brasilabia* or *Lopesiana*. The type needs to be examined to place this species.

Cimbex macleayi Leach 1817: 103. ♂. 'insula St. Domingo' (Canberra ex Macleay Museum, Sydney, ♂). Lepeletier, 1823: 30–31 ('insula Sancto-Domingo'). Cresson, 1880a: 35 ('San

FIGS. 53–67. Diprionidae. 53, Forewing and hindwing, *Neodiprion* sp. 54, Anal area of forewing, *Monoctenus* sp. 55, Male antenna and dorsal view of one segment of *Monoctenus* sp. 56, Male antennal segment, dorsal view, *Neodiprion* sp. 57, Female antenna, *Zadiprion* sp. 58, Apex of hind tibia and hind tarsus of *Neodiprion* sp. 59, Apex of hind tibia and hind tarsus of *Zadiprion* sp. 60, Female lancet, *Z.falsus*. 61, Female lancet, *Z.townsendi*. 62, Female lancet, *Z.howdeni*. 63, Female lancet, *Z.roteus*. 64, Male genital capsule and aedeagus of *M.sadatus*. 65, Male genital capsule and aedeagus of *Z.howdeni*. 66, Male genital capsule and aedeagus of *Z.falsus*. 67, Aedeagus, *Z.townsendi*. Ventral view of left half of genital capsule and lateral view of aedeagus figured.



Domingo'). Kirby, 1882: 8 ('Haiti'). Dalla Torre, 1894: 377 ('San Domingo'). Ashmead, 1900: 367 ('San Domingo'). Konow, 1905c: 5 ('San Domingo'). Konow, 1906: 57-58 ('Insel Haiti'; *klugii* Leach as a syn.). Smith, 1969: 543 (repeats previous recorded localities).

Cimbex venusta Perty, 1833: 129, 215, Pl. 26, Fig. 2. 'Habitat in montibus Provinciae Minarum' () [compared with *Cimbex sylvanum*, a palearctic species, on p. 215. From the figure, this is obviously not neotropical]. Kriechbaumer, 1874: 417-418 (compared with European species). Kirby, 1882: 8 ('Minas geraes' [probably wrong locality]). Dalla Torre, 1894: 378 ('Brasilia?'). Konow, 1905c: 4 (as syn. of *Cimbex femorata* (L.) [a palearctic species]).

Family DIPRIONIDAE

Antenna with 13 or more segments, serrate in female (Fig. 57), pectinate or bipectinate in male (Figs. 55, 56). Mesosternal-pleural suture absent. Tibiae lack preapical spines. Vein 2A+3A of forewing complete, anal cell crossed by a crossvein (a) or vein 2A+3A fused with 1A at centre forming apical and basal anal cells; anal cell present in hindwing (Figs. 53, 54).

Males of some Pergidae (Perreyiinae) may be confused with those of Diprionidae because of the pectinate (or father-like) antennae, but the Pergidae have the mesosternal-pleural suture, lack a basal anal cell in the forewing, and lack an anal cell in the hindwing.

Larvae of Diprionidae feed on the foliage of conifers of the plant families Cupressaceae and Pinaceae. Extensive outbreaks sometimes occur in forests which may cause growth loss and mortality of trees. The family is holarctic and coextensive with the coniferous forests of the world; in the New World they occur as far south as do their hosts, into northern Central America (Nicaragua). In Mexico, outbreaks of *Zadiprion falsus*, n.sp. (= *Z. vallicola* of authors, not Rohwer) have been recorded in the pine forests of Michoacán (Hernández, 1930; Olmedo, 1932; Mendiola, 1942; Lara & Ortiz, 1969). In Guatemala, an unidentified species referred to as '*Diprion* sp.' has caused damage (Alvarado, 1938, 1939). Wilkinson & Drooz (1979) reported

on the biology of *Neodiprion excitans* Rohwer in Belize.

Three genera are known from south of the United States; references to other genera (e.g. *Diprion*) in the literature undoubtedly refer to one of these. Smith (1975) gave a key to North American genera and listed the world species. Wong & Szlabey (1986) treated the larvae of the North American genera.

Key to Genera

- 1 Anal cell of forewing contracted in middle, with basal and apical anal cells (Fig. 54); male flagellar segments unipectinate (Fig. 55) (*Monoctenus*)
- Anal cell of forewing not contracted, anal crossvein (a) present (Fig. 53); male with at least 10 basal flagellar segments bipectinate (Fig. 56) (*Diprioninae*)
- 2 Female pulvillar pad of hind basitarsus shorter than apical width of basitarsus (Fig. 58); hind tibial spurs normal, inner one longer than half apical width of tibia; antenna usually 16-20 segmented, male antenna with all but last flagellar segment bipectinate; thorax mostly impunctate and shining, some large punctures sometimes on mesoscutellum (*Neodiprion*)
- Female pulvillar pad of hind basitarsus longer than apical width of basitarsus (Fig. 59); hind tibial spurs subclavate, not longer than half apical width of tibia; antenna 21-25 segmented, male antenna with 5 apical flagellar segments unipectinate; thorax, especially mesonotum, densely punctate and dull (*Zadiprion*)

Subfamily MONOCTENINAE

Genus *Monoctenus* Dahlbom

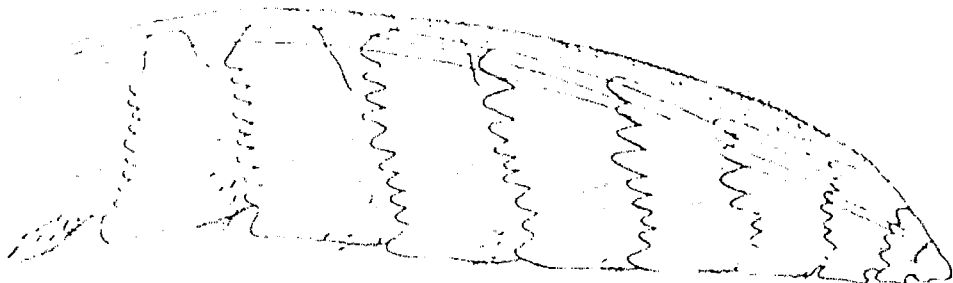
Monoctenus Dahlbom 1835: 7.

Type species: *Tenthredo juniperi* Linnaeus. Monotypic.

Forewing with vein 2A+3A contracted in middle and fused with 1A at centre, forming basal and apical anal cells (Fig. 54). Supraclypeal area somewhat protuberant. Flagellar segments of male unipectinate (Fig. 55).

Larvae of *Monoctenus* feed on the foliage of Cupressaceae, mainly *Juniperus*. The genus is holarctic, and in North America several species are found east of the Rocky Mountains. One species occurs in Mexico.

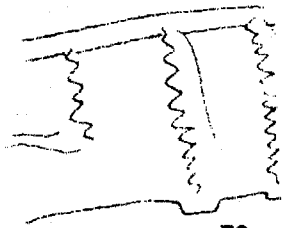
h
o
p
l
o
g
i
c
a
l
i
t
y



68



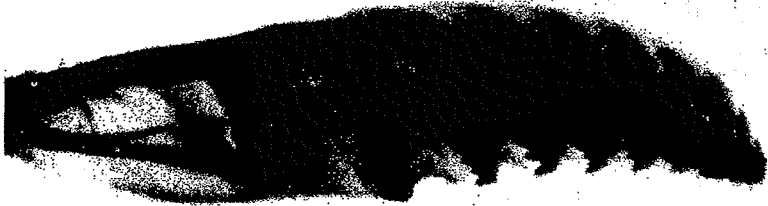
69



70



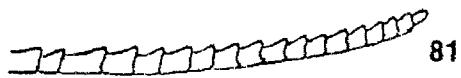
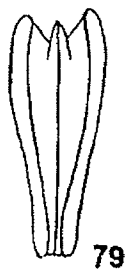
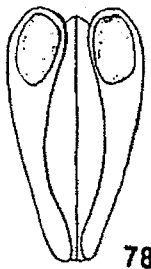
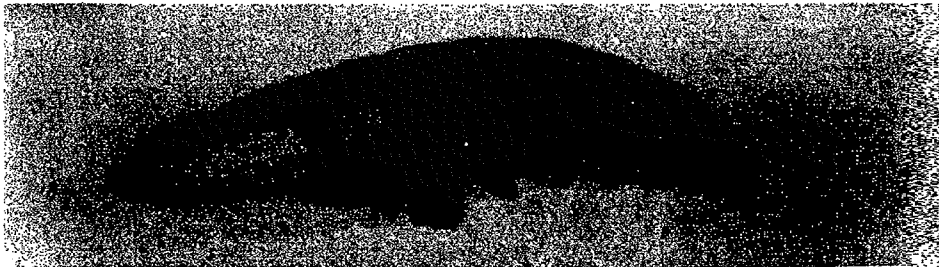
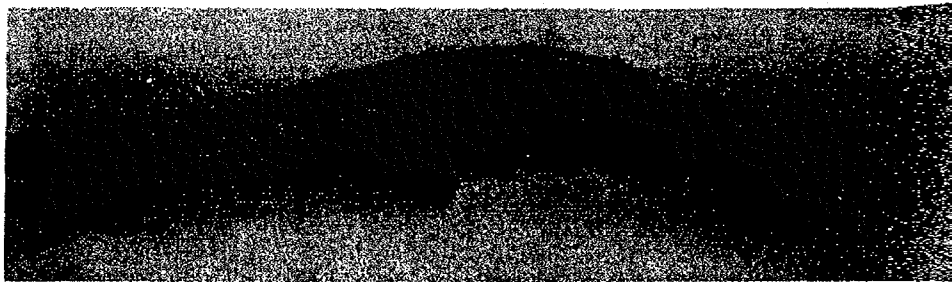
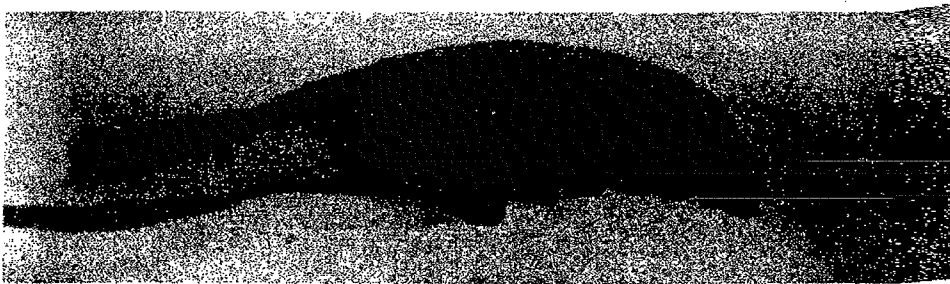
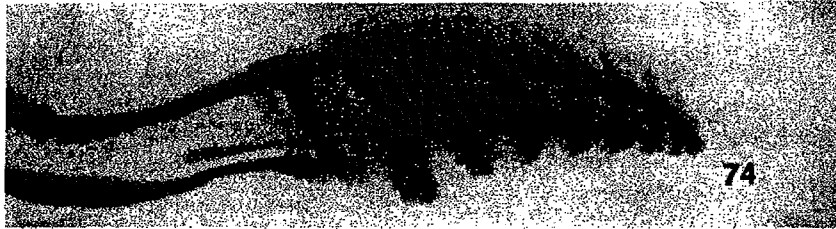
71

