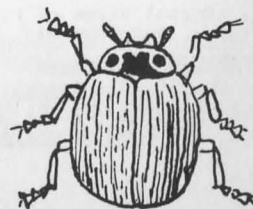
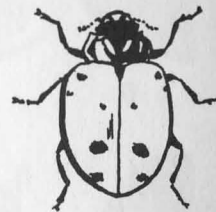
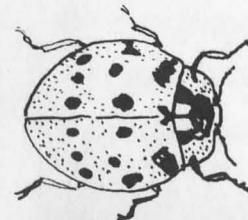
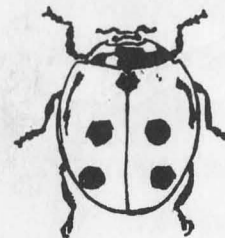
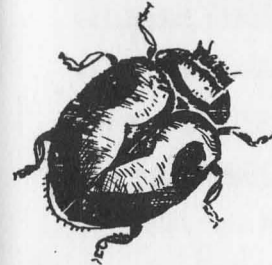


THE COCCINELLIDAE OF LOUISIANA

(Insecta: Coleoptera)

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AND AGRICULTURAL AND MECHANICAL COLLEGE

*Center for Agricultural Sciences
And Rural Development*

AGRICULTURAL EXPERIMENT STATION
DOYLE CHAMBERS, DIRECTOR

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ABSTRACT

A taxonomic study of the Coccinellidae of Louisiana was undertaken in 1965 to identify the species occurring in the state. Keys and descriptions are provided for the 6 subfamilies, 11 tribes, 27 genera, and 71 species recorded as occurring in the state. Of the species listed, 38 are reported from Louisiana for the first time. Five of these were described as new. Distribution records by parish and dates of seasonal occurrence are given. Fifty-five of the species listed for Louisiana occur also in some states of the upper Mississippi Basin. Brachyacantha quadripunctata Melsheimer, Cryptolaemus montrouzieri Mulsant, and Scymnus (Nephus) intrusus Horn were not collected during this study but are included on the basis of literature reports and previous collection.

THE COCCINELLIDAE OF LOUISIANA (INSECTA: COLEOPTERA)

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INTRODUCTION

Concern about the quality of our environment has stimulated a revival of interest in the predaceous and parasitic families of insects. The majority of Coccinellidae are of importance as predators on aphids, scale insects, spider mites, and the eggs and larvae of other insects. Only one genus in the Western Hemisphere contains species which are injurious to agricultural crops.

The family was last revised in 1899, and some of the genera which have been studied since then need to be reviewed again now that more material is available. A taxonomic study of the Coccinellidae of Louisiana was undertaken in 1965 to identify the species occurring in the state. Data from specimens collected throughout the state were supplemented by records from the insect collection of the Department of Entomology of Louisiana State University, material borrowed from the U. S. National Museum of Natural History, Washington, D. C., and from the literature.

Keys and descriptions are provided for the 6 subfamilies, 11 tribes, 27 genera, and 71 species recorded as occurring in the state. Of the species listed, 38 are reported from Louisiana for the first time. Five of these were described as new. Distribution records by parish and dates of seasonal occurrence are given. Fifty-five of the species listed for Louisiana occur also in some states of the upper Mississippi Basin.

REVIEW OF THE LITERATURE

Prior to this study, 12 species of Coccinellidae were described from Louisiana. One of these was apparently reported erroneously from the state, one is a nomen dubium, and 6 are synonyms of older names (Table 1).

TABLE 1. Species of Coccinellidae described from Louisiana prior to this study.

<u>Original binomial</u>	<u>Present binomial</u>
1. <u>Scymnus terminatus</u> Say, 1835	<u>S. terminatus</u>
2. <u>Harmonia notulata</u> Mulsant, 1850	<u>Neoharmonia venusta venusta</u> (Melsheimer, 1847)
3. <u>Scymnus creperus</u> Mulsant, 1850	<u>S. creperus</u>
4. <u>Scymnus nigrivestis</u> Mulsant, 1850	<u>nomen dubium</u> (Gordon, 1973)
5. <u>Thalassa montezumae</u> Mulsant, 1850	<u>T. montezumae</u>
6. <u>Naemia fuscilabris</u> Mulsant, 1866	<u>Coleomegilla maculata</u> <u>fuscilabris</u>
7. <u>Scymnus amabilis</u> LeConte, 1852	<u>S. amabilis</u>
8. <u>Scymnus cinctus</u> LeConte, 1852	<u>S. loewii</u> Mulsant, 1850
9. <u>Exochomus guexi</u> LeConte, 1852	<u>E. marginipennis</u> (LeConte, 1824)
10. <u>Scymnus circumspectus</u> Horn, 1895	<u>S. circumspectus</u>
11. <u>Megilla maculata floridana</u> Leng, 1903	<u>C. m. fuscilabris</u>
12. <u>Scymnus ludovicianus</u> Casey, 1824	<u>S. flavifrons</u> Melsheimer, 1847

Mulsant (1850) listed Thalassa montezumae as having been collected in New Orleans by Pilate. Crotch (1873) regarded it as doubtfully from the United States. Hubbard (1899) collected the species in Arizona. Following this paper, E. A. Schwarz added that "the Mexican Thalassa montezumae had never before been found within the United States, the locality 'New Orleans, La.,' given by Mulsant being evidently erroneous." Leng (1903b) listed it from Tucson and Williams, Arizona. The Coleoptera catalogs by Leng and Korschefsky continue to list Louisiana as one of the localities.

The first listing of Coccinellidae in Louisiana was included in a catalog of the Coleoptera from the region of Lake Pontchartrain by Summers in 1874. He listed 19 species, 11 of which are probably correctly identified, although it is doubtful that Adalia bipunctata (Linnaeus) is found that far south. Some of the same species listed by Summers were also reported from New Orleans by Shufeldt (1884) and from Assumption Parish and New Orleans by Townsend (1835).

Hippodamia parenthesis was reported from the Morgan City area by Wickham (1893), an apparent misidentification as the species does not occur here. Hine (1904, 1906) collected five species in Cameron Parish, one of which, Scymnus caudalis LeConte, may be misidentified. Rosenfeld (1911) found six lady beetles in a collection of insects and spiders from Spanish moss in Avoyelles Parish. Two of the species listed, Hyperaspis signata (Olivier) and Scymnus collaris Melsheimer, may have been misidentified.

Cryptolaemus montrouzieri Mulsant and Rhizobius debilis Blackburn were reported in south Louisiana by Garrett (1910) and Cressman (1933), respectively, but neither species has been collected in the state since the original report. The first collection of the Mexican bean

beetle, Epilachna varivestis Mulsant, in Louisiana was reported by Eddy in 1940.

The following workers have reported lady beetles in the Baton Rouge area: Morgan (1897); Tucker (1914); Rosewall (1922); and Floyd (1940). In northeast Louisiana, Glick (1939) listed nine species of coccinellids collected by airplane over Tallulah. Dobzhansky (1931) and Wingo (1952) each list one species. In northwest Louisiana, Newsom and Smith (1949) found six lady beetles common in cotton fields; the identity of one, Scymnus creperus, is in doubt.

Five species of lady beetles were used in a study of the effects of Systox on some common predators of the cotton aphid, Aphis gossypii Glover, reported by Ahmed, et al. (1954). Scymnus creperus and S. haemorrhous may be misidentified.

Other listings from Louisiana are reported by Leng (1903b, 1908, 1911), Cressman and Plank (1935), Harrison (1943), Timberlake (1943) and Rees (1947).

METHODS AND MATERIALS

Collection and Preservation of Specimens

Material for this study was obtained from existing collections and from collecting trips made throughout the state. The most profitable time for collecting lady beetles was from early spring to mid-summer, but collections were made throughout the year to determine seasonal occurrence. Specimens were usually collected by sweeping or beating vegetation in cultivated and wooded areas and along roadsides with a sweep net. Some specimens were collected in light traps and boll weevil sex attractant traps.

Specimens were killed and then pinned or preserved in vials of 75% ethyl alcohol. Specimens preserved in alcohol were easily dissected to study the genitalia or other taxonomic characters. When this method was used, however, colors sometimes faded or specimens with delicate integuments became somewhat distorted after drying.

Preparation and Comparison of Genitalia

The following technique was used to dissect and compare the genitalia of male specimens.

Labels were removed from the pin, and the specimen was placed into a beaker of gently bubbling hot water to relax it. Insects affixed to card points were first placed in a watch glass containing ethyl acetate. If the specimen was not free from the card point in about five minutes, it was dropped into a beaker of hot water. After one to three minutes, depending on the size of the specimen,

it was removed from the water. A small dissecting needle was inserted at the lateral edge of the hind coxae to separate the abdomen from the thorax. Fine forceps were used to remove the abdomen.

The abdomen was placed in a beaker containing a hot solution of concentrated aqueous potassium hydroxide. The beaker remained on the hot plate for three to five minutes, depending on the size of the specimen. Prolonged exposure to potassium hydroxide causes distortion of the genitalia. The abdomen was then placed in a dish of distilled water for examination. With fine forceps the dorsal membranes of the abdomen were removed and the genitalia lifted out. A stiff camel's hair brush was used to remove excess tissue from the abdomen and genitalia.

Specimens originally on card points were repointed. The abdomen was dried and glued, ventral side up, either upon the same point as the specimen or upon a point beneath it. Labels were repinned. The genitalia were stored in glycerin in a genitalia vial which was pinned at an angle beneath the specimen.

The genitalia of each specimen to be compared were placed separately in a drop of glycerine in a white plastic dish. A small card bearing a number was placed in the dish, and a corresponding number was pinned on the specimen. One dish containing genitalia was placed beneath the microscope, and the genitalia to be compared with it were added or removed from the right to avoid confusion. This enabled a comparison of the genitalia of two specimens from any angle.

Drawings were made with a drawing tube attached to a Wild M 5 stereomicroscope. All figures on Plate I are 64X. Figures on Plate II and figures 1 to 11 on Plate III are 68X; figures 12 to 15 on Plate III are 53X. All figures on Plates IV to VII are 9X. The phallobase of the male genitalia was drawn without the trabes.

Identification of Specimens

Specimens were identified by the use of the keys and revisions of Brown (1962), Brown and de Ruelle (1962), Casey (1899), Chapin (1946, 1965a), Dobzhansky (1931, 1941), Gordon (1970a, 1970b), Horn (1895), Leng (1903a, 1903b, 1908, and 1911), McKenzie (1936), Sasaji (1968), Timberlake (1943), and Wingo (1952). In addition comparisons were made with type specimens in the U. S. National Museum of Natural History at Washington, D. C., and with type specimens borrowed from Dr. C. W. Wingo of the University of Missouri at Columbia and Dr. W. Y. Watson of Universite Laurentienne, Sudbury, Ontario. Specimens were also borrowed from the Florida State Collection of Arthropods (F.S.C.A.) and Texas A and M University (T.A.M.U.).

Coccinellidae Westwood, 1839, p. 395.

Body elongate-oval to round, weakly to strongly convex, pubescent or glabrous. Size 0.8 mm to 18 mm. Elytra not truncate and never distinctly striate. Antennae usually eleven-segmented, but varying from 7 to 11 segments, more or less clubbed. Mandibles simple, bifid or multidentate at apices, with or without basal teeth. Terminal segments of maxillary palpi usually securiform, but sometimes conical, elongate-oval or parallel-sided. Prosternal lobe usually distinctly separating front coxae. Mesepimera reaching middle coxal cavities. Abdomen with 5 or 6 visible sterna, rarely with seventh sternum visible. First abdominal sternum with arcuate postcoxal lines, complete or variously incomplete. Tibial spurs present or absent. Tarsal formula usually cryptotetramerous, but often trimerous, rarely obviously tetramerous. Tarsal claws simple, appendiculate or bifid. Male genitalia with an elongate curved siphon, the true aedeagus, and trilobed phallosome, basically composed of basal lobe and two parameres, sometimes with pair of ventral alae between basal lobe and parameres.

The division of the family into subfamilies and tribes follows the classification proposed by Sasaji (1968).

