A review of the genus *Bicyrtes* (Hymenoptera: Sphecidae, Nyssoninae, Bembicini)

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Abstract. *Bicyrtes* is a moderate-sized bembicine sand wasp which is restricted to the New World. The 27 known species include 4 new ones: *B. brasiliana* (Brazil), *B. chilicola* (Chile and Peru), *B. paranoe* (South America), and *B. venezuelae* (Venezuela). Some characters not previously used are found in the descriptions and the key to species, amplified by 46 illustrations.

*Bicyrtes* Lepeletier 1845:58 was described with *servillii* Lepeletier as the monotype. However, this species had been described previously by Say (1824:336) as *Monedula ventralis*, one of two common species of *Bicyrtes* in the United States. The nomenclatural history of *Bicyrtes* and its relatives was given by Bohart and Menke (1976:53).

The first comprehensive key to the genus was by Handlirsch (1889:501). Improvements in it were made by J. Parker (1929:165), Willink (1947:555) (South America only), and Bohart and Horning (1971:20) (North America only). In view of several new species, some new synonymy, some previously unused characters, and extensions of geographical ranges, a new key is offered here.

All workers have put considerable reliance on color patterns, particularly for females, which have fewer "structural" characters than males. Therefore, the key to females must be used with caution (see note on variation of color pattern in *B. cingulata*). "Structural" characters, such as shape of the male labrum (in *cingulata*), legs, propodeal flanges, male antennal structure, male genitalia, shape of male T-VII, and female pygidial plate are emphasized in the key.

Technically, this New World genus can be recognized by the scarlike (but not depressed) midocellus, 6-4 palpal formula, and lateral propodeal angles projecting backward as flanges. Ordinarily, the white or yellow, medially interrupted, bands on most terga can be used for recognition. However, a few species such as *simillima* may have lateral tergal spots only. Also, species of *Bicyrtes* such as *angulata, fodiens, venezuelae,* and *capnoptera* may have complete bands.

Some species average larger or smaller than others. Thus *B. quadrifasciata, B. simillima,* and *B. pexa* usually have females of about 17 mm in length, whereas *B. insidiatrix* females are seldom more than 12 mm long. Of course, there is considerable size variation, which may result from amount of food available to the larvae. *Bicyrtes* provision with bugs, usually nymphs or adults of Pentatomidae, Coreidae, or Reduviidae.

Four new species are included in the key, *B. paranoe, R. venezuelae, B. brasiliana,* and *R. chilicola.* This brings to 26 the total number of described species.

Terms used in the key, which may be unfamiliar, are: F-I etc., flagellomeres; propodeal flange, flattened and posteriorly directed lateral projection; T-I etc., terga; S-I etc., sterna; clasper, gonostyle. Geographical ranges for the species are given in the male key.

Type depositories for species are in the following institutions, identified by the pertinent city.

American Museum of Natural History (New York)  
Argentine National Museum (Buenos Aires)  
Austrian Natural History Museum (Vienna)  
Belgian Museum of Natural History (Brussels)  
British Museum of Natural History (London)  
California Academy of Sciences (San Francisco)  
Carnegie Museum (Pittsburgh)  
Cornell University (Ithaca)  
Florida State Collection of Arthropods (Gainesville)  
Humboldt Museum (Berlin)  
Kansas University Snow Museum (Lawrence)  
Laval University Provancher Collection (Quebec)  
Miguel Lillo Institute, Argentina (Tucuman)  
Swiss Natural History Museum (Geneva)  
University of California Bohart Museum (Davis)  
University of Denmark Zoology Museum (Copenhagen)
I would like to thank the curators of the above institutions for sending me types or giving me access to collections under their care. Types studied are indicated by an asterisk in the synonymy listed. Special help has been given by several curators: Arnold Menke (Washington), Lynn Kimsey (Davis), Lionel Stange (Gainesville), and Woj. Pulawski (San Francisco).

**Key to species of the genus Bicyrtes**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Species mentioned or suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Males, flagellum with 11 articles, abdomen with 7 visible terga</td>
<td>odontophora (Handlirsch)</td>
</tr>
<tr>
<td></td>
<td>Females, flagellum with 10 articles, abdomen with 6 visible terga</td>
<td>colombica Fritz</td>
</tr>
<tr>
<td>2.</td>
<td>Forebasitarsus stout, less than 4x as long as broad</td>
<td>odontophora (Handlirsch)</td>
</tr>
<tr>
<td></td>
<td>— Forebasitarsus slender, 5 to 6x as long as broad</td>
<td>paraguayana Strand</td>
</tr>
<tr>
<td>3.</td>
<td>Midcoxa with an inner posterior projection or spine</td>
<td>tricolorata J. Parker</td>
</tr>
<tr>
<td></td>
<td>— Midcoxa simple</td>
<td>tricolorata J. Parker</td>
</tr>
<tr>
<td>4.</td>
<td>Labrum with an inner posterior projection or spine</td>
<td>fodiens (Handlirsch)</td>
</tr>
<tr>
<td></td>
<td>— Labrum smoothly convex</td>
<td>fodiens (Handlirsch)</td>
</tr>
<tr>
<td>5.</td>
<td>Midtibia compressed subapically in edge-on view</td>
<td>ventralis (Say)</td>
</tr>
<tr>
<td></td>
<td>— Midtibia not compressed subapically</td>
<td>ventralis (Say)</td>
</tr>
<tr>
<td>6.</td>
<td>Labrum strongly bent out subapically; scutum without a discal pair of spots anteriorly; mideoxal projection large, flattened; F-XI hooklike</td>
<td>fodiens (Handlirsch)</td>
</tr>
<tr>
<td></td>
<td>— Labrum with a tooth or protruding angle at inner apex; midfemur with thin and sharp-edged basal expansion</td>
<td>fodiens (Handlirsch)</td>
</tr>
</tbody>
</table>
15. Submarginal cell I brown with a small, clear apical area, labrum usually black (w. Texas, New Mexico, Arizona, south to Costa Rica) viduata (Handlirsch)

