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A TAXONOMIC REVISION OF THE NEARCTIC
SPECIES OF *HIMERTA* FOERSTER
(HYMENOPTERA: ICHNEUMONIDAE).

by

LUC LEBLANC, BSc(Agr)

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of
Master of Sciences.

Department of Biology

Carleton University

Ottawa, Canada

October 26, 1988

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"A TAXONOMIC REVISION OF THE NEARCTIC
SPECIES OF *HIMERTA* FOERSTER
(HYMENOPTERA: ICHNEUMONIDAE)"

submitted by Luc Leblanc, BSc(Agr)
in partial fulfillment of the requirements for
the degree of Master of Sciences

Thesis supervisor

Chairman, Department of biology

Carleton University

December 1988

ABSTRACT

The Nearctic species of the Holarctic genus *Himerta* (Hymenoptera: Ichneumonidae: Ctenopelmatinae) are revised. Nineteen species are considered, of which sixteen are described as new. An illustrated key to the species is provided. Treatment of each species includes a description of structural characters, a detailed description of coloration and its variations for each sex using color names taken from standard color nomenclature charts, measurements and proportions of various body parts, the etymological origin of name if the species is new, list of specimens in collections, distribution map and notes on biology. The array of states is illustrated with scanning electron micrographs for most structural characters. Probable direction in the evolution of states within several characters is given and phylogenetic events are proposed.

I want to thank the curators cited in the list of collections for the loan of specimens. I greatly appreciate the help of Dr. S.B. Peck from Carleton University, my thesis supervisor, for reviewing the manuscript and for sponsoring field collecting in Northern Québec in the summer of 1987. Drs H. and M. Townes and Dr. D. Wahl are deeply acknowledged for their hospitality in a trip to visit the American Entomological Institute in December 1987. Mr. L. Ling from Carleton University has very kindly accepted to take the Scanning Electron Micrographs. For discussions and suggestions for improvements I acknowledge the participation of Dr. H. Damman from Carleton University, Dr. C.A. Barlow from Carleton University, Dr. D.E. McAllister from the National Museums of Canada and Dr. R.T. Patterson from Carleton University.

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INTRODUCTION

The Holarctic genus *Himerta* belongs to the subfamily Ctenopelmatinae (also called Scolobatinae) in the large insect family Ichneumonidae. The subfamily Ctenopelmatinae is divided into ninety-four genera in seven tribes (Gauld 1984, Townes 1969-b) and nearly all its members are primary endoparasites on larvae of sawflies (Hymenoptera: Symphyta).

Very little taxonomic work has been accomplished on Ctenopelmatinae. Townes (1969-b) has provided keys to and has described the world genera. Revisions exist for the Nearctic species of *Ctenopelma* (Barron 1981), *Rhorus* (Barron 1986), *Perilissus* (Burks 1952) and *Syndipnus* (Walley 1940) and for the European species of *Glyptorhaestus* (Hinz 1975), *Trematopygus* (Hinz 1985), *Trematopygodes* (Hinz 1980), *Synomelix* (Idar 1983) and *Hadrodactylus* (Idar 1979, 1981).

The number of species yet to be described probably far exceeds the number described so far. Barron, in his revisions, has described eight new species of *Rhorus* when eight were previously known (Barron 1986) and has described eighteen new species of *Ctenopelma* when only six were previously known (Barron 1981). In the present study I describe sixteen new Nearctic species of *Himerta* when only three were known at the start of the revision.

The tribe Mesoleiini, to which *Himerta* belongs, is the largest and the most taxonomically difficult in the

subfamily. As pointed out by Townes (1969-b) and by Carlson (1979), the generic limits are often not sharply defined and some genera are rather arbitrarily defined. The genus *Himerta*, however, is very distinct from the other genera. Only taxonomic studies at the species level will elucidate the higher relationships within the tribe. I hope the present study will generate more interest in this neglected and yet large and ecologically important subfamily.

MATERIALS, METHODS AND TERMINOLOGY

COLLECTIONS EXAMINED. The specimens used for the revision have been borrowed from sixteen collections. The following is a list of the collections and the curators who took care of the loans. Identification codes for the collections are from Arnett and Samuelson (1986).

AEIC American Entomological Institute, Gainesville,
Florida, H.K. Townes

ANSP Academy of Natural Sciences, Philadelphia,
Pennsylvania, D. Azuma

CASC California Academy of Sciences, San Francisco,
California, N.D. Penny

CNCI Canadian National Collection of Insects, Ottawa,
Ontario, J.R. Barron

CUIC Cornell University, Ithaca, New York, J.K. Liebherr

LACM Los Angeles County Museum of Natural History, Los
Angeles, California, R.R. Snelling

LEBL Luc Leblanc private collection, Montreal, Quebec

MCZC Museum of Comparative Zoology, Harvard University,
Cambridge, Massachusetts, S.R. Shaw

OSUO Oregon State University, Corvallis, Oregon, J.A.
DiGiulio

SEMC Snow Entomological Museum, University of Kansas,
Lawrence, Kansas, G.W. Byers

SMDV Spencer Museum, University of British Columbia,
Vancouver, British Columbia, S.G. Cannings

UASM Strickland Entomological Museum, University of
Alberta, Edmonton, Alberta, D. Shpeley

UCDC Bohart Museum of Entomology, University of
California, Davis, R.O. Schuster

UCRC University of California, Riverside, California,
J.C. Hall

USNM United States National Museum, Washington, District
of Columbia, T. Nuhn

WAHL David Wahl private collection, Gainesville, Florida

A total of 877 specimens (349 females and 528 males) have been used, half of which belong to three species: *H. rubiginosa* (200 specimens), *H. unicolorata* (146 specimens) and *H. carinata* (113 specimens). Over 80% of all the specimens are from the CNCI and AEIC. Five Holotypes have also been examined: three from ANSP and two from USNM. Palearctic specimens from CNCI and AEIC have also been examined but the names have not been given unless the identity of the names given on the specimens came from direct comparison with Holotypes (Homotypes in AEIC).

SCANNING ELECTRON MICROGRAPHS. They have been made with uncoated specimens kept in an humidor overnight. The microscope used is a JEOL model JSM-U3 at Carleton University, Ottawa.

MORPHOLOGICAL TERMINOLOGY. The morphological terminology used in the descriptions mostly follows that of Townes (1969-a). The plates originally published in Townes are reproduced in the Appendix. However the following changes are proposed: vertex is used instead of occiput, malar spaces instead of cheeks, tentorial pits instead of clypeal foveae, occiput instead of postocciput, gena instead of temple, propleuron instead of propleurum, mesoscutellum instead of scutellum, metascutellum instead of postscutellum, mesepisternum as part of mesopleurum of Townes, metapleuron instead of metapleurum, propleuron instead of propleurum, epicnemium instead of prepectus and epicnemial carina instead of prepectal carina. The body is divided into three parts: head, mesosoma, which includes the propodeum, and metasoma, the first tergite of which is truly the second abdominal segment because the first true abdominal segment has become the propodeum.

MORPHOLOGICAL CHARACTER STATES. The Scanning Electron Micrograph subjects were selected to show the entire array of states of each character as described below.

Most useful characters in the head are in the face and in the clypeus. The lower ends of the inner margins of the compound eyes at the level of the face are parallel (Figs 1,4) in the females of all the species, slightly convergent (Fig 3) in the males of a number of species and strongly convergent (Fig 2) in male *H. atra*. The face is usually

moderately wide (Figs 1,3) but is very wide in *H. carinata* (Fig 4) due to the position of the antennal sockets at the middle of the height of the compound eyes (they are above the middle in all the other species) and is very narrow in male *H. atra* (Fig 2) due to the convergence of the inner eye margins. Antennal sockets are either at a moderately strong angle with the vertical axis of the compound eyes (Fig 5) along with the face being moderately convex medially or they are at a very strong angle with the vertical axis of the compound eyes (Fig 6) along with the face being strongly convex medially. The face usually bears a tubercle between the anterior margins of the antennal sockets. The tubercle is large and well defined in *H. carinata* (Fig 11). In most other species the tubercle is small but well defined (Fig 7) or it is vestigial, meaning that it is reduced to a small area absent of sculpture (Figs 8,9). In some *H. eruga* and in *H. infuscata*, that have strongly reduced head sculpture, the vestigial tubercle has become indistinct from the rest of the head surface (Fig 10). Clypeus basal margin ranges from almost flat (Fig 10) to moderately convex (Figs 7,8) to strongly convex (Fig 11) and is generally more convex in males than in females within a species. The basal clypeal margin in *H. townesorum* (Fig 9) is unique among the species in going very high into the face. The apical margin of the clypeus is moderately emarginate in *H. carinata* (Fig 11) and weakly emarginate in the other species (Figs 7 to 10).

Notauli on the mesoscutum vary from indistinct (Fig 15), meaning that there are no lateral grooves on anterior half of the mesoscutum, to being weakly defined (Fig 13), to well defined and strong (Fig 14). The mesoscutellum is usually fairly wide (Fig 16) but is narrow (Fig 17) in *H. scutellata* and *H. townesorum*.

The epicnemial carina can be moderately (Figs 18 to 21 and 22 to 26) or strongly (Fig 22) produced posteriorly on the mesepisternum. The epicnemial carina usually ends far from the anterior margin of the mesepisternum (Figs 18 to 23 and 26) but sometimes it comes very close to the anterior margin (Figs 24,25) and is then said to reach the margin. Of high taxonomic importance is the level at which the epicnemial carina anteriorly terminates in relation to the posterior margin of the pronotum minus the hind corner lobe. It may terminate at (Figs 19 to 22 and 26) or below (Figs 18,23,24) or sometimes above (Fig 25) the level of the middle of the margin. The degree of sculpturing between the punctures on the mesepisternum ranges from sculpture absent (Fig 29) to moderately coarse (Fig 27) to very coarse (Fig 28) and often producing (with the punctures) a reticulate pattern of wrinkling. Species from high mountains (*H. eruga*, *H. alpina* and *H. infuscata*) tend to have their general body sculpturing very reduced to absent.

Sculpturing on the propodeum ranges from absent (Fig 34) to weak (Fig 33) to moderately coarse (Figs 31,35) to coarse

(Figs 30,32) to very coarse (Fig 36). The median longitudinal carinae on the propodeum are usually restricted to two short posterior carinae with (figs 30,33) or without (Figs 31,32,34) weak vestiges of carinae anteriorly but are well developed and strong in *H. carinata* (Fig 36). The anterior half of the propodeum usually has a median furrow that varies from absent to very faint (Fig 34) to weakly developed (Figs 30,33) to well developed with (Figs 35,36) or without (Figs 31,32) the adjacent sides of the propodeum uplifted.

Sculpturing on metasomal tergites ranges from absent (Fig 40) to very reduced (Fig 41) to moderate (Figs 37,38,39,42) to coarse (Fig 43). The sides of the first metasomal tergite vary from being nearly parallel (Fig 37) to slightly divergent (Figs 39 to 42) to moderately divergent (Fig 38) to strongly divergent (Fig 43). They are generally more divergent in females than in males within species. The median dorsal carinae on the first metasomal tergite vary from undeveloped (Figs 37,41) to weakly developed (Figs 38,39,40) to moderately developed (Fig 42) to strongly developed (Fig 43). The spiracles on the first tergite are usually at midlength of the tergite (Figs 37 to 42) but are on the basal two fifths of the tergite length in *H. carinata* (Fig 43). Uplifting of spiracles from the tergite ranges from almost not uplifted (Fig 37) to moderately uplifted (Figs 41,42) to strongly uplifted (Figs

38,39,40,43).

The width and shape of the ovipositor dorsal notch is of primary taxonomic importance. There are three types of ovipositors. In ten species the notch is moderately wide with its anterior margin gradually sloping with a small tooth-like angle and its posterior margin abruptly sloping with a strong angle (Fig 44). The ovipositor of *H. atra* (Fig 45) is a special case of the above ovipositor type: its notch is narrow with both anterior and posterior margins sloping with strong angles. In six species the notch is wide, with the anterior margin gradually sloping with a small tooth-like angle and the posterior margin gradually sloping without any angle (Fig 46). In *H. carinata* the notch is very wide, with its anterior margin gradually sloping without an angle and with its posterior margin gradually sloping over a long distance without an angle (Fig 47).

Descriptions of morphological character states are based on examination of all the specimens of each species instead of only the Holotype. There are however, in many species, a few odd specimens that do not fit all the character states of the description. The descriptions are consequently compromises to be clear and concise but may not include all the odd exceptions.

COLOR TERMINOLOGY. Species of *Himerta* are colored with a large diversity of yellows, oranges, browns and blacks in

varying patterns. Color pattern is very important to distinguish species and in many cases species differ more by their coloration than by other morphological attributes.

Taxonomic studies on Ichneumonidae have usually dealt with species with less color diversity, and they often use vague color terms such as fulvous, piceous and ferrugineous. Different authors do not always agree on what actual color they associate to a color name. To accurately describe the diversity of colors, to differentiate close but distinct colors and to avoid the use of vague color names a standardized color nomenclature system has been used.

The ISCC-NBS (Inter-society color Council-National Bureau of Standards) color name charts (Kelly 1965) have been used. The system consists in charts with colored squares representing 267 numbered and named colors. Color names are combinations of simple color names often with descriptive adjectives. The Munsell system (Anonymous 1966) also gives charts and a standardized numerical coding system but the color names are not as simple. Twenty-one color names from the ISCC-NBS system have been used in the descriptions and are listed below with their equivalent codes in the Munsell color system.

ISCC-NBS code and name		Munsell code
24	reddish black	2.0 R 0.9/0.9
44	dark reddish brown	9.6 R 1.3/3.6

47	dark grayish reddish brown	9.0 R 2.0/2.0
51	deep orange	4.1 YR 5.1/11.3
54	brownish orange	4.1 YR 5.0/8.0
55	strong brown	4.6 YR 3.5/7.6
59	dark brown	5.3 YR 1.6/3.4
65	brownish black	7.8 YR 0.6/0.9
67	brilliant orange yellow	0.1 Y 8.1/10.5
69	deep orange yellow	8.6 YR 6.0/12.1
70	light orange yellow	9.4 YR 8.3/6.8
72	dark orange yellow	9.3 YR 6.0/7.9
74	strong yellowish brown	8.8 YR 4.6/8.5
75	deep yellowish brown	8.8 YR 3.1/5.0
78	dark yellowish brown	9.4 YR 2.3/3.3
82	vivid yellow	3.3 Y 8.0/14.3
83	brilliant yellow	4.4 Y 8.7/8.9
84	strong yellow	3.7 Y 7.2/9.3
86	light yellow	4.3 Y 8.8/6.8
89	pale yellow	4.7 Y 9.0/3.8
267	black	N 0.8/

Colors on specimens have been associated with standard colors on the charts by examining with a binocular dissecting microscope specimens placed on the various color squares on the charts. The extent of variation in the color of a part within a sex of a species has been assessed by comparing specimens side by side under the microscope and

the color variations have been identified by comparison with the charts.

It is not necessary to refer to the charts in order to successfully identify species. The identification key has been designed to generally avoid having to compare two colors that do not sharply differ from each other. Couplets calling for more cryptic color differences are augmented by other characters referring to structures, distribution and timing of flight season.

COLOR DESCRIPTIONS. The antennal flagellum is usually differentiated into sections of different colors. It most often has a yellow section in the middle. Sharply defined color sections are called the basal, middle and apical sections. When there are only two sharply defined sections they are the basal and apical sections.

For colors on the head, mesosoma and metasoma the dominant background color is given first and the parts differing in color are given after.

The background color on the body is usually a variant of brown: strong brown, brownish orange or strong yellowish brown. Two species (part of female *H. flavida* and *H. foxleii*) have head and mesosoma black or reddish black and have strong brown or deep orange metasoma. A few species (part of female *H. flavida*, male *H. flavida*, *H. atra*, *H. scutellata* and *H. townesorum*) have black as their entire background color. Several normally strong brown or brownish

orange species however have variants with their background color partly to entirely substituted by black (female and male *H. luteofacia*, male *H. eruga* and male *H. epicnemio*).

These odd black variants generally appear from within populations of normally colored individuals. Whenever the identification key asks for the presence or absence of black on the metasoma, the species that may have black variants can be keyed through both halves of the key.

The terminology used to refer to colors of areas within sclerites is described below. Areas within bilaterally symmetrical parts (face, clypeus, epicnemium, dorsal and ventral faces of mesosoma and metasomal tergites) are identified as median/lateral and basal/apical for face, clypeus and epicnemium or anterior/posterior for other parts. Areas within asymmetrical parts are identified as anterior/posterior and upper/lower. Antennae are divided into dorsal and ventral faces and legs are divided into anterior, posterior, dorsal and ventral faces when imagined as stretched out horizontally at right angles from the body.

The most important color feature other than background color is the presence or absence of yellow markings on the mesosternum. Males of many species have brilliant yellow to pale yellow markings on the mesosternum and often also as anterolateral spots on the mesoscutum. Males of eight species (*H. scutellata*, *H. townesorum*, *H. alpina*, *H. infusca*, *H. unicolorata*, *H. lineola*, *H. foxleii* and *H.*

carinata) do not have yellow markings on the mesosternum. In females these mesosternal markings are present only in some specimens of *H. luteofacia* and in every specimen of *H. bicolorata*.

MEASUREMENTS. The total number of antennal flagellomeres and number of flagellomeres in the sections have been counted in every specimen, up to a maximum of ten specimens of one sex per locality. Data are presented as total range and mean $\pm$ standard deviation between parentheses. Because they are based on a large number of specimens, the means and standard deviations of the counts are more meaningful data than total ranges, that include the odd extremes. Total number of flagellomeres tends to be positively correlated with the size of the specimen and there is much overlap between species. A more useful character to distinguish some species is the number of flagellomeres in the yellow middle section.

Specimens have been measured with a micrometer in one eyepiece of a binocular dissecting microscope. Thirteen measurements have been taken on each of 130 females and 122 males. Up to ten females and ten males have been measured for each species: two randomly selected specimens from each locality represented by a good series of specimens and the remaining specimens randomly selected from the other localities to a total of ten specimens. When most specimens were from one locality only a minimum of five specimens were

measured. Data on measurements are presented as total ranges and mean $\pm$ standard deviation between parentheses. Because these are based on ten or fewer specimens the total ranges of the measurements are more meaningful than means and standard deviations. From the measurements seven ratios have been calculated and are presented as total ranges.

The following are descriptions of the exact position of the micrometer when taking each measurement. Between parentheses is the maximum error on a measurement reading, expressed as the length of the smallest unit of the micrometer.

Length of fore wing (± 0.1 mm) is measured from base of costa to the most distant tip between the ends of Rs and M. Length of face (± 0.03 mm) is measured as the distance between the imaginary line connecting the lowermost margins of the antennal sockets and the imaginary line connecting the tentorial pits. Width of face (± 0.03 mm) is measured as the distance between the inner margins of the compound eyes at the level of the imaginary line connecting the lowermost margins of the antennal sockets. Width of face and compound eyes (± 0.09 mm) is measured as the distance between the outermost limits of the compound eyes at the level of the imaginary line connecting the lowermost margins of the antennal sockets. Width of compound eye (± 0.03 mm) is measured at the level of the middle of eye height at a head angle that allows both the outer and the inner margins

of the eye to be seen simultaneously. Width of gena (± 0.03 mm) is measured at the level of the middle of compound eye height as the distance between the outer eye margin and the occipital carina. Lengths of flagellomeres 1 and 2 (± 0.03 mm) are measured on the ventral faces of the flagellomeres. Length of hind femur (± 0.09 mm) is measured on lateral face of femur as the distance from the basal margin to the most distant tip of the femur. Length of first metasomal tergite (± 0.09 mm) is measured in lateral view as the distance between the very beginning of the tergite on the propodeum to the most distant tip on the dorsal surface of the tergite. Apical width of first tergite (± 0.03 mm) is measured in dorsal view at the widest point of tergite near its apex.

Genus HIMERTA Foerster

Ithagenes Foerster, 1868: 158. Junior homonym. Type species:

Ichneumon defectivus Gravenhorst. Monotypically included and designated by Townes, 1969-b. Synonym designated by Townes, 1969-b. Holotype not seen.

Himerta Foerster, 1868: 200. Type species: *Euryproctus*

(*Himertus*) *bisannulatus* Thomson. Designated by Viereck, 1914 from two species included by Thomson, 1883. Holotype not seen.

Clepsiorthus Foerster, 1868: 200. Type species: *Mesoleus?*

rubiginosus Cresson. Designated by Viereck, 1914 from four species included in Davis, 1898. Synonym designated by Cushman, 1927. Holotype seen.

Eocenetis Foerster, 1868: 211. Type species: *Eocenetis*

scutellaris Kriechbaumer. By subsequent monotypy from inclusion by Kriechbaumer, 1897. Synonym designated by Townes et al, 1965. Holotype not seen.

Dolioctonus Foerster, 1868: 212. Type species: *Ichneumon*

defectivus Gravenhorst. Monotypically included and designated by Perkins, 1962. Synonym designated by Perkins, 1962. Holotype not seen.

Himertus Thomson, 1883: 926. Emendation.

Neoprotarchus Cushman, 1924: 10. Type species: *Neoprotarchus*

ater Cushman. Monotypic and originally designated. Synonym designated by Cushman, 1927. Holotype seen.

Daisetsuzania Uchida, 1930: 289. Type species: *Daisetsuzania albitrons* Uchida. Monotypic and originally designated.

Synonym designated by Townes, 1957. Holotype not seen.

DESCRIPTION. (Modified from Townes 1969-b). Fore wing 6.9-10.0 mm long. Flagellum with 29 to 46 flagellomeres. Face very wide in *H. carinata* and moderately wide in the other species. Clypeus very small and narrow, basally almost flat to strongly convex and apically moderately emarginate in *H. carinata* and weakly emarginate in the other species. Mandible short with anterior tooth wider and a little longer than the posterior tooth. Notaulus indistinct to strong. Mesepisternum with punctures small and separated by more than their diameter to large and separated by less than their diameter. Sculpture between the punctures on mesepisternum absent to very coarse and sometimes forming with the punctures a reticulate pattern of wrinkling. Spurs of middle and hind tibiae moderately long and of unequal lengths. Propodeum short, with sculpture absent to very coarse and with carinae absent except for median longitudinal carinae being well developed and strong in *H. carinata* and restricted to two very short posterior carinae in the other species. Median furrow on anterior half of propodeum absent to well developed, with or without adjacent sides of propodeum being uplifted. Hind femur 4.17 to 6.95 as long as wide. Areolet in fore wing absent. Cu-A distant

from Rs&M by about 0.7 its length in fore wing. Nervellus intercepted by Cul at or above its middle in hind wing (Fig 12). Metasoma moderately long. Sculpture on metasomal tergites absent to moderate but strong in *H. carinata*. First tergite short and moderately wide and with sides almost parallel, to moderately divergent, and strongly divergent in *H. carinata*. First tergite with median dorsal carinae undeveloped to strong and with dorsolateral carinae complete. Hairs on female subgenital plate short and dense; slanted backwards in *H. carinata* and erect in the other species.

DIAGNOSIS. The following combination of character states distinguishes the genus *Himerta* from other genera of Mesoleiini. 1. Clypeus small and narrow (Figs 1 to 4). 2. Anterior mandible tooth not much longer than posterior tooth (Figs 5,6). 3. Areolet absent in fore wing. 4. Nervellus intercepted by Cul at or above its middle in hind wing (Fig 12).

BIOLOGY. As are the other members of the subfamily Ctenopelmatinae, species of *Himerta* are primary endoparasites on larvae of sawflies. Published information (Short 1978 and Townes 1969-b) and that from reared specimens in CNCI suggests that larvae of the genus *Zaraea* (Cimbicidae), the honeysuckle sawflies, are the usual hosts of *Himerta*. The Palearctic *H. sepulchralis* Holmgren and the Nearctic *H. epicnemia*, *H. bicolorata* and *H. carinata* have

all been reared from *Zaraea*. The species *H. carinata* has, however, also been reared twice independently from larvae of spruce sawflies (genus *Pikonema*, Tenthredinidae). This unusually wide jump in hosts for a species from a highly host-selective genus is consistent with the conspicuous morphological divergence of *H. carinata* from other species of *Himerta*.

KEY TO THE SPECIES

- 1---Median longitudinal carinae of propodeum well developed
(Fig 36); first metasomal tergite coarsely sculptured
(Fig 43); face wide (Fig 4).....*H. carinata* n.sp.
- 1'---Median longitudinal carinae of propodeum reduced to two
short posterior carinae (Figs 30-35); first metasomal
tergite at the most moderately sculptured (Figs 37-42);
face narrow to moderately wide (Figs 1-3).....2
- 2---With the following combination of character states:
wings darkly infusate; mesepisternum with punctures
small and separated by more than their diameter;
mesepisternum and propodeum without sculpture between
the punctures (Figs 25,29,33,34); restricted to high
mountains in United States (Map 3, triangles and Map 9,
circles).....3
- 2'---Wings lightly infusate to almost hyaline; punctures on
mesepisternum of varying size and distance of
separation; with or without sculpture between the
punctures on mesepisternum and propodeum; variable
distribution.....4
- 3---Head and mesosoma mostly to entirely black and metasoma
mostly deep orange.....*H. alpina* n.sp.
- 3'---Head, mesosoma and metasoma mostly strong brown.....
.....*H. infusata* n.sp.
- 4---Females.....5

- 4'--Males.....20
- 5---Color of face, clypeus and often malar spaces uniformly brilliant yellow to pale yellow without darker longitudinal lines.....6
- 5'--Color of face, clypeus and malar spaces not brilliant yellow or pale yellow or if so then with one to three darker longitudinal lines from antennal sockets down to basal margin of clypeus.....8
- 6---Hind tarsomere 1 with same color as the rest of the tarsus; restricted to the United States east of 100°W (Map 1, triangles).....*H. luteofacia* n.sp.
- 6'--Basal fifth to four fifths of hind tarsomere 1 darker than the rest of the tarsus; widely distributed (Maps 10-11).....7
- 7---Mesosternum with at least traces of pale yellow; transcontinental (Map 11, circles)..*H. bicolorata* n.sp.
- 7'--Mesosternum without pale yellow markings; restricted to the western mountain chains (Map 10).....
.....*H. unicolorata* n.sp. (a few specimens)
- 8---Metasomal tergites entirely black and facial orbits on head black.....9
- 8'--Metasomal tergites mostly strong yellowish brown, strong brown, brownish orange or deep orange; if black then facial orbits on head brownish orange or brilliant yellow.....10
- 9---Mesoscutellum narrow (Fig 17); apical three fifths of

- hind tibia black.....*H. scutellata* n.sp.
- 9'--Mesoscutellum wide (Fig 16); apical half of hind tibia
black.....*H. atra* (Cushman)
- 10--Basal half of to entire metatarsomere 1 clearly darker
than the rest of the tarsus; median furrow on anterior
half of propodeum well developed with adjacent sides
of propodeum uplifted (Fig 35).....11
- 10'-Metatarsus of uniform color, without a clearly darker
portion on tarsomere 1; median furrow on anterior half
of propodeum varying from absent to well developed but
usually without adjacent sides of propodeum being much
uplifted.....14
- 11--Mesosoma entirely reddish black and dark brown except
for faint traces of deep orange on mesoscutum,
mesoscutellum and metascutellum.....*H. foxleii* n.sp.
- 11'-Mesosoma largely strong brown to brownish orange.....12
- 12--Sculpture on propodeum coarse (as Fig 30); restricted to
northwestern North America (Map 6).....*H. gelida* n.sp.
- 12'-Sculpture on propodeum moderately coarse (Fig 35);
distributed in more southern parts of North America
(Map 8, triangles and Map 10).....13
- 13--Hind tibia with subbasal two fifths light yellow or deep
orange yellow and with apical three fifths brownish
orange and gradually becoming dark reddish brown
towards apex; face pale yellow with three parallel
strong yellowish brown to dark reddish brown lines

- running from antennal sockets down to basal margin of clypeus; distributed east of the western mountain chains (Map 8, triangles).....*H. lineola* n.sp.
- 13'-Hind tibia strong brown to strong yellowish brown with or without subbasal half deep orange yellow but without its apical three fifths gradually becoming dark reddish brown towards apex; face, except for orbits, uniformly strong yellowish brown to deep orange yellow to sometimes pale yellow with three parallel strong yellowish brown to deep orange yellow lines running from antennal sockets down to basal margin of clypeus; restricted to the western mountain chains (Map 10).....
.....*H. unicolorata* n.sp. (most specimens)
- 14--Mesosoma largely black to entirely black except for brownish orange, brilliant yellow or pale yellow mesoscutellum, often subtegmental ridge and sometimes metascutellum; large size (flagellum with 42-44 flagellomeres and fore wing 8.6-9.4 mm long); widely distributed (Map 2, circles).....*H. flavida* (Davis)
- 14'-Black markings on mesosoma of limited extent, if largely black then smaller sized species (flagellum with 39-42 flagellomeres and fore wing 7.4-8.3 mm long) restricted to northwestern North America (Map 5).....15
- 15--Epicnemial carina reaching anterior margin of mesepisternum and ending below the level of the middle of the pronotum excluding hind corner lobe (Fig 24);

- body color almost uniformly strong yellowish brown
with black markings almost absent; small body size
(fore wing 6.8-7.3 mm long).....*H. pumila* n.sp.
- 15'-Epicnemial carina generally not reaching anterior margin
of mesepisternum but ending at or below the level of
the middle of the pronotum excluding hind corner lobe
(Figs 18,19,20); body color strong brown to brownish
orange with black markings present and of variable
extent; body size generally larger (fore wing 7.4-10.0
mm long).....16
- 16--Sculpture between punctures absent on mesepisternum (as
Fig 29) and strongly reduced on propodeum (as Fig 33);
restricted to high mountains in United States (Map 3,
circles).....*H. eruga* n.sp.
- 16'-Sculpture between punctures moderately coarse to coarse
on mesepisternum (Figs 27,28) and on propodeum (eg Fig
31); variable distribution.....17
- 17--Sculpture between punctures on mesepisternum very coarse
(Fig 28), often producing with the punctures a
reticulate surface; restricted to southwestern Canada
(Map 2, triangles) or to northwestern North America
(Map 5).....18
- 17'-Sculpture between punctures on mesepisternum moderately
coarse (Fig 27), never producing with the punctures a
reticulate surface; widely distributed but not as far
north (Map 1, circles and Map 4).....19

- 18--Notauli on mesoscutum indistinct to weak (as Figs 13 and 15); mesoscutum with an anteromedian black band to half of scutum length; restricted to northern British Columbia, Yukon and Alaska (Map 5)..*H. rugopleura* n.sp.
- 18'-Notauli on mesoscutum strong (Fig 14); mesoscutum without an anteromedian black band to half of scutum length; restricted to southwestern British Columbia (Map 2, triangles).....*H. pacifica* n.sp.
- 19--Epicnemial carina ending below the level of the middle of the posterior margin of the pronotum excluding hind corner lobe (Fig 18); hind tibia basally brownish orange for a short distance, followed by a light yellow segment and with apical three fifths basally brownish orange and gradually becoming dark reddish brown to black towards apex; distributed generally east of the western mountain chains (Map 1, circles).....
.....*H. epicnemias* n.sp.
- 19'-Epicnemial carina ending at the level of the middle of the posterior margin of the pronotum excluding hind corner lobe (Fig 19); hind tibia uniformly strong brown; restricted to the western mountain chains (Map 4).....*H. rubiginosa* (Cresson)
- 20--Mesosternum without brilliant yellow, light yellow or pale yellow markings.....21
- 20'-Mesosternum with brilliant yellow, light yellow or pale yellow markings.....25

- 21--Metasoma uniformly black.....22
- 21'-Metasoma strong brown, brownish orange or deep orange.23
- 22--Face pale yellow; clypeus basal margin going moderately
high into face (as Figs 7,8,10).....*H. scutellata* n.sp.
- 22'-Face black; clypeus basal margin going very high into
face (Fig 9).....*H. townesorum* n.sp.
- 23--Mesosoma entirely reddish black with dark brown or dark
reddish brown except for usually deep orange yellow
markings on mesoscutellum and metascutellum and
sometimes subtegular ridge pale yellow.....
.....*H. foxleii* n.sp.
- 23'-Mesosoma mostly strong brown or brownish orange.....24
- 24--Background body color strong brown; face, excluding
orbits, strong yellowish brown to deep orange yellow to
pale yellow with three faint darker parallel lines from
antennal orbits to upper margin of clypeus to entirely
pale yellow; posterior half of vertex and genae and
entire occiput strong brown; restricted to the western
mountain chains (Map 10).....
.....*H. unicolorata* n.sp. (most specimens)
- 24'-Background color brownish orange; face entirely pale
yellow with three faint darker parallel lines from
antennal orbits to upper margin of clypeus; posterior
half of vertex and genae and entire occiput black;
distributed east of the western mountain chains (Map 8,
triangles).....*H. lineola* n.sp.