Key to the subfamilies of the Coccinellidae of Louisiana

1. Apical segments of maxillary palpi conical or elongate-oval; mentum very narrowly joined to submentumSticholotinae Sasaji
Apical segments of maxillary palpi strongly divergent apically, nearly parallel-sided or rarely slightly convergent apically; mentum usually not very narrowly articulated with submentum. . . . 2
2. Clypeus strongly expanded laterally, concealing antennal bases and subdividing eyes Chilacorinae Sasaji
Clypeus not as above 3
3. Antennae relatively short, at most two-thirds as long as head width; apical segments of maxillary palpi usually nearly parallel-sided, never strongly divergent apically; middle coxal cavities usually broadly separated. Scymninae Sasaji
Antennae relatively long, at least half as long as width of head, usually longer than two-thirds of that; terminal segments of maxillary palpi usually strongly divergent apically; middle coxal cavities usually narrowly separated. 4
4. Dorsal surface glabrous.Coccinellinae Ganglbauer
Dorsal surface pubescent 5
5. Body strongly convex, 5 mm or more in length; antennae always eleven-segmented; mandibles with multidenticulate tips and without basal teeth; abdomen always with 6 visible sterna; tarsi always cryptotetramerous. Epilachninae Ganglbauer
Body weakly convex, less than 5 mm in length; antennae eight- to eleven-segmented; mandibles with bifid tips and basal teeth; abdomen with 5 or 6 visible sterna; tarsi obviously tetramerous, cryptotetramerous or trimerous Coccidulinae Sasaji

Sticholotinae Sasaji, 1968, p. 19.

Body minute or small in size. Head capsule sometimes projecting anteriorly. Antennae usually inserted more or less dorsally, rarely laterally. Mandibles simple or bifid at tips. Apical segments of maxillary palpi conical or elongate-oval. Mentum and submentum narrowly joined. Middle coxal cavities broadly separated by compact and broad articulation of mesosternum and metasternum. Tarsi usually cryptotetramerous, rarely trimerous.

This subfamily contains four tribes, two of which occur in the Western Hemisphere.

Key to the tribes of the Sticholotinae of Louisiana

1. Antennal club composed of single segment; prosternum strongly lobed in front completely concealing mouthparts
.Serangiini Blackwelder
Antennal club composed of more than one segment; prosternum not covering mouthparts.Sticholotini Weise

Tribe Serangiini Blackwelder

Serangiini Blackwelder, 1945, p. 450.

Dorsal surface strongly convex, shining, very sparsely pubescent. Antennae eight- or nine-segmented, each club composed of a single elongate segment. Terminal segments of maxillary palpi elongate-oval. Prosternum strongly lobed in front, completely concealing mouthparts. Ventral surface with grooves for reception of femora. Femora very broad and flat, concealing tibiae when legs are retracted. Abdomen composed of 5 visible sterna, apical sternum longer than 3 preceding.

One genus occurs in the United States.

Genus Delphastus Casey

Delphastus Casey, 1899, p. 111.

Body elongate-oval, compact, glabrous, sparsely pubescent. Antennae nine-segmented, clubs each composed of one elongate segment. Pronotum completely margined, obliquely so at apical angles. Prosternum strongly lobed in front, concealing mouthparts, notched on each side for reception of antennae. Ventral surface of body with deep grooves for reception of legs; epipleura notched for reception of femoral

tips. Legs with coxae widely separated; anterior femora broad and flat, concealing tibiae and tarsi; middle and hind tibiae angulate externally. Abdomen with 5 visible sterna, first and fifth longer than rest.

The genus was recently reviewed by Gordon (1970b) who listed twelve species, one of which occurs in Louisiana.

Delphastus pusillus (LeConte)

Oeneis pusilla LeConte, 1852, p. 135.

Head yellow in male, brownish black in female; slightly pubescent with a band of coarse punctures across vertex. Pronotum with fine sparse punctures, slightly pubescent, black, lateral margins yellow in male. Elytra black, appearing impunctate, but finely sparsely punctate, slightly pubescent at base and apex. Ventral surface black, prosternum and legs yellow in male, darker in female. Prosternal lobe impunctate; first 4 abdominal sterna finely sparsely punctate, fifth sternum finely densely punctate. Length, 1.4-1.6 mm; width, 1.1-1.3 mm.

Specimens examined: 44 were collected from April 11 to October 21. Some specimens were collected on gardenia infested with whitefly.

Distribution records: Avoyelles, Caddo, Catahoula, Claiborne, East Baton Rouge, East Feliciana, Franklin, Grant, Ouachita, Pointe Coupee, Rapides, Red River, Sabine, St. Helena, and West Feliciana parishes.

Tribe Sticholotini Weise

Sticholotini Weise, 1900, p. 430.

Body minute to small, dorsum glabrous or uniformly pubescent. Antennae consisting of 7 to 11 segments; antennal clubs with 2 or more segments. Terminal segments of maxillary palpi usually conical. Prosternum broad, quadrate, not lobed in front, mouthparts visible. Abdomen composed of 5 or 6 visible sterna, 2 basal sterna usually not fused.

Leng (1920) erected the tribe Microweiseini for the single genus Microweisea. The genus was placed in the tribe Pharini Casey by Pope (1962). Sasaji (1968) pointed out that the tribal name Pharini cannot be used because the generic name Pharus is a homonym; therefore, the oldest valid name for the group is Sticholotini.

Four North American genera are presently included in this tribe, one of which is found in Louisiana.

Genus Microweisea Cockerell

Microweisea Cockerell, 1903, p. 38.

Body elongate-oval, glabrous, with a few short hairs. Head with clypeus abruptly expanded in width in front of antennal sockets. Antennae ten-segmented; clubs three-segmented. Pronotum with oblique lines across anterior angles. Apical segments of maxillary palpi conical. Prosternum with anterior margin slightly lobed. Abdomen with 6 visible sterna. Postcoxal lines on first abdominal sternum incomplete, nearly reaching hind margin, not extending laterally.

Horn (1895) moved the North American species from the genus Pentilia Mulsant and placed them in Smilia Weise. Cockerell (1903) discovered that Smilia was preoccupied and in 1900 proposed Epismilia to replace it, only to find that name had also been used before at the generic level. He, therefore, proposed Microweisea to replace Epismilia. The name Pseudoweisea proposed by Schwarz (1904) is a misquotation of Cockerell's name. Gordon (1970a) reviewed the genus and presented a key to the five species, one of which has been collected in Louisiana.

Microweisea misella (LeConte)

Pentilia misella LeConte, 1878, p. 400.

Body entirely black in color. Head alutaceous, nearly impunctate. Pronotum alutaceous, finely punctured. Elytra shining, coarsely unevenly punctured. Abdominal sterna alutaceous, impunctate. Length, 0.9-1.1 mm; width, 0.6-0.8 mm.

Specimens examined: 50 were collected from January 27 to December 30, but none were collected in September and November.

Distribution records: Cameron, DeSoto, East Baton Rouge, Livingston, Ouachita, Sabine, Tangipahoa, and West Feliciana parishes.

Discussion: Morgan (1897) reported that a species of Microweisea, which was probably M. misella, was found feeding on red spider on Citrus trifoliata L. Cressman and Plank (1935) listed this species as a predator of the camphor scale, Pseudaonidia duplex (Cockerell). Many specimens were collected on Melia azedarach L. infested with a bark scale.

Subfamily Scymninae Sasaji

Scymninae Sasaji, 1968, p. 23.

Dorsal surface pubescent, but glabrous in the Hyperaspini and apparently so in some genera of Scymnillini. Antennae usually very

short, at most about two-thirds as long as head width. Terminal segments of maxillary palpi not strongly securiform, usually nearly parallel-sided. Middle coxae comparatively broadly separated. Elytral epipleura very narrow and rather short. Femora nearly cylindrical, rather stout, sometimes flat. Tarsi cryptotetramerous or trimerous.

Sasaji included five tribes in this subfamily.

Key to the tribes of the Scymninae of Louisiana

1. Dorsal surface glabrous or apparently so 2
Dorsal surface obviously pubescent 3
2. Dorsal surface glabrous; female with 6 abdominal sterna, male with seven, last very small Hyperaspini Costa
Head and thorax sparsely pubescent; abdomen with 5 sterna in both sexes. Scymnillini Casey
3. Terminal segments of maxillary palpi slightly convergent apically with apices truncate; anterior margin of prosternum convex anteriorly, partially concealing mouthparts, prosternal carinae absent Stethorini Dobzhansky
Terminal segments of maxillary palpi parallel-sided or slightly divergent apically; anterior margin of prosternum straight or slightly concave, or in Cryptolaemus, convex and covering mouthparts; prosternal carinae present or absent . . . Scymnini Costa

Tribe Stethorini Dobzhansky

Stethorini Dobzhansky, 1924, p. 20.

Body very small. Dorsum pubescent. Antennae eleven-segmented. Terminal segments of maxillary palpi slightly convergent apically with truncate apices. Prosternum roundly convex anteriorly, partly concealing mouthparts, prosternal lobe without carinae. Inner side of mesepimeron very short. Abdomen with 6 visible sterna.

This tribe contains a single genus.

Genus Stethorus Weise

Stethorus Weise, 1885, p. 65.

Body small, elongate-oval, pubescent. Eyes large, moderately coarsely faceted. Antennae short, eleven-segmented, inserted between eyes and lateral margins of clypeus; antennal bases exposed, but clypeus not emarginate around them. Clypeus short before eyes, truncate with rounded angles. Mandibles each with subapical tooth. Apical segments of maxillary palpi oblong, obliquely truncate and narrower

toward apices. Prosternum convex medially, without carinae, extended forward in broad arc so as to partly hide mouthparts. Abdomen with 6 visible sterna, suture between first 2 sterna faint at middle. Postcoxal lines on first abdominal sternum complete, but of variable length. Tarsi trimerous. Tarsal claws bifid.

There are seven species in America north of Mexico according to Leng (1920), Brown (1950), and Hall and Fleshner (1958).

Key to the species of Stethorus of Louisiana

1. Postcoxal lines on first abdominal sternum not surpassing middle of segment punctum (LeConte)
Postcoxal lines on first abdominal sternum reaching almost to posterior margin utilis (Horn)

Stethorus punctum (LeConte)

Scymnus punctum LeConte, 1852, p. 141.

Head black, antennae and mouthparts yellowish. Pronotum black, finely evenly punctate. Elytra black, more coarsely punctured than pronotum. Ventral surface black. Postcoxal lines on first abdominal sternum complete, short, not surpassing middle of sternum. Male phallobase figured on Pl. III, Fig. 10. Legs yellow; femora dark brown, tips pale. Length 1.3 mm; width, 0.8-0.9 mm.

Specimens examined: 24 were collected from May 2 to June 4 and from October 4 to November 21 on azalea, magnolia, and Quercus nigra L. infested with spider mites.

Distribution records: East Baton Rouge, Ouachita, Rapides, and Sabine parishes.

Stethorus utilis (Horn)

Scymnus utilis Horn, 1895, p. 107.

Head black, antennae and mouthparts yellowish. Pronotum black, finely evenly punctate. Elytra black, more coarsely punctured than pronotum. Ventral surface black. Postcoxal lines of first abdominal sternum complete, reaching almost to posterior margin. Male phallobase figured on Pl. III, Fig. 11. Legs yellow; femora dark brown, tips pale. Length, 1.1-1.3 mm; width, 0.8-0.9 mm.

Specimens examined: 119 were collected from February 12 to November 21, but none were collected in August. Most of the specimens were collected on azalea, magnolia, and Quercus nigra L. infested with spider mites.

Distribution records: East Baton Rouge, Pointe Coupee, Sabine, Tangipahoa, and West Feliciana parishes.

Discussion: This species is very similar to S. punctum but differs in the length of the postcoxal lines which extend to the posterior margin of the first abdominal sternum.

Tribe Scymini Costa

Scymnini Costa, 1849, p. 9.

Dorsum pubescent. Antennae nine-to eleven-segmented, moderately clubbed, usually relatively short. Eyes usually moderate in size with or without postantennal emarginations. Terminal segments of maxillary palpi parallel-sided or slightly divergent apically. Anterior margin of prosternum flat or slightly concave, with or without prosternal carinae; except in Cryptolaemus in which it is convex anteriorly completely concealing mouthparts. Inner side of mesepimeron rather long. Elytral epipleura narrow, horizontal and without foveae. Abdomen with 6 visible sterna. Tarsi cryptotetramerous or trimerous. Male genitalia symmetrical or asymmetrical, simple or complex.

There are presently eight genera in the tribe.

Key to the genera of the Scymnini of Louisiana

1. Prosternum extended forward covering mouthparts and antennae in repose Cryptolaemus Mulsant
Prosternum not extended forward covering mouthparts. 2
2. Head in repose covering prosternum and anterior coxae; antennae with 2 basal segments large, compressed; head greatly extended anteriorly in front of eyes. Nephaspis Casey
Head in repose not covering prosternum and anterior coxae; antennae with two basal segments not large and compressed; head slightly extended anteriorly in front of eyes Scymnus Kugelann

Genus Scymnus Kugelann

Scymnus Kugelann, 1794, p. 545.