— Submarginal cell I not brown, labrum not usually all black ............................................ 16

16. T-V-VI with little, if any, pale markings, mesothoracic dorsum usually all black .......................... 17
— T-V-VI or VII with pale markings, mesothoracic dorsum various ........................................... 18

17. Midoxa with thick inner fringe of whitish hair, lateral tergal spots rounded, clasper slender toward apex but not "rat-tailed" (Brazil, Argentina) simillima (F. Smith)

— Midoxa without unusual pubescence, tergal spots narrowed or forming disconnected bands posteriorly, clasper "rat-tailed" toward apex (as in Fig. 24) (U.S. e. of Rocky Mts.) quadrifasciata (Say)

18. F-IV expanded toward apex in profile and meeting F-V which is enlarged slightly toward base, clasper with fringe covering outer one-third ............................................ 19
— F-IV not swollen in profile and not meeting an enlarged F-V, clasper various .................................. 21

19. Scutellum, metanotum, mesopleuron all black, clypeus yellow with broad basal black mark (French Guiana, Brazil) pexa J. Parker

— Scutellum, metanotum, mesopleuron with pale markings, clypeus various ..................................... 20

20. Hindfemur with irregular posterior margin, concave in part (Fig. 7), foretarsus relatively slender (compare Figs. 8, 9), clypeus whitish with large broad basal black mark (Mexico, Caribbean Islands through Central America to Argentina) discisa (Taschenberg)

— Hindfemur with posterior margin slightly but smoothly convex; foretarsus relatively stout (compare Figs. 8, 9), clypeus usually light yellow, occasionally whitish, with small basal black mark (Venezuela) venezuelae R. Bohart

21. Scutellum with a medially interrupted anterior yellow band, scutum with elongate anterodiscal spots (as in Fig. 42), clasper "rat-tailed" toward apex (w. Texas, Mexico, West Indies to Argentina) variegata (Olivier)

— Scutellum without anterior yellow band, other characters various ............................................. 22

22. T-VII narrowly rounded at apex, with a strong lateral tooth (Fig. 14); clasper slender in dorsal view (Fig. 22) (Paraguay, Argentina) ................................................. anisifis Strand

— T-VI without lateral tooth, clasper less slender ................................ 23

23. Hindfemur somewhat expanded and sharply edged beneath near base (as in Fig. 2), F-IV-VIII with orange tyli, F-I slightly shorter than scape (U.S. n. Mexico) capnoptera (Handlirsch)

— Midfemur not appreciably expanded toward base, flagellum various ........................................ 24

24. Scutellar spots pointing inward anteriorly (as in Fig. 45); clasper fringed along outer edge, tapering to a point (Cuba, Virgin Islands, Bahamas, Dominica, Florida) spinosa (Fabricius)

— Scutellar spots not pointing inward anteriorly, clasper various .................................................................. 25

25. Flagellum mostly orange beneath, with a series of orange tyli on F-III to F-V; clasper with outer one-third covered with fringelike hair (as in Fig. 21) (Argentina) mendica (Handlirsch)

— Flagellum all black at least beyond F-I, clasper with fringe of hair along lateral edge (as in Fig. 23) .......... 26

26. Labrum and clypeus all yellow, femora and tibiae all yellow; rake spines of foretibial I mostly longer than foretibial II; T-VII slightly concave posteriorly (Chile, Peru) chilicola R. Bohart

— Labrum, at least, all dark or mottled, femora and tibiae with some dark markings; rake spines of foretibial I not longer than foretibial II; T-VI rounded posteriorly (Arizona, Mexico) affinis (Cameron)

27. Pygidial plate well defined, measured by a lateral carina, longer than scape (Figs. 26, 28, 29); lateral propodeal flange rounded (as in Fig. 41) ............................................. 28

— Pygidial plate not well defined, or lateral carina not as long as scape: lateral propodeal flange various ......... 31

28. S-VI, as seen in perpendicular view of T-VI, crescentic, not angularly protruding (Fig. 26) .................... 29
— S-VI, as seen in perpendicular view of T-VI, angularly flared (Figs. 28, 29) .......................................... 30

29. F-I and several following flagellomeres yellow to orange beneath; F-I about as long as scape, body markings various; capnoptera (Handlirsch)

— F-I and following flagellomeres black; F-I considerably longer than scape; clypeus, labrum, and tibiae all yellow chilicola (R. Bohart)
30. Pygidial plate long and narrow (Fig. 29), S-II sometimes bispinose, hindcoxa not toothed at inner apex

— Pygidial plate stouter (Fig. 28), S-II not bispinose, hindcoxa toothed at inner apex ......................... anisitsi (Strand)

31. Propodeal flange pointed rather than rounded (Figs. 39, 40), T-VI with a distinct median carina or ridge (Fig. 37) ............................................. 32

— Propodeal flange rounded rather than pointed (Fig. 41). T-VI various ............................................. 34

32. Legs and scape extensively red ............................................. angulata (F. Smith)

— Legs and scape not extensively red ................................. 33

33. Clypeus entirely, and labrum at least partly, yellow; forebasitarsus sometimes all or partly yellow colombica Fritz

— Clypeus largely and labrum entirely black, forebasitarsus black (Fig. 30). cingulata (Burmeister) .............................................

