Revision of the Genus *Mulsantina* Weise (Coleoptera: Coccinellidae)

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ABSTRACT Nine species in the genus *Mulsantina* Weise are recognized including two new species: one from Mexico (*mexicana* sp. nov.) and one from Guatemala and Mexico (*curva* sp. nov.). *Harmonia quinquelineata* Mulsant and *Coccinella albopicta* Gorham are transferred to *Mulsantina*, and the latter and *Cleis concolor* Crotch are placed as synonyms of *M. lynx* (Mulsant). *Mulsantina cyathigera* (Gorham) and *M. quinquelineata* (Mulsant) are reported in the United States for the first time. The species are described and illustrated, and their distributions and plant and host associations are given.

THE GENUS *Cleis* was erected by Mulsant (1850, p. 208) for two Mexican species, *C. mirifica* and *C. lynx*. Unfortunately he had previously used the name *Cleis* (p. 135) for another species, *C. humilis*, but he subsequently changed this generic name to *Clynis* (p. 1023). Crotch (1874) designated *Cleis mirifica* as the type species, then placed the name as a synonym of *C. lynx* although the former had page priority. In 1906, Weise proposed the name *Mulsantina* to replace *Cleis* Mulsant because the name was preoccupied by *Cleis* Guérin-Méneville, 1831 (Lepidoptera: Callidulidae) (Fletcher 1979). This change was apparently overlooked until detected by Korschefsky (1932). Casey (1908) erected the genus *Pseudocleis* with *Coccinella picta* as the type because he did not believe this species was congeneric with *C. lynx* (=*C. mirifica*). Leng (1920) placed *Pseudocleis* as a synonym of *Cleis* and has been followed by subsequent workers.

In addition to *C. mirifica* and *C. lynx*, Mulsant (1850) also described *Harmonia contexta* which he placed as a synonym of *H. picta* (Randall 1838) in the appendix. In 1856, he described *Cleis licia*, which was placed as a synonym of *Verania discolor* (Fabricius) by Crotch (1871, 1874). *Coccinella concinnata* Melsheimer (1847) was synonymized with *C. picta* by LeConte (1850), and the latter species was placed in *Cleis* by Casey (1899). Other additions to the genus included *Cleis concolor* Crotch (1874), *C. minor* Casey and *C. hudsonica* Casey (1899), *C. picta* var. *blanchardi* Johnson (1910), *C. picta nubilata* Casey (1924), and *C. labyrinthica* Sicard (1929). In 1920, Leng listed *C. picta* and *C. hudsonica* as the two species occurring north of Mexico. Korschefsky's world catalog (1932) included *M. concolor*, *M. hudsonica*, *M. labyrinthica*, *M. lynx*, and *M. picta* in the genus *Mulsantina* and added *Coccinella picta* ab. *impictipennis* Weise (1895). Blackwelder (1945) listed five species from Central America and the West Indies in this genus including *Coccinella cyathigera* Gorham (1891). *Mulsantina luteodorsa* was described by Chapin in 1973, bringing the total number of species in the genus to seven. *Coccinella quinquelineata* Mulsant (1850) was said by Crotch (1874) to be allied with *C. picta*, and *C. albopicta* Gorham (1891) was believed to be the same species as *Cleis mirifica* = (*C. lynx*) (Gorham 1892, Timberlake 1943).

Genitalia were dissected and compared using methods given by Chapin (1974), except that to dissolve unwanted tissue, abdomens were placed in a vial containing concentrated aqueous potassium hydroxide held in a beaker of hot water on a hot plate. Male genitalia were removed from the basal end of the abdomen for examination, but female genitalia were removed only for the preparation of the illustrations. To examine other specimens, the dorsal membrane was slit on one or both sides and folded back to expose the spermetheca and sperm duct. Male genitalia and female abdomens were placed in microvials containing glycerin or glued to card points with clear fingernail polish and pinned beneath the specimens.

Label data are recorded as written with possible misspellings noted. Counties, mountain ranges, etc., are not listed separately if more specific localities within these areas are given in parentheses and brackets. Some localities could not be found on available maps, others referred to too large an area, and some were ambiguous.

Mulsantina Weise

Mulsantina Weise 1906, p. 34; Korschefsky 1932, p. 564; Timberlake 1943, pp. 19, 54; Blackwelder 1945, p. 453; Hatch 1962, p. 183; Grimes 1965, p. 39; J. Chapin 1974, p. 65; Belicek 1976, p. 350.

Cleis Mulsant 1850, p. 208; Mulsant 1866, p. 148; Crotch 1871, p. 5; Crotch 1874, p. 142; Gorham 1892, p. 168; Casey 1899, pp. 84, 95; Leng 1920, p. 217; Wingo 1952, p. 23 (not *Cleis* Mulsant

1850, p. 135, nor *Cleis* Guérin-Méneville 1831). Type-species: *Cleis mirifica* Mulsant, by subsequent designation of Crotch 1874.

Pseudocleis Casey 1908, p. 406; Leng 1920, p. 217; Korschefsky 1932, p. 564; Timberlake 1943, p. 19. Type-species: *Coccinella picta* Randall, by original designation.

Coccinellini with form oval to elongate-oval, moderately convex. Head, pronotum, and elytra punctate with fine network of lines between punctures, less distinct on elytra. Pronotum without marginal bead at base; lateral margins of pronotum and elytra narrowly explanate and translucent. Anterior margin of clypeus with slight anterolateral projections. Prosternal lobe narrow, without carinae. Mesosternum convex, anterior face with shallow median depression. Epipleura wider than space between middle coxae. Postcoxal line incomplete, curving laterally along posterior margin of first abdominal sternum, ending about even with outer edge of hind coxae. Femoral apices barely visible beyond elytral margins; tibiae without distal spurs; each tarsal claw with small subquadrate basal tooth. Male genitalia symmetrical. Female genitalia without infundibulum, sperm duct variable, from extremely long and coiled to relatively short and straight.

Mulsant (1850), Crotch (1874), and Korschefsky (1932) placed *Mulsantina* with or near genera now included in the Psylloborini while North American authors placed it correctly in the Coccinellini. *Mulsantina* differs from the genera *Adalia, Aphidecta, Cycloneda,* and *Olla* with which it might be confused in the presence of an incomplete postcoxal line which runs along the posterior margin of the first abdominal sternum and in the absence of spurs on the middle and hind tibiae. It differs from *Psyllobora* in the presence of slight anterolateral projections on the anterior margin of the clypeus.

The color patterns vary intraspecifically and sometimes overlap interspecifically. All but *M. luteodorsa* have an M-shape figure on the pronotum which is solid or broken into the component spots. The elytra usually have black or brown maculation on a yellowish white to brownish yellow background, but several species have specimens with immaculate orange elytra. Females have the posterior margins of the first four ventral abdominal sterna truncate; the fifth is slightly sinuate; and the sixth is rounded and entire, except in *M. mexicana* sp. nov. In males, the intersegmental membranes are wider behind sterna 2–4, and the posterior margins appear emarginate; the fifth sternum is slightly emarginate, and the sixth has a median notch. In fully sclerotized males, the abdomen curves ventrally. Specific differences in the male genitalia are found in the shape of the basal lobe and parameres of the phallobase and at the tip of the sipho. In females, the relative length of the sperm duct is the most important character and to a lesser extent the shape of the spermatheca.

Sixteen names have been associated with this genus. Nine species are recognized, and two of these are undescribed. Members of *Mulsantina* are found from Canada to Guatemala, and one species occurs in Haiti. They are usually collected on the Pinaceae, but some species are found on oak, poplar, citrus and *Cinchona*. Little is known about the hosts of this genus; most of the records are casual observations. Torres Beato et al. (1982) reported that two species of aphids were the preferred prey of *M. mexicana* sp. nov.

Key to the Species of *Mulsantina*

1. Species found in Canada and United States 2
   Species found in Mexico, Guatemala, or Haiti 6
2. Pronotum with slightly curved black stripe each side of middle and black spot in each lateral area, sometimes joined to median stripe basally; elytra immaculate (Fig. 13) ..... *luteodorsa* Chapin
   Pronotum with median M-shape figure, either solid or reduced to component spots, lateral spots present or absent ... 3
3. Elytron with six black spots, one on humerus, three at about one-third, and two at two-thirds; spots sometimes reduced, rarely absent (Fig. 14) .... *cyathigera* (Gorham)
   Elytron not as above 4
4. Pronotum with two dashes near anterior margin, spots forming M-shape figure usually separate; elytron with longitudinal black vitta, sometimes interrupted, black spot internally just anterior to middle and another behind middle near lateral margin; suture dark (Fig. 6); boreal species found in north or in mountainous areas of eastern United States .... *hudsonica* (Casey)
   Pronotum without two dashes near anterior margin, spots forming M-shape figure connected or separate; elytron not fitting above description 5
5. Widespread species with variable maculation (Fig. 1–5); elytron with longitudinal vitta with separate or attached posterolateral spot, uniting one or two transverse vittae which may be reduced or absent; or elytron with black areas greatly expanded or immaculate; metasternum dark brown or black; genitalia as in Fig. 33 and 42 ..... *picta* (Randall)
   Species from Arizona, New Mexico, Utah, and Colorado; pronotal maculation reduced; elytron as in *M. picta,* pattern often paler; or each elytron with three longitudinal vittae, one along suture, one from callus to two-thirds, and one attached to it externally; or with only me-

dian vitta, sometimes interrupted or reduced to two spots, with or without sutural vitta and posterolateral spot (Fig. 7–12); metasternum yellowish or reddish brown in south; dark brown in north; genitalia as in Fig. 35 and 50 ..... *quinquelineata* (Mulsant)

6. Species from Haiti; maculation as in Fig. 16 ..... *labyrinthica* (Sicard)
   Species from Mexico or Guatemala 7
7. Elytron mostly black or dark brown with orange or ivory spots 8
   Elytron orange or yellow, with or without maculation 9
8. Elytron black with large orange spot on disk, lateral margin narrowly pale (Fig. 15) ..... *cyathigera* (Gorham)
   Elytron dark brown with five ivory spots, variable in size and sometimes connected (Fig. 21) ..... *lynx* (Mulsant)
9. Elytron with maculation 10
   Elytron without maculation 19
10. Elytra with broad U-shape brown vitta flanked on each side posteriorly by two narrow elongate marks (Fig. 28; genitalia as in Fig. 41 and 48); southern Mexico and Guatemala ..... *curva* sp. nov.
    Elytra not as above 11
11. Elytron with one or more longitudinal vittae, joined to transverse vittae or not .. 12
    Elytron with transverse vittae or spots ... 14
12. Elytron with longitudinal vitta with separate or attached posterolateral spot uniting one or two transverse vittae which may be reduced or absent (Fig. 2 and 3) ..... *picta* (Randall)
    Elytron with one or more longitudinal vittae not joined to transverse vittae, inner margin of median vitta straight or sinuate 13
13. Elytron with two or three longitudinal vittae, one along suture, one from callus to two-thirds, inner margin sinuate, and, sometimes, one attached to it externally (Fig. 9) ..... *quinquelineata* (Mulsant)
    Elytron with median vitta, inner margin straight, sometimes interrupted or reduced to two spots; sutural vitta present or absent (Fig. 25–27) ..... *mexicana* sp. nov.
14. Elytron with spots 15
    Elytron with transverse vittae 18
15. Elytron with large apical spot and indistinct one behind scutellum (Fig. 23) ..... *lynx* (Mulsant)
    Elytron with two or more spots 16
16. Elytron with two spots, one median and one behind it at two-thirds (Fig. 26) ..... *mexicana* sp. nov.
    Elytron with more than two spots 17
17. Elytron with six black spots, one on humerus, three at about one-third, and two at two-thirds; spots sometimes reduced, rarely absent (Fig. 14) ..... *cyathigera* (Gorham)
    Elytron with four or 8–11 spots, variable in size (Fig. 17–20) ..... *lynx* (Mulsant)
18. Elytron with broad dark band around ivory basal spot near suture and another band at four-fifths (Fig. 22) .... *lynx* (Mulsant)
    Elytron with two narrow irregular fascia before middle and at two-thirds, each with spot near lateral margin (Fig. 4) ..... *picta* (Randall)
19. Metepisternum black ..... *lynx* (Mulsant)
    Metepisternum ivory or brown 20
20. Metepisternum brown ..... *cyathigera* (Gorham)
    Metepisternum ivory 21
21. Intercoxal area of first abdominal sternum ivory; genitalia as in Fig. 40 and 49 .... *mexicana* sp. nov.
    Intercoxal area of first abdominal sternum brown or black; genitalia as in Fig. 42 ..... *picta* (Randall)

Mulsantina picta (Randall)

(Fig. 1–5, 33, and 42; Map, Fig. 29)

Coccinella picta Randall 1838, p. 51; LeConte 1850, p. 238; LeConte 1852, p. 131; Crotch 1874, p. 105; Gorham 1891, p. 154.