- 25--Metasomal tergites largely black with or without traces of brownish orange or deep orange yellow.....26
- 25'-Metasomal tergites largely strong brown or brownish orange.....30
- 26--Sculpture between punctures on mesepisternum absent (as Fig 29); restricted to high mountains in United States (Map 3, circles).....*H. eruga* n.sp. (in part)
- 26'-Sculpture between punctures on mesepisternum moderately coarse to coarse (Figs 27,28); widely distributed....27
- 27--Inner eye margins strongly convergent at the level of face and face narrow (Fig 2); metasomal tergites uniformly black; posterior face of middle femur dark brown to black.....*H. atra* (Cushman)
- 27'-Inner eye margins parallel to slightly convergent at the level of face and face moderately wide (as Figs 1,3); metasomal tergites usually with traces of brownish orange or deep orange yellow; posterior face of middle femur brilliant yellow to deep orange yellow.....28
- 28--Epicnemial carina ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe (as Fig 19); propodeum sculpture coarse (Fig 30); collected from mid July to Mid August.....
.....*H. flavida* (Davis)
- 28'-Epicnemial carina ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe (Fig 18); propodeum sculpture moderately

- coarse (as Fig 31); collected from late March to mid August.....29
- 29--Middle section of antennal flagellum always yellow and long (with 8-11 flagellomeres with mean= 9.8 ± 0.7 SD); restricted to Mississippi and Missouri River areas and also collected in northern Florida (Map 1, triangles); collected from late March to early June.....
.....*H. luteofacia* n.sp. (in part)
- 29'-Middle section of antennal flagellum brilliant yellow and shorter (with 2-9 flagellomeres with mean= 5.9 ± 1.8 SD) or sometimes not differentiated from basal or apical sections; widely distributed east of the Rocky Mountains (Map 1, circles); collected from early June to mid August.....*H. epicnemis* n.sp. (a few specimens)
- 30--Basal half to entire metatarsomere 1 clearly darker than the rest of the tarsus.....31
- 30'-Entire metatarsus of uniform color.....33
- 31--Sculpture on propodeum coarse (as Fig 30); restricted to northwestern North America (Map 6).....*H. gelida* n.sp.
- 31'-Sculpture on propodeum moderately coarse (Fig 35); distribution transcontinental but not as far north (Map 10 and map 11, circles).....32
- 32--Mesoscutum with anterolateral yellow spots.....
.....*H. bicolorata* n.sp.
- 32'-Mesoscutum without anterolateral yellow spots.....
.....*H. unicolorata* n.sp. (a few specimens)

- 33--Sculpture between punctures on mesepisternum absent (as Fig 29); restricted to high mountains in United States (Map 3, circles).....*H. eruga* n.sp. (in part)
- 33'-Sculpture between punctures on mesepisternum moderately coarse to coarse (Figs 27,28); widely distributed....34
- 34--Sculpture between punctures on mesepisternum very coarse (Fig 28), often producing with the punctures a reticulate surface; restricted to southwestern Canada (Map 2, triangles) or to northwestern North America (Map 5).....35
- 34'-Sculpture between punctures on mesepisternum moderately coarse (Fig 27), never producing with the punctures a reticulate surface; widely distributed but not as far north (Map 1, circles and triangles and Map 4).....36
- 35--Mesoscutum with anteromedian black band at least to half of scutum length; restricted to northern British Columbia, Yukon and Alaska (Map 5)..*H. rugopleura* n.sp.
- 35'-Mesoscutum without an anteromedian black band to half of scutum length; restricted to southwestern British Columbia (Map 2, triangles).....*H. pacifica* n.sp.
- 36--Epicnemial carina ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe (Fig 18); distributed generally east of the western mountain chains (Map 1, circles and triangles).
.....37
- 36'-Epicnemial carina ending at the level of the middle of

the posterior margin of the pronotum, excluding hind corner lobe (Fig 19); restricted to the western mountain chains (Map 4).....*H. rubiginosa* (Cresson)

37--Middle section of flagellum always yellow and long (with 8-11 flagellomeres with mean= 9.8 ± 0.7 SD); restricted to Mississippi and Missouri River areas and also collected in northern Florida (Map 1, triangles); collected from late March to early June.....
.....*H. luteofacia* n.sp. (in part)

37'-Middle section of flagellum brilliant yellow and shorter (with 2-9 flagellomeres with mean= 5.9 ± 1.8 SD) or sometimes not differentiated from basal or apical sections; widely distributed east of the Rocky Mountains (Map 1, circles); collected from early June to mid August.....*H. epicnemia* n.sp. (most specimens)

DESCRIPTIONS OF THE SPECIES

Himerta luteofacia Leblanc, new species

Fig 37; Map 1

HOLOTYPE. Male. Labelled: "Golden Pond, Ky. [Kentucky] May, 1965 Malaise trap" [typed except for hand printed month on white label]; "HOLOTYPE [typed] *Himerta luteofacia* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in females and parallel to slightly convergent in males at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally moderately convex in females and strongly convex in males and apically weakly emarginate.

Notauli on mesoscutum weak. Mesoscutellum wide. Epicnemial carina moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by more than their diameter. Sculpture on mesepisternum moderately coarse. Microsculpture on speculum

weak to strong. Sculpture on propodeum moderately coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae to entirely absent. Median furrow on anterior half of propodeum weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite slightly divergent in females and parallel or nearly so (Fig 37) to slightly divergent in males. Median dorsal carinae on first metasomal tergite undeveloped. Spiracles of first metasomal tergite at midlength of tergite and not uplifted to moderately uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape strong brown. Pedicel black. Flagellum with basal section black, middle section pale yellow and apical section dark orange yellow.

Head strong brown except for the following. Brilliant yellow to light yellow parts are face, clypeus and mandibles except for black mandible teeth.

Mesosoma strong brown except for the following. Brilliant yellow to light yellow parts are hind corner lobe of pronotum, subtegular ridge, tegula, often anterolateral spots on mesoscutum, mesoscutellum, metascutellum, and sometimes sublateral spots on anterior half of mesosternum. Mesepimeron strong brown or light yellow. Black parts are propleuron basally, sometimes depression behind collar of

pronotum dorsally, posterior margin of pronotum, often anteromedian band to half of mesoscutum length, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture between metascutellum and propodeum, often epicnemium medially, often anterolateral spots on mesosternum along lower pleuron margin lateral to yellow spots when present, posterior margin of mesepisternum from tegula to end of postpectal carina, lower and posterior margins of metapleuron.

Fore and middle coxae dorsally brilliant yellow to light yellow and ventrally strong brown. Hind coxa strong brown. Fore, middle and hind trochanters 1 brilliant yellow. Fore, middle and hind trochanters 2 strong brown. Fore, middle and hind femora strong brown with apex of hind femur black dorsally. Fore and middle tibiae light yellow. Hind tibia with basal two fifths light yellow and apical three fifths strong brown and gradually becoming black towards apex. Fore, middle and hind tarsi light yellow except for strong brown tarsomeres 5.

Metasoma strong brown except for tergite 1 being black down to end of glymma.

Wings lightly infusate.

Variations in female coloration. Ten specimens conform to the above description. In five specimens strong brown is largely to completely replaced by black. Largely replaced

means that strong brown is still present on legs, on vertex, on genae and partly on abdomen. Completely replaced means that strong brown is left only as spots on vertex behind eye margins and on fore legs and middle legs.

Measurements in females. Flagellum with 42-46 (44.2 ± 1.1) flagellomeres. Flagellum basal section with 8-10 (9.0 ± 0.5) flagellomeres, middle section with 8-9 (8.7 ± 0.5) flagellomeres and apical section with 24-29 (26.5 ± 1.4) flagellomeres.

Number of specimens measured: 10. Fore wing 7.9-9.4 (8.8 ± 0.5) mm long. Face 0.51-0.63 (0.59 ± 0.03) mm long, 0.89-1.10 (0.98 ± 0.06) mm wide and 1.51-1.81 as wide as long. Face and compound eyes 1.78-2.09 (1.93 ± 0.09) mm wide and 1.90-2.05 as wide as face. Compound eye 0.57-0.73 (0.68 ± 0.05) mm wide, gena 0.45-0.52 (0.50 ± 0.02) mm wide, face 1.34-1.57 as wide as compound eye and gena 0.67-0.85 as wide as compound eye. Flagellomere 1 0.98-1.22 (1.05 ± 0.09) mm long, flagellomere 2 0.38-0.48 (0.42 ± 0.03) mm long and flagellomere 1 2.24-2.90 as long as flagellomere 2. Hind femur 2.86-3.48 (3.23 ± 0.22) mm long, 0.46-0.56 (0.51 ± 0.03) mm wide and 5.71-6.71 as long as wide. First metasomal tergite 1.85-2.20 (2.01 ± 0.12) mm long, 0.63-1.11 (0.85 ± 0.12) wide apically and 1.98-3.02 as long as apically wide.

Male coloration. Scape and pedicel dorsally brownish orange to strong brown to black and ventrally brilliant yellow to light yellow. Flagellum with basal section black,

middle section brilliant yellow to light yellow and apical section dark orange yellow to dark grayish reddish brown.

Head brownish orange to strong brown except for the following. Brilliant yellow to light yellow parts are vertical orbits, frontal orbits, often frons in front of ocelli, face, malar spaces, genae up to level of lower third of compound eye height, sometimes temporal orbits, clypeus and mandibles except for black mandible teeth.

Mesosoma brownish orange to strong brown except for the following. Brilliant yellow to light yellow parts are propleuron, collar of pronotum, hind corner lobe of pronotum, subtegular ridge, tegula, anterolateral spots on mesoscutum and extending along lateral scutum margin back to at least level of tegula, mesoscutellum, metascutellum, apical half and lateral fourth to half of epicnemium, all mesosternum except often apically and anterolaterally, lower part of mesepisternum from postpectal carina to level of lower corner of pronotum and mesepimeron. Often with brownish orange or black as anterolateral narrow to wide spots on mesosternum and on apical third or less of mesosternum. Black parts are dorsal half of depression behind pronotum collar, lower half of posterior margin of pronotum, usually anteromedian band on mesoscutum to half of scutum length, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture

between metascutellum and propodeum, basal half and lateral half to three fourths of epicnemium, posterior margin of mesepisternum from tegula to end of postpectal carina and anterior, lower and posterior margins of metapleuron.

Fore, middle and hind coxae and trochanters 1 and 2 brilliant yellow to light yellow except for hind coxa being brownish orange except for brilliant yellow to light yellow on its ventral face. Fore and middle femora deep orange yellow except for basal half of ventral face and apex being brilliant yellow to light yellow. Hind femur brownish orange and apex black to dark reddish brown at least dorsally. Fore and middle tibiae brilliant yellow to light yellow and often with apical half of ventral face deep orange yellow. Hind tibia basally deep orange yellow for a short distance, followed by brilliant yellow to light yellow and with apical three fifths brownish orange basally and gradually becoming dark reddish brown towards apex. Fore, middle and hind tarsi brilliant yellow to light yellow except for deep orange yellow tarsomeres 5 and deep orange yellow basal half of hind tarsomere 1.

Metasoma brownish orange except for tergite 1 being black down to end of glymma.

Wings lightly infusate.

Variations in male coloration. Eighteen specimens conform to the above description. In the other thirteen specimens brownish orange is largely to completely replaced

by black. Largely replaced means that brownish orange is still present on mesoscutum medially, on hind femora and partly on abdomen. A few specimens show a combination of brownish orange and black parts. Completely replaced means that all parts cited as brownish orange in the description are black.

Measurements in males. Flagellum with 40-45 (42.5 ± 1.3) flagellomeres. Flagellum basal section with 8-11 (9.8 ± 0.7) flagellomeres, middle section with 8-13 (10.6 ± 1.4) flagellomeres and apical section with 20-24 (22.1 ± 1.3) flagellomeres.

Number of specimens measured: 10. Fore wing 8.4-9.1 (8.6 ± 0.3) mm long. Face 0.55-0.61 (0.58 ± 0.02) mm long, 0.88-0.95 (0.91 ± 0.02) mm wide and 1.52-1.62 as wide as long. Face and compound eyes 1.71-1.99 (1.83 ± 0.08) mm wide and 1.94-2.14 as wide as face. Compound eye 0.66-0.73 (0.69 ± 0.03) mm wide, gena 0.45-0.52 (0.48 ± 0.03) mm wide, face 1.24-1.34 as wide as compound eye and gena 0.63-0.75 as wide as compound eye. Flagellomere 1 0.88-1.01 (0.97 ± 0.05) mm long, flagellomere 2 0.34-0.45 (0.39 ± 0.03) mm long and flagellomere 1 2.24-2.77 as long as flagellomere 2. Hind femur 2.79-3.17 (2.96 ± 0.15) mm long, 0.45-0.49 (0.46 ± 0.01) mm wide and 6.02-6.95 as long as wide. First metasomal tergite 1.85-2.09 (1.90 ± 0.08) mm long, 0.59-0.78 (0.68 ± 0.07) wide apically and 2.37-3.09 as long as apically wide.

ETYMOLOGY. From the Latin luteus, meaning yellow and

the Latin facies, meaning face. Refers to the fact that females have yellow faces.

DISTRIBUTION. Map 1. Along Mississippi and Missouri Rivers and in northern Florida.

SPECIMENS EXAMINED. 16 females and 31 males.

PARATYPES. UNITED STATES. FLORIDA: Gainesville, 30.iii.1986, J. LaSalle (1F,AEIC). **IOWA:** Mt-Pleasant, 10.v.1934, Millspaugh (1F,USNM). **KANSAS:** 2 mi. N. Baldwin, Breidenthal Reserve, 5-19.v.1982 (1M), 26-29.v.1982 (1F,1M), 29.v-5.vi.1982 (1M), 5-19.vi.1983 (3F,1M), D.B. Wahl (WAHL); Lawrence, 13.v.1979, D.B. Wahl (1M,WAHL); 5 mi. N.E. Lawrence, 27.iv.1981 (1F,8M), 28.iv.1981 (4F,5M), D.B. Wahl (WAHL); Onaga, Crevecoeur (1M,USNM); unknown locality, (1M,USNM). **KENTUCKY:** Golden Pond, v.1965, (1F,1M,AEIC). **MISSOURI:** Columbia, 4.v.1929, W.S. Craig (1M,USNM); New Hartford, 22.v.1938, W.S. Craig (1M,USNM); Williamsville, 22.iv-13.v.1970 (3F,3M), v.1969 (1F,2M), 12-26.v.1969 (2M), J.T. Becker (CNCI).

BIOLOGY. Collected on March 30 in Florida and between late April and early June in the drainages of the Mississippi and Missouri Rivers. No host records.

Himerta epicnemia Leblanc, new species

Fig 18; Map 1

HOLOTYPE. Female. Labelled: "Boissevain, Man. [Manitoba] July 17 1953 Brooks-Kelton" [typed on white label except for hand printed collecting day]; "HOLOTYPE [typed] *Himerta epicnemia* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in CNCI.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally moderately convex in females and moderately to strongly convex in males and apically weakly emarginate.

Notauli on mesoscutum weak. Mesoscutellum wide. Epicnemial carina (Fig 18) moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by approximately their diameter to small and separated by more than their diameter. Sculpture on mesepisternum moderately coarse. Microsculpture on speculum weak to strong. Sculpture on propodeum moderately coarse. Median longitudinal carinae of propodeum reduced to two

short posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum absent to weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent in females and slightly to moderately divergent in males. Median dorsal carinae on first metasomal tergite undeveloped. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted to sometimes not uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape and pedicel brownish orange to black. Flagellum basal section brownish orange except for reddish black basal half of flagellomere 1; sometimes whole basal section reddish black. Middle section brilliant yellow. Apical section deep yellowish brown to dark grayish reddish brown.

Head brownish orange except for deep orange yellow mandibles and black mandible teeth.

Mesosoma brownish orange except for the following. Mesoscutellum brilliant yellow to brownish orange. Deep orange yellow parts are hind corner lobe of pronotum, subtegular ridge and tegula. Mesepimeron dark reddish brown. Black parts are propleuron, often two lateral spots in depression behind collar of pronotum, often anteromedian

band on mesoscutum to half of scutum length, depression between mesoscutellum and metascutellum, depression between metascutellum and propodeum, median three fourths of epicnemium, lateral spots on anterior half of mesosternum along lower pleuron margins, posterior margin of mesepisternum from tegula to end of postpectal carina, anterior, lower and posterior margins of metapleuron.

Fore legs and middle legs deep orange yellow. Hind coxa brownish orange and black ventroapically. Hind trochanter 1 brownish orange and black ventrobasally. Hind trochanter 2 brownish orange. Hind femur brownish orange except for black to dark reddish brown apical fifth. Hind tibia basally brownish orange for a short distance, followed by a light yellow segment and apical three fifths basally brownish orange and gradually becoming dark reddish brown to black towards apex. Hind tarsus deep orange yellow.

Metasoma brownish orange except for the following. Basal fifth of tergite 1 dorsally and laterally black. Apex of ovipositor sheath and ovipositor deep orange yellow.

Wings lightly infusate.

Variations in female coloration. Background color sometimes strong brown. The extent of black markings is variable. Reduction of black markings involves reduction or absence of anteromedian mesoscutum band, reduction of extent of black on epicnemium and sometimes absence of anterolateral spots on mesosternum. Extensive black

markings involve entire epicnemium, most of mesosternum, mesepisternum parts adjacent to epicnemium and sternum and sometimes parts of pronotum, metapleuron and propodeum being black.

Measurements in females. Flagellum with 37-44 (41.8 ± 2.0) flagellomeres. Flagellum basal section with 9-10 (9.3 ± 0.5) flagellomeres, middle section with 5-8 (5.6 ± 1.2) flagellomeres and apical section with 25-29 (27.0 ± 1.5) flagellomeres.

Number of specimens measured: 10. Fore wing 7.5-9.3 (8.5 ± 0.5) mm long. Face 0.51-0.66 (0.58 ± 0.04) mm long, 0.85-1.06 (0.96 ± 0.06) mm wide and 1.53-1.86 as wide as long. Face and compound eyes 1.67-1.95 (1.83 ± 0.08) mm wide and 1.84-1.96 as wide as face. Compound eye 0.60-0.72 (0.66 ± 0.04) mm wide, gena 0.48-0.55 (0.51 ± 0.03) mm wide, face 1.39-1.53 as wide as compound eye and gena 0.73-0.82 as wide as compound eye. Flagellomere 1 0.88-1.12 (0.98 ± 0.08) mm long, flagellomere 2 0.37-0.44 (0.40 ± 0.02) mm long and flagellomere 1 2.34-2.58 as long as flagellomere 2. Hind femur 2.65-3.38 (2.99 ± 0.22) mm long, 0.46-0.60 (0.53 ± 0.04) mm wide and 5.40-5.79 as long as wide. First metasomal tergite 1.64-2.16 (1.91 ± 0.15) mm long, 0.73-1.07 (0.86 ± 0.09) wide apically and 2.01-2.42 as long as apically wide.

Male coloration. Scape and pedicel dorsally reddish black to strong yellowish brown and ventrally brilliant yellow. Flagellum basal section dark orange yellow to

brownish orange to brownish black. Flagellum middle section brilliant yellow or sometimes same color as basal and apical sections. Flagellum apical section deep yellowish brown to brownish black.

Brilliant yellow parts on head are frontal orbits, face, malar spaces and genae to lower fifth to third of compound eye height, clypeus and mandibles except for black mandible teeth. Rest of head usually brownish orange with or without black between and behind antennal sockets and/or in and around ocellar triangle and/or occiput but sometimes black more extensive to cover occiput, posterior half of vertex and genae, frons and ocellar triangle to rarely entirely black except for brownish orange spots on vertical orbits.

Mesosoma brownish orange except for the following. Brilliant yellow parts are apical third to four fifths of or sometimes entire propleuron, often lower corner of pronotum and sometimes entire collar of pronotum, hind corner lobe of pronotum, subtegular ridge, tegula, often anterolateral spots on mesoscutum and mesoscutellum. Metascutellum brilliant yellow to deep orange yellow. Epicnemium with basal third to two thirds of median three fourths black and the rest brilliant yellow except for brownish orange basal third of lateral fourth to sometimes entirely black except for brilliant yellow along apical margin. Mesosternum brilliant yellow except for posterior fifth to half being brownish orange or black and with or without anterolateral

dark brown to black spots to sometimes entirely black except for anterosublateral brilliant yellow lines. Mesepisternum with or without brilliant yellow or black along its lower margin. Mesepimeron brilliant yellow to brownish orange to dark reddish brown. Black parts are basal fifth to two thirds of or rarely entire propleuron, often dorsal half of depression behind pronotum collar to entire collar and depression, sometimes spot on posterior margin of pronotum, anteromedian band on mesoscutum ranging from absent to very short to reaching half of scutum length, usually anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, sometimes axillary troughs of mesoscutellum, usually suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, usually posterior margin of mesepisternum from tegula to end of postpectal carina, anterior, lower and posterior margins of metapleuron and often posterior margin of propodeum.

Fore and middle coxae brilliant yellow and rarely with posterior faces deep orange yellow. Hind coxa brownish orange and usually with ventral face brilliant yellow and usually black at apex of anterior, ventral and posterior faces. Fore, middle and hind trochanters 1 and 2 brilliant yellow except sometimes for brownish orange apical half of hind trochanter 2. Fore and middle femora deep orange yellow and with ventral faces often brilliant yellow. Hind

femur brownish orange with apex black. Fore and middle tibiae brilliant yellow and with ventral faces often deep orange yellow. Hind tibia basally brownish orange for a short distance, followed by brilliant yellow and with apical three fifths brownish orange and usually becoming reddish black towards apex. Fore, middle and hind tarsi brilliant yellow except for tarsomeres 5 being brownish orange and often basal half of to entire hind tarsomere 1 being brownish orange.

Metasoma brownish orange except for tergite 1 being black down to end of glymma or sometimes to spiracles and often with ventrolateral carina being black.

Wings lightly infusate.

Variations in male coloration. In five specimens brownish orange is mostly replaced by black so brownish orange remains only as spots on vertical orbits, often on hind corner of pronotum in front of the lobe, upper fourth of mesepisternum, largely on mesoscutum, often base of hind femur and usually at least traces on metasomal tergites 2, 3 and 4.

Measurements in males. Flagellum with 37-43 (40.0 ± 1.7) flagellomeres. Flagellum basal section with 9-11 (10.2 ± 0.8) flagellomeres, middle section with 2-9 (5.9 ± 1.8) flagellomeres and apical section with 21-28 (24.1 ± 1.9) flagellomeres.

Number of specimens measured: 10. Fore wing 7.7-8.9

(8.2 ± 0.4) mm long. Face 0.51-0.60 (0.55 ± 0.03) mm long, 0.80-0.95 (0.88 ± 0.04) mm wide and 1.53-1.67 as wide as long. Face and compound eyes 1.67-1.92 (1.78 ± 0.07) mm wide and 1.92-2.08 as wide as face. Compound eye 0.60-0.70 (0.65 ± 0.03) mm wide, gena 0.43-0.50 (0.46 ± 0.02) mm wide, face 1.27-1.49 as wide as compound eye and gena 0.64-0.80 as wide as compound eye. Flagellomere 1 0.83-1.01 (0.91 ± 0.06) mm long, flagellomere 2 0.34-0.40 (0.37 ± 0.02) mm long and flagellomere 1 2.21-2.77 as long as flagellomere 2. Hind femur 2.44-2.96 (2.69 ± 0.17) mm long, 0.46-0.55 (0.50 ± 0.03) mm wide and 4.76-6.39 as long as wide. First metasomal tergite 1.64-2.02 (1.80 ± 0.12) mm long, 0.60-0.79 ($\pm$) wide apically and 2.20-2.74 as long as apically wide.

ETYMOLOGY. Refers to the epicnemial carina that anteriorly ends below the level of the middle of the posterior margin of the pronotum.

DISTRIBUTION. Map 1. Across Canada and northern States east of the western mountain chains, to Valentine, Nebraska and Estes Park, Colorado.

SPECIMENS EXAMINED. 23 females and 43 males.

PARATYPES. CANADA. ALBERTA: Banff, Eisenhower Lookout, 4600', 16.viii.1962, K.C. Herrmann (1F,CNCI); Bilby, 29.vi.1924, G. Salt (1F,AEIC); Calgary, 19.vii.1924 (1M), 26.vii.1922 (1F), G. Salt (USNM); Carstairs, 5.vii.1948 (1F,CNCI); Cowley, 16.vi.1962, W.R.M. Mason (1M,CNCI); Crowsnest, emerg. 28.vii.1950, Forest Insect Survey specimen

no. A1016A, ex. *Zaraea* (1M,CNCI); Demmitt, 12.vi-6.ix.1984, S. & J. Peck (1F,LEBL); Drumheller, 14.vi.1946, E.H. Strickland (1F,AEIC); Edmonton, 20.vi.1926, E.H. Strickland (1M,CNCI); Edmonton, 21.vi.1932 (1M,UASM), 22.vi.1932 (3M,AEIC;1M,CNCI), O. Peck; Elkwater Park, 12.vi.1952 (1M), 13.vii.1952 (1M), L.A. Konotopetz (CNCI); Elkwater Park, 20.vii.1952 (1M), 23.vii.1952 (1F), A.R. Brooks (CNCI); Frank, 18.vi.1962, W.R.M. Mason (1M,CNCI); George Lake, 11.vi-8.ix.1984 (1F,LEBL); George Lake, 7.vi.1980, G. Gibson (1M,CNCI); Jumping Pd Cr., 20mi.W. Calgary, 11.vii.1962 (1M), 13-16.vii.1962 (1M), 17-19.vii.1962 (3M), 15-17.viii.1962 (1M), W.R.M. Mason (CNCI); 8mi.E. Morley, 22.vi.1962, W.R.M. Mason (1M,CNCI); Wabamun, 17.vi.1950, E.H. Strickland (1F,UASM). Waterton, 11.viii.1947, E.H. Strickland (1F,CNCI); Waterton Nat. Pk, 1350 m., 18.vi.1980, W.R.M. Mason (1M,CNCI). ONTARIO: Dane, emerg. 8.ii.1960, Forest Insect Survey specimen # S59-1972-01-1, ex. *Zaraea inflata* (1F,CNCI). QUEBEC: Hull, 13.vi.1965 (1F,CNCI); Matagami Lk, 49°54'N77°14'W, 12.vi-8.viii.1987, L. Leblanc (2F,LEBL); Old Chelsea, 27.vi.1961, S.M. Clark (1M,CNCI). SASKATCHEWAN: Big River, 5.vii.1959, A. & J. Brooks (1M,CNCI); Broadview, 10.vii.1957, L.A. Konotopetz (1F,CNCI); Elbow, 20.vi.1960, A.R. Brooks (2M,CNCI); Elbow, 24.vii.1954, Brooks & Wallis (1F,CNCI); Prince Albert, 4.vii.1954, Brooks & Wallis 1M,CNCI); Rockglen, 49°11'N105°56'W, 21.vi.1955, J.R. Vockeroth (1M,CNCI); St-

Victor, 49°20'N105°54'W, 27.vi.1955, J.R. Vockeroth
(1M,CNCI); Saskatoon, 9.vi.1957, A.R. Brooks (1M,CNCI);
Saskatoon, 30.vi.1925, K.M. King (1F,CNCI). UNITED STATES.
COLORADO: nr Estes Pk, 15.vi.1948, H.M.G.D. & J. Townes
(1F,AEIC). MICHIGAN: Huron Mts, 28.vi.1961, H. & M. Townes
(2M,AEIC); Isle Royale, 12.vii (1F,USNM). NEBRASKA:
Valentine, 6.vi.1972 (1F,1M), 7.vi.1972 (2M), H. & M. Townes
(AEIC); Valentine Refuge, 5.vi.1972 (1M), 7.vi.1972 (2F,1M),
8.vi.1972 (2M), H. & M. Townes (AEIC). NORTH DAKOTA:
Stevens, Ramsey Co., 1.vii.1951, P.B. Kennowski (1M,AEIC).
UNKNOWN LOCALITY (3M,UASM).

BIOLOGY. Collected between June 6 and July 26 except
for two specimens collected between August 15 and August 17.
One specimen reared from *Zaraea inflata* and one reared from
Zaraea sp.

