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A Review of the Genus *Macrosiagon* in Mexico, with Notes on *Rhipiphorus* (Coleoptera, Rhipiphoridae)

BY PATRICIA VAURIE¹

INTRODUCTION

Although the Mexican species of *Macrosiagon* and *Rhipiphorus* were studied by Rivnay in his revision of the family in 1929, and before him by Champion, 1891, in the "Biologia," recent material collected in Mexico for the American Museum of Natural History has added some new information on these none too common genera of parasitic beetles. Six states of Mexico in which these genera have not been taken before are here recorded: Sonora, Coahuila, Aguascalientes, Jalisco, Nayarit, and Colima. Two species not known to occur in Mexico (*M. sayi* and *M. lineare*) have now been taken there, and *M. excavatum* and *R. rex* from Mexico are reported for the first time from the United States. Some species of *Macrosiagon* are reported for the first time from South America (*flavipenne*, *bifoveatum*, and *lineare*), and from the Bahamas and Santo Domingo (*flavipenne*). Ten of the 13 North American species of *Macrosiagon* (about 100 species are listed for the genus according to Csiki, 1913) occur both in Mexico and the United States, and many of these are distributed also farther south. Of *Rhipiphorus*, however, with 41 species given by Csiki and Rivnay, only seven of the 28 North American species have been found so far in Mexico.

The new material was collected from 1947 to 1954 on four David Rockefeller expeditions, to northern Mexico in 1947, 1952, and 1954,

¹ Assistant, Department of Insects and Spiders.

and in 1953 to central and western Mexico. The collectors on these expeditions were G. and M. Bradt, M. Cazier, and W. J. Gertsch in 1954, the same with the addition of C. Michener, R. Schrammel, and H. Spieth in 1947, Cazier, Gertsch, and Schrammel in 1952, and C. and P. Vaurie in 1953. Other collectors were C. and P. Vaurie in Guatemala in 1947, in Bimini, Bahamas, in 1951, and R. F. Smith in 1950 in Mexico.

The Rhipiphoridae are a small family near the Mordellidae and Meloidae. They inhabit most parts of the world, but only three genera have species occurring in Mexico, the two studied in this paper of the tribe Rhipiphorini, and *Trigonodera* (= *Pelecotomoides*) of the Pelecotomi. According to Linsley and MacSwain (1951, p. 79), "The species are parasitic in the larval stage, spending the early part of their development as internal parasites, their later development as external parasites, a habit otherwise almost unknown in the Coleoptera. The genus *Rhipiphorus* is parasitic on the larvae of bees. . . . *Macrosiagon* . . . on the larvae of wasps of the families Bembicidae, Tiphidae and Scoliidae." The adult females frequent flowers of milkweed, wild buckwheat, flea-bane, goldenrod, aster, mint, and others (*Asclepias*, *Eriogonum*, *Pluchea*, *Solidago*, *Aster*, *Monarda*, *Isocoma*, and *Baccharis*) for the purpose of ovipositing where bees and wasps will be available for the young. Males are found less often; males of many species of *Rhipiphorus* do not visit flowers at all, but "live only one day frequenting the nesting site of the host" (Linsley and MacSwain, *loc. cit.*). Some of the hosts recorded in the literature are *Prosopis glandulosa* and *Bembex spinolae* for *Macrosiagon flavipenne*, *Tiphia* for *M. pectinatum*, *Elis* (= *Myzine*) for *M. sayi*; *Epinomia triangulifera* for *Rhipiphorus solidaginis*, *Nomia nevadensis* for *R. nomiae* and *R. epinomiae*, *Diadasia consociata* for *R. dammersi* and *R. smithi*, and *Diadasia bituberculata* for *R. diadasiae* (Linsley and MacSwain, *loc. cit.*; Rivnay, 1929).

Species of *Macrosiagon* have the body humped as in many mordellids (fig. 1), the abdominal segments telescoped and retracted, and the elytra markedly dehiscent, or separating towards the apex. In flight they can be mistaken for small wasps. On mounted specimens the long transparent wings are usually exposed between the elytra and droop backward. The 11-segmented antennae are fan shaped, or biflabellate, in the males and shallowly pectinate or serrate in the females. The males of some species (all those in Mexico excepting *flavipenne* and *discicollis*) have thickly hairy pads on the under side of the front tarsal segments. The claws are bifid; the inner claw is the shorter.

Color in this genus is extremely variable, changing within a species from black to yellow (or red) on almost any part of the body, usually