Harmonia picta: Mulsant 1850, p. 1017; Mulsant 1856, p. 141; Mulsant 1866, p. 65; Crotch 1873, p. 373; Wickham 1894, p. 303; Leng 1903, p. 205.

Neoharmonia picta: Crotch 1871, p. 2.

Cleis picta: Casey 1899, p. 95; Bowditch 1902, p. 206; Schaeffer 1905, p. 143; Johnson 1910, p. 72; Leng 1920, p. 217; Stehr 1930, p. 40; Wingo 1952, p. 46.

Pseudocleis picta: Casey 1908, p. 406.

Mulsantina picta: Korschefsky 1932, p. 565; Timberlake 1943, p. 19; Blackwelder 1945, p. 453; Grimes 1965, p. 79; Hatch 1962, p. 183; J. Chapin 1974, p. 66; Phouc and Stehr 1974, p. 61; Belicek 1976, p. 350; Larochelle 1979, pp. 55, 81.

Coccinella concinnata Melsheimer 1847, p. 177.

Harmonia contexta Mulsant 1850, pp. 87, 1017.

Coccinella picta var. *impictipennis* Weise 1895, p. 125.

Mulsantina picta ab. *impictipennis:* Korschefsky 1932, p. 565.

Cleis picta ab. *impictipennis:* Leng and Mutchler 1933, p. 88.

Cleis picta var. *blanchardi* Johnson 1910, p. 72.

Cleis minor Casey 1899, p. 95.

Cleis picta var. *minor:* Bowditch 1902, p. 206; Schaeffer 1905, p. 143; Johnson 1910, p. 72; Leng 1920, p. 217.

Harmonia picta var. *minor:* Leng 1903, p. 205.

Pseudocleis picta minor: Casey 1908, p. 406.

Cleis picta minor: Dobzhansky 1935, p. 335; Malkin 1943, p. 197.
Mulsantina picta ab. *minor:* Korschefsky 1932, p. 565; Blackwelder 1945, p. 453.
Mulsantina picta minor: Timberlake 1943, p. 19; Hatch 1962, p. 183.
Cleis picta nubilata Casey 1924, p. 158.
Mulsantina picta nubilata: Korschefsky 1932, p. 565.
Mulsantina picta ab. *nubilata:* Blackwelder 1945, p. 453.
Cleis concolor: Gaines 1933, p. 263; Blackwelder 1939, p. 47 (misidentification).

Male. Form elongate-oval. Head pale yellow, vertex black with two anterior prolongations each preceded by interrupted black line on face. Antennae and mouthparts yellow-brown, labrum paler. Pronotum pale yellow with median black M-shape figure not extending to anterior margin, base of pronotum narrowly black beneath it, with spot attached to each leg. Scutellum black. Elytron pale yellow with black vitta running from callus to three-fourths uniting two transverse vittae, one curving anteriorly to suture from internal dilation before middle, a broader one at three-fourths which is expanded anteriorly and posteriorly along suture; elongate spot attached posterolaterally. Ventral surface with anterior part of head, prosternum, mesosternum, anterior mesal part of metasternum, posterior margin of mesepisternum, metepisternum (except anterior and medial margin), mes- and metepimera pale yellow, remainder of thorax black. Abdomen reddish brown, black anteromedially. Leg reddish brown, coxa black, anterior coxa with yellow spot. Genitalia as in Fig. 33.

Female. Similar to male except for sexual characters. Genitalia as in Fig. 42.

Variation. Length 3.32–5.31 mm; width 2.24–3.98 mm. Markings on head vary from two solid black lines to two rows of faint brown spots. M-shape figure on pronotum composed of seven black spots flanked on each side by two small and one large spot, spots variously fused or fragmented, with lateral ones sometimes reduced or absent. Elytral pattern varies from mostly black with basal and discal spots and margin yellow to immaculate orange. Usually elytron yellow or straw-colored with black or brown pattern, pale areas near suture sometimes smudged with brown; oblique vitta usually with slight external prolongation anteriorly which occasionally joins posterior spot enclosing pale area; vitta dilated internally near middle and at apex, dilations sometimes joined enclosing pale area; vitta occasionally interrupted between dilations; posterior spot separate or attached, often prolonged to side margin; transverse vittae irregular in shape, interrupted, faint, or absent; rarely, posterior third of elytron, except margin, black, with straight vitta present or absent; or, in Mexico, pattern resembles *M. hudsonica*. Mesepisternum and rarely the metepisternum completely black; thorax dark brown; abdomen varies from yellowish brown to black; leg yellowish brown.

Type Localities. Of *picta*, Chelsea beach, Massachusetts; of *concinnata*, Pennsylvania; of *contexta*, "Mexique"; of *impictipennis* and *blanchardi*, not given; of *minor*, Siskiyou Co., California; of *nubilata*, Mexico.

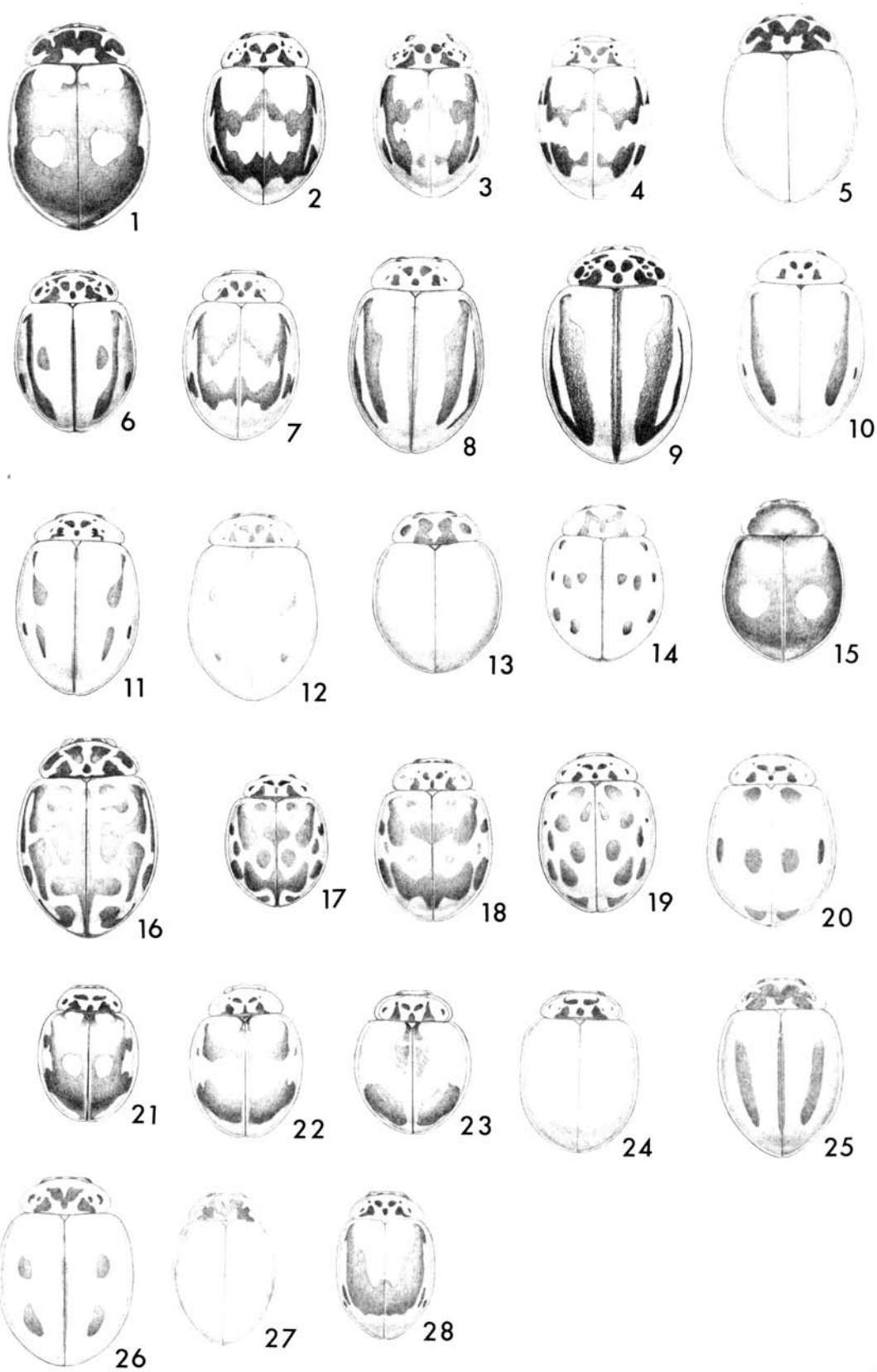
Type Depositories. Of *picta* and *concinnata*, types not located; of *contexta*, CUMZ[1] (lectotype designated by Gordon [1985]); of *impictipennis* and *blanchardi*, types not designated; of *minor*, USNM (35534) (lectotype here designated); of *nubilata*, USNM (35535).

Discussion. The black areas on the elytra are greatly expanded in specimens from the Middle Atlantic states becoming somewhat less so in specimens from the middle and southern states west to the Mississippi River. To the north and west, the maculation is less extensive becoming browner in the far west and Mexico. Specimens with immaculate orange elytra occur with maculate forms in the eastern half of the country; along the California coast, particularly in the San Francisco area; and, occasionally, in Oregon, Washington, and Mexico. They comprised the only color form examined from Florida, Louisiana, and College Station, Tex.

Mulsantina picta differs from *M. quinquelineata* in the more extensive pronotal markings, darker maculation, and dark brown or black metasternum. Some Mexican specimens of *M. picta* are paler with reduced markings and resemble *M. hudsonica* or *M. curva* sp. nov. Mexican females with immaculate elytra may be separated from other species by the ivory-white metepisternum and the usually brown intercoxal area of the first abdominal sternum.

Coccinella concinnata, described from Pennsylvania by Melsheimer (1847) was placed as a synonym of *C. picta* by LeConte (1850) and subsequent authors. Mulsant (1850) described *Harmonia contexta* from Mexico but placed it as a synonym of *H. picta* later in the same work, and this placement has not been questioned. One of the labels on the lectotype (Gordon 1985) indicates the specimen is from "am. b." which may be correct as the elytral pattern of the homotype labeled by Gordon in 1973 is more extensive and darker than other Mexican specimens and resembles specimens from eastern United States. The form with immaculate elytra was mentioned by Randall (1838), Crotch (1873), and Wickham (1894). Weise (1895) named it *C. p.* var. *impictipennis*, but the name was apparently overlooked until the publication of Korschefsky's world catalog (1932). Leng (1903) reported that the elytra of males were immaculate, that the name *H. contexta* applied to females in which the black color forms two transverse bands sublaterally connected, and that the name *H. concinnata* applied to females in which the elytra were almost wholly black. Johnson