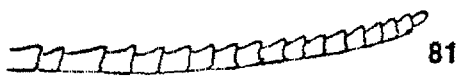
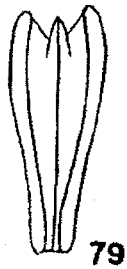
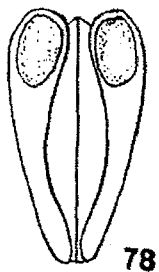
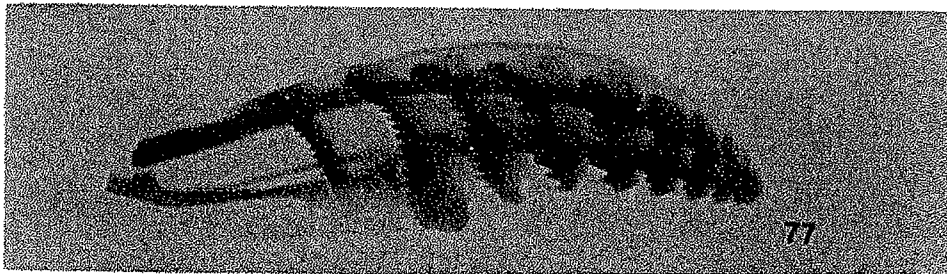
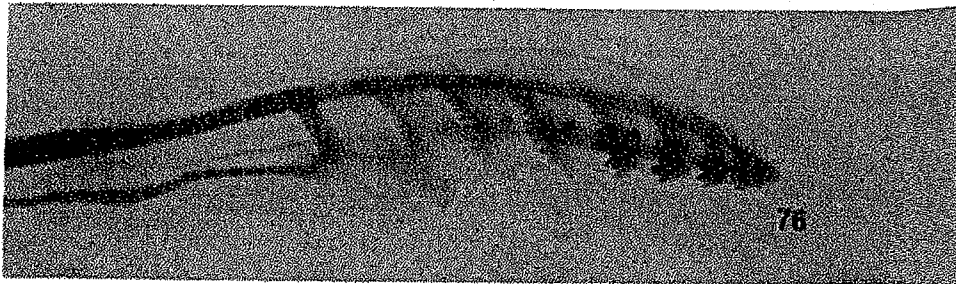
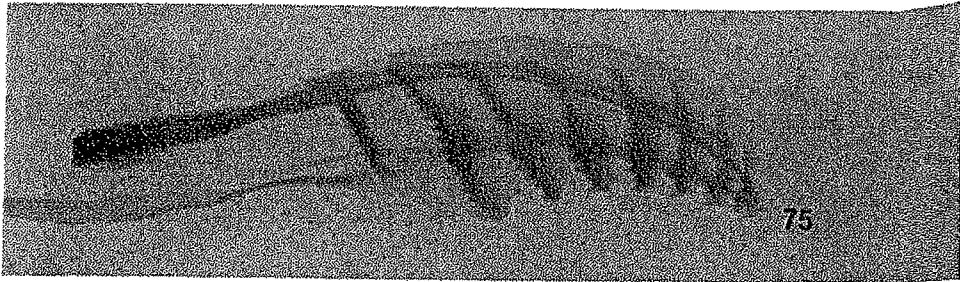
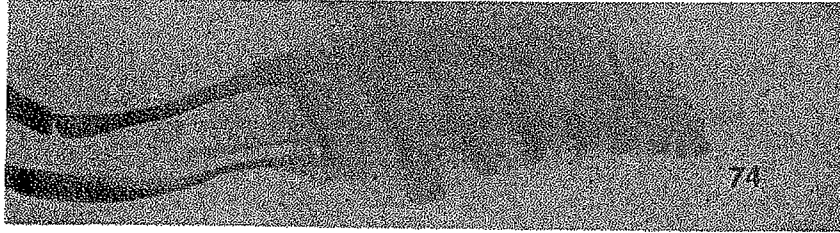


72



73





SPECIES

sadadus Smith - Mexico (Durango, Veracruz)

**Monoctenus sadadus* Smith 1975: 414-415, Figs. 8-10. ♀, ♂. '3 mi W El Salto, Dgo., Mex., 9000' (Ottawa, ♀) (specimens were labelled 'ex juniper?'). Lancet and male genitalia as in Figs. 64, 68.

Subfamily DIPRIONINAE

Genus *Zadiprion* Rohwer

Neodiprion subg. *Zadiprion* Rohwer 1918: 83.

Type species: *Diprion grandis* Rohwer. Orig. desig.

Forewing with anal cell crossed by anal cross-vein (a), 2A+3A not fused with 1A at centre (Fig. 53). Pulvillar pad of hind basitarsus of female longer than apical width of basitarsus and apical hind tibial spurs subclavate, not longer than half apical width of hind tibia (Fig. 59). Supraclypeal area flat. Antenna 21-25 segmented, male antenna with basal flagellar segments bipectinate (Fig. 56), apical 5 segments unipectinate (Fig. 55). Thorax, especially of male, densely punctate, dull.

Species of *Zadiprion* are large, plump sawflies, usually larger than species of *Neodiprion*. The genus occurs only in western United States, south to Guatemala. There are five species, four of which occur in Mexico and Guatemala, and all are associated with *Pinus* spp. *Zadiprion falsus*, n.sp. (= *Z. vallicola* of authors, not Rohwer), has been responsible for extensive damage in the forests of Michoacán. The single species not included here is *Z. rohweri* (Middleton) which feeds on *Pinus monophylla* and *P. edulis* in south-western United States. It is separated from the species below by the almost entirely yellow coloration and the inverted U-shaped first annulus of the lancet of the female (Smith, 1972c, Fig. 2), and the black abdomen (except hypandrium) of the male (other known males have a lateral white border on the abdomen and most of the sternum whitish).

Key to species

- 1 Female..... 2
- Male..... 5
- 2 First annulus of lancet present, with 2 or 3 large teeth or about 11 small teeth (Figs. 60, 61)..... 3
- First annulus of lancet absent (Figs. 62, 63)..... 4
- 3 First annulus of lancet with 2 or 3 large teeth; annuli 2 and 3 subparallel (Fig. 60)..... *falsus*, sp.n.
- First annulus of lancet with about 11 small teeth; annuli 2 and 3 converge at dorsum (Fig. 61)..... *townsendi* (Cockerell)
- 4 Head, thorax, and legs mostly reddish brown; lancet with 8 annuli (Fig. 63)..... *roteus* Smith
- Head, thorax, and legs yellowish; lancet with 7 annuli (Fig. 62)..... *howdeni* Smith
- 5 Clypeus, supraclypeal area, basal plates, and mesopleural spot yellow; aedeagus as in Fig. 67..... *townsendi* (Cockerell)
- Above parts entirely black..... 6
- 6 Legs, except coxae, yellowish; genitalia as in Fig. 66..... *howdeni* Smith
- Legs with coxae, trochanters, and most of femora black, extreme apices of femora, tibiae and tarsi yellowish; genitalia as in Fig. 65..... *falsus*, sp.n.

SPECIES

falsus Smith, sp.n. - Mexico (Jalisco, Michoacán)

Neodiprion (Zadiprion) vallicola: Hernández, 1930: 196-198. Middleton, 1931: 165 (♂). Olmedo, 1932: 168-175 (♀, ♂, larva; biology; hosts f, h). Mendiola, 1942: 3-30.

Zadiprion sp.: Lara & Ortiz, 1969: 14-20 (biology; hosts b, f).

Zadiprion vallicola: Rivadeneyra, 1970: 69-100 (biology; damage; parasites; hosts b, f). Smith, 1971a: 194, 196 (♀, ♂, larva; hosts a-g). Smith 1975: 415 (in key). Cisneros, 1976 (biology). Solorzano, 1977 (biology). Hernández, 1980: 109-114, Fig. 3 (biology; hosts c, e, h-k).

Zadiprion falsus Smith. This species was adequately described and illustrated by Smith (1971a, 1975) under the name *vallicola* and is separated from other species in the preceding

FIGS. 74-81. Diprionidae. 74, Female lancet of *Neodiprion gillettei*. 75, Female lancet of *N. bicolor*. 76, Female lancet of *N. equalis*. 77, Female lancet of *N. autumnalis*. 78, Apical view of sheath, *N. omosus*. 79, Apical view of sheath, *N. merkei*. 80, Female antenna, *N. omosus*. 81, Female antenna, *N. equalis*.

key. Lancet as in Fig. 60, male genitalia as in Fig. 65.

Holotype. ♀, MEXICO: Uruapan, Michoacán, larva collection 3.iii.1968, emerged 14 vi.1968, on *Pinus montezumae* (Fedorico Islas S.) (Washington).

Paratypes. MEXICO: 5 ♀, 4 ♂, same data as for holotype (Washington).

Discussion. Because of the literature referring to the name *vallicola*, it is unfortunate to have to change the name of this species. All literature, except for Rohwer's original description of *vallicola*, is based on misidentifications and all pertains to and must now be called *falsus*. This misidentification has perpetuated since Middleton (1931) who reported on specimens identified by Rohwer from Michoacán, Mexico, which were feeding on pines. Since that time, it was wrongly assumed that everything from Mexico was *vallicola*. The type of *vallicola*, is from Chihuahua, a locality far removed from that of *falsus*, and, in addition, is morphologically identical to *townsendi*, a species rather widely distributed in south-western United States. The species from Michoacán and adjacent areas, as reported on in the literature, therefore requires a different name.

This species has caused extensive damage to pines where it occurs. A number of the above papers deal with its biology.