Body oval to elongate-oval, dorsal surface pubescent. Antennae eleven-segmented. Terminal segments of maxillary palpi parallel-sided, apical margins strongly oblique. Prosternum not extended anteriorly, with or without prosternal carinae. Abdomen with 6 visible sterna. Postcoxal lines on first abdominal sternum complete or incomplete, varying subgenerically. Elytral epipleura narrow, horizontal, not foveate for reception of femoral apices. Tibial spurs absent. Tarsi

four-segmented, third very small or sometimes absent. Tarsal claws variable. Male genitalia simple or complex; symmetrical or asymmetrical.

This genus has more species than any other genus in the United States. It is being revised by Robert D. Gordon who has kindly made available to me the current names to be used for Louisiana species.

Key to the subgenera of Scymnus of Louisiana

1. Postcoxal lines on first abdominal sternum recurved toward base of abdomen 2
Postcoxal lines not recurved toward base of abdomen. 3
2. Postcoxal lines complete, reaching base of first abdominal sternum Pullus Mulsant
Postcoxal lines incomplete, recurved toward, but not reaching base of first abdominal sternum Scymnus s. str. Kugelann
3. Postcoxal lines joining posterior margin of first abdominal sternum. Diomus Mulsant
Postcoxal lines not joining posterior margin of first abdominal sternum, but continuing laterally parallel to it . . . Nephus Mulsant

Subgenus Scymnus s. str. Kugelann

Scymnus Kugelann, 1794, p. 545.

Prosternal lobe with 2 carinae. Postcoxal lines on first abdominal sternum not reaching posterior margin, recurved toward, but not reaching base of abdomen. Fifth abdominal sternum of male usually emarginate.

Five species have been described from eastern North America.

Key to the species of the subgenus Scymnus s. str. of Louisiana

1. Elytra ferruginous with numerous small black spots nebulosus LeConte
Elytra black 2
2. Each elytron with large red spot in front of middle circumspectus Horn
Elytra with apical edge reddish yellow 3
3. Parameres triangular in shape (Pl. I, Fig. 5); siphon with fishhook-like projection at apex. paracanus Chapin
Parameres oblong-oval (Pl. I, Fig. 3), scarcely broader at bases than at apices 4
4. Siphon without fishhook-like projection at apex; basal lobe narrowly triangular indianensis Weise
Siphon with fishhook-like projection at apex; basal lobe broad at base, gradually rounding to point at apex. apicanus Chapin

Scymnus (Scymnus) circumspectus Horn

Scymnus circumspectus Horn, 1895, p. 96.

Head black, mouthparts pale. Pronotum black. Elytra black; each elytron with large red spot just before middle. Ventral surface black. First abdominal sternum of males with median carinae, fifth emarginate and impressed with sixth to form a shallow fovea. Legs with femora black, tibiae and tarsi reddish brown. Male phallobase figured on Pl. I, Fig. 6. Length, 2.4-2.6 mm; width, 1.9 mm.

Specimens examined: 4 were collected from March 27 to June 29, but none were collected in April.

Distribution records: Caddo (N.M.N.H.), Livingston, Natchitoches (N.M.N.H.), and Ouachita parishes.

Discussion: Horn described this species from Louisiana and Tennessee.

Scymnus (Scymnus) indianensis Weise

Scymnus rusticus Casey, 1899, p. 154 (Preoccupied).

Scymnus indianensis Weise, 1929, p. 33.

Head reddish yellow. Pronotum reddish yellow with median arcuate black spot at base occupying most of length, or black with lateral margins pale. Elytra black, apical edge reddish yellow. Prosternum black, pale laterally; prosternal carinae complete to anterior margin, converging slightly. Mesosternum and metasternum black. Abdomen with first 2 or 3 sterna black, pale laterally; remainder reddish yellow. Fifth sternum of male slightly emarginate. Legs reddish yellow. Male phallobase (Pl. I, Fig. 1) with basal lobe and parameres almost equal in length; basal lobe narrowly triangular; each paramere oblong-oval, scarcely broader at base than at apex, fringed with hair except at basal half of dorsal edge; siphon without fishhook-like projection near tip. Length, 1.9-2.1 mm; width, 1.4-1.6 mm.

Specimens examined: 6 males were collected from May 10 to July 15, but none were collected in June.

Distribution records: Ascension, East Baton Rouge, East Feliciana, and West Feliciana parishes.

Discussion: This species was thought to be S. americanus Mulsant until recent work by R. D. Gordon separated the two (Gordon, 1972).

Scymnus (Scymnus) apicanus Chapin

Scymnus (Scymnus) apicanus Chapin, 1973, p. 1071.

Head, mouthparts, and antennae reddish yellow. Pronotum reddish

yellow with median arcuate black spot at base which extends anteriorly for four-fifths the length. Elytra black, narrowly reddish yellow apically. Prosternum black at middle, reddish yellow laterally; prosternal carinae convergent, disappearing before anterior margin. Mesosternum and metasternum black. Abdomen with first 3 sterna black medially, pale laterally, remainder reddish yellow; fifth sternum emarginate at apex. Legs reddish yellow. Male phallobase (Pl. I, Fig. 2, 3) with basal lobe a little longer than parameres, broad at base, gradually rounding to a point at apex; each paramere oblong-oval, scarcely broader at base than apex, fringed with hair except at basal half of dorsal edge; siphon with fishhook-like projection near tip. Length, 2.1-2.6 mm; width, 1.6-1.9 mm.

Specimens examined: 14 males were collected from April 27 to June 26.

Distribution records: Ascension and Plaquemines parishes.

Discussion: This species closely resembles S. indianensis. It differs in the following characters: it is larger and the fifth abdominal sternum of males is more deeply emarginate; the male genitalia are larger with the basal lobe a pointed oval instead of a narrow triangle; and the siphon has a fishhook-like projection near the tip.

Scymnus (Scymnus) paracanus Chapin

Scymnus (Scymnus) paracanus Chapin, 1973, p. 1071.

Head, mouthparts, and antennae reddish yellow. Pronotum reddish yellow with median arcuate black spot at base which extends anteriorly for three-fourths the length. Elytra black, apical edge broadly reddish yellow. Prosternum reddish yellow, darker between coxae; prosternal carinae convergent, fading out toward anterior margin. Mesosternum and metasternum black. Abdominal sterna reddish brown, first one darker; fifth sternum emarginate at apex. Legs reddish yellow. Male phallobase (Pl. I, Fig. 4, 5) with basal lobe longer than parameres, parallel-sided for basal two-thirds, narrowing to a blunt point; each paramere triangular in shape, broader at base than apex, fringed with hair except along basal half of dorsal edge; siphon with fishhook-like projection near apex. Length, 2.4-2.8 mm; width, 1.8-1.9 mm.

Specimens examined: 3 males were collected May 6 and July 25. One of these was reared from a larva feeding on cotton aphids.

Distribution records: Claiborne and Webster parishes.

Discussion: This species differs from S. indianensis and S. apicanus in the shape of the parameres and the basal lobe of the male genitalia.

Scymnus (Scymnus) nebulosus LeConte

Scymnus nebulosus LeConte, 1852, p. 137.

Head ferrugineous. Pronotum ferrugineous with indefinite median brown spot at base. Elytra ferrugineous with irregular black spots. Prosternum black, lateral margins ferrugineous; prosternal carinae complete to anterior margin, converging slightly. Mesosternum and metasternum black. Abdominal sterna brown at base, paler apically. Legs ferrugineous, femora darker. Male phallobase figured on Pl. I, Fig. 7, 8. Length, 2.3 mm; width, 1.6 mm.

Specimens examined: A single male was collected in Natchitoches, Louisiana, March 28, 1907, on Crataegus sp. by Cushman and Pierce (N.M.N.H.).

Discussion: Since S. nebulosus was described from California and no specimens were collected during this study, it is possible that this species is not native to Louisiana.

Subgenus Pullus Mulsant

Pullus Mulsant, 1846, p. 241.

Prosternal lobe with 2 carinae. Postcoxal lines on first abdominal sternum forming complete arcs which are shorter than the sternum; first abdominal sternum of male may or may not be modified at the middle; fifth sternum of male usually emarginate. Male genitalia symmetrical or asymmetrical, with or without ventral alae.

The subgenus Pullus is the largest and most difficult group because of the similarity of species. Color patterns vary intra-specifically and frequently several species share the same color pattern. Casey (1899) was the last to review the whole group. Wingo (1952) studied 24 species of the upper Mississippi basin and described eight new species. He used the male genitalia to separate species in addition to using the characters of the first and fifth abdominal sterna of males more extensively than had previous authors. Fourteen species of Pullus have been collected in Louisiana; all but three occur in the upper Mississippi basin.

Mulsant (1850) described S. nigrivestis from New Orleans. The type cannot be located, and the name must be considered a nomen dubium (Gordon, 1973).

Key to the species of the subgenus Pullus of Louisiana

1. Lateral margins of body reddish yellow above; pronotum with basal black spot confluent with triangular black area along elytral suture; first abdominal sternum of male with median oval depressed area loewii Mulsant

- Body black above or with pale areas on margins of pronotum and apex of elytra 2
2. Apex of elytra with broad pale area covering at least one-fifth of length. 3
3. Apex of elytra black or narrowly pale. 7
3. First abdominal sternum of male with median glabrous area surrounded by dense punctures and pubescence 4
3. First abdominal sternum not so modified. 5
4. Apical pale area occupying about one-fourth of elytral length; elongate-oval beetles; male genitalia with basal lobe and parameres subequal in length, ventral alae lacking securus Chapin
- Apical pale area occupying more than two-fifths of elytral length; broadly oval beetles; male genitalia with basal lobe longer than parameres, ventral alae present. brullei Mulsant
5. Apical pale area of elytra occupying one-fifth of length; first abdominal sternum of male depressed at middle with minute glabrous area at posterior margin not surrounded by dense pubescence; fifth and sixth sterna with shallow fovea. 6
- Apical pale area of elytra occupying one-third to two-fifths of length; first abdominal sternum of male unmodified; sixth deeply emarginate with two ventrally produced hooks rubricaudus Casey
6. Basal lobe of male genitalia with large downward projecting hook on upper right ventral surface; dorsally, 2 laterally curved processes at middle of base. louisianae Chapin
- Basal lobe without large downward projecting hook on upper right ventral surface; dorsally, 2 processes located each side of middle fraternus LeConte
7. Pronotum entirely black or black with anterior angles pale 8
- Pronotum reddish yellow or reddish yellow with median black spot of variable size at base 9
8. Less than 2 mm long; oval; male with large spade-shaped median glabrous area on first abdominal sternum; male genitalia with basal lobe shorter than ventral alae and parameres compar Casey
- More than 2 mm long; rounded; male with median glabrous area of first abdominal sternum triangular in shape; male genitalia with basal lobe longer than parameres and shorter than ventral alae tenebrosus Mulsant
9. Pronotum entirely reddish yellow; male genitalia with basal lobe longer than parameres which are thick and heavily sclerotized; ventral alae absent. cervicalis Mulsant
- Pronotum reddish yellow with median black spot of variable size at base; sometimes greatly reduced; male genitalia with ventral alae 10
10. Basal lobe longer than ventral alae, with 2 raised lines uniting at apical third; parameres less than half the length of ventral alae creperus Mulsant
- Basal lobe as long as or shorter than ventral alae 11
11. Apex of basal lobe with pronounced ventrally produced hook uncus Wingo
- Apex of basal lobe without such a hood 12
12. Ventral alae attached at base of basal lobe; basal lobe longer than parameres and shorter than ventral alae with ventral ridges rising to a point scarcely curved dorsally, above oval dorsal surface. socer LeConte

- Ventral alae attached along basal two-thirds of basal lobe13
13. Basal lobe nearly equal in length to ventral margins of basal piece; ventral alae narrow, neither rolled ventrally nor expanded dorsally at tipsnatchezianus of Wingo, 1952, not Casey, 1899 Basal lobe longer than the length of ventral margins of basal piece; ventral alae rolled ventrally and expanded dorsally at tips puncticollis LeConte

Scymnus (Pullus) louisianae Chapin

Scymnus (Pullus) louisianae Chapin, 1973, p. 1071.