[1] See *Acknowledgment* for abbreviations.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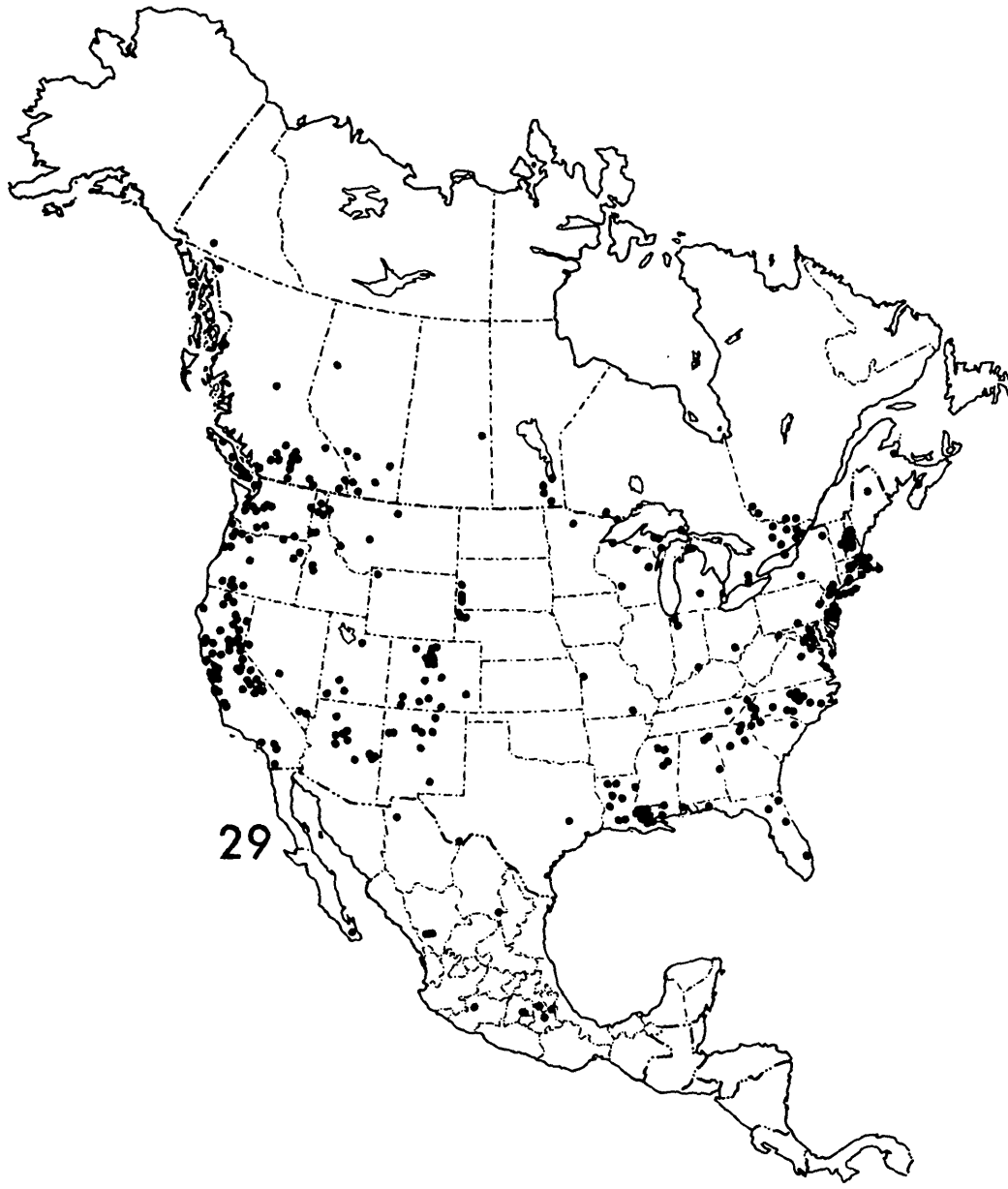

Fig. 29. Known distribution of *M. picta*.

(1910), apparently unaware of Weise's work, renamed the form *Cleis p.* var. *blanchardi* in honor of the man who called his attention to the fact that this was not a sex difference but one which occurred throughout the range. Specimens of this form from College Station, Tex., were referred to as *C. concolor* Crotch (Gaines 1933), a misidentification. *Cleis minor* Casey (1899) was regarded as a variety of *C. picta* by Bowditch (1902), Leng (1903), and Schaeffer (1905), and in 1908, Casey reduced it to a subspecies. Dobzhansky (1935) felt *C. minor* did not rate subspecific rank although the western representatives of this species differed from the eastern ones in coloration and perhaps in

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Fig. 1–28. Dorsal views of *Mulsantina* spp. (1–5) *M. picta*; (6) *M. hudsonica*; (7–12) *M. quinquelineata*; (13) *M. luteodorsa*; (14–15) *M. cyathigera*; (16) *M. labyrinthica*; (17–24) *M. lynx*; (25–27) *M. mexicana* sp. nov.; (28) *M. curva* sp. nov.

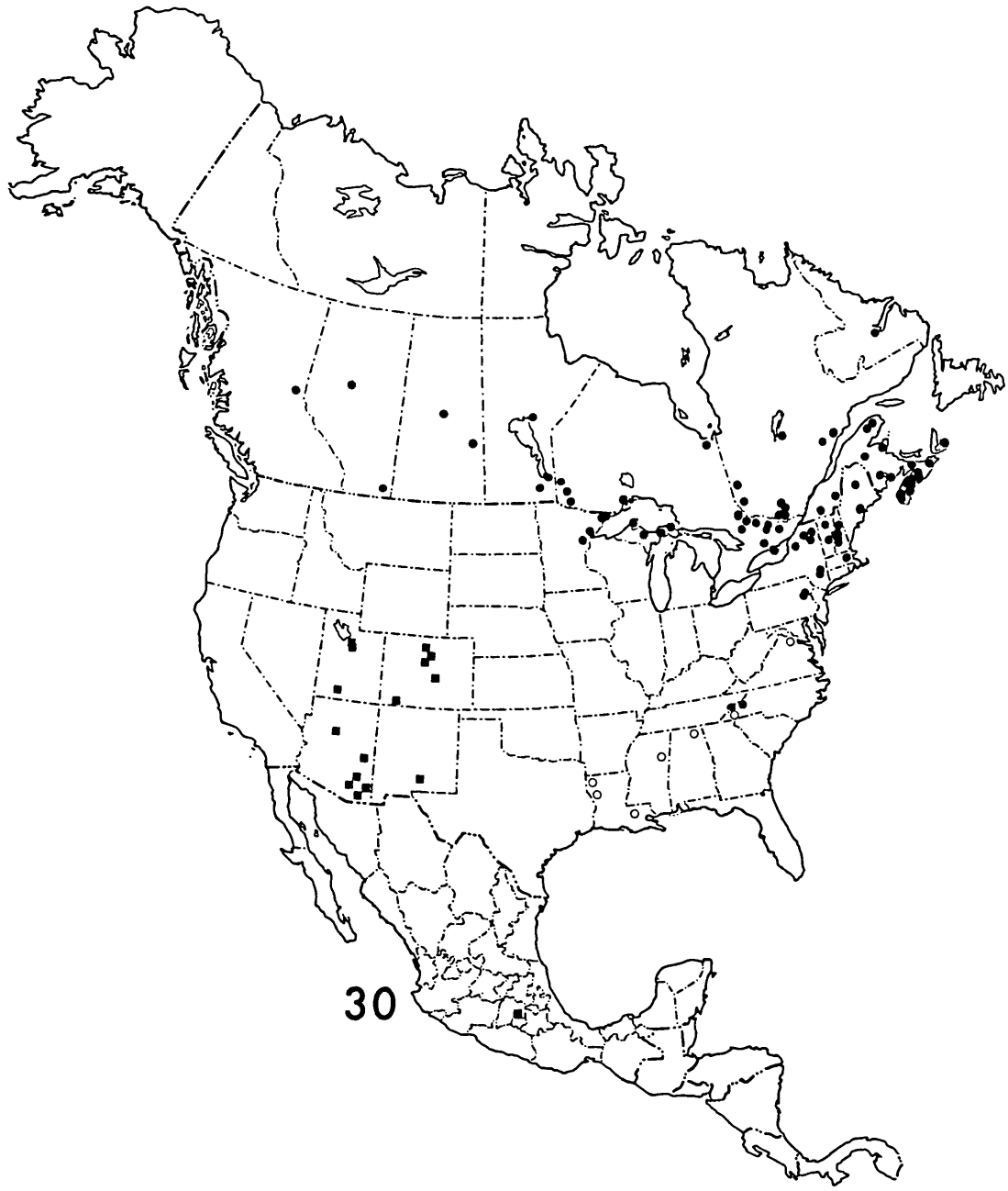

Fig. 30. Known distribution of *M. hudsonica* (●), *M. luteodorsa* (○), and *M. quinquelineata* (■).

size. I agree with Dobzhansky and feel that these changes are clinal. *Cleis picta nubilata* Casey (1924), described from Mexico, falls within the range of variation exhibited by *M. picta*.

The types of *Coccinella picta* and *C. concinnata* could not be located; Randall's collection was lost (Sprague and Austin 1875), and there were no specimens of *C. concinnata* under that name in the Melsheimer Collection (A. F. Newton, personal communication).

Casey had at least three specimens of *Cleis minor*, all males. One labeled "Siskiyou Co. Cal./CASEY bequest 1925/TYPE USNM 35534 (red label)/minor Csy." is here designated and labeled as the lectotype. The other two specimens labeled "Alameda Co. Cal./CASEY bequest 1925/minor-2 PARATYPE USNM 35534 (red label)" and "Siskiyou Co. Cal./CASEY bequest 1925/minor-4 PARATYPE USNM 35534 (red label)" are designated and labeled as paralectotypes. A fourth specimen in his collection was labeled "Cal./CASEY bequest 1925/CASEY determ. minor-3." Casey had

Fig. 31. Known distribution of *M. cyathigera* (△) and *M. lynx* (●).

a single female specimen of *C. p. nubilata* labeled "Mex/CASEY bequest 1925/TYPE USNM 35534 (red label)/nubilata Csy."; it must be considered the holotype.

Host records for this species include the following: Adelgidae: *Chermes* spp. (Gillette 1907, Saunders 1883); *C. pinicorticis* Fitch (Britton 1914); *Adelges cooleyi* (Gillette) (Cummings 1959); *A. piceae* (Ratzeburg) (Brown and Clark 1956, Mitchell 1962). Aphididae: *Dilachnus* = (*Cinara* spp.) (Essig 1926, Gaines 1933); *Eulachnus rileyi* (Williams) (Grimes 1965); *Mindarus abietinus* Kock (Witter and Amman 1969); *Schizolachnus piniradiatae* (Davidson) (Gagne and Martin 1968, Grobler 1962). Diaspididae: *Chionaspis pinifoliae* (Fitch) (Britton 1914). Coccidae: *Lecanium* spp. (Timberlake 1943); *Toumeyella* sp. (Chapin 1974). Margarodidae: *Matsucoccus resinosae* Bean and Godwin (1955).

Plant associations from the label data are as follows: Pinaceae: *Abies concolor* Lindl. and Gord.; *Picea* sp.; *Pinus clausa* (Engelm.) Vasey; *P. coulteri* Don.; *P. edulis* Engelm.; *P. elliottii* Engelm.; *P. glabra* Walt.; *P. jeffreyi* Murr.; *P. ponderosa* Laws.; *P. radiata* Don.; *P. resinosa* Ait.; *P. strobus* L.; *P. taeda* L.; *P. virginiana* Mill.; *Pseudotsuga taxifolia* (Lam.) Britt. Betulaceae: *Betula* sp. Cupressaceae: *Thuja* sp. Apocynaceae: *Apocynum androsaemifolium* L. Rhamnaceae: *Ceanothus* sp.

Only the Canadian and Mexican localities are listed below.

Material Examined. 2,094 specimens. CANADA: *Alberta:* Banff; Blairmore; Brooks; Burmis; Crow's Nest Pass; Grande Prairie; Kannanaskis; Lethbridge; Waterton. *British Columbia:* Aspen Grove; Atlin; Bowser; Dog Lake, Penticton; Duncan; Elko; Garden Bay L., Pender Harbor; Golden; Goldstream; Gordon Hd.; Hector; Lac-le-Jeune nr. Kamloops; Ladysmith; Langford; Lavington; Midday Val., Merrit; Nanaimo Biol. Station; Nanaimo, Van. Is.; Nth Bend; 5 mi. W O.K. Falls, White Lake; Oliver (5 mi. NW; Madden L.; McIntyre Cr.; Meyer Flats; Sawmill Lake); Ottertail; Robson; Saanich Dist.; 2 mi. S Salmo; Salmon Arm; Sidney; Spious Creek; Sproat Lake; Summerland; Summit Lake, Mi 392 Alaska Hwy.; Vancouver (Mt. Seymour); Vernon; Victoria. *Manitoba:* Ft. Garry; Sandilands; Victoria B'ch; Winnipeg. *New Brunswick:* Tabusintac. *Nova Scotia:* Kentville. *Ontario:* Ad & Lennox Co.; Chalk River; Constance Bay; Fronenac (sic) Co.; Hastings Co.; Marmora; Maynooth; Mt. Pleasant; Oakland; Ottawa; Pr. Edw. Co.; Quetico Provincial Pk.; Rockport; Simcoe; Spencerville, Limerick Forest. *Quebec:* Ft.

