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Some Notes on the Bee Genus *Andrena*

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Some Notes on the Bee Genus ANDRENA.

BY LAWRENCE BRUNER.

Several years ago the writer undertook to determine and label the bees contained in the collection of insects belonging to the University of Nebraska. After some preliminary work in the way of assorting and arranging the material at hand, and securing literature with which to do the naming, it was found that the large number of the species belonging to the genus Andrena in its broad sense could only be placed by the aid of some kind of synoptic key or table. Not being able to find such an aid in our entomological literature it was decided to construct one for the purpose.

This being decided upon, it was soon ascertained that the various authors who had established the already recognized and recorded species had used different characters upon which to base their descriptions. The use or choice of distinct characters by the various authors when describing their species made it very difficult for the writer when attempting to decide upon the principal features of the proposed table in order to make it as nearly a natural one as possible. After several vain attempts at employing structural characters for the separation of the main groups, at least, all efforts in this direction ceased, and such secondary characters as the presence or absence, length, abundance, color and arrangement of pubescence were employed instead. This choice was made necessary because, as stated above, the various authors when characterizing their new species had overlooked many of the structural characters now used in the limitation of forms.

While nothing like perfection is claimed for the present table as it now stands, it has been a great help to the writer in his attempts at placing the hundred or more forms belonging to the collection which he is working over. It is with this knowledge in mind that the table is offered to others who may be interested in our Andrenid bees. Later, after more of our species that are still undescribed have been determined and characterized, and when both sexes of some known species have been recognized, a new and better table can be constructed.
In describing bees of this group it would be well to employ such characters as punctuation of face, thorax and abdomen; the nature of the triangle (inclosure) at the base of the metathorax—whether bounded by a rim or by an impressed line; its surface, whether rough or smooth; shape and size of head and its attachments, as antennæ, tubercle at apex of clypeus, mandibles, etc.; form of abdomen, depression of apical portion of segments; any special characteristic of legs, as of tibiae and tarsi; pubescence, length, abundance, arrangement, color, etc.; general color of wings, and indication of variation of form and size in cells, nervures and stigma; abundance and color of anal fimbria in the female; also the general color of the insect or of any portion of it. If all, or most, of these points are kept in mind when a new form is characterized, the difficulty of its recognition by others will be greatly lessened. It will also enable the would-be tabulator to construct his key on characters that are less artificial and therefore more constant than those employed here.

While working over the described American forms it was found that a few synonyms occur. In order to make the paper a trifle more complete there are added below:

*Andrena bicolor* (Amer. citations—not Fabr.) = carlini Ckll.

" *fimbriata* Sm. = *americana* D. T.

" *flavoelypeata* Sm. = *bipunctata* Cress.

" *simulata* Prov. = *canadensis* D. T.

" *clypeata* Sm. = *clypeolata* D. T.

" *laticeps* Prov. = *Provancheri* D. T.

" *serotina* Rob. = *Robertsonii* D. T.

" *scutellaris* Rob. = *scutellata* D. T.

" *hirticeps* Rob. (not Sm.) = *carlini* Ckll.


A Preliminary Table for the Separation of the Species of *Andrena* of America north of Mexico.

Normally with three submarginal cells in anterior wings—(*Andrena*, *Trachandrena*, *Opandrena*, *Ptilanerena*, *Pterandrena* and *Iome-lissa*). ...............-1.

Normally with but two submarginal cells in anterior wings...(*Parandrena*) 229.

1. Insect with the abdomen above more or less markedly rufous, ferruginous, orange or testaceous. ...............-2.

Insect with the abdomen not at all rufous, ferruginous or orange, or if testaceous, only slightly so at extreme apex of segments ...............-18.

2. With the light color chiefly ferruginous or rufous ..................-3.

With the light color orange, yellowish or testaceous—basal, apical or both ...-16.
3. Pubescence black .............................................. **prima** Casad.
   Pubescence gray or fulvous ........................................ 4.
4. Wings clear or only faintly clouded ........................................ 5.
   Wings rather strongly clouded apically .......................... 10.
5. Enclosure of metathorax bounded by a salient rim, the surface more or less
   strongly longitudinally ridged ........................................ 6.
   Enclosure indistinctly marked, the surface rather finely granular ....... 7.
6. Abdomen red, except sides of 1st and 2nd segments—both sexes.

**sphecodina** Casad. & Ckll.
   Abdomen of female with the apical margins of the segments and apical segments
   more or less black, that of male black, save occasionally with
   indications of red on the ventral surface of 1 and 2 ........................... **Marina** Rob.
7. Head and thorax black, or varied with yellow, finely granular. Insects
   large or of moderate size ........................................ 8.
   Head and thorax with bluish and greenish reflections. Insects rather small.

**illinoiensis** form **bicolor** Rob.
   Insects of moderate size (about 10 mm.) ........................................ 9.
   Insects rather large (12 mm. or over) ........................................ 10.
8. Abdomen of female red, sometimes with base of apical segments broadly
   black and with their apices testaceous; the males similar, but fre-
   quently entirely black. Wings hyaline, apical margins faintly clouded.

**erythrogastra** Ashm.
   Abdomen of female with base of all segments broadly black. Wings with a
   strong reddish yellow tinge ........................................ **rhodura** Ckll.
9. Clypeus dark in both sexes ........................................ 11.
   Clypeus not dark, at least in the ♀ ........................................ 12.
10. First segment of abdomen very feebly and sparsely punctured.