34. Legs mostly extensively red ............................................. 35

— Legs mostly black and yellow, not mostly red ...... 36

35. Legs almost wholly red, forewing radial vein black, mesopleuron black. insidlaurex (Handlirsch)

— Legs red and yellow, forewing radial vein dark red basal, remainder red, mesopleuron yellow-marked tricolorata J. Parker

36. Forewing submarginal cell I brown except for a small apical clear spot ............................................. viduata (Handlirsch)

— Forewing submarginal cell I not almost entirely brown ................................. 37

37. T-III yellow markings much closer together than those on T-IV ............................................. quadrisectata (Say)

— T-III yellow markings not much closer together than those on T-IV ................................. 38

38. Scutellum with a nearly complete anterior yellow band (Fig. 42), scutal discal spots narrow and attenuate (Fig. 39), propodeal flange broadly rounded (as in Fig. 41) ............................................. variagata (Olivier)

— Scutellum without spots or with lateral ones, scutal spots and propodeal flange various ......................... 39

39. Clypeal black mark basal, bipartite (Fig. 35). T-VI spots, if any, widely separated, propodeal flange narrowly rounded, scutum with discal yellow spots elongate, longer than broad ............................................. odontophora (Handlirsch)

— Clypeal black mark (if any) not bipartite, or T-VI spots not widely separated, other characters various 40

40. T-I to V with widely separated yellow spots, scutum without discal spots, T-VI black, propodeal flange narrowly rounded ............................................. simillima (F. Smith)

— Tegular spots mostly close or joined medially, other characters various ................................. 41

41. Clypeus with black marks along its lower rim (Fig. 36) or more extensive apically; propodeal flange broadly rounded ............................................. ventralis (Say)

— Clypeal black marks basal or absent, propodeal flange various ............................................. 42

42. Scutum all black except for tiny posterolateral dot; mesopleuron all black except for dot behind pronotal lobe; flagellum yellow toward base; F. I all yellow; clypeus yellow with basal mark, with coarse and separated punctures ............................................. pexa J. Parker

43. Flagellum dusii reddish beneath toward base, clypeus smooth and all yellow or nearly so, scutum with mediiodiscal pale spots mendica (Handlirsch)

— Flagellum black beneath toward base, other characters various ............................................. 44

44. Scutellar spots pointing inward anteriorly (Fig. 45); scutal spots large and stout (Fig. 44), labrum all yellow, clypeus usually with a basal black spot ............................................. spinosa (Fabricius)

— Scutellar spots oval or squarish but not pointing inward anteriorly, their size various; other characters various ............................................. 45

45. Clypeus with a basal black spot which is triangular and longer than broad (as in Fig. 34), or short and broad ............................................. 46

— Clypeus without a basal black spot, or with spot at least as broad as long, not short and basai 47

46. Forebasitarsus margined with black along posterior edge (Fig. 31); clypeus with black markings, if any, along apical edge; labrum usually all black, apicomedial carina of S-VI as long as scape, T-VI black ............................................. affinis (Cameron)

— Forebasitarsus not black margined; clypeus with broad basal black mark, sometimes bipartite, labrum yellow; apicomedial carina of S-VI shorter than scape (Fig. 39); T-VI with two yellow spots ............................................. paranae R. Bohart
47. T-V spots narrow to linear, not rounded; all tergal bands weak, sometimes widely broken medially; T-VI black, scutal dots small, scutellar spots also small, foretarsal I black-rimmed or red-spotted. — T-V spots rather large, rounded, other characters various. 48

48. Scutal spots large and posteriorly pointed, about as long as scape or longer (Fig. 43); scutellar spots large and usually pointing inward; clypeal black mark small, T-VI various. — Scutal spots small or merely dots, shorter than scape; scutellar spots narrow, clypeal black mark various; T-VI sometimes spotted. 49

49. Hindleg almost all black on inner side, T-VI black, clypeal black mark small but irregularly rounded and about as broad as long. — Hindleg with tibial inner black streak stopping short of apical red spot; forebasitarsus various. — ref: Bembidula anisitsi Strand 1910:142. Syntypes, male, female, Villa Mora, Paraguay (Berlin).

— Clypeal black mark small and triangular, anterodiscal scutal yellow spots usually small, hindtibial black inner streak complete, forebembesticus nearly always black rimmed or with red spots (Fig. 33). — discus (Taschenberg)

— Clypeal black mark small and triangular, anterodiscal scutal yellow spots large, hindtibial black inner streak stopping short of apical red spot; forebembesticus various. — illoii Willink

49. Hindleg almost all black on inner side, T-VI black, clypeal black mark small but irregularly rounded and about as broad as long. — Hindleg with tibial inner black streak stopping short of apical red spot; forebasitarsus various. — ref: Bembidula anisitsi Strand 1910:142. Syntypes, male, female, Villa Mora, Paraguay (Berlin).