Head, mouthparts, and antennae reddish yellow. Pronotum reddish yellow with median arcuate black spot at base which reaches anteriorly for five-eighths or more of the length. Elytra black with slightly arcuate apical pale area on each elytron which occupies about one-fifth the length of the elytra. Prosternum reddish yellow, darker between coxae. Mesosternum and metasternum black. Abdomen with first 2 sterna black, second pale laterally; remainder of sterna reddish yellow. First abdominal sternum depressed at middle; with minute glabrous area at posterior margin; fifth sternum apically impressed with sixth to form a shallow fovea; sixth emarginate apically. Legs reddish yellow. Male phallobase (Pl. I, Fig. 11, 12) with basal lobe longer than parameres. Basal lobe asymmetrical with a dorsally curved point at apex; right side with two ventral lobes, the upper very large and bearing a downward projecting hook; left side lobed at basal half; dorsal surface with a projection from apex to middle; base with 2 laterally curved processes at middle. Each paramere narrow at base and apex, tip bluntly rounded with 2 tufts of hair, a few short fine hairs on dorsal side, a longer tuft on ventral side. Ventral alae absent. Length, 2.1-2.4 mm; width, 1.4-1.8 mm.

Specimens examined: 73 males were collected from May 17 to October 11.

Distribution records: Caddo, Concordia, DeSoto, East Baton Rouge, East Feliciana, Franklin, Iberville, Natchitoches, Ouachita, Rapides, Sabine, St. Martin, Tangipahoa, and Webster parishes.

Discussion: Specimens were collected on Lactuca canadensis L. infested with Dactynotus pseudoambrosiae Oliver and crapemyrtle and pyracantha infested with aphids.

This species is very similar to S. fraternus. The basal lobes of both are asymmetrical, but in S. fraternus the large ventral lobe on the right side ends in a blunt point and the two processes at the base on the dorsal surface are situated laterally.

Scymnus (Pullus) fraternus LeConte

Scymnus fraternus LeConte, 1852, p. 138.

Head, mouthparts, and antennae reddish yellow. Pronotum reddish

yellow with median arcuate black spot at base which extends almost to anterior margin. Elytra black with slightly arcuate apical pale area on each elytron which occupies about one-fifth the length of the elytra. Prosternum reddish yellow, darker between coxae. Mesosternum and metasternum black. Abdomen with first 2 sterna black, second pale laterally; remainder of sterna reddish yellow. First abdominal sternum depressed at middle, with minute glabrous area at posterior margin; fifth sternum apically impressed with sixth to form a shallow fovea; fifth and sixth slightly emarginate apically. Legs reddish yellow. Male phallobase figured on Pl. I, Fig. 13, 14. Length, 2.3 mm; width, 1.6-1.8 mm.

Specimens examined: 4 males were collected from July 9 to August 3 in West Feliciana Parish.

Discussion: The differences between this species and S. louisianae have been discussed under the latter species. Specimens of S. fraternus were also examined from New York, New Jersey, North Carolina, and Tennessee indicating that distributions of the two species overlap.

Scymnus (Pullus) rubricaudus Casey

Scymnus rubricauda Casey, 1899, p. 141.

Head reddish yellow. Pronotum black, anterior margin, anterior angles or lateral margins reddish yellow; one specimen with pronotum reddish yellow with indefinite arcuate black spot in front of scutellum. Elytra black; each elytron with arcuate apical pale area extending anteriorly one-third to two-fifths the length. Prosternum black, lateral margins reddish yellow. Mesosternum and metasternum black. Abdomen with first 2 abdominal sterna black, pale laterally; remainder of sterna reddish yellow. First abdominal sternum of male unmodified; fifth shallowly emarginate; sixth deeply emarginate with two ventrally produced hooks. Legs reddish yellow. Male phallobase (Pl. II, Fig. 8) with basal lobe longer than parameres; basal lobe broad at base tapering to point from apical third with 2 pairs of ventrally produced lobes; parameres with short tufts of hair at apices; ventral alae absent. Length, 1.6-1.9 mm; width, 1.1-1.4 mm.

Specimens examined: 7 were collected May 21, June 2, and October 5.

Distribution records: Caddo, Rapides, and West Feliciana parishes.

Discussion: Wingo (1952) synonymized S. texanus Casey and S. chromopyga Casey with S. rubricaudus. The male genitalia of the type specimens are identical.

Scymnus (Pullus) securus Chapin

Scymnus (Pullus) securus Chapin, 1973, p. 1072.

Head, mouthparts and antennae reddish yellow. Pronotum reddish yellow with median arcuate black spot at base extending anteriorly

for most of length or black with anterior margins, anterior angles or lateral margins reddish yellow. Elytra black; each elytron with arcuate apical pale area occupying one fourth the length. Prosternum reddish brown or black, lateral margins reddish yellow. Mesosternum and metasternum black. Abdomen with first 2 abdominal sterna black, pale laterally; remainder reddish yellow. First abdominal sternum with minute median glabrous area surrounded by a large patch of dense punctures and pubescence; fifth widely emarginate at apex and impressed with sixth to form a shallow fovea; sixth narrowly emarginate at apex. Legs reddish yellow. Male phallobase (Pl. I, Fig. 9, 10) with basal lobe and parameres subequal in length; basal lobe broad at base and pointed at apex with broad lobes ventrally; parameres with pointed tufts of hair at apices; ventral alae absent. Length, 1.9-2.3 mm; width, 1.3-1.6 mm.

Specimens examined: 31 were collected from May 29 to October 23.

Distribution records: Cameron, St. Tammany, and Tangipahoa parishes.

Discussion: This species resembles S. rubricaudus. The male of S. securus has a median patch of dense punctures and pubescence on the first abdominal sternum and lacks the ventrally produced hooks of the sixth sternum. The specimens from Cameron Parish were collected in a grassy coastal marsh.

Scymnus (Pullus) brullei Mulsant

Scymnus brullei Mulsant, 1850, p. 984.

Head black basally, yellow from anterior margin of frons distally. Pronotum black or with anterior angles reddish brown. Elytra black with sharply arcuate reddish yellow apical spot on each elytron extending from two-fifths to more than half the length. Prosternum black with lateral margins pale. Mesosternum and metasternum black. First 2 abdominal sterna black, second pale laterally; remainder reddish yellow. First abdominal sternum of male depressed at middle with median glabrous area, variable in extent, surrounded by dense punctures and pubescence; fifth broadly emarginate. Legs reddish yellow. Male phallobase (Pl. II, Fig. 11) with basal lobe longer than parameres and ventral alae; basal lobe pointed at apex, narrowed at about the middle, flattened dorsally, grooved laterally, ventral ridges expanded at apical half like a hood; membranes connecting ventral alae to basal lobe narrow, bluntly pointed and lightly sclerotized ventrally; ventral alae almost as long as basal lobe; parameres shorter than ventral alae with tufts of hair at apices. Length, 2.3-2.4 mm; width, 1.6-1.8 mm.

Specimens examined: 5 were collected from May 5 to June 21. One was reared from a larva feeding on Hysteroneura setariae (Thomas) on Prunus sp.

Distribution records: Ouachita, Tensas, and West Feliciana parishes.

Discussion: Scymnus brullei, which was described from Florida, is one of several species with similar color patterns and male genitalia. Five other specimens with identical genitalia have been examined from Texas and Michigan. Their color pattern varies, and in one specimen, the head, lateral margins of the pronotum, and an apical area extending almost to the humeral angles are reddish yellow.

The species Wingo (1952) described as S. brullei is not conspecific with Louisiana specimens. In that species the membranes connecting the basal lobe and ventral alae appear bilobed at the apices with the dorsal of the two lobes being a little longer; each paramere has a dorsal row of hair at the basal half and a tuft of hair at the apex. Wingo reported that this species was very variable in pronotal and elytral markings. He examined specimens from every state of the upper Mississippi basin. The author has also examined a specimen from Maryland and one from Kansas.

Species in this group have similar characters on the first and fifth abdominal sterna which serve to separate them from other species which they resemble in color pattern.

Scymnus (Pullus) loewii Mulsant

Scymnus loewii Mulsant, 1850, p. 980.

Head reddish yellow. Pronotum reddish yellow with median arcuate black spot at base extending anteriorly for three-fourths the length. Elytra reddish yellow laterally with central triangular black spot, wider than, but confluent with the one on the pronotum, decreasing to point before apex of elytra; sometimes with piceous streak on lateral edges behind middle. Prosternum reddish yellow, black between coxae. Mesosternum and metasternum black. Abdominal sterna black or with last 4 sterna reddish brown. First abdominal sternum of male with median oval depressed area with pubescence no longer than that of surrounding areas, fifth sternum not emarginate, sixth with small fovea. Legs reddish yellow, femora sometimes darker. Male phallobase (Pl. II, Fig. 1) with basal lobe longer than parameres, widest at base and tapering to point at apical third with 2 ventral lobes; parameres with tufts of hair at apices extending to tip of basal lobe; ventral alae lacking. Length, 1.9-2.3 mm; width, 1.3-1.6 mm.

Specimens examined: 81 were collected from April 1 to November 17. This is a common species in the state. The following host associations were noted: Solidago sp. infested with Dactynotus ambrosiae (Thomas); Verbena sp. infested with Dactynotus verbena (Boudreaux); and Betula nigra L. infested with Calaphis betulella Walsh.

Distribution records: Specimens were collected in 35 parishes, and the species probably occurs throughout the state.

Discussion: Scymnus loewii was described by Mulsant in 1850 from Mexico. In 1852 LeConte described S. cinctus from New Orleans and said it differed from S. loewii by its entirely yellow feet.

Horn (1895) regarded the differences between S. cinctus and S. loewii as being of an evanescent nature. He listed the distribution of the former as being from New Orleans through Texas and westward to California. Gorham (1897) agreed with Horn and listed S. cinctus as a synonym of S. loewii. Korschefsky (1931) listed the two species separately giving the same distribution for each. Chapin (1965b) regarded S. cinctus as a synonym of S. loewii.

Wingo (1952) stated that this species may be confused with similarly marked pale forms which he identified as S. brullei. The male of S. loewii is distinguished from other species by the median oval depressed area without long pubescence on the first abdominal sternum.

Two specimens differ from the normal color pattern in having a triangular red spot on each elytron which extends from the apex to the middle of the length. The male genitalia are identical to those of other males of the species.

Scymnus (Pullus) cervicalis Mulsant

Scymnus cervicalis Mulsant, 1850, p. 984.

Head and pronotum reddish yellow. Elytra black, apex narrowly edged with reddish yellow. Prosternum reddish yellow. Mesosternum and metasternum black. Abdomen with first sternum black, next 3 sterna black in middle and pale laterally, last two generally pale. First abdominal sternum of male flattened at middle with small glabrous area at margin which is almost obsolete in some specimens; pubescence all of same length; fifth sternum emarginate and impressed with sixth to form a shallow fovea. Legs reddish yellow. Male phallobase (Pl. II, Fig. 9) with basal lobe rising to point above parameres; parameres thick, heavily sclerotized, with hairs laterally on apical halves which are almost as long as the basal lobe; ventral alae absent. Length, 1.8-1.9 mm; width, 1.1-1.4 mm.

Specimens examined: 46 were collected from March 28 to May 29 and from September 17 to November 21. Most of them were collected on Quercus michauxii Nutt.

Distribution records: Catahoula, East Baton Rouge, Ouachita, Rapides, Tangipahoa, and West Feliciana parishes.

Discussion: Wingo (1952) mistakenly reported that ventral alae were present; he also said the first abdominal sternum was not modified, but most Louisiana specimens have a small glabrous area at the posterior margin.

Scymnus (Pullus) creperus Mulsant

Scymnus creperus Mulsant, 1850, p. 985.

Head reddish yellow. Pronotum reddish yellow with triangular

black spot at base which extends anteriorly to middle or a little beyond. Elytra black, narrowly edged with reddish yellow at apex. Prosternum reddish yellow, black between coxae. Mesosternum and metasternum black. First 2 abdominal sterna black, second pale laterally; remainder of sterna reddish yellow, darker at middle. First abdominal sternum of male convex at middle with small median glabrous area at posterior margin which is reduced in some specimens; this area is surrounded by dense punctures and pubescence; posterior margin of fifth sternum emarginate and impressed with sixth to form a shallow fovea. Legs reddish yellow. Male phallobase (Pl. II, Fig. 10) with basal lobe longer than ventral alae and parameres, bluntly pointed at apex with two raised lines uniting at upper third; basal lobe joined by membranes near tip to ventral alae which are more heavily sclerotized on ventral margins; parameres less than half the length of ventral alae with tufts of hair at apices reaching almost to ventral tips of ventral alae. Length, 1.9-2.3 mm; width, 1.4-1.6 mm.