Hosts: (a) *Pinus pseudostrobus chiapensis*; (b) *Pinus montezumae*; (c) *Pinus michoacana*; (d) *Pinus tenuifolia*; (e) *Pinus oocarpa*; (f) *Pinus leiophylla*; (g) *Pinus cembroides*; (h) *Pinus ayacahuite*; (i) *Pinus pringlei*; (j) *Pinus pseudo-strobus*; (k) *Pinus hartwegi*.

howdeni Smith — Guatemala; Mexico (Chiapas)

**Zadiprion howdeni* Smith, 1975: 416. ♀. '5 mi. W. San Cristobal L. C., Chis., Mex.' (Ottawa, ♀).

Host: *Pinus oaxacana*.

Specimens from 'Depto. Solola, Argueta', and 'Comovidad Ruiz, S. Juan Jacatep.', Guatemala, were reared from the above host.

roteus Smith — Mexico (Hidalgo)

**Zadiprion roteus* Smith, 1975: 416-417. ♀. 'Jacala, Hdlg., Mex.' (Ottawa, ♀).

townsendi (Cockerell) — Mexico (Chihuahua); U.S.A. (South Dakota south to Arizona, New Mexico).

**Lophyrus townsendi* Cockerell, 1898: 457. ♀. 'South Fork, Eagle Creek, White Mountains, N. Mex., about 8000 feet' (Washington, ♀). *Neodiprion (Zadiprion) townsendi*: Rohwer, 1918: 83.

Zadiprion townsendi: Ross, 1951: 19. Smith, 1971a: 191-194, Figs. 4, 7, 14 (♀, ♂, larva; host a; syn.: *grandis* Rohwer). Smith, 1979: 30 (host a).

'bull pine sawfly': Swenk, 1911: 1-33 (host a; biology).

**Diprion grandis* Rohwer, 1912c: 208. ♀, ♂. 'Crawford, Sioux County, Nebraska' (Washington, ♀).

**Neodiprion (Zadiprion) vallicola* Rohwer, 1918: 84. ♀. 'Meadow Valley, Mexico' (Washington, ♀). Syn.n.

Hosts: (a) *Pinus ponderosa*.

The type locality of *vallicola*, Meadow Valley, is a collecting site of C. H. T. Townsend and is in western Chihuahua at the headwaters of Rio Piedras Verdes, 2226 m (7300 ft), 108° 15' W, 29° 58' N. The lancet of the type is identical to that of *townsendi* (Fig. 61). This name was wrongly applied to a species from central Mexico (see *falsus*).

Genus *Neodiprion* Rohwer

Neodiprion Rohwer, 1918: 83.

Type species: *Lophyrus lecontei* Fitch. Orig. desig.

Anal cell of forewing crossed by a crossvein (a), vein 2A+3A not contracted and fused to 1A at centre (Fig. 53). Supraclypeal area flat. Female pulvillar pad of hind basitarsus shorter than apical width of basitarsus; hind tibial spurs acute at apex, with inner spur longer than half width of hind tibia (Fig. 58). Antenna usually 15-20 segmented; flagellar segments of male antenna bipectinate except for apical one (Fig. 56). Thorax, especially of male, smooth, shining and impunctate or with some large punctures on mesoscutellum.

Nearly thirty species of *Neodiprion* occur in North America, and a number of these may extend south with the range of their hosts. The fauna of Mexico and Central America is virtually

unexplored. Some individual specimens from Mexico cannot be adequately identified and may be members of unworked complexes of western North America. Several distinct entities are described below. Collections of adults and larvae with associated biological information will be necessary to determine the extent and number of species present in Mexico. It is very important to have as much information as possible for species identification, though, morphologically, species are primarily based on characters of the female. I have not seen many specimens, and those recorded here are only the ones verified by me. Reports of other species, such as *Neodiprion sertifer* (Geoffroy) (Lara & Ortiz, 1969), may belong to one of the species listed below. Ross (1955) keyed the females of the North American species. Most species are associated with *Pinus* spp.; however, some feed on *Tsuga* spp., *Picea* spp., *Abies* spp. and *Pseudotsuga* spp.

Two species groups in *Neodiprion* are recognized, the *lecontei* group and the *sertifer* group. The *lecontei* group has large, distinct punctures rather evenly distributed on the mesoscutellum and occurs mainly in eastern North America, Cuba, and Central America (*N. excitans*). The *sertifer* group has no punctures on the mesoscutellum or a very few limited to the extreme lateral areas, and occurs mainly in western North America and Mexico.

Key to species (females)

- 1 Mesoscutellum with distinct punctures; head and thorax may be red with abdomen blue black and white 2
- Mesoscutellum smooth, impunctate or with a few punctures on sides; colour not as above, head and thorax similar to colour of abdomen 5
- 2 Annuli 3 and 4 of lancet strongly divergent (Fig. 69) 3
excitans Rohwer
- Annuli 3 to apex of lancet subparallel (Figs. 71, 72) 4
cubensis Hochmut
- 3 Annulus 1 with 4 or 5 large teeth (Fig. 70) 4
merkeli Ross, *merkeli maestrensis* Hochmut
- Annulus 1 with 10-15 or more small teeth (Figs. 71, 72) 4
- 4 Annulus 1 and 2 strongly divergent (Fig. 71); scopaes of sheath slender without distinct scopal pads (Fig. 79) 4
merkeli Ross, *merkeli maestrensis* Hochmut
- Annulus 1 and 2 subparallel (Fig. 72); scopaes of sheath broad with distinct, round scopal pads (Fig. 78) 4
insularis (Cresson)
- 5 Head, body, and legs shining black with basal quar-

ter to third of tibiae white; sometimes brownish on postocular area (rami of central antennal segments longer than length of respective segment, Fig. 80; teeth of annuli usually large and triangular, Fig. 73) 6

- Colour not as above, brownish or reddish brown with black markings on mesonotum, head, and dorsum of abdomen, or with abdomen entirely orange... 7
- 6 First annulus with less than 9 and annuli 2-4 each with less than 11 large, triangular teeth; distance between first and second annuli equal to distance between second and third annuli (Fig. 73) 6
omonus, sp.n.
- First annulus with 11 annuli, annuli 2-4 each with 13-15 annuli, teeth of annuli smaller than above; distance between first and second annulus greater than distance between second and third annuli 6
unidentified species
- 7 Abdomen entirely orange; lancet as in Fig. 75, with small, evenly sized annular teeth *bicolor*, sp.n.
- Abdomen reddish usually with some black on dorsum or all black above and whitish laterally and ventrally 8
- 8 Lancet with second and third serrulae equal in size, lancet as in Fig. 76 *equalis*, sp.n.
- Lancet with second serrula much larger than third serrula, lancet similar to that shown in Fig. 77 *autumnalis* Smith

SPECIES

autumnalis Smith species-complex - Mexico (Chiapas, Chihuahua, D.F., Hidalgo, Veracruz); U.S.A. (all western states east to the Great Plains).

Neodiprion fulviceps: Smith, 1975: 417 (Mexico). Castro Castaneda, 1981: 43-51 (biology, in Chihuahua, host a)

**Neodiprion autumnalis* Smith in Smith & Wagner, 1986: 218-220. ♀, ♂. 'Springerville, Apache Co., Arizona' (Washington, ♀).

Hosts: (a) *Pinus arizonica*; *P. lecontei*; *Pinus* spp.

Specimens from Mexico are referred to this complex at present. There may be a number of species involved, and clarification of species limits needs to be based on series of reared individuals with associated larvae and biological data. The female lancet is similar to that in Fig. 77. See Smith & Wagner (1986) for discussion and separation of *autumnalis* from *fulviceps* (Cresson), the latter now regarded as a separate species with different biological characteristics. *Neodiprion autumnalis* is by far the most

widespread and most commonly collected species of the two.

Two reared series examined are from Ajusco, Mexico, D.F., on *P.teocote*, and from San Juanito, Chihuahua, on *P.arizonica* (Castro Castaneda, 1981).

bicolor Smith, sp.n. – Mexico (Hidalgo)

Female. Length, 6.0–7.5 mm. Antenna black; head black with labrum, clypeus, supraclypeal area, and palpi yellow orange and gena to top of eye dark brown or head may be mostly reddish brown with ocellar area and stripes to eyes black and spot above each antenna black. Thorax with pronotum whitish, extreme anterior margin black; meso- and metanotum black, lines along lateral border of mesoprescutum and lateral edges of lateral lobes dark brown; mesoscutellum white; pleurae whitish to yellow, mesosternum black. Abdomen entirely reddish orange; sheath, except for apical margins, black. Legs yellow orange, only extreme base of femora with black spot; tibiae and tarsi paler, more whitish than femora. Wings hyaline, very slightly clouded at apex; veins and stigma black. Antenna 18-segmented; antennal length $1\frac{1}{2}\times$ head width; in lateral view, rami of central segments a little longer than length of respective segment. Head punctate, few to no punctures on postocular and postocellar areas; few punctures on extreme lateral edges of mesoscutellum. Postocellar area protuberant, convex, raised above level of ocelli. Distances between eye and lateral ocellus, hindocelli and hindocellus and posterior margin of head as 1.0:1.2:1.0. Sheath with scopal pads, as in Fig. 78. Lancet as in Fig. 75; annular teeth small and triangular, about 13–14 on annulus 1, 16–18 on annulus 2, and 12–14 on annuli 3 and 4; distance between first and second annuli slightly greater than distance between second and third annuli; second serrula small, truncate at apex.

Male. Length, 6.3 mm. Black: apical quarter femora, tibiae, and basal 2 tarsal segments white. Antenna pectinate.

Holotype. ♀, MEXICO: Cardonal, Hidalgo, 782A, 2.vii.1981, *Pinus pinceana* (Cibrian & Mendez) (Washington).

Paratypes. MEXICO: 4♀, 1♂, same data as for holotype (Washington).

Discussion. The blackish to reddish brown head and thorax and the contrasting bright

orange to red orange abdomen is a most unusual colour in *Neodiprion*; this, and comparison of the lancet with Fig. 75, should separate this species.

cubensis Hochmut – Cuba

Neodiprion cubensis Hochmut, 1984: 12–16, Figs. 1C, 2C, 3C. ♀, larva. 'Casimba,' Mesita de Nipe, Provincia Holguin, Cuba (Instituto de Zoologia, Acad. Ciencias de Cuba, ♀) (host a).

Host: (a) *Pinus cubensis*.

equalis Smith, sp.n. – Mexico (México).