— Clypeal black mark small and triangular, anterodiscal scutal yellow spots usually small, hindtibial black inner streak complete, forebembesticus nearly always black rimmed or with red spots (Fig. 33). — discus (Taschenberg)

— Clypeal black mark small and triangular, anterodiscal scutal yellow spots large, hindtibial black inner streak stopping short of apical red spot; forebembesticus various. — illoii Willink

Bicyrtes angulata (F. Smith)


I have studied about 10 specimens of each sex, and they seem to be relatively uniform. All have the basal half to two-thirds of the clypeus red, bordered at the extreme base with black in males. The angular propodeal flange is a dominant feature (as in Fig. 39).

Bicyrtes anisitsi (Strand)

Bembidula anisitsi Strand 1910:142. Syntypes, male, female, Villa Mora, Paraguay (Berlin).

Bembidula tridentata Strand 1910:146. Holotype male, Villa Mora, Paraguay (Berlin).


The laterally toothed male T-VII is diagnostic (Fig. 14). It is reminiscent of a similar condition in Microbembex uruguayensis (Holmberg), where it occurs in both sexes. Of course there are no lateral propodeal flanges in Microbembex. However, these are only weakly developed in B. anisitsi. A basic difference between the 2 genera is that Microbembex has abbreviated palpi, rather than the standard 6-4 of Bicyrtes. In females of both B. anisitsi and B. fodiens S VI protrudes beneath T VI. In anisitsi, this peculiarity is angular (compare Figs. 28, 29). I have studied only three males and two females of this distinctive species.

Bicyrtes affinis (Cameron)


The relatively evenly spaced mesopleural punctuation is a character most useful to separate affinis from other North American species. Yellow markings are subject to some variation. Among the 32 males in the collection, all have a black apical rim on the clypeus, all have a black or mottled labrum, 31 have the propodeal dorsum black, all have T-VI black, and discal area of the scutum black or (in 2 cases) with minute dots. In the 10 females, 7 have dorso medial propodeal spots or a narrow band, 7 have small anterodiscal scutal spots, all have foretarsal I black-rimmed (Fig. 31), all have labrum black and clypeus with apical black rim.

Bicyrtes affinis (Cameron)


The relatively evenly spaced mesopleural punctuation is a character most useful to separate affinis from other North American species. Yellow markings are subject to some variation. Among the 32 males in the collection, all have a black apical rim on the clypeus, all have a black or mottled labrum, 31 have the propodeal dorsum black, all have T-VI black, and discal area of the scutum black or (in 2 cases) with minute dots. In the 10 females, 7 have dorso medial propodeal spots or a narrow band, 7 have small anterodiscal scutal spots, all have foretarsal I black-rimmed (Fig. 31), all have labrum black and clypeus with apical black rim.

Bicyrtes brasiliana R. Bohart, new species

Male holotype: Length 15 mm. Holotype male (San Francisco), Barre do Tapiraque, Mato Grosso, XII-11-62 (B. Malkin). Paratype male (Davis), same data as holotype except XII-18-62. Black, marked with whitish yellow as follows: scape in front, mandible mostly, clypeus except for broad and irregular basic mark, labrum, frons laterally, narrow postocular strip, pronotum narrowly in front, continued to pronotal lobe and large attached spot, anterodiscal long oval spots, two long lateral scutal marks nearly joining long lateral scutellar marks, wings at base, broad spots on metanotum and dorsum of propodeum, flange of propodeum...
apically, large mesopleural spot, fore- and midfemora outwardly, hindfemur likewise except for basal spot (Fig. 6), narrowly interrupted bands on T-I to T-VI, lateral spot on T-VII, lateral spots on S-I to S-V; antennal tip reddish; forewing faintly tinted. Pubescence fine and silvery on clypeus and sternum, some erect black bristles on S-V to S-VII, fore- and hindfemur posteriorly edged with fine pale pubescence (Fig. 6). F-IV to F-VI somewhat enlarged, shiny oval spots beneath F-V-VI, forebasitarsus and following article as in Fig. 11, former nearly parallel-sided, foretarsomeres IV, V ventrally as in Fig. 15, IV with prominent transparent "window", midfemur serrate below (about as in Fig. 1), S-II with small median tooth, propodeal flange broadly rounded, T-VII distinctly angled medially, clasper with "rat-tailed" apex, fringed laterally (Fig. 24).

Female. Unknown.

The peculiar ventral aspect of foretarsomere V (Fig 15) with its large clear "window" has not been noted in any other Bicyrtes. This condition occurs in both types. Other features which differentiate B. brasiliana from B. paranae are the nearly straight-sided forebasitarsus of the former (Fig. 11), and its densely fringed hindfemur (Fig. 6).

*Bicyrtes capnoptera* (Handlirsch)


*Bembidula mesillensis* Cockerell 1898:142. Holotype male*, Las Cruces, New Mexico (Washington).