**Jessicae** Ckll.
   First segment of abdomen strongly punctured ........................................ **argemonis** Ckll.
11. Dorsum of thorax honey-yellow ........................................ **mellea** Crrss.
   Thorax entirely black ........................................ 13.
12. Pubescence on head and thorax pale yellow or fulvous .................. 14.
   Pubescence on head and thorax dull white ........................................ 15.
13. Pubescence fulvous; basal joints of antennae more or less strongly ferrugi-
   nous ........................................ **prunorum** Ckll.
   Pubescence pale yellowish; antennae entirely dark.

**prunorum** sub. sp. **Gillettei** Ckll.
14. Second segment of abdomen provided with a black band ........................... **Casadæ** Ckll.
   Second segment of abdomen with only a black spot on each side.

**pascocensis** Ckll.
15. With the light color orange and confined to the apex and base of segments.

**aureocincta** Ckll.
16. The light color reddish or yellowish testaceous ........................ 17.
17. Larger (13.5 mm.), the pubescence rather long and copious, yellowish. Apex
   of segments yellowish testaceous. Venter honey yellow.

** melliventris** Cress.
   Smaller (8.5 mm.), the pubescence scant, pale. Apex of segments broadly
   reddish. Fimbria pale ........................................ **lineata** Prov.

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18. Body of insect altogether or in part blue, green or brassy (seneous)...... 19. Body of insect black, with or without yellow face marks.............. 35.
19. Insect with head and thorax concolorous with abdomen.............. 25.
Insect with head and thorax differently colored from abdomen........ 20.
20. Head and thorax black, abdomen more or less bronzy, green or blue... 22.
Head and thorax greenish.................................................. 21.
Abdomen with a faint greenish lustre.................................. 24.
22. Abdomen with a brassy tinge........................................ 23.
22. Segments 2-5 with their apices slightly depressed, anal fimbria fulvous.

subtilis Sm.
Abdomen finely roughened, impunctate, apical margins of segments depressed and narrowly testaceous, anal fimbria fuscous; cheeks in male subtri-
angular, the angle opposite the middle of the eye... erythronii Rob.
24. Segments 3-5 with thin bands of long white hairs, anal fimbria bright orange fulvous; male with the pubescence on thorax with fulvous tint, and hair at apex of abdomen yellowish or nearly white.

subaustralis Ckll.
Abdomen without well-defined hair bands ................................ 32.
26. General color blue-black; anal fimbria dirty white, the abdomen of male bluish, the apex not densely tufted......................... geranii Rob.
General color nigro-seneous, anal fimbria rufo-fuscous.............. candida Sm.
General color greenish, with blue and purple reflections........ 27.
27. Face of ♂ without yellow markings.................................. 31.
Face of ♂ with whitish yellow markings................................ 28.
Males..................................................................................... 30.
29. Fovea narrow; clypeus bare, convex, metallic; enclosure rugose; cell III long................................................. personalis Rob.
Fovea broad; clypeus more pubescent, flatter, not metallic; enclosure less rugose; cell III shorter................................. zizie Rob.
30. Antennae short, joint 3 nearly equalling 4 and 5 together; clypeus rather flat, whitish; sometimes with a whitish dot on each side of face.
zizie Rob.
Antennae long, joint 3 no longer than 4; clypeus convex, whitish, as well as a spot on each side of face................................. personalis Rob.
31. Robust, enclosure of metathorax narrow, the scutellum not purplish.

polemonii Rob.
Slender, enclosure of metathorax broad, the scutellum purplish.

illinoiensis Rob.
32. Abdomen strongly and closely punctured ......................... cerasifoli Ckll.
Abdomen impunctate, shining............................................... 33.
33. Anal fimbria black; the pubescence of face also black.

nigrocærulea Ckll.
Anal fimbria brownish; the pubescence of face mostly pale................ 34.
34. Pubescence of thorax ochraceous, on metatnorax black........... cærulea Sm.
Pubescence of thorax white, the few black hairs inconspicuous.

terra Ckll.
35. Insects with whitish or yellowish face marks ...........................................36.
Insects without such face marks ..............................................................64.
36. Females .......................................................................................................37.
Males ...............................................................................................................40.
37. Spot of lemon yellow on each side of face ...............................................38.
38. Clypeus dark, apical margins of abdominal segments pale testaceous

**pulchella** Rob.

Clypeus in part or wholly yellow .............................................................39.
39. Clypeus pale lemon yellow with sides black; with semicircular spot on sides
of face below the eyes........................................................................... Alicharum Ckll.
Clypeus entirely yellow, apical margins of abdominal segments provided
with narrow fascia of white pubescence.............................................. Aliciae Rob.
Sometimes with a yellow spot on clypeus, in the median line not far from the
anterior edge.......................................................................................... Kincaidii Ckll.
40. With both the clypeus and a spot on each side of face white or yellowish ....41.
With clypeus alone light colored .............................................................52.
41. abdomen impunctate, the surface finely tesselate.....................................42.
Abdomen distinctly punctured ..................................................................44.
42. Very small, not over 6 mm. long, the face marks whitish.

**personata** Rob.
Larger, between 7 and 9 mm., face marks yellow or yellowish ...............43.
43. Thorax with sparse, feeble punctures, its pubescence dirty white.

**asteris** Rob.
Thorax minutely tesselate, with strong quite numerous punctures, its pubes-
cence pale ferruginous ........................................................................... Cragini Ckll.
44. Clypeus wholly light colored, except anterior edge and the usual two dots;
vernial species..........................................................................................46.
Clypeus with more or less black; autumnal species ....................................45.
Clypeus sometimes with a small yellow spot, also one such spot on each side
of face ....................................................................................................... Viole Rob.
45. Sides of clypeus black, wings dusky at apex, first two abdominal segments
with orange-fulvous bands ..................................................................... Alicharum Ckll.
Anterior margin of clypeus broadly black, wings clear.......................... **pulchella** Rob.
46. Face markings lemon yellow ...................................................................47.
Face markings cream color .......................................................................50.
47. Joint 3 of antennae shorter than 13, about at long as 5, entire apical margin
of clypeus black, lateral face marks small or wanting .................. dubia Rob.
Joint 3 of antennae as long as 13, and as long as 4 and 5 together ........ 48.
Antenne dark. Wings a little dusky at tips .............................................. kansensis Ckll.
Pubescence dull white ................................................................................49.
49. Middle of anterior margin of clypeus black, lateral face marks large.