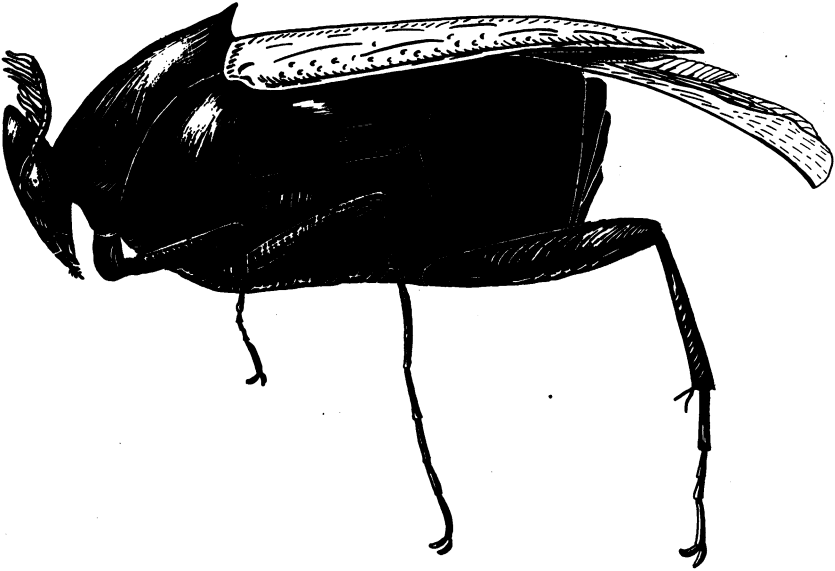


FIG. 1. Male of *Macrosiagon flavipenne* (LeConte).

head, pronotum, elytra, and parts of the under side. This dimorphism appears to be sexual in some species (*flavipenne*, *bifoveatum*, and *excavatum*), the female sometimes having both colors, the male only one color. Thus in *excavatum* males have the head and pronotum black, whereas females have them either black or yellow. As more males become known, however, some of these supposed color differences between the sexes disappear.

The species are distinguished sometimes by the elytral color pattern, by the shape of the elytra (degree of dehiscence), the shape of the face (triangular in *discicollis*, broad and stout in *sayi*, *octomaculatum*, and *pectinatum*, and elongate in all the rest), the shape of the pronotum (with or without a median process or basal depressions), and the length and shape of the hind tarsal segments. The size is not diagnostic, great variance being present within a species, nor is the punctuation constant.

The 13 species of this genus in North America are widely distributed over the continent, with the single exception of *fernaldum* Rivnay which is known only from California. One of the species (*dimidiatum* Fabricius), although it occurs throughout most of the United States, has not to my knowledge been recorded from south of the United States, and another species (*octomaculatum* Gerstaecker), although widespread throughout southern United States and in Guatemala, the West Indies,

and South America, apparently does not occur in Mexico. The latter species has been included in this paper, however, because it may possibly be a synonym in whole or in part of an equally variable Mexican species (*pectinatum* Fabricius).

In *Rhipiphorus* the dorsal part of the entire abdomen is exposed by the long unfolded wings and the minute convex elytra, giving these beetles, with their black and yellow coloration, the aspect of bees. The antennae, which in the female are often only 10- instead of 11-segmented, are biflabellate in the males, long and prominently displayed, and monoflabellate or deeply pectinate in the females. They are inserted above the eyes, in contrast to those of *Macrosiagon* which are inserted near the middle of the eyes. All species in Mexico are black or yellow or a combination of both colors. The claws are pectinate, the teeth more numerous in the males. In the females the seventh tergite is expanded into a large, shield-like pygidium that is bent under the abdomen; the pygidium presents varying shapes in both sexes in different species.

Members of this genus from Mexico are very poorly represented in the collection of the American Museum of Natural History, the only series being that of *R. rex* Champion. Material from the United States is also scanty, both in number of species and number of specimens. This lack of material is evident also in the descriptions, many of which are based on one specimen only or on one sex only. In a genus where sexual dimorphism in color is so great and in which other secondary sexual characters, as the pygidium, the antennae, and the number of teeth in the tarsal claws, are important, the possession of but one sex is not sufficient for identification. Of the 28 North American species recorded by Rivnay, eight are known from females only, and seven from males only; of the 12 species recorded by Linsley and MacSwain (1950, 1951) from California, three are known from the female only. Of the seven Mexican species both sexes are known only of *rex*, *niger*, and *tuberculatus*, three of the four other species being represented by the type alone. Although I have examined the types of these Mexican species (except *brevipes* Rivnay), there seems to be no point in redescribing these, because I have nothing to add to Champion's descriptions or distributional records. The only species I was able to identify in our material are *rex* Champion and *niger* Waterhouse. The section on *Rhipiphorus* is therefore briefly treated, and no key to the species is attempted.

PROCEDURE

Following the system used by Linsley and MacSwain (1951), an asterisk (*) is placed before each new locality in the paragraphs on

distribution. Other distributional records are taken from Champion (1891). Where a species is known from Central America in addition to Mexico the distribution is given for both. Records from the West Indies or South America are given in the text.

The original references for the species have been given, but no synonymy. Names of collectors are given above in the Introduction, but not below in the text.

CLASSIFICATION

GENUS *MACROSIAGON* HENTZ

Macrosiagon HENTZ, 1830, Trans. Amer. Phil. Soc., new ser., vol. 3, p. 462. Type, by original designation, *Rhipiphorus dimidiatus* Fabricius.

The genus is discussed in the Introduction. Although the word *siagon*, from the Greek meaning jaw or jawbone, is feminine, most authors have evidently followed Hentz and considered the name neuter. Hentz used *M. dimidiatum*. Champion (1891) used the later name *Emenadia*; others have used *Rhipiphorus*.