Female. Length, 6.4 mm. Antenna black; head black with anterior portion from halfway between ocelli and below whitish. Thorax yellow orange with meso- and metanotum black except for white scutellum and brownish streaks laterally on mesoprescutum and lateral lobes. Abdomen black on dorsum, yellowish white laterally and ventrally. Legs yellowish orange. Wings hyaline, veins dark brown, stigma amber. Antenna 18-segmented, length about $1\frac{1}{2}\times$ head width; in lateral view, rami of segments very short, much less than length of respective segment. Head punctate, punctures sparse to absent on postocular and postocellar areas. Distances between eye and hindocellus, hindocelli, and hindocellus and posterior margin of head as 1.0:1.5:1.0. Sheath with scopal pads, as in Fig. 78. Lancet as in Fig. 76; long and slender; annular teeth long and narrow, most $2\times$ or more longer than broad; about 13–14 teeth on first annulus, 18–20 teeth on second annulus, and 15–16 teeth on third and fourth annuli; distance between first and second annuli much greater than distance between third and fourth annuli; second serrula small, subequal in size to third serrula.

Male. Unknown.

Holotype. ♀, MEXICO: Real de Arriba, Temascaltepec, 23.v.1933 (*Hinton & Usinger*) (San Francisco).

Paratype. MEXICO: 1♀, same data as holotype, except 12.viii.1933 (San Francisco).

Discussion. The long slender annular teeth and the small second serrula that is about the same size as the third serrula are distinctive. The lancet is unlike any North American species in Ross' (1955) key.

excitans Rohwer - Belize; Honduras; Nicaragua (?); El Salvador; U.S.A. (Delaware, Virginia south to Florida, west to Oklahoma, Texas)

**Neodiprion* (*Neodiprion*) *excitans* Rohwer, 1921: 93-94. ♀, ♂. 'Montgomery County, Texas' (Washington, ♀). Smith, 1975: 417 (specimens from Belize, El Salvador and Nicaragua probably this species). Wilkinson & Drooz, 1979: 501-505 (Belize; biology; host a; possibly a distinct species).

Hosts: (a) *Pinus caribaea*; '*P. caribaea* var. *hond.*' from El Salvador specimens; *P. oocarpa*, from Honduras specimens.

Specimens have been collected in several Central American countries which are referred to *excitans* for the time being. Preferred hosts in the United States are *Pinus taeda* and *P. echinata*; but it is also known on *P. clausa*, *P. serotina*, *P. glabra*, and *P. rigida*. Wilkinson & Drooz (1979) noted some differences between the Belize and U.S. populations, namely, that the female lancets had 1-3 more teeth per annulus in the Belize specimens and the different type of oviposition pattern, the Belize populations ovipositing in rows on the needles of its host and the U.S. populations ovipositing a single egg per needle next to the fascicle sheath. Further studies are needed to determine if the two populations crossbreed and to see if there are constant morphological features that will separate them.

I have seen specimens from El Salvador with the host label 'white pine'; from El Salvador, Coatepeque, 1974-IX, from *Pinus caribaea* var. *hond.*; and from Honduras (Siquatopeque) reared from a cluster of about 45-50 larvae on the tip of a pine needle cluster of *Pinus oocarpa*. The Nicaraguan record is based on larvae.

insularis (Cresson) - Cuba

**Lophyrus insularis* Cresson 1865: 1-2. ♀, ♂. 'Cuba' (Philadelphia, ♀) (host a). Cresson, 1880a: 44. Dalla Torre, 1894: 294. Ashmead, 1900: 366. Konow, 1905c: 42. Cresson, 1916: 5 (type).

Neodiprion insularis: Ross, 1951: 20-21. Ross, 1955: 197, 203, Fig. 31 (in key; lancet fig.; separation from N. Am. species). Smith, 1969: 543. Smith, 1971b: 530 (type).

Hochmut, 1972: 2-18 (Cuba; biology; host b). Hochmut, 1984: 2-9, Figs. 1A, 2A, 3A (♀, ♂, larva; lancet fig.; biology; host b; distribution in Cuba).

Hosts: (a) *Pinus* sp.; (b) *Pinus caribaea*.

merkelii merkelii Ross - Bahamas (New Providence Is.); U.S.A. (Florida, Georgia)

**Neodiprion merkelii* Ross, 1961: 542-543. ♀, ♂, 'Ft. Meyers, Florida' (Washington, ♀). Greenbaum, 1975: 202 (New Providence Is.; host a).

Hosts: (a) *Pinus caribaea*.

In the United States this species has been recorded from *Pinus elliottii* var. *densa*. For further references, see Smith (1979). The New Providence record is based on larvae.

merkelii maestrensis Hochmut - Cuba

Neodiprion merkelii maestrensis Hochmut, 1984: 9-12, Figs. 1B, 2B, 3B. ♀, ♂, larva. 'Pinar de Morales, El Corojo, Municipio Guisa, Provincia Granma, Cuba' (Instituto de Zoología, Acad. Ciencias de Cuba, ♀) (host a; also in Provincia Santiago).

Hosts: (a) *Pinus maestrensis*.

omonus Smith, sp.n. - Guatemala; Mexico (México, Michoacán, Morelos)

Neodiprion gillettei: Smith, 1975: 417 (Mexico). Jimenez, 1976: 4-17 (biology, parasites; on pines, Michoacán). Hernandez, 1980: 109-117, Fig. 4 (biology). [Misidentifications]

Neodiprion omonus Smith. Female. Length, 5.8-7.5 mm. Black; palpi brownish, postocular area sometimes brownish, extreme apices of femora and basal quarter to third of tibiae white, extreme apices of tibiae and tarsal segments narrowly ringed with white. Wings lightly, uniformly blackish clouded; veins and stigma black. Antennal length $1\frac{1}{4}$ × head width, in lateral view, rami of central segments longer than length of respective segment. Head punctate, fewer punctures on postocular area and practically none on postocellar area; postocellar area slightly convex, not raised above level of ocelli. Distances between eye and lateral ocellus, hindocelli, and hindocellus and post-

erior margin of head as 1.0:1.2:1.0. Sheath with scopal pads, as in Fig. 78. Lancet as in Fig. 73; annular teeth large and triangular, 7-9 on first annulus and 9-11 on annuli 2-4; distance between first and second annulus subequal to distance between second and third annuli; lower margin of second serrula straight, second serrula much larger than third.

Male. Length, 5.8-6.8 mm. Antenna pectinate. Colour similar to female.

Holotype. ♀, MEXICO: Cacupo Exp., Uruapan, ex pupa 8.xi.1971 (Cisneros) (Washington).

Paratypes. MEXICO: 1♀, same data as for holotype; same except for dates, 1♀, viii.1971, 8♂, xi.1971 (Washington); 1♀, 1♂, Tequesquahuac, 21.viii.1979, on *Pinus radiata* (Washington); 1♀, Coajomulco, Mor., 7.vi.1946 (J. & D. Pallister) (New York).

Other specimens. GUATEMALA: 1♀, 1♂, Depto Solola, Argueta, 12.ix.1979 *P.oaxacana* (Dix).

Discussion. This species may be confused with *gillettei* (Rohwer), a species with similar coloration from south-western United States, but there are more teeth on the annuli and the teeth are much smaller on the lancet of *gillettei* (Fig. 74). The small number of teeth and their large size should distinguish this species. The specimens from Guatemala are very similar, though slight differences and lack of a number of specimens for study preclude making them part of the type series. Hernandez (1980) reported on this species under the name *gillettei*.

Host information on the Uruapan specimens was sent to me by F. Islas S.; he stated that the larvae fed on *Pinus patula*, *P.lawsoni*, *P.leiophila* and *P.ayacahuite*.

Unidentified species. Guatemala.

One specimen similar in colour to *omosa* was examined, but the lancet is different, especially the distance between the first and second annuli which is greater than the distance between the second and third annuli. The annular teeth are also smaller and greater in number. It was reared from *Pinus tenuifolia*.

Superfamily SIRICOIDEA

Family XIPHYDRIIDAE

Xiphydriidae are usually moderate to large cylindrical sawflies though some can be very small. A specimen of *Derecyrtia* from Chile is

about 4 mm long and some of the larger specimens, 25 mm. Characteristics of the family are the long, slender, filiform antenna with about 20-25 segments (Fig. 84); head above eyes commonly dome-shaped and shining (except *Brachyxiplus*); cervical sclerites elongated and appearing as a short neck (Fig. 86); lateral lobes of mesonotum usually divided by a transverse ridge (Fig. 87); mesonotum and metanotum approximate with none of the mesopostnotum visible; posterior margin of pronotum emarginated (Fig. 87); one or two apical spines on foretibia (one sometimes small and difficult to see); lack of preapical spines on tibiae (except *Steirocephala*); radial crossvein (2r) present or absent in forewing, vein 2A+3A of forewing complete and connected to 1A by a crossvein (a) (Figs. 82, 83), and hindwing with closed cells (Fig. 82).

Larvae of Xiphydriidae are wood borers. Those of the North American species, all in the genus *Xiphydria* Latreille, bore in wood of angiospermous trees and shrubs, most commonly in twigs and smaller branches and normally in dead or dying wood. Habits of neotropical species are not known; only two collections provide clues to possible hosts. One is a collection of larvae of an unidentified species (intercepted by U.S. Quarantine at New York) in wood logs from Nicaragua. The other is an adult of *Steirocephala flavipes* from Chile which bears a label '*Nothofagus pumilio* leaves'.

Adults are rare in collections, I have seen less than fifty specimens which includes types of most species. Maa (1949) and Benson (1954) each presented a classification for the world fauna, Smith (1976) revised the North American fauna, and Smith (1978) listed about 100 species in his world catalogue. Two subfamilies were defined by Benson (1954), the Derecyrtinae and Xiphydriinae. Except for the dubious placement of one species in the Xiphydriinae, all Neotropical species belong in the Derecyrtinae which has representatives only in the neotropics and Australia. The Xiphydriidae are known from Nicaragua to the southern tip of Chile; none have been found in the area between Central America and the north temperate regions of the United States. Four genera are included.