Specimens examined: 36 males were collected from April 9 to July 28 and on October 1 and December 28. The one collected in December was found in a cotton boll.

Distribution records: Acadia, Allen, Ascension, Bossier, Cameron, East Baton Rouge, Jefferson, Madison (N.M.N.H.), Rapides, Sabine, St. Martin, Tangipahoa, Tensas, Webster, West Baton Rouge, and West Feliciana parishes.

Discussion: An examination of the type specimens revealed that S. medionotans Casey, S. subtropicus Casey, and S. hortensis Wingo were synonyms of S. creperus (Gordon, 1971, 1973). Mulsant described S. creperus from New Orleans. The author has examined specimens from Texas, Louisiana, Mississippi and Florida. S. creperus may be confused with S. socer, but in S. creperus the fifth abdominal sternum of males is more deeply emarginate.

Scymnus (Pullus) socer LeConte

Scymnus socer LeConte, 1852, p. 139.

Head reddish yellow. Pronotum reddish yellow with arcuate black spot at base which extends anteriorly one-half to four-fifths the length of the pronotum. Elytra black, narrowly edged with reddish yellow at apex. Prosternum reddish yellow, darker between coxae. Mesosternum and metasternum black. First 2 abdominal sterna black, remainder reddish yellow. First abdominal sternum of male with median glabrous area, usually a narrow triangle, outlined by dense punctures and pubescence; posterior margin of fifth sternum emarginate and impressed with sixth to form a shallow fovea. Legs reddish yellow. Male phallobase (Pl. II, Fig. 4) with basal lobe longer than parameres and shorter than ventral alae with ventral ridges rising to a point, scarcely curved dorsally, above the oval dorsal part; no pronounced trough below the point between dorsal and ventral surfaces; ventral alae attached at base of basal lobe, lightly sclerotized and expanded

dorsally at the tips; parameres with tufts of hair at apices; ventral margins of basal piece straight. Length, 1.8-2.3 mm; width, 1.3-1.6 mm.

Specimens examined: 36 males were collected from April 28 to November 1. They were collected on Verbesina sp. infested with Dactynotus verbesinae Boudreaux, aphid-infested pyracantha, Solidago sp., crapemyrtle, cotton, red cedar, and arbor vitae.

Distribution records: Acadia, Ascension, Assumption, Calcasieu, East Baton Rouge, East Feliciana, Livingston, Natchitoches, Ouachita, Pointe Coupee, St. Mary, Tangipahoa, and West Feliciana parishes.

Discussion: This species was at first thought to be S. tenebrosus Mulsant based on the similarities of the genitalia and the fact that Wingo (1952) reported that the species in his study area was composed of both black specimens and specimens with pale areas on the pronotum and elytra, the genitalia of which were identical. However, S. tenebrosus and S. socer were collected together only once on arbor vitae in Baton Rouge. Sweep net collections in 11 other parishes yielded only S. socer. Further examination of the genitalia revealed that S. tenebrosus differs from S. socer as follows: the dorsal outline of the basal lobe is more rounded; apex of the ventral process is rounder and more dorsally curved; there is a pronounced trough below the point between the dorsal and ventral surfaces of the basal lobe; the ventral alae are broader at their apices; and the ventral margins of the basal piece curve outward at their apices. The two forms are different, although the genitalia are very similar.

This is the species referred to as S. kinzeli Casey (Chapin, 1971) according to information received from Gordon (1973).

Scymnus (Pullus) tenebrosus Mulsant

Scymnus tenebrosus Mulsant, 1850, p. 989.

Head and mouthparts reddish yellow in male, vertex darker; in female, head black, anterior margin and mouthparts reddish yellow. Pronotum and elytra black. Ventral surface of thorax black. Abdominal sterna black, last one reddish brown. First abdominal sternum of male with median triangular glabrous area surrounded by dense punctures and pubescence; fifth sternum emarginate and impressed with sixth to form a shallow fovea. Legs reddish brown; femora sometimes darker. Male phallobase (Pl. II, Fig. 3) with basal lobe longer than parameres and shorter than ventral alae with two ventral ridges rising to a point above rounded dorsal part; the point curves dorsally and is separated by a pronounced trough from dorsal part; ventral alae attached at base of basal lobe, heavily sclerotized in part and broadly expanded at tips; parameres with tufts of hair at apices; ventral margins of basal piece curved outward at apices. Length, 2.1-2.4 mm; width, 1.6-1.9 mm.

Specimens examined: 28 males. One specimen was collected May 10. The rest were collected June 11 in Baton Rouge on arbor vitae.

Distribution records: East Baton Rouge and West Feliciana parishes.

Discussion: The elytra are black although close scrutiny reveals a narrow reddish brown apex if the light and background are properly reflected. This species resembles S. compar but is larger and rounder. The male has a triangular median glabrous area on the first abdominal sternum and a deeper fovea in the fifth and sixth sterna. Scymnus tenebrosus is most closely related to S. socer, and this relationship is discussed under that species.

Scymnus (Pullus) puncticollis LeConte

Scymnus puncticollis LeConte, 1852, p. 139.

Head reddish yellow. Pronotum reddish yellow with median black spot at base which occupies less than half the length, rarely more and usually less, sometimes greatly reduced. Elytra black, narrowly edged with reddish yellow. Prosternum reddish yellow, black between coxae. Mesosternum and metasternum black. First abdominal sternum black, second black with pale lateral margins, remainder reddish yellow. First abdominal sternum of male convex at middle with median glabrous area surrounded by dense punctures and pubescence; fifth sternum deeply emarginate and impressed with sixth to form a fovea. Legs reddish yellow. Male phallobase (Pl. II, Fig. 6) with basal lobe a little shorter than ventral alae, longer than parameres and longer than length of ventral margins of basal piece; basal lobe with ventral process rising to a point above apex of dorsal part; ventral alae attached to basal two-thirds of basal lobe, rolled ventrally and expanded dorsally at tips; parameres with long tufts of hair at apices reaching to tips of ventral alae. Length, 2.1-2.6 mm; width, 1.4-1.8 mm.

Specimens examined: 11 males were collected in May. Seven were collected by beating trees along Vaughn Creek in West Feliciana Parish.

Distribution records: East Baton Rouge, East Feliciana, and West Feliciana parishes.

Discussion: S. puncticollis is closely related to S. natchezianus of Wingo (1952) and not that of Casey (1899) but differs in having the basal lobe longer, and the ventral alae are wider, rolled ventrally and expanded dorsally at the tips. This is the species referred to as S. lacustris LeConte (Chapin, 1971) according to information received from Gordon (1974a).

Scymnus (Pullus) natchezianus of Wingo, 1952, not Casey, 1899

Scymnus (Pullus) natchezianus Casey, (Wingo, 1952, p. 39, misidentification).

Head reddish yellow. Pronotum reddish yellow with rectangular black spot at base which extends anteriorly for half the length.

Elytra black, narrowly edged with reddish yellow at apex. Prosternum reddish yellow. Mesosternum and metasternum black. First 2 abdominal sterna black with pale lateral margins, remaining sterna reddish yellow. First abdominal sternum of male with median flat glabrous area surrounded by dense punctures and pubescence; fifth deeply emarginate and impressed with sixth to form a fovea. Legs reddish yellow. Male phallobase (Pl. II, Fig. 7) with basal lobe as long as ventral alae and longer than parameres, with ventral process which comes to a point above apex of rounded dorsal part; basal lobe nearly equal in length to ventral margins of basal piece; ventral alae relatively narrow, scarcely curved ventrally and attached to basal two-thirds of basal lobe; parameres with long tufts of hair apically which are somewhat longer than ventral alae. Length, 2.2 mm; width, 1.6 mm.

Specimens examined: One male was collected November 1 on Quercus michauxii Nutt. in Baton Rouge.

Discussion: Wingo (1952) identified specimens from Missouri and Kansas as S. natchezianus Casey (1899) realizing that their status might be changed when the type was dissected. The species which Wingo discussed is closely related to S. puncticollis, but the basal lobe is shorter, and the ventral alae are narrower and not rolled ventrally, nor are they expanded dorsally at their tips. The pronotal spot in the five known specimens varies from a rectangle occupying half the length of the pronotum to an arcuate black spot extending almost to the anterior margin. Robert D. Gordon will describe this species as new in his revision of the genus.

Scymnus (Pullus) uncus Wingo

Scymnus (Pullus) uncus Wingo, 1952, p. 38.

Head reddish yellow. Pronotum reddish yellow with rectangular black spot at base which extends anteriorly no more than one-third of length and is almost lacking in one specimen. Elytra black, narrowly edged with reddish yellow at apex. Prosternum reddish yellow. Mesosternum and metasternum black. First 2 abdominal sterna black, remainder reddish yellow. First abdominal sternum of male with large flat median glabrous area surrounded by dense punctures and pubescence; fifth broadly emarginate and impressed with sixth to form a fovea. Legs reddish yellow. Male phallobase (Pl. II, Fig. 5) with basal lobe a little shorter than ventral alae, longer than parameres, and with a pronounced ventrally produced hook at tip; ventral alae attached to basal two-thirds of basal lobe, broadly expanded and lightly sclerotized at tips; parameres with tufts of hair at apices. Length, 2.1-2.3 mm; width, 1.6-1.8 mm.

Specimens examined: 6 males. One specimen was collected April 27 on Salix nigra Marsh., one from a boll weevil sex attractant trap in May, three on arbor vitae in June, and one was swept from alligator weed on June 30.

Distribution records: East Baton Rouge and Tensas parishes.

Discussion: This species resembles S. puncticollis and S. natchezianus of Wingo (1952), not Casey (1899), but the glabrous area on the first abdominal sternum is larger and the fifth sternum is more broadly emarginate. The distinctive genitalia with the pronounced ventrally produced hook at the apex of the basal lobe will separate S. uncus from these species. Previously the species was known only from the type specimen collected in Monona County, Iowa.

Scymnus (Pullus) compar Casey

Scymnus (Pullus) compar Casey, 1899, p. 148.

Head dark brown basally, yellowish from anterior margin of frons distally in both sexes; a few males with head largely reddish yellow. Pronotum entirely black or black with anterior angles reddish brown. Elytra black; in some specimens apex appears narrowly reddish brown on close scrutiny. Prosternum black or with lateral margins pale. Mesosternum and metasternum black. Abdominal sterna black, last 2 or 3 sterna reddish brown. First abdominal sternum of male with large spade-shaped median glabrous area outlined by long pubescence; fifth slightly emarginate and impressed with sixth to form a shallow fovea. Legs reddish yellow or reddish brown; femora darker in some specimens. Male phallobase (Pl. II, Fig. 2) with basal lobe shorter than ventral alae and parameres with elevated ventral ridges rising to a point which is shorter than oval dorsal part and separated from it by a trough; ventral alae curved around basal lobe, connected to it by membranes, longer and more heavily sclerotized ventrally; parameres longer than basal lobe and shorter than ventral alae with terminal tufts of hair curved ventrally. Length, 1.8-1.9 mm; width, 1.3-1.4 mm.

Specimens examined: 16 were collected October 2 and 4 in Baton Rouge on red cedar.

Discussion: According to Gordon (1973), this is the species described as S. impunctus by Wingo (1952). The reddish brown apex of the elytra is not obvious and the elytra appear black. This species resembles S. tenebrosus but is smaller and more oval. The male differs in the spade-shaped median glabrous area on the first abdominal sternum and the shallower fovea of the fifth and sixth sterna.

Subgenus Nephus Mulsant

Nephus Mulsant, 1846, p. 237.

Prosternum without pair of carinae between coxae. Postcoxal lines on first abdominal sternum gradually curve posteriorly and are parallel to first abdominal suture, ending before lateral margin. Fifth abdominal sternum of male without secondary sexual characters.

1. Elytra pale brown or ferrugineous intrusus Horn
Elytra black, a round reddish yellow spot on each elytron behind
middle. flavifrons Melsheimer

Scymnus (Nephus) flavifrons Melsheimer

Scymnus (Nephus) flavifrons Melsheimer, 1847, p. 181.