Himerta flavida (Davis)

Fig 30; Map 2

Clepsiorthus flavidus Davis, in Slosson, 1896: 264 (Nomen Nudum); Davis, 1898 (1897): 326. *Himertus flavidus* Cushman, 1927: 13. **HOLOTYPE**. Seen by author. Female. Labelled: "MT.WASH'N [Mt. Washington, New Hampshire]" [typed on white label]; "HoloTYPE [printed] 4415 [hand printed]" [red label]; "Clepsiorthus flavidus Davis" [hand written on white label]; "ANSP" [typed on yellow label]. Parts missing: none. Type in ANSP.

Himertus dakota Cushman, 1927: 14. Synonym designated by Townes, 1945. **HOLOTYPE**. Seen by author. Female. Labelled: "Spearfish, S.D. [South Dakota] July 26-1924" [typed on white label except for hand printed day and year]; "M" [typed on white label]; "Type No. [typed] 40443 [hand printed] U.S.N.M. [typed]" [red label]; "Himertus dakota Type. Cush." [hand printed on white label]. Parts missing: none. Type in USNM.

Lampronota annulata Davis, 1895: 31. *Himerta annulata* Townes, 1945: 507. **NEW SYNONYM. HOLOTYPE**. Seen by author. Male. Labelled: "Gaylord Mich [Michigan] 7-19-94 110" [hand written on white label]; "COLLECTION OF G.C. DAVIS" [typed on white label]; "HoloTYPE [typed] 4442 [hand printed]" [red label]; "Lampronota annulata" [hand written on white label]; "ANSP" [typed on yellow label].

Parts missing: left antenna and right flagellum but middle and apical sections of one flagellum broken and glued on label. Type in ANSP.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in females and parallel to slightly convergent in male at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally moderately convex in female and strongly convex in male and apically weakly emarginate.

Notauli on mesoscutum weak. Mesoscutellum wide. Epicnemial carina moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures small and separated by more than their diameter to moderately large and separated by approximately their diameter. Sculpture on mesepisternum moderately coarse. Microsculpture on speculum strong. Sculpture on propodeum (Fig 30) coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum absent to weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite slightly to moderately divergent. Median dorsal carinae on first metasomal tergite undeveloped to sometimes weakly developed in males. Spiracles of first metasomal tergite at midlength of tergite and not uplifted to moderately uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape and pedicel black. Flagellum basal section with flagellomere 1 black and other flagellomeres black with or without ventral surface brownish orange. Flagellum middle section brilliant yellow to pale yellow. Flagellum apical section dark brown to strong brown to brownish orange with or without dorsal surface black.

Head black except for the following. Face black with facial orbits brownish orange or brilliant yellow with or without a median longitudinal brownish orange or dark brown band. Clypeus dark brown to black or brilliant yellow. Mandibles with basal halves dark brown and apical halves brownish orange except for black teeth or entirely brilliant yellow or dark grayish reddish brown except for black teeth. Usually with strong brown spots on vertical orbits and sometimes strong brown spot in front of median ocellus.

Mesosoma entirely black except for the following. Subtegular ridge brilliant yellow or brownish orange or

black. Mesoscutellum brownish orange or brilliant yellow or pale yellow. Metascutellum sometimes brilliant yellow.

Fore coxa and trochanters 1 and 2 reddish black. Middle coxa black and middle trochanters 1 and 2 reddish black. Hind coxa and trochanters 1 and 2 black. Fore femur reddish black except for deep orange yellow apical three fifths of anterior face and apical two fifths of posterior face. Middle femur reddish black except for light yellow apex. Hind femur reddish black. Fore and middle tibiae and tarsi light yellow. Hind tibia basally deep orange yellow for a short distance, followed by light yellow and with apical half reddish black. Hind tarsus light yellow except for deep orange yellow tarsomere 5 and sometimes faint reddish black traces on tarsomere 1.

Metasomal tergite 1 black and with apex strong brown in one specimen. Other tergites black with faint traces of strong brown or entirely strong brown with or without basal half of tergite 2 black. Ovipositor sheath reddish black except for deep orange yellow apex. Ovipositor deep orange yellow.

Wings lightly infusate.

Variations in female coloration. The above color description is accurate for seven specimens. In three specimens strong brown is present on head and mesosoma. They fit the description except in the following respects.

In two specimens frons and anterior half of vertex and

gena down to lower third of compound eye height strong brown except for black or dark reddish brown between and behind antennal sockets and black or dark reddish brown ocellar triangle.

Hind corner lobe of pronotum strong brown in one specimen and brilliant yellow in one specimen. Subtegular ridge brilliant yellow. Mesoscutum strong brown except for black anteromedian band to half of scutum length , black sublateral bands lateral to anteromedian band and black anterior, lateral and posterior margins. Mesoscutellum and metascutellum brilliant yellow. Mesepisternum with strong brown ranging from upper third of anterior two thirds of to entire pleuron except along posterior margin including speculum and for black area on anterior half near lower margin. Metapleuron ranging from entirely black to entirely strong brown except for black along anterior, lower and posterior margins. Propodeum ranging from entirely black except for strong brown apical fifth between lateral longitudinal carinae to entirely strong brown except for black anterior and posterior margins.

Fore and middle coxae each with a light yellow spot at apex of dorsal face in two specimens. Fore femur deep orange yellow with light yellow at apex. Middle femur reddish black with deep orange yellow at apex to entirely deep orange yellow. Hind femur with basal fifth to four fifths brownish orange.

Metasomal tergites entirely strong brown except for black basal half to three fourths and lateral faces of tergite 1, black basal fourth to half of tergite 2 in two specimens and basal third of tergite 1 in one specimen.

Measurements in females. Flagellum with 42-44 (43.0 ± 0.8) flagellomeres. Flagellum basal section with 7-10 (8.4 ± 1.1) flagellomeres, middle section with 6-10 (7.8 ± 1.6) flagellomeres and apical section with 25-29 (27.3 ± 1.4) flagellomeres.

Number of specimens measured: 10. Fore wing 8.6-9.4 (9.0 ± 0.2) mm long. Face 0.55-0.66 (0.61 ± 0.03) mm long, 0.95-1.04 (1.00 ± 0.03) mm wide and 1.51-1.76 as wide as long. Face and compound eyes 1.85-2.06 (1.92 ± 0.06) mm wide and 1.84-2.03 as wide as face. Compound eye 0.67-0.76 (0.71 ± 0.03) mm wide, gena 0.46-0.66 (0.53 ± 0.06) mm wide, face 1.34-1.53 as wide as compound eye and gena 0.68-0.75 as wide as compound eye. Flagellomere 1 0.93-1.10 (1.02 ± 0.05) mm long, flagellomere 2 0.37-0.43 (0.41 ± 0.02) mm long and flagellomere 1 2.26-2.80 as long as flagellomere 2. Hind femur 2.86-3.42 (3.07 ± 0.17) mm long, 0.49-0.6 (0.54 ± 0.03) mm wide and 4.17-6.00 as long as wide. First metasomal tergite 1.81-2.13 (1.99 ± 0.10) mm long, 0.85-0.98 (0.90 ± 0.05) wide apically and 1.95-2.41 as long as apically wide.

Male coloration. Scape and pedicel black dorsally and brilliant yellow ventrally. Flagellum basal and apical sections brownish black and usually with at least traces of

brownish orange ventrally. Flagellum middle section usually brilliant yellow but sometimes not differentiated from basal and apical sections.

Head black except for the following. Brilliant yellow parts are often vertical orbits, frontal orbits, face, malar spaces, genae up to level of half of compound eye height, face, clypeus and mandibles except for black mandible teeth. Vertical orbits often brownish orange.

Mesosoma black except for the following. Brilliant yellow parts are basal third of propleuron, hind corner lobe of pronotum, subtegular ridge, tegula, anterolateral spots on mesoscutum to one third of scutum length and usually narrowly extending laterally to tegulae, mesoscutellum, metascutellum, apical half and lateral third of epicnemium, anterior two thirds of to entire mesosternum and lower part of mesepisternum from end of postpectal carina to upper limit of pale yellow on epicnemium.

Fore and middle legs brilliant yellow with tarsomeres 5 deep orange yellow and often with at least traces of deep orange yellow on dorsal faces of femora. Hind coxa black except for brilliant yellow ventral face. Hind trochanters 1 and 2 brilliant yellow. Hind femur black. Hind tibia with basal half brilliant yellow and apical half dark brown to black. Hind tarsus with tarsomere 1 deep orange yellow to dark brown and tarsomeres 2 to 5 brilliant yellow.

Metasoma black with faint traces of deep orange yellow

on tergites 2 to 4.

Wings lightly infusate.

Measurements in males. Flagellum with 38-44 (41.8 ± 2.3) flagellomeres. Flagellum basal section with 10-11 (10.4 ± 0.5) flagellomeres, middle section with 5-7 (6.2 ± 0.8) flagellomeres and apical section with 24-28 (26.4 ± 1.5) flagellomeres.

Number of specimens measured: 5. Fore wing 7.2-8.6 (8.1 ± 0.5) mm long. Face 0.56-0.59 (0.57 ± 0.01) mm long, 0.79-0.93 (0.87 ± 0.05) mm wide and 1.41-1.62 as wide as long. Face and compound eyes 1.71-1.95 (1.84 ± 0.08) mm wide and 2.08-2.15 as wide as face. Compound eye 0.68-0.77 (0.72 ± 0.03) mm wide, gena 0.40-0.50 (0.46 ± 0.03) mm wide, face 1.16-1.26 as wide as compound eye and gena 0.59-0.67 as wide as compound eye. Flagellomere 1 0.85-1.10 (0.96 ± 0.08) mm long, flagellomere 2 0.32-0.41 (0.38 ± 0.04) mm long and flagellomere 1 2.35-2.81 as long as flagellomere 2. Hind femur 2.47-2.93 (2.72 ± 0.18) mm long, 0.43-0.51 (0.47 ± 0.03) mm wide and 5.44-6.15 as long as wide. First metasomal tergite 1.57-1.99 (1.79 ± 0.14) mm long, 0.60-0.74 (0.69 ± 0.05) wide apically and 2.41-2.70 as long as apically wide.

DISTRIBUTION. Map 2. Apparently transcontinental in southern Canada and northern United States. Collected in the Rocky Mountains in northern British Columbia.

SPECIMENS EXAMINED. 10 females and 9 males.

OTHER SPECIMENS. CANADA. ALBERTA: Edmonton, 26.vii.1948,

E.H. Strickland (1F,AEIC); George Lake, 11.vi-8.ix.1984, S.& J. Peck (2F,LEBL); Jumping Pond Creek, 20 mi. W. Calgary, 11-12.viii.1962 (1M), 13-14.viii.1962 (1F,6M), 15-17.viii.1962 (2M), W.R.M. Mason (CNCI). BRITISH COLUMBIA: Racing River, 2400', 27.vii.1973, H.& M. Townes (1F,AEIC); Stone Mtn Pk, 3800', 19.vii.1973, H.& M. Townes (1F,AEIC). SASKATCHEWAN: Rockglen, 2.viii.1955, A.R. Brooks (1F,CNCI). UNITED STATES. MAINE: Ashland, 13.viii.1946 (1F,AEIC). MICHIGAN: Alcona Co., 27.vii.1946 (1F), 31.vii.1938 (1F), R.R. Dreisbach (AEIC).

BIOLOGY. Collected from July 19 to August 17. No host record.

Himerta eruga Leblanc, new species

Map 3

HOLOTYPE. Female. Labelled: "Steamboat Sprs Aug 6 '48 Col [Colorado] HMGD&J Townes" [typed on white label except for hand printed collecting day]; "HOLOTYPE [typed] *Himerta eruga* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face indistinct to vestigial. Clypeus basally moderately convex in female and strongly convex in male and apically weakly emarginate.

Notauli on mesoscutum indistinct to weak. Mesoscutellum wide. Epicnemial carina moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by more than their diameter. Sculpture on mesepisternum absent. Microsculpture on speculum absent. Sculpture on propodeum weak and often in male with strong transverse wrinkling. Median longitudinal carinae of propodeum reduced to two short posterior carinae and

sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum absent to weakly developed or sometimes well developed with adjacent sides on propodeum not uplifted when wrinkling is present.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent in female and slightly divergent in male. Median dorsal carinae on first metasomal tergite undeveloped to sometimes weakly developed in male. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape strong brown. Pedicel black. Flagellum basal section black dorsally and strong brown ventrally; black dominant on basal flagellomeres and gradually taken over by strong brown towards apex. Flagellum apical section dark grayish reddish brown.

Head strong brown except for strong brown to vivid yellow mandibles and black mandible teeth.

Mesosoma strong brown except for the following. Mesepimeron dark reddish brown. Black parts are narrow median band on anterior fifth to half of mesoscutum, anterior and lateral margins of mesoscutum down to tegulae, axillary troughs of mesoscutellum, suture between metascutellum and propodeum, median three fourths of

epicnemium, lateral spots on anterior half of mesosternum along lower pleuron margin, posterior margin of mesepisternum from tegula to end of postpectal carina, lower and posterior margins of metapleuron, posterior margin of propodeum.

Legs strong brown.

Metasoma strong brown except for tergite 1 being dorsally black down to end of glymma and dorsolateral carina of tergite 1 sometimes also black.

Wings lightly infusate.

Variations in female coloration. Hind corner lobe of pronotum, subtegular ridge and tegula deep orange yellow in one specimen. Anteromedian black band of mesoscutum very short in two specimens. Mesosternum black spot absent in one specimen.

Measurements in females. Flagellum with 39-44 (42.0 ± 1.8) flagellomeres. Flagellum basal section with 13-15 (14.0 ± 0.7) flagellomeres and apical section with 25-30 (27.8 ± 1.9) flagellomeres.

Number of specimens measured: 7. Fore wing 8.5-9.1 (8.8 ± 0.2) mm long. Face 0.55-0.63 (0.59 ± 0.03) mm long, 0.94-1.04 (0.97 ± 0.04) mm wide and 1.54-1.77 as wide as long. Face and compound eyes 1.81-1.92 (1.86 ± 0.04) mm wide and 1.85-2.00 as wide as face. Compound eye 0.63-0.70 (0.66 ± 0.02) mm wide, gena 0.49-0.57 (0.54 ± 0.03) mm wide, face 1.38-1.56 as wide as compound eye and gena 0.73-0.90 as

wide as compound eye. Flagellomere 1 0.92-1.10 (1.03 ± 0.05) mm long, flagellomere 2 0.37-0.43 (0.40 ± 0.02) mm long and flagellomere 1 2.43-2.73 as long as flagellomere 2. Hind femur 2.79-2.93 (2.84 ± 0.05) mm long, 0.43-0.57 (0.51 ± 0.05) mm wide and 5.11-6.68 as long as wide. First metasomal tergite 1.78-2.02 (1.93 ± 0.08) mm long, 0.76-0.95 (0.85 ± 0.07) wide apically and 2.06-2.53 as long as apically wide.

Male coloration. Scape dorsally brownish orange to brownish black and ventrally brilliant yellow. Pedicel dorsally brownish black and ventrally brilliant yellow to brownish black. Flagellum with flagellomeres dorsally brownish black and ventrally dark brown.

Head brownish orange except for the following. Brilliant yellow parts are often vertical orbits, frontal orbits, face, malar spaces, clypeus and mandibles except for black mandible teeth. Often black within and around ocellar triangle and on frons as bands behind antennal sockets and reaching ocellar triangle. Occiput often black.

Mesosoma brownish orange except for the following. Mesoscutellum and metascutellum brilliant yellow to deep orange yellow. Brilliant yellow parts are apical half of propleuron, hind corner lobe of pronotum, subtegular ridge, tegula, usually anterolateral spots on mesoscutum to one third of scutum length, apical half and lateral fourth of epinotum, anterior half of median four fifths of to entire mesosternum and lower part of mesepisternum from end of

postpectal carina to level of upper limit of brilliant yellow on epicnemium. Mesepimeron dark reddish brown to black. Black parts are basal half of propleuron, usually black on pronotum ranging from dorsal half of depression behind collar, anterior half of upper margin and lower half of posterior margin to entire pronotum except laterally in front of hind corner lobe, in two specimens anteromedian band on mesoscutum to half of scutum length, anterior and entire lateral margins of mesoscutum, suture between mesoscutum and mesoscutellum, often axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, basal half of median three fourths of epicnemium, usually black on mesepisternum and epicnemium above brilliant yellow ranging from spot on anterior margin of mesepisternum above upper limit of brilliant yellow to wide band above and adjacent to brilliant yellow area, sometimes part of to entire speculum, posterior margin of mesepisternum from tegula to end of postpectal carina, anterior, lower and posterior margins of metapleuron, sometimes lower fourth to two thirds of metapleuron and posterior margin of propodeum.

Fore, middle and hind coxae and trochanters 1 brilliant yellow except for hind coxa being brownish orange and usually with ventral face being brilliant yellow and apex of posterior face being being dark reddish brown. Fore and middle trochanters 2 brilliant yellow to deep orange yellow.

Hind trochanter 2 brilliant yellow to brownish orange. Fore and middle femora deep orange yellow with or without ventral faces being brilliant yellow. Hind femur brownish orange and dark reddish brown apically on anterior, dorsal and posterior faces. Fore and middle tibiae and tarsi brilliant yellow to deep orange yellow with tarsomeres 5 brownish orange. Hind tibia basally brownish orange for a short distance, followed by brilliant yellow and with apical two thirds brownish orange and gradually becoming dark reddish brown towards apex. Hind tarsus with tarsomeres 1 and 5 brownish orange to dark reddish brown, tarsomere 2 brilliant yellow to deep orange yellow or as tarsomere 1 and tarsomeres 3 and 4 brilliant yellow to deep orange yellow.

Metasoma brownish orange except for tergite 1 being black basally to end of glymma or dorsally to half of tergite length and usually also with ventrolateral carina black.

Wings lightly infusate.

Variations in male coloration. In most specimens from Steamboat Springs, Colorado, the specimen from Loveland Pass, Colorado and the specimen from the undetermined Colorado locality, brownish orange is largely replaced by black in the following way. On head brownish orange is present at the most as spots on vertical orbits. On mesosoma brownish orange is present at the most on posterior fifth of mesoscutum and basal half of hind femur. On

metasoma tergite 1 is black with or without brownish orange at apex and the other tergites are either brownish orange or black with faint traces of brownish orange.

Measurements in males. Flagellum with 38-44 (41.5 ± 1.6) flagellomeres.

Number of specimens measured: 8. Fore wing 7.3-9.0 (8.3 ± 0.6) mm long. Face 0.55-0.60 (0.57 ± 0.02) mm long, 0.78-0.95 (0.87 ± 0.06) mm wide and 1.40-1.60 as wide as long. Face and compound eyes 1.67-1.85 (1.77 ± 0.08) mm wide and 1.92-2.14 as wide as face. Compound eye 0.56-0.71 (0.65 ± 0.05) mm wide, gena 0.45-0.52 (0.50 ± 0.04) mm wide, face 1.18-1.57 as wide as compound eye and gena 0.70-0.93 as wide as compound eye. Flagellomere 1 0.89-1.02 (0.97 ± 0.06) mm long, flagellomere 2 0.33-0.40 (0.38 ± 0.03) mm long and flagellomere 1 2.24-3.07 as long as flagellomere 2. Hind femur 2.44-3.00 (2.67 ± 0.20) mm long, 0.46-0.57 (0.51 ± 0.04) mm wide and 4.80-5.58 as long as wide. First metasomal tergite 1.53-1.92 (1.72 ± 0.15) mm long, 0.65-0.82 (0.72 ± 0.07) wide apically and 2.30-2.70 as long as apically wide.

ETYMOLOGY. From the Latin e-, meaning without and from the Latin ruga, meaning wrinkle. Refers to the general absence of sculpturing on the body.

DISTRIBUTION. Map 3. At high altitudes in Colorado, eastern Idaho and Utah.

SPECIMENS EXAMINED. 8 females and 20 males.

PARATYPES. UNITED STATES. COLORADO: Loveland Pass, W.

slope, 9850', 28.vii.1961, J.G. Chilcott (1M,CNCI); Phantom Vy, Rocky Mtn Nat. Pk, 9400', 9.viii.1948, H.M.D.& J. Townes (1M,AEIC); Steamboat Sprs, 5.viii.1948 (1F,4M), 6.viii.1948 (1F,6M), H.M.G.D.& J. Townes (AEIC); Urraca Cem., 22mi.ESE Mosca, 8000', 24.vii-5.viii.1968, E.C. Becker (1F,CNCI); Undetermined locality (2M,USNM). IDAHO: St-Anthony, Freemont Co., 23.viii.1948, E.I. Schlinger (1F,AEIC). UTAH: Mill Creek Canyon, S.Lake Co., 7600', 17.vii.1962 (1F,2M), 19.vii.1962 (2F), 21.vii.1962 (2M), R.&K. Dreisbach (CNCI).

BIOLOGY. Collected between July 17 and August 23. No host record.

Himerta rubiginosa (Cresson)

Figs 1,5,7,13,19,27,38,44; Map 4

Mesoleius? rubiginosus Cresson, 1879(1878): 372.*Clepsiorthus rubiginosus* Davis, 1898: 326. *Himertus**rubiginosus* Cushman, 1927: 13. **HOLOTYPE**. Seen by author.

Male. Labelled: "Cala. [California]" [typed on white label]; "Type No. [typed] 1405.1 [hand printed]" [red label]; "Type Cress. Coll." [typed on yellow label]; "ANSP" [typed on yellow label]. Parts missing: right flagellomeres 17 to 40, left fore pretarsus, right fore leg beyond coxa, left hind tarsomeres 4 and 5 and right hind tarsomere 5. Head off the specimen and glued on locality label. Type in ANSP.

DESCRIPTIONS. Structures. Inner margins of compound eyes (Fig 1) parallel at the level of face. Antennal sockets (Fig 5) at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face (Fig 7) small but well defined. Clypeus basally moderately convex in female and strongly convex in male and apically weakly emarginate.

Notauli on mesoscutum (Fig 13) weak. Mesoscutellum wide. Epicnemial carina (Fig 19) moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of

the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures large and separated by approximately their diameter. Sculpture on mesepisternum (Fig 27) moderately coarse. Microsculpture on speculum weak. Sculpture on propodeum moderately coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum weakly developed to well developed with adjacent sides on propodeum not uplifted.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite (Fig 38) moderately divergent in female and slightly to moderately divergent in male. Median dorsal carinae on first metasomal tergite undeveloped to weakly developed. Spiracles of first metasomal tergite at midlength of tergite and moderately to strongly uplifted. Ovipositor notch (Fig 44) moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape and pedicel strong brown. Flagellum basal section strong brown and gradually becoming brilliant yellow towards its apex and often first few flagellomeres dark grayish reddish brown to black at least dorsally. Flagellum apical section dark grayish reddish brown.

Head strong brown except for black mandible teeth.

Mesosoma strong brown except for the following. Deep orange yellow parts are hind corner lobe of pronotum, subtegular ridge and tegula. Mesepimeron dark reddish brown. Black parts are apical margin of propleuron, posterior margin of pronotum, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture between metascutellum and propodeum, median two thirds of epicnemium, posterior margin of mesepisternum from tegula to end of postpectal carina, anterior and lower margins of metapleuron.

Legs strong brown.

Metasoma strong brown except for tergite 1 being dorsally black down to end of glymma.

Wings lightly infusate.

Variations in female coloration. Black markings, except on epicnemium and on propleuron, usually restricted to sutures and carinae but sometimes more extensive and sometimes very much reduced.

Measurements in females. Flagellum with 37-44 (41.8 ± 1.9) flagellomeres. Flagellum basal section with 13-17 (15.0 ± 0.7) flagellomeres and apical section with 24-29 (26.6 ± 1.5) flagellomeres.

Number of specimens measured: 10. Fore wing 8.8-10.0 (9.3 ± 0.4) mm long. Face 0.58-0.65 (0.61 ± 0.02) mm long,

0.96-1.10 (1.03 ± 0.05) mm wide and 1.58-1.72 as wide as long. Face and compound eyes 1.85-2.06 (1.97 ± 0.06) mm wide and 1.84-2.03 as wide as face. Compound eye 0.67-0.73 (0.71 ± 0.02) mm wide, gena 0.51-0.62 (0.56 ± 0.04) mm wide, face 1.36-1.50 as wide as compound eye and gena 0.72-0.85 as wide as compound eye. Flagellomere 1 1.01-1.16 (1.09 ± 0.05) mm long, flagellomere 2 0.37-0.46 (0.42 ± 0.03) mm long and flagellomere 1 2.50-2.83 as long as flagellomere 2. Hind femur 2.86-3.38 (3.10 ± 0.17) mm long, 0.48-0.63 (0.56 ± 0.05) mm wide and 4.95-6.01 as long as wide. First metasomal tergite 1.74-2.09 (1.96 ± 0.12) mm long, 0.73-1.01 (0.88 ± 0.09) wide apically and 2.03-2.52 as long as apically wide.

Male coloration. Scape dorsally brownish orange and ventrally brilliant yellow to deep orange yellow. Pedicel dorsally brownish orange to dark grayish reddish brown and ventrally brilliant yellow to deep orange yellow. Flagellum with basal section brownish orange with basal half of flagellomere 1 and dorsal surface of first few flagellomeres dark grayish reddish brown; sometimes basal section gradually becoming deep orange yellow towards apex. Apical section of flagellum dark grayish reddish brown.

Head brownish orange except for the following. Brilliant yellow parts are frontal orbits, face, malar spaces, clypeus and mandibles except for black mandible teeth.

Mesosoma brownish orange except for the following. Mesoscutellum and metascutellum brilliant yellow to brownish

orange. Brilliant yellow parts are apical three fifths of propleuron, hind corner lobe of pronotum, subtegular ridge, tegula, often anterolateral spots on mesoscutum, apical half of to entire epicnemium, entire mesosternum, lower part of mesepisternum from postpectal carina to level of upper limit of brilliant yellow on epicnemium. Mesepimeron brilliant yellow to brownish orange to dark reddish brown. Black parts are basal two fifths of propleuron, dorsal half of to entire depression behind collar of pronotum, lower half of posterior margin of pronotum, rarely very short anteromedian band on mesoscutum, anterior and lateral margins of mesoscutum at least down to tegulae, suture between mesoscutum and mesoscutellum, axillary trough of mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, basal half or less of epicnemium, posterior margin of mesepisternum from tegula to end of postpectal carina, anterior, lower and posterior margins of metapleuron and posterior margin of propodeum.

Fore, middle and hind coxae and trochanters 1 and 2 brilliant yellow except for hind coxa being brownish orange with or without ventral face being brilliant yellow. Fore and middle femora brilliant yellow to strong yellowish brown. Hind femur brownish orange and usually with apex dark reddish brown dorsally. Fore and middle tibiae and tarsi brilliant yellow to deep orange yellow with tarsomeres 5

brownish orange. Hind tibia basally brownish orange for a short distance, followed by brilliant yellow and with apical half brownish orange and sometimes gradually becoming dark reddish brown towards apex. Hind tarsus with tarsomere 1 brownish orange except for brownish orange to strong yellowish brown to brilliant yellow apex, tarsomeres 2 to 4 brownish orange to strong yellowish brown to brilliant yellow and tarsomere 5 brownish orange.

Metasoma brownish orange except for tergite 1 being black on its basal fifth to half and often on its whole lateral face.

Wings lightly infusate.

Variations in male coloration. Most specimens do not differ much from the description. In very few specimens black markings are reduced or more extensive but never much so. Brownish orange is never replaced by black as it is the case in some of the other species.

Measurements in males. Flagellum with 38-44 (40.5 ± 1.5) flagellomeres. Flagellum basal section with 14-19 (16.4 ± 1.2) flagellomeres and apical section with 22-27 (24.1 ± 1.5) flagellomeres.

Number of specimens measured: 10. Fore wing 7.5-9.1 (8.6 ± 0.5) mm long. Face 0.51-0.68 (0.60 ± 0.05) mm long, 0.87-1.06 (0.95 ± 0.06) mm wide and 1.51-1.76 as wide as long. Face and compound eyes 1.74-2.09 (1.90 ± 0.11) mm wide and 1.93-2.07 as wide as face. Compound eye 0.68-0.79

(0.72 ± 0.03) mm wide, gena 0.49-0.61 (0.53 ± 0.04) mm wide, face 1.26-1.42 as wide as compound eye and gena 0.66-0.81 as wide as compound eye. Flagellomere 1 0.83-1.10 (0.99 ± 0.09) mm long flagellomere 2 0.35-0.43 (0.40 ± 0.02) mm long and flagellomere 1 2.24-2.78 as long as flagellomere 2. Hind femur 2.58-3.07 (2.87 ± 0.15) mm long, 0.49-0.56 (0.53 ± 0.02) mm wide and 4.92-5.65 as long as wide. First metasomal tergite 1.50-2.13 (1.87 ± 0.21) mm long, 0.61-0.89 (0.77 ± 0.09) wide apically and 2.19-2.98 as long as apically wide.

DISTRIBUTION. Map 4. Western mountain chains from southern British Columbia to southernmost California and east into Idaho. Also collected in Terrace, British Columbia and in the Bighorn forest in Wyoming.

SPECIMENS EXAMINED. 58 females and 141 males.