*Bicyrtes annulata* J. Parker 1917:67. Holotype female*, Oak Creek Canyon, Arizona (Lawrence).

*Bicyrtes triaisi* C. Fox 1923:435. Holotype male*, presumably from La Paz, Baja California Sud, Mexico (San Francisco).

This common species has the greatest variation in markings of any Bicyrtes that I have seen (n=265). More northern U.S.A. specimens have a rather even distribution of black and yellow. More desertic material, and especially from the Imperial Valley of California, have the yellow component extended. Thus in such females the scutum, scutellum, propodeum, and terga may be mostly or all yellow. On the other hand, many specimens from Florida may have the markings red or red-tinted. Characters given in the key, particularly the well developed female pygidial plate (Fig. 26) simplify identification. Males have the midfemur compressed and somewhat expanded toward base (as in Fig. 2), but without a definite tooth (Fig. 3) as in *ventralis*.

*Bicyrtes chilicol6* R. Bohart, new species

Male holotype: Length 15 mm. Black, marked with sulfur yellow as follows: scape in front, mandible basally, clypeus, labrum, lower and lateral frons, narrow postocular strip, pronotal ridge including lobes, scutum laterally and a pair of lengthwise anterodiscal dots, tegula and post-tegula partly, squarish lateral scutellar spot, elliptical metanotal mark, band across propodeal summit, lateral propodeal flange, large triangle on mesopleuron, clasper with "rat-tailed" apex, fringed laterally (Fig. 24).

Female. Unknown.

The peculiar ventral aspect of foretarsomere V (Fig 15) with its large clear "window" has not been noted in any other Bicyrtes. This condition occurs in both types. Other features which differentiate B. brasiliana from B. paranae are the nearly straight-sided forebasitarsus of the former (Fig. 11), and its densely fringed hindfemur (Fig. 6).

B. capnoptera

paradctic.

Female. Unknown.

The peculiar ventral aspect of foretarsomere V (Fig 15) with its large clear "window" has not been noted in any other Bicyrtes. This condition occurs in both types. Other features which differentiate B. brasiliana from B. paranae are the nearly straight-sided forebasitarsus of the former (Fig. 11), and its densely fringed hindfemur (Fig. 6).
of basoventral edge, entire edge with fine short but thick pubescence. The female characters are less numerous; T-VI black, with a distinct pygidial plate; clypeus, labrum, tibiae all yellow; clypeus with a few deep punctures; F-I longer than scape; scutum with anterodiscal dots; and size large (for Bicyrtes). Relationships with other species are shown in the key. The species name indicates “living in Chile”.

**Bicyrtes cingulata** (Burmeister)

*Bombidula cingulata* Burmeister 1874:125. Holotype male*, “Cordova”, Argentina (Buenos Aires?).


The peculiar hooklike terminus of the male antenna (Fig. 16), along with the bent-out male labrum are diagnostic features. In females the pointed propodeal flange (Fig. 40), black labrum, and black forebasitarsus (Fig. 30) are distinctive taken together. Of the 10 females I have studied, 8 have T-I all black. Several specimens of both sexes labeled *micans* have T-III and following marked with yellow. Willink (1953:344) awarded these the status of subspecies. However, I consider them merely as a variety (n=33).

**Bicyrtes colombica** Fritz


The pointed propodeal flange (Fig. 39), and the midcoxal projection of the male (as in Fig. 13) place this species near *B. angulata* and *B. cingulata*. The 3 species are readily distinguished as indicated in the key. I have studied 8 specimens of each sex.

**Bicyrtes diodonta** (Handlirsch)

*Bembidula diodonta* Handlirsch 1889:484. Holotype male*, Orizaba, Mexico (Geneva).

*Bicyrtes plexis* Pate 1936:220. Holotype male, Compostela, Nayarit, Mexico (Ithaca).

The holotype has a large black spot on the yellow clypeus and somewhat reduced tergal bands. Otherwise it agrees with a male in the Bohart Museum, which has a short fringe on flattened foretarsal I, uneven mesopleural punctuation, a polished median bump on S-V, yellow lateral spots with white apices on S-II to V, and midfemur irregularly serrate below on distal one-half. The male flagellum, with its swollen apex of F-IV and base of F-V is similar to that of *B. discisa* and *B. paraguayana*. The latter also has a bump on S-V. The short and thick posterior fringe on the hindfemur of male *diodonta* (Fig. 5) readily distinguishes it from the other two species, as well as *B. pexa*, which has no bump on S-V. I have studied only three males and two females.

**Bicyrtes discisa** (Taschenberg)

*Monetula discisa* Taschenberg 1870:26. Syntypes, male, female, Rio de Janeiro, Brazil (depository?).

*Bicyrtes discisa* and five related species have the male flagellum expanded on both sides of the F-IV-V joint. These are *B. discisa*, *B. venezuelae*, *B. pexa*, *B. diodonta*, *B. paraguayana*, and *B. lilloi*. In all of these the male clasper has dense setae on the outer one-third (Figs. 20, 25). Most other species (except *B. mendica*) have the setal fringe essentially lateral (Figs. 19, 21, 23). In *B. diodonta*, *B. lilloi*, and *B. paraguayana*, the male has a median swelling on S-VI. As indicated in the key, *B. pexa* and *B. venezuelae* are separated by several color characters. Also, both *pexa* and *discisa* have the hindfemur posteriorly concave in profile (Fig. 7), unlike *B. venezuelae*. Other peculiarities are discussed under the individual species.