Key to genera

1 Forewing with radial crossvein (Fig. 83) 2

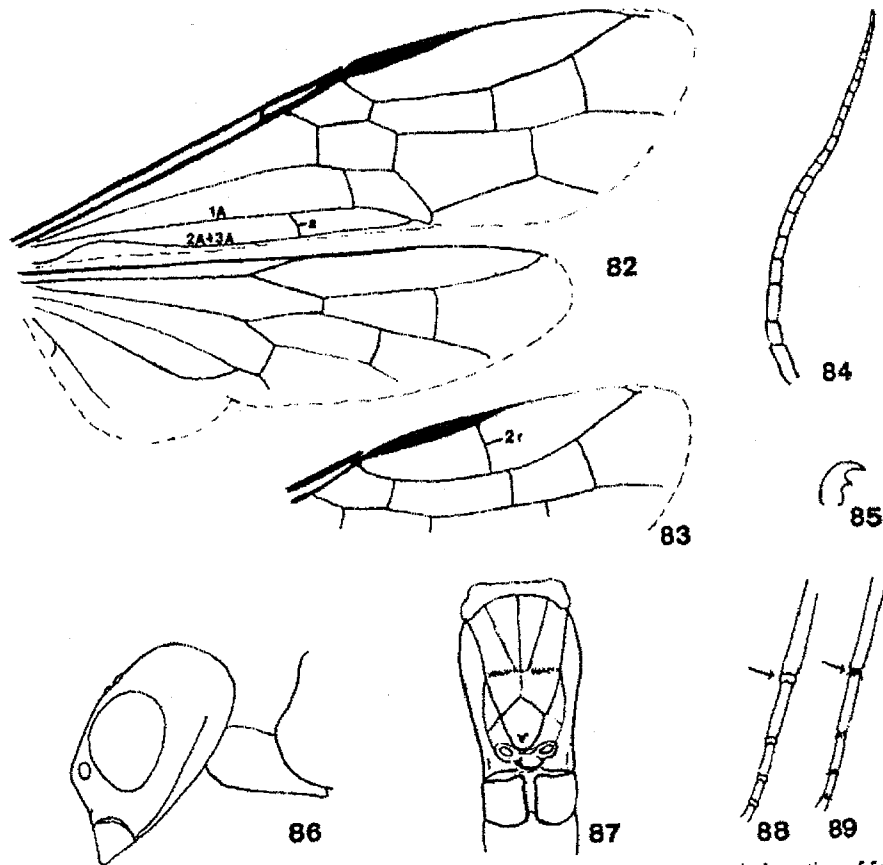
- Forewing without radial crossvein (Fig. 82) 3
- 2 Head not broader than thorax; area posterior to supraorbital line dull, deeply sculptured; tarsal claws with inner tooth (Fig. 85) Chile *Brachyxiphus*
- Head slightly broader than thorax; area posterior to supraorbital line polished and practically unsculptured; tarsal claws simple; Peru *Eoxiphia*
- 3 Genal carina absent; tarsal pulvilli absent, tarsi clothed beneath with dense mat of hairs (Fig. 89); tibiae without preapical spines; third antennal segment $1\frac{1}{2}\times$ or less length of fourth (Fig. 84) *Derecyrta*
- Genal carina developed behind each eye on lower lateral margin of head (Fig. 86); lobelike tarsal pulvilli present (Fig. 88) mid- and hind tibiae with preapical spines; third antennal segment $2\times$ length of fourth *Steirocephala*

Subfamily DERECYRTINAE

Posterior margin of the pronotum shallowly excavated, excavation about equal to medial length of pronotum; mesoscutellum with dorsal area margined by a carina and usually with a prominent tubercle at its apex; femora scarcely swollen, hind femur plus trochanter 4-7 times as long as broad; hindclaw of female enlarged and $1\frac{1}{2}\times$ as long as midclaw; female sheath equals a half to five-eighths of basal plate; and tarsi with or without pulvillar pads.

Tribe Derecyrtni

Differentiated from the only other tribe, the Brachyxiphini, by the lack of the radial crossvein



FIGS. 82-89. Xiphydriidae. 82, Forewing and hindwing, *Derecyrta* sp. 83, Anteroapical portion of forewing, *Brachyxiphus* sp. 84, Antenna, *Derecyrta* sp. 85, Tarsal claw, *Derecyrta* sp. 86, lateral view of head and cervical sclerites, *Steirocephala* sp. 87, Dorsum of thorax, *Derecyrta* sp. 88, Hind tarsus, *Steirocephala* sp. 89, Hind tarsus, *Derecyrta* sp.

(2r) in the forewing (Fig. 82), head shining and impunctate behind ocelli, the postocellar area not differentiated by lateral furrows, and hairs on head, if present, much shorter than pedicel.

Genus *Derecyrtia* Smith

Derecyrtia Smith, 1860: 255.

Type species: *Derecyrtia pictipennis* Smith. Monotypic.

Xyphydrina Westwood, 1874: 121. Nomen nudum.

Third antennal segment about 1½× length of fourth segment. Genal carina absent. Tarsal segments without pulvillar pads, only mat of hairs present beneath each tarsal segment (Fig. 89). No preapical spines on hind tibia. Hind femur 4-5× longer than broad; hind apical tarsal segment of female shorter than hind basitarsus; tarsal claws with small inner tooth.

Derecyrtia occurs from Costa Rica to southern Brazil and Paraguay and possibly Chile and is the largest neotropical genus of Xiphydriidae. Nine species have been described, but most are known only from one sex. Because of the lack of specimens available for study, it is impossible to determine the extent of variation in coloration and sculpturation that is presently used to distinguish species and impossible to make definitive sex associations. The characters in the following key are sufficient to separate the species as currently known. Konow (1905d) gave a key to species.

Key to species

- 1 Female 2
- Male 9
- 2 Head with yellow stripe from inner orbits through malar space and gena to upper posterior margin of head; yellow spot on supraclypeal area; upper third of mesepisternum, and lateral spots on abdominal segments 2-8 yellow *circularis*, sp.n.
- Head, thorax, and abdomen uniformly black or thorax and abdomen partly red, without yellow as described above 3
- 3 Wings clear hyaline or yellowish, at most infuscated black at apices 4
- Wings darkly black infuscated, sometimes with hyaline spot or band below stigma and lighter black toward apices 6
- 4 Wings yellowish infuscated with apex of forewing (from apex of radial cell) blackish and intercostal area blackish; costa and stigma black; thorax and abdomen entirely orange (sheath black); sheath short, as long as high (legs black with apex of fore femur, fore tibia, and all tarsi except apical tarsal segment of each dark orange) *andrei* Konow
- Wings uniformly hyaline to yellowish infuscated; costa and stigma yellow; thorax and abdomen dark red brown to brown or black with part of thorax red; sheath long, 1½× or more longer than high 5
- 5 Thorax and abdomen uniformly dark brown to brown, paler than black head *rugifrons* Cameron
- Thorax (except for black cervical sclerites, mesepimeron, mesoscutellum, and metathorax) red, contrasting with black abdomen and head *patagiata* Konow
- 6 Thorax and abdomen, except for black apical segments and sheath, red; forewing with broad hyaline band below stigma and small hyaline spot at base *pictipennis* Smith
- Thorax all or partly and abdomen (except sometimes basal 2 or 3 segments) black; forewing with hyaline band, small hyaline spot, or uniformly dark below stigma 7
- 7 Forewing with broad hyaline band below stigma; abdominal segments 2-4 sometimes brownish to red (top of head, infusions on pronotum, and medonotal lateral lobes sometimes reddish) *lugubris* Westwood
- Forewing uniformly black infuscated or with only a small hyaline spot in one or two cells below stigma; abdomen black 8
- 8 Pronotum (except sometimes lower lateral angles), mesonotum anterior to scutellum, upper third or less of mesopleuron, and tegula red; front of face between ocelli and clypeus longitudinally striate *striatifrons* Malaise
- Thorax, abdomen, and head black; front of face irregularly rugose *jakowlewi* Tschitschérine
- 9 Head black with yellow stripe on inner orbits through malar space and gena to upper posterior margin of head; prescutum and scutellum of mesonotum yellow; upper third of mesepisternum and lateral spots on abdominal segments 2-8 yellow; venter of abdomen reddish brown *circularis*, sp.n.
- Head, thorax, and abdomen uniformly red or black, without yellow pattern as described above 10
- 10 Forewing darkly uniformly infuscated, at most with small hyaline spot in one or two cells; pronotum and underside of thorax dark brown *jakowlewi* Tschitschérine
- Forewing with or without hyaline bands or marks; head, legs, pronotum, mesonotum, and at least apical abdominal segments reddish to reddish brown 11
- 11 Entirely reddish brown, only antenna and femora

- blackish; forewing with infuscated band below stigma and at apex *variipennis* Rohwer
 - Antenna and base of abdomen black; forewing moderately infuscated. *porteri* Brèthes

SPECIES

andrei Konow - Ecuador

- **Derecyrtia andrei* Konow, 1897c: 373-374. ♀. 'Ecuador' (Eberswalde, ♀). Konow, 1905b: 3. Konow, 1905d: 35, 37-38. Hedicke, 1938b: 15. Smith, 1978: 126. Oehlke & Wudowenz, 1984: 366 (type).

I have seen only the type which is labelled 'Equateur'. The sheath is shorter than that of other species, being only about as long as high.

circularis Smith, sp.n. - Venezuela

Derecyrtia circularis Smith. Female. Length, 18.0-20.0 mm. Antenna black. Head black with following yellow: spot on middle of inner orbit, stripe from lower orbit through malar space and extending on gena to posterior corner of head, and triangular spot on supraclypeal area. Thorax black with upper corners of pronotum (with black spot at centre) and upper third mesepisternum yellow. Abdomen black with lateral yellow spots on segments 2-8, largest on 2 and 8, size decreasing from 2 to 7. Legs black. Wings hyaline, forewing with intercostal area and apex (apical half of radial cell and apical 2 cubital cells) blackish infuscated; narrow margins adjacent to veins infuscated; veins and stigma black; hindwing with intercostal area and apex (apical quarter of radial cell and apical to cell M) infuscated black.

Antenna 23-24 segmented; third segment $1\frac{1}{2}$ × length of fourth. Head smooth and shining behind ocelli and on gena with few punctures mostly near outer orbits. Area between ocelli and antennae rugose with intermixed punctures, not striate. Thorax shining, faintly dulled with fine punctures, largest punctures on mesoprescutum, posterior half lateral lobes, and anterior half of scutellum; mesepisternum shinier, fewer small punctures than rest of thorax. Sheath about three-quarters length of basal plate.

Male. Length, 16.0 mm. Coloration similar to that of female except as follows: continuous

yellow stripe from lateral postocellar area through inner orbit, malar space, and gena to posterior corner of head; lateral corners of pronotum broadly yellow (with brown spot at centre) and spot on lower lateral angle of pronotum, midlateral and posterolateral margins of pronotum brown; upper half mesepisternum, posterior half mesoprescutum, and most of mesoscutellum (except anterior and lateral margins, line at centre, and spot at apex) yellow; abdomen black above with lateral yellow spots on segments 2-8, decreasing in size posteriorly only gradually; venter of abdomen reddish brown; legs reddish brown with bases of coxae and all tarsi more blackish; wings hyaline with intercostal areas and apices blackish infuscated, without infuscated areas adjacent to veins. Punctuation similar to that of female.

Holotype. ♀. VENEZUELA: Aragua, Rancho Grande, 1100 m, 20.v.1971 (F. Fernandez. Y, J. A. Clavijo & F. Fernandez. H.) (Maracay).