CANADA. BRITISH COLUMBIA: Chase, 18.vi.1923, W.B. Anderson (1F,CNCI); Cowichan Lk, 6-15.vii.1966, J.A. Chapman (1F,CNCI); Creston, 13.v.1958, H.& A. Howden (1M,CNCI); Pass Cr., 20.v.1947, H.R. Foxlee (1M,CNCI); Robson, 27.v.1949 (2M), 30.v.1947 (1M), 31.v.1949 (1M), vi.1945 (1M), 1.vi.1941 (1M), 2.vi.1950 (1M), 3.vi.1949 (1M), 5.vi.1953 (1M), 7.vi.1954 (1M), 7.vi.1956 (1M), 8.vi.1948 (1M), 8.vi.1962 (1M), 9.vi.1950 (1M), 9.vi.1953 (6M), 9 vi.1956 (1M), 10.vi.1953 (1M), 11.vi.1945 (1M), 11.vi.1953 (1M), 12.vi.1948 (1M), 13.vi.1948 (1M), 13.vi.1950 (1M), 15.vi.1950 (1M), 16.vi.1945 (2M), 17.vi.1947 (1M), 17.vi.1949 (1M), 17.vi.1950 (1F,1M), 18.vi.1950 (1M),

20.vi.1947 (1M), 21.vi.1954 (1M), 21.vi.1956 (1M),
 22.vi.1953 (1M), 22.vi.1954 (1M), 26.vi.1950 (2M),
 27.vi.1950 (1F), 27.vi.1952 (1M), 2.vii.1953 (1M),
 5.vii.1947 (1F), 5.vii.1951 (1M), 6.vii.1949 (1F),
 16.vii.1953 (1F), 30.vii.1949 (1F), all collected by H.R.
 Foxlee (4M,AEIC;7F,23M,CNCI;1F,15M,SMDV); Terrace,
 8.vii.1960, W.R. Richards (1F,CNCI); 6 mi.W. Terrace, Gagnon
 Rd, 24.vi.1960, C.H. Mann (1F,CNCI); Terrace, Spring Creek,
 30.vi.1960, B.S. Heming (1F,CNCI); Vernon, 25.vi.1924, E.A.
 Rendell (1F,CNCI); Victoria, 17.vii.1909, J.B. Wallis
 (1M,MCZC). UNITED STATES. CALIFORNIA: Berkeley, 29.iv.1934
 (2M,UCDC), 8.v.1937, R.M. Bohart (1M,OSUO), 17.v.1937, R.M. &
 G.E. Bohart (1M,UCDC); Big Flat Coffee Creek, 21.vi.1934,
 G.E. Bohart (1F,1M,AEIC;2M,UCDC); 3.3 mi.S. Cuyamaca,
 23.vi.1950, Timberlake (1F,UCRC); Richmond, 3.v.1935
 (1M,OSUO;1M,USNM); Sta Monica Mts, 2.v.1952, B. Tinglof
 (1M,LACM), 17.v.1952, D. Shepherd (1F,LACM); Lake Wohlford,
 21.iv.1974 (1M), 28.iv.1974 (1M),30.iv.1974 (1M), H. & M.
 Townes (AEIC). IDAHO: Craters of the Moon National
 Monument, 11.vii.1965, D.S. Horning Jr (1F,USNM); Idaho
 City, 9.vi.1978 (3M), 11.vi.1978 (1M), 13.vi.1978 (1M), H. &
 M. Townes (AEIC); Lowman, 4000', 9.vi.1978 (1F,4M),
 11.vi.1978 (2M), 12.vi.1978 (2M), 14.vi.1978 (1M),
 6.viii.1978 (1F), H. & M. Townes (AEIC); nr. Stanley,
 2.viii.1978 (1M), 3.viii.1978 (2F), 5.viii.1978 (4M),
 6.viii.1978 (1M), 8.viii.1978 (1F,3M), H. & M. Townes (AEIC).

OREGON: Blue River, 27.vi.1972, H.J. Andrews (1M,OSUO); Corvallis, 21.v.1978 (1F), 30.v.1978 (1F), 2.vi.1978 (1F), 4.vi.1978 (1F), 18.vi.1978 (1F), 25.vi.1978 (1F), H. & M. Townes (AEIC); Hyatt Reservoir, 19.vi.1978 (1F,5M), 22.vi.1978 (2F), 25.vi.1978 (2F,1M), 29.vi.1978 (5F,2M), 30.vi.1978 (2M), 2.vii.1978 (1F), H. & M. Townes (AEIC); Joseph, Chief Joseph Mtn, 15.viii.1950, G.H. & J.L. Sperry (1M,UCRC); Mt-Hood, 3500', 18.vii.1978 (1M), 19.vii.1978 (4F,2M), 24.vii.1978 (1F,1M), 30.vii.1978 (1F), H. & M. Townes (AEIC); Ochoco Creek, 14.vii.1978, H. & M. Townes (3F,1M,AEIC); Pinehurst, 19.vi.1978 (1M), 21.vi.1978 (1F,1M), 23.vi.1978 (1F), 29.vi.1978 (3F), 2.vii.1978 (1F), H. & M. Townes (AEIC); Selma, 20.vi.1978 (1F,3M), 28.vi.1978 (1F,1M), 29.vi.1978 (1M), H. & M. Townes (AEIC); Woods Creek, Lenton Co., 6.vii.1941, G.R. Ferguson (2M,OSUO); Yachats, 24.vi.1962, G.C. Eickwort (1M,CNCI), R.W. Matthews (6M,CNCI). WASHINGTON: Bumping Lk, 1.viii.1937, W.W. Baker (1F,AEIC), Longmire, 27.vi.1935, A.L. Melander (1M,MCZC); Forks, 5.vii.1920, E.C. VanDyke (1M,CASC); Port-Blakely, 2.vii.1898 (1M,OSUO); Port-Townsend, 9.vii.1897 (1F,17M,OSUO); Puyallup?, 1933, S.E. Crumb Jr (1M,AEIC); Westport, 17.vii.1940, H. & M. Townes (1M,AEIC); Undetermined locality, Cresson collection (1M,ANSP). WYOMING: Bighorn Natl For, Tie Hack Cpgd, 11-12.vii.1974, R.L. Fisher (1M,CNCI).

BIOLOGY. Collected in California between April 21 and

June 23 and in the more northerly States and in British Columbia between May 13 and August 8. One specimen from Oregon collected on August 15. No host record.

Himerta pacifica Leblanc, new species

Figs 14,16,20,28,31,39; Map 2

HOLOTYPE. Female. Labelled: "Cowichan L. [Lake], B.C. 28-ix 1966 J.A. Chapman" [typed on white label except for hand printed collecting day and month]; "HOLOTYPE [typed] *Himerta pacifica* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in CNCI.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face small but well defined. Clypeus basally moderately convex and apically weakly emarginate.

Notauli on mesoscutum (Fig 14) strong. Mesoscutellum (Fig 16) wide. Epicnemial carina (Fig 20) moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures large and separated by less than their diameter. Sculpture on mesepisternum (Fig 28) very coarse, producing with the punctures a reticulate surface. Microsculpture on speculum strong. Sculpture on propodeum (Fig 31) moderately coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae and often also anteriorly present as

weak vestiges. Median furrow o. anterior half of propodeum well developed with transverse wrinkling.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite (Fig 39) slightly to moderately divergent in females and moderately divergent in male. Median dorsal carinae on first metasomal tergite undeveloped to weakly developed. Spiracles of first metasomal tergite at midlength of tergite and strongly uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape deep orange yellow. Pedicel black. Flagellum basal section with basal half of flagellomere 1 black, flagellomeres of basal half of section dorsally black, otherwise flagellomeres brownish orange and gradually becoming light yellow to pale yellow towards apex. Apical section strong brown to dark grayish reddish brown.

Head brownish orange except for the following. Face deep orange yellow, clypeus and mandibles brilliant orange yellow except for black mandible teeth.

Mesosoma brownish orange except for the following. Deep orange yellow parts are hind corner lobe of pronotum, subtegular ridge and tegula. Mesepimeron brownish orange to dark reddish brown. Black parts are anterior and lateral margins of mesoscutum down to tegulae, suture between metascutellum and propodeum, median three fourths of

epicnemium, posterior margin of mesepisternum from tegula to end of postpectal carina, anterior, lower and posterior margins of metapleuron and posterior margin of propodeum.

Fore legs and middle legs deep orange yellow. Hind coxa, trochanters and femur brownish orange and sometimes femur black dorsoapically for a short distance. Hind tibia with basal half light yellow and apical half brownish orange, rarely becoming dark reddish brown near apex. Hind tarsus deep orange yellow.

Metasoma brownish orange except for tergite 1 being black down to glymma and ventrolateral carina of tergite 1 being black to end of tergite.

Wings lightly infusate.

Measurements in females. Flagellum with 40-43 (41.8 ± 1.0) flagellomeres. Flagellum basal section with 13-15 (14.6 ± 0.7) flagellomeres and apical section with 25-29 (27.2 ± 1.2) flagellomeres.

Number of specimens measured: 5. Fore wing 8 3-8.8 (8.6 ± 0.2) mm long. Face 0.59-0.63 (0.62 ± 0.02) mm long, 0.92-1.02 (0.97 ± 0.04) mm wide and 1.49-1.65 as wide as long. Face and compound eyes 1.85-1.99 (1.90 ± 0.06) mm wide and 1.89-2.06 as wide as face. Compound eye 0.62-0.72 (0.68 ± 0.04) mm wide, gena 0.49-0.55 (0.51 ± 0.02) mm wide, face 1.36-1.57 as wide as compound eye and gena 0.73-0.84 as wide as compound eye. Flagellomere 1 0.98-1.07 (1.01 ± 0.04) mm long, flagellomere 2 0.39-0.40 (0.395 ± 0.005) mm long and

flagellomere 1 2.42-2.75 as long as flagellomere 2. Hind femur 2.93-3.14 (3.00 ± 0.08) mm long, 0.52-0.57 (0.56 ± 0.02) mm wide and 5.17-5.58 as long as wide. First metasomal tergite 1.81-2.09 (1.99 ± 0.11) mm long, 0.77-0.92 (0.84 ± 0.05) wide apically and 2.12-2.52 as long as apically wide.

Male coloration. Scape dorsally reddish black and ventrally brownish orange with a pale yellow apical spot. Pedicel reddish black. Basal section of flagellum with first few flagellomeres reddish black and rest of basal section with flagellomeres dorsally reddish black and ventrally brownish orange with brownish orange becoming more extensive towards apex of basal section. Middle section of flagellum pale yellow. Apical section of flagellum dark grayish reddish brown.

Head brownish orange except for the following. Pale yellow parts are areas between antennal sockets and compound eye margins, face, malar spaces, clypeus and mandibles except for black mandible teeth. Black parts are band along posterior and inner margins of antennal sockets and occiput.

Mesosoma brownish orange except for the following. Pale yellow parts are apical half of propleuron, hind corner lobe of pronotum, tegula, apical fifth of epicnemium and basal half of mesosternum. Deep orange yellow parts are subtegular ridge, mesoscutellum and its axillary troughs and metascutellum and its axillary troughs. Black parts are posterior margin of pronotum, very short anteromedian band

on mesoscutum, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, basal four fifths of epicnemium, posterior margin of mesepisternum from tegula to end of postpectal carina, mesepimeron, anterior, lower and posterior margins of metapleuron and posterior margin of propodeum.

Fore and middle coxae and trochanters 1 and 2 pale yellow except for deep orange yellow dorsal face of middle coxa. Hind coxa brownish orange except for black spots at apex on anterior and posterior faces. Hind trochanters 1 and 2 pale yellow with faint traces of deep orange yellow. Fore and middle femora deep orange yellow except for pale yellow anterior face of middle femur. Hind femur brownish orange and reddish black at apex on dorsal, anterior and posterior faces. Fore and middle tibiae and tarsi pale yellow except for deep orange yellow tarsomeres 5. Hind tibia basally deep orange yellow for a short distance, followed by pale yellow and with apical half deep orange yellow and gradually becoming reddish black towards apex. Hind tarsus with tarsomere 1, basal half of tarsomere 2 and tarsomere 5 deep orange yellow and with apical half of tarsomere 2 and tarsomeres 3 and 4 pale yellow.

Metasoma brownish orange except for basal half of tergite 1 and area along ventrolateral carina of tergite 1

being black.

Wings lightly infusate.

Measurements in male. Flagellum with 41 flagellomeres. Flagellum basal section with 10 flagellomeres, middle section with 5 flagellomeres and apical section with 26 flagellomeres.

Number of specimens measured: 1. Fore wing 8.5 mm long. Face 0.61 mm long, 0.96 mm wide and 1.58 as wide as long. Face and compound eyes 1.92 mm wide and 1.99 as wide as face. Compound eye 0.68 mm wide, gena 0.50 mm wide, face 1.41 as wide as compound eye and gena 0.73 as wide as compound eye. Flagellomere 1 1.01 mm long, flagellomere 2 0.39 mm long and flagellomere 1 2.59 as long as flagellomere 2. Hind femur 2.86 mm long, 0.57 mm wide and 4.98 as long as wide. First metasomal tergite 1.92 mm long, 0.84 wide apically and 2.28 as long as apically wide.

ETYMOLOGY. Refers to its distribution being restricted to southwestern Canada around the Pacific Ocean.

DISTRIBUTION. Map 2. Only found in southwestern British Columbia near the Pacific Ocean.

SPECIMENS EXAMINED. 16 females and 1 male.

PARATYPES. CANADA. BRITISH COLUMBIA: Cowichan Lake, 11.vii.1966 (1F, 1M), 21-27.vii.1964 (2F), 11.viii.1966 (2F), 24.viii.1966 (2F), 30.viii.1966 (2F), 10.ix.1964 (1M), 18.ix.1966 (2F), 28.ix.1966 (1F), J.A. Chapman (CNCI); Steelhead, 16.viii.1933, H.B. Leech (1F); Vancouver

(1F,USNM).

BIOLOGY. This species has the latest seasonality of all the species. Two specimens were collected between July 11 and July 27 but all the other specimens were collected between August 11 and September 28. No host record.

Himerta rugopleura Leblanc, new species

Map 15

HOLOTYPE. Female. Labelled: "Anchorage, AK. [Alaska] viii.3-6.1976 Peter A. Rush" [typed on white label]; "HOLOTYPE [typed] *Himerta rugopleura* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in females and parallel to slightly convergent in males at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face vestigial. Clypeus basally moderately convex in females and moderately to strongly convex in males and apically weakly emarginate.

Notauli on mesoscutum indistinct to weak. Mesoscutellum wide. Epicnemial carina moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by approximately their diameter. Sculpture on mesepisternum very coarse, often producing with the punctures a reticulate surface. Microsculpture on speculum strong. Sculpture on propodeum coarse. Median longitudinal

carinae of propodeum reduced to two short posterior carinae and often also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum absent to weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite slightly divergent. Median dorsal carinae on first metasomal tergite undeveloped. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape black with or without strong brown on basal half of ventral face. Pedicel black. Flagellum basal section black with or without brownish orange ventral face. Flagellum middle section light yellow with traces of dark brown. Flagellum apical section dark grayish reddish brown dorsally and brownish orange ventrally.

Mandibles strong yellowish brown to strong brown except for black teeth. Lower margins of malar spaces and lateral margins of clypeus black. Occiput black. Rest of head ranging from entirely strong brown except for black behind antennal sockets and within ocellar triangle to strong brown except for black on posterior half of vertex and genae, between and behind antennal sockets and around ocellar

triangle to entirely black except for strong brown facial orbits, spot on face below antennal sockets and spots on vertical orbits.

Mesosoma strong brown except for the following. Hind corner lobe of pronotum strong yellowish brown to strong brown. Subtegular ridge strong yellowish brown to brownish orange. Tegula dark grayish reddish brown to black. Mesoscutellum light yellow with traces of brownish orange to entirely brownish orange. Metascutellum brownish orange. Black parts are entire propleuron, collar, depression behind collar and lower half of posterior margin of pronotum, anteromedian band on mesoscutum to half of scutum length, entire anterior and lateral margins of mesoscutum, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, entire epicnemium, usually entire mesosternum but in one specimen strong brown medially and with strong brown anterosublateral lines, often widely along anterior and/or lower margins of mesepisternum, usually at least posterior half of speculum, posterior margin of mesepisternum from tegula to end of postpectal carina, mesepimeron, at least anterior, lower and posterior margins of and usually lower half to three fourths of metapleuron and posterior margin of propodeum.

Fore and middle coxae strong brown with black at apex on

anterior and posterior faces to entirely black. Hind coxa strong brown with black at apex on anterior and posterior faces to entirely black except for strong brown dorsal face. Fore and middle trochanters 1 reddish black. Hind trochanter 1 strong brown with black at base of dorsal face to entirely black. Fore and middle trochanters 2 reddish black with posterior faces brownish orange. Hind trochanter 2 strong brown. Fore and middle femora brownish orange. Hind femur strong brown with black at apex. Fore and middle tibiae and tarsi deep orange yellow. Hind tibia basally brownish orange for a short distance, followed by deep orange yellow and with apical half strong brown and gradually becoming reddish black towards apex. Hind tarsus brownish orange to deep orange yellow.

Metasoma strong brown except for tergite 1 being black to end of glymma and with ventrolateral carina being black.

Wings lightly infusate.

Variations in female coloration. In one specimen mesosoma is entirely black except for strong brown spot on upper third of mesepisternum, strong brown on hind corner of pronotum in front of hind corner lobe, mesoscutum as in description and brownish orange mesoscutellum and metascutellum.

Measurements in females. Flagellum with 39-42 (39.8 ± 1.1) flagellomeres. Flagellum basal section with 10-11 (10.3 ± 0.5) flagellomeres, middle section with 2-4

(2.6 ± 0.8) flagellomeres and apical section with 26-28

(26.9 ± 0.7) flagellomeres.

Number of specimens measured: 7. Fore wing 7.4-8.3 (7.9 ± 0.3) mm long. Face 0.51-0.60 (0.55 ± 0.03) mm long, 0.79-0.92 (0.88 ± 0.04) mm wide and 1.51-1.68 as wide as long. Face and compound eyes 1.60-1.77 (1.70 ± 0.07) mm wide and 1.85-2.02 as wide as face. Compound eye 0.60-0.66 (0.63 ± 0.02) mm wide, gena 0.44-0.48 (0.46 ± 0.01) mm wide, face 1.33-1.48 as wide as compound eye and gena 0.70-0.76 as wide as compound eye. Flagellomere 1 0.79-1.07 (0.94 ± 0.08) mm long, flagellomere 2 0.32-0.40 (0.36 ± 0.03) mm long and flagellomere 1 2.42-3.03 as long as flagellomere 2. Hind femur 2.27-2.79 (2.64 ± 0.18) mm long, 0.42-0.48 (0.44 ± 0.02) mm wide and 5.31-6.64 as long as wide. First metasomal tergite 1.50-1.81 (1.72 ± 0.11) mm long, 0.61-0.94 (0.77 ± 0.12) wide apically and 1.93-2.74 as long as apically wide.

Male coloration. Scape and pedicel black except for light yellow ventral faces. Flagellum basal section black with or without strong brown ventral face. Flagellum middle section light yellow with traces of dark brown. Flagellum apical section dark brown to dark grayish reddish brown.

Head black except for the following. Light yellow parts are frontal orbits. face, malar spaces and genae to lower fifth to two fifths of compound eye height, clypeus and mandibles except for black mandible teeth. Strong brown ranging from spots on vertical orbits to whole vertical

orbits, temporal orbits down to light yellow area and spot behind ocellar triangle.

Propleuron with basal fourth black and apical three fourths light yellow. Pronotum strong brown with black varying from collar, depression behind collar and posterior margin black to entirely black except for strong brown spots in front of hind corner lobes; often collar of pronotum light yellow dorsally. Hind corner lobe of pronotum, subtegular ridge and tegula light yellow. Mesoscutum strong brown except for anterior and lateral margins being black, anteromedian black band to half of scutum length, often sublateral black bands lateral to anteromedian band, sometimes anterolateral light yellow spots. Mesoscutellum light yellow. Axillary troughs of mesoscutellum black. Suture between mesoscutellum and metascutellum black. Metascutellum light yellow to strong brown. Suture between metascutellum and propodeum black. Epicnemium with basal two thirds to three fourths of median two thirds to entire width black and remaining epicnemium light yellow. Mesosternum light yellow with posterior fourth to half black and sometimes with anterolateral black spots. Mesepisternum with light yellow on anterior half along lower margin and remaining mesepisternum strong brown with black varying from posterior margin from tegula to end of postpectal carina and anterior area above light yellow to entirely black except for subtegular ridge. Mesepimeron black with sometimes

2

2.8

3.2

3.6

4.0

2.5

2.2

2.0

1.8

1.6

MicroD

light yellow or upper half. Metapleuron strong brown with black varying from anterior, lower and posterior margins to entirely black except for strong brown spot on upper division of metapleuron. Propodeum strong brown with black varying from posterior margin to entirely black.

Fore, middle and hind coxae and trochanters 1 and 2 light yellow except for hind coxa varying from strong brown with with ventral face light yellow and black at apex on anterior and posterior faces to entirely black except for light yellow ventral face. Fore and middle femora brownish orange to deep orange yellow. Hind femur varying from strong brown with black at apex to entirely black except for strong brown at base. Fore and middle tibiae and tarsi deep orange yellow with or without basal halves of tibiae light yellow. Hind tibia basally brownish orange for a short distance, followed by deep orange yellow and with apical half strong brown and gradually becoming reddish black towards apex. Hind tarsus with tarsomeres 1 and 5 and sometimes tarsomere 2 brownish orange and with usually tarsomere 2 and with tarsomeres 3 and 4 light yellow.

Metasoma strong brown with black basally on tergite 1 to end of glymma or up to basal four fifths of tergite length and with ventrolateral carina being black.

Wings lightly infusate.

Measurements in males. Flagellum with 36-40 (38.3 ± 1.4) flagellomeres. Flagellum basal section with 10-12

(11.0 ± 0.5) flagellomeres, middle section with 2-4 (3.0 ± 0.5) flagellomeres and apical section with 22-27 (24.4 ± 1.6) flagellomeres.

Number of specimens measured: 8. Fore wing 6.9-8.1 (7.4 ± 0.5) mm long. Face 0.48-0.54 (0.50 ± 0.02) mm long, 0.78-0.90 (0.83 ± 0.04) mm wide and 1.56-1.80 as wide as long. Face and compound eyes 1.50-1.78 (1.65 ± 0.09) mm wide and 1.78-2.09 as wide as face. Compound eye 0.61-0.70 (0.63 ± 0.03) mm wide, gena 0.42-0.49 (0.44 ± 0.02) mm wide, face 1.18-1.48 as wide as compound eye and gena 0.63-0.74 as wide as compound eye. Flagellomere 1 0.77-0.94 (0.84 ± 0.06) mm long, flagellomere 2 0.33-0.39 (0.36 ± 0.03) mm long and flagellomere 1 2.17-2.59 as long as flagellomere 2. Hind femur 2.27-2.68 (2.47 ± 0.13) mm long, 0.40-0.48 (0.43 ± 0.03) mm wide and 5.13-5.97 as long as wide. First metasomal tergite 1.39-1.85 (1.63 ± 0.15) mm long, 0.57-0.85 (0.72 ± 0.09) wide apically and 1.76-2.86 as long as apically wide.

ETYMOLOGY. From the Latin ruga, meaning wrinkle and the Greek pleura, meaning side. Refers to the strongly sculptured mesepisternum.

DISTRIBUTION. Map 15. Alaska and Northern British Columbia.

SPECIMENS EXAMINED. 9 females and 16 males.

PARATYPES. CANADA. BRITISH COLUMBIA: Racing River, 2400', 16.vii.1973, H. & M. Townes (1M, AEIC); Stone Mtn Pk, 3500', 28.vii.1973, H. & M. Townes (1M, AEIC). UNITED STATES.

ALASKA: Anchorage, 25-30.vi.1976 (1M), 30.vi-6.vii.1976 (3F), 6-12.vii.1976 (2F,2M), 12-16.vii.1976 (1M), 16-20.vii.1976 (1F,3M), 20-23.vii.1976 (1F), 23.vii-3.viii.1976 (2F), P.A. Rush (AEIC); Kenai Peninsula, Cooper Landing, Rt 1, 25.vi-18.vii.1984, S. & J. Peck (1M,LEBL); Kenai Peninsula, E. Skilak Rd Jct., Rt 1, 25.vi-18.vii.1984, S. & J. Peck (2F,2M,LEBL); Mt-McKinley, 2000', 14.viii.1954, D. Townes (1M,AEIC).

BIOLOGY. Collected from late June to mid August. No host record.

Himerta atra (Cushman)

Figs 2,8,21,32,45; Map 7

Neoprotarchus ater Cushman, 1924: 10. *Himerta atra* Cushman,1927: 13. **HOLOTYPE**. Seen by author. Female. Labelled:

"Mill Valley [California] 6-7 [June 7] - [19] 15" [typed on white label except for hand printed collecting date]; "EP VanDuzee Collector" [typed on white label]; "Type No. [typed] 25976 [hand printed] U.S.N.M. [typed]" [red label]; "Neoprotarchus ater Type. Cush." [hand printed on white label]. Parts missing: middle left tarsomeres 2 to 5; hind left tarsomeres 2 to 5 and hind right tarsomeres 3 to 5. Also fore right leg broken and glued on locality label; both antennae broken beyond pedicels and one flagellum glued on locality label and broken beyond flagellomere 38 and the other flagellum glued on locality label and broken beyond flagellomere 17 and a section of 12 flagellomeres long also glued on locality label. Type in USNM.

DESCRIPTIONS. Structures. Inner margins of compound eyes (Fig 2) parallel in females and strongly convergent in males at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide in females and narrow in males and moderately convex medially. Tubercle on face (Fig 8)

vestigial. Clypeus basally almost flat in female and moderately convex in male and apically weakly emarginate.

Notauli on mesoscutum indistinct to weak. Mesoscutellum wide. Epicnemial carina (Fig 21) moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by slightly more than their diameter. Sculpture on mesepisternum coarse. Microsculpture on speculum weak to strong. Sculpture on propodeum (Fig 32) coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum weakly developed to well developed with adjacent sides on propodeum not uplifted.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite slightly to moderately divergent in female and slightly divergent in male. Median dorsal carinae on first metasomal tergite undeveloped to sometimes weakly developed in male. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted. Ovipositor notch (Fig 45) narrow with anterior margin abruptly sloping with a strong angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Antennae black except for pale

yellow middle section of flagellum.

Head black except for the following. Face often with two median strong yellowish brown to pale yellow oval spots of varying size adjacent to clypeus. Clypeus basal half black to dark brown and apical half strong yellowish brown. Mandible basal half black and apical half strong yellowish brown except for black teeth.

Mesosoma black except for the following. Mesoscutellum pale yellow. Subtegular ridge strong yellowish brown.

Fore, middle and hind coxae and trochanters 1 and 2 black. Fore femur anteriorly strong yellowish brown and posteriorly dark brown to black. Middle and hind femora dark brown to black. Fore tibia dorsally pale yellow and ventrally deep orange yellow. Middle tibia with basal three fifths pale yellow and apical two fifths dark brown. Hind tibia basally black for a short distance, followed by pale yellow and with apical half dark brown to black. Fore and middle tarsi dorsally strong yellowish brown and ventrally pale yellow. Hind tarsus with tarsomere 1 black, tarsomere 2 black or black basally and pale yellow apically or pale yellow, tarsomeres 3 and 4 pale yellow and tarsomere 5 dark brown.

Metasoma black except for ovipositor sheath being basally dark brown and apically strong yellowish brown and ovipositor being strong yellowish brown.

Wings lightly infuscate.

Measurements in females. Flagellum with 40-42 (41.2 ± 0.8) flagellomeres. Flagellum basal section with 6-7 (6.5 ± 0.5) flagellomeres, middle section with 7-9 (7.7 ± 0.8) flagellomeres and apical section with 26-28 (27.0 ± 0.6) flagellomeres.

Number of specimens measured: 10. Fore wing 7.7-9.3 (8.6 ± 0.5) mm long. Face 0.52-0.63 (0.60 ± 0.03) mm long, 0.84-1.00 (0.94 ± 0.06) mm wide and 1.48-1.61 as wide as long. Face and compound eyes 1.64-1.99 (1.89 ± 0.11) mm wide and 1.95-2.10 as wide as face. Compound eye 0.57-0.74 (0.69 ± 0.06) mm wide, gena 0.45-0.56 (0.51 ± 0.03) mm wide, face 1.24-1.47 as wide as compound eye and gena 0.69-0.85 as wide as compound eye. Flagellomere 1 0.61-1.10 (0.91 ± 0.14) mm long, flagellomere 2 0.33-0.44 (0.39 ± 0.03) mm long and flagellomere 1 2.29-2.50 as long as flagellomere 2. Hind femur 2.44-3.17 (2.91 ± 0.19) mm long, 0.44-0.61 (0.55 ± 0.05) mm wide and 4.91-5.56 as long as wide. First metasomal tergite 1.53-2.16 (1.91 ± 0.18) mm long, 0.58-0.95 (0.80 ± 0.11) wide apically and 2.06-2.67 as long as apically wide.

Male coloration. Scape and pedicel black dorsally and pale yellow ventrally. Flagellum black with a pale yellow middle section.

Head black except for the following. Pale yellow parts are frontal orbits, face, malar spaces, clypeus and mandibles except for black mandible teeth.

Mesosoma black except for the following. Pale yellow

parts are apical half of propleuron, hind corner lobe of pronotum, subtegular ridge, tegula, anterolateral spots on mesoscutum, mesoscutellum, sometimes metascutellum, lower half of epicnemium, anterosublateral bands on mesosternum, anterior bands on mesepisternum near lower margin.

Fore and middle coxae pale yellow except for strong yellowish brown basal half of posterior face. Hind coxa black with pale yellow ventral face. Fore, middle and hind trochanters 1 and 2 pale yellow except for strong yellowish brown posterior face of fore trochanter 2, narrow black band on dorsal face of hind trochanter 1 and black dorsal face of hind trochanter 2. Fore femur anteriorly strong yellowish brown and posteriorly dark brown. Middle femur anteriorly pale yellow to strong yellowish brown and posteriorly dark brown except for base and apex being pale yellow to strong yellowish brown. Hind femur black. Fore tibia pale yellow. Middle tibia pale yellow with deep orange yellow apical third of ventral surface. Hind tibia basally black for a short distance, followed by pale yellow and with apical half dark brown to black. Fore, middle and hind tarsi pale yellow except for dark brown apical halves of tarsomeres 5 and black basal three fourths to whole hind tarsomere 1.

Metasoma black.

Wings lightly infusate.

Variations in male coloration. The extent of pale yellow on epicnemium and adjacent sternum and pleuron is

variable ranging from almost absent to covering apical fourth of epicnemium and two short anterolateral spots on sternum to covering apical two thirds of epicnemium, anterior two thirds of mesosternum and anterior two thirds of lower third of mesepisternum.

Measurements in males. Flagellum with 37-42 (40.7 ± 1.5) flagellomeres. Flagellum basal section with 7-9 (8.0 ± 0.7) flagellomeres, middle section with 6-12 (9.2 ± 1.6) flagellomeres and apical section with 21-25 (23.4 ± 1.4) flagellomeres.

Number of specimens measured: 10. Fore wing 7.7-9.1 (8.4 ± 0.5) mm long. Face 0.55-0.65 (0.60 ± 0.03) mm long, 0.73-0.89 (0.81 ± 0.05) mm wide and 1.15-1.49 as wide as long. Face and compound eyes 1.81-2.06 (1.90 ± 0.09) mm wide and 2.22-2.76 as wide as face. Compound eye 0.59-0.83 (0.74 ± 0.02) mm wide, gena 0.49-0.57 (0.51 ± 0.03) mm wide, face 0.90-1.35 as wide as compound eye and gena 0.63-0.83 as wide as compound eye. Flagellomere 1 0.81-1.00 (0.93 ± 0.07) mm long, flagellomere 2 0.35-0.45 (0.41 ± 0.03) mm long and flagellomere 1 2.06-2.48 as long as flagellomere 2. Hind femur 2.47-3.38 (2.8 ± 0.2) mm long, 0.45-0.59 (0.53 ± 0.04) mm wide and 4.74-5.77 as long as wide. First metasomal tergite 1.74-2.13 (1.92 ± 0.10) mm long, 0.62-0.93 (0.75 ± 0.09) wide apically and 2.29-2.80 as long as apically wide.