Coulonge; Hull; Laniel; Ville-Marie. *Saskatchewan:* Hudson Bay. *Yukon Territory:* Canyon Creek; Lower Laberge; Whitehorse. MEXICO: Koebele No. 501; Koebele No. 1647. *Baja California Sur:* Sierra La Laguna, 1,770–1,850 m. *Chihuahua:* Rio Santa Maria at Buenaventura. *Coahuila:* Hwy. 57, 15 mi. SE Saltillo, 7,000 ft.; 7,500 ft., nr. Jame, 33 mi. SE Saltillo. *Distrito Federal:* La Venta; 3,150 m, P. N. Cumbres Ajusco, Mt. Alegre. *Durango:* 5 mi. W El Salto, 9,000 ft.; 18 mi. W El Salto, 9,200 ft.; 25 mi. E El Salto. *Michoacan:* Paricutin. *Puebla:* 7,700 ft., 3 mi. E Puebla, Hwy. 150D; 6 mi. E Zapatepec (sic). *Tlaxcala:* 9 mi. N Calpulalpan. AUA, CAS, CNC, CUCC, FSCA, LSU, MSU, NAUF, NCSR, TAMU, UAF, UAT, UGA, UMO, USNM, WHN.

Mulsantina hudsonica (Casey)
(Fig. 6, 34, and 43; Map, Fig. 30)

Cleis hudsonica Casey 1899, p. 96; Schaeffer 1905, p. 143; Johnson 1910, p. 72; Leng 1920, p. 217.
Cleis picta var. *hudsonica:* Bowditch 1902, p. 206; Stehr 1930, p. 40; Wingo 1952, p. 46.
Harmonia picta var. *hudsonica:* Leng 1903, p. 206.
Pseudocleis hudsonica: Casey 1908, p. 406.
Mulsantina hudsonica: Korschefsky 1932, p. 564; Hatch 1962, p. 183; Phuoc and Stehr 1974, p. 61; Belicek 1976, p. 351; Larochelle 1979, pp. 55, 81.

Male. Form elongate-oval. Head yellowish white, vertex black with two anterior prolongations, each preceded by interrupted black line on face. Antennae and mouthparts yellowish brown. Pronotum yellowish white with median M-shape design formed by five black spots with dot and dash above each leg, flanked on each side by two smaller spots and large fragmented spot near each lateral margin; posterior pronotal margin narrowly dark beneath "M." Scutellum pale. Each elytron pale yellow with black vitta from callus to middle of apical fourth with anterior lateral hook and apical internal dilation; oval black spot near vitta internally just anterior to middle and another behind middle near lateral margin. Suture narrowly black except behind scutellum. Ventral surface with lateral areas of head, prosternum, mesosternum, anterior medial margin of metasternum, mes- and metepimera, spot on mesepisternum, and lateral margin of metepisternum yellowish white, remainder of thorax and abdomen dark brown, abdomen paler laterally. Coxa black, anterior one with pale spot; remainder of leg yellowish brown, tibia and tarsi darker. Genitalia as in Fig. 34.

Female. Similar to male except for sexual characters. Genitalia as in Fig. 43.

Variation. Length 3.49–4.98 mm; width 2.49–3.49 mm. Rarely vittae on face absent or head black with three pale spots; labrum dark. Spots forming pronotal pattern whole, fragmented or variously fused, sometimes forming solid M-shape mark with black spot attached at middle of each leg. Internal spot on elytron fused with vitta or sometimes so elongate it fuses with internal dilation of vitta; vitta sometimes reduced to interrupted line; external spot reduced to dot, rarely absent. Scutellum dark. Episternum black; abdomen and leg dark brown.

Type Locality. "H. B." (Hudson Bay).

Type Depository. USNM (35536).

Discussion. *Mulsantina hudsonica* was described by Casey (1899) although Mulsant (1850, 1866), Crotch (1873) and Wickham (1894) included the elytral pattern of this species in descriptions of *M. picta*. It was considered a variety of *M. picta* by Bowditch (1902), Leng (1903), and Schaeffer (1905), but Casey (1908) reiterated its validity as a species and was followed by most subsequent authors. *Mulsantina hudsonica* is most closely related to *M. picta*. While there is some variation in the color pattern of *M. hudsonica*, the spots forming the pronotal pattern are usually separate and rarely form a solid M-shape mark, two dashes are present near the anterior pronotal margin, the elytral suture is dark in both sexes, and the pattern on each elytron is not joined across the suture as it usually is in specimens of *M. picta* from the same area. The male genitalia of both species are very similar and somewhat variable. The patch of hairs near the tip of the sipho is much denser in *M. hudsonica*. In the female, the sperm duct of *M. hudsonica* is much shorter than in *M. picta*; and the spermathecae are shaped differently. In North Carolina, *M. hudsonica* may be confused with *Aphidecta obliterata* (L.), but the two may be separated by the characters given in the generic discussion above. The specimens from Arizona placed in this species by Schaeffer (1905) and Johnson (1910) were misidentified and belong to *M. quinquelineata*.

According to label data, specimens have been collected from *Abies balsamea, Picea glauca, P. mariana*, red spruce, white pine, and willow; the only host record given is "*Adelges*-infested BF." Clark et al. (1971) list *M. hudsonica* as a native predator of *Adelges piceae* in eastern Canada.

The holotype is a unique specimen in the USNM.

Material Examined. 373 specimens. CANADA: *Alberta:* Elkwater, 49°42′, 110°16′; McMurray; Slave Lak (sic). *British Columbia:* Dome Creek; Lindup. *Manitoba:* Norway House; Victoria Be'ch; Winnipeg. *New Brunswick:* Bathurst; Hempstead (sic); Kedgwick; Mispex Beach; Rockwood Pk., St. John; Tabusintac; Woodmans Cr. *Newfoundland:* Goose Bay, Labrador. *Nova Scotia:* Annapolis Royal; Bridgewater, Crescent Beach; Cole Harbour; Dartmouth; Kentville; Mt. Uniacke; South Ohio; Sydney; Tatamagouche; Truro; White Pt. Bch., Queens Co. *Ontario:* Algonquin Pk.; Bell's Corners; Britannia Hts.; Chalk River; Clearwater B., L. of the Woods; Hastings Co.; Huntley; Huntsville; Ingolf; Lake Temagami (sic); Marmora; Moose Factory; Pembroke; Prince Edward Co.;

Fig. 32. Known distribution of *M. mexicana* sp. nov. (●) and *M. curva* sp. nov. (△).

Rainy R. Dist.; 6 mi. W Richmond; Scotia Jct.; Sioux Narrows; Thunder Bay; nr. Wilmo (sic). *Prince Edward Island:* Hawplon. *Quebec:* Beech Grove; Belvedere, Parc Gatineau; Cascapédia; Duparquet; Forestville; Ft. Coulonge; Gatineau Co., Gatineau Pk., nr. Lac Philippe; Kazabazua; Knowlton; Lac Bourgeois, Parc Gatineau; Lac Cayamant, Pontiac; Lac Danford; Lac Mégantic; Laniel; Lytton; Mistassini Lk. 20 mi. N Mistassini Post; Mt. Albert; Mt. Jacques-Cartier; Mt. Lyall, 3,000 ft.; Perkins; St. Joseph d'Alma. *Saskatchewan:* Canora; Prince Albert. UNITED STATES: *Maine:* Mt. Katahdin (4,300–5,000 ft.; 5,100 ft.; summit; summit, elev. 5,215 ft.); Knox Co. *Massachusetts:* Stoneham. *Michigan:* Copper Hr.; Marquette; Newberry; White-Fish Point, L.S. *Minnesota:* Clouquet, Carlton Co.; Duluth; Gd. Marais; Hovland. *New Hampshire:* "N. H."; Claremont; Franconia; Lost River; Mt. Washington (cow pasture, 5,700 ft., Toll Rd.; Lakes of the Clouds, 5,000 ft.; near summit; summit, 6,290 ft.); Pike; Pinkham Notch; White Mts. *New York:* Artist's Brook, Essex Co.; Maplecrest, Catskill Mts.; Mt. MacIntyre; Mt. Marcy top; Parkers, Lewis Co.; Saranac Lake; Slide Mt. (Ulster Co.; 4,200 ft.); Up. Saranac; Whiteface Mt. (plains; top; trail; trail top); Wilmington. *North Carolina:* Black Mts.; Chestnut Bald, 5,900 ft., Pisgah Natl. Forest, Haywood Co.; Clingman's Dome, 6,600 ft.; Great Smoky Mts. Natl. Park (5,500 ft.; Indian Gap, 5,200 ft.); Mt. Mitchell (6,500 ft.; 6,800 ft.); Pisgah Rdg. *Pennsylvania:* Canadensis, Monroe Co.; Pocono Lk. *Tennessee:* ≈8 air mi. SE Gatlinburg off U.S. Rt. 441; D* Guyot"sw 551–552, alt. 5,600 ft. *Vermont:* Mt. Mnsfld.; Quechee. CAS, CNC, FSCA, NCSR, TAMU, UAT, USNM.

***Mulsantina quinquelineata* (Mulsant),** comb. nov. (Fig. 7–12, 35, and 50; Map, Fig. 30)

Harmonia quinque-lineata Mulsant 1850, p. 89; Mulsant 1866, p. 67.

Coccinella quinque-lineata: Crotch 1874, p. 106.

Coccinella quinquelineata: Gorham 1891, p. 155 (in part); Korschefsky 1932, p. 513; Blackwelder 1945, p. 454.

Cleis hudsonica: Schaeffer 1905, p. 143; Johnson 1910, p. 72 (in part).

Male. Form elongate-oval. Head yellowish white, vertex black with two anterior prolongations each preceded by faint interrupted brown line on face. Antennae and mouthparts yellow brown. Pronotum yellowish white with median

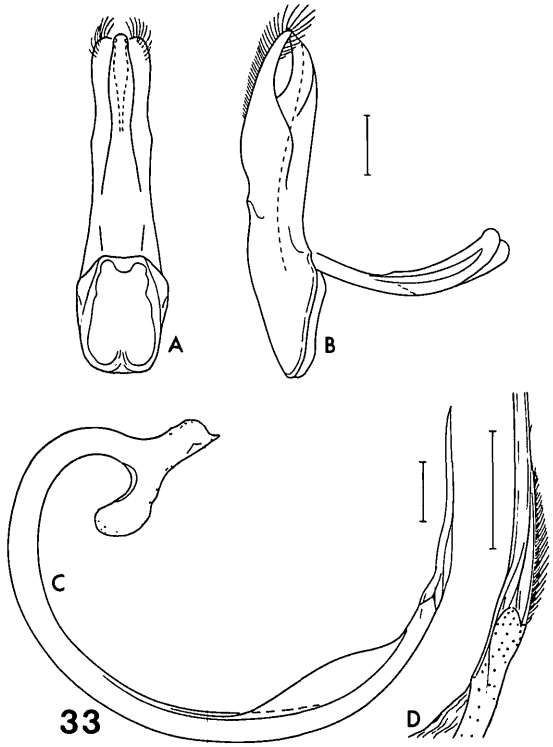

Fig. 33. Male genitalia of *M. picta*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

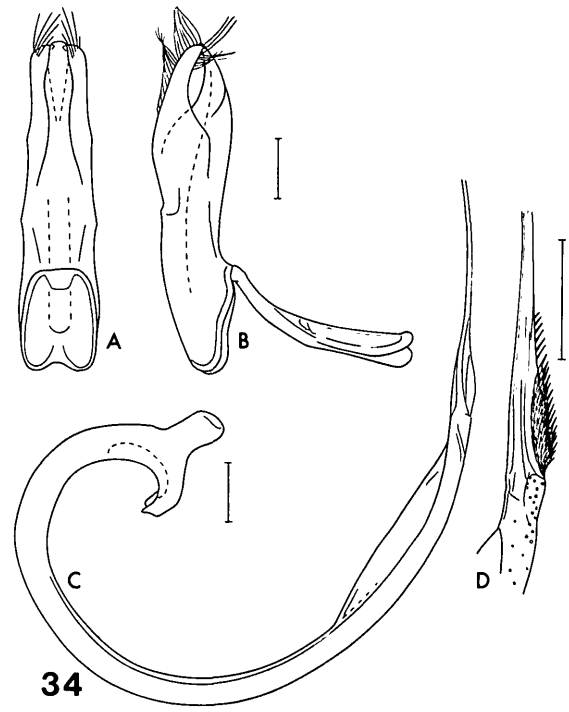

Fig. 34. Male genitalia of *M. hudsonica*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

M-shape figure composed of five brown spots occupying basal two-thirds; two small spots next to and above each leg and few brown dots near each lateral margin; pronotal base narrowly dark beneath "M." Scutellum pale. Each elytron yellowish white with two irregular transverse brown vittae at one-third and two-thirds, less distinct near suture, joined laterally by longitudinal vitta with external prolongation anteriorly; triangular spot near elytral margin at two-thirds. Ventral surface with anterior part of head, prothorax, mesosternum, anterior medial margin of metasternum, metepisternum, and mes- and metepimera yellowish white, mesepisternum with dark spot, remainder of thorax reddish brown. Abdomen and leg yellowish brown, anterior coxa with white spot. Genitalia as in Fig. 35.