KEY TO THE SPECIES OF *Macrosiagon* IN CENTRAL AMERICA

1. Mesoepesternum convex, bulging out from the sides of the pronotum . . . 2
 Mesoepesternum rather flat, at least not bulging beyond the sides of
 the pronotum 9
2. Basal median lobe of pronotum with a distinct, semi-erect, excavated
 process that appears as an overhanging spine when seen from the
 side (fig. 1) *flavipenne*
 Basal median lobe of pronotum either flat or carinate, sometimes exca-
 vated at tip, but without semi-erect process 3
3. Hind tarsi with second segment longer than third and scarcely
 thicker *cruentum*
 Hind tarsi with second segment shorter than third and usually definitely
 thicker 4
4. Base of pronotum with two distinct elongate or triangular depressions
 on each side 5
 Base of pronotum without depressions 7
5. Pronotal depressions triangular, deeply and abruptly excavated; elytra
 in females almost entirely black *bifoveatum*
 Pronotal depressions elongate, slightly depressed; elytra always with
 more yellow than black 6
6. Elytra with sublateral black line from basal fourth to apex; antennae
 and abdomen black *excavatum*
 Elytra with base only black; antennae and abdomen yellow (only one
 male known) *carinipenne*
7. Hind tarsi with apices of first two segments obliquely truncate . . . *sayi*
 Hind tarsi with apices of first two segments rounded 8
8. Vertex convex, smoothly rounded, usually sparsely punctate; pronotum
 black or yellow but unicolorous (Guatemala, Mexico) . . . *pectinatum*

KEY TO THE SPECIES OF *Macrosiagon* IN CENTRAL AMERICA—*Concluded*

- Vertex flattened or concave, bulbous above the eye, then more or less truncate on top; usually densely punctate; pronotum yellow with two elongate black marks or black with yellow marks (Guatemala, Panama, South America, West Indies, but not Mexico) *octomaculatum*
- 9(1). Elytra short, no longer than abdomen; labrum deeply emarginate *discicollis*
- Elytra long, reaching well beyond the abdomen; labrum truncate or rounded 10
10. Hind tarsi with second segment flattened or concave above; head more elongate (space between bottom of eye and top of mandible equal to about one-half of the length of eye) *limbatum*
- Hind tarsi with second segment rounded as other segments; head shorter, more square (space between bottom of eye and top of mandible much less than one-half of the length of eye) *lineare*

The only species in North America not included in the above key are discussed under *flavipenne* in the text that follows. These species are *fernaldum* (California), which has an elongated process as in *flavipenne*, and *dimidiatum* (United States), the type of the genus, which has the second segment of the hind tarsi the same length as the third, and both segments extremely short.

Macrosiagon flavipenne LeConte

Figure 1

Macrosiagon flavipennis LECONTE, 1866, Smithsonian Misc. Coll., vol. 6, p. 153 (type, male, New York, in Museum of Comparative Zoölogy).

DISTRIBUTION IN MEXICO: Durango: Villa Lerdo; *San Juan del Rio, 5200 feet, July, 1947. *Chihuahua: *Huejotitlan, 5700 feet, July, 1947.

REMARKS: About 40 specimens of this species have been examined, but only two of these, both females, are from Mexico. One of them has the lower half of the face red instead of black, otherwise the two specimens are similar, both with the elytra yellow in front, black behind, as in other females of the species (males have the elytra entirely yellow). This species and *fernaldum*, the latter known so far from California only, are the only ones with a distinct long process on the median lobe at the base of the pronotum, and the clypeus exceedingly elongate and acuminate. In *fernaldum* both sexes have the elytra yellow. The males, like the males of *fernaldum*, *dimidiatum*, and *discicollis*, do not have hairy pads on the front tarsi.

Although described from New York, *flavipenne* is found not only in the United States and Mexico, but also I have seen a male from South

Bimini in the Bahamas, a female from Haina, Santo Domingo, three specimens from South America (at the British Museum), and two females from Concordia, Entre Rios, Argentina. The elytral pattern in *dimidiatum* (United States) is the same as that of females of *flavipenne*, but *dimidiatum* has the vertex of the head flat, not concave, and instead of having an elongate process on the pronotum it has the median lobe carinate but with a cup-like concavity at the apex.

Champion (1891) has a drawing of a female from Durango, the only specimen he had seen.

Macrosiagon bifoveatum (Horn)

Rhipiphorus bifoveatus HORN, 1875, Trans. Amer. Ent. Soc., vol. 5, p. 123 (type, male, Illinois, in Academy of Natural Sciences of Philadelphia).

DISTRIBUTION IN MEXICO AND CENTRAL AMERICA: Mexico: Oaxaca. Guatemala: Chimaltenango; *Chichicastenango, 6000 feet, August, 1947. Nicaragua.

REMARKS: The two excavations at the base of the pronotum are much deeper and more abrupt in this species than they are in *excavatum* or *carinipenne*, species that also occur in Mexico and are the only other ones with these pronotal "dimples." Specimens of *bifoveatum* are also generally larger, usually at least 10 mm. in length. The only records in the United States are the type, from Illinois, and a specimen from Texas seen by Rivnay at the Museum of Comparative Zoölogy. Rivnay remarks (1929, p. 28, footnote) that "it is rather strange to note that no specimens have been taken in any place between Illinois and Texas." Except for these records, this would seem to be a southern species.

The males usually have the legs yellowish, the females have them black. In males the elytra are mostly yellow (half or more), in females they are either entirely black, or black with two small yellow spots laterally near base. Horn called the male elytra "brownish." The abdomen is black or dark red in both sexes; the head and pronotum are entirely black except for a little red at base of the pronotum in some males. Champion (1891) figures a male, but says that two-thirds of his 20 specimens had the elytra entirely black.