DISTRIBUTION. Map 7. Transcontinental and in the north to northern British Columbia and south to Michigan and to

Mill Valley, California.

SPECIMENS EXAMINED. 14 females and 23 males.

CANADA. ALBERTA: Bilby, 21.vii.1924, D. Bryant (1F,CNCI); Edmonton, 6.vii.1940, E.H. Strickland (1M,AEIC); George Lk, 11.vi-8.ix.1984, S. & J. Peck (1M,LEBL); Wabamun, 4.vii.1940, E.H. Strickland (1F,AEIC). BRITISH COLUMBIA: 14KmE. Coal River, 14.vi-3.ix.1984, S. & J. Peck (3F,1M,LEBL); Cowichan Lk, 11.vii.1966 (2M), 21-27.vii.1964 (2M), 30.viii.1966 (1F), J.A. Chapman (CNCI); Lac La Hache, 3-6.vii.1964 (1M), 10-13.vii.1964 (1F), 13-16.vii.1964 (1F), L.H. McMullen (CNCI); Racing River, 2400', 23.vii.1973 (1F,1M), 25.vii.1973 (1M), H. & M. Townes (AEIC). ONTARIO: Manitoulin Is., Maple Point, vi-vii.1982, A. Ritchie (1M,AEIC); One Sided Lake, 10.vii.1960, S.M. Clark (1F,CNCI). QUEBEC: Matagami Lk, 49°54'N77°14'W, 12.vi-2.viii.1987, L. Leblanc (1F,LEBL). SASKATCHEWAN: Redberry, 14.vii.1941, J.G. Rempel (1M,CNCI). UNITED STATES. MICHIGAN: Midland Co., 12-21.vi.1961, R.R. Dreisbach (1F,AEIC). OREGON: Corvallis, 11.vii.1978, H. & M. Townes (1F,AEIC); Hyatt Reservoir, 29.vi.1978, H. & M. Townes (2M,AEIC); Parkdale, 20.vii.1978, H. & M. Townes (1F,AEIC); Selma, 20.v.1978 (6M), 27.v.1978 (2M), 29.v.1978 (1M), H. & M. Townes (AEIC).

BIOLOGY. Collected between May 20 and July 27 and one specimen collected on August 30 in Cowichan Lake. No host record.

Himerta scutellata Leblanc, new species

Figs 17,22; Map 8

HOLOTYPE. Female. Labelled: "Stone Mt. Pk., B.C. 3500 ft. vii.25 H.&M. Townes" [typed on white label]; "Holotype [typed] *Himerta scutellata* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally moderately convex in females and moderately to strongly convex in males and apically weakly emarginate.

Notauli on mesoscutum indistinct to weak. Mesoscutellum narrow (Fig 17). Epicnemial carina (Fig 22) strongly produced posteriorly on mesepisternum, not reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large to large and separated by approximately their diameter. Sculpture on mesepisternum moderately coarse. Microsculpture on speculum weak. Sculpture on propodeum coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of

propodeum weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent in females and parallel or nearly so to slightly divergent in males. Median dorsal carinae on first metasomal tergite undeveloped to sometimes weakly developed in males. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Antennae black except for pale yellow middle section of flagellum.

Head black.

Mesosoma black except for the following. Mesoscutellum pale yellow. Subtegular ridge strong yellowish brown to black.

Fore, middle and hind coxae and trochanters 1 and 2 black. Fore femur black except for dark yellowish brown apical half anteriorly. Middle and hind femora black. Fore tibia dorsally pale yellow and ventrally deep orange yellow. Middle tibia with basal three fifths pale yellow and apical two fifths black. Hind tibia basally black for a short distance, followed by pale yellow and with apical three fifths black. Fore and middle tarsi black or sometimes dark yellowish brown. Hind tarsi black.

Metasoma black except for dark yellowish brown ovipositor.

Wings lightly infusate.

Measurements in females. Flagellum with 39-42 (40.7 ± 1.1) flagellomeres. Flagellum basal section with 5-7 (5.8 ± 0.6) flagellomeres, middle section with 6-8 (7.0 ± 0.9) flagellomeres and apical section with 27-29 (27.8 ± 0.9) flagellomeres.

Number of specimens measured: 10. Fore wing 7.8-9.3 (8.4 ± 0.4) mm long. Face 0.55-0.67 (0.58 ± 0.04) mm long, 0.88-0.98 (0.94 ± 0.03) mm wide and 1.38-1.67 as wide as long. Face and compound eyes 1.74-1.99 (1.83 ± 0.08) mm wide and 1.87-2.14 as wide as face. Compound eye 0.61-0.70 (0.65 ± 0.03) mm wide, gena 0.43-0.54 (0.49 ± 0.03) mm wide, face 1.31-1.56 as wide as compound eye and gena 0.64-0.81 as wide as compound eye. Flagellomere 1 0.87-1.04 (0.95 ± 0.05) mm long, flagellomere 2 0.34-0.43 (0.37 ± 0.03) mm long and flagellomere 1 2.03-2.93 as long as flagellomere 2. Hind femur 2.61-3.24 (2.85 ± 0.18) mm long, 0.51-0.63 (0.54 ± 0.04) mm wide and 4.98-5.45 as long as wide. First metasomal tergite 1.71-2.16 (1.90 ± 0.15) mm long, 0.72-0.98 (0.88 ± 0.08) wide apically and 1.87-2.47 as long as apically wide.

Male coloration. Antennae black except for pale yellow middle section of flagellum.

Head black except for the following. Pale yellow parts are frontal orbits, face, malar spaces, clypeus and

mandibles except for black mandible teeth.

Mesosoma black except for the following. Pale yellow parts are hind corner lobe of pronotum, subtegular ridge, tegula, anterolateral spots on mesoscutum and mesoscutellum.

Fore, middle and hind coxae black except for pale yellow apical half of anterior face of fore coxa. Fore, middle and hind trochanters 1 and 2 black except for pale yellow anterior face of fore trochanter 1. Fore femur anteriorly strong yellowish brown and posteriorly dark brown except for pale yellow apex on anterior and posterior faces. Middle and hind femora black. Fore tibia pale yellow except for deep orange yellow apical half on ventral face. Middle tibia pale yellow except for black to deep yellowish brown apical sixth of dorsal face and apical half of ventral face. Hind tibia basally black for a short distance, followed by pale yellow and with apical three fifths black. Fore tarsus pale yellow except for dark brown tarsomere 5. Middle tarsus with tarsomere 1 basal half pale yellow to deep yellowish brown and apical half deep yellowish brown, tarsomere 2 deep yellowish brown, tarsomeres 3 and 4 pale yellow and tarsomere 5 dark brown. Hind tarsus black except for tarsomere 4 being usually pale yellow.

Metasoma black.

Wings lightly infusate.

Measurements in males. Flagellum with 38-43 (39.9 ± 1.4) flagellomeres. Flagellum basal section with 6-10 (7.9 ± 0.8)

flagellomeres, middle section with 5-9 (6.4 ± 1.1)
 flagellomeres and apical section with 23-27 (25.4 ± 1.2)
 flagellomeres.

Number of specimens measured: 8. Fore wing 7.3-9.1
 (8.0 ± 0.8) mm long. Face 0.51-0.62 (0.55 ± 0.05) mm long,
 0.84-1.00 (0.89 ± 0.07) mm wide and 1.55-1.74 as wide as long.
 Face and compound eyes 1.71-1.95 (1.78 ± 0.11) mm wide and
 1.92-2.10 as wide as face. Compound eye 0.63-0.72
 (0.66 ± 0.03) mm wide, gena 0.45-0.55 (0.49 ± 0.05) mm wide,
 face 1.23-1.46 as wide as compound eye and gena 0.67-0.80 as
 wide as compound eye. Flagellomere 1 0.81-0.99 (0.87 ± 0.08)
 mm long, flagellomere 2 0.33-0.39 (0.34 ± 0.03) mm long and
 flagellomere 1 2.43-2.74 as long as flagellomere 2. Hind
 femur 2.51-2.89 (2.60 ± 0.21) mm long, 0.46-0.61 (0.52 ± 0.06)
 mm wide and 4.69-5.49 as long as wide. First metasomal
 tergite 1.67-2.09 (1.82 ± 0.15) mm long, 0.59-0.73 (0.66 ± 0.04)
 wide apically and 2.49-2.86 as long as apically wide.

ETYMOLOGY. From the Latin scutellum, referring to the
 narrow scutellum.

DISTRIBUTION. Map 8. British Columbia and Black Hills
 in South Dakota.

SPECIMENS EXAMINED. 18 females and 22 males.

PARATYPES. CANADA. BRITISH COLUMBIA: Atlin, 11.viii.1955,
 H.J. Huckel (1F,CNCI); Canim Lake, 23.vi.1938, G.S. Walley
 (1M,CNCI); 37KmW. Ft-Nelson, Alaska Hwy, 12.vi-5.ix.1984,
 S. & J. Peck (5F,2M,LEBL); Pink Mtn, 252KmS. Ft-Nelson,

12.vi-5.ix.1984, S.&J. Peck (2F,LEBL); Stone Mtn Pk, 3500',
23.vii.1973 (1F), 28.vii.1973 (1M), H.& M. Townes (AEIC),
Stone Mtn Pk, 3800', 17.vii.1973 (3M), 18.vii.1973 (1M),
19.vii.1973 (1F,4M), 21.vii.1973 (1M), H.& M. Townes (AEIC);
Racing River, 2400', 23.vii.1973 (1M), 25.vii.1973 (1F,4M),
27.vii.1973 (5F,1M), H.& M. Townes (AEIC). UNITED STATES.
SOUTH DAKOTA: Harney Peak, 22.vii.1924 (1M,USNM).

BIOLOGY. Precise collecting dates range between June 23
and August 11. No host record.

Himerta townesorum Leblanc, new species

Figs 9,12,23; Map 11

HOLOTYPE. Male. Labelled: "Stone Mt. Pk., B.C. 3800± ft. vii.17.73 H. & M. Townes" [typed on white label; "HOLOTYPE [typed] *Himerta townesorum* Leblanc 1988 [hand printed]" [red label]]. Parts missing: right flagellomeres 26 to 43 and hind right tarsomere v; also head broken off and glued back and left antenna broken between pedicel and flagellomere 1 and glued back. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face (Fig 9) vestigial. Clypeus basally moderately convex and ending high into face and apically weakly emarginate.

Notauli on mesoscutum indistinct. Mesoscutellum narrow. Epicnemial carina (Fig 23) moderately produced posteriorly on mesepisternum, not reaching anterior margin of mesepisternum and ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures large and separated by less than their diameter. Sculpture on mesepisternum very coarse. Microsculpture on speculum strong. Sculpture on propodeum coarse. Median longitudinal carinae of propodeum

reduced to two short posterior carinae. Median furrow on anterior half of propodeum weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite slightly divergent. Median dorsal carinae on first metasomal tergite undeveloped. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted.

Male coloration. Antennae black except for pale yellow middle section of flagellum.

Head black except for small pale yellow median spot at base of clypeus.

Mesosoma black except for pale yellow mesoscutellum.

Fore, middle and hind coxae and trochanters 1 and 2 black. Fore femur black except for anterior face being strong yellowish brown on its distal half except for pale yellow apex. Middle and hind femora black. Fore tibia pale yellow except for deep orange yellow apical half of ventral face. Middle tibia with basal three fifths pale yellow and apical two fifths reddish black. Hind tibia basally black for a short distance, followed by pale yellow and with apical three fifths black. Fore tarsus dark yellowish brown. Middle tarsus black. Hind tarsus black except for pale yellow tarsomere 4.

Metasoma black.

Wings lightly infuscate.

Measurements in male. Flagellum with 43 flagellomeres.

Flagellum basal section with 5 flagellomeres, middle section with 8 flagellomeres and apical section with 30 flagellomeres.

Number of specimens measured: 1. Fore wing 9.0 mm long. Face 0.59 mm long, 1.09 mm wide and 1.85 as wide as long. Face and compound eyes 1.95 mm wide and 1.80 as wide as face. Compound eye 0.70 mm wide, gena 0.57 mm wide, face 1.56 as wide as compound eye and gena 0.82 as wide as compound eye. Flagellomere 1 1.01 mm long, flagellomere 2 0.40 mm long and flagellomere 1 2.52 as long as flagellomere 2. Hind femur 3.00 mm long, 0.59 mm wide and 5.12 as long as wide. First metasomal tergite 2.06 mm long, 0.83 wide apically and 2.48 as long as apically wide.

ETYMOLOGY. Named after Henry and Marjorie Townes who have collected the Holotype and have collected a large number of specimens used in the revision.

DISTRIBUTION. Map 11. Known only from northern British Columbia.

SPECIMENS EXAMINED. 1 male (Holotype). Females unknown.

BIOLOGY. Collected on July 17. No host record.

Himerta pumila Leblanc, new species

Fig 24; Map 9

HOLOTYPE. Female. Labelled: "Willow Bunch, 29-vii-55 Sask. [Saskatchewan] C.D. Miller" [typed on white label except for hand printed collecting day and month]; "HOLOTYPE [typed] *Himerta pumila* Leblanc 1988 [hand printed]" [red label]. Part missing: fore left tarsomere v. Deposited in CNCI.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a moderately strong angle with vertical axis of compound eye. Face moderately wide and moderately convex medially. Tubercle on face vestigial. Clypeus basally moderately convex and apically weakly emarginate.

Notauli on mesoscutum weak. Mesoscutellum wide. Epicnemial carina (Fig 24) moderately produced posteriorly on mesepisternum, reaching anterior margin of mesepisternum and ending below the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by approximately their diameter. Sculpture on mesepisternum moderately coarse. Microsculpture on speculum absent. Sculpture on propodeum moderately coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae. Median furrow on anterior half of

propodeum absent.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent. Median dorsal carinae on first metasomal tergite undeveloped. Spiracles of first metasomal tergite at midlength of tergite and not uplifted. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin abruptly sloping with a strong angle.

Female coloration. Scape strong yellowish brown. Pedicel dorsally dark grayish reddish brown and ventrally strong yellowish brown. Flagellum basal section with basal half of flagellomere 1 and dorsal faces of first few flagellomeres dark grayish reddish brown in one specimen, otherwise flagellomeres brownish orange and gradually becoming brilliant yellow towards apex. Flagellum apical section dark grayish reddish brown.

Head, mesosoma, legs and metasoma entirely strong yellowish brown except for the following. Deep orange yellow parts are face, clypeus, mandibles except for black teeth, hind corner lobe of pronotum, subtegular ridge, tegula, fore coxa, trochanters, femur and basal half of tibia, middle coxa, trochanters, femur and tibia and sub-basal two fifths of hind tibia. In one specimen apex of hind femur dark reddish brown and hind tibia gradually becoming dark reddish brown towards apex. Tergite 1 black to end of glymma.

Wings almost hyaline.

Measurements in females. Flagellum with 38-42 flagellomeres. Flagellum basal section with 11 flagellomeres, middle section with 4 flagellomeres and apical section with 23-27 flagellomeres.

Number of specimens measured: 2. Fore wing 6.8-7.3 long. Face 0.50-0.51 mm long, 0.79-0.85 mm wide and 1.59-1.67 as wide as long. Face and compound eyes 1.57-1.64 mm wide and 1.92-1.98 as wide as face. Compound eye 0.57 mm wide, gena 0.43-0.45 mm wide, face 1.38-1.49 as wide as compound eye and gena 0.74-0.79 as wide as compound eye. Flagellomere 1 0.73-0.82 mm long, flagellomere 2 0.33 mm long and flagellomere 1 2.22-2.48 as long as flagellomere 2. Hind femur 2.26-2.61 mm long, 0.43 mm wide and 5.31-6.12 as long as wide. First metasomal tergite 1.43-1.57 mm long, 0.70-0.79 wide apically and 2.06-2.52 as long as apically wide.

ETYMOLOGY. From the Latin pumilis, meaning little and referring to the small body size of the species.

DISTRIBUTION. Map 9.

SPECIMENS EXAMINED. 2 females. Males unknown.

PARATYPE. UNITED STATES. WASHINGTON: Whidby Island, 6.viii.1898 (1F, OSUO).

BIOLOGY. Collected on July 29 and on August 6. No host record.

Himerta alpina Leblanc, new species

Figs 25,29,33,40; Map 9

HOLOTYPE. Male. Labelled: "Tuscarora, Nev. [Nevada] June 5,1978, H.& M. Townes" [typed on white label]; "HOLOTYPE [typed] *Himerta alpina* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel at the level of face. Antennal sockets at a very strong angle with vertical axis of compound eye. Face moderately wide and very convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally moderately convex and apically weakly emarginate.

Notauli on mesoscutum indistinct. Mesoscutellum wide. Epicnemial carina (Fig 25) moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum in all females and in some males and ending above at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures small and separated by more than their diameter. Sculpture on mesepisternum (Fig 29) absent. Microsculpture on speculum absent. Sculpture on propodeum (Fig 33) weak to moderately coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae. Median furrow on anterior half of propodeum weakly

developed.

Sculpture on metasomal tergites very reduced to absent. Sides of first metasomal tergite (Fig 40) moderately divergent in females and slightly divergent in males. Median dorsal carinae on first metasomal tergite undeveloped to sometimes weakly developed in males. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted in females and strongly uplifted in males. Ovipositor notch wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle.

Female coloration. Scape and pedicel black. Flagellum black basally and gradually becoming dark grayish reddish brown towards apex.

Head black except for clypeus and mandibles being black to dark reddish brown with mandible teeth black.

Mesosoma entirely black.

Fore, middle and hind coxae and trochanters 1 and 2 black. Fore, middle and hind femora deep orange except for faint black at apex of hind femur. Fore and middle tibiae deep orange. Hind tibia black. Fore and middle tarsi reddish black. Hind tarsus with tarsomeres 1 and 5 black and tarsomeres 2, 3 and 4 light orange yellow except for dark brown base and apex of tarsomere 2.

Metasoma deep orange except for the following. Tergite 1 black and basal fifth of tergite 2 black in one specimen.

Ovipositor sheath reddish black except for light orange yellow apex.

Wings darkly infusate.

Variations in female coloration. Specimen from Tuscarora, Nevada has its legs mostly black except for hind femur being deep orange and black at apex dorsally, anteriorly and posteriorly and hind tarsomeres 2, 3 and 4 being light orange yellow with traces of dark brown at their bases and apices.

Measurements in females. Flagellum with 36-38 (36.8 ± 1.0) flagellomeres.

Number of specimens measured: 4. Fore wing 7.8-8.0 (7.9 ± 0.1) mm long. Face 0.55-0.60 (0.58 ± 0.03) mm long, 0.87-0.95 (0.92 ± 0.05) mm wide and 1.55-1.63 as wide as long. Face and compound eyes 1.71-1.85 (1.79 ± 0.08) mm wide and 1.92-1.97 as wide as face. Compound eye 0.57-0.67 (0.63 ± 0.06) mm wide, gena 0.52-0.57 (0.55 ± 0.03) mm wide, face 1.42-1.51 as wide as compound eye and gena 0.82-0.91 as wide as compound eye. Flagellomere 1 0.82-0.92 (0.87 ± 0.05) mm long, flagellomere 2 0.33-0.37 (0.34 ± 0.02) mm long and flagellomere 1 2.48-2.67 as long as flagellomere 2. Hind femur 2.44-2.86 (2.64 ± 0.23) mm long, 0.51-0.56 (0.54 ± 0.03) mm wide and 4.76-5.09 as long as wide. First metasomal tergite 1.71-1.95 (1.83 ± 0.12) mm long, 0.79-0.92 (0.87 ± 0.07) wide apically and 1.87-2.46 as long as apically wide.

Male coloration. Scape and pedicel black. Flagellum

black basally and gradually becoming dark grayish reddish brown towards apex.

Head black except for the following. Facial orbits often pale yellow. Clypeus and mandibles black to pale yellow with mandible teeth black.

Mesosoma entirely black.

Fore, middle and hind coxae and trochanters 1 and 2 black. Fore and middle femora and tibiae and hind femur deep orange. Hind tibia black to reddish black and usually with very faint trace of deep orange ventrally on basal third. Fore and middle tarsi dark brown with faint traces of light orange yellow. Hind tarsus with tarsomeres 1 and 5 black, tarsomere 2 black with or without its apical half pale yellow and tarsomeres 3 and 4 pale yellow.

Metasoma deep orange except for black on at least basal three fourths of tergite 1 and often on basal fourth of tergite 2.

Wings darkly infusate.

Variations in male coloration. Specimens from Tuscarora, Nevada have their fore and middle leg color patterns varying from as described above to almost entirely black with faint traces of deep orange on femora and tibiae and faint traces of light orange yellow on tarsi.

Measurements in males. Flagellum with 35-39 (37.2 ± 1.2) flagellomeres.

Number of specimens measured: 10. Fore wing 7.7-8.4

(8.0 ± 0.2) mm long. Face $0.54-0.63$ (0.58 ± 0.03) mm long, $0.88-1.00$ (0.93 ± 0.04) mm wide and $1.53-1.73$ as wide as long. Face and compound eyes $1.78-1.99$ (1.87 ± 0.06) mm wide and $1.92-2.24$ as wide as face. Compound eye $0.65-0.73$ (0.68 ± 0.02) mm wide, gena $0.55-0.68$ (0.60 ± 0.04) mm wide, face $1.36-1.44$ as wide as compound eye and gena $0.83-0.96$ as wide as compound eye. Flagellomere 1 $0.76-0.95$ (0.87 ± 0.06) mm long, flagellomere 2 $0.34-0.42$ (0.38 ± 0.02) mm long and flagellomere 1 $2.07-2.61$ as long as flagellomere 2. Hind femur $2.37-2.86$ (2.68 ± 0.16) mm long, $0.49-0.60$ (0.56 ± 0.03) mm wide and $4.46-5.21$ as long as wide. First metasomal tergite $1.74-1.92$ (1.81 ± 0.07) mm long, $0.72-0.96$ (0.81 ± 0.07) wide apically and $1.99-2.48$ as long as apically wide.

ETYMOLOGY. From the Latin *alpinus*, meaning from high mountains, and referring to the high latitude localities it has been collected in.

DISTRIBUTION. Map 9. At high altitudes in Colorado, Utah, Idaho, Nevada and in the Sierra Nevada in California.

SPECIMENS EXAMINED. 4 females and 16 males.

PARATYPES. UNITED STATES. CALIFORNIA: Leevining, 27.vi.1948, H.M.G. & D. Townes (1M, AEIC); Mammoth, 9.vii.1933 (1M, AEIC); nr Sonora Pass, 8000', 6.vii.1948, H.M.G. & D. Townes (1M, AEIC). COLORADO: nr Estes Pk, 15.vi.1948, H.M.G. & D. Townes (1M, AEIC); Granite Peaks Camp, 9000', 18-31.vii.1928, J. Bequaert (1M, MCZC); Phantom VY, 9400', Rocky Mtn Nat. Pk, 9.viii.1948, H.M.D. & J. Townes (1F, AEIC).

IDAHO: nr Stanley, Galena Summit, 8700', 1.viii.1978, H. & M. Townes (1M, AEIC). NEVADA: Tuscarora, 3.vi.1978 (1M), 5.vi.1978 (1F, 4M), H. & M. Townes (AEIC). UTAH: Strawberry Daniel Pass, 19.vi.1948, H.M.G. & D. Townes (2F, 4M, AEIC).

BIOLOGY. Collected between June 3 and August 9. No host record.

Himerta infuscata Leblanc, new species

Figs 10,34,41; Map 3

HOLOTYPE. Male. Labelled: "Leevining, Cal.
[California] June 25 1948, H.M.G. & D. Townes" [typed on
white label except for hand printed collecting day];
"Himerta sp. 7 Tow '49" [hand printed on white label];
"HOLOTYPE [typed] *Himerta infuscata* Leblanc 1988 [hand
printed]" [red label]. Part missing: hind left tarsomere v.
Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound
eyes parallel at the level of face. Antennal sockets at a
very strong angle with vertical axis of compound eye. Face
moderately wide and very convex medially. Tubercle on face
(Fig 10) indistinct. Clypeus basally almost flat and
apically weakly emarginate.

Notauli on mesoscutum indistinct. Mesoscutellum wide.
Epicnemial carina moderately produced posteriorly on
mesepisternum, never reaching anterior margin of
mesepisternum and ending at the level of the middle of the
posterior margin of the pronotum, excluding hind corner
lobe. Mesepisternum with punctures small and separated by
more than their diameter. Sculpture on mesepisternum
absent. Microsculpture on speculum absent. Sculpture on
propodeum (Fig 34) absent. Median longitudinal carinae of
propodeum reduced to two short posterior carinae. Median

furrow on anterior half of propodeum reduced to a very faint basal depression.

Sculpture on metasomal tergites very reduced. Sides of first metasomal tergite (Fig 41) slightly divergent. Median dorsal carinae on first metasomal tergite undeveloped. Spiracles of first metasomal tergite at midlength of tergite and strongly uplifted.

Male coloration. Scape with basal two thirds strong brown and apical third black. Pedicel black. Flagellum black and gradually becoming dark grayish reddish brown towards apex.

Head strong brown except for the following. Face brownish orange. Facial orbits and clypeus pale yellow. Mandibles brownish orange except for black teeth.

Mesosoma strong brown except for the following. Brownish orange parts are hind corner lobe of pronotum, subtegular ridge and tegula. Black parts are basal half and apical margin of propleuron, small lateral spots in depression behind collar of pronotum, posterior margin of pronotum, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, entire epicnemium except for narrow strong brown area laterally, posterior margin of mesepisternum from tegula to end of postpectal carina and lower and posterior margins of metapleuron.

Fore and middle legs brownish orange except for dark reddish brown dorsal faces of trochanters 1 and 2. Hind coxa, trochanters 1 and 2, femur and tibia brownish orange except for reddish black apex of tibia. Hind tarsus with tarsomere 1 black, tarsomeres 2, 3 and 4 pale yellow and tarsomere 5 brownish orange.

Metasoma strong brown except for basal fifth of tergite 1 and ventrolateral carina of tergite 1 being black.

Wings darkly infusate.

Measurements in male. Flagellum with 37 flagellomeres.

Number of specimens measured: 1. Fore wing 7.5 mm long. Face 0.57 mm long, 0.87 mm wide and 1.51 as wide as long. Face and compound eyes 1.81 mm wide and 2.09 as wide as face. Compound eye 0.67 mm wide, gena 0.52 mm wide, face 1.29 as wide as compound eye and gena 0.78 as wide as compound eye. Flagellomere 1 0.79 mm long, flagellomere 2 0.33 mm long and flagellomere 1 2.41 as long as flagellomere 2. Hind femur 2.51 mm long, 0.49 mm wide and 5.14 as long as wide. First metasomal tergite 1.99 mm long, 0.67 wide apically and 2.96 as long as apically wide.

ETYMOLOGY. From the Latin infuscus, meaning dark colored and referring to the dark colored wings.

DISTRIBUTION. Map 3. Sierra Nevada Mountains in California.

SPECIMENS EXAMINED. 1 male (Holotype). Females unknown.

BIOLOGY. Collected on June 25. No host record.

Himerta unicolorata Leblanc, new species

Figs 3,6,15,35,42,46; Map 10

HOLOTYPE. Female. Labelled: "Corvallis, Ore. [Oregon] May 15, 1976 H.K. Townes" [typed on white label]; "HOLOTYPE [typed] *Himerta unicolorata* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes (Fig 3) parallel in females and slightly convergent in males at the level of face. Antennal sockets (Fig 6) at a very strong angle with vertical axis of compound eye. Face moderately wide and very convex medially. Tubercle on face small but well defined. Clypeus basally almost flat to moderately convex in females and moderately convex in males and apically weakly emarginate.

Notauli on mesoscutum (Fig 15) indistinct to weak. Mesoscutellum wide. Epicnemial carina moderately to strongly produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by approximately their diameter to sometimes more than their diameter. Sculpture on mesepisternum absent to moderately coarse. Microsculpture on speculum absent to weak. Sculpture on propodeum (Fig 35) moderately coarse. Median longitudinal

carinae of propodeum reduced to two short posterior carinae and often also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum well developed with adjacent sides on propodeum uplifted.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite (Fig 42) moderately divergent in females and slightly to moderately divergent in males. Median dorsal carinae on first metasomal tergite undeveloped to weakly developed. Spiracles of first metasomal tergite at midlength of tergite and moderately to strongly uplifted. Ovipositor notch (Fig 46) wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle.

Female coloration. Scape and pedicel strong brown to black. Flagellum basal section dark orange yellow to dark brown, if dark orange yellow then usually basal half of flagellomere 1 and dorsal surfaces of first few flagellomeres dark brown. Flagellum middle section pale yellow, sometimes dark orange yellow or dark brown and not defined from basal or apical sections. Flagellum apical section dark orange yellow.

Head strong brown except for the following. Facial orbits deep orange yellow to pale yellow. Face, excluding orbits, strong yellowish brown to deep orange yellow to pale yellow with three faint parallel strong yellowish brown to

deep orange yellow lines from antennal orbits down to upper margin of clypeus to entirely pale yellow. Malar spaces strong brown or sometimes pale yellow. Clypeus deep orange yellow to pale yellow. Mandibles pale yellow with or without their apical halves deep orange yellow except for black teeth. Usually black along posterior margins of antennal sockets.

Mesosoma strong brown except for the following. Deep orange yellow parts are hind corner lobe of pronotum, tegula, mesoscutellum and metascutellum. Subtegular ridge deep orange yellow to strong yellow to pale yellow. Mesepimeron strong brown to dark reddish brown. Black parts are basal half of to entire propleuron, dorsal half of depression behind collar of pronotum, posterior margin of pronotum, anteromedian band on mesoscutum very short or absent, rarely long and extending to half of scutum length, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, median three fourths of epicnemium to all epicnemium except for its lateral fourth and upper half to entire epicnemium with or without adjacent area of mesepisternum being black, posterior margin of mesepisternum from tegula to usually end of postpectal carina, often spot above postpectal carina, usually anterior, lower and posterior margins of metapleuron and

usually posterior margin of propodeum.