**Cressoni** Rob.
Entire apical margin of clypeus black, lateral face marks small or wanting.

**Bridwellii** Ckll.
50. Length 12 mm., flies in June................................................................. rudbeckiae Rob.
Length not ever 8 mm., fly in March and April .................................51.
51. Larger, flagellum dark ............................................................................ capricornus Casad. & Ckll.
Smaller (6 mm.), flagellum ferruginous .................................................. primulifrons Casad.
52. Larger species (10-12 mm.). - 53.
Smaller species (5-9 mm.). - 54.
Stigma comparatively small. - 55.
Stigma normal. - 56.

53. Wings clear hyaline; abdomen minutely tessellate. - Barberi Ckll.
Wings whitish; abdomen rather finely punctured, the apical portions of segments rather broadly pale testaceous. - helianthi Rob.

54. Abdomen without punctures, the head of moderate width. - Aliciae Rob.
Abdomen punctured, the head rather large. - 55.

55. Head broader than thorax, the apical margins of abdominal segments broadly pale testaceous. - reflexa Cress.
Head and thorax about equal in width. - 56.

56. Abdomen covered with fine, short, appressed hairs which form bands on segments 4 and 5. - fracta Casad. & Ckll.
Abdomen without hair bands, flies late in the spring. - Kincaidii Ckll.

57. Pubescence on thorax ochraceous or pale fulvous. - 58.
Pubescence on thorax gray or white. - 59.

58. Head and thorax clothed with ochraceous pubescence. - clypeolata D. T.
Pubescence on head and thorax inclining to fulvous. - scutellata D. T.
Clypeus with a large trilobed yellow spot. - krigiana Rob.

59. Flagellum of antennae testaceous or ferruginous beneath. - 60.
Flagellum of antennae darker, brown or black beneath. - 61.

60. Clypeus chrome yellow; abdomen finely punctate, flies in spring. - Trevoris Ckll.
Clypeus pale yellow; abdomen impunctate, flies in the fall. - solidaginis Rob.

61. Abdomen without well defined hair bands. - 62.
Abdomen provided with more or less complete hair bands. - 63.

62. Abdomen smooth, shining, almost without pubescence. - valida Say.
Abdomen more or less thickly and evenly covered with pubescence. - 64.

63. Thorax with the pubescence dense, hiding the surface. - 65.
Thorax with the pubescence rather sparse, not hiding the surface. - 66.

64. Insects larger (17 mm. in length); wings purplish fuliginous. - nigra Prov.
Insects smaller (13 mm.); wings smoky red. - 65.

65. Wings dusky hyaline; abdomen closely and finely punctured. - nigerrima Casad.
Wings yellowish hyaline, abdomen practically impunctate. - Porterae Ckll.
70. Pubescence quite dense on face and thorax above. 

71. Pubescence rather thin when compared to that of the species belonging to the alternate section. 

72. With bright ferruginous or fulvous pile 

73. With the pubescence paler—some shade of testaceous, light ochraceous, gray or white. 

74. Robust, rather large species (12-17 mm.), with thoracic pubescence quite dense. 

75. More slender smaller species (10-12 mm.), with the thoracic pubescence slightly less dense, ochraceous. 

76. With bright ferruginous or fulvous pile. 

77. With the pubescence paler—some shade of testaceous, light ochraceous, gray or white. 

78. Robust, rather large species (12-17 mm.), with thoracic pubescence quite dense. 

79. More slender smaller species (10-12 mm.), with the thoracic pubescence slightly less dense, ochraceous. 

80. Inclosure at base of metathorax strongly longitudinally plicate. 

81. Surface of abdomen smooth, polished; hairs on face and head black; the facial grooves lined with a silvery down. 

82. Abdomen rather free from hairs, smooth and shiny. 

83. Abdomen decidedly hairy throughout. 

84. Surface of abdomen tesselate and well punctured; hairs on face and head mixed with pale and black. 

85. Pubescence on the pleurae black; that on the face mixed with pale and black. 

86. Pubescence on pleurae pale; that on face black only around the mouth. 

87. Smaller (13 mm.); without blackish bands between the tegulae. 

88. Larger (14-17 mm.); with a black-appareing band between the tegulae. 

Hallii Dunning. 

89. Pubescence on thorax above and the pleurae fulvo-ochraceous. 

Dunningi Ckkll. 

90. Pubescence on pleurae fulvo-ochraceous. 

Dunningi Ckkll. 

91. Hair of face wholly black; area at base of metathorax more closely rugulose, narrower; tubercle small and emarginate or binodulose at apex. 

92. Hair of face a little paler at sides and on occiput; area at base of metathorax roughened, not plicate, rather broad and long; tubercle with sloping sides and truncate at apex. 

93. Pubescence on thorax above and the pleurae fulvo-ochraceous.
Pubescence on head, thorax and femora fulvous, brightest on scutellum. *viciniformis* Rob.

Pubescence on head and thorax above ochraceous; abdomen with shallow punctures; anal fimbria obscure fulvous. Male smaller, but for most part with similar pubescence and clearer wings. *errans* Sm.

85. Pubescence ochraceous only on mesothorax, scutellum and postscutellum. *Merriami* Ckll.

Pubescence on mesothorax, scutellum, postscutellum, metathorax, upper part of pleura and on first and base of second abdominal segments ochraceous. *washingtoni* Ckll.