Female. Pattern variable as in Fig. 7 to 10 and 12. Genitalia as in Fig. 50.

Variation. Length 3.90–4.81 mm; width 2.41–2.99 mm. Markings on face usually brown, sometimes black; labrum reddish brown. Pronotal spots black, usually separate. Lateral pronotal area pale, with dark spot, or rarely with five or six black spots above and beside each leg of M-shape mark. Scutellum brown or black. Elytron yellowish orange to yellowish white with light brown, rarely black, vitta extending from callus to three-fourths, enlarged before middle, sometimes narrower, interrupted, or reduced to spots, posterior one faint, and usually spot near elytral margin behind middle; or with second narrower vitta attached anteriorly or posteriorly to first and located between it and elytral margin; or with only suggestion of spots at callus, before middle and near apex; or apparently immaculate. More commonly, elytral pattern resembles pale *M. picta*; longitudinal vitta sometimes interrupted between transverse vittae; external prolongation may extend to posterolateral spot which may be attached to longitudinal vitta and extend to elytral margin; transverse vittae connected enclosing pale spot or reduced to enlargement of longitudinal vitta. Suture narrowly brown, partly so, or rarely black. Mesepisternum pale or mostly dark; mesepimeron with dark spot; metepisternum darker anteriorly or medially or rarely completely black; remainder of thorax dark brown or rarely, along with abdomen and leg, black.

Type Locality. "Mexique."

Type Depository. CUMZ (lectotype designated by Gordon [1985]).

Discussion. Mexican specimens, including the type (Fig. 9), have extremely dark maculation. The same patterns, pale brown and with variations, are found in southeastern Arizona, and some of these specimens were misidentified as *M. hudsonica* by Schaeffer (1905) and Johnson (1910). Usually spec-

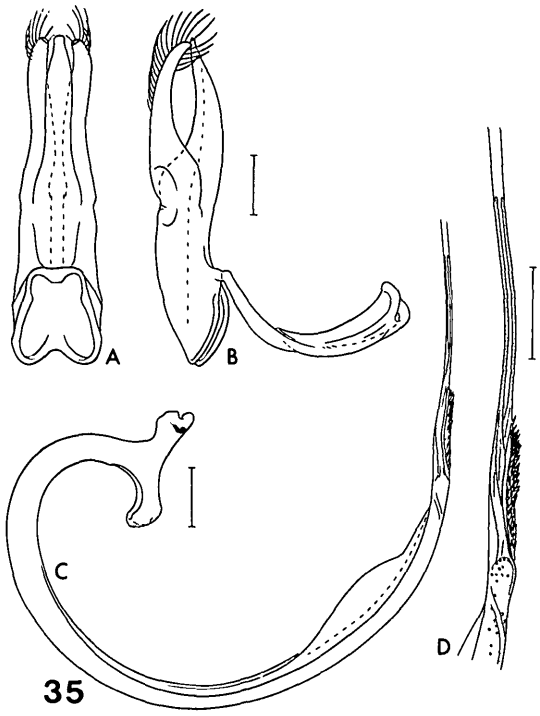

Fig. 35. Male genitalia of *M. quinquelineata*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

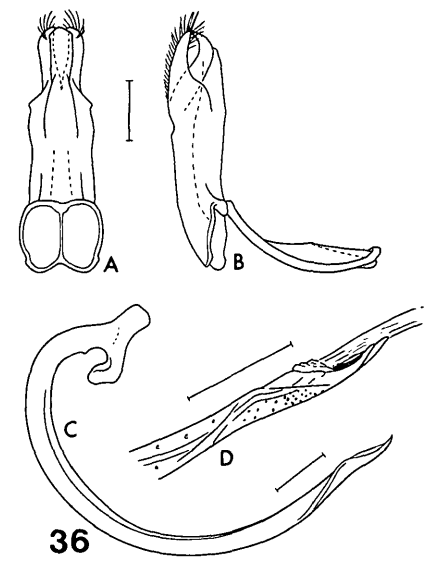

Fig. 36. Male genitalia of *M. luteodorsa*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

imens resemble *M. picta*, but the maculation is reduced, the elytral markings are paler, and the metasternum is yellowish or reddish brown. In Colorado and Utah, however, the metasternum is dark brown, and the specimens are difficult to separate from *M. picta* unless genitalia are examined. The two species occur together except in southeastern Arizona. *Mulsantina quinquelineata* is separated from *M. mexicana* sp. nov. by the sinuate inner margin of the median elytral vitta and by the black metepisternum.

Specimens were collected on 1 January in El Paso County, Col., on a dead *P. ponderosa*, from 13 May in the Santa Catalina Mountains, Ariz., to 5 September south of Mexico City, and on 11 November at Soldier Lake, in the Santa Catalina Mountains.

Material Examined. 70 specimens. MEXICO: "Mexique". *Distrito Federal:* 3,150 m, P. N. Cumbres Ajusco, Mt. Alegre; Hwy. 95, 16 km S Mexico City. UNITED STATES: *Arizona:* Chiricahua Mts., Alt. 6,200 ft.; Coconino Co.; Graham Mts. (9,200 ft.; Hospital Fl.); Huachuca Mts. (?, Top, 9,000 ft.; Carr's Peak, 9,000 ft., on pine); Palmerly, Cochise Co.; Santa Catalina Mts. (8,000 ft.; 9,000 ft.; Hitchcock Hwy. Mi. 20; Mt. Lemon [8,000 ft.]; Soldier L.); Snow Flat, Pinaleño Mts., 8,800 ft.; White Mts. (Coulter Ranch, 9,200 ft.); Williams. *Colorado:* '56, Hopk 34220.M.1, hibernating in Engel. spruce; 2 mi. W of Boulder; Durango, Junction Cr. Rd., 10,000 ft.; El Paso Co.; Estes Park, 9,000 ft.; Mt. Evans, Doolittle Ranch, 9,800 ft.; Mt. Manitou. *New Mexico:* Cloudcroft. *Utah:* Alta; Aspen Grove, B.Y.U. Campus, Timpanogas; Bryce Canyon. CAS, CNC, FSCA, LSU, TAMU, UAT, USNM.

Mulsantina luteodorsa J. Chapin
(Fig. 13, 36, and 44; Map, Fig. 30)

Mulsantina luteodorsa J. Chapin 1973, p. 1073; J. Chapin 1974, p. 67.

Male. Form oval. Head yellowish white, vertex black. Antennae and mouthparts yellowish white, maxillary palpi darker apically. Pronotum yellowish white with slightly curved black stripe each side of middle, extending from base almost to apex, isolated black spot in each lateral pale area. Scutellum yellowish white. Elytra yellowish orange, immaculate. Ventral surface black; prosternum, mesosternum, anterior medial margin of metasternum, mes- and metepimera yellowish white. Leg yellowish brown, metathoracic leg with femur black, paler at base and apex, tibia streaked with black externally. Genitalia as in Fig. 36.

Female. Similar to male except as follows: head yellowish white, black anteriorly and posteriorly, labrum dark. Ventral surface black; epimeron yellowish white. Leg with femur black, pale apically; metathoracic tibia black externally. Genitalia as in Fig. 44.

Variation. Length 3.80–4.60 mm; width 2.99–3.40 mm. Black stripes on pronotum joined basally or lateral black spot on pronotum joined to median

stripe basally. Scutellum dark. Female may have pale area on prosternum, mesosternum, and anterior medial margin of metasternum. Femora of first two pairs of legs of males and tibiae of both sexes sometimes streaked with black.

Type Locality. Baton Rouge, La.

Type Depository. USNM.

Discussion. Specimens of this species may be confused with specimens of *Cycloneda*. Collections have been made from 11 April through 31 July. The Baton Rouge specimens were collected on basket oak, *Quercus michauxii* Nutall, and an Alabama specimen was also beaten from oak.

Material Examined. 20 specimens. ALABAMA: Hazen; Madison Co., Monte Sano St. Pk. LOUISIANA: Baton Rouge, Many, Shreveport. MISSISSIPPI: Starkville. NORTH CAROLINA: Macon Co. VIRGINIA: Vienna. AUA, CAS, LSU, NCSR, USNM.

Mulsantina cyathigera (Gorham)
(Fig. 14, 15, 37, and 45; Map, Fig. 31)

Coccinella cyathigera Gorham 1891, p. 158; Gordon 1974, p. 165.
Harmoniaspis cyathigera: Casey 1908, p. 404.
Coccinella (Neoharmonia) cyathigera: Korschefsky 1932, p. 510.
Mulsantina cyathigera: Blackwelder 1945, p. 453.

Male. Form oval. Head ivory yellow, vertex black with two slight prolongations anteriorly. Antennae and mouthparts yellowish brown. Pronotum ivory yellow with median black M-shape mark extending almost to anterior margin, prescutellar spot separate, and posterior pronotal margin narrowly dark beneath "M." Scutellum black. Each elytron ivory yellow with six black spots, one on humerus, three at one-third with middle one more posterior, and two at two-thirds, median one more posterior. Suture narrowly reddish brown. Ventral surface yellow brown, thorax darker, with anterior part of head, prothorax, mesosternum, anterior medial margin of metasternum, and mesepimeron pale. Leg yellow brown. Genitalia as in Fig. 37.

Female. Similar to male except for sexual characters. Genitalia as in Fig. 45.

Variation. Length 3.32–4.65 mm; width 2.57–3.40 mm. Head with two faint interrupted brown lines on face. M-shape pronotal mark composed of seven spots variously fused or separated or occasionally reduced. Elytron sometimes more yellow, spots variable in size, rarely faint, median lateral and one or both posterior spots sometimes absent; rarely elytron immaculate. One male from Mexico differs as follows: head black with median basal area yellow brown. Antennae and mouthparts yellow brown. Pronotum black, lateral edges narrowly pale. Scutellum black. Each elytron black with large orange spot at about middle of length, lateral margin narrowly pale, suture brown. Ventral surface yellowish or reddish brown.

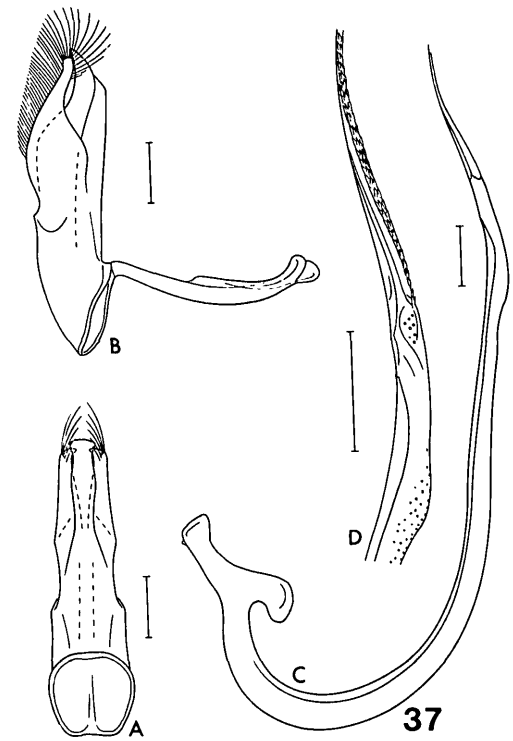

Fig. 37. Male genitalia of *M. cyathigera*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

Type Locality. Guatemala: Quiche Mts., 7,000 to 9,000 ft.

Type Depository. BMNH (lectotype here designated).