Fore, middle and hind coxae strong yellowish brown to strong brown. Fore, middle and hind trochanters 1 strong brown to strong yellowish brown, usually basally black on dorsal face for a short distance, sometimes fore and middle trochanters 1 pale yellow anteriorly and strong yellowish brown posteriorly. Fore, middle and hind trochanters 2 strong brown to strong yellowish brown and often with at least traces of black to dark reddish brown on their anterior faces. Fore femur strong brown to strong yellowish brown. Middle and hind femora strong brown. Fore and middle tibiae and tarsi deep orange yellow with tarsomeres 5 strong yellowish brown. Hind tibia strong brown to strong yellowish brown to sometimes strong yellowish brown basally for a short distance, followed by deep orange yellow and with apical half strong yellowish brown, often black at apex on anterior, posterior and dorsal faces. Hind tarsus with basal half to four fifths of tarsomere 1 strong yellowish brown to strong brown to dark reddish brown, rest of tarsomere 1 and tarsomeres 2, 3 and 4 pale yellow and tarsomere 5 strong yellowish brown.

Metasoma strong brown except for the following. Tergite 1 black basally to end of glymma or dorsally down to basal third and often also with ventrolateral carina black. Ovipositor sheath black with strong brown to deep orange yellow at apex. Ovipositor deep orange yellow.

Wings lightly infusate.

Variations in female coloration. In most specimens from Idaho and a few specimens from Robson, British Columbia face is strong brown with or without deep orange yellow facial orbits, clypeus is deep orange yellow and mandibles are deep orange yellow to pale yellow except for black teeth.

Measurements in females. Flagellum with 36-41 (38.1 ± 1.2) flagellomeres. Flagellum basal section with 9-11 (10.2 ± 0.7) flagellomeres, middle section with 2-5 (3.7 ± 1.1) flagellomeres and apical section with 22-27 (24.3 ± 1.2) flagellomeres.

Number of specimens measured: 10. Fore wing 7.9-9.4 (8.8 ± 0.5) mm long. Face 0.51-0.61 (0.57 ± 0.03) mm long, 0.82-0.99 (0.92 ± 0.05) mm wide and 1.52-1.76 as wide as long. Face and compound eyes 1.67-1.99 (1.84 ± 0.10) mm wide and 1.86-2.05 as wide as face. Compound eye 0.55-0.71 (0.65 ± 0.05) mm wide, gena 0.45-0.60 (0.53 ± 0.04) mm wide, face 1.34-1.69 as wide as compound eye and gena 0.73-1.00 as wide as compound eye. Flagellomere 1 0.85-1.00 (0.93 ± 0.05) mm long, flagellomere 2 0.33-0.39 (0.36 ± 0.02) mm long and flagellomere 1 2.27-2.68 as long as flagellomere 2. Hind femur 2.44-3.00 (2.78 ± 0.18) mm long, 0.44-0.56 (0.52 ± 0.04) mm wide and 5.03-5.94 as long as wide. First metasomal tergite 1.50-1.99 (1.84 ± 0.13) mm long, 0.72-0.94 (0.86 ± 0.07) wide apically and 1.97-2.43 as long as apically wide.

Male coloration. Scape strong brown and sometimes with

apical half brownish black dorsally and laterally. Pedicel dark brown to brownish black. Flagellum basal section dark brown to brownish black. Flagellum middle section pale yellow or sometimes dark orange yellow and not defined from apical section. Flagellum apical section dark orange yellow to dark brown. Often entire flagellum brownish black with or without faint traces of pale yellow on middle section.

Head strong brown except for the following. Facial orbits pale yellow. Face, excluding orbits, strong yellowish brown to deep orange yellow to pale yellow with three faint parallel deep orange yellow lines from antennal orbits down to upper margin of clypeus to entirely pale yellow. Malar spaces pale yellow. Clypeus pale yellow. Mandibles pale yellow except for black teeth. Usually black along posterior margins of and often between antennal sockets.

Mesosoma strong brown except for the following. Hind corner lobe of pronotum strong brown to deep orange yellow or rarely pale yellow. Subtegular ridge strong yellow to pale yellow. Tegula strong yellow to deep orange yellow or rarely pale yellow. Mesoscutellum and metascutellum deep orange yellow. Narrow anterosublateral pale yellow lines on mesosternum in a few specimens. Mesepimeron strong brown to dark reddish brown. Black parts are basal half of to entire propleuron, dorsal half of depression behind collar of pronotum, posterior margin of pronotum, anteromedian band on

mesoscutum very short or absent, rarely long and extending to half of scutum length, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, sometimes axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, median three fourths of epicnemium to all epicnemium except for its lateral fourth and upper half to entire epicnemium with or without adjacent area of mesepisternum being black, in a few specimens wide diagonal lines from posterolateral margins to anteromedian margin of mesosternum, posterior margin of mesepisternum from tegula to end of postpectal carina, often spot above postpectal carina, anterior, lower and usually posterior margins of metapleuron and usually posterior margin of propodeum.

Fore and middle coxae deep orange yellow, sometimes with traces of light orange yellow and sometimes with pale yellow marks anteroapically. Hind coxa strong brown to deep orange yellow. Fore and middle trochanters 1 deep orange yellow and hind trochanter 1 strong brown, usually all trochanters 1 basally black on dorsal face for a short distance, often fore and middle trochanters 1 pale yellow anteriorly and deep orange yellow posteriorly. Fore and middle trochanters 2 deep orange yellow and hind trochanter 2 strong brown; all trochanters 2 often with at least traces of black to dark reddish brown on their anterior faces.

Fore and middle femora strong yellowish brown. Hind femur strong brown. Fore and middle tibiae and tarsi deep orange yellow with tarsomeres 5 strong yellowish brown. Hind tibia strong yellowish brown to strong brown basally for a short distance, followed by strong yellow to deep orange yellow and with apical three fifths strong yellowish brown to strong brown and gradually becoming strong brown to dark reddish brown towards apex, sometimes whole tibia strong yellowish brown and gradually becoming strong brown to dark reddish brown towards apex. Hind tarsus with basal three fifths to four fifths of tarsomere 1 dark reddish brown to black, rest of tarsomere 1 and tarsomeres 2, 3 and 4 pale yellow and tarsomere 5 strong yellowish brown.

Metasoma strong brown except for tergite 1 being black basally to end of glymma or dorsally down to basal third to half of tergite and often also with ventrolateral carina black.

Wings lightly infusate.

Measurements in males. Flagellum with 35-41 (37.7 ± 1.5) flagellomeres. Flagellum basal section with 9-13 (10.8 ± 0.8) flagellomeres, middle section with 3-7 (4.5 ± 1.1) flagellomeres and apical section with 21-26 (22.9 ± 1.4) flagellomeres.

Number of specimens measured: 10. Fore wing 7.72-8.46 (8.1 ± 0.3) mm long. Face 0.51-0.59 (0.55 ± 0.03) mm long, 0.84-0.92 (0.88 ± 0.02) mm wide and 1.52-1.74 as wide as long.

Face and compound eyes 1.74-1.92 (1.82 ± 0.06) mm wide and 1.98-2.15 as wide as face. Compound eye 0.63-0.71 (0.67 ± 0.03) mm wide, gena 0.49-0.59 (0.55 ± 0.03) mm wide, face 1.24-1.35 as wide as compound eye and gena 0.71-0.87 as wide as compound eye. Flagellomere 1 0.85-0.94 (0.90 ± 0.03) mm long, flagellomere 2 0.33-0.40 (0.37 ± 0.02) mm long and flagellomere 1 2.27-2.70 as long as flagellomere 2. Hind femur 2.44-2.96 (2.63 ± 0.18) mm long, 0.35-0.57 (0.48 ± 0.06) mm wide and 4.56-6.07 as long as wide. First metasomal tergite 1.50-1.88 (1.76 ± 0.11) mm long, 0.68-0.89 (0.80 ± 0.07) wide apically and 1.98-2.52 as long as apically wide.

ETYMOLOGY. From the Latin unus, meaning one and the Latin color. Refers to the fact that both females and males are of uniform coloration while in most other species males have extensive yellow markings.

DISTRIBUTION. Map 10. Western mountain chains from southern British Columbia to around San Francisco Bay in California and east into Idaho.

SPECIMENS EXAMINED. 56 females and 90 males.

PARATYPES. CANADA. BRITISH COLUMBIA: Robson, 7.v.1939 (1M), 7.v.1949 (2M), 14.v.1949 (1F), 15.v.1954 (1M), 19.v.1961 (1F), 20.v.1950 (1F,4M), 21.v.1962 (2M), 23.v.1949 (1M), 24.v.1948 (1M), 24.v.1962 (1F), 26.v.1962 (2F,3M), 28.v.1962 (1F,2M), 29.v.1948 (1M), 29.v.1950 (1M), 29.v.1961 (1M), 30.v.1948 (1F), 30.v.1962 (1F), 31.v.1948 (2F), 31.v.1949 (2F,3M), 1.vi.1962 (1M), 2.vi.1949 (1F,3M),

2.vi.1950 (1M), 3.vi.1949 (1M), 3.vi.1953 (1F), 5.vi.1962 (1F), 6.vi.1949 (1F), 8.vi.1962 (1F), 11.vi.1953 (1M), 12.vi.1950 (1M), 13.vi.1950 (1F,1M), 14.vi.1948 (1M), 14.vi.1953 (1M), 17.vi.1950 (1F), H.R. Foxlee (1M,AEIC;13F,21M,CNCI;7F,12M,SMDV); Steelhead, 18.vi.1933, H.B. Leech (1F,CNCI); Trinity Valley, 21.v.1959, L.A. Kelton (1M,CNCI). **UNITED STATES. CALIFORNIA:** Alpine Lk., Lily Pond, 1500', 25.v.1970, D.D. Munroe (1M,CNCI); Berkeley, 8.v.1937 (1M,OSUO), 17.v.1937 (1M,AEIC), G.E. & R.M. Bohart; Cazadero, 12-14.v.1918, J.C. Bradley (1M,CUIC); Eureka, 24.v, H.S. Barber (1F,USNM); Mt-Hamilton, 14.iv.1936, R.M. & G.E. Bohart (1F,UCDC); Oakland, 30.iv.1937, E.S. Ross (1M,AEIC). **IDAHO:** Idaho City, 9.vi.1978 (2F,8M), 11.vi.1978 (2F,2M), 13.vi.1978 (1F,3M), 14.vi.1978 (1F), H. & M. Townes (AEIC); Lowman, 4000', 9.vi.1978 (3F), 12.vi.1978 (1M), 14.vi.1978 (1M), H. & M. Townes (AEIC); nr Stanley, 5.viii.1978 (1F), 8.viii.1978 (1F), H. & M. Townes (AEIC); Troy, 31.v, J.W. Aldrich (1M,USNM). **OREGON:** Cascadia, 19.v.1935, S. Lewett Jr (1M,OSUO); Corvallis, v.1936 (1M,OSUO), 6.v.1987 (1F,1M), 7.v.1987 (3F,3M), 8.v.1978 (1M), 8.v.1987 (2F,4M), 9.v.1987 (1F,1M), 11.v.1976 (1M), 11.v.1987 (3F), 12.v.1987 (2M), 13.v.1976 (1M), 15.v.1976 (2M), 21.v.1978 (1M), 30.v.1978 (1M), 2.vi.1978 (2F), 9.vi.1978 (1F), H. & M. Townes (AEIC); Hyatt Reservoir, 19.vi.1978 (3M), 20.vi.1978 (1F), 22.vi.1978 (1M), 23.vi.1978 (1M), 29.vi.1978 (1M), H. & M. Townes (AEIC);

Ochoco Creek, 14.vii.1978, H.& M. Townes (1F,AEIC); Selma, 20.vi.1978 (1F,2M), 26.vi.1978 (2F), H.& M. Townes (AEIC); Wetmore Campground, Baker Co., 4500', 2.vii.1965 (2F,CNCI). WASHINGTON: Seattle, v.1931 (1M,OSUO); Washougal, 10.v.1976, H.& M. Townes (1M,AEIC).

BIOLOGY. Collected between April 14 and May 25 in California and between May 6 and July 2 in the more northernly States and in British Columbia. One specimen collected on July 14 in Oregon and three specimens collected on August 5-8 in Idaho. No host record.

Himerta lineola Leblanc, new species

Map 4

HOLOTYPE. Female. Labelled: "One Sided Lake, ONT. [Ontario] June-22-1960 S.M. Clark" [typed on white label except for hand printed collecting day]; "HOLOTYPE [typed] *Himerta lineola* Leblanc 1988 [hand printed]" [red label]. Parts missing: right flagellomeres 31 to 37 and left hind tarsus. Deposited in CNCI.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in females and slightly convergent in males at the level of face. Antennal sockets at a very strong angle with vertical axis of compound eye. Face moderately wide and very convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally almost flat in females and moderately convex in male and apically weakly emarginate.

Notauli on mesoscutum indistinct. Mesoscutellum wide. Epicnemial carina moderately to strongly produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by less than their diameter. Sculpture on mesepisternum absent to moderately coarse. Microsculpture on speculum absent. Sculpture on propodeum moderately

Fore, middle and hind coxae and trochanters 1 and 2 reddish black to dark brown with faint traces of brownish orange on middle and hind coxae. Fore and middle femora deep orange yellow. Hind femur deep orange yellow to deep orange, in one specimen with black at apex anteriorly, posteriorly and dorsally. Fore and middle tibiae and tarsi light orange yellow except for deep orange yellow tarsomeres 5. Hind tibia usually basally dark brown for a short distance, followed by light orange yellow and with apical three fifths brownish orange and gradually becoming dark brown to reddish black towards apex. Hind tarsus with tarsomere 1 mostly to entirely reddish black, tarsomere 2 light orange yellow with or without its basal half reddish black, if entirely light orange yellow then tarsomere 1 light orange yellow apically on its ventral face, tarsomeres 3 and 4 light orange yellow and tarsomere 5 deep orange yellow.

Metasoma deep orange except for the following. Tergite 1 reddish black on its anterior half to three fourths dorsally and black for its whole length laterally. In one specimen tergite 2 with faint reddish black for a short distance along its anterior margin.

Wings lightly infusate.

Measurements in males. Flagellum with 38-40 (38.6 ± 0.9) flagellomeres. Flagellum basal section with 11-12 (11.7 ± 0.6) flagellomeres, middle section with 4-5 (4.7 ± 0.6)

sockets.

Mesosoma brownish orange except for the following.

Subtegular ridge deep orange yellow to pale yellow.

Mesoscutellum brilliant yellow to deep orange yellow.

Metascutellum deep orange yellow. Dark reddish brown to black parts are propleuron, dorsal half of to entire collar of pronotum, subtegular ridge, tegula, anteromedian band on mesoscutum to half of scutum length, anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum except in one specimen, suture between mesoscutellum and metascutellum, axillary troughs of metascutellum except in one specimen, suture between metascutellum and propodeum, median three fourths of to entire epicnemium, hind margin of mesepisternum from tegula to end of postpectal carina and anterior and lower margins of metapleuron except in one specimen.

Fore and middle coxae dark orange yellow to brownish orange; fore coxa dark reddish brown in one specimen. Fore and middle trochanters 1 and 2 dark orange yellow to brownish orange to dark reddish brown; anterior faces of fore and middle trochanters 1 pale yellow in one specimen. Fore and middle femora, tibiae and tarsi deep orange yellow. Hind coxa brownish orange; faintly dark reddish brown at apex on dorsal and posterior faces in two specimens. Hind trochanters 1 and 2 and femur brownish orange; apex of femur

dark reddish brown dorsally and posteriorly in two specimens. Hind tibia basally dark reddish brown for a short distance, followed by light yellow, or deep orange yellow in one specimen, and with apical three fifths brownish orange and gradually becoming dark reddish brown towards apex. Hind tarsus with basal half of to most of tarsomere 1 dark reddish brown, apical part of tarsomere 1 and tarsomeres 2, 3 and 4 pale yellow and tarsomere 5 deep orange yellow.

Metasoma brownish orange except for basal fourth to half of dorsal face of tergite 1 being dark reddish brown to black and ovipositor sheath being dark reddish brown and pale yellow at apex.

Wings lightly infusate.

Variations in female coloration. In one specimen dark markings are extensive and cover, in addition to the areas cited in the description, entire pronotum except for brownish orange posterolaterally in front of hind corner lobe, areas of mesepisternum adjacent to epicnemium and mesosternum, wide sublateral longitudinal bands on mesosternum and lower fourth of metapleuron.

Measurements in females. Flagellum with 35-37 (36.3 ± 1.0) flagellomeres. Flagellum basal section with 9-10 (9.3 ± 0.5) flagellomeres, middle section with 4-5 (4.5 ± 0.6) flagellomeres and apical section with 22-23 (22.5 ± 0.6) flagellomeres.

Number of specimens measured: 4. Fore wing 7.5-8.3 (7.9 $\pm$ 0.4) mm long. Face 0.49-0.52 (0.51 $\pm$ 0.02) mm long, 0.79-0.89 (0.84 $\pm$ 0.05) mm wide and 1.62-1.70 as wide as long. Face and compound eyes 1.64-1.78 (1.72 $\pm$ 0.09) mm wide and 2.00-2.08 as wide as face. Compound eye 0.59-0.65 (0.62 $\pm$ 0.03) mm wide, gena 0.43-0.51 (0.47 $\pm$ 0.04) mm wide, face 1.32-1.43 as wide as compound eye and gena 0.73-0.82 as wide as compound eye. Flagellomere 1 0.70-0.88 (0.80 $\pm$ 0.10) mm long, flagellomere 2 0.31-0.38 (0.33 $\pm$ 0.04) mm long and flagellomere 1 2.28-2.69 as long as flagellomere 2. Hind femur 2.37-2.65 (2.52 $\pm$ 0.14) mm long, 0.43-0.49 (0.46 $\pm$ 0.03) mm wide and 5.35-5.55 as long as wide. First metasomal tergite 1.53-1.74 (1.62 $\pm$ 0.11) mm long, 0.70-0.73 (0.71 $\pm$ 0.03) wide apically and 2.14-2.38 as long as apically wide.

Male coloration. Scape and pedicel dark grayish reddish brown with faint traces of brownish orange on their ventral faces. Flagellum dark grayish reddish brown except for pale yellow middle section.

Head brownish orange except for the following. Pale yellow parts are frontal orbits, face except for three very faint parallel dark brown lines running from antennal sockets down to basal margin of clypeus, clypeus and mandibles except for black mandible teeth. Black parts are frons, area within ocellar triangle, posterior half of vertex and genae and occiput.

Mesosoma brownish orange except for the following.

Subtegmental ridge pale yellow. Mesoscutellum and metascutellum deep orange yellow. Apical half of propleuron dark brown. Dark reddish brown parts are mesepimeron and wide lateral bands on posterior half of mesoscutum. Black parts are basal half of propleuron, all pronotum except for small brownish orange area in front of hind corner lobe, median lobe of mesoscutum to half of scutum length, anterolateral spots on mesoscutum to one fourth of scutum length, lateral and posterior margins of mesoscutum, axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, axillary troughs of metascutellum, suture between metascutellum and propodeum, entire epicnemium, mesosternum except for narrow diagonal brownish orange bands from subapical lateral margins of sternum down to basal fourth and median half of sternum, mesepisternum between lower half of epicnemium and anterior half of mesosternum, upper fourth of mesepisternum, posterior margin of mesepisternum from tegula to end of postpectal carina, spot above postpectal carina, anterior, lower and posterior margins of metapleuron and posterior margin of propodeum.

Fore coxa dark brown. Middle coxa light orange yellow with dorsal face dark brown. Hind coxa brownish orange and dark brown at apex on posterior face. Fore and middle trochanters 1 and 2 dark brown with anterior faces of fore and middle trochanters 1 pale yellow. Hind trochanters 1

and 2 brownish orange and black basally. Fore and middle femora deep orange yellow. Hind femur brownish orange. Fore and middle tibiae and tarsi light orange yellow except for deep orange yellow tarsomeres 5. Hind tibia basally reddish black for a short distance, followed by light orange yellow and with apical three fifths dorsally and apically dark reddish brown and ventrally brownish orange. Hind tarsus with tarsomere 1 reddish black except for pale yellow apex, tarsomeres 2, 3, 4 and basal half of tarsomere 5 pale yellow and apical half of tarsomere 5 deep orange yellow.

Metasoma brownish orange except for basal half of dorsal face of tergite 1 being black and ventrolateral carina being dark reddish brown.

Wings lightly infusate.

Measurements in male. Flagellum with 37 flagellomeres. Flagellum basal section with 11 flagellomeres, middle section with 6 flagellomeres and apical section with 20 flagellomeres.

Number of specimens measured: 1. Fore wing 7.7 mm long. Face 0.49 mm long, 0.85 mm wide and 1.75 as wide as long. Face and compound eyes 1.67 mm wide and 1.96 as wide as face. Compound eye 0.62 mm wide, gena 0.43 mm wide, face 1.37 as wide as compound eye and gena 0.69 as wide as compound eye. Flagellomere 1 0.89 mm long, flagellomere 2 0.33 mm long and flagellomere 1 2.70 as long as flagellomere 2. Hind femur 2.44 mm long, 0.44 mm wide and 5.56 as long

as wide. First metasomal tergite 1.67 mm long, 0.74 wide apically and 2.25 as long as apically wide.

ETYMOLOGY. From the Latin *linea*, meaning line and referring to the strong yellowish brown longitudinal lines on the face.

DISTRIBUTION. Map 4. A few specimens collected across Canada east of British Columbia.

SPECIMENS EXAMINED. 4 females and 1 male.

PARATYPES. CANADA. ALBERTA: Edmonton, 7.vi.1950 (1F,UASM).

MANITOBA: Ninette, 13.vi.1958, C.D.F. Miller (1M,CNCI).

QUEBEC: Gaspé, 8.vii.1933, E.B. Watson (1F,CNCI).

SASKATCHEWAN: Waskesiu, 25.vi.1938, J.G. Rempel (1F,AEIC).

BIOLOGY. Collected between June 7 and June 25. No host record.

Himerta foxleei Leblanc, new species

Map 3

HOLOTYPE. Male. Labelled: "Robson, B.C. [British Columbia] 2-vi-1950 H.R. Foxlee" [typed on white label except for hand printed collecting date]; "HOLOTYPE [typed] *Himerta foxleei* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in CNCI.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in female and parallel to slightly convergent in males at the level of face. Antennal sockets at a very strong angle with vertical axis of compound eye. Face moderately wide and very convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally moderately convex and apically weakly emarginate.

Notauli on mesoscutum indistinct. Mesoscutellum wide. Epicnemial carina moderately produced posteriorly on mesepisternum, not reaching anterior margin of mesepisternum except in one male and ending above the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe or at the level of the middle when carina not reaching anterior margin. Mesepisternum with punctures moderately large and separated by less than their diameter. Sculpture on mesepisternum absent. Microsculpture on speculum absent. Sculpture on propodeum coarse. Median longitudinal carinae of propodeum reduced to two short

posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum well developed with adjacent sides on propodeum uplifted.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent in female and slightly to moderately divergent in males. Median dorsal carinae on first metasomal tergite weakly to moderately developed. Spiracles of first metasomal tergite at midlength of tergite and moderately uplifted. Ovipositor notch wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle.

Female coloration. Scape and pedicel dark brown. Flagellum basal section with each flagellomere dark brown medially and brownish orange basally and apically. Flagellum middle section brilliant yellow. Flagellum apical section brownish orange.

Head reddish black except for the following. Pale yellow parts are facial orbits, clypeus and mandible basal halves. Dark brown parts are face except for facial orbits and apical halves of mandibles except for black teeth. Deep orange spots on vertex along eye margins.

Mesosoma reddish black except for the following. Deep orange parts are faint traces on apical half of mesoscutum, median half of mesoscutellum and metascutellum. Dark brown parts are propleuron, hind corner lobe of pronotum,

subtegular ridge, tegula and mesepimeron.

Fore, middle and hind coxae and trochanters 1 and 2 dark brown except for deep orange apical half of ventral face of trochanter 2. Fore and middle femora deep orange yellow. Hind femur deep orange. Fore and middle tibiae and tarsi light orange yellow except for deep orange yellow tarsomeres 5. Hind tibia basally dark brown for a short distance, followed by light orange yellow and with apical three fifths brownish orange and gradually becoming dark brown towards apex. Hind tarsus with basal four fifths of tarsomere 1 reddish black, apical fifth of tarsomere 1 and tarsomeres 2, 3 and 4 light orange yellow and tarsomere 5 deep orange yellow.

Metasoma deep orange except for the following. Tergite 1 reddish black on its anterior three fourths dorsally, black for its whole length laterally and with faint reddish black dorsoposteriorly. Tergite 2 with faint reddish black for a short distance along its anterior margin. Ovipositor sheath reddish black and light orange yellow apically.

Wings lightly infusate.

Measurements in female. Flagellum with 37 flagellomeres. Flagellum basal section with 10 flagellomeres, middle section with 3 flagellomeres and apical section with 24 flagellomeres.

Number of specimens measured: 1. Fore wing 9.09 mm long. Face 0.56 mm long, 0.93 mm wide and 1.65 as wide as

long. Face and compound eyes 1.85 mm wide and 1.99 as wide as face. Compound eye 0.66 mm wide, gena 0.48 mm wide, face 1.41 as wide as compound eye and gena 0.72 as wide as compound eye. Flagellomere 1 1.00 mm long, flagellomere 2 0.40 mm long and flagellomere 1 2.48 as long as flagellomere 2. Hind femur 2.96 mm long, 0.50 mm wide and 5.92 as long as wide. First metasomal tergite 2.02 mm long, 0.88 wide apically and 2.30 as long as apically wide.

Male coloration. Scape and pedicel dark brown. Flagellum basal section reddish black to dark brown with traces of brownish orange. Flagellum middle section brilliant yellow to dark orange yellow. Flagellum apical section brownish orange to dark grayish reddish brown.

Head reddish black except for the following. Pale yellow parts are facial orbits, malar spaces, clypeus and mandibles except for black mandible teeth. Face except for facial orbits dark brown to pale yellow with three parallel faint dark brown lines, a median one and two lateral ones at level of tentorial pits, running from antennal sockets down to basal margin of clypeus. Small to large deep orange spots on vertex between eye margins and lateral ocelli.

Mesosoma reddish black except for the following. Deep orange yellow parts are usually median half of mesoscutellum and sometimes metascutellum. Subtegular ridge dark brown to pale yellow. Mesepimeron reddish black to dark reddish brown.

Fore, middle and hind coxae and trochanters 1 and 2 reddish black to dark brown with faint traces of brownish orange on middle and hind coxae. Fore and middle femora deep orange yellow. Hind femur deep orange yellow to deep orange, in one specimen with black at apex anteriorly, posteriorly and dorsally. Fore and middle tibiae and tarsi light orange yellow except for deep orange yellow tarsomeres 5. Hind tibia usually basally dark brown for a short distance, followed by light orange yellow and with apical three fifths brownish orange and gradually becoming dark brown to reddish black towards apex. Hind tarsus with tarsomere 1 mostly to entirely reddish black, tarsomere 2 light orange yellow with or without its basal half reddish black, if entirely light orange yellow then tarsomere 1 light orange yellow apically on its ventral face, tarsomeres 3 and 4 light orange yellow and tarsomere 5 deep orange yellow.

Metasoma deep orange except for the following. Tergite 1 reddish black on its anterior half to three fourths dorsally and black for its whole length laterally. In one specimen tergite 2 with faint reddish black for a short distance along its anterior margin.

Wings lightly infusate.

Measurements in males. Flagellum with 38-40 (38.6 ± 0.9) flagellomeres. Flagellum basal section with 11-12 (11.7 ± 0.6) flagellomeres, middle section with 4-5 (4.7 ± 0.6)

flagellomeres and apical section with 21-24 (22.7 ± 1.5) flagellomeres.

Number of specimens measured: 4. Fore wing 7.7-9.0 (8.4 ± 0.5) mm long. Face 0.51-0.59 (0.55 ± 0.03) mm long, 0.79-0.94 (0.88 ± 0.05) mm wide and 1.48-1.74 as wide as long. Face and compound eyes 1.67-1.95 (1.80 ± 0.10) mm wide and 1.94-2.15 as wide as face. Compound eye 0.61-0.73 (0.66 ± 0.05) mm wide, gena 0.46-0.59 (0.52 ± 0.04) mm wide, face 1.25-1.40 as wide as compound eye and gena 0.73-0.87 as wide as compound eye. Flagellomere 1 0.82-1.01 (0.94 ± 0.08) mm long. flagellomere 2 0.34-0.42 (0.39 ± 0.03) mm long and flagellomere 1 2.29-2.52 as long as flagellomere 2. Hind femur 2.44-2.89 (2.74 ± 0.17) mm long, 0.46-0.57 (0.52 ± 0.04) mm wide and 4.88-6.17 as long as wide. First metasomal tergite 1.71-2.02 (1.85 ± 0.11) mm long, 0.71-0.94 (0.82 ± 0.08) wide apically and 1.93-2.56 as long as apically wide.

ETYMOLOGY. Named after H.R. Foxlee who has collected in Robson, British Columbia almost half of the specimens of *Himerta* in the Canadian National Collection.

DISTRIBUTION. Map 3. Only two localities: Robson, B.C. and Red Deer, Alberta.

SPECIMENS EXAMINED. 1 female and 4 males. **PARATYPES.** **CANADA.** ALBERTA: Red Deer, 25.vi.1957, Brooks & MacNay (1F, CNCI). **BRITISH COLUMBIA:** Robson, 24.v.1948 (1M), 25.v.1949 (1M), 1-15.vi.1950 (. H.R. Foxlee (CNCI).

BIOLOGY. Collected between May 25 and June 25. No host

record.

Himerta bicolorata Leblanc, new species

Map 11

HOLOTYPE. Female. Labelled: "Ithaca N.Y. [New York] 11 vi 1947 W. Mason" [typed on white label except for hand printed collecting day]; "Himerta [hand printed] Det. W.R.M. Mason '48 [typed]" [white label]; "HOLOTYPE [typed] Himerta bicolorata Leblanc 1988 [hand printed]" [red label]. Part missing: left hind tarsomere v. Deposited in CNCI.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in females and slightly convergent in males at the level of face. Antennal sockets at a very strong angle with vertical axis of compound eye. Face moderately wide and very convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally almost flat in females and almost flat to moderately convex in males and apically weakly emarginate

Notauli on mesoscutum indistinct to weak. Mesoscutellum wide. Epicnemial carina moderately to strongly produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures small and separated by more than their diameter to moderately large and separated by approximately their diameter. Sculpture on mesepisternum absent to moderately coarse. Microsculpture on speculum

absent to weak. Sculpture on propodeum moderately coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae and sometimes also anteriorly present as weak vestiges. Median furrow on anterior half of propodeum usually well developed with adjacent sides on propodeum uplifted but sometimes weakly developed.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent in females and slightly to moderately divergent in males. Median dorsal carinae on first metasomal tergite undeveloped to sometimes weakly developed. Spiracles of first metasomal tergite at midlength of tergite and moderately to strongly uplifted but sometimes not uplifted. Ovipositor notch wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle.