86. The pubescence quite uniformly fulvous or reddish ochraceous. *rastula* Ckll.

The pubescence paler, some shade of light ochraceous, gray or white. *radiata* Ckll.

The pubescence on head moderately long. *pruni* Rob.

Enclosure of metathorax decidedly rugose. *corni* Rob.

89. Males. *provancheri* D. T.

Females. *mesilla* Ckll.

90. Head quite large, as wide or wider than thorax, and with cheeks strongly produced back of the eyes. *perarmata* Ckll.

Head of only moderate width, and with the cheeks normal. *convexa* Prov.

91. Size small (6½ mm.); apical margins of abdominal segments testaceous. *vestita* Prov.

92. Size large (9-11 mm.); apical margins of abdominal segments not testaceous. *cragi* Rob.

Wings hyaline, iridescent; length 7 mm. *salicis* Rob.


Apical margins of abdominal segments black or concolorous. *algida* Sm.
98. Enclosure of metathorax with the surface not strongly rugose nor provided with ridges ................................................. 99.

Enclosure of metathorax with the surface strongly rugose or at least provided with definite ridges .................................. 102.

99. Anal fimbria brownish or gray .................................... 100.

Anal fimbria fulvous .................................................. 101.

100. Head and thorax covered with long gray pubescence; the enclosure microscopically tessellate ........................................... Birtwelli Ckll.

Head and thorax covered with yellowish pubescence; the enclosure granular (?) ......................................................... convexa Prov.

101. Head and thorax covered with long white pubescence, the latter almost bare dorsally; the enclosure slightly depressed, not so coarsely sculptured as the integument behind it ........................................... delta Vier.

Head and thorax covered with whitish pubescence, tinged above with yellow; the enclosure granular ........................................... rufosignata Ckll.

102. The enclosure bounded by a well defined ridge ........................................... 103.

The enclosure not bounded by a definite ridge or wall .......................... 104.

103. Pubescence on thorax moderately long; fimbria brownish.

Marie form concolor Rob.

Pubescence short and feathery; fimbria fulvous ................................ nuda Rob.

104. Smaller species (8 mm.). Apical margins of abdominal segments pale testaceous ......................................................... krigiana Ckll.

Larger species (10–12 mm.) ................................................................ 105.

105. Surface of enclosure strongly rugose .................................... 106.

Surface of enclosure more or less regularly ridged .................................. 107.

106. The pubescence on head and thorax in female ochraceous, to fulvous in male. Face in front of ocelli striate ............................... cratægi Rob.

The pubescence on head and thorax pale; the face before ocelli smooth, shining and sparsely but definitely punctured .................. heraclei Rob.

107. Smaller (10 mm.). Enclosure of metathorax provided with small vermiciform plications ........................................... Sigmundi Ckll.

Larger (12 mm.) .................................................................. 108.

108. Enclosure irregularly subreticulately ridged ....................... subcommoda Ckll.

Enclosure with the basal area finely striate .................................. commoda Sm.

109. Pubescence on abdomen paler, either grayish or fulvous .................. 110.

Pubescence on abdomen at least in part black ............................... 118.

110. Females ...................................................................... 111.

Males ............................................................................ 113.

111. Larger (13–15 mm.). The abdomen clothed with pale pubescence, which often forms thin apical fasciae ................................ Sayi Rob.

Smaller (9–10 mm.) ................................................................ 112.

112. Head and thorax above with pale fulvous pubescence; that on abdomen of the same color, short and thinly scattered, most dense towards apex. victima Sm.

Head and thorax above with pale whitish yellow pubescence; the abdomen thinly covered with hoary pubescence; fimbria fulvous. mæsta Sm.

113. Larger (9–12 mm.). Head broader than thorax .......................... 114.

Smaller (8 mm.). Enclosure scarcely rugulose, not margined ................ 115.
114. Enclosure of metathorax rather coarsely reticulated. Pubescence as in female, only somewhat longer. Sayi Rob.
Abdomen clothed with short scattered pale pubescence, dense and ochraceous at apex. bruniventris Cress.

115. Head without black hairs. Sayi Rob.
Head provided with black hairs on vertex and about margins of eyes. .116.
116. Head subquadrate above, pubescence on face and cheeks long and white.
Abdomen shining, with thinly scattered hoary pubescence. mœsta Sm.
117. Abdomen with the first and second segments clothed above with long whitish hairs, those on remaining segments sparser and confined to the lateral margins. frigida Sm.
Abdomen shining, provided with a thin scattered griseous pubescence and with a few silvery hairs at the extreme tip. hirticeps Sm.
118. Pubescence on abdomen entirely black. impuncta Kby.
Pubescence on basal half of abdomen whitish, on apical half black, that on thorax rufescent. viciniiformis Rob.
119. Pubescence on thoracic dorsum brighter, more fulvous. anogra Ckll.
120. Pubescence quite long, dense and copious throughout; erect or scarcely decumbent, even on abdomen where forming bands. chromatricha Ckll.
Pubescence on abdomen rather short, and for the most part decumbent, at least when forming bands. .121.
121. Entire pubescence golden yellow, that on all segments forming complete bands. permitis Cress.
Pubescence variable in color. .122.
122. That on thorax and scutellum above bright orange red. cliromatrica Ckll.
That on thorax and scutellum above pale yellow or ochraceous. .123.
123. Anal fimbria lemon yellow, on abdomen pale ochraceous; anal fimbria fulvous. mentzeliae Ckll.
Larger (12½ mm.). Pubescence on thorax pale yellow, whitish on abdomen, anal fimbria yellowish. .124.
Smaller (8½ mm.). Pubescence long, yellow ochraceous, forming bands on apical margins of abdominal segment; anal fimbria ochraceous. miserabilis Prov.
125. Pubescence lemon yellow, that on apex of abdomen mostly black. hirticineta Prov.
Pubescence cream colored, on the middle and hind tibiae pale; facial quadrangle about as broad as long; fimbria fuscous. **apacheorum** Ckll.