Discussion. *Coccinella cyathigera* was described by Gorham (1891) from specimens collected in Guatemala. In 1908, Casey transferred it along with three other Central American species, *C. albopicta* Gorham, *Harmonia ampla* Mulsant and *H. luteipennis* Mulsant, to his newly erected genus *Harmoniaspis*. Korschefsky (1932) placed it in the *Coccinella* subgenus *Neoharmonia,* and Blackwelder (1945) transferred it to *Mulsantina*. Gordon (1974) designated a type species for *Harmoniaspis* and listed it as a synonym of *Neoharmonia*.

This species resembles members of *Olla* or *Psyllobora*. Three Mexican females have immaculate elytra and may be confused with immaculate forms of *M. lynx, M. picta,* and *M. mexicana* sp. nov., from which they may be separated by the yellowish or reddish metasternum and metepisterna. The female genitalia are very similar to those of *M. lynx,* and the spermathecae of both species vary in shape; *M. cyathigera* usually has a longer sperm duct. The single melanic specimen has the same type of male genitalia, and, in the absence of other material, is considered to be only a color form.

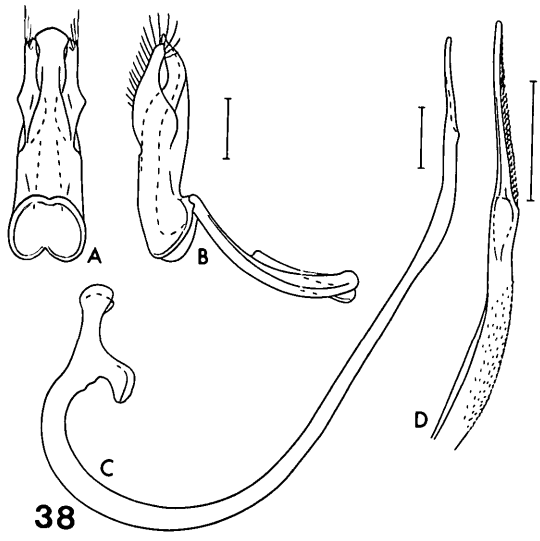

Fig. 38. Male genitalia of *M. lynx*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

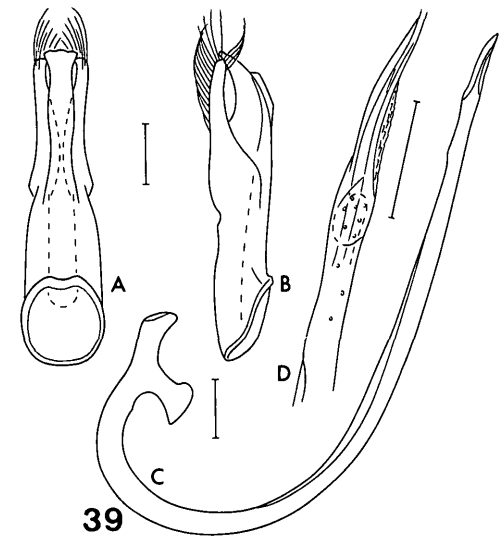

Fig. 39. Male genitalia of *M. labyrinthica*. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

Mulsantina cyathigera is apparently most common in southeastern Arizona where specimens were collected, except in October, from 22 March in Ramsey Canyon in the Huachuca Mountains to 17 November in Madera Canyon in the Santa Rita Mountains. The only plant associations listed on the labels were "ex fir" and "bred from pupa on alder" on Mt. Lemmon in the Santa Catalina Mountains. In Mexico, the melanic specimen was collected from a bromeliad.

The type series consisted of "about a dozen examples" (Gorham 1891), but I was able to locate only seven specimens. The six in the British Museum are glued on rectangular cards with two specimens per card. One pair of specimens bears the following labels: "Quiche Mts., 7-9000 ft. Champion./Coccinella cyathigera Gorham. (handwritten)/Sp. figured./Type (round disk with orange border)/B.C.A., Col., VII. Coccinella (printed) cyathigera Gorh (handwritten)." I hereby designate and label the specimen on the left indicated by a red dot as the lectotype. The specimen on the right; the pair of specimens bearing the first, second, and fifth labels; a specimen in the Muséum National D'Histoire Naturelle, Paris, with the first two labels and a blue one reading "Museum Paris (printed), Collection Sicard (handwritten)"; and a pair of specimens with the label "Quezaltenango, 7800 ft. Champion." are designated as paralectotypes.

Material Examined. 164 specimens. GUATEMALA: (L. Conradt); Quezaltenango, 7,800 ft.; Quiche Mts., 7,000-9,000 ft. *Escuintla:* Finca, Los Cerritos. MEXICO: Koebele No. 501. *Distrito Federal:* Mexico City, El Pedregal, 2,340 m. *Mexico:* Hwy. 55, 3 mi. N Atlacomulco, 8,650 ft.; Toluca. *Oaxaca:* Microwave Sta. 4 km N jct. to Tlaxiaco from Pan Am Hwy., from bromeliad. UNITED STATES: *Arizona:* Chiricahua Mts. (8,000-9,000 ft., Rustler Park, Cochise Co.; 8,500 ft.); Graham Mt.; Huachuca Mts. (Ramsey Cn. [5,500 ft.]); Pinal Mts. (Gila County; base Pinal Mts., 4,000 ft. alt.); Santa Catalina Mts. (8,300 ft.; HkHyMi 25; HkHyMi 26; Molino Basin; Mt. Lemmon [7,000 ft.; Bear Wallow]; Soldier's Camp; Soldier L.); Santa Rita Mts., Madera Cyn.; Sierra Vista. CAS, CNC, FSCA, LSU, UAT, USNM.

Mulsantina lynx (Mulsant)

(Fig. 17-24, 38, and 46; Map, Fig. 31)

Cleis lynx Mulsant 1850, p. 210; Mulsant 1866, p. 149; Crotch 1871, p. 5; Crotch 1874, p. 142; Gorham 1892, p. 168; Casey 1908, p. 406.

Mulsantina lynx: Korschefsky 1932, p. 565; Blackwelder 1945, p. 453.

Cleis mirifica Mulsant 1850, p. 209; Mulsant 1866, p. 149; Crotch 1871, p. 5; Gorham 1892, p. 168.

Mulsantina lynx ab. *mirifica:* Korschefsky 1932, p. 565; Blackwelder 1945, p. 453.

Mulsantina mirifica: Timberlake 1943, p. 19.

Mulsantina mirifica var. *lynx:* Timberlake 1943, p. 19.

Cleis concolor Crotch 1874, p. 142; Gorham 1892, p. 168. NEW SYNONYMY.

Mulsantina concolor: Korschefsky 1932, p. 564; Blackwelder 1945, p. 453.

Coccinella albo-picta Gorham 1891, p. 158; NEW SYNONYMY; new combination with *Mulsantina*.

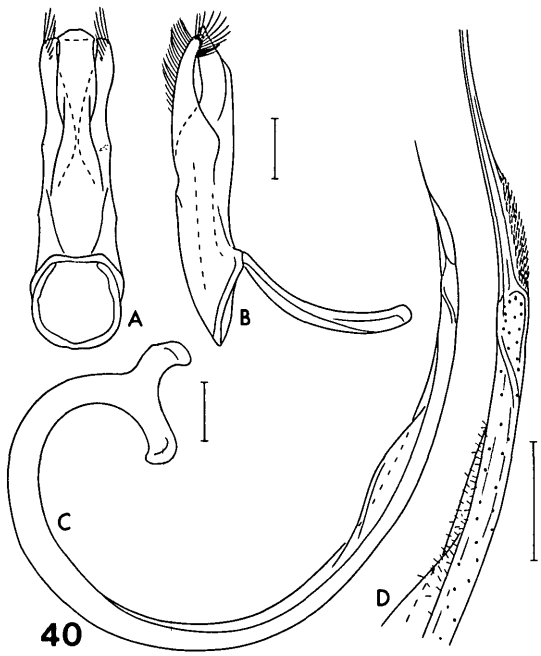

Fig. 40. Male genitalia of *M. mexicana* sp. nov. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

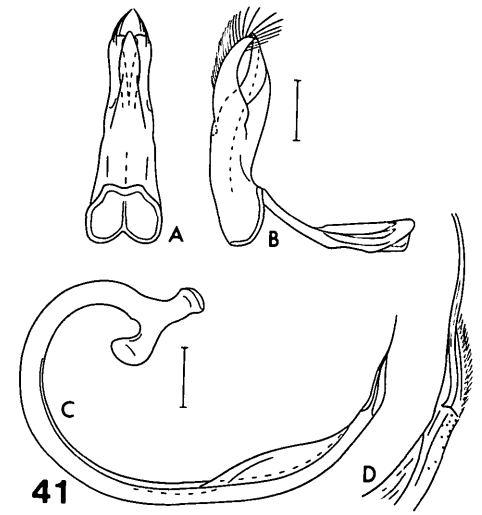

Fig. 41. Male genitalia of *M. curva* sp. nov. (A and B) Ventral and lateral views of phallobase without and with trabes; (C and D) entire sipho and enlarged view of apex. Scale bar = 0.2 mm.

Coccinella albopicta: Korschefsky 1932, p. 509; Timberlake 1943, p. 20; Blackwelder 1945, p. 454; Gordon 1974, p. 165.
Harmoniaspis albopicta: Casey 1908, p. 404.

Male. Form round to oval. Head ivory-white, vertex black with two anterior prolongations each preceded by interrupted brown line on face. Antennae and mouthparts yellowish brown. Pronotum ivory white with median M-shape figure composed of five spots with another near each lateral margin, posterior pronotal margin narrowly dark beneath "M." Scutellum dark. Each elytron ivory-white with 10 dark brown spots: two somewhat triangular ones at one-fourth and three-fourths narrowly joined along suture; one near scutellum and one behind it at one-half; three spots in diagonal row from humerus to apex, anterior one elongate; lateral spot just before middle and two near lateral margin at one-fourth and three-fourths; three spots at three-fourths connected or nearly so. Ventral surface with head pale anteriorly, dark posteriorly. Prothorax, mesosternum, anterior medial margin of metasternum, mes- and metepimera ivory-white, remainder of thorax dark brown. Abdomen yellow brown. Leg yellow brown, anterior coxa paler. Genitalia as in Fig. 38.

Female. Similar to male except for sexual characters. Genitalia as in Fig. 46.

Variation. Length 3.15–4.15 mm; width 2.32–3.15 mm. Clypeus with V-shape spot. Pronotum with punctiform spot above leg of "M" or between it and lateral spot; spots forming "M" enlarged or variously connected; lateral spots reduced or absent. In *lynx* form, elongate medial elytral spot divided into two spots, pre-apical spots joined or separate; or spot near scutellum, two at middle, and apical one less distinct (Fig. 18); or spots separate (Fig. 19), or pattern reduced to four spots, three along suture and one near lateral margin (Fig. 20). In forms *mirifica* and *albopicta* (Fig. 21), each elytron dark brown with five ivory-white spots, variable in size and sometimes connected: one at base near suture, another behind it at middle of length, and three along lateral margin at humeral angle, middle, and along posterior margin; or each elytron has broad dark band around basal spot near suture and another at fourth-fifths (Fig. 22), or indistinct spot along suture behind scutellum and large brown spot in posterior half (Fig. 23). Elytron immaculate in form *concolor* (Fig. 24); one specimen with suture narrowly brown. Scutellum dark or pale. Ventral abdominal segments yellow-brown to dark brown with terminal segments sometimes paler.

Type Localities. Of *lynx* and *mirifica*, "Mexique"; of *concolor*, Mexico; of *albopicta*, San Gerónimo, 3,000 ft., Guatemala.

Type Depositories. Of *lynx* and *mirifica*, MHNP (lectotypes here designated); of *concolor*, CUMZ; of *albopicta*, BMNH (lectotype here designated).