Female coloration. Scape and pedicel black and sometimes with traces of brownish orange on their ventral faces. Flagellum brownish black to dark orange yellow except for pale yellow middle section.

Pale yellow parts on head are frontal orbits, face, malar spaces, genae up to level of lower margins of compound eyes, clypeus and mandibles except for black mandible teeth. Occiput black. Color of rest of head ranging from brownish orange with black behind antennal sockets to brownish orange with black on posterior half of vertex and genae, around ocellar triangle and on frons medially to entirely black.

Mesosoma brownish orange except for the following. Pale yellow parts are usually apical half of propleuron, subtegular ridge, anterolateral spots on anterior fourth of mesoscutum present or absent, mesoscutellum, sometimes lateral parts of epicnemium and mesepimeron. Mesosternum with or without pale yellow on its anterior fifth and median three fourths and with pale yellow diagonal lines leaving anterolateral three fourths of sternum and going back to middle of lateral margins of sternum and with anterolateral areas of sternum adjacent to pale yellow being black; sometimes entire basal half of mesosternum pale yellow except for anterolateral black spots. Hind corner lobe of pronotum and tegula pale yellow to sometimes dark reddish brown. Metascutellum brownish orange to dark orange yellow to rarely pale yellow. Black parts are basal half to three fourths of to sometimes entire propleuron, usually at least dorsal half of depression behind collar of pronotum to entire collar and depression to sometimes most pronotum except lateroposteriorly, sometimes posterior margin of pronotum, usually anteromedian band on mesoscutum to half of scutum length, anterior and lateral margins of mesoscutum at least down to tegulae, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, median two thirds to four fifths of epicnemium or sometimes entire epicnemium and

rarely also with adjacent anterior area of mesepisternum and usually posterior margin of mesepisternum down to at most end of mesepimeron.

Fore coxa deep orange yellow to brownish orange with or without its anterior face being pale yellow, sometimes coxa entirely dark reddish brown. Middle coxa deep orange yellow to brownish orange and usually pale yellow on apical half of ventral, anterior and sometimes dorsal faces. Hind coxa brownish orange. Fore and middle trochanters 1 pale yellow and sometimes with posterior faces deep orange yellow to dark reddish brown. Hind trochanter 1 pale yellow to brownish orange. Fore, middle and hind trochanters 2 brownish orange. Fore and middle femora brownish orange with pale yellow apices. Hind femur brownish orange. Fore and middle tibiae and tarsi deep orange yellow to light orange yellow except for brownish orange tarsomeres 5. Hind tibia basally brownish orange to dark reddish brown for a short distance, followed by pale yellow and with apical three fifths brownish orange and gradually becoming dark reddish brown towards apex. Hind tarsus with basal fifth to three fifths of tarsomere 1 black, rest of tarsomere 1 and tarsomeres 2, 3 and 4 pale yellow and tarsomere 5 brownish orange.

Metasoma brownish orange except for the following. Often faint traces of dark reddish brown on tergites 4 to 8. Basal three fourths of ovipositor sheath dark reddish brown

to black. Ovipositor deep orange yellow.

Wings almost hyaline.

Measurements in females. Flagellum with 36-39 (37.4±0.8) flagellomeres. Flagellum basal section with 9-10 (9.5±0.5) flagellomeres, middle section with 3-7 (4.6±1.1) flagellomeres and apical section with 22-26 (23.3±1.2) flagellomeres.

Number of specimens measured: 10. Fore wing 8.4-9.4 (8.9±0.3) mm long. Face 0.52-0.59 (0.56±0.02) mm long, 0.78-0.94 (0.89±0.04) mm wide and 1.49-1.67 as wide as long. Face and compound eyes 0.62-0.70 (0.66±0.03) mm wide and 1.89-2.26 as wide as face. Compound eye 0.62-0.70 (0.66±0.03) mm wide, gena 0.46-0.54 (0.49±0.02) mm wide, face 1.16-1.51 as wide as compound eye and gena 0.68-0.78 as wide as compound eye. Flagellomere 1 0.85-1.00 (0.91±0.05) mm long, flagellomere 2 0.35-0.43 (0.39±0.02) mm long and flagellomere 1 2.17-2.50 as long as flagellomere 2. Hind femur 2.65-2.96 (2.82±0.11) mm long, 0.45-0.52 (0.50±0.02) mm wide and 5.32-5.95 as long as wide. First metasomal tergite 1.71-2.02 (1.86±0.11) mm long, 0.73-0.95 (0.87±0.06) wide apically and 2.02-2.39 as long as apically wide.

Male coloration. Scape and pedicel black to brownish black and usually with most ventral surface of scape pale yellow. Flagellum basal section black to brownish black, deep yellowish brown in one specimen. Flagellum middle section pale yellow. Flagellum apical section black to

brownish black to deep yellowish brown.

Pale yellow parts on head are sometimes vertical orbits, frontal orbits, face, malar spaces, genae up to level of lower margins of compound eyes or to at most lower third of compound eye height, clypeus and mandibles except for black mandible teeth. Occiput black. Color of rest of head ranging from brownish orange with black behind antennal sockets to brownish orange with black on posterior half of vertex and genae, around ocellar triangle and on frons medially to entirely black.

Mesosoma brownish orange except for the following. Pale yellow parts are apical third to two thirds of propleuron, usually lower lateral halves of to entire collar of pronotum, hind corner lobe of pronotum, subtegular ridge, tegula, anterolateral spots on mesoscutum, mesoscutellum, apical half of lateral third to half of epicnemium, usually entire mesosternum except for black spots cited below, usually lower part of mesepisternum along mesosternum and mesepimeron. Metascutellum and usually its axillary troughs deep orange yellow. Black parts are basal third to two thirds of propleuron, dorsal half of depression behind collar of pronotum to most pronotum except posteriorly and collar sometimes pale yellow, usually anteromedian band on mesoscutum to half of scutum length, anterior and lateral margins of mesoscutum at least down to tegulae, in one specimen whole mesoscutum except for pale yellow

anterolateral spots, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, basal half of median half to two thirds of epicnemium or entire epicnemium in one specimen, often anterolateral spots and sometimes posterolateral spots on mesosternum, in two specimens entire mesosternum except for two narrow anterosublateral pale yellow lines and posterior margin of mesepisternum from tegula to upper margin of mesepimeron.

Fore and middle coxae pale yellow. Hind coxa brownish orange with or without ventral face pale yellow. Fore, middle and hind trochanters 1 pale yellow with or without deep orange yellow on dorsal face of hind trochanter 1. Fore and middle trochanters 2 pale yellow to deep orange yellow. Hind trochanter 2 pale yellow to brownish orange. Fore and middle femora deep orange yellow. Hind femur brownish orange. Fore and middle tibiae and tarsi pale yellow except for deep orange yellow tarsomeres 5. Hind tibia basally brownish orange to dark reddish brown for a short distance, followed by pale yellow and with apical two thirds brownish orange and gradually becoming dark reddish brown towards apex. Hind tarsus with basal half to three fourths of tarsomere 1 black, rest of tarsomere 1 and tarsomeres 2, 3, 4 and basal half of tarsomere 5 to entire tarsomere 5 pale yellow and with apical half of tarsomere 5

brownish orange.

Metasoma entirely brownish orange.

Wings almost hyaline.

Measurements in males. Flagellum with 34-37 (36.2 ± 1.0) flagellomeres. Flagellum basal section with 9-11 (10.4 ± 0.7) flagellomeres, middle section with 3-8 (5.3 ± 1.5) flagellomeres and apical section with 17-22 (20.5 ± 1.9) flagellomeres.

Number of specimens measured: 10. Fore wing 6.8-8.4 (7.7 ± 0.5) mm long. Face 0.46-0.55 (0.52 ± 0.02) mm long, 0.72-0.87 (0.81 ± 0.05) mm wide and 1.40-1.65 as wide as long. Face and compound eyes 1.50-1.85 (1.69 ± 0.10) mm wide and 2.03-2.22 as wide as face. Compound eye 0.55-0.74 (0.63 ± 0.06) mm wide, gena 0.43-0.52 (0.46 ± 0.04) mm wide, face 1.16-1.37 as wide as compound eye and gena 0.68-0.78 as wide as compound eye. Flagellomere 1 0.71-0.90 (0.82 ± 0.06) mm long, flagellomere 2 0.29-0.49 (0.38 ± 0.06) mm long and flagellomere 1 1.83-2.48 as long as flagellomere 2. Hind femur 2.09-2.65 (2.39 ± 0.18) mm long, 0.39-0.49 (0.44 ± 0.03) mm wide and 5.31-5.71 as long as wide. First metasomal tergite 1.50-1.81 (1.62 ± 0.11) mm long, 0.63-0.79 (0.73 ± 0.05) wide apically and 2.01-2.80 as long as apically wide.

ETYMOLOGY. From the Latin bi, meaning two and the Latin color. Refers to the fact that both females and males have extensive yellow markings, a color feature usually restricted to males.

DISTRIBUTION. Map 11. Transcontinental north to Demmit, Alberta and to James Bay and south to Pineywood Springs, Colorado.

SPECIMENS EXAMINED. 42 females and 16 males.

PARATYPES. CANADA. ALBERTA: Demmitt, 12.vi-6.ix.1984, S. & J. Peck (1F,LEBL); Drumheller, 14.vi.1946, E.H. Strickland (1M,AEIC); Edmonton, 12.vi.1946 (1M), 24.vi.1945 (1M), 30.vi.1945 (1F), 1.vii.1947 (1F), 2.vii.1945 (1F), 5.vii.1948 (1M), 7.vii.1947 (1F), E.H. Strickland (1F,2M,AEIC;3F,2M,UASM); Frank, 16.vi.1962, W.R.M. Mason (1F,CNCI); George Lake, 11.vi-8.ix.1984 (2F,LEBL); Gull Lake, 23.vi.1929, E.H. Strickland (1F,AEIC); Jumping Pd Cr., 20mi.W. Calgary, 3.vii.1962, W.R.M. Mason (1M,CNCI); 8mi.E. Morley, 22.vi.1962, W.R.M. Mason (1M,CNCI); Red Deer, 25.vi.1957, Brooks & MacNay (1F,CNCI). BRITISH COLUMBIA: Hixon, 11.vi.1966 (2F), 4.vii.1965 (1F), 11.vii.1965 (1F), 19.vii.1965 (1F), E.D.A. Dyer (CNCI); Oliver, 15.vii.1965, W.R. Richards (1F,CNCI); Revelstoke, 2.vii.1973, H.J. Teskey (1F,CNCI); Robson, 9.v.1949 (1M), 18.v.1949 (1F), 31.v.1950 (1F), H.R. Foxlee (CNCI). NEWFOUNDLAND: South Branch, 8-15.vii.1974, G. Heinrich (1F,CNCI). NOVA SCOTIA: Cape Breton Highlands Nat. Pk, Mackenzie Mtn, 1.vii.1983, R. Vockeroth (1F,LEBL). QUEBEC: Hwy to James Bay, Km462, 52°44'N77°21'W, L. Leblanc (1M,LEBL); Laniel, 23.vi.1944, A.R. Brooks (1M,CNCI); Matagami Lk, 49°54'N77°14'W, 12.vi-8.viii.1987, L. Leblanc (2F,LEBL). SASKATCHEWAN:

Christopher Lk, 8.vii.1959, A. & J. Brooks (1M,CNCI); Great Sand Hills, W. of Swift Current, 30.v.1939, A.R. Brooks (2F,CNCI); Saskatoon, emerg. 14.v.1941, ex honeysuckle sawfly, H. McDonald (1F,CNCI); Saskatoon, 9.vii.1957, A.R. Brooks (1F,CNCI). UNITED STATES. COLORADO: Pineywood Springs, 26.vi.1962, R. & K. Dreisbach (1F,CNCI). IDAHO: Lowman, 6000'. 13.vi.1978, H. & M. Townes (1M,AEIC). MAINE: Oxbow, 24.vi (1M,AEIC). MINNESOTA: Kittson Co., 26.vi.1936, D.G. Denning (1F,CNCI); Roseau, 18.vi.1953; R.L. Fisher (1F,CNCI). NEBRASKA: Valentine, 6.vi.1972 (1M), 7.vi.1972 (2M), H. & M. Townes (AEIC). NORTH DAKOTA: Badlands, Slope Co., 46°35'51"N 103°26'45"W, 808m., 30.v.1987, Allen & McCabe (6F,1M,AEIC). OREGON: Indian Ford, Deschutes Co., 3200', 10.vii.1965, E. & I. Munroe (1F,CNCI); Ochoco Creek, 8.vii.1978 (1F), 11.vii.1978 (1F), 14.vii.1978 (1F), H. & M. Townes (AEIC). WISCONSIN: Milwaukee (1F,USNM).

BIOLOGY. Collected from May 30 to July 19 except at Robson, B.C., where it has been collected as early as May 9. Reared specimen labelled "ex honeysuckle sawfly", which is the genus *Zaraea*.

Himerta gelida Leblanc, new species

Fig 26; Map 6

HOLOTYPE. Male. Labelled: "Anchorage, AK. [Alaska] vi.19-25.76 P.A. Rush" [typed on white label]; "HOLOTYPE [typed] *Himerta gelida* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes parallel in females and slightly convergent in males at the level of face. Antennal sockets at a very strong angle with vertical axis of compound eye. Face moderately wide and very convex medially. Tubercle on face vestigial to small but well defined. Clypeus basally almost flat in females and moderately convex in males and apically weakly emarginate.

Notauli on mesoscutum indistinct. Mesoscutellum wide. Epicnemial carina (Fig 26) moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by approximately their diameter. Sculpture on mesepisternum moderately coarse. Microsculpture on speculum absent. Sculpture on propodeum coarse. Median longitudinal carinae of propodeum reduced to two short posterior carinae. Median furrow on anterior half of propodeum well developed

with adjacent sides on propodeum uplifted.

Sculpture on metasomal tergites moderate. Sides of first metasomal tergite moderately divergent in females and slightly to moderately divergent in males. Median dorsal carinae on first metasomal tergite undeveloped to weakly developed. Spiracles of first metasomal tergite at midlength of tergite and moderately to strongly uplifted. Ovipositor notch wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle.

Female coloration. Scape and pedicel reddish black. Flagellum brownish orange with or without a pale yellow middle section.

Facial orbits usually pale yellow. Face deep orange yellow to dark orange yellow to strong brown and usually with three parallel reddish black to black vertical lines from antennal sockets down to upper margin of clypeus. Clypeus dark orange yellow to strong brown to dark brown. Mandibles pale yellow except for black teeth. Occiput black. Rest of head, including malar spaces, ranging from strong brown with black on posterior half of vertex and genae with or without area of antennal sockets and frons being black to entirely black with strong brown spots on vertical orbits and behind lateral ocelli.

Mesosoma strong brown except for the following. Deep orange yellow parts are subtegular ridge, mesoscutellum and

metascutellum. Dark reddish brown parts are hind corner lobe of pronotum and tegula. Axillary troughs of mesoscutellum and metascutellum black to strong brown. Black parts are entire propleuron, posterior margin of pronotum, pronotum partly ranging from dorsal half of depression behind collar to entire collar and depression, anteromedian band on mesoscutum to half of scutum length, entire anterior and lateral margins of mesoscutum, suture between mesoscutum and mesoscutellum, suture between mesoscutellum and metascutellum, suture between metascutellum and propodeum, entire epicnemium, often anterolateral spots on mesosternum and sometimes sublateral bands on mesosternum, posterior margin of mesepisternum from tegula to end of postpectal carina, spot above postpectal carina and anterior, lower and posterior margins of metapleuron.

Fore coxa black to brownish orange. Middle and hind coxae brownish orange with or without apical half of dorsal face of middle coxa and apical half of posterior face of hind coxa reddish black. Fore and middle trochanters 1 and 2 reddish black. Hind trochanters 1 and 2 brownish orange. Fore, middle and hind femora brownish orange with hind femur black at apex of anterior, dorsal and posterior faces. Fore and middle tibiae and tarsi deep orange yellow. Hind tibia basally reddish black for a short distance, followed by deep orange yellow and with apical two thirds brownish orange and

gradually becoming reddish black towards apex. Hind tarsus with tarsomere 1 and sometimes basal half of tarsomere 2 reddish black, tarsomeres 2, 3 and 4 pale yellow and tarsomere 5 deep orange yellow.

Metasoma strong brown except for the following. Tergite 1 black to end of glymma and sometimes with ventrolateral carina black. Ovipositor sheath reddish black with apex deep orange yellow. Ovipositor deep orange yellow.

Wings lightly infusate.

Measurements in females. Flagellum with 33-38 (35.4 ± 1.6) flagellomeres. Flagellum basal section with 9-10 (9.9 ± 0.4) flagellomeres, middle section with 3-5 (3.6 ± 0.8) flagellomeres and apical section with 20-24 (22.1 ± 1.3) flagellomeres.

Number of specimens measured: 10. Fore wing 7.3-8.7 (8.1 ± 0.6) mm long. Face 0.45-0.57 (0.51 ± 0.04) mm long, 0.76-0.94 (0.83 ± 0.06) mm wide and 1.38-1.77 as wide as long. Face and compound eyes 1.53-1.88 (1.68 ± 0.12) mm wide and 1.88-2.35 as wide as face. Compound eye 0.54-0.82 (0.62 ± 0.09) mm wide, gena 0.40-0.55 (0.45 ± 0.05) mm wide, face 1.10-1.50 as wide as compound eye and gena 0.55-0.82 as wide as compound eye. Flagellomere 1 0.74-0.93 (0.86 ± 0.06) mm long, flagellomere 2 0.31-0.38 (0.34 ± 0.03) mm long and flagellomere 1 2.36-2.62 as long as flagellomere 2. Hind femur 2.23-2.82 (2.53 ± 0.19) mm long, 0.42-0.55 (0.47 ± 0.04) mm wide and 4.81-5.71 as long as wide. First metasomal

tergite 1.36-1.92 (1.70 ± 0.16) mm long, 0.61-0.93 (0.79 ± 0.09) wide apically and 1.96-2.23 as long as apically wide.

Male coloration. Scape and pedicel brownish black. Flagellum basal section brownish black to dark brown. Flagellum middle section usually pale yellow, rarely not defined from basal or apical sections. Flagellum apical section dark brown.

Pale yellow parts on head are frontal orbits, face, malar spaces, clypeus and mandibles except for black mandible teeth. Occiput black. Rest of head ranging from strong brown with black on posterior half of vertex and genae with or without area of antennal sockets and frons being black to entirely black with strong brown spots on vertical orbits and behind lateral ocelli.

Mesosoma strong brown except for the following. Pale yellow parts are apical margin of to half of propleuron, hind corner lobe of pronotum, subtegular ridge, tegula, sometimes anterolateral spots on mesoscutum, usually apex of and often lower half of lateral fourth of epicnemium, and usually anterosublateral lines on mesosternum to half of sternum length. Mesoscutellum and mesepimeron pale yellow to deep orange yellow. Metascutellum deep orange yellow. Black parts are basal half of to most propleuron, posterior margin of pronotum, pronotum partly ranging from dorsal half of depression behind collar to entire collar and depression, anteromedian band on mesoscutum to half of scutum length,

anterior and lateral margins of mesoscutum to tegulae, suture between mesoscutum and mesoscutellum, axillary troughs of mesoscutellum, suture between mesoscutellum and metascutellum, axillary troughs of metascutellum, suture between metascutellum and propodeum, epicnemium except for pale yellow parts cited above to entire epicnemium and sometimes adjacent mesepisternum, anterolateral spots on mesosternum lateral to pale yellow bands, usually wide diagonal lines medially to pale yellow bands, posterior margin of mesepisternum from tegula to end of postpectal carina, spot above postpectal carina and anterior, lower and often posterior margins of metapleuron.

Fore and middle coxae pale yellow with posterior faces dark brown to brownish orange and ventral faces deep orange yellow. Hind coxa brownish orange and usually with traces of reddish black on dorsal and posterior faces. Fore and middle trochanters 1 pale yellow and dark brown on dorsal faces. Hind trochanters 1 and 2 brownish orange to reddish black. Fore and middle trochanters 2 and femora brownish orange. Hind femur brownish orange with reddish black apex. Fore and middle tibiae and tarsi deep orange yellow except for brownish orange tarsomeres 5. Hind tibia basally reddish black for a short distance, followed by deep orange yellow to pale yellow and with apical two thirds reddish black. Hind tarsus with basal three fifths of to entire tarsomere 1 reddish black, rest of tarsomere 1, tarsomeres

2, 3 and 4 and basal half of tarsomere 5 pale yellow and with apical half of to entire tarsomere 5 dark brown.

Metasoma strong brown except for tergite 1 being black to end of glymma.

Wings lightly infusate.

Measurements in males. Flagellum with 33-38 (35.3 ± 1.3) flagellomeres. Flagellum basal section with 9-12 (10.5 ± 0.7) flagellomeres, middle section with 2-5 (3.8 ± 0.9) flagellomeres and apical section with 19-24 (21.1 ± 1.3) flagellomeres.

Number of specimens measured: 5. Fore wing 7.1-8.7 (8.0 ± 0.6) mm long. Face 0.45-0.50 (0.48 ± 0.02) mm long, 0.74-0.90 (0.83 ± 0.05) mm wide and 1.61-1.92 as wide as long. Face and compound eyes 1.57-1.78 (1.68 ± 0.08) mm wide and 1.93-2.16 as wide as face. Compound eye 0.56-0.66 (0.61 ± 0.03) mm wide, gena 0.43-0.49 (0.46 ± 0.02) mm wide, face 1.22-1.48 as wide as compound eye and gena 0.70-0.80 as wide as compound eye. Flagellomere 1 0.77-0.93 (0.85 ± 0.06) mm long, flagellomere 2 0.32-0.35 (0.34 ± 0.01) mm long and flagellomere 1 2.25-2.81 as long as flagellomere 2. Hind femur 2.20-2.61 (2.45 ± 0.16) mm long, 0.43-0.49 (0.46 ± 0.02) mm wide and 5.14-5.64 as long as wide. First metasomal tergite 1.57-1.78 (1.65 ± 0.09) mm long, 0.61-0.88 (0.74 ± 0.09) wide apically and 2.02-2.57 as long as apically wide.

ETYMOLOGY. From the Latin gelidus, meaning cold and referring to its distribution being restricted to

northwestern North America.

DISTRIBUTION. Map 6. Alaska, Yukon and northern British Columbia.

SPECIMENS EXAMINED. 13 females and 30 males.

PARATYPES. CANADA. BRITISH COLUMBIA: Alaska Hwy, 37 Km W. Ft-Nelson, 12.vi-5.ix.1984, S.& J. Peck (1F,4M,LEBL); Racing River, 2400', 16.vii.1973, H.& M. Townes (1F,AEIC); Stone Mtn Pk, 3800', 18.vii.1973, H.& M. Townes (1F,AEIC). YUKON TERRITORY: Dempster Jct., 40 Km E. Dawson, 19.vi-25.viii.1984, S.& J. Peck (2F,LEBL); Simpson Lk, 81 Km.N. Watson Lk, 15.vi-1.ix.1984, S.& J. Peck (1F,LEBL). UNITED STATES. ALASKA: Anchorage, 8.vii.1951, R.S. Bigelow (2F,CNCI); Anchorage, 11-18.vi.1976 (1F,3M), 19-25.vi.1976 (1F,12M), 25-30.vi.1976 (1F,3M), 30.vi-6.vii.1976 (2M), 6-12.vii.1976 (1F,2M), 16-20.vii.1976 (1M), P.A. Rush (AEIC); 11 mi.S. Anderson Jct, Rt 3, mile 270, 23.vi-11.viii.1984, S.& J. Peck (1F,LEBL).

BIOLOGY. Collected from mid June to mid July. No host record.

Himerta carinata Leblanc, new species

Figs 4,11,36,43,47; Map 12

HOLOTYPE. Female. Labelled: "Corvallis, Ore. [Oregon] May 11, 1976 H.& M. Townes" [typed on white label]; "HOLOTYPE [typed] *Himerta carinata* Leblanc 1988 [hand printed]" [red label]. Parts missing: none. Deposited in AEIC.

DESCRIPTIONS. Structures. Inner margins of compound eyes (Fig 4) parallel at the level of face. Antennal sockets at a very strong angle with vertical axis of compound eye. Face very wide and very convex medially. Tubercle on face (Fig 11) well defined and prominent. Clypeus basally strongly convex and apically moderately emarginate.

Notauli on mesoscutum weak. Mesoscutellum wide. Epicnemial carina moderately produced posteriorly on mesepisternum, never reaching anterior margin of mesepisternum and ending at the level of the middle of the posterior margin of the pronotum, excluding hind corner lobe. Mesepisternum with punctures moderately large and separated by approximately their diameter to large and separated by less than their diameter. Sculpture on mesepisternum absent to moderately coarse. Microsculpture on speculum absent to weak. Sculpture on propodeum (Fig 36) very coarse. Median longitudinal carinae of propodeum

strongly developed as carinae subdividing on posterior fourth of propodeum each into two anteriorly diverging branches ending at midlength of propodeum, and propodeum strongly uplifted. Median furrow on anterior half of propodeum well developed with adjacent sides on propodeum uplifted.

Sculpture on metasomal tergites coarse. Sides of first metasomal tergite (Fig 43) strongly divergent in female and moderately divergent in male. Median dorsal carinae on first metasomal tergite strongly developed. Spiracles of first metasomal tergite at basal two fifths of tergite length and strongly uplifted. Ovipositor notch (Fig 47) very wide with anterior margin gradually sloping without an angle and with posterior margin gradually sloping over a long distance.

Female coloration. Scape dorsally strong brown and ventrally brilliant yellow. Pedicel and flagellum brownish orange.

Head strong brown except for the following. Brilliant yellow parts are frontal orbits, face except for a short narrow basomedian strong brown line, malar spaces, clypeus and mandibles except for black mandible teeth. Black parts are space between antennal sockets and upper half of occiput.

Mesosoma strong brown except for the following. Brilliant yellow parts are often lower corner of pronotum,

hind corner lobe of pronotum and subtegular ridge. Tegula brilliant yellow to brownish orange. Mesoscutellum brownish orange or sometimes brilliant yellow. Metascutellum strong brown to brownish orange. Mesepimeron strong brown to brilliant yellow. Black parts are base of propleuron, often upper half of depression behind pronotum collar, sometimes upper and posterior margins of pronotum, usually very short anteromedian band on mesoscutum, usually suture between mesoscutum and mesoscutellum, usually suture between metascutellum and propodeum, basal three fourths and median three fourths of epicnemium, median area on mesosternum from median third anteriorly to median three fourths posteriorly, posterior margin of mesepisternum from tegula to end of mesepimeron, sometimes posterior half of to most speculum and usually anterior and lower and sometimes posterior margins of metapleuron.

Fore leg strong brown except for brilliant yellow anterior faces of coxa, trochanter 1, femur and often tibia. Middle leg strong brown except for anterior faces of coxa and trochanter 1 being often brilliant yellow and for a brilliant yellow spot at apex of anterior face of femur. Hind coxa, trochanters, femur and tibia strong brown except for reddish black apex of tibia and black at base of ventral face of trochanter 1. Hind tarsus brilliant yellow except for brownish orange tarsomere 5.

Metasoma strong brown except for the following. Tergite

1 black to end of glymma. Ovipositor sheath strong brown to black. Ovipositor deep orange yellow.

Wings lightly infusate.

Variations in female coloration. The above color description is accurate for specimens from southern British Columbia (Robson, Fernie, Aleza Lk), Montana, Idaho, Oregon and California. Specimens from areas east of the Rocky Mountains and specimens from northern British Columbia, northern Alberta and Yukon differ from the description by the extent of black and brilliant yellow markings.

Specimens from northern British Columbia (Stone Mtn Pk, Pink Lk), from Fawcett, Alberta, from Yukon and from northern Quebec have considerably more extensive black markings and they fit the description except in the following respects.

Scape dorsally black and ventrally strong brown. Pedicel black. Flagellum basal section strong brown and gradually becoming brilliant yellow towards apex except for dorsal face of basal half of section being black. Flagellum apical section dark brown to brownish black.

Facial orbits brilliant yellow. Face, excluding orbits, black with strong brown spots under antennal sockets to entirely black. Occiput entirely black. Head behind malar spaces, compound eyes and antennal sockets varies from strong brown with black on posterior half of vertex and genae and between antennal sockets and posterior ocelli to

entirely black except for strong brown spots on vertical orbits.

Basal half of to entire propleuron black. Lower corner of pronotum deep orange yellow to strong brown. Black parts on pronotum are upper margin, posterior margin and anteriorly varying from upper half of depression behind collar to entire collar and depression except for lower corner. Tegula always brilliant yellow. Mesoscutum with entire anterior and lateral margins black, with anteromedian black band to one fourth to half of scutum length and sometimes with sublateral wide black bands lateral to anteromedian band. Mesoscutellum always brilliant yellow. Axillary troughs of mesoscutellum black. Suture between mesoscutellum and metascutellum black. Metascutellum always brownish orange. Axillary troughs of metascutellum black. Suture between metascutellum and propodeum always black. Epicnemium entirely black. Mesosternum as in description with or without anterolateral black spots or entirely black or, in one specimen, entirely strong brown. Mesepisternum often black anteriorly along epicnemium and with its posterior half black. Mesepimeron deep orange yellow. Metapleuron entirely black.

Fore coxa sometimes entirely reddish black. Fore femur with brilliant yellow usually reduced to a spot at apex. Middle coxa often reddish black with dorsal surface strong brown with or without an apical brilliant yellow spot.

Anterior face of middle trochanter 1 sometimes black. Middle tibia sometimes with a sub-basal brilliant yellow ring. Ventral face of hind coxa reddish black. Hind tibia with basal third brilliant yellow, middle third strong brown and apical third black.

Specimens from east of the Rocky Mountains often have considerably reduced black markings and have more extensive yellow markings. Background color is strong brown or sometimes brownish orange when black markings are reduced. Specimens from Eisenhower Jct (Alberta) and from Nova Scotia have their black markings to the same extent as in the description but have no black on mesosternum and also differ in some of their other color features in the way described below. Specimens from Edmonton (Alberta), Kansas and Michigan have extremely reduced black markings and differ from the description in the following respects.

Background body color strong brown to brownish orange.

Scape dorsally black to brownish orange and ventrally brownish orange to brilliant yellow to pale yellow. Pedicel dorsally black to brownish orange and ventrally brownish orange to brilliant yellow to pale yellow. Flagellum basal section brownish orange with or without gradually becoming pale yellow towards apex except for dorsal face of basal half of section being black. Flagellum apical section brownish orange to dark brown.