*Bicyrtes discisa* is relatively abundant, and ranges from Mexico and the Caribbean Islands to Argentina. All males (n=121) have a distinctive white background for the large black basal mark on the clypeus. In females (n=77) all have triangular basal black clypeal marks on a yellow background, mediodiscal scutal spots, and oval spots on T-V and VI. Both sexes have the propodeal flanges rounded (about as in Fig. 41). Females are difficult to separate from *lilloi* except by association with males. Some examples of variation in males are: mediodiscal scutal spots, mostly small, are present in 96%; T-VII is all black in 13%.

**Bicyrtes fodiens** (Handlirsch)

**Bembidula burmeisteri** Handlirsch 1889:500. Holotype female, "Amerika" (Brussels).

The tooth at the inner apex of the hindcoxa is unique (n=104). Other features are the absence of anterodiscal scutal spots, usually all black mesopleuron, and T-I sometimes all black. The male midfemur is a little flattened and expanded toward base (Fig. 2).

**Bicyrtes insidiatrix** (Handlirsch)


Although the almost entirely red legs are characteristic, markings are somewhat variable. Among the 10 males and 14 females in our collection, nearly all have the labrum black or dark red in contrast to the yellow or red clypeus. All have the flagellum reddish or yellow toward the base. and a black mesopleuron. T-VI is always black or red, and in some specimens T-IV-V are spotted rather than banded. Occasionally, the scutellum may be all yellow or red. Specimens from Florida usually have all the markings more red than yellow.

**Bicyrtes lilloi** Willink


This species is similar to *B. paraguayana* since both have a bump on male S-V. One difference in the material I have seen (n=15) is that the last tergum is two-spotted in *lilloi*, all black (n=27) in *B. paraguayana*. Males of the former differ additionally in having the bump of S-V somewhat longitudinally ridged. A further difference from *discisa*, shared with *B. paraguayana*, is the nearly straight posterior margin of the male hindfemur. Females of *lilloi* from Brazil and Argentina are difficult to separate from yellower *B. discisa*.

**Bicyrtes mendica** (Handlirsch)


In many respects, *B. mendica* is similar to *B. discisa*. However, in the male, the clasper of the former is blunt at the apex instead of "rat-tailed". Also, male F-IV and V are not expanded in *mendica*. The all yellow clypeus of the female separates it from most other *Bicyrtes* in this sex. I have studied three males and ten females.

**Bicyrtes odontophora** (Handlirsch)


The enlarged and black-margined foretarsomere I (Fig. 12) of the male, and the bipartite basal clypeal mark (Fig. 35) of the female are characteristic. The male antenna beneath has F-VI and following narrower then F-V, which bears an orange spot. This is one of the larger species of *Bicyrtes*, its length averaging 17 mm in both sexes (n=32).

**Bicyrtes paraguayanana** (Strand)


The rounded swelling on S-VI of the male, together with the narrowly rounded propodeal flange distinguish this sex from *B. discisa* (see discussion of characters under *B. discisa*). Females are difficult to separate but the narrowly rounded propodeal flange and all dark T-VI of *B. paraguayanana* can be used. In addition, the unusually thin tergal bands, although not unique, contribute to its overall dark appearance. In all males I have seen (n=21), pale markings of the clypeus and frons are yellow (clypeus white in *B. discisa*). T-VII is all black (spotted in *B. lilloi*), and 15 have tiny mediodiscal scutal spots (large in *B. diodonta*). In the presumed females (n=12), all have T-VI black, and two have tergal bands rather widely broken medially.

**Bicyrtes parananae** R. Bohart, new species

Male holotype: Length 14 mm. Black, marked with whitish yellow as follows: scape in front, mandible mostly, clypeus except for broad and irregular basal mark (as in Fig. 35), labrum, frons
laterally, narrow postocular strip, pronotal ridge narrowly, pronotal lobe and attached lateral spot, pair of anterodiscal scutal dots, scutal side and adjacent elliptical scutellar mark, tegula and posttegula partly, hindwing basally, broad metanotal spot, posterior rim of propodeal enclosure, propodeal flange apically, elongate mesopleural spot, femora and hindtibia in front, fore- and midtibia, tarsi except apically, narrowly interrupted bands on T-I to T-VII, lateral spots of S-II to S-V; reddish are: antennal tip, wing veins mostly; forewing cells clear. Pubescence silvery on clypeus and foretarsus, inconspicuous elsewhere except posteriorly on S-IV-VI where erect dark bristles are nearly half as long as scape. Punctuation fine and close on head and notum, a little coarser and slightly separated on mesopleuron, medium-sized and scattered on T-VII. Flagellomere IV slightly enlarged apically, V to IX flattened beneath, V-VII polished there but not VII-IX; forebasitarsus and following article as in Fig. 10, basitarsus roughly triangular, twice as long as broad, posterior edge with fringe and scattered stouter setae; midfemur serrate below on distal half (Fig. 1), hindfemur with a few short hairs basad (Fig. 4). S-II with a stout medial tooth; propodeal flange broadly rounded (about as in Fig. 41). T-VII slightly angled mediodiaterally; clasper fringed laterally, almost "rat-tailed" toward apex (Fig. 23).