Head reddish yellow, vertex black in male; black with mouthparts reddish yellow in female. Pronotum black or black with anterior angles or lateral margins pale. Elytra black; each elytron with round reddish yellow spot behind middle, nearer suture than lateral margin. Ventral surface black, last abdominal sternum pale; sometimes with lateral margins of prosternum and median area of abdomen pale. Legs with femora black, tibiae and tarsi reddish yellow, sometimes entirely reddish yellow. Male phallobase figured on Pl. III, Fig. 1, 2. Length, 1.6-1.9 mm; width, 1.1-1.3 mm.

Specimens examined: 18 were collected in all months from April 14 to October 1 except August. Several were collected on cypress and oak.

Distribution records: Catahoula, East Baton Rouge, Livingston, Tensas, and West Feliciana parishes.

Discussion: Casey (1924) described S. ludovicianus from Alexandria, Louisiana, and said it differed from S. flavifrons in the much larger and somewhat more apical elytral spots. The type, a female, was examined, and the size of the elytral spots is within the range of individual variation of S. flavifrons.

Scymnus (Nephus) intrusus Horn

Scymnus intrusus Horn, 1895, p. 92.

Head, pronotum and elytra entirely pale brown or ferrugineous, pubescence white. Ventral surface pale brown or ferrugineous. Male phallobase figured on Pl. I, Fig. 15, 16. Length, 1.4-1.6 mm; width, 1.1 mm.

Specimens examined: 4 were collected in June in East Baton Rouge and Terrebonne parishes (N.M.N.H.).

Discussion: Garrett (1910) stated that this species was a predator of the sugarcane mealybug, Dysmicoccus boninsis (Kuwana), in south Louisiana. Specimens were collected again in 1932, but none were collected during this study.

Diomus Mulsant, 1850, p. 951.

Postcoxal lines gradually curving to join posterior margin of first abdominal sternum. Prosternal carinae present or absent.

Key to the species of the subgenus Diomus of Louisiana

1. Elytra black, apex pale. 2
Elytra black, marked with pale spots or fasciae. 3
2. Elytra black, apex narrowly yellow; pronotum reddish yellow
. xanthaspis Mulsant
Elytra black, apex with large median arcuate pale area occupying
about one-fourth of length; pronotum reddish yellow with median
black area of variable size. terminatus Say
3. Each elytron with 2 large reddish yellow spots, variable in shape,
sometimes connected. bigemmus Horn ?
Each elytron with anterior spot and posterior sinuate bar confluent
with pale apical edge; pattern varying to two very small spots
. amabilis LeConte

Scymnus (Diomus) amabilis LeConte

Scymnus amabilis LeConte, 1852, p. 135.

Head reddish yellow to reddish brown. Pronotum reddish yellow with median black spot of variable size at base, black with anterior angles pale, or entirely black. Elytra black with two spots and narrow apical edge reddish yellow, these markings variable in size or greatly reduced; anterior spot located in front of middle, closer to suture than lateral margin; posterior marking a sinuate bar or crescent extending to lateral margin and joining pale apical edge, or a small spot located closer to suture than lateral margin. Prosternum reddish yellow or black, pale laterally; prosternal carinae present. Mesosternum and metasternum black. Abdominal sterna black at base, pale at apex. Legs reddish yellow or with femora darker. Male phallobase figured on Pl. III, Fig. 3, 4. Length, 1.3-1.6 mm; width, 0.8-1.1 mm.

Specimens examined: 43 were collected April 9 and from June 5 to 10. The Baton Rouge specimens were beaten from cypress.

Distribution records: East Baton Rouge, and West Feliciana parishes.

Discussion: S. amabilis was described from New Orleans. This species was thought to be S. liebecki Horn until recent work by Gordon (1973) separated the two. Much variability exists in the size and shape of the spots in Louisiana specimens, and in one specimen the

anterior spot is obsolete. The variety of S. quadritaeniatus which LeConte (1878) mentions from Opelousas is also a specimen of this species (Gordon, 1974c).

Scymnus (Diomus) bigemmus Horn ?

Scymnus bigemmus Horn, 1895, p. 88.

Head reddish yellow. Pronotum reddish yellow with median black spot at base occupying about one-third of length. Elytra black; each elytron with 2 reddish yellow spots which are narrowly joined together, anterior spot smaller than posterior spot, located just before middle and closer to suture than to lateral margin; posterior spot large, almost equidistant from suture and lateral margin. Prosternum reddish yellow, posterior margin darker; prosternal carinae lacking. Mesosternum and metasternum black. Abdominal sterna reddish brown, darker at base and center. Legs reddish yellow. Length, 1.6 mm; width, 1.1 mm.

Specimens examined: One female was collected September 26 on camellia infested with Fiorinia theae Green in Pointe Coupee Parish, and one was collected in Cameron Parish on July 17.

Discussion: These females were tentatively identified as D. bigemmus by Gordon (1974b) who explained that positive identification is not possible without males. The species was described from Florida.

Scymnus (Diomus) terminatus Say

Scymnus terminatus Say, 1835, p. 203.

Head yellow. Pronotum yellow with median black spot at base or black with lateral margins yellow. Elytra black with large median arcuate apical yellow area occupying about one-fourth the length. Prosternum yellow; prosternal carinae complete to anterior margin, converging slightly. Mesosternum and metasternum black. Abdomen with first 2 sterna black, pale laterally; remainder yellow. Male phallobase figured on Pl. III, Fig. 5. Legs yellow. Length, 1.6-1.8 mm; width, 1.1-1.3 mm.

Specimens examined: 122 were collected from April 1 to November 9.

Distribution records: Specimens were collected in 36 parishes, and the species is probably distributed throughout the state.

Discussion: This species was described from Louisiana. Scymnus partitus Casey (1899) was long considered a distinct species because the pronotum was reddish yellow with a broad black spot at the base. Specimens of this pronotal pattern are commonly collected with S. terminatus which has the pronotum black with lateral margins yellow. The male genitalia of the type of S. partitus were identical to the male genitalia of specimens of S. terminatus, and S. partitus is considered to be a synonym.

Scymnus (Diomus) xanthaspis Mulsant

Scymnus xanthaspis Mulsant, 1850, p. 952.

Head and pronotum reddish yellow. Elytra black narrowly edged with reddish yellow at apex. Prosternum reddish yellow; mesosternum and metasternum black. Abdominal sterna brown, paler at apex. Legs reddish yellow. Length, 1.4 mm; width, 0.9 mm.

Specimen examined: One female was collected May 20 in Tangipahoa Parish.

Genus Nephaspis Casey

Nephaspis Casey, 1899, p. 168.

Body elongate-oval, pubescent, hairs directed longitudinally. Head with front extended in front of eyes, clypeus deeply emarginate. Antennae with first 2 segments large, compressed, remainder small. Apical segments of maxillary palpi securiform. Pronotum as wide as base of elytra. Head in repose covering prosternum and anterior coxae, which are conical, widely separated at bases and contiguous at apices. Sternum convex, mesosternum truncate anteriorly. Elytral epipleura narrow, obsolete behind middle. Abdomen of 6 visible sterna; postcoxal lines incomplete, recurved toward base of abdomen, variable in extent. Tarsal claws slender and simple.

Two species have been described in the genus, N. gorhami Casey (1899) from Panama and N. amnicola Wingo (1952) from Iowa.

Nephaspis amnicola Wingo

Nephaspis amnicola Wingo, 1952, p. 44.

Head black basally, pale yellow brown distally. Mouthparts pale. Pronotum black, punctures faint. Elytra black, apical edge narrowly yellow; punctures coarse, more distinct than on pronotum. Ventral surface black, abdominal sterna 5 and 6 and usually narrow lateral margins of sterna 3 and 4 pale. Legs pale. Length, 1.3 mm; width, 0.8-0.9 mm.

Specimens examined: 5 females were collected September 26 on Viburnum sp. infested with whiteflies in Pointe Coupee Parish.

Discussion: This species is presently known only from the type series of three males. Although it is possible that the females collected in this study are not conspecific, it seems best to include them with this species until series containing both sexes become available. In color pattern they resemble N. brunnea Casey (1899) which he later (1905) designated as the female of N. gorhami.

Genus Cryptolaemus Mulsant

Cryptolaemus Mulsant, 1853, p. 268.

Body oval, convex, pubescent. Antennae ten-segmented. Terminal segments of maxillary palpi elongate securiform. Mandibles each with subapical tooth. Prosternum extended anteriorly to cover mouthparts and antennae in repose; prosternal carinae weak, parallel, extending less than halfway to anterior margin. Mesosternum weakly notched anteriorly. Abdomen with 6 visible sterna; postcoxal lines on first abdominal sternum complete. Tibial spurs absent. Tarsi three-segmented. Tarsal claws dimorphic, cleft in males, and with large basal subquadrate teeth in females.

One species of this genus was brought from Australia and introduced into California to control mealybugs.

Cryptolaemus montrouzieri Mulsant

Cryptolaemus montrouzieri Mulsant, 1853, p. 268.

Head and pronotum yellowish orange. Elytra lustrous black, each elytron with arcuate yellowish orange area at apex. Ventral surface with thoracic sterna black, prosternum and abdominal sterna yellowish orange; male with distinct fovea in sixth abdominal sternum. Legs black; male with prothoracic pair pale. Length, 3.6-4.6 mm; width, 2.6-3.3 mm.

Specimens examined: 7 from California.

Discussion: Garrett (1910) reported that C. montrouzieri was released in sugarcane plots in New Orleans to combat the sugarcane mealybug in 1908, but specimens were not recovered in 1909. He added that further introductions were planned. No specimens were collected during this study, but the species is included on the basis of the above report. This species has been reported from Florida (Muma, et al. 1961) and Indiana and Missouri (Wingo, 1952).

Tribe Hyperaspini Costa

Hyperaspini Costa, 1849, p. 9.

Dorsum glabrous. Scutellum relatively large, triangular. Eyes emarginate or entire. Elytral epipleura relatively narrow, foveate for reception of femoral tips or not. Abdomen with 6 visible sterna in female; male with very small visible seventh abdominal sternum. Anterior tibiae spinose, simple or with external plates. Tarsi cryptotetramerous. Basal lobe of male genitalia asymmetrical.

Leng (1920) included five genera in the tribe.

Key to the genera of the Hyperaspini of Louisiana

1. Each anterior tibia spinose at basal two-fifths with oblique double edge from spine to apex. Brachyacantha Chevrolat
Each anterior tibia slender, not spinose at basal two-fifths
. Hyperaspis Chevrolat

Genus Hyperaspis Chevrolat

Hyperaspis Chevrolat, 1837, p. 459.

Body elongate-oval to broadly oval; dorsal surface glabrous, punctate; abdominal sterna pubescent in a few species. Eyes finely faceted, not emarginate. Antennae eleven-segmented, short. Mandibles bifid at apices, toothed at base. Terminal segments of maxillary palpi securiform. Prosternum with 2 carinae which converge anteriorly. Elytral epipleura with distinct foveae for reception of femoral tips. Abdomen with 6 visible sterna in female, 7 in male, last one very small. Postcoxal lines on first abdominal sternum incomplete, recurved toward but not reaching base of abdomen. Tibiae slender, not spinose; each anterior tibia with external plate delimited by oblique suture at apex. Tarsi cryptotetramerous. Each tarsal claw with tooth at base, rudimentary in some species.

Dobzhansky reviewed the genus in 1941 and figured the color patterns and male genitalia of a number of species. Hyperaspis is the second largest genus in the United States.

Key to the species of Hyperaspis of Louisiana

1. Elytra with marginal vittae. 2
Elytra without marginal vittae 3
2. Marginal vittae extending from humeri to apices, sinuate; elytra with pair of oval discal spots undulata (Say)
Marginal vittae extending from humeri to about middle; elytra with 2 pairs of spots, one discal, one apical lateralis Mulsant
3. Each elytron with 3 pale spots, discal and marginal spots in front of middle and apical spot. pratensis LeConte
Each elytron with less than 3 pale spots 4
4. Each elytron with two spots, separated or united 5
Each elytron with one spot 7
5. Each elytron with large discal spot joined to large spot at apical margin, its inner outline concave. connectens (Thunberg)
Each elytron with 2 separate spots, the larger on disc and the smaller at apex. 6
6. Basal lobe of male genitalia shorter than parameres, broad, truncate at apex, with rounded projection on right side of ventral surface, left side concave signata (Olivier)

- Basal lobe of male genitalia as above, except with rounded projection on left side of ventral surface, right side concave congressi Watson
7. Pale spot subapical, nearer lateral margin than suture bigeminata (Randall)
- Pale spot discal 8
8. Pronotum with subquadrate yellow spots at lateral margins pinorum Casey
- Pronotum with lateral margins narrowly yellow in males, completely black in females 9
9. Basal lobe of male genitalia slightly shorter than parameres, long and narrow with straight sides, apex truncate. binotata (Say)
- Basal lobe of male genitalia shorter than parameres, broad, truncate at apex, with rounded projection on right side of ventral surface, left side concave signata (Olivier)
- Basal lobe of male genitalia as in H. signata, except with rounded projection on left side of ventral surface, right side concave congressi Watson

Hyperaspis pratensis LeConte

Hyperaspis pratensis LeConte, 1852, p. 134.