Specimens examined include four in the American Museum of Natural History from "Guatemala," and Chichicastenango, Guatemala, and 18 in the British Museum (Natural History) from Oaxaca, Mexico, "Guatemala," Chimaltenango, Guatemala, and Nicaragua. There are two other specimens in the British Museum from Brazil (Santa Catarina and Rio de Janeiro) that appear to be this species. They are females with the

two yellow spots on the black elytra. The range in size of all specimens seen is from 7 to 16 mm.

Macrosiagon excavatum (Champion)

Emenadia excavata CHAMPION, 1891, *Biologia Centrali-Americana*, vol. 4, pt. 2, p. 354, pl. 16, figs. 7-8 (type, male, Capulalpam, Oaxaca, Mexico, in British Museum).

DISTRIBUTION IN MEXICO: *Aguascalientes: *Aguascalientes, August, 1953; *El Retoño, 10 miles east of Aguascalientes, August, 1953. *Jalisco: *El Refugio, 9 miles west of Tepatitlan, July, 1953. Guerrero: Chilpancingo. Morelos: Cuernavaca. Oaxaca: Oaxaca; Capulalpam. Veracruz: Cordoba; Jalapa; Minatitlan.

REMARKS: The 22 specimens taken recently in Aguascalientes and two from Jalisco extend the range of this species farther north in Mexico than previously recorded. An even more northern specimen, a male, was collected by the author 11 miles east of Caldwell, Burleson County, southeastern Texas, east of Austin, in the summer of 1953, in a sandy grassy field. This is the first report of the species from the United States.

As stated by Champion, the elytral pattern is unusually constant in this species, and it is also the only species with such a pattern, namely, the elytra have black marks on yellow, the black being present across the base and in two distinct sublateral longitudinal lines that are separated from the black at the base; the suture, side margins, and apices of the elytra are also black. In the type of *carinipenne*, which is very similar and also has pronotal depressions, the elytra are black at base only, the remainder being yellow. All the specimens of *excavatum* I have seen (nine males and 17 females in the American Museum; three males, including the type, and 22 females in the British Museum) have the elytra as described above. Champion says this is the commonest species of the genus in Mexico; he had 41 specimens, only three of which were males. He figures both sexes (1891, pl. 16).

Sexual dimorphism occurs in the color of the head and pronotum which is always black in the male, but either black or red in the female. The black females usually have black legs and the red females red legs, but some females of either coloration have the legs bicolored, and three of 18 red females examined had black legs. Of these 18 red females all but one (from Jalisco) have the mesoepisterna also red; this one specimen differs further by having black borders on the red head, and the median lobe is black on the otherwise red pronotum. Another specimen, one of the black females from Aguascalientes, has the head bicolored, mostly black but red on the vertex. The proportion of red to black females

seems to be about the same, that is, half and half, in all populations, whether northern or southern. The males, which are always black on head and pronotum, nevertheless often have some red on the hind tibiae or hind tarsi. The abdomen is black in both sexes. The antennae are entirely dark in most of the black individuals, and usually dark but with the basal segment yellow in the red individuals. The size varies from 5 to 10 mm.

The series from El Retoño in Aguascalientes was collected at the end of August as the insects were flying and alighting on some small, bushy, spiny trees on a high, prairie-like plateau at about 6000 feet.

Macrosiagon carinipenne (Champion)

Emenadia carinipennis CHAMPION, 1891, *Biologia Centrali-Americana*, vol. 4, pt. 2, p. 355, pl. 16, fig. 9 (type, male, Yautepec, Morelos, Mexico, in British Museum).

DISTRIBUTION IN MEXICO: Morelos: Yautepec.

REMARKS: This species is very similar to the preceding (*excavatum*). I have seen only one specimen, the type, and no others have ever been reported, to my knowledge, so that the extent of variation cannot be known. It is so far the only species in North America that does not occur in the United States. The type has the head flatter on top than *excavatum* and with more punctures; it has the elytra entirely yellow except for a black border at the base. The head and pronotum are black. It differs further from *excavatum* by having the antennae, except for their tips, pale, not dark, and the abdomen, tibiae, and tarsi yellow. These, of course, may represent male coloration. Rivnay (1929) made an error in stating the type locality as Yantipepec.

Macrosiagon sayi (LeConte)

Rhipiphorus bicolor SAY, 1823, *Jour. Acad. Nat. Sci. Philadelphia*, vol. 3, p. 275 (type locality, Pennsylvania), preoccupied by *bicolor* Olivier, 1795.

Rhipiphorus sayi LECONTE, 1858, *ibid.*, ser. 2, vol. 4, p. 21, new name.

DISTRIBUTION IN MEXICO: *Jalisco: *La Punta, August, 1953.

REMARKS: This species differs from the two following (*octomaculatum* and *pectinatum*) by having the apices of the first two tarsal segments on the hind tarsi produced or obliquely truncate, but is otherwise very similar. The male has the antennae longer than the male of *octomaculatum*; both sexes have the vertex flat, more or less truncate, as in *octomaculatum*, not convex and rounded as in most *pectinatum*, and the occiput carinate. In coloration this species is like the two others mentioned, it has the head and pronotum either black or yellowish, either spotted or

immaculate, the elytra yellow, with six black spots or marks, or the elytra immaculate and entirely yellow or entirely black. The short thick second tarsal segment of the hind legs is also similar in the three species.