**Female:** Length 13-15 mm. Markings about as in male except: trace spot on vertex next to ocellar bulge; anterodiscal spots slightly larger and longer (Fig. 44); forebasitarsus stout, bearing 3 preapical rake bristles (Fig. 32); T-VI broad, a little narrowed in distal half which bears short pygidial carinae and is extensively polished. S-VI with scattered punctures, medial carina restricted to apical one-third (Fig. 35).

**Holotype male** (New York), Vila Velha, Paraná, Brazil, II-2-74 (J. G. Rozen, F. C. Thompson). Paratypes, 2 females (New York), same data as holotype; female (Davis), same data as holotype except collected I-31-74; male (London), topotypic, IV-2-70 (O. G. Richards); male (Washington), Paso Yohay, Paraguay, II-15-50 (F. H. Schade); male (Davis), "Colombia"; male (Gainesville), Santa Cruz, Montero, Bolivia, III-14-86 (F. D. Bennett).

This species is related to *B. brasiiliana* and *B. odontophora* but *B. paranae* is easily distinguished by the male foretarsus (compare Figs. 10, 11, 12, 15, 19). The female of *B. paranae* is smaller than that of *B. odontophora*, and the former has the pygidium more extensively polished. Also, *B. paranae* has smaller anterodiscal spots on the scutum.

The triangular shape of the forebasitarsus in the male is the single most diagnostic character (Fig. 10). To this can be added the expanded foretarsomeres I-II, and the spinose male midtibia. Both sexes have a broad basal black mark on the clypeus (often bipartite as in Fig. 35 in females), anterodiscal scutal dots, large yellow mesopleural mark, and two-spotted last tergum. The female S-VI has a short carina apicad and sparse punctuation. Differences with other *Bicyrtes* are indicated in the key.

The species name refers to the Brazilian State of Paraná.

**Bicyrtes pexa** J. Parker


In addition to the holotype female, I have studied a pair collected at Vila Velha, Paraná, Brazil. All of these have the thorax almost entirely black, only remnants of some yellow marks present. If my female is correctly identified, it differs from the type by having most of the tergal bands narrowly connected (not so in my male), and yellow-marked F-I-II. Also, mine is a little larger, 17 mm long instead of 15. Although Parker did not mention punctuation, my Vila Velha female has unusually coarse punctures on the clypeus.

**Bicyrtes quadrijfasciata** (Say)

*Monedula 4-fasciata* Say 1824:336. Syntypes, male, female, Pennsylvania (Lost).

*Monedula sallei* Guérin-Ménéville 1844:437, Holotype female, New Orleans, Louisiana (depository?).

In a long series of *B. quadrijfasciata* in the Bohart Museum collection (n-110) the increasing distance between the pairs of tergal bands posterad are an easy means of identification, especially among North American species. Some specimens of *B. viduata* may have a similar condition, but they have a brown forewing submarginal cell. This is one of the larger species of the genus, averaging 17 mm in length. Small specimens of males might be confused with *B. capnoptera*, but the midfemur of *B. quadrijfasciata* is not at all expanded basally,
and the more terminal tergal bands are more separated.

**Bicyrtes simillima** (F. Smith)


*Hembex? defecta* Héthics 1909:64. Holotype female, no data (depository?).


*Bicyrtes orfilai* Willink 1952:78. Holotype male*, Rosario, Santa Fe, Argentina (Tucuman).

Bicyrtes orfilai Willink 1952:78. Holotype male*, Rosario, Santa Fe, Argentina (Tucuman).

Although I have seen only a few specimens of each sex of *B. simillima* (n=5), it appears to be quite distinctive, not just in markings, but in size. It is one of the largest *Bicyrtes*, averaging about 17 mm in length. Apparently, the male labrum is usually all black except for a basal dot (n=6). The clypeus may also be black. Both sexes have the scutum all or nearly all black, terga I-IV or I-V with pale yellow lateral spots, female T-VI without indication of a pygidial plate, male hindlegs often all black and male antenna relatively simple. The claspers are quite narrow and have discontinuous short, lateral setae. In some males the lateral propodeal flange may be indented medially. This is true in the type of *B. pullata*. Some variation in details of markings account for the considerable synonymy.

**Bicyrtes spinosa** (Fabricius)


The fact that scutellar spots point inward anteriorly is a good diagnostic feature (n=34). Other characteristics (not unique) are the yellow labrum and clypeus, the latter with a basal black mark; slightly elongate anterodiscal scutal spots (large in female); and all black flagellum and pygidium. This species has been thought previously to be found only in the Caribbean Islands. However, I have seen a male from Gainesville, Florida.

**Bicyrtes tricolorata** J. Parker

*Bicyrtes tricolorata* J. Parker 1929:171. Holotype male, "Amer. Merid.," South America (Berlin).


I have seen only a few specimens of this species, mainly males. There is a series of males from Argentina (TUCUMAN) which are remarkable for the broad and continuous yellow tergal bands along with many red markings elsewhere. The clypeus is mostly red, as in the unrelated *B. angulata*, and the antenna is extensively red based. The synonymy of *B. solo* is doubtless correct, but Parker's type has broad yellow tergal bands, slightly interrupted medially on I-IV, continuous on T-V. There is no differentiated pygidial plate. The male antenna is relatively simple, and the claspers are broad with a lateral fringe. The male midtibia is concave toward the apex in profile (Fig. 17), and S-II has a large tooth. This is a large species, rivalling *B. simillima*.