Pubescence ochraceous, that on middle and hind tibiae dark fuscous; facial quadrangle a little broader than long; fimbria fuscous. **americana** D. T.

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<tr>
<th>126. Insects rather small, less than 8 mm. in length</th>
<th>127.</th>
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<tr>
<td>Insects larger, 8 mm. or more in length</td>
<td>124.</td>
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<th>127. Females</th>
<th>128. Males</th>
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<tr>
<th>128. Anal fimbria white or whitish</th>
<th>129. Anal fimbria ochraceous, fulvous or fuscous</th>
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<tr>
<th>129. Head and thorax clothed with pale yellow pubescence.</th>
<th>130. Abdomen with complete dense bands of white pubescence.</th>
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- **canadensis** D. T.  
  Head and thorax clothed with rather long grayish white pubescence.
  Wings with the stigma light brown.

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<th>130. Abdomen with the hair bands on segments 1 and 2 interrupted.</th>
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- **primulifrons** Casad.

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<tr>
<th>131. Fimbria ochraceous; the pubescence long and of the same color.</th>
<th>132. Fimbria fulvous or subfuscous.</th>
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<tr>
<th>132. Wings with their apices decidedly clouded</th>
<th>133. Wings with their apices not clouded</th>
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<th>133. Area at base of metathorax large, coarsely reticulated.</th>
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- **Robertsonii** D. T.
  Area at base of metathorax not especially large, shortly rugose at base.

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<th>134. Area at base of metathorax bounded by an impressed line, finely roughened.</th>
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- **nebecula** Sm.

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<th>135. Wings distinctly clouded apically</th>
<th>136. Inclosure of metathorax finely roughened, more coarsely so at the base.</th>
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<thead>
<tr>
<th>136. Inclosure of metathorax bounded by a raised rim</th>
<th>137. Inclosure poorly defined laterally, but terminating in a sharp edge at truncation</th>
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<tr>
<th>138. Fasciae on abdominal segments 3 and 4 continuous.</th>
<th>139. Fasciae on abdominal segments 2 to 4 interrupted.</th>
</tr>
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</table>

**melanochroa** Ckll.

**miserabilis** Cress.

**nebecula** Sm.

**notlioscorcli** Rob.

**notlioscorcli** Sm.

**Rugosa** Rob.
139. Metathorax on each side of inclosure coarsely reticulated and nearly bare, nervures and stigma dark. .................. ***obscura*** Rob.

Metathorax on each side of inclosure rather finely rugose and closely pubescent. .................. ***hippotes*** Rob.

140. Head large; the cheeks broad and more or less angulated behind. .......... 141.

Head of moderate size; the cheeks narrower and less distinctly angulate behind. .......... 142.

141. Cheeks strongly produced behind the eyes and bordered by a carina or ridge. Inclosure of metathorax large and rather coarsely reticulated. ***platyparia*** Rob.

Cheeks broad, with a rounded angle at point opposite and but a little below middle of eyes. Inclosure of metathorax finely roughened. ***geranii*** form ***maculata*** Rob.


Inclosure of metathorax longitudinally striate or ridged. .......... 143.


Head and thorax with long whitish pubescence, especially abundant on clypeus. Eyes wider apart below than above. .......... ***erigenia*** Rob.

144. Males. ........................................... 145.

Females ........................................... 158.

145. Larger, 10 mm. and over ........................................... 146.

Smaller, 7 mm. to 9 mm. ........................................... 147.

146. Wings clear hyaline, the nervures and stigma brown. Pubescence silky grayish white, long on head and thorax; bands on abdomen at apex of segments, interrupted and poorly defined. .......... ***elietricha*** Casad. & Ckll.

Wings hyaline, the apex broadly dusky. Pubescence yellow ochraceous, long and dense. Apical margins of segments subtestaceous and furnished with bands of short dense yellowish pubescence. ***texana*** Cress.

147. Pubescence on head and thorax more or less fulvous or rufous. .......... 148.

Pubescence on head and thorax whitish, ochraceous, or at most brownish white ........................................... 151.

148. Wings somewhat infuscated or clouded apically. .......... 149.

Wings hyaline or at most smoky-hyaline. .......... 150.

149. Head and thorax clothed with a thin pale pubescence, inclining to rufous on clypeus and mesonotum. The fascie on abdomen interrupted. ***hippotes*** Rob.


Nervures and stigma testaceous. Abdominal segments 2-4 with narrow fascie, interrupted on 2 and 3. .......... ***spiræana*** Rob.

151. Head and thorax with pubescence brownish white. Wings hyaline, the nervures piceous, stigma pale brown, marginal with piceous. Abdomen with interrupted fascie. .......... ***Knutthiana*** Ckll.

Head and thorax with the pubescence whitish or pale yellow. .......... 152.
152. Head larger, broader than thorax, strongly produced behind the eyes. 153. Head moderate, not strongly produced behind the eyes. 155. Wings smoky-hyaline, tinged brownish, nervures and stigma brown. Mandibles toothed within. Thin hair bands on segments 5 and 6.

**platyparia** form **occidentalis** Ckll.

Wings hyaline, nervures and stigma honey-yellow. Mandibles long, slender, the extreme base toothed below.