Paratypes. VENEZUELA: 1♀, same locality as for holotype except 1400 m, 26.viii.1970 (J. & B. Bechyne); 1♂, same locality except Portachuleo, 1100 m, 26.ix.1968 (J. Salcedo & J. A. Clavijo) (Maracay).

Discussion. The yellowish markings of the head, thorax, and abdomen are unknown in other South American *Derecyrtia*. These distinctive markings separate this species.

jakowlewi Tschitschérine - Bolivia; Colombia; Guyana; Peru

- **Derecyrtia jakowlewi* Tschitschérine, 1894: 436-439. ♀. 'Amérique mér.: Colombie' (Leningrad, ♀). Semenow, 1901: 185. Konow, 1905b: 3. Konow, 1905d: 36, 39. Benson, 1930: 620 (British Guiana). Hedicke, 1938b: 15. Benson, 1955: 112 (♂ from Bolivia). Smith, 1978: 126.

I have seen the type from Colombia (labelled '8014' and '*Derecyrtia jakowlewi*, m., ♀, Typ. Tschitscherin det.') and one other female specimen from Peru ('Mairo Rio, probably in the Montana'). The records from Guyana and Bolivia are from the literature.

lugubris Westwood - Brazil (Espírito Santo, Paraná, Rio de Janeiro, Santa Catarina, São Paulo)

Derecyrtia lugubris Westwood, 1874: 122, Pl. 23, Fig. 3. ♀. 'Brazil' (Mus. Reg. Holm. (F. Sahlberg) etiam in Mus. W. W. Saunders, ♀). Dalla Torre, 1894: 398. Konow, 1897b: 298, 299, 210. Konow, 1905b: 3. Konow, 1905d: 36, 38-39. Hedicke, 1938b: 15. Smith, 1978: 126.

I have not located the type, but the description and illustration by Westwood agree with specimens I have seen from the above localities.

***patagiata* Konow - Peru**

**Derecyrtia patagiata* Konow 1899: 148-149. ♀. 'Peru (Callanga, Cuczo)' (Eberswalde, ♀). Konow, 1905b: 3. Konow, 1905d: 35, 36-37. Hedicke, 1938b: 15. Smith, 1978: 126. Oehlke & Wudowenz, 1984: 403 (type).

Two female syntype specimens are at Eberswalde, both labelled 'Callanga Cuczo, Peru'. One is designated lectotype, the other a paralectotype.

***pictipennis* Smith - Brazil (Amazonas, São Paulo?); Peru**

**Derecyrtia pictipennis* Smith, 1860: 255-256. ♀. 'Ega, Brazil' (London, ♀). Westwood, 1874: 122, Pl. 23, Fig. 2. Kirby, 1882: 368, Pl. 14, Fig. 13 (Ega, São Paulo). Dalla Torre, 1894: 398. Tschitschérine, 1894: 438. Konow, 1897b: 298, 299, 310. Konow, 1905b: 3. Konow, 1905d: 35, 38. Benson, 1930: 620 (antennae). Hedicke, 1938b: 15-16. Smith, 1978: 126.

The type in London (BM 1.23) is labelled 'Ega'; also in London is a specimen labelled 'St Paul, Braz'. The specimen from Peru is from 'Huanuco, Tingo Maria XI-62'. A specimen at Oxford is also labelled type and 'Amazons, Bates (1861)'. This cannot be the type since it was collected after the original description.

***porteri* Brèthes - Chile**

Derecyrtia porteri Brèthes, 1919: 49-50. ♂. 'les provinces centrales du Chile' (Buenos Aires?, ♂). Smith, 1978: 126.

The type has not been located, and it is impossible to tell if this species belongs to *Derecyrtia* or *Steirocephala* from the description.

If it is a *Derecyrtia*, it is the only known species from Chile.

***rugifrons* Cameron - Costa Rica**

**Derecyrtia rugifrons* Cameron, 1883: 68-69, Pl. 3, Fig. 13. ♀. 'Costa Rica, Irazu, 6000 to 7000 feet' (London, ♀). Dalla Torre, 1894: 398. Konow, 1897b: 298, 299, 310. Konow, 1905b: 3. Konow, 1905d: 35, 36. Hedicke, 1938b: 16. Smith, 1978: 126.

I have seen only the type, BM 1.32, labelled 'Irazu, Costa Rica, Rogers'.

***striatifrons* Malaise - Ecuador; Peru**

**Derecyrtia striatifrons* Malaise 1942: 119. ♀. 'Ecuador, east of the Cordilleras (Napo, 450 m.)' (Stockholm, ♀). Smith 1978: 126.

The specimen from Peru is the only specimen examined other than the type; it is labelled 'Middle Rio Ucayall'.

***variipennis* Rohwer - Paraguay**

**Derecyrtia variipennis* Rohwer, 1911b: 378. ♂. 'San Bernardino, Paraguay' (Washington, ♂). Hedicke, 1938b: 16. Smith, 1978: 127.

This pale reddish brown to orange specimen is possibly the male of *lugubris*; however, I cannot be sure since the sexes of the latter have not been associated.

Genus *Steirocephala* Benson

Steirocephala Benson, 1954: 157-158.

Type species: *Derecyrtia reedii* Kirby. Original desig.

Third antennal segment 2× or more length of fourth segment. Genal carina present laterally behind each eye (Fig. 86). Lobelike tarsal pulvillar pads present on each tarsal segment (Fig. 88); preapical spines present on mid- and hind tibiae (at least in *flavipes* and *lateralba*); hind femur 4-5× longer than broad; hind apical tarsal segment of female shorter than hind basitarsus.

The four known species of *Steirocephala* occur in Chile. The presence of lobelike pulvillar pads on the tarsal segments and presence of a genal carina are the main characters for separation of this genus from *Derecyrtia*.

Key to species

- 1 Legs black; thorax black; head mostly red, antenna black; abdomen black with lateral white spots on segments 2-7 and white band on tergum 8
lateralba, sp.n.
- Legs reddish to orange, coxae and trochanters may be black; either antenna white in middle or various amounts of red or yellow on thorax or abdomen 2
- 2 Antenna black with segments 4-6 white (head thorax and abdomen black) ... *flavipes* (Philippi)
-- Antenna entirely black or uniformly reddish ... 3
- 3 Head and thorax black; abdomen black with segments 2-4 and most of 5 reddish ... *reedii* (Kirby)
-- Head (ocellar spot with short anterior and posterior extension black), antenna, and mesoprescutum mostly reddish, rest of thorax and abdomen black
ruficeps (Brèthes)

SPECIES

flavipes (Philippi) -- Chile (Magallanes, Llanquihue, Valdivia)

**Brachyixiphus flavipes* Philippi, 1871: 287, Pl. 3, Fig. 2. ♂. 'prov. Valdivia' (Ithaca, ♂). Westwood, 1874: 121 (♂). Hoebeke, 1980: 7 (type).

Derecyrtia flavipes: Westwood, 1874: 205 (♂). Kirby, 1881: 50. Kirby, 1882: 369. Kirby, 1883: 202. Dalla Torre, 1894: 398. Konow, 1897b: 298, 299, 310. Konow, 1905b: 3. Konow, 1905d: 36, 39. Porter, 1916: 15 (*Reedi*). Rohwer, 1925: 44-45 (♂ type described; ♀). Hedicke, 1938b: 15.

Steirocephala flavipes: Benson, 1954: 158. Smith, 1978: 127.

The type is labelled 'Brachyixiphus flavipes Philip., p. 1596. Vald. 1870', '(Brachyixiphus) Derecyrtia flavipes (Phil.) det Rohwer Feb. 1-21', 'Holotype, Derecyrtia flavipes (Philippe)', 'Holotype, Cornell U. No. 4649'. I have seen specimens from as far south as 'Arch du Cape Horn, Baie Orange' and 'S. Chile, Puerto Williams, Isla Navarino'. A label on the latter specimen reads 'on Nothofagus pumilio (leaves)' - a possible clue to its host.

lateralba Smith, sp.n. -- Chile (Osorno)

Steirocephala lateralba Smith. Female. Length, 10.5 mm. Antenna black. Head red with mandibles and mouthparts black, large black ocellar spot extending outside ocelli and about halfway to antennae, small black spot on inner margin of

each eye, and small black spot in malar area. Thorax and legs entirely black. Abdomen black with white lateral spots on segments 2-7 and white band on tergum 8. Wings uniformly moderately black infuscated; veins and stigma black. Antenna 19+ segmented (apical segment(s) appear broken off); first segment a little shorter than third segment, third segment subequal in length to following two segments together. Head smooth and shining above and behind eyes; longitudinal carinae extending from ocelli between antenna to apex of clypeus, areas lateral to ocelli and antennae rugose. Thorax shining, sparsely punctate; transverse ridges on posterior two-thirds of mesoprescutum; mesoscutellum more densely rugose than rest of mesonotum and with short spinelike projection; short spinelike projection on each lateral lobe; mesopleuron shining, slightly 'wrinkled' or rugose. Mid- and hind tibiae with preapical spines; tarsal claw with inner tooth; hind basitarsus shorter than following segments combined. Abdomen slightly dulled with microsculpture. Sheath long, narrow, rounded at apex, about two-thirds length of basal plate.

Male. Unknown.

Holotype. ♀, CHILE: Prov. Osorno, Orsono - Purranque, 30.iv.1973 (*Munzermayer*), also on label: 'Encontrado sobre hotas de arbustos' (deposited in Washington, by permission of R. Scott Cameron, Texas Forest Service).

Discussion. The coloration, especially the black antennae, mostly red head, and lateral white spots on the abdomen, will separate *lateralba* from other species of this genus.

reedii (Kirby) -- Chile

**Derecyrtia reedii* Kirby, 1882: 369, Pl. 14, Fig. 15. ♀. 'Chili' (London, ♀). Dalla Torre, 1894: 398. Konow, 1897b: 298, 299, 310. Konow, 1905b: 3 (*reedii*). Konow, 1905d: 36, 40 (*reedii*). Porter, 1916: 15. Hedicke, 1938b: 16 (*reedii*).

Steirocephala reedii: Benson, 1954: 158. Smith, 1978: 127.

I have seen only the type, BM 1.24, labelled 'Chili 73/15'.

ruficeps (Brèthes) -- Chile (Aconcagua, Llanquihue)

**Derecyrtia ruficeps* Brèthes 1915: 69. ♂. 'La Ligua (Aconcagua)' (Buenos Aires, ♂). Porter, 1916: 15. Hedicke, 1938b: 16.