Face entirely brilliant yellow to pale yellow except

usually for very narrow median longitudinal strong brown to black band and sometimes black band along basal margin of clypeus. Area between and behind antennal sockets and ocellar triangle usually black. Occiput without black.

Propleuron entirely strong brown to brownish orange. Black markings on pronotum absent or covering at the most dorsal half of depression behind collar. Lower corner of pronotum and tegula brilliant yellow to pale yellow. In one specimen anterolateral pale yellow spots on mesoscutum. Suture between mesoscutum and mesoscutellum usually not black. Mesoscutellum brilliant yellow to pale yellow. Metascutellum brownish orange to brilliant yellow to pale yellow. Suture between metascutellum and propodeum usually not black. Epicnemium with black restricted to its very basis medially and often brilliant yellow at apex medially. Mesosternum without black and often with narrow anterosublateral brilliant yellow to pale yellow lines. No black markings on mesepisternum. Mesepimeron brilliant yellow to pale yellow. No black markings on metapleuron.

Fore coxa and trochanter 1 strong brown and brilliant yellow to pale yellow anteriorly or entirely brilliant yellow or pale yellow. Fore and middle trochanters 2 strong brown with or without anterior faces pale yellow. Fore and middle femora strong brown with or without their anterior faces and apical fifths brilliant yellow or pale yellow. Fore and middle tibiae strong brown with their basal fifths

and with or without their anterior faces brilliant yellow or pale yellow. Middle coxa and trochanter 1 strong brown with their anterior faces brilliant yellow or pale yellow to entirely brilliant yellow or pale yellow. Hind trochanter 1 often with anterior face brilliant yellow to pale yellow. Hind tibia with its basal fourth to three fifths brilliant yellow to pale yellow and remaining strong brown and gradually becoming reddish black towards apex.

No black markings on metasomal tergite 1.

Measurements in females. Flagellum with 29-38 (35.4 ± 1.7) flagellomeres.

Number of specimens measured: 10. Fore wing 7.7-9.5 (8.6 ± 0.6) mm long. Face 0.46-0.59 (0.51 ± 0.03) mm long, 0.83-1.10 (0.98 ± 0.07) mm wide and 1.68-2.00 as wide as long. Face and compound eyes 1.67-2.06 (1.88 ± 0.11) mm wide and 1.84-2.08 as wide as face. Compound eye 0.61-0.73 (0.65 ± 0.04) mm wide, gena 0.45-0.60 (0.53 ± 0.04) mm wide, face 1.37-1.62 as wide as compound eye and gena 0.70-0.92 as wide as compound eye. Flagellomere 1 0.45-0.73 (0.63 ± 0.08) mm long, flagellomere 2 0.24-0.35 (0.31 ± 0.03) mm long and flagellomere 1 1.89-2.22 as long as flagellomere 2. Hind femur 2.44-3.10 (2.74 ± 0.20) mm long, 0.45-0.59 (0.52 ± 0.05) mm wide and 4.68-6.15 as long as wide. First metasomal tergite 1.57-2.02 (1.77 ± 0.15) mm long. 0.95-1.22 (1.11 ± 0.09) wide apically and 1.41-1.84 as long as apically wide.

Male coloration. Scape strong brown. Pedicel dark

reddish brown. Flagellum basal section brownish orange with dorsal face of its basal half dark reddish brown to black. Flagellum apical section black to dark brown.

Head strong brown except for the following. Brilliant yellow parts are face except for brownish orange ranging from a short narrow basomedian line to a wide median longitudinal band, malar spaces, clypeus and mandibles except for black mandible teeth. Black parts are space between and behind antennal sockets, often ocellar triangle and occiput.

Mesosoma strong brown except for the following. Brilliant yellow to brownish orange parts are hind corner lobe of pronotum, subtegular ridge and mesepimeron. Tegula and mesoscutellum brownish orange. Metascutellum strong brown to brownish orange. Black parts are basal third of propleuron, usually small lateral spots in depression behind pronotum collar but sometimes black more extensive and covering upper half of depression or rarely entire collar and depression, anteromedian band on mesoscutum usually very short but sometimes to third and rarely to half of scutum length, usually anterior and lateral margins of mesoscutum down to tegulae, suture between mesoscutum and mesoscutellum, sometimes axillary troughs of mesoscutellum, rarely suture between mesoscutellum and metascutellum, rarely axillary troughs of metascutellum, suture between metascutellum and propodeum, basal three fourths of median

three fourths of epicnemium or sometimes entire epicnemium, median area on mesosternum from median third anteriorly to entire width posteriorly and often anterolateral spots on mesosternum or sometimes entire mesosternum black, posterior margin of mesepisternum from tegula to end of postpectal carina, posterior half of to entire speculum, anterior, lower and usually posterior margins of metapleuron and rarely posterior margin of propodeum.

Fore leg strong brown except for brilliant yellow on anterior faces of often coxa, trochanter 1, femur at least apically and often tibia. Middle leg strong brown except for anterior faces of coxa and trochanter 1 being sometimes brilliant yellow and for a brilliant yellow spot at apex of anterior face of femur. Hind coxa, trochanters, femur and tibia strong brown except for black at base of ventral face of trochanter 1, sometimes apex of femur black anteriorly, dorsally and posteriorly, often brilliant yellow basal third of tibia and reddish black apex of tibia. Hind tarsus brilliant yellow except for usually brownish orange basal half of tarsomere 1 and for brownish orange tarsomere 5.

Metasoma strong brown except for tergite 1 being black to end of glymma.

Wings lightly infusate.

Variations in male coloration. As for females the above description is accurate for specimens from Southern British Columbia (Ferne, Lillooet, Robson), Waterton (Alberta) and

Oregon. Specimens from high latitudes and from east of the Rocky Mountains differ from the description by the extent of black and brilliant yellow markings.

Specimens from high latitudes (Stone Mtn Park, B.C. and Moose Factory, Ontario) have more extensive black markings and fit the description except in the following respects.

Scape and pedicel black. Flagellum basal section usually black dorsally and brownish orange ventrally. Flagellum middle section brilliant yellow. Flagellum apical section dark brown or sometimes brownish orange.

Face with wide median longitudinal black band. Frons, vertex, genae and occiput entirely black except for brilliant yellow frontal orbits and strong brown spots on vertical orbits or strong brown covering vertical orbits and anterior halves of genae or sometimes without strong brown at all.

Propleuron entirely black. Lower corner of pronotum often brilliant yellow. Black parts on pronotum are upper margin, posterior margin and most of to entire collar and depression behind collar and entire anterior half of pronotum. Subtegular ridge always brilliant yellow. Tegula brilliant yellow to deep orange yellow. Mesoscutum with entire anterior and lateral margins black, with anteromedian black band to one fourth to half of scutum length and sometimes with sublateral wide black bands lateral to anteromedian band. Mesoscutellum brilliant yellow or sometimes deep orange yellow. Axillary troughs of

mesoscutellum black. Suture between mesoscutellum and metascutellum black. Metascutellum deep orange yellow to brownish orange. Axillary troughs of metascutellum black. Epicnemium entirely black. Mesosternum as in description or sometimes entirely strong brown. Mesepisternum posterior half black to mostly black. Mesepimeron with upper half brilliant yellow to deep orange yellow and lower half strong brown to black. Metapleuron entirely black. Propodeum black with traces of strong brown to entirely black.

Parts of fore and middle legs called strong brown in the description are brownish orange. Fore femur with brilliant yellow usually restricted to a spot at apex. Fore tibia with a basal brilliant yellow ring. Anterior faces of middle coxa and trochanter 1 usually brilliant yellow. Ventral, posterior and dorsal faces of middle coxa and ventral face of middle trochanter 1 sometimes black. Basal fourth of middle tibia brilliant yellow. Hind coxa with anterior, ventral and posterior faces black at apex or sometimes entirely black. Hind tibia with basal third brilliant yellow, middle third strong brown and apical third black. Basal half of hind tarsomere 1 never brownish orange.

Metasoma with tergite 1 dorsally and laterally black to spiracles or sometimes to three fourths of tergite length and sometimes with ventrolateral carina black to end of tergite.

Of the very few specimens from east of the Rocky

Mountains only one (Atherton, Missouri) shows reduced black markings and more extensive brilliant yellow markings. It differs from the description in the following respects.

Background body color brownish orange.

Scape dorsally brownish orange and ventrally brilliant yellow. Pedicel brownish black. Flagellum basal section dorsally black and ventrally deep orange yellow. Flagellum apical section deep orange yellow.

Face entirely brilliant yellow. Ocellar triangle and occiput brownish orange.

Mesosoma entirely brownish orange except for the following. Brilliant yellow parts are lateral third of propleuron, lower corner of pronotum, hind corner lobe of pronotum, subtegular ridge, tegula, anterolateral spots on mesoscutum, mesoscutellum, metascutellum, apical two thirds and lateral half of epicnemium, narrow anterosublateral line on mesosternum, spot on posterior half of mesepisternum along its lower margin and mesepimeron. Black parts are basal third and median half of epicnemium, suture between metascutellum and propodeum and lower half of anterior margin of metapleuron.

Leg parts called strong brown in the description are brownish orange except for hind femur and hind tibia. Fore coxa brilliant yellow with posterior face brownish orange. Fore trochanter 1 entirely brilliant yellow. Fore femur with anterior face brilliant yellow. Fore tibia with basal fourth

brilliant yellow. Middle coxa brilliant yellow with ventral face brownish orange. Middle trochanter 1 brilliant yellow with posterior face brownish orange. Anterior face of middle femur brilliant yellow. Basal fourth of middle tibia brilliant yellow. Hind coxa and trochanters 1 and 2 brownish orange. Hind femur strong brown with apex black anteriorly, dorsally and posteriorly. Hind tibia with basal third brilliant yellow and apical third strong brown and gradually becoming reddish black towards apex. Hind tarsus entirely brilliant yellow.

Metasoma entirely brownish orange.

Measurements in males. Flagellum with 33-37 (34.8 ± 1.11) flagellomeres. Flagellum basal section with 13-15 (13.9 ± 0.8) flagellomeres and apical section with 18-22 (20.2 ± 1.2) flagellomeres.

Number of specimens measured: 10. Fore wing 7.4-8.6 (8.1 ± 0.4) mm long. Face 0.44-0.51 (0.47 ± 0.03) mm long, 0.83-0.99 (0.93 ± 0.06) mm wide and 1.84-2.17 as wide as long. Face and compound eyes 1.64-1.85 (1.72 ± 0.08) mm wide and 1.76-2.01 as wide as face. Compound eye 0.55-0.63 (0.59 ± 0.03) mm wide, gena 0.43-0.61 (0.53 ± 0.04) mm wide, face 1.36-1.72 as wide as compound eye and gena 0.76-1.00 as wide as compound eye. Flagellomere 1 0.61-0.72 (0.67 ± 0.04) mm long, flagellomere 2 0.29-0.38 (0.33 ± 0.03) mm long and flagellomere 1 1.89-2.19 as long as flagellomere 2. Hind femur 2.30-2.75 (2.48 ± 0.14) mm long, 0.42-0.52 (0.45 ± 0.03)

mm wide and 4.85-6.13 as long as wide. First metasomal tergite 1.57-1.81 (1.68 ± 0.08) mm long, 0.83-1.10 (0.99 ± 0.09) wide apically and 1.46-1.97 as long as apically wide.

ETYMOLOGY. From the Latin carina, meaning ridge and referring to the extensive median longitudinal carinae.

DISTRIBUTION. Map 12. Transcontinental north to Yukon Territory and to James Bay and south to Lawrence, Kansas and to Pine Flats in southern California.

SPECIMENS EXAMINED. 52 females and 61 males.

PARATYPES. CANADA. ALBERTA: Banff, Eisenhower Jct, 4700', 7.vii.1962, W.R.M. Mason (1f,CNCI); Edmonton, 29.v.1926 (1M), 16.vi.1950 (1F), E.H. Strickland (AEIC); Fawcett, 10.vi.1934, E.H. Strickland (1F,AEIC); Waterton, 6.vi.1962, W.R.M. Mason (1M,CNCI). **BRITISH COLUMBIA:** Aleza Lk, emerg. 6.II.1952, Forest Insect Survey specimen No. 51-1189D, ex. *Pikonema*, (1F,CNCI); Fernie, 10.vi.1935 (1M), 15.vi.1935 (1F), reared, ex. *Abia* (sic!), H. Leech (CNCI); Lillooet, coll. 25.viii.1948, emerg. 29.iii.1949, ex. sawfly larva on Douglas fir, J.H. McLeod, (1M,CNCI); Pink Mtn, 252KmE. Dawson, 12.vi-5.ix.1984, S.&J. Peck (1F,LEBL); Robson, 7.v.1949 (1F,1M), 18.v.1949 (3F), 19.v.1950 (1M), 20.v.1950 (1M), 20.v.1962 (1F), 28.v.1962 (1F), 30.v.1950 (1F), 3.vi.1950 (1F), H.R. Foxlee (6F,3M,CNCI;2F,SMDV); Stone Mtn Pk, 3800 feet, 12.vii.1973 (1M), 13.vii.1973 (1M), 14.vii.1973 (1M), 17.vii.1973 (2M), 18.vii.1973 (2F,6M), 19.vii.1973 (4M), 20.vii.1973 (2F), H. & M. Townes (AEIC);

Stone Mtn Pk, 5500 feet, 17.vii.1973 (1F,8M), 18.vii.1973 (2F,1M), 19.vii.1973 (1M), H. & M. Townes (AEIC). MANITOBA: Riding Mtn Nat. Pk, 6KmE. Clear Lk, 3.vii.1979, D.B. Lyons (2M,LEBL). NOVA SCOTIA: Cape Breton Highlands Nat. Pk., Lone Shieling, 28.vi.1983 (1F,LEBL). Pleasant Bay, 28.vi.1984, H.J. Teskey (1F,CNCI). ONTARIO: Moose Factory, 22.vi.1949, D.P. Whillans (1M,AEIC). QUEBEC: Hwy to James Bay, Km 66, 50°03'N 77°07'W, 12.vi-8.viii.1987, L. Leblanc (1F,LEBL). YUKON TERRITORY: Dempster Jct, 40KmE. Dawson, 19.vi-25.viii.1984, S. & J. Peck (2F,LEBL). UNKNOWN PROVINCE: Cté-Bureau, Laviotelle, emerg. 1.iv.1960, Forest Insect Survey specimen No. 59P.4083, ex. *Pikonema alaskensis* (1F,CNCI). UNITED STATES. CALIFORNIA: Pine Flat, 3.v.1947, Timberlake (1F,UCRC). IDAHO: Moscow Mts, 3600', 4.vi.1970, P. Oman (1F,OSUO). KANSAS: 5mi.N. Lawrence, 28.iv.1981, D.B. Wahl (1F,SEMC). MICHIGAN: Clare, 19.vi.1976, H. & M. Townes (1F,AEIC); Emmet Co., 27.v.1960, R. & K. Dreisbach (2F,AEIC); Missaukee Co., 4.vii.1952, R.R. Dreisbach (1F,AEIC). MISSOURI: Atherton (1M,MCZC). MONTANA: Glacier Pk, Swiftcurrent, 23.vii.1935, A.L. Melander (1F,MCZC). OREGON: Corvallis, 30.iv.1976 (1F,3M), 6.v.1987 (1M), 8.v.1987 (1F), 9.v.1987 (1M), 11.v.1976 (1F,4M), 12.v.1976 (3F,1M), 12.v.1987 (1F), 14.v.1976 (1F), 15.v.1976 (1F,1M), H. & M. Townes (AEIC); Forest Grove, 8.v.1938 (1M,OSUO); Hyatt Reservoir, 20.vi.1978 (1F), 29.vi.1978 (1F), H. & M. Townes (AEIC); Selma, 20.v.1978 (2F,2M), 21.v.1978 (1M),

27.v.1978 (1F), 28.v.1978 (1F), H. & M. Townes (AEIC).

BIOLOGY. Collected between April 28 and June 29 in Missouri, Kansas, Idaho, Oregon and California and between May 7 and July 23 in northern United States and in Canada. Reared from *Zaraea* sp (*Abia* being a Palearctic relative of *Zaraea*), from *Pikonema*, from *Pikonema alaskensis* and from an undetermined sawfly feeding on Douglas fir (*Pseudotsuga taxifolia*).

DISCUSSION

The tribe Mesoleiini is very difficult to study owing to the large number of closely similar species and to the often poorly defined generic boundaries (Townes 1969-b).

Phylogenetic relationships at the species level are difficult to recognize because character states are generally weakly differentiated and highly subject to convergent evolution (Sanborne 1984, Wahl 1987). Most studies do not propose phylogenies beyond the species group level. The present study proposes phylogenetic relationships that are incomplete but that are the best compromise using the few available characters recognized to be of high value.

The genus *Himerta* is one of the few well defined genera within Mesoleiini (Townes 1969-b). The Holarctic genera *Himerta* and *Protarchus* (and possibly also the Palearctic genus *Perispuda*) form a monophyletic unit defined by two synapomorphies: 1. clypeus small and narrow with its surface flat and shiny except for its convex basal margin and 2. host range restricted to larvae of Cimbicidae (*Protarchus* attacks *Trichiosoma* and *Cimbex*, *Himerta* attacks *Zaraea* and there are no host records for *Perispuda*) demonstrated by literature records (Townes et al 1965, Townes 1969-b, Short 1978 and Carlson 1979) and by reared specimens in CNCI. The genus *Himerta* is defined by two synapomorphies: 1. loss of

areolet in fore wing and 2. host range mostly restricted to the genus *Zaraea* (although *H. carinata* has been reared twice from *Pikonema*).

Within the genus *Himerta* three phenetic groupings are suggested by interpreting the states of six characters.

Group A includes the Nearctic *H. carinata* and the Palearctic *H. albifrons* (Uchida) and *H. scutellaris* (Kriechbaumer). It is defined as follows: 1. Antennal sockets at a very strong angle with the vertical axis of the compound eyes. 2. Face very wide. 3. Median longitudinal carinae of propodeum strongly developed and furrow well developed with adjacent sides of propodeum uplifted (Fig 36). 4. Sculpture on metasomal tergites very coarse (Fig 43). 5. Ovipositor notch very wide with anterior margin gradually sloping without an angle and posterior margin gradually sloping over a long distance (Fig 47). 6. Males without yellow markings on mesosternum. 7. Metatarsus uniformly light (*H. carinata*) or with tarsomere 1 basally darker than the rest of the tarsus (*H. albifrons* and *H. scutellaris*).

Group B includes the Nearctic *H. alpina*, *H. infuscata*, *H. unicolorata*, *H. lineola*, *H. foxleii*, *H. bicolorata* and *H. gelida* and at least four Palearctic species. It is defined as follows: 1. Antennal sockets at a very strong angle with the vertical axis of the compound eyes (Fig 6). 2. Face moderately wide. 3. Median longitudinal carinae of propodeum

reduced to two short apical carinae and furrow well developed with adjacent sides of propodeum uplifted (Fig 35). In *H. infuscata* the furrow and uplifting are reduced because of the general smoothening of the cuticle associated with its occurrence at high altitudes. 4. Sculpture on metasomal tergites moderately coarse to absent (Figs 40 to 42). 5. Ovipositor notch wide with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle (Fig 46). 6. Males without yellow markings at least on mesosternum except in *H. bicolorata* and in *H. gelida*. 7. Metatarsomere 1 with basal portion clearly darker than the rest of the tarsus.

Group C includes the Nearctic *H. luteofacia*, *H. epinenia*, *H. flavida*, *H. eruga*, *H. rubiginosa*, *H. pacifica*, *H. rugopleura*, *H. atra*, *H. scutellata*, *H. townesorum* and *H. pumila* and at least one Palearctic species and is defined as following: 1. Antennal sockets at a moderately strong angle with the vertical axis of the compound eyes (Fig 5). 2. Face moderately wide. 3. Median longitudinal carinae of propodeum reduced to two short apical carinae and furrow well developed but without adjacent sides of propodeum being uplifted to entirely absent (Figs 30 to 33). 4. Sculpture on metasomal tergites moderately coarse to absent (Figs 37 to 39). 5. Ovipositor notch moderately wide with anterior margin gradually sloping with a small tooth-like angle

(strong angle in *H. atra*) and with posterior margin abruptly sloping with a strong angle (Fig 44). 6. Males with yellow markings at least on mesosternum and usually also on adjacent mesepisternum and on lateral and apical margins of epicnemium except in *H. scutellata* and in *H. townesorum*. 7. Metatarsus of uniform color except in *H. atra*, *H. scutellata*, and *H. townesorum* in which it is black.

States within characters have been polarized, using outgroup comparison with *Protarchus* as the most closely related genus and with Mesoleiini as a generalized outgroup, as following. 1. Angle of antennal sockets with vertical axis of face: very strong is plesiomorphic and moderately strong is apomorphic. 2. Face width: moderately wide is plesiomorphic and very wide is apomorphic. 3. Propodeum carinae and furrow: strong median longitudinal carinae and well developed median furrow with adjacent sides of propodeum uplifted is plesiomorphic; median longitudinal carinae reduced to two short posterior carinae but presence of a strong furrow with adjacent sides of the propodeum uplifted is intermediate apomorphic (the uplifted sides are in fact remnants of the median longitudinal carinae, as demonstrated by a few specimens of *H. unicolorata* that have very strongly uplifted sides that are continuous with weak vestiges of median longitudinal carinae similar to those in *H. carinata*); the loss of the uplifting of the propodeum adjacent to the furrow and a partial to complete reduction

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of the furrow itself is the most apomorphic state. 4. Sculpture on metasomal tergites: very coarse is plesiomorphic and moderately coarse is apomorphic. 5. Ovipositor notch: very wide notch with anterior and posterior margins gradually sloping without angles is plesiomorphic; wide notch with anterior margin gradually sloping with a small tooth-like angle and posterior margin sloping without any angle is intermediate apomorphic; moderately wide notch with anterior margin gradually sloping with a small tooth-like angle and posterior margin abruptly sloping with a strong angle is the most apomorphic. 6. Yellow on mesosternum in males: absence is plesiomorphic and presence is apomorphic because it is an unusual situation in Mesoleiini. 7. There has been no attempt to polarize metatarsus color states.

The polarized character states allow me to suggest a phylogeny for the species groups. Figure 48 shows the phylogenetic tree illustrating the relationships between the species groups.

Group A is the most primitive because it is defined by symplesiomorphies shared with *Protarchus* but absent in group B and group C. These are: strong median longitudinal carinae on propodeum and well developed furrow with adjacent sides of propodeum uplifted and very coarse sculpture on metasomal tergites. The very wide face is the synapomorphy that makes group A holophyletic.

Group B is an intermediate group possibly paraphyletic with respect to group C. Group B has gained several synapomorphies over group A. These are: loss of median longitudinal carinae of propodeum but vestiges of them expressed as uplifting of propodeum laterally to the median furrow, moderately coarse sculpture on metasomal tergites and narrowing of ovipositor notch with anterior margin gradually sloping with a small tooth-like angle and with posterior margin gradually sloping without an angle but over a shorter distance than in group A. The above apomorphies are either shared with group C (metasomal tergite sculpture) or are intermediate apomorphies leading to more apomorphic homologous character states in group C (propodeum structure and ovipositor notch) and they consequently do not allow to tell whether group B is holophyletic and therefore the sister lineage of group C or paraphyletic with respect to group C, then making group C a descendent from species that already had the character states of group B. The apomorphic state of the presence of yellow on the male mesosternum is present in group C but also in two species of group B: *H. bicolorata* and *H. gelida*. If group B and group C are two holophyletic sister groups then yellow on the mesosternum of the male must have appeared independently twice: in two species of group B and in the first ancestors of group C. If, on the other hand, group B is paraphyletic with respect to group C then yellow on mesosternum in males would have

originated in group B and *H. bicolorata* and *H. gelida* would be at the end of the group B lineage before the branch leading to group C. This last observation and the fact that the propodeum and ovipositor character states in group B are intermediate apomorphies with respect to the more advanced apomorphic states in group C support the paraphyletic nature of group B.

Group C is the most advanced group and has gained apomorphies over group B. These are: antennal sockets at a moderately strong angle with vertical axis of compound eyes, loss of the uplifting of propodeum adjacent to the median furrow and often reduction or loss of the furrow and ovipositor notch narrowed with development of a strong angle in the sloping of its posterior margin.

The zoogeography of the Nearctic species of *Himerta* is even more difficult to interpret than their phylogeny due to the limited amount of information available and to the lack of knowledge on the Palearctic species. Only a few observations and interpretations will be given.

Present day distributions show widespread and restricted distributions within each species group and several similar and fully sympatric distribution patterns have been attained convergently by unrelated species from groups B and C. The group A species *H. carinata*, the group B species *H. bicolorata* and the group C species *H. flavida* and *H. atra* are all widespread transcontinental species (Maps

2,7,11,12). The group B species *H. unicolorata* and the group C species *H. rubiginosa* and *H. scutellata* are all restricted to the western mountain chains (Maps 4,8,10) without being closely related. The group C species *H. epicnemias* is widespread east of the western mountain chains (Map 1) and is therefore parapatric with respect to the western mountain species. The group B species *H. alpina* and *H. infuscata* and the group C species *H. eruga* are restricted to the high mountains in western United States (Maps 3,9) and have convergently lost their body surface sculpturing. The group B species *H. gelida* and the group C species *H. rugopleura* both occur in Alaska, in Yukon and in northern British Columbia (Maps 5,6) without being closely related. The identical restricted distributions of unrelated species are most likely due to the invasion of similar ecological niches by convergent evolution.

The genus *Himerta* has originated in the Palearctic region or the Nearctic region and has undoubtedly invaded the other region through the Beringian land bridge. The ancestors of the three species groups may have crossed the Beringian bridge at the same time or at different times and have since gradually proliferated into ecologically specialized species that have adopted a diversity of distribution patterns as we know today.

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FIGS 1-6. 1-4, anterior view of head: 1, *H. rubiginosa* female; 2, *H. atra* male; 3, *H. unicolorata* male; 4, *H. carinata* female. 5-6, lateral view of head: 5, *H. rubiginosa* female; 6, *H. unicolorata* male.

FIGS 7-17. 7-11, anterior view of face: 7, *H. rubiginosa* female; 8, *H. atra* male; 9, *H. townesorum* male; 10, *H. infuscata* male; 11, *H. carinata* female. 12, hind wing of *H. townesorum* male. 13-15, lateral view of mesoscutum: 13, *H. rubiginosa* female; 14, *H. pacifica* female; 15, *H. unicolorata* male. 16-17, dorsal view of mesoscutellum: 16, *H. pacifica* female; 17, *H. scutellata* female.

FIGS 18-23, lateral view of pronotum and mesepisternum: 18, *H. epicnemia* female; 19, *H. rubiginosa* female; 20, *H. pacifica* female; 21, *H. atra* male; 22, *H. scutellata* female; 23, *H. townesorum* male.

FIGS 24-29. 24-26, lateral view of pronotum and mesepisternum: 24, *H. pumila* female; 25, *H. alpina* female; 26, *H. gelida* female. 27-29, detail view of lower half of mesepisternum: 27, *H. rubiginosa* female; 28, *H. pacifica* female; 29, *H. alpina* female.

FIGS 30-35, dorsal view of propodeum: 30, *H. flavida* female; 31, *H. pacifica* female; 32, *H. atra* male; 33, *H. alpina* male; 34, *H. infusca* male; 35, *H. unicolorata* male.

FIGS 36-43. 36, dorsal view of propodeum in *H. carinata* female. 37-43, dorsal view of metasomal tergite 1: 37, *H. luteofacia* male; 38, *H. rubiginosa* female; 39, *H. pacifica* female; 40, *H. alpina* male; 41, *H. infusata* male; 42, *H. unicolorata* male; 43, *H. carinata* female.

FIGS 44-47, lateral view of ovipositor: 44, *H. rubiginosa*; 45, *H. atra*; 46, *H. unicolorata*; 47, *H. carinata*.

FIG 48. Cladogram indicating the relationships within the genus *Himerta*. Synapomorphies are indicated by letters. a. clypeus small and narrow with its surface flat and shiny except for its convex basal margin; b. host range restricted to larvae of Cimbicidae; c. loss of areolet in fore wing; d. host range restricted to larvae of *Zaraea*; e. face very wide; f. loss of median longitudinal carinae of propodeum but presence of uplifting of propodeum laterally to median furrow as vestiges of carinae; g. loss of coarse sculpture on metasomal tergites; h. narrowing of ovipositor notch with posterior margin gradually sloping without an angle but over a shorter distance than in group A; i. presence of yellow on mesosternum of male; j. antennal sockets at a moderately strong angle with vertical axis of compound eyes; k. loss of uplifting of propodeum adjacent to the furrow and often reduction or loss of the furrow itself; l. further narrowing of ovipositor notch with development of a strong angle in the sloping of its posterior margin.

APPENDIX

MORPHOLOGICAL TERMINOLOGY. The following plates describe the morphological terminology used in the descriptions. The head and mesosoma drawings have been reproduced from Townes (1969) and the ovipositor drawing is original. Names of parts are given and names originally given by Townes are given between parentheses when different from those used in this work. Numbers missing are part names not used in the descriptions.

MORPHOLOGY OF HEAD

1	Vertex	
2	Frons	
3	Face	
4	Malar space	(cheek)
5	Clypeus	
6	Basal margin of clypeus	
7	Tentorial pit	(clypeal fovea)
9	Vertical orbit	
10	Frontal orbit	
11	Facial orbit	
13	Vertex	(occiput)
14	Occiput	(postocciput)
16	Occipital carina	
19	Gena	(temple)

MORPHOLOGY OF OVIPOSITOR

1	Anterior margin of notch
2	Notch
3	Posterior margin of notch

MORPHOLOGY OF MESOSOMA

1	Mesoscutum	
3	Mesoscutellum	(scutellum)
4	Metascutellum	(postscutellum)
6	Tegula	
7	Subtegular ridge	
8-10	Pronotum	
8	Collar of pronotum	
10	Hind corner lobe of pronotum	
11-12	Mesepisternum	
13	Mesepimeron	
15	Metapleuron	(metapleurum)
17	Propleuron	(propleurum)
18	Epicnemium	(prepectus)
19	Mesosternum	
20	Coxae	
21	Propodeum	
29	Propodeal spiracle	
33	Axillary trough of mesonotum	
34	Axillary trough of metanotum	
A	Notaulus	
C	Epicnemial carina	(prepectal carina)
G	Postpectal carina	
J	Pleural carina	
L	Median longitudinal carina

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