155. Wings hyaline, iridescent, the nervures and stigma testaceous. Abdomen covered above with hairs.

156. Inclosure at base of metathorax not margined and scarcely rugulose. Abdominal fasciae almost obsolete.

**meesta** Sm.

Inclosure at base of metathorax bounded by an impressed line, rather dull and minutely roughened. Hind margins of segments with thin white hair bands. Antennæ wholly black, moniliform.

**monilicornis** Ckll.

157. Nervures and stigma pale yellow. Apex of abdominal segments somewhat depressed, testaceous, and more or less covered with pale hair bands.

**macilenta** Prov.

Nervures and stigma brown or ferruginous.

158. Pubescence on head and thorax long, white or pale yellow. Fasciae of long white hairs on abdominal segments. Stigma ferruginous.

**distans** Prov.

Pubescence on head and thorax white, more or less mixed with black on vertex and about antennæ. Stigma very dark brown.

**segregans** Ckll.

159. Larger, usually 12 or more mm. in length.

Medium, between 10 and 12 mm. in length.

Smaller, between 8 and 10 mm. in length.


Stigma of anterior wing normal. Pubescence variable.

161. Anal fimbria sooty. Abdominal fasciae white, that on 1 interrupted, on 2-4 continuous.

**Barberi** Ckll.

Anal fimbria yellowish or fulvous. Abdominal fasciae more or less ochraceous.

162. Wings milky white, the nervures and stigma dark ferruginous. Abdomen with thin fasciae on segments 2-4.

**Grænicheri** Ckll.

Wings more or less hyaline.

163. Apical margins of abdominal segments testaceous.

Apical margins of abdominal segments concolorous. Wings smoky, their apical margins clouded, nervures dark ferruginous. Fimbria reddish ochraceous.

**nitudor** Ckll.

164. Wings clear hyaline, the nervures and tegulae pale testaceous. Fimbria pale fulvous.

**helianthi** Ckll.

Wings fulvo-hyaline, apical margins clouded, nervures testaceous. Fimbria golden-yellow.

**rudbeckiae** Rob.
165. Pubescence for the most part fox-red, moderately long and dense. Segments 2-4 with apical hair bands of the same color. *Vulpicolor* Ckll.

166. Pubescence on head and thorax more or less fulvous. *Macgillivrayi* Ckll.

167. Wings yellowish-hyaline, nervures (except subcostal) and stigma ferruginous. Sides of abdominal segments 2-4 with pubescence on hind margins. *Hilaris* Sm.


169. Abdomen thinly covered above with hoary pubescence, the apical margins of the segments beneath fringed with the same. *Macgillivrayi* Ckll.


171. Smaller, 10 mm. in length. *Imitatrix* Cress.
177. Faciae on abdominal segments widely interrupted. .......... 178.
Faciae on abdominal segments white, more or less complete. 179.
178. Insect clothed on thorax with long dense pubescence. The abdominal fasciae composed of fulvous hairs. Fimbria dark rufous.

**striatifrons** Ckll.

Insects thickly clothed on thorax with short pubescence. The abdominal bands composed of whitish hairs. Fimbria fulvous. **rugosa** Rob.

179. Hair band on segment 2 interrupted 180.

Hair bands on segment 2, as well as on the others, complete 181.


**claytoniae** Rob.

Wings hyaline, apical margins somewhat clouded, the nervures and stigma testaceus. Fimbria dull ferruginous **quintilis** Rob.


**Forbesii** Rob.

182. Wings fusco-hyaline, apical margins a little clouded, nervures and stigma dull testaceus. **Cressonii** Rob.

Wings yellowish-hyaline, nervures (except black subcostal) and stigma ferruginous. **Macgillivrayi** Ckll.

183. Pubescence more or less ochraceous. 184.

Pubescence white or whitish 185.

184. Abdominal fasciae reduced to lateral patches. 185.

Abdominal fasciae more or less complete. 186.

185. The fasciae in the form of a fringe on the sides of segments 3 and 4. Fimbria fuscous. **placida** Sm.

The fasciae in the form of well-marked patches of white hair on the lateral margins of segments 2-4. Also some scattered glistening yellow hairs across middle of 3 and 4. Segment 5 and fimbria fulvous.

**grandior** Ckll.

186. The fasciae white. 187.

The fasciae obscure, grayish or yellowish. 188.


The pubescence long and dense, ochraceous on dorsum of thorax, elsewhere whitish. Fasciae on 2-4 complete. Fimbria gray-brown.

**sapellonis** Ckll.

188. The cheeks strongly produced behind the eyes. Mandibles long and slender, toothed below at extreme base. Abdominal segments with obscure fasciae on their pale testaceus edges. Fimbria fuscous.

**mandibularis** Rob.

The cheeks normal, not strongly produced behind the eyes. 189.

189. Abdomen with very distinct pale gray hair bands, all continuous. Wings clear hyaline, nervures, stigma and tegulae brown.

**electrica** Casad. and Ckll.

190. Abdominal segments 2-4 with pale testaceous margins and thin white hair bands. Fimbria blackish. \textit{salicacea} Rob.
Abdominal segments without testaceous margins. \textbf{191.}

Fasciae more or less complete. Basal nervure normal. \textbf{192.}

192. Segments 2-4 with thin fasciae of white on the broadly depressed apical margins. \textbf{asteris} Rob.
Segments 2-4 normal, their fasciae snow-white; that on 2 interrupted. \textbf{prunifloris} Ckll.

193. Pubescence on head and thorax above darker, more or less fulvous or blackish. \textbf{194.}
Pubescence on head and thorax above pale, more or less white, gray, yellow or ochraceous. \textbf{194.}

194. Head and thorax with considerable of the pubescence black. Abdominal segments 2-4 with lateral apical bands of white pubescence. Wings smoky. \textbf{195.}
Head and thorax above with the pubescence chiefly fulvous. \textbf{196.}

195. Head broad, the cheeks large and shining. Basal joint of hind tarsi narrower than the other. Fimbria silvery gray. \textbf{parnassiae} Ckll.