Steirocephala ruficeps: Benson, 1954: 158 (Brullé as author). Smith, 1978: 127.

The type is only 5.2 mm long. It is labelled 'La Ligua (Aconcagua), C. E. Porter, IX-1909-18', 'Derecyrtia ruficeps Brèthes'. I have seen one other specimen (at London) from 'S. Chile, Puerto Montt, ii-1942, E. Reed'; it is a female similar in colour and structure to the type male and may be the female of this species.

Tribe Brachyxiophini

Forewing with radial crossvein present; head behind ocelli dull, deeply sculptured; postocellar area defined by distinct lateral furrows; numerous standing hairs on head that are subequal to or longer than length of pedicel.

Genus *Brachyxiplus* Philippi

Brachyxiplus Philippi, 1871: 285-287.

Type species: *Brachyxiplus grandis* Philippi. Desig. by Kirby, 1881.

Genal carina present (as in Fig. 86); third antennal segment 2× longer than fourth segment. Hind femur slender, 7× longer than broad; apical hind tarsal segment of female enlarged and longer than hind basitarsus; tarsal claws with inner tooth; no preapical spines on mid- and hind tibiae; tarsal segments with lobelike pulvillar pads (Fig. 88).

Brachyxiplus occurs in Chile and southern Argentina, the latter record being from the literature. The two species listed here are similar, and some authors have synonymized them or treated them as subspecies. The only difference I have noted is that *B. hyalinus* has more hyaline or yellowish wings than the more brownish-black infuscated wings of *B. grandis*. The differences in wing coloration could be variation and additional material will be needed to clarify the status of the two species, but, for now, I list them separately.

Rohwer (1911a) designated *grandis* as the type species, but Kirby (1881) had already done so.

Species of *Brachyxiplus* are the only neotropical xiphydriids which have densely sculptured heads with standing hairs; all others

have the head behind the ocelli smooth, shining, and with at most some pubescence or hairs shorter than one-third the length of the second antennal segment.

SPECIES

grandis Philippi - Chile (Ñuble, Valdivia); Argentina (Chubut)

**Brachyxiplus grandis* Philippi, 1871: 287, Pl. 3. Fig. 1. ♀. 'prov. Valdivia, loco dicto los Ulmos' (Ithaca, ♀). Westwood, 1874: 121, 205 (in *Derecyrtia* on p. 205). Kirby, 1881: 50. Kirby, 1882: 369 (syn.: *bicolor* Westwood). Dalla Torre, 1894: 398. Konow, 1897b: 300, 310. Schrottky, 1902: 91 (Argentina, Chubut). Konow, 1905b: 3. Konow, 1905d: 40-41. Porter, 1916: 15. Hedicke, 1938b: 14-15. Smith, 1978: 128. Hoebeke, 1980: 7 (type).

Brachyxiplus grandis grandis: Rohwer, 1925: 42-43 (♀ type redescribed).

**Derecyrtia bicolor* Westwood 1874: 121, Pl. 23, Fig. 1. ♂. 'Chili' (Oxford, ♂).

The type is labelled 'Brachyxiplus grandis Ph. p. 1595, Valdivia 1870', 'Brachyxiplus grandis grandis Philip. det Rohwer Feb. 1-21', 'Holotype *Derecyrtia grandis* (Philippi)', 'Holotype Cornell U. No. 4648'. The type of *bicolor* is labelled 'TYPE Westwood, Thes. Ent. Oxon. p. 122, pl. 23, fig. 1, coll. Hope Oxon.', 'Derecyrtia bicolor Westw. Thes. Ent. pl. f. 1, Chili 1860', 'gen. *Brachyxiplus* (*Derecyrtia*) *bicolor* Westw. = *Brachyxiplus grandis* Philippi ♀ 1871', 'Type Hym: 894 *Derecyrtia bicolor* Westwood Hope Dept. Oxford'. The record from Argentina is from Schrottky (1902). Other than the types, I have seen several other specimens, but only two with specific locality data: 'Sto Domingo' and 'El Marchant, Ñuble' Chile.

This species is black with abdominal segments 2-8 orange (tergum 2 black on meson, tergum 8 with black spot on meson and on each side). The tegula and posterior margins of the pronotum below are brownish.

hyalinus Kirby - Chile (Magallanes)

**Brachyxiplus hyalinus* Kirby, 1882: 369, Pl. 14, Fig. 9. ♂. 'Chili' (London, ♂). Dalla Torre,

1894: 398. Konow, 1897b: 300, 310 (as syn. of *grandis*). Smith, 1978: 128.
Brachyxiphus grandis hyalinus: Rohwer, 1925: 43-44 (♀, Punta Arenas). Hedicke, 1938b: 15.

The type, BM I.22, is labelled 'Chili 73/75'.

Subfamily XIPHYDRIINAE

Excavation of posterior margin of the pronotum deep, several times medial length of pronotum; no dorsal areas or tubercles on mesoscutellum; femora swollen, hind femur plus trochanter 3-3½× as long as broad; hindclaw in female not enlarged and about same size as midclaw; female sheath equal to five-eighths or more of basal plate; tarsi with pulvilli.

This description is based on nearctic and palearctic specimens; I have not seen examples of *Eoxiphia*.

Genus *Eoxiphia* Maa

Eoxiphia Maa, 1949: 24.

Type species: *Xiphydria paragaudis* Konow. Original desig.

Maa (1949) proposed this genus without seeing a specimen, basing it on Konow's description of the type species. He quotes part of Konow's description and defines the genus only in his key to world genera. In his key, *Eoxiphia* goes to the section where the pronotum is deeply emarginated anteriorly (characteristic of the Xiphydriinae) and the radial crossvein is present in the forewing, then comes out in a couplet with *Brachyxiphus* but is separated from that by the third antennal segment only slightly longer than the fourth and the head polished. Further characteristics mentioned are the head slightly broader than the thorax, segment 3 of the maxillary palpus is subequal in length to segments 5 and 6 together and segment 5 is very short, the anterior ocellus lies on the supraorbital line, and the tarsal claws are simple. This combination of characters, especially the deeply emarginated posterior margin of the pronotum, presence of a radial crossvein in the forewing, polished head, and simple tarsal claws, are unique among neotropical xiphydriids. Even though the type of *paragaudis* is apparently lost and I have not seen other specimens with this combination of char-

acters, I am retaining the genus for future consideration. Benson (1954) provisionally placed *Eoxiphia* in the Xiphydriinae, a subfamily that is holarctic.

SPECIES

paragaudis (Konow) - Peru

Xiphydria paragaudis Konow, 1899: 149. ♀. 'Peru (Callenga, Cuzco)' (lost). Konow, 1905b: 4. Konow, 1905d: 44, 55-56. Hedicke, 1938b: 10. Oehlke & Wudowenz, 1984: 402 (specimen missing in Eberswalde collection).
Eoxiphia paragaudis: Maa, 1949: 25, Smith, 1978: 104.

Family SIRICIDAE

The Siricidae, also known as horntails or woodwasps, are primarily a northern group associated with the coniferous and angiospermous forests. They are large (some females including ovipositor more than 45 mm long), cylindrical, and the female has a characteristic long slender ovipositor. Other characteristics of the family are the filiform or slightly laterally compressed antennae with 6-25 segments (Figs. 93-96); emarginated posterior margin of the pronotum, with medial length of pronotum sometimes one-third width of pronotum; indistinct mesoprescutum with sutures very faint, mesonotal lateral lobes divided by diagonal furrows (Fig. 101); absence of preapical spines on the tibiae; one apical spine on the fore tibia which is usually cleft at its apex; and the presence of a radial crossvein in the forewing (Figs. 90-92). The family is traditionally divided into two subfamilies on the basis of the number of antennal segments, distance between the antennae, and number of labial palpal segments.

Larvae of Siricidae are wood borers, the Siricinae in coniferous trees and the Tremecinae in angiospermous trees and shrubs, and they are commonly transported by commerce in wood and wood products. The life cycle of some species may last for several or more years, and adults may not emerge until after the wood is used for construction. One species, *Urocerus gigas gigas*, has been introduced into and become established in Chile. There is a possibility of other introductions because of the



increased plantings of coniferous trees in parts of South America. The native species of Siricidae are mostly southern extensions of northern species and occur only as far south as do the coniferous forests into Central America. One fossil *Urocerus* has been discovered in Argentina. Though specimens are rare from Mexico and Central America, the family undoubtedly occurs wherever conifers are found.

Benson (1943) reviewed the world fauna of Siricidae and gave keys to genera and species of certain genera. Middlekauff (1960) gave a key to the species of western North America. The world catalogue by Smith (1978) may be referred to for additional information and extensive references.

Key to genera

- 1 Hind tibia with 2 apical spines (Fig. 103); stub of 3A usually absent in forewing (Fig. 91) 2
- Hind tibia with 1 apical spine (Fig. 102); stub of 3A usually present in forewing (Fig. 90) 4
- 2 Antenna 13-segmented (Fig. 94); distance between antennae about 2× more than distance between antenna and eye; head black; cell 2Rs of forewing narrow (Fig. 92) *Siroremex*
- Antenna with 18 or more segments (Fig. 93), rarely less; distance between antennae 1½× or less the distance between antenna and eye; head black or with pale areas on each side; cell 2Rs of forewing longer than broad (Fig. 91) 3
- 3 A large pale yellowish spot on each side of head, or in some males head mostly yellow to red brown; female cornus long and narrow, constricted at base (Fig. 98) *Urocerus*
- Head black; female cornus triangular, not constricted at base (Fig. 97) *Sirex*
- 4 Antenna slender, with 18 or more segments (Fig. 93); genal carina present behind each eye (Fig. 99); female ovipositor as long as body; female cornus longer than broad, nearly parallel sided (as in Fig. 98) *Xeris*
- Antenna stout, slightly swollen in middle, with 17 or fewer segments (Figs. 95, 96); genal carina absent; female ovipositor shorter than abdomen; female cornus triangular (as in Fig. 97) 5
- 5 Antenna with 5 or 6 segments (Fig. 96); hind tibia and basitarsus of male greatly expanded and laterally flattened (Fig. 100); forewing with crossvein 2r-m (Fig. 91); hindwing with anal cell *Teredon*
- Antenna with 14-17 segments (Fig. 95); hind tibia and basitarsus of male more cylindrical; forewing without crossvein 2r-m (Fig. 90); hindwing without anal cell *Tremex*

Subfamily SIRICINAE

This subfamily is recognized by the long antennae, if stretched along the forewing would reach beyond the stigma (except *Siroremex*); antennae set close together so that the distance between them is about 1½× as great as the distance between the antenna and eye (except *Siroremex*); and the 3-segmented labial palpus. Known host are coniferous trees.