The specimen from Mexico, a male, is the first record of *sayi* south of the Rio Grande. It was taken on milkweed (*Asclepias*). It differs from other specimens seen from the United States by having the pronotum black instead of red. The elytra have the apices, two median small spots, and two basal spots black. Although Rivnay (1923) says males have the head and abdomen black and the females red, I have seen a female from Davis Mountains, Texas, with the head black.

Macrosiagon octomaculatum (Gerstaecker)

Rhipiphorus octomaculatus GERSTAECKER, 1855, *Rhipiphoridum coleopterorum . . . systematica*, p. 22 (type locality not designated, given as "Illinois, Pernambuco, Bahia").

DISTRIBUTION IN CENTRAL AMERICA: Guatemala: San Jeronimo; Chamiquin; Chimaltenango. Panama: Caldera in Chiriqui.

REMARKS: Strictly speaking, this species does not belong in the present paper as it has not been taken in Mexico, although it occurs both north and south of Mexico. It is possible that it may prove to be the same as the following species (*pectinatum*), which does occur in Mexico, and with which *octomaculatum* appears to integrate in a number of characters. Both these forms are very close to *sayi*, differing from it in the rounded, not obliquely truncate apices of the hind tarsal segments. Typical specimens have both the pronotum and elytra the same yellow (or reddish) color, the pronotum with two longitudinal black marks, the elytra with six black marks, two at base, two at middle, two at apex, the basal ones often lacking.

The "distinct suture" on the occiput that is used by nearly all authors to distinguish this species from *pectinatum* is not, according to my examination, a suture but merely a carina, and this carina can be found also in some specimens of *pectinatum*. The shape of the vertex, flattened or concave and truncate in *octomaculatum*, convex and rounded in *pectinatum*, apparently varies also, at least in the latter. The only other differences I can find is that the antennae appear proportionately shorter in *octomaculatum* and I have not seen any specimen of this species with the pronotum entirely black as in many *pectinatum*, although a series of nine females of what appears to be *octomaculatum* from St. Kitts in the West Indies has the pronotum mostly black, with only a center line and the two hind angles yellowish. The only difference Horn (1875) could find was that *octomaculatum* had denser punctures and thicker

pubescence below than *pectinatum*, but this difference is so slight as to be virtually non-existent.

According to the "Biologia" and to specimens seen at the British Museum, this species occurs also in French Guiana, British Guiana, Colombia, Brazil, Paraguay, Argentina, and on the island of Guadeloupe in the West Indies. Champion (1891) illustrates a male from Guatemala with the apical black of the elytra lacking. He thought his specimen from Chiriqui in Panama might be Perty's *rubropicta* from Brazil which is said to have the elytra black with six red spots, but I have seen this specimen, a female, in the British Museum, and consider it to be a very dark *octomaculatum*.

Macrosiagon pectinatum (Fabricius)

Mordella pectinata FABRICIUS, 1775, Systema entomologiae, p. 263 (type locality, America).

DISTRIBUTION IN MEXICO AND CENTRAL AMERICA: Mexico: Durango: Durango; *Palos Colorados, 8000 feet, August, 1947; *San Lucas, 6700 feet, August, 1947. *Chihuahua: *Matachic, July, 1947; *Kilometer 36, Santa Barbara to Ojito, 6900 feet, August, 1947. *Aguascalientes: *Aguascalientes, August, 1953; *El Retoño, 10 miles east of Aguascalientes, August, 1953. *Jalisco: *La Punta, August, 1953. Guatemala: Chimaltenango.

REMARKS: This is certainly one of the most variable of the species and has 12 or 15 synonyms recorded for it by Rivnay (1929). In his revision Rivnay placed this species at the end, stating that it needed further study and that it occurred all over North and Central America. It is possible, as suggested by Linsley and MacSwain (1951), that there is a species complex here and even that *octomaculatum* is involved, in whole or in part.

The elytra present the same variations as they do in *octomaculatum*; they are usually yellow, with six black marks, but the marks may be elongate and partially confluent, sometimes so confluent that the elytra are entirely black, or the basal and median marks may be lacking, or all marks may be lacking. The head and pronotum are usually black, but occasionally one or the other is yellow (or reddish); I have not seen any specimens with the two elongate black marks present in most individuals of *octomaculatum*. Below the color varies also. Of the specimens before me, all the males (eight) and females (four) from localities in Mexico are the black variety (black head, pronotum, and most of the under side), and seven of the 11 males from the United States and two of the six females are also black. The specimens from the United States are from

Massachusetts, Connecticut, New York, North Carolina, Florida, Arkansas, and Arizona. Some of the above specimens have the carina on the occiput as pronounced as in *octomaculatum*, but they have the vertex rounded, only occasionally flattened. The face is quite densely punctate, but less so in some than in others. The apex of the median lobe of the pronotum, although usually somewhat excavated, is scarcely so in some individuals. Champion found this lobe to vary in the same way in his *excavatum* (1891, p. 355).