Body roundly oval. Head black, mouthparts and antennae brown. Pronotum black, lateral margins yellow, convex internally. Elytra black; each elytron with three yellow spots, discal and marginal spots in transverse line in front of middle and apical spot (Pl. VII, Fig. 11). Length, 2.1 mm; width, 1.8 mm.

Specimens examined: One female was collected April 20 in East Baton Rouge Parish.

Hyperaspis lateralis Mulsant

Hyperaspis lateralis Mulsant, 1850, p. 657.

Head of male yellow, of female black. Pronotum of male black, anterior and lateral margins narrowly pale; of female, black. Elytra black with red markings; each elytron with marginal vitta along basal two-fifths of length, wider anteriorly, a discal spot and a smaller apical spot (Pl. VII, Fig. 12). Length, 2.6-3.8 mm; width, 2.1-2.9 mm.

Specimens examined: 40 were collected March 18 and from June 2 to 14.

Distribution records: Caddo, East Baton Rouge, and Tensas parishes.

Discussion: Dobzhansky (1941) reported that this species was common on scale-infested Monterey cypress along the California coast. Wingo (1952) listed a specimen from Juniperus virginiana infested with Pseudococcus juniperi. The majority of specimens were collected from cypress, but one was collected from arbor vitae. All of these plants belong to the family Cupressaceae.

Hyperaspis connectens (Thunberg)

Coccinella connectens Thunberg, 1808, p. 157.

Head of male yellowish orange; of female, black with anterior margin sinuately pale. Pronotum black, lateral margins broadly yellowish orange; anterior margin very narrowly pale in male. Elytra black, with markings yellowish orange; each elytron with large rounded or transverse discal spot and large spot at apical margin, its inner outline concave, the two connected, occasionally separate (Pl. VII, Fig. 13). Length, 2.3-2.9 mm; width, 1.8-2.3 mm.

Specimens examined: 102 were collected from April 1 to October 30, but none were collected in September. Most specimens were collected by sweeping.

Distribution records: Ascension, Avoyelles, Catahoula, East Baton Rouge, East Feliciana, Evangeline, Iberville, Lafayette, Livingston, Pointe Coupee, Rapides, St. Helena, St. James, St. John, St. Landry, St. Martin, Vermilion, West Baton Rouge, and West Feliciana parishes.

Hyperaspis binotata (Say)

Coccinella binotata Say, 1826, p. 302.

Head of male yellow, anterior and posterior margins banded with black; of female, black. Pronotum black with moderately wide pale lateral margins and narrow anterior margin pale in male; black in female. Elytra black, each elytron with round or slightly transverse reddish yellow spot slightly in front of middle (Pl. VII, Fig. 10). Male phallobase with basal lobe slightly shorter than parameres, long and narrow with straight sides, apex truncate (Fig. 123, Dobzhansky, 1941). Length, 2.1-2.9 mm; width, 1.6-2.3 mm.

Specimens examined: 23 were collected June 1 and 2 on Quercus sp. in Sabine Parish.

Discussion: This species may be separated from the two-spotted forms of H. signata and H. congressi by the shape of the basal lobe which is long and narrow with straight sides. The description of the male genitalia given by Watson (1960) does not agree with that of Dobzhansky (1941), but no explanation is given. Hyperaspis binotata, H. signata, and H. congressi belong to a group of species which are frequently misidentified because of the similarity of their color patterns.

Hyperaspis signata (Olivier)

Coccinella signata Olivier, 1808, p. 1047.

Head of male yellowish white, anterior and posterior margins banded with black. Pronotum of male black, lateral and anterior margins narrowly pale; sometimes only lateral margins pale. Head

and pronotum of female black. Elytra black with one or two pairs of red spots, large pair on disc in front of middle and smaller pair at apex, which may be absent (P. VII, Fig. 6, 7). Male phallobase with basal lobe asymmetrical, much shorter than parameres, broad, truncate at apex, with rounded projection on right side of ventral surface, left side concave (Pl. IV, Fig. 14 and 15). Length, 2.6-3.9 mm; width, 2.1-3.1 mm.

Specimens examined: 53 males were collected from March 28 to June 11. Most of the specimens were collected on magnolia or on spruce pine infested with Toumeyella sp.

Distribution records: East Baton Rouge, St. James, and Tensas parishes.

Discussion: Dobzhansky (1941) reported that the apical spots were reduced or lacking some specimens of H. signata. Specimens with two elytral spots were more numerous than those with four spots in the series collected in this study. Although minor individual variations in the shape of the basal lobe were noted, the male genitalia of the two forms were identical. Both forms resemble H. congressi, and the two-spotted form is similar to H. binotata. The shape of the basal lobe with the rounded projection on the right side of the ventral surface will separate H. signata from the other two species.

Hyperaspis congressi Watson

Hyperaspis congressi Watson, 1960, p. 211.

Head of male yellowish white, anterior and posterior margins banded with black. Pronotum of male black, lateral and anterior margins narrowly pale; sometimes only lateral margins pale. Head and pronotum of female black. Elytra black with one or two pairs of red spots, larger pair in front of middle and smaller pair at apex, which may be absent (Pl. VII, Fig. 8, 9). Male phallobase with basal lobe asymmetrical, much shorter than parameres, broad, truncate at apex, with rounded projection on left side of ventral surface, right side concave (Pl. IV, Fig. 16 and 17). Length, 2.8-3.6 mm; width, 2.1-2.8 mm.

Specimens examined: 21 males were collected from May 18 to June 10. The Baton Rouge specimens were collected on spruce pine infested with Toumeyella sp.

Distribution records: East Baton Rouge, Ouachita, and West Feliciana parishes.

Discussion: The two-spotted form of this species was described from Canada (Watson, 1960). Half of the males collected during this study had four elytral spots, but the male genitalia, while showing minor individual variations in the shape of the basal lobe, were otherwise identical. Hyperaspis congressi resembles H. signata. Both species have two color patterns, but the basal lobe of the

male genitalia of congressi has the rounded projection on the left side of the ventral surface. Both species were collected on spruce pine infested with Toumeyella sp. The two-spotted form resembles H. binotata from which it is separated by the differences in the male genitalia.

Hyperaspis pinorum Casey

Hyperaspis pinorum Casey, 1924, p. 162.

Head yellowish orange in male, black in female. Pronotum black with subquadrate yellowish orange spots laterally; male with anterior margin also pale. Elytra black; each elytron with round or oval, red or orange discal spot, the center of which is caudad to middle of length (Pl. VII, Fig. 14). Length, 2.8-3.3 mm; width, 1.9-2.4 mm.

Specimens examined: 73 were collected from May 18 to August 2. Most of the specimens were collected on spruce pine infested with Toumeyella sp.

Distribution records: East Baton Rouge, Ouachita, and St. Tammany parishes.

Discussion: This species differs from H. binotata and the two-spotted forms of H. signata and H. congressi in the subquadrate pale spots on the pronotum.

Hyperaspis bigeminata (Randall)

Coccinella bigeminata Randall, 1838, p. 32.

Head yellowish orange in male with black band behind eyes, black in female. Pronotum black with subquadrate yellowish orange or pink spots laterally; male with anterior margin also pale. Elytra black with round subapical pink spot located nearer lateral margin than suture (Pl. VII, Fig. 15). Length, 2.8-3.1 mm; width, 2.3-2.4 mm.

Specimens examined: 3 were collected in May in boll weevil sex attractant traps.

Distribution records: Catahoula and Tensas parishes.

Hyperaspis undulata (Say)

Coccinella undulata Say, 1824, p. 92.

Head of male yellow; of female, black. Pronotum black, lateral margins broadly yellow; male with anterior margin yellow. Elytra black; each elytron with sinuate marginal vitta, widest at elytral apex, and oval discal spot (Pl. VII, Fig. 16). Length, 2.1-2.4 mm; width, 1.4-1.8 mm.

Specimens examined: 4 were collected from June 15 to September 18, but none were collected in August.

Distribution records: Cameron and Webster parishes.

Genus Brachyacantha Chevrolat

Brachiacantha Chevrolat, 1837, p. 458.

Body oval to broadly oval, glabrous. Antennae eleven-segmented. Eyes finely faceted and slightly emarginate. Terminal segments of maxillary palpi securiform. Epipleura foveate for reception of femoral tips. Abdomen with 6 visible sterna in female and 7 in male, last one very small. Postcoxal lines on first abdominal sternum incomplete, recurved toward but not attaining base. Abdomen of male with sterna 3 to 5 variously modified by cusps, depressions, and emarginations. Anterior tibiae spinose externally before middle, grooved from there to apices. Tarsi cryptotetramerous. Each tarsal claw with large internal tooth at base.

The genus was reviewed by Leng (1911), and a few species have been described since that time. The elytral pattern is intraspecifically variable.

Key to the species of Brachyacantha of Louisiana

1. Elytra pale, each elytron with black sutural stripe laterally expanded at 1/3 and 2/3, continued around apex, usually ending in marginal spot at apical third. bollii Crotch
Elytra black with pale markings. 2
2. Elytra with basal spots lacking; each elytron with transverse antemedial band, narrow or wide, complete or divided, and subapical spot; third abdominal sternum of male bicuspid. dentipes (Fabricius)
Elytra with at least one basal spot on each side of suture 3
3. Spots 2 or 3 in number, rarely with 4 or 5 spots, in which case the humeral and discal spots are small and indistinct
. quadripunctata Melsheimer
Spots 5 in number. 4
4. Size larger, 3 mm or more in length. ursina (Fabricius)
Size small, less than 3 mm in length felina (Fabricius)

Brachyacantha dentipes (Fabricius)

Coccinella dentipes Fabricius, 1801, p. 381.

Head of male orange; of female black with median orange inverted triangular spot. Pronotum black with narrow orange apical margin and broad orange lateral margins, angulate toward disc. Elytra black, each elytron with discal and lateral orange spots in front

of middle, sometimes joined to form transverse band which reaches margin but not suture, and subapical spot (Pl. VI, Fig. 6). Third abdominal sternum of male with 2 prominent cusps, fourth sternum shallowly and fifth deeply excavated at apical margins. Length, 5.1-5.4 mm; width, 3.6 mm.

Specimens examined: 3 were collected March 9 and April 7.

Distribution records: East Feliciana, Natchitoches, and Tangipahoa parishes.

Discussion: A number of varieties have been named as a result of the variable color pattern. Wingo (1952) included the forms B. socialis Casey, B. separata Leng and B. tau LeConte as synonyms.

Brachyacantha ursina (Fabricius)

Coccinella ursina Fabricius, 1787, p. 61.

Head yellow, anterior and posterior margins darker. Pronotum black with quadrate pale areas at lateral margins. Elytra black; each elytron with 5 yellow spots, one basal, one humeral, 2 in transverse line near middle, and one subapical (Pl. VI, Fig. 7). Length, 3.1 mm; width 2.4 mm.

Specimen examined: One female was collected October 30 in East Feliciana Parish.

Discussion: Wingo (1952) includes B. albifrons (Say) as a synonym.

Brachyacantha felina (Fabricius)

Coccinella felina Fabricius, 1775, p. 87.

Head yellow, anterior and posterior margins darker in female. Pronotum black; female with narrow anterior margin and quadrate areas at lateral margins yellow; male with anterior and lateral margins more broadly pale, black area shallowly bilobed at apex. Elytra black; each elytron with 5 yellow spots, one basal, one humeral, two in transverse line near middle and one subapical (Pl. VI, Fig. 8). Length, 2.1-2.8 mm; width, 1.4-1.9 mm.

Specimens examined: 31 were collected from May 17 to May 26 and on July 4 on pecan, Betula nigra L., and in boll weevil sex attractant traps.

Distribution records: Catahoula, Concordia, East Feliciana, Grant, Ouachita, Tensas, and West Feliciana parishes.

Discussion: This species is very similar to B. ursina but is smaller in size.