196. Abdominal fasciae fulvous. \textbf{197.}
Abdominal fasciae white or pale. \textbf{198.}

197. Wings fulvo-hyaline, the nervures, stigma and tegulae rufotestaceous. Abdomen with silken gloss. Fimbria ferruginous. \textbf{fulvipennis} Sm.
Wings yellowish-hyaline, faintly clouded beyond the marginal cell; nervures and stigma honey-yellow. Fimbria brown. \textbf{salicis} Rob.

198. Segments 2 and 3 at the sides with apical pubescence. The margins obscurely rufo-piceous. Fimbria rufo-piceous. \textbf{integra} Sm.
Segments 2-4 with their fasciae more or less complete. \textbf{199.}

199. Hair bands dense, moderately wide, interrupted on segment 2. \textbf{200.}
Hair bands thin and narrow. \textbf{201.}

Fasciae ochraceous. Fimbria brownish ochraceous. Wings slightly yellowish, the stigma and nervures largely testaceous. \textbf{pacta} Vier.

201. Apical margins of segments narrowly testaceous. Fimbria fuscous. \textbf{scutellata} D. T.
Apical margins of segments concolorous. Fimbria fuscous. \textbf{202.}

202. Wings hyaline, iridescent, slightly clouded at apex; nervures and stigma ferruginous. Abdominal fasciae sometimes interrupted on 2 and 3. \textbf{miranda} Sm.
Wings hyaline, nervures and stigma testaceous. Abdominal fasciae interrupted on 2 and 3. \textbf{spireana} Rob.

203. Thorax with ochraceous pubescence. \textbf{204.}
Thorax with light yellow or grayish pubescence. \textbf{206.}

204. Abdominal segments provided with conspicuous white hair bands, interrupted on 1. Wings smoky, nervures dark brown. \textbf{clypeonitens} Ckll.
Abdominal segments 2–4 provided with narrow hair bands. 205.

205. Wings hyaline, nervures and stigma testaceous. Fimbria ochraceous.

lauracea Rob.

Wings subfuscous, the apex faintly clouded, nervures dark brown, stigma slightly paler. Fimbria dark brownish. truncata Vier.

206. Anal fimbria lighter, dirty white, yellowish or pale ochraceous. 207.

Anal fimbria darker, ferruginous-fuscous, fulvous or brownish. 213.

207. Fimbria yellowish or ochraceous. Abdominal segments narrowly testaceous at apex. 208.

Fimbria dirty white. Abdominal segments with their apices only in part testaceous. 209.


Apex of abdominal segments with bands of dirty white hairs, interrupted on 2. Fimbria yellowish. Inclosure with very obscure rim, punctured like the part beyond. salicina Ckll.

209. Wings with the apex quite noticeably smoky. Abdomen with apical bands of long white pubescence, thin on 1, dense on 2–5.

xanthigera Ckll.

Wings with the apex not noticeable dusky. 210.

210. Wings hyaline, the nervures and stigma pale yellow. Segments 2–4 with more or less complete bands. 211.

Wings hyaline or subhyaline, the nervures brown or fuscous. Tips of abdominal segments not noticeably testaceous. 212.

211. Abdomen black, apical margins of segments markedly testaceous. macilenta Sm.

Abdomen pale brown, apical margins not markedly lighter colored. trizonata Ashm.

212. Abdominal segments 2–4 with fringe of long white hair, interrupted on 2. Length 9 mm. distans Prov.

Abdominal segments 2–4 with apical fasciae of dirty white hairs. Length 8 mm. aliena Sm.

213. Fasciae on abdominal segments incomplete or interrupted in the middle. 214.

Fasciae on abdominal segments at least in part complete. 218.

214. Wings with a decidedly yellowish tinge. 215.

Wings not decidedly yellowish. 216.


Abdominal segments 2–4 with interrupted fasciae of sparse white hair. Fimbria brownish. atala Vier.

216. Anal fimbria pale fulvous. hippotes Rob.

Anal fimbria sooty or brownish. 217.

217. Pubescence on thorax above brownish white. Wings with nervures piceous, the stigma pale brown, marginal with piceous. Fimbria dark purplish gray. Knuthiana Ckll.

Pubescence on thorax above pale ochraceous. Wings subfuscous, the apex faintly clouded, the nervures dark brown, stigma slightly paler. Fimbria brownish dark. truncata Vier.