Some of the dark specimens with nearly immaculate elytra (the apex alone dark) might be mistaken for individuals of *dimidiatum* from the United States. In *pectinatum*, however, the median lobe of the pronotum has not such a distinct cup-like cavity at the apex, the face is not nearly so elongate or narrow, the male has tarsal pads on the front legs, and the second segment of the hind tarsi is shorter and thicker than the third.

Macrosiagon cruentum (Germar)

Rhipiphorus cruentus GERMAR, 1824, Insectorum species novae, p. 168 (type locality, "America septentrionali").

DISTRIBUTION IN MEXICO: *Chihuahua: *Eight miles west of Chihuahua, August, 1950; *Santa Barbara, 6200 feet, May, 1947. Guanajuato: Guanajuato. *Colima: Ten miles west of Colima, August, 1954.

REMARKS: This species differs from all the others in the region by having the second segment of the hind tarsi longer than the third and of approximately the same thickness. The elytra are also less acuminate than in all preceding species, but more acuminate than in *discicollis*. The inner margins of each elytron do not diverge until about two-thirds or three-quarters of the way to the apex; the apices are not needle-like as in most species. I have seen only four specimens from Mexico: three females from Chihuahua and Colima in the American Museum and a female from Guanajuato in the British Museum. This latter is the specimen from which Champion's figure was made (1891) and was the only specimen he had seen. These individuals have the head and pronotum black (pronotum is half red in one specimen), the elytra yellow, with the base narrowly black, and the apices black in apical third or fourth of the elytra, the abdomen red, sternum black in all or in part, and the legs either black or black and red. Similarly marked females have been seen from California and other localities in the United States; in some of these there is more black on the elytra apically (as much as one-half of the elytra); in some there is less black, or the basal black band is lacking.

In a female from Pinar del Rio in western Cuba, the only black is on the legs, the base and apex of the elytra, and on the metaepimeron. This

female is similar in coloration to the majority of specimens in a series of 39 males and females from Death Valley Junction, Inyo County, California (the extent of black on the sternum varies), and would seem to correspond to the variety "*rufum*" LeConte described from San Diego County, California. Linsley and MacSwain (1950), however, have described a subspecies (*flumineum*) from "desert areas" in Riverside, Imperial, and San Bernardino counties in California, which is also said to be mostly yellow, "pale yellow brown" with the tips of the elytra "dark brown," and the legs "partially brownish." No mention is made of the sternum which is therefore assumed to be also yellow-brown, not black as in our series from Inyo County. In their key to the subspecies, Linsley and MacSwain (1951) state that the male of *c. cruentum* (this includes "*rufum*") has "at least head and pronotum black," and they had not seen any males in which they were yellow, but three of the six males in the series from Inyo County do have them yellow (one male also has the elytra entirely yellow). Therefore this series does not key out to either subspecies, because the other three males have the pronotum mostly black, the head partly or wholly black, and part of the abdomen also black. If on the other hand the Inyo County series should be considered, in spite of the black sternum, to be *c. flumineum*, then the other specimens from Inyo County listed by the above authors (1951, p. 82) as nominate *cruentum* would also be *flumineum*, but these evidently are not the "yellow" variety. These subspecies are also said to occur even within the same county in California—Riverside. (MacSwain, *in litt.*, has said that the specimens given as *cruentum* from San Bernardino County in the 1951 paper are referable instead to *flumineum*.) It would surprise me very much if subspecies based on color can be maintained in this genus, where the color is so variable throughout. Unfortunately I have not seen any material from the localities given by Linsley and MacSwain except a male from Yermo, San Bernardino County, which is the dark variety but with a little yellow on head and pronotum.

Macrosiagon limbatum (Fabricius)

Mordella limbata FABRICIUS, 1781, Species insectorum, vol. 1, p. 332 (type locality, North America).

DISTRIBUTION IN MEXICO AND CENTRAL AMERICA: Mexico: Guanajuato: Guanajuato. Guerrero: Chilpancingo. Morelos: Cuernavaca. *Oaxaca: *Oaxaca, 5000 feet, July, 1937. Veracruz: Orizaba. [Not located:] Xucumanatlan; Cerro de Plumas. Guatemala: *Rabinal, 3000 feet, August, 1947. Costa Rica: Cache. Panama: Volcan de Chiriqui.

REMARKS: This species and the two following (*lineare* and *discicollis*)

differ from all the preceding species by having the mesoepisterna flatter, not convex and bulging, the head glabrous and virtually impunctate, and the front coxae separated by a prosternal spine, which, however, is usually not visible because of the deflection of the head. The many variations in color combinations are apparently not sexual in this species. The commonest pattern in the United States is the pronotum yellow with a black spot of varying size that sometimes nearly covers the pronotum, the elytra black but with an indistinct yellow stripe in the center of each elytron, and the head yellow with the vertex usually black. Such specimens occur also in Mexico, and in both countries there are a number of variations. The head is occasionally entirely black, the pronotum and elytra may be entirely yellow or entirely black; the legs are usually varicolored, the femora and tibiae yellow with black apices; and the body below is yellow and black. Rivnay's variety "*pulchrum*" from North Carolina (1929) is said to have the elytra black and the pronotum entirely yellow. I have not seen any specimens from the United States so marked, but I have seen them from Mexico and also a variety that is entirely yellow. Champion (1891) illustrates four color varieties.