Discussion. The color pattern is quite variable in this species. Females with immaculate elytra are distinguished from other species by the black metepisterna which is ivory white in *M. picta* and *M. mexicana* sp. nov. and brown in *M. cyathigera*. The male genitalia of the three color forms (Fig. 17, 21, and 23) are the same. The female genitalia

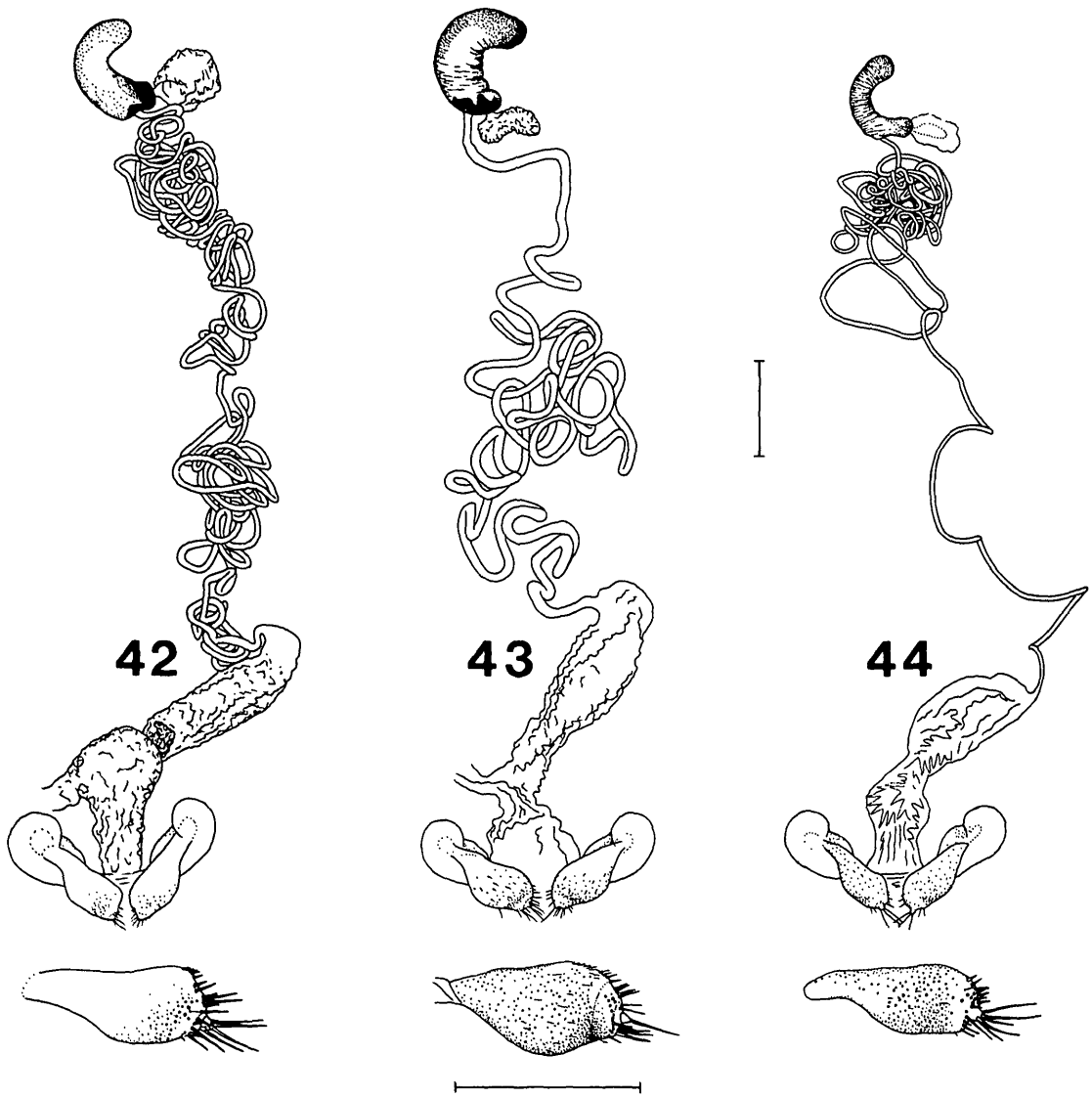

Fig. 42–44. Female genitalia. (42) *M. picta*; (43) *M. hudsonica*; (44) *M. luteodorsa*. Scale bar = 0.1 mm.

are very similar to those of *M. cyathigera*, but the sperm duct is usually shorter.

The two species originally included in the genus *Cleis* were *C. mirifica* and *C. lynx*, respectively. Crotch (1871) followed this arrangement in his list of Coccinellidae. In 1874 he selected *C. mirifica* as the type species, then placed the name as a synonym of *C. lynx* because he thought the color pattern was a variation of that found in the latter species. In their catalogs, Korschefsky (1932) and Blackwelder (1945) followed Crotch. Timberlake (1943) reported that the two forms had identical male genitalia and agreed with Crotch that they belonged to the same species, but he listed *M. lynx* as a variety of *M. mirifica*. The types of *C. lynx* and *C. mirifica* are unique specimens in the Sicard collection (MNHP) and each bears the following labels: "type. (handwritten)/Coll. Mniszech/Mexique/(blue label) Museum Paris (printed) collection Sicard (handwritten)." Each of these specimens is designated and labeled as a lectotype. *Mulsantina concolor* (Crotch) had been regarded as a species by previous authors, although Timberlake (1943) figured a form with immaculate elytra under *M. mirifica*. The holotype is a unique female in several pieces. The metasternum and metepisterna are black, and the genitalia resemble those of *M. lynx*. This specimen in the Crotch collection (CUMZ) is labeled "TYPE" (rectangular blue label)/"TYPE" (printed) concolor Mex Deyr (handwritten)."

Gorham described *Coccinella albopicta* from five specimens in 1891. In 1892, he said there was a specimen of this species placed under *Cleis lynx*

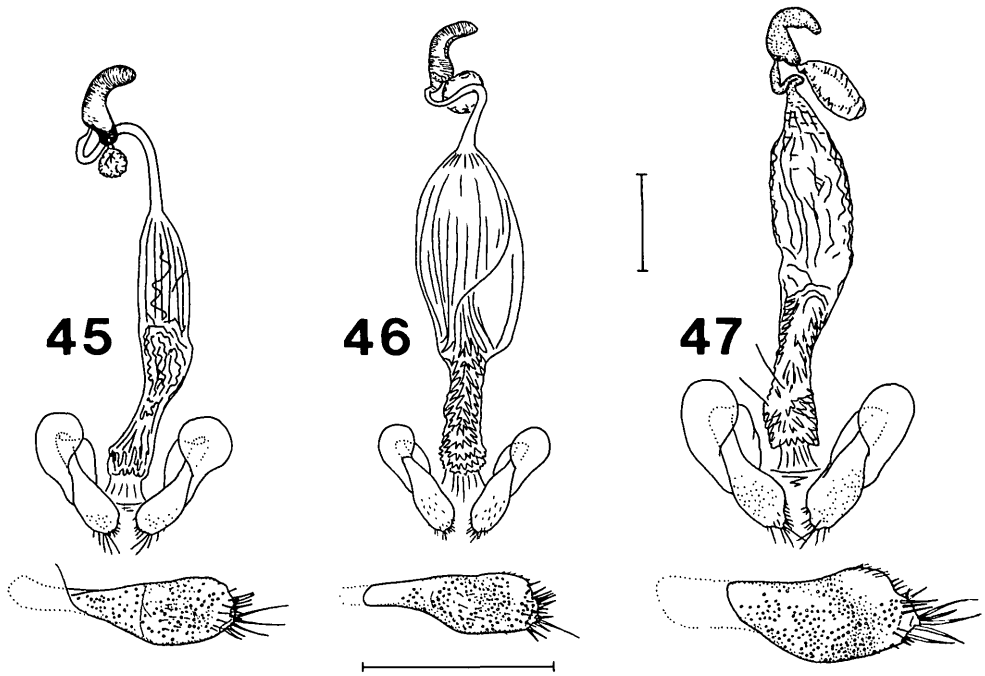

Fig. 45–47. Female genitalia. (45) *M. cyathigera*; (46) *M. lynx*; (47) *M. labyrinthica*. Scale bar = 0.1 mm.

in the Crotch collection. Timberlake (1943) could find nothing in Gorham's description to separate *Coccinella albopicta* from *M. mirifica*. Two specimens of *C. albopicta* were located in the British Museum, and they have the color pattern of *Cleis mirifica*. The one bearing the following labels is designated and labeled as the lectotype: "S. Geronimo, 3000 ft. Champion./Coccinella albopicta Gorh. (handwritten)/Cleis myrifica Muls SeC Crotch Coll. (handwritten)/Sp. figured./Type (two round labels edged in orange)/B.C.A., Col., VII. Coccinella (printed) albopicta Gorh (handwritten)." The other specimen, designated as the paralectotype, is labeled "Mexico city. Hoge./B.C.A., Col., VII. Coccinella (printed) albopicta Gorh (handwritten)/C. albopicta Gorham. (handwritten)."

In Mexico, specimens were collected on 7 January east of San Luis Potosi, from 9 June near El Salto to 9 September west of Ciudad Mendoza and on 1 December south of Manzamitla.

Material Examined. 83 specimens. GUATEMALA: S. Geronimo, 3,000 ft. MEXICO: "Mexico," Schl., 27754, 27755; Koebele No. 1647; Koebele No. 1649; pine forest, 7 mi. S Manzamitla. *Distrito Federal:* Mexico City, El Pedregal, 2,340 m. *Durango:* 3 mi. E El Salto, 8,400 ft.; (10 mi.; 20 mi.) W El Salto; 11 mi. SW El Salto. *Hidalgo:* Hwy. 85, 19 mi. NW Jacala, 7,500 ft. *Mexico:* Hwy. 15, 28 mi. W Toluca, 9,100 ft.; Valle de Bravo (1 mi. N 6,500 ft.; 7 mi. N, 8,300 ft.). *Michoacan:* Patzcuaro, on orchid at Laredo, Tex.; 8 mi. W Patzcuaro, 7,600 ft.; Hwy. 15, 8 mi. NW Quiroga, 7,700 ft.; Hwy. 15 (3 mi.; 4 mi.) SE Tuxpan, 6,500 ft.; Hwy. 15, 4 mi. W Zacapu, 7,700 ft.; Hwy. 15, 11 mi. E Zitacuaro, 9,000 ft.; Zitacuaro. *Morelos:* Cuernavaca (5 mi. M. [sic]); Hwy. 95 (3 km; 8 km) N Cuernavaca. *Nuevo Leon:* 8 mi. S of La Escondida; 18 mi. N La Escondida. *Oaxaca:* Oaxaca; Koebele No. 1649; Hwy. 131, 8 mi. N Telixtlahuaca, 7,100 ft. *Puebla:* Hwy. 129, 10 mi. NE Amozoc, 8,500 ft. *San Luis Potosi:* 20 mi. E S. L. Potosi. *Sinaloa:* 15 mi. W El Palmito. *Tamaulipas:* Hwy. 101, 16 mi. SW Cd. Victoria, 5,000 ft. *Veracruz:* 19 km W Cd. Mendoza. AUA, CAS, CNC, LSU, TAMU, UAT, USNM, ZMHB.

Mulsantina labyrinthica (Sicard)
(Fig. 16, 39, and 47)

Cleis labyrinthica Sicard 1929, p. 517.
Mulsantina labyrinthica: Korschefsky 1932, p. 565; Blackwelder 1945, p. 453.