**Bicyrtes variegata** (Olivier)

*Bembex variegata* Olivier 1789:292. Holotype male (?), French Guiana (depository?).

*Monodula sericea* Spinola 1851:315. Syntype females, Chile (depository?).


The complete or nearly complete yellow band across the anterior part of the scutellum (Fig. 42) is diagnostic (n=100). In the original description Olivier included this character. He mentioned the interrupted tergal bands but not the spots on T-VI which customarily occur in females. Therefore, it may be assumed that the type was a male.

**Bicyrtes venezuelae** R. Bohart, new species

Male holotype: Length 13.5 mm. Black, marked with yellow as follows: scape in front, mandible mostly, clypeus except for small black basal spot, labrum, frons laterally, narrow postocular strip, pronotal ridge and lobe, pair of anterodiscal scutal spots, scutal side and adjacent squarish scutellar spot, tegula and post-tegula partly, broad metanotal spot, posterior rim of propodeal enclosure, propodeal flange apically, large mesopleural spot, femora and tibiae mostly, hindtibial inner surface except for black mark stopping at three-fourths of length (shorter in most paratypes), tarsi mostly, terga I-V with medially interrupted bands, T-VI with large oval spots, S-II to V with lateral spots; forewing cells clear. Pubescence silvery on clypeus, pale to fulvous on vertex and mesopleuron,
black and erect but short on S-V to VII, some setae one-third as long as scape. Punctation mostly fine and close, a little larger and slightly separated on mesopleuron and T-VII where there is a subapical mostly polished area. Flagellomere IV apically and V basally slightly enlarged, F-V to IX in ventral view flattened and polished; forebasitarsus slender, about 4x as long as broad (Fig. 9), four posterior setae shorter than breadth of tarsomere; midfemur notched toward apex beneath; S-II with short medial tooth, propodeal flange broadly rounded, T-VI faintly angled medially; clasper with fine dense setae covering outer one-half, almost "rat-tailed" toward apex.

Female: Length 14 mm. Markings as in male except: F-I often with a medial yellow dot in front; black clypeal spot sometimes a little larger; anteromedial discal spots larger, often as long as scape and pointed posteriorly; forebasitarsus about twice as long as broad, bearing three preapical rake bristles; T-VI with oval yellow spots, punctation becoming sparse medially.

Holotype male (Davis), Puerto de Cata, Aragua, Venezuela, IV-19-73 (H. M. Bohart). Paratypes (all from Venezuela), male (Gainesville), 13 km sw. Machiques, Zulia, IV-14-81 (E. Grisell); male (Davis), Los Illermonitos Paez, Zulia, VI-26-79 (R. Schuster et al.); male (Gainesville), 18 km sw. Carora, Lara, VII-11-88 (C. Porter, L. Stange); 14 males, 5 females (Washington, Davis), 44 km s Calabozo, Guarico, V-28-85 (A. Menke, J. Carpenter).

This species seems to be closely related to B. discisa, but B. venezuelae has a stouter male foretarsus (Fig. 9), a more evenly convex posterior edge of the hind femur, and a usually yellow rather than white clypeal ground color. The female of B. venezuelae differs in a few color characters as outlined in the key.

Bicyrtes ventralis (Say)

Monedula ventralis Say 1824:336. Holotype male, Pennsylvania (Lost).
Bicyrtes servillii Lapelotier 1845:53. Holotype female, Philadelphia, Pennsylvania (depository?).
Monedula parata Provancher 1888:416. Holotype female*, Los Angeles, California (Quebec).

This is one of the two most abundant species in the United States (n=360), the other being B. capitoptera. The basoventral tooth on the midfemur of male ventralis is diagnostic. Similarly, the well-formed pygidial plate of B. capitoptera females distinguishes that sex from others in the U.S. Most B. ventralis have broad tergal bands, interrupted medially. Some females have all of the tergal bands continuous. There is a strong tendency for the labrum to be black, and for the clypeus to be black-rimmed below (Fig. 36). Rarely, the labrum and clypeus of males may be all black.

Bicyrtes viduata (Handlirsch)


The darkly stained submarginal cell I with a tiny apical clear "window" seems to be unique among Bicyrtes. Otherwise, there is quite a variation in markings (n=190) over its range from southwestern U.S. to Costa Rica. Along with the customary black labrum, more southerly material exhibits a diminution in size and number of pale tergal markings. The male clasper is broad, somewhat "rat-tailed" at the apex, and fringed laterally.

References


Figs. 1-25, males. Figs. 1-3, midfemur, outer view. Figs. 4-7, hindfemur, outer view. Figs. 8-9, foretarsi, dorsal. Figs. 10-12, foretarsals-I-II, outer view. Figs. 13, right coxa and trochanter. Fig. 14, T-VII. Figs. 15, 18, foretarsals IV-V, ventral. Fig. 16, flagellomeres VII-XI, lateral. Fig. 17, midtibia, lateral. Figs. 19-21, 23-25, right clasper, ventral. Fig. 22, genitalia, ventral.