Of the 17 Mexican and four Central American specimens examined (all but two at the British Museum), five of the former are entirely black, four have the pronotum yellow and the elytra black, one is entirely yellow, and seven have the typical pattern of most specimens from the United States. Three of the four varieties were taken in the same locality in Mexico—Chilpancingo. The same variation in color was found in specimens at the British Museum from Santa Catarina, Espirito Santo, and Rio de Janeiro in Brazil, and from Paraguay. It occurs also in Argentina (Blackwelder, 1945).

Macrosiagon lineare (LeConte)

Rhipiphorus linearis LECONTE, 1866, Smithsonian Misc. Coll., vol. 6, p. 154 (type, male, Kentucky, in Museum of Comparative Zoölogy).

DISTRIBUTION IN MEXICO: *Chihuahua: *Cañon Prieto, near Primavera, 6500 to 6800 feet, July, 1947.

REMARKS: This species is very similar to the preceding (*limbatum*), differing from it in only two characters: the face is not nearly so elongate or narrow, and is especially much broader at the bottom than in *limbatum*; the second tarsal segment of the hind tarsi is proportionately longer and is not flattened, shining, or concave above, but rounded and hairy as are the other segments.

The male and three females from the locality given above represent the first records from Mexico. Rivnay (1929) had seen specimens from

the Huachuca Mountains in Arizona, and the species is known also from Alabama, Arkansas, and the type locality, Kentucky. A male and female from Rio Vermelho, Santa Catarina, Brazil, in the collection of the American Museum also appear to be this species. The facial and tibial characters agree with those of the Mexican specimens and of a male and female from southwest Arkansas that were compared with LeConte's type of *lineare* by Rivnay. The male is entirely black except for the varicolored legs, as is true also of the Mexican male; the female has the coloration of the other females, namely, all parts, except the black elytra and the varicolored legs, red. Rivnay says the type (a male) is entirely black. The type, as well as the Arkansas specimens and one of the specimens from Brazil, is very much smaller than the four specimens from Mexico.

Macrosiagon discicollis (Gerstaecker)

Rhipiphorus discicollis GERSTAECKER, 1855, Rhipiphoridum coleopterorum . . . systematica, p. 32 (type, female, Brazil, in Zoologische Museum Berlin-Greifswald).

DISTRIBUTION IN MEXICO: Durango: Ventanas. Yucatan: Temax.

REMARKS: In addition to the above localities, this species has been recorded from the West Indian islands of Cuba, Puerto Rico, Guadeloupe, Santo Domingo, and Jamaica, the latter two being new; also from Colombia and Brazil in South America.

This species resembles *limbatum* and *lineare* and differs from the other species in its flat mesoepisterna, in the presence of a prosternal spine between the front coxae, and in its virtually impunctate head. The elytra are much less dehiscent than in all other species, the inner margins of each elytron being contiguous until just before the apex. The head also differs from that of other species by being neither elongate nor squarish, but more or less triangular, broad at the top and much narrower below. The narrow clypeus is deeply emarginate, more so than in any other species. Another unique character in this species is the fuzzy aspect of the antennae of the male which have long hairs, longer than the rami are wide, emanating from all sides of each ramus. Other species do in fact possess some hairs on the antennae, but they are scarcely visible. The males do not have the front tarsi densely pubescent beneath as in other Mexican species with the exception of *flavipenne*.

Color variations in the five Mexican specimens seen at the British Museum include the following: (1) one specimen with the pronotum and elytra yellowish, the apex of the elytra only black (figured by Champion, 1891); (2) one specimen with yellow pronotum and elytra, the elytra with a band of black at the base and apex; (3) three specimens

(two females from Yucatan, one from Ventanas) with the elytra entirely black, but the pronotum yellow, with a black mark in center, either a stripe or a spot (figured also by Champion, 1891). In a series of nine specimens from Mayaguez, Puerto Rico, at the American Museum, one specimen is like 1 above, five specimens resemble 3 but with the pronotum red transversely across the base, two specimens have the elytra entirely black and the pronotum yellow, and one specimen is entirely black except for the extreme hind angles of the pronotum which are yellow.

According to the West Indian material, the males have the body below both black and yellow, whereas the females have it yellow only, but I failed to notice whether this character is sexually dimorphic in the Mexican specimens seen at the British Museum.

GENUS *RHIPIPHORUS* BOSC

Rhipiphorus Bosc, 1792, Jour d'Hist. Nat., vol. 2, p. 293 (type, by original designation, *Rhipiphorus subdipterus* Bosc).

For a discussion of the genus, see the Introduction. In Champion (1891) the name *Rhipidophorus* was used for the genus, and others have used *Myodites*.

Rhipiphorus brevipes Rivnay

Rhipiphorus brevipes RIVNAY, 1929, Mem. Amer. Ent. Soc., no. 6, p. 46, pl. 4, fig. 13 (type, male, Rio Balsas, Mexico, in Museum of Comparative Zoölogy).

DISTRIBUTION IN MEXICO: Guerrero: Rio Balsas.

REMARKS: No specimens examined.

Rhipiphorus rex (Champion)

Rhipidophorus rex CHAMPION, 1891, Biologia Centrali-Americana, vol. 4, pt. 2, p. 360, pl. 16, figs. 19, 19a (type, male, Mexico, in British Museum).

DISTRIBUTION IN MEXICO: *Sonora: *Ten miles south of Hermosillo, July, 1954. *Coahuila: *Guadalupe, May, 1952; *Gloria, May, 1952; *Paila, 3900 feet, July, 1947.