Male. Form elongate-oval. Head ivory-white, vertex black with two anterior prolongations each preceded by interrupted brown line on face. Antennae and mouthparts brownish yellow. Pronotum ivory white with seven brown spots: four anterior, composed of two triangular medial spots and oval spot near each lateral margin; and three basal, composed of two large spots at base of pronotum, one on either side of small prescutellar spot, posterior pronotal margin narrowly brown between spots. Scutellum brown. Elytron ivory-white with irregular brown markings: one along

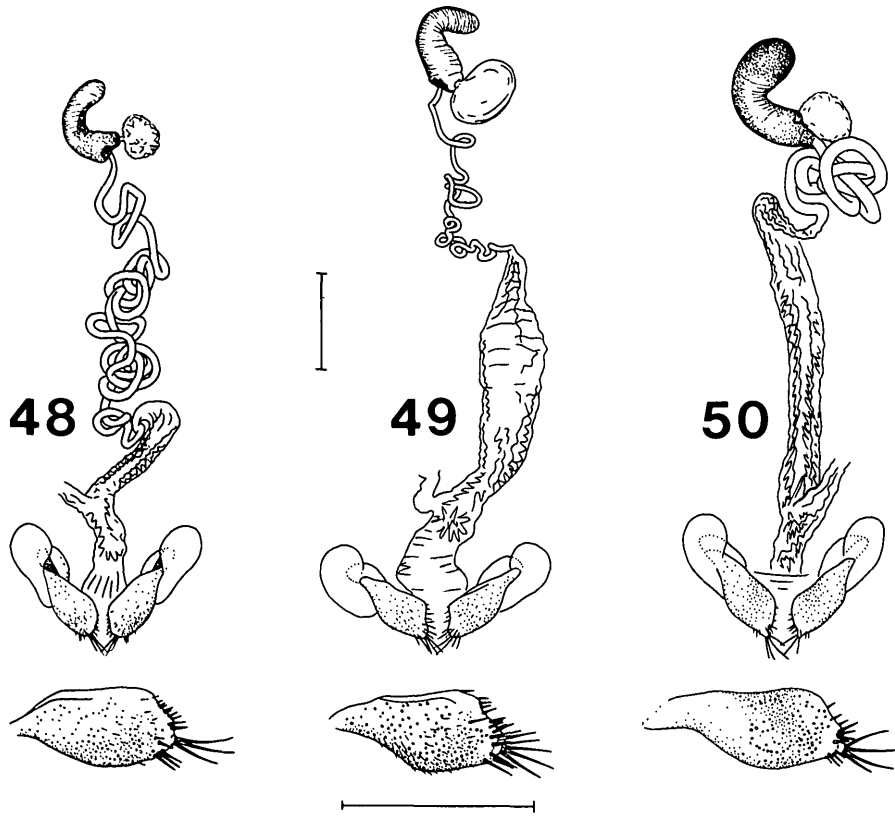

Fig. 48–50. Female genitalia. (48) *M. curva* sp. nov.; (49) *M. mexicana* sp. nov.; (50) *M. quinquelineata*. Scale bar = 0.1 mm.

suture expanded laterally at two-thirds, ending just beyond elytral tip; round spot near scutellum; irregular mark which surrounds it and turns posterior at callus running near lateral margin to about one-half; round spot near lateral margin at two-thirds; elongate median spot in posterior half; and anteapical V-shape spot. Ventral surface with head pale anteriorly, dark posteriorly. Prosternum, mesosternum, anterior medial margin of metasternum, posterior margins of mes- and metepisterna, and mes- and metepimera ivory white, remainder of thorax brown. Abdomen brown with intercoxal process white. Leg yellow brown, anterior coxa paler. Genitalia as in Fig. 39.

Female. Similar to male except for sexual characters. Genitalia as in Fig. 47.

Variation. Length 3.74–4.73 mm; width 2.66–3.22 mm. Occasionally some of the elytral marks are fused, the metepisternum is sometimes paler, and the anterior coxa may be brown.

Type Locality. Haiti.

Type Depository. BMNH (lectotype here designated).

Discussion. The type series consisted of two specimens in poor condition. The one in the British Museum, bearing the following labels, is hereby designated and labeled as the lectotype: "Type (round disk with orange border)/G. N. Wolcott Coll./Ex. Citrus trees./Haiti No. 132-27 Kenscoff, Haiti May 10, 1927 (printed and handwritten)/Pres. by Imp. Bur. Ent. Brit. Mus. 1929—570./Cleis labyrinthica n sp. Sic type (handwritten)." The one in the Muséum National D'Histoire Naturelle, Paris labeled "Haiti No. 132-27 Kenscoff, Haiti May 10, 1927/G. N. Wolcott Coll./Ex. Citrus trees./Muséum Paris 1930 Coll. Sicard (printed blue label)/Cleis labyrinthica n sp Sic type" is designated a paralectotype.

Material Examined. 12 specimens. HAITI: 1, Kenscoff, Dec. 1, 1946; 11, 1½ mi. S Kenscoff, 11-VIII-35 (USNM).

Mulsantina mexicana, sp. nov.
(Fig. 25–27, 40, and 49; Map, Fig. 32)

Mulsantina picta minor: Timberlake 1943, p. 62; Torres Beato et al. 1982, p. 17 (misidentification).

Holotype Male. Form elongate-oval. Head pinkish white, vertex black with two anterior prolongations each preceded by interrupted black line on face. Antenna and maxillary palpus reddish brown, labrum light brown, mandible ivory.

Pronotum ivory white with median black M-shape mark not extending to anterior margin with curved mark attached to each leg and diffuse brown spots laterally; margin narrowly black basally between legs of "M." Scutellum ivory white. Elytron yellow orange with broad longitudinal brown vitta; suture with brown stripe for most of length. Ventral surface with head ivory white, black basally. Prosternum, mesosternum, anterior medial margin of metasternum, mes- and metepisterna, and mes- and metepimera ivory white with black spot on mesepisternum and gray one on mesepimeron; remainder of metasternum dark reddish brown. Abdomen reddish brown, first sternum pale between coxae and laterally. Leg yellowish brown, coxa dark brown, anterior coxa with white spot; tibia darker externally. Genitalia as in Fig. 40. Length 4.23 mm; width 2.99 mm.

Female. Similar to male except for sexual characters. The sixth abdominal sternum has a median notch in both sexes. Genitalia as in Fig. 49.

Variation. Length 3.65–4.81 mm; width 2.49–3.40 mm. Markings on face black or brown, solid, sometimes reduced, or occasionally absent. Pronotal markings variable, black or brown, with spots forming M-shape mark variously fused or reduced to five black spots with two dots by each leg; lateral marks reduced or absent. Elytron dull orange to ivory, sutural vitta narrow or absent, median vittae faint, or reduced to two spots, or elytron immaculate. Mesepisternum mostly black, mesepimeron white, metepisternum black anteriorly and medially, and metasternum, abdomen, and leg yellow brown to black.

Holotype. Male. 14 miles east of Landa de Matamoros, Queretaro, Mexico; July 23–24, 1970, Murray, Phelps, Hart, Schaffner (TAMU).

Paratypes. 60 specimens. MEXICO: 7.4.26, H. Hinton (1, CAS); Koebele No. 501 (1, USNM); El Chico, VII-11-37, Mead (2, CAS). *Coahuila:* 7,500′, nr. Jame, 33 mi. S. E. Saltillo, VII-18-63 (2), VII-25-63 (4), H. F. Howden (CNC). *Distrito Federal:* La Venta, May, A. Fenyes Collection (1, CAS); 2750 m. Road from Mexico City to P. N. Cumbres de Ajusco, 4 Sept. 1982, C. W. & L. B. O'Brien & G. J. Wibmer (1, EGR; 1, LSU); Hwy. 95 (16 km.; 21 km.) S. Mexico City, 5 Sept. 1982, C. W. & L. O'Brien & G. Wibmer (2, LSU). *Durango:* Buenos Aires, 9000′, 10 mi. W. La Ciudad, IV-22-61 (2), V-8-61 (5), Howden & Martin, at light (CNC); 32 miles SW. of Durango, VIII-13-65, H. Burke & J. Meyer (1, TAMU); 5 mi. W. El Salto, 9000′, V-4-61, Howden & Martin (5); 10 mi. W. El Salto, 9000′, 21-IV-1961 (1), V-7-61 (1), Howden & Martin; 20 mi. w. El Salto, VII-20-1964, H. F. Howden (1) (CNC). *Hidalgo:* Hwy. 85, 19 mi. NW. Jacala, 7500′, 25 July 1982, CW & L. O'Brien & G. Wibmer (2, LSU). *Mexico:* Hwy. 15, 42 mi. W. Toluca, 8850′, 7 Aug. 1982, CW & L. O'Brien & G. Wibmer (1, LSU). *Michoacan:* Hwy. 15, 8 mi. NW. Quiroga 7700′, 8 Aug. 1982, CW & L. O'Brien & G. Wibmer, on *Pinus* (1); 17 mi. W. Patzcuaro 7700′, 14 Aug. 1982, CW & L. O'Brien and G. Wibmer (1) (LSU). *Oaxaca:* Hwy. 175, 19 mi. NE. Oaxaca 8300′, 26 Aug. 1982, C. & L. O'Brien & G. Wibmer, on oak (2); Hwy. 175, 27 km. NE. Oaxaca 8500′, 29 Aug. 1982, C. & L. O'Brien & G. Wibmer (1) (LSU). *Puebla:* 7700′, 3 mi. E. Puebla, Hwy. 150 D, 14 May 1983, C. W. & L. O'Brien & GB Marshall, *Pinus ayacahuite,* (1, LSU); 6 mi. W. Teziutlan, Aug. 18, 1958, H. F. Howden (12); 6 mi. West Teziutlan, VIII-4-6-60, H. F. Howden (1) (CNC). *Queretaro:* 2, same data as holotype (TAMU); 18 mi. E Landa de Matamoros, 6500′, V-26-1974, C & L O'Brien & Marshall (1, CAS). *Veracruz:* Hwy. 140, 16 mi. NW. Jalapa 8200′. 18 Aug. 1982, C. & L. O'Brien & G. Wibmer (1, LSU); Hwy. 140, 14 mi. NW. Jalapa 7500′, 20 Aug. 1982, C. & L. O'Brien & G. Wibmer (1, LSU); La Joya, 15 mi. W. Jalapa, VIII-19-60, H. F. Howden, on *Pinus* (1, CNC); Las Vigas, Hoege (1, USNM).

Discussion. *Mulsantina mexicana* may be confused with immaculate females of *M. picta, M. lynx,* and *M. cyathigera.* It can be distinguished from *M. picta* by the white spot which is usually present on the intercoxal area of the first abdominal sternum and from *M. lynx* and *M. cyathigera* by the ivory-white metepisterna. This species is separated from *M. quinquelineata* by the straight inner margin of the median elytral vitta and the paler ventral surface. The genitalia of both sexes are different from other species, and the female has a notch in the sixth abdominal sternum which is lacking in other species.

This species was considered to be *M. picta minor* by Timberlake (1943) and Torres Beato et al. (1982). The latter authors studied its biology, morphology, and feeding behavior in Chapingo, Mexico. They reported that it was found in the lower and middle levels of *Populus balsamifera* infested with the aphids *Chaitophorus* sp. and *Tuberolachnus salignus* (Gmelin), which were the preferred prey in laboratory experiments. Specimens have also been collected on pine and oak according to label data.

Mulsantina curva, sp. nov.
(Fig. 28, 41, and 48; Map, Fig. 32)

Holotype Male. Form elongate-oval. Head yellowish white, vertex black with two anterior prolongations each preceded by interrupted black line on face. Antenna yellowish brown, last two segments darker; labrum and mouthparts brown, mandible yellowish white. Pronotum yellowish white with median black M-shape mark, not extending to anterior margin, composed of five spots with two smaller spots near each leg and faint brown marks near each lateral margin. Elytra brownish yellow, paler around U-shape brown vitta which extends from callus to four-fifths and is indented internally at one-third and again at suture and flanked on each side posteriorly by two

narrow elongate marks, ones nearest margins being much smaller. Ventral surface with head distally, prothorax, mesosternum, anterior medial margin of metasternum, metepisterna, and mes- and metepimera yellowish white; mesepisterna mostly dark brown; epipleura yellowish; remainder of thorax and abdomen reddish brown. Leg yellowish brown with pale spot on each anterior coxa. Genitalia as in Fig. 41. Length 3.49 mm; width 2.41 mm.

Female. Similar to male except for sexual characters. Genitalia as in Fig. 48.

Variation. Length 3.32–4.15 mm; width 2.32–2.82 mm. Labrum sometimes pale; distal antennal segments yellow brown; one specimen with median irregular black triangle on vertex. Occasionally some of pronotal spots fused or larger fragmented spot present near each lateral margin. Elytra not always paler around vitta which sometimes joins posterolateral elongate mark. Posterior part of metasternum and abdomen yellow brown, metepisterna darker medially.

Holotype. Male. El Naranjo Chic., Guatemala; VII-12-44; E. J. Hambleton; on *Cinchona* 8 (USNM).

Paratypes. 23 specimens. GUATEMALA: 8, same data as holotype (USNM); 24 mi. NW. Chimaltenango 8500′, VI-7-1974, C. W. and L. O'Brien and Marshall (1, CAS). MEXICO: *Chiapas:* 7 mi. E. San Cristobal, V-30-69; D. E. Bright (1, CNC); Hwy. 190, 5 mi. SE. San Cristobal de las Casas, 7400′ (25 May 1983 [7]; 26 May 1983, on pine [6]), C. W. & L. O'Brien & GB Marshall (LSU).

Discussion. This species is similar in appearance to some specimens of *M. picta* from Mexico, but the phallobase is smaller, the median lobe is shaped differently, and the sperm duct, although variable in length, is shorter. I am told that the type locality is located in the department of Suchitepéquez, 12 mi. E of Mazatenango; the village is Chicacao.

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