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218. Pubescence darker, on cheeks, top of head and thorax, above dull fulvous.  
Fimbria brownish .................................................. beulahensis Vier. 
Pubescence lighter, whitish, yellowish or pale ochraceous ............... 219. 
219. Triangle at base of thorax finely roughened or granulated .......... 220. 
Triangle at base of thorax rather strongly reticulated or longitudinally plicate or rugose 
220. Pubescence on head and thorax grayish yellow. Tips of segments testaceous. 
Fimbria fulvous....................................................... frigida Sm. 
Pubescence on head and thorax white or dull white, without the yellowish tinge ................................................................. 221. 
221. Wings yellowish, nervures brownish, the stigma deep honey yellow. Segments 1–4 with broad but very thin apical fasciae of dull white hairs. 
apacheorum var. a Ckll. 
Wings smoky or smoky hyaline ........................................... 222. 
222. These members hyaline ............................................. 223. 
These members more or less smoky .................................. 224. 
223. Nervures and stigma dull testaceous. Head broader than thorax; cheeks broad and rounded. Abdominal fasciae thin, narrow, whitish, complete. 
geranii maculata Rob. 
Nervures and stigma dark brown. Head normal. Abdominal fasciae on segment 1 almost obsolete ........................................... segregans Ckll. 
224. Wings faintly clouded apically. Abdominal fasciae interrupted on segments 1 and 2 ...................................................... simplex Sm. 
Wings not clouded. Abdominal fasciae on 1 only interrupted. 
solidaginis Rob. 
225. Inclosure with its surface reticulated. Head large, broader than thorax, the cheeks strongly and broadly produced behind the eyes, bordered by a rim .................................................. platyparia Rob. 
Inclosure with its surface longitudinally ridged, plicate or striate ...... 226. 
Pubescence sparse, the thorax above nearly bare. Abdominal segments with apical margins narrowly testaceous and with fasciae of white hairs on 2–4 ..................................................... 228. 
227. Apical margins of abdominal segments 2–4 fringed with white pubescence, anal fimbria slightly fulvous ........................................ algida Sm. 
Apical margins of abdominal segments 1–4 fringed rather broadly with dirty white pubescence. Fimbria inclining to fuscous .............. erigenæ Rob. 
228. Clypeus smooth, shining and impunctate, except on the sides. Mesothorax with scarcely a trace of punctures ......................... bipunctata Cress. 
Clypeus minutely tessellate and dull all over, with rather sparse shallow punctures. Mesothorax with distinct though shallow and rather sparse punctures .................................. hartfordensis Ckll. 
229. * The prevailing color of entire insect blue or greenish. .............. 230. 
The prevailing color black, but in some instances the abdomen may be more or less ferruginous ........................................... 231. 
230. Steel-blue, sometimes tinged with dark green; the pubescence mostly pale, male and female ........................................... chalybea Cress. 

This section, as represented in the present table, undoubtedly contains forms that should be referred elsewhere.
AMERICAN HYMENOPTERA.

Shining blue-black, the pubescence entirely black, female; on cheeks, front, occiput and thoracic dorsum dull white, male .......... **Foxii** Ckll.

231. Females .................................................. 232.
   Males ..................................................... 237.

232. Head and thorax black. The abdomen rufous or reddish ...... 233.
   Entire insect black ........................................ 234.

   Abdomen mostly orange rufous, practically naked above, except on the apex which is strongly fringed with pale ochraceous hairs. Flies in fall.
   **pectidis** Ckll.

234. Pubescence throughout black ........................... **phenax** Ckll.
   Pubescence pale, or at most only a few black hairs intermingled with the prevailing light colored ones ....................... 235.

235. Hind margins of abdominal segments furnished with uniform bands of dense, appressed white pubescence, the adjacent bases of the following segments with similar but thinner and narrower bands.
   **rhodocerata** Ckll.
   Hind border of abdominal segments with less conspicuous light hair bands .......................................................... 236.

236. Smaller (8–9 mm.); the metathorax rather minutely granular; the wings yellowish fuliginous .......... **andrenoides** Cress.
   Larger (9–10 mm.); the metathorax more rugose, and the wings clearer than the preceding .......... **wellesleyana** Ckll.

237. Provided with yellow face marks ................................ 238.
   Face wholly black .......................................... 241.

238. Clypeus, together with a portion of face, yellowish ........ 239.
   Clypeus alone yellow (7 mm.) .......... **concinnula** Ckll.

239. Clothed on head and thorax with rather long whitish pubescence, that on abdomen short and sub-erect...... 240.
   Clothed on head and thorax with fulvous-yellow pubescence (7½ mm.).
   **nevadensis** Cress.

240. Clypeus somewhat bulging, smaller (8½ mm.) .......... **andrenoides** Cress.
   Clypeus more flattened, larger (9 mm.) .......... **wellesleyana** Rob.

   Abdomen without hair bands ................................ 244.

242. The head wider than the thorax, face narrowing below, flagellum rufous below ......................... 243.
   Head not wider than the thorax. Abdomen clothed with short sub-erect pale pubescence mixed with black, apical margin of each segment with a regular narrow fascia of dense white pubescence (10 mm.).
   **regularis** Cress.

243. Larger (8–9 mm.); tarsi ferruginous, the wings slightly dusky toward apex.
   **rhodocerata** Ckll.

244. Smaller (6½ mm.); wings hyaline, slightly dusky at tips.
   **nigrifrons** Cress.

245. Larger (8 mm.); wings perfectly clear. ............... **enochi** Ckll.
The following normally three-celled species are also occasionally found in which one or both wings have but two submarginal cells: *bipunctata, claytonia, hippotes, platyparia, robertsonii, solidaginis, personata, asteris, krigiana, milwaukeeensis*, etc.

Since this table was finished, Dr. S. Graenicher, of Milwaukee, Wisconsin, has published a paper in the *Canadian Entomologist* (June, 1903, pp. 162-166), in which five additional species are described. As a remodelling of the table at this time is impracticable, it may suffice to indicate briefly where these new forms would fall:

The species *thaspii* Graen., ♀, will come in the vicinity of *frigida* Sm., or *lauracea* Rob., both of which it resembles in some respects. *Cockerelli* Graen., ♂, comes nearest *macoupinensis* Rob., from which it differs by having the facial fovee black instead of pale, and the fimbria purplish instead of ochraceous. The male of *Cockerelli* may be compared with *perarmata* ♂, but lacks the tooth at base of mandibles of the latter. *Milwaukeeensis* Graen, ♀, is nearest to *impuncta* Kby., but differs from it by having the pubescence on two basal segments of abdomen ochraceous to fulvous, instead of whitish. The male of this species has the pubescence entirely fulvous, and the head extremely broad. The *viburnella* Graen., ♀, will fall in the vicinity of *rufosignata* Ckll., and his *albofoveata* ♀ seems to come near *platyparia* Rob., and *hartfordensis* Ckll.