Genus *Sirex* Linnaeus

Sirex Linnaeus, 1761: 396.

Type species: *Sirex juvencus* Linnaeus. Desig. by Curtis, 1829.

Paururus Konow, 1896: 41, 43.

Type species: *Sirex juvencus* Linnaeus. Desig. by Rohwer, 1911a.

Antenna with 18 or more segments (Fig. 93); genal carina absent; head black. Hind tibia with 2 apical spines. Forewing with crossvein 2r-m and basal stub of vein Cu₁, basal stub of 3A absent; hindwing with anal cell (Fig. 91). Female cornus triangular, not constricted at base or widened at apex (Fig. 97).

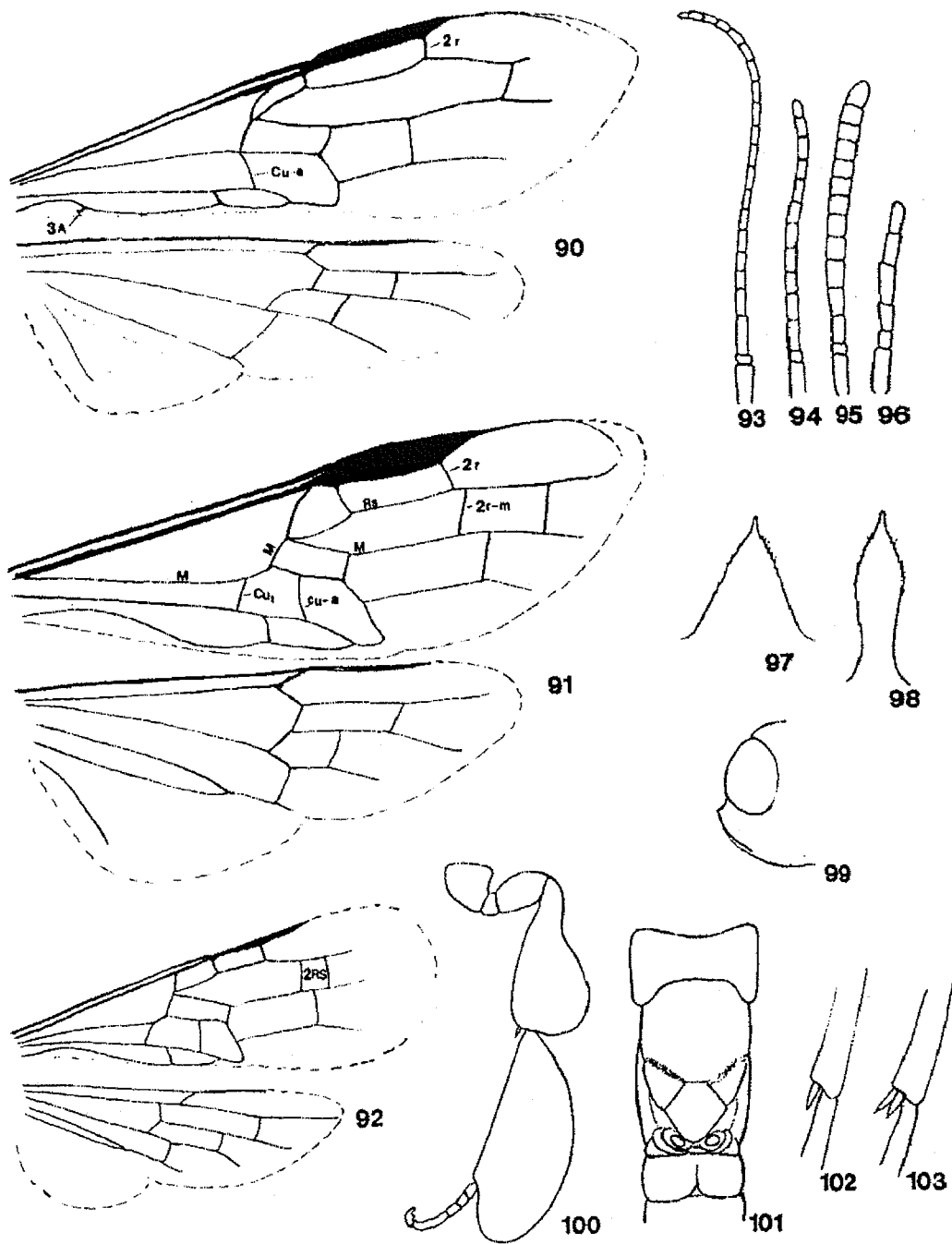
There are about eight nearctic species in this genus, and at least two apparently extend southward into Mexico and possibly as far as Honduras. Two records are based on U.S. Plant Quarantine interceptions and need confirmation.

Key to species

- 1 Female 2
- Male 3
- 2 Ovipositor as long as forewing. *areolatus* (Cresson)
- Ovipositor shorter than forewing, if stretched along wing margin reaching from base to a little beyond stigma *juvencus californicus* (Ashmead)
- 3 Legs black; apical 2 or 3 abdominal segments black *areolatus* (Cresson)
- Legs red; abdomen black on some basal terga, spots sometimes reaching seventh or eighth segment, but apex red *juvencus californicus* (Ashmead)

SPECIES

areolatus (Cresson) - U.S.A. (Rocky Mountains to the Pacific Coast; Virginia, Florida); Honduras (?).



FIGS. 90-103. Siricidae. 90, Forewing and hindwing, *Tremex columba*. 91, Forewing and hindwing, *Sirex areolatus*. 92, Forewing and hindwing, *Sirotemex flammeus*. 93, Antenna, *Xeris tarsalis*. 94, Antenna, *S. flammeus*. 95, Antenna, *T. columba*. 96, Antenna, *Teredon cubensis*. 97, Female cornus, *Sirex* sp. 98, Female cornus, *Urocerus* sp. 99, Left half of head, *Xeris* sp. 100, Hindleg, *Teredon latitarsus*. 101, Dorsum of thorax, *Sirex* sp. 102, Apical hind tibial spurs of *Sirex* sp. 103, Apical hind tibial spurs of *Tremex* sp.

- **Urocerus areolatus* Cresson, 1868: 375-376. ♀.
New Mexico (Philadelphia, ♀).
- Sirex gracilis* Westwood, 1874: 114, Pl. 21, Fig. 4. ♀. 'America Septentrionalis' (Oxford, ♀).
- **Urocerus caeruleus* Cresson, 1880a: 34-35. ♀.
'Vancouver's Island' (Philadelphia, ♀).
- Sirex apicalis* Kirby, 1882: 377-378, Pl. 15, Fig. 11. ♂. 'Vancouver's Island' (London, ♂).

Hosts: *Cupressus* sp., *Juniperus* sp., *Libocedrus* sp., *Pinus* spp., *Pseudotsuga* sp., *Sequoia* sp., *Taxodium* sp.

For further references see Smith (1978, 1979). The Honduras specimen was intercepted by U.S. Plant Quarantine at New Orleans, Louisiana, 'in bananas'.

***juvencus californicus* (Ashmead) - U.S.A.** (Rocky Mountains to the Pacific Coast); Guatemala; Mexico (Chihuahua).

- **Paururus californicus* Ashmead, 1904: 64. ♀.
'Placer Co., California; Hoquiam, Wash.' (Washington, ♀).
- **Sirex obesus* Bradley, 1913: 12-13. ♀.
'Arizona' (Philadelphia, ♀).

Hosts: *Cupressus* sp., *Larix* sp., *Pinus* spp., *Pseudotsuga* sp.; specimen from Chihuahua labelled 'Madera pine'.

For further references, see Smith (1978, 1979). The specimen from Guatemala is a male and is without further locality data; it is unusual in that there are only 14 antennal segments and the black on the abdominal terga extends to the eighth tergum, the amount of black diminishing toward the eighth tergum, but in all other respects it agrees with *californicus*. One other specimen is from 'Mexico' intercepted by U.S. Plant Quarantine at El Paso, Texas, 'in pine lumber'.

Genus *Urocerus* Geoffroy

Urocerus Geoffroy, 1785: 363.

Type species: *Ichneumon gigas* Linnaeus. Monotypic.

Xanthosirex Semenov-Tian-Shanskij, 1921: 86.

Type species: *Xanthosirex phantasma* Semenov-Tian-Shanskij. Original desig.

Antenna with more than 18 segments (Fig. 93). Head with large pale yellowish spots on each side, in some males head may be mostly

yellowish to reddish brown. Genal carina absent. Hind tibia with 2 apical spines. Forewing with crossveins 2r-m and Cu, present, stub of 3A absent (as in Fig. 91); hindwing with anal cell. Cornus of female elongate, constricted at base and widened at apex (Fig. 98).

Five species of this holarctic genus are known in North America, two of which have been recorded from Mexico. In addition, several specimens of the North American *gigas flavicornis* have been found in Brazil, and the palearctic *gigas gigas* has been introduced and established in Chile. As is true for *Sirex*, *Urocerus* is also undoubtedly native only to the coniferous forests of the northern hemisphere.

Additional references to the species listed below are in Smith (1978, 1979).

Key to species

- 1 Female.....2
- Male.....4
- 2 Abdomen black, wings yellowish
californicus Norton
- Abdomen black with yellow bands, wings yellowish to hyaline3
- 3 Posterior half of eighth tergum and all ninth tergum except for cornus black
gigas flavicornis (Fabricius)
- Tergum 8 all yellow, at least part of ninth tergum yellow *gigas gigas* (Linnaeus)
- 4 Abdomen reddish brown, head sometimes mostly reddish brown to yellowish.... *californicus* Norton
- Abdomen black with segments 3-6 yellow; head black with yellowish spot on each side
gigas flavicornis (Fabricius), *gigas gigas* (Linnaeus)

SPECIES

***californicus* Norton** - Canada, U.S.A. (Rocky Mountains to the Pacific Coast); Mexico.

Urocerus albicornis var. *californicus* Norton, 1869: 360. 'New England, N.Y., N.W.T., Lake Winnipeg, Chilyunk Dept. Wash. Terr.' ().

Urocerus californicus: Bradley, 1913: 20 (Mexico). Middlekauff, 1960: 67 (Mexico).

**Urocerus fulvus* Cresson, 1880a: 35. ♂. 'Colorado, Washington Territory' (Philadelphia, ♂). Cameron, 1883: 68 (Mexico).

Sirex flavipennis Kirby, 1882: 380, Pl. 15, Fig. 10. ♀. 'Vancouver's Island' (London, ♀).