Brachyacantha bollii Crotch

Brachyacantha bollii Crotch, 1873, p. 379.

Head yellow, anterior margin, mouthparts and antennae darker. Pronotum black, with narrow yellow anterior margin and yellow quadrate areas at anterior angles narrowly extended posteriorly. Scutellum black. Elytra yellow; each elytron with black sutural stripe laterally expanded at one-third and two-thirds of length, continued around apex ending in marginal spot at apical third or extended to suture isolating an apical pale spot (Pl. VI, Fig. 9). Length, 2.8-2.9 mm; width, 2.1-2.3 mm.

Specimens examined: 2 were collected April 10 and June 15.

Distribution records: Natchitoches (Leng, 1911), Rapides, and Vernon parishes.

Discussion: The elytra vary from yellow to orange in color. Leng (1911) states that the elytral color pattern varies to black with five pale spots variously confluent or separate.

Brachyacantha quadripunctata Melsheimer

Brachiacantha 4-punctata Melsheimer, 1847, p. 178.

Leng (1911) reported that this species occurred in Louisiana, but it was not collected during this study. The description of the species is taken from Leng.

Body broadly rounded, glabrous. Male with head pale; pronotum pale with basal black area bilobed in middle, or all black except for narrow anterior border. Female with head black, front sometimes paler in V-shaped design; pronotum black, narrow margin about apical angles pale. Maculation of each elytron variable as follows: basal and subapical spots; humeral and basal spots not connected, subapical spot; humeral and basal spots connected or nearly connected, subapical spot; humeral, basal, marginal and subapical spots, sometimes minute discal spot. Length, 2.2-3.5 mm.

Discussion: Several varieties were named based on variations in the elytral pattern. Wingo (1952) includes B. basalis Melsheimer, B. confusa Mulsant, and B. flavifrons Mulsant as synonyms.

Tribe Scymnillini Casey

Scymnillini Casey, 1899, p. 112.

Body oval, small to minute in size, pubescent or apparently glabrous. Head strongly deflexed, deeply inserted in pronotum. Pronotum obviously narrower than elytra, deeply emarginate at apex, with narrowly reflexed lateral margins; base feebly lobed before scutellum. Eyes well-developed with narrow anterior emarginations.

Antennae very short, inserted very close to eyes, exposed at bases. Clypeus feebly sinuately-truncate. Apical segments of maxillary palpi securiform. Prosternum flat, devoid of carinae, widely separating anterior coxae. Abdomen with 5 visible sterna, fifth but little longer than two preceding. Epipleura narrow, flat, without fovea. Legs free; tibiae slender; tarsi well-developed; tarsal claws slender, apparently simple.

Sasaji (1968) did not include this tribe in his discussion of the phylogeny of the Coccinellidae. It appears to belong in the Scymninae, but its affinities with the other tribes of the subfamily have yet to be studied. Blackwelder (1945) included four genera in the tribe in the Western Hemisphere, one of which occurs in Louisiana.

Genus Scymnillus Horn

Scymnillus Horn, 1895, p. 110.

Size very small, oval. Body sparsely pubescent on head and pronotum; elytra glabrous with only a few hairs. Eyes narrowly emarginate. Antennae ten-segmented, very short, inserted close to eyes, exposed at bases. Clypeus short in front of antennae, truncate at apex. Labrum narrower than clypeus. Mandibles each with subapical tooth. Apical segments of maxillary palpi parallel-sided. Prosternum T-shaped; prosternal lobe broad, flat, without carinae, widely separating anterior coxae. Mesosternum truncate, broadly joined to metasternum. Epipleura narrow, flat, disappearing behind middle. Abdomen of 5 visible sterna, first longer than next 3, fifth a little longer than 2 preceding. Postcoxal lines incomplete, curving toward posterior margin of first abdominal sternum and running parallel to it to lateral margins. Tibiae without spurs. Tarsi cryptotetramerous. Each tarsal claw with small basal tooth.

Korschefsky (1931) included seven species in the genus.

Scymnillus aterrimus Horn

Scymnillus aterrimus Horn, 1895, p. 110.

Head black, mouthparts and antennae pale. Pronotum black. Head and pronotum sparsely punctate, each puncture bearing decumbent hair. Elytra black, glabrous, sparsely punctate, with only a few scattered hairs. Ventral surface black, lateral margins of prosternum, epipleura, and last abdominal sternum pale. Legs reddish yellow. Male phallobase figured on Pl. III, Fig. 6, 7. Length, 1.3-1.4 mm; width, 0.9 mm.

Specimens examined: 31 were collected from May 21 to June 11 and from October 2 to 4. Many were collected on cypress, arbor vitae, and red cedar.

Distribution records: Caddo, East Baton Rouge, and Rapides parishes.

Discussion: This species was described from northern California and Oregon and has been recorded from Florida (Muma, et al., 1961).

Subfamily Chilocorinae Sasaji

Chilocorinae Sasaji, 1968, p. 20.

Clypeus strongly expanded laterally. Antennae relatively short. Anterior margin of pronotum deeply trapezoidally concave and strongly descending laterally. Elytral base distinctly broader than pronotal base. Apical segments of maxillary palpi cylindrical, truncate apically. Metasternum with fovea for reception of middle femora. Elytral epipleura relatively broad and/or its inner carinae reaching elytral apex. Tibiae often angulate externally.

Sasaji (1968) included three tribes in the subfamily, one of which occurs in North America.

Tribe Chilacorini Costa

Chilacorini Costa, 1849, p. 9.

Form oval or round, moderately to strongly convex. Dorsal surface usually glabrous. Antennae with 7 to 10 segments. Clypeus strongly expanded laterally, concealing bases of antennae and subdividing eyes. Elytral epipleura wide, strongly slanted toward external margins. Prosternal lobe without carinae. Abdomen usually with 6 visible sterna in male, sixth very short; 5 in female. Tibiae occasionally modified, with or without terminal spurs. Tarsi cryptotetramerous. Tarsal claws simple or with basal teeth.

This tribe was reviewed by Chapin (1965a) who provided a key to the genera of the world as well as characterizations of the genera based as far as possible on the type species.

Key to the genera of the Chilacorini of Louisiana

1. Postcoxal lines complete to base of abdomen; elytral epipleura not foveate for reception of hind femora; tibiae with small spurs on last 2 pairs of legs, not toothed externally; antennae ten-segmented Exochomus Redtenbacher
Postcoxal lines not complete, either joining first abdominal suture or recurved halfway to base of abdomen 2
2. Postcoxal lines joining first abdominal suture; elytral epipleura

foveate for reception of hind femora; tibiae toothed at basal third and without spurs; antennae eight-segmented. Chilocorus Leach
Postcoxal lines recurved toward base of abdomen; elytral epipleura foveate for reception of hind femora; tibiae with small spurs on last two pairs of legs, not toothed externally; antennae ten-segmented. Axion Mulsant

Genus Axion Mulsant

Exochomus (Axion) Mulsant, 1850, p. 477.

Form rounded, strongly convex, upper surface glabrous. Antennae ten-segmented. Pronotum feebly punctate, but not pubescent at lateral margins. Elytra with lateral margins slightly reflexed; epipleura slightly foveate for reception of hind femora. Abdomen with 6 visible sterna in male, 5 in female; postcoxal lines on first abdominal sternum recurved toward, but not reaching, base of abdomen. Tibiae with small spurs on last two pairs of legs, not toothed externally. Each tarsal claw with quadrate tooth at basal half.

This is a North American genus. Korschefsky (1932) includes four species, two of which have been collected in Louisiana.

Key to the species of Axion of Louisiana

1. Elytra black; each elytron with round red subbasal spot plagiatum (Olivier)
Elytra black; each elytron with red basal elongate spot near humeral angle and narrow elongate spot along suture behind middle tripustulatum (Degeer)

Axion tripustulatum (Degeer)

Coccinella 3-pustulata Degeer, 1775, p. 393.

Head black, pale anteriorly in male. Pronotum black, anterior angles narrowly pale, more noticeable in male. Elytra black, each elytron with red basal elongate spot near humeral angle and narrow elongate red spot along suture behind middle (Pl. V, Fig. 2). Ventral surface red, sternum, median areas of mesosternum and metasternum, and external margins of epipleura black. Legs black in female; black in male except for trochanters and spot of variable size on femora pale. Length, 5.9-7.3 mm; width, 5.4-6.3 mm.

Specimens examined: 11 were collected from March 3 to May 29 and on October 10.

Distribution records: Assumption, Avoyelles, East Baton Rouge, and Iberville parishes.

Axion plagiatum (Olivier)

Coccinella plagiata Olivier, 1808, p. 1044.

Head of male pale, vertex black; of female, black. Pronotum black, anterior angles narrowly pale. Elytra black, each elytron with round red subbasal spot located nearer lateral margin than suture (Pl. V, Fig. 1). Ventral surface black, sides of body and internal margins of epipleura pale. Legs black in female; male with extensive pale areas on prothoracic and mesothoracic legs; metathoracic legs darker. Length, 5.6-6.4 mm; width, 5.3-5.6 mm.

Specimens examined: 16 were collected June 2 on Quercus sp. in Caddo Parish.

Genus Chilocorus Leach

Chilocorus Leach, 1815, p. 116.

Form rounded, strongly convex, upper surface glabrous. Antennae eight-segmented. Pronotum pubescent toward lateral margins. Elytral margins not reflexed, finely beaded; epipleura excavated for reception of hind femora. Abdomen with 6 visible sterna in male, 5 in female; postcoxal lines join posterior margin of first abdominal sternum. Tibiae with triangular tooth on each at basal third and without spurs on all legs. Each tarsal claw with small quadrate tooth at base.

One species occurs in Louisiana.

Chilocorus stigma (Say)

Coccinella stigma Say, 1835, p. 202.

Head and pronotum black. Elytra black, each elytron with round red spot on disc in front of middle (Pl. IV, Fig. 7). Ventral surface with head and thorax black, abdomen red. Legs black. Length, 4.3-5.1 mm; width, 3.6-4.6 mm.

Specimens examined: 45 were collected from January 31 to November 1, but none were collected in March or July.

Distribution records: Assumption, Beauregard, Caddo, Calcasieu, DeSoto, East Baton Rouge, Natchitoches, Ouachita, Plaquemines, Rapides, Sabine, Tensas, West Baton Rouge, and West Feliciana parishes.

Discussion: The twicestabbed lady beetle, formerly known as Chilocorus bivulnerus Mulsant, is the most common species of this tribe in Louisiana. A number of specimens were collected on scale-infested magnolias. Cressman and Plank (1935) stated that it was a predator of the camphor scale, Pseudaonidia duplex (Cockerell). This

species is sometimes confused with Olla abdominalis (Say) from which it is distinguished by the extension of the clypeus which subdivides the eyes and by the entirely black pronotum.

Genus Exochomus Redtenbacher

Exochomus Redtenbacher, 1843, p. 121.

Form broadly oval to almost circular. Antennae ten-segmented. Epipleura not foveate for reception of hind femora. Abdomen with 6 visible sterna in male, 5 in female; postcoxal lines of first abdominal sternum complete, or nearly so, to base of abdomen. Tibiae with small spurs on last two pairs of legs, not toothed externally. Tarsal claws each with subquadrate tooth at base.

One species is found in Louisiana.

Exochomus marginipennis (LeConte)

Coccinella marginipennis LeConte, 1824, p. 173.

Head black, pale anteriorly in male. Pronotum of male black with anterior angles or lateral margins widely pale; female with pronotum black, anterior angles only nubulously pale. Elytra with 2 color patterns: black with pale spot on each side of scutellum; sometimes with elongate pale spot on suture at middle which may be joined to the two at base; lateral margins of elytra sinuately pale for half or more of length (Pl. VI, Fig. 13, 14); or, elytra reddish orange, each elytron with subapical black spot of variable size and sometimes with black spot on disc above middle (Pl. VI, Fig. 15, 16). Length, 2.4-3.3 mm; width, 2.1-2.8 mm.

Specimens examined: 46 were collected from February 22 to August 20. Most of them were collected by beating oak or aphid-infested crapemyrtle.

Distribution records: Bossier, Caddo, East Baton Rouge, East Feliciana, Evangeline, Franklin, Grant, LaSalle, Natchitoches, Ouachita, Rapides, Sabine, St. Helena, St. Landry, St. Tammany, Vernon, Washington, Webster and West Feliciana parishes.

Discussion: Exochomus guexi, one of the color forms of E. marginipennis, was described from Louisiana and named for Mr. J. A