REMARKS: This is, as Champion stated, "perhaps the finest species of the genus." It is large, 10 mm. or more, and the beautiful full-blown antennae of the male resemble somewhat the yellow tentacles of a sea anemone. The variations of the species have not yet been described, as Champion had only one specimen, and Rivnay (1929) had not seen any

specimens. The series from Guadalupe consists of two males and six females, from Gloria of four females, and one female each from Sonora and Coahuila. In addition (and these are reported for the first time from the United States), we have a series of five males and two females from Big Bend National Park in Texas, six females from Eagle Pass, nine other specimens from Texas, and one from White River, Arizona. The significant characters of the species appear to be represented in all this material: the deep and very oblique apical emargination of the first segment of the hind tarsi, the densely hairy elongate projection on the inner side of the front coxae at apex, and the median carination of the dorsal segments of the abdomen. This carina is much more distinct in some specimens than in others and is sometimes hidden by the wings which are dark and smoky along the costae and partly across the middle and subapically. One of our males from Guadalupe was compared with the type in the British Museum and agrees with it in all respects.

There is very little difference in coloration between the sexes. In the eight males examined the head, pronotum, and sternum are black, the abdomen is dorsally black except for the last two segments, ventrally with black and yellow stripes (one male from the United States has two tiny yellow spots at the base of the pronotum). In the 28 females the coloration differs in some specimens which have yellow on the sides of the pronotum to a varying extent, some yellow on the sternum, and yellow on the sides of the abdomen dorsally, this yellow often invading the black either from the sides or between the segments. The antennae of the male are yellow, with the tips slightly darkened; those of the female are either yellow or piceous or a combination of both colors. Females have the first rami as long as the eye and decreasing in length to the apex; there are only nine rami, but there appear to be two segments at base without rami, making 11 segments in all. The female pygidium is triangularly elongate, as in Rivnay's figure of *Rhipiphorus vierecki* (1929, pl. 4, fig. 7p). In fact the present species agrees very well with the description of Fall's *vierecki* from Arizona and New Mexico except that no mention is made by Fall of carinate tergites or of the hairy process on the front coxae.

Rhipiphorus laevicollis (Champion)

Rhipidophorus laevicollis CHAMPION, 1891, *Biologia Centrali-Americana*, vol. 4, pt. 2, p. 360, pl. 16, fig. 20 (type, female, Mexico City, in British Museum).

DISTRIBUTION IN MEXICO: Distrito Federal: Mexico City.

REMARKS: Type examined; no other specimens seen.

Rhipiphorus tuberculatus (Champion)

Rhipidophorus tuberculatus CHAMPION, 1891, Biologia Centrali-Americana, vol. 4, pt. 2, p. 362, pl. 16, figs. 22, 22a (type, male, Atoyac, Veracruz, in British Museum).

DISTRIBUTION IN MEXICO: Veracruz: Atoyac.

REMARKS: Type and one female examined; no other specimens seen.

Rhipiphorus niger (Waterhouse)

Myodites niger WATERHOUSE, 1875, Cist. Ent., vol. 1, p. 369 (type, female, Dueñas, Guatemala, in British Museum).

DISTRIBUTION IN MEXICO AND CENTRAL AMERICA: Mexico: Veracruz: Orizaba. Guatemala: Dueñas; Panzos; *Cunen, 6000 feet, August, 1947.

REMARKS: Our single specimen from Cunen, a female, was found to agree with the type in the British Museum in all characters except the abdomen which is darker dorsally in our specimen, lacking the broad bands of yellow on the first two segments, as shown in Champion's figure (1891, pl. 16, fig. 23) of a male from Panzos. In our specimen the abdomen is entirely black ventrally, whereas in the type and other specimens at the British Museum it is yellow with only the sides black. This species differs markedly from *rex*, but not from *tuberculatus*, *hyalinus*, and *simplex*, by having the first segment of the hind tarsi elongate and not obliquely truncate or emarginate. It seems to differ from *hyalinus* only in the not entirely black elytra and in the not entirely hyaline wings.

Rhipiphorus hyalinus (Champion)

Rhipidophorus hyalinus CHAMPION, 1891, Biologia Centrali-Americana, vol. 4, pt. 2, p. 363, pl. 16, fig. 25 (type, male, Cordoba, Mexico, in British Museum).

DISTRIBUTION IN MEXICO: Veracruz: Cordoba.

REMARKS: Type examined; no other specimens seen.

Rhipiphorus simplex (Champion)

Rhipidophorus simplex CHAMPION, 1891, Biologia Centrali-Americana, vol. 4, pt. 2, p. 363, pl. 16, fig. 25 (type locality given as Ventanas in Durango, but type specimen is a female from Presidio, Mexico, collected by Forrer).

DISTRIBUTION IN MEXICO: Durango: Ventanas (Presidio).

REMARKS: Type examined; no other specimens seen. Ventanas and Presidio may well be two names for the same locality.

Rhipiphorus species

Four males representing three species cannot at present be identified. One is from La Punta, Jalisco, August, 1953; one, from San Pedro de Colonias, 3700 feet, August, 1947; and two are from Nayarit, Santiago Ixcuintla, May, 1950, and Compostela, November, 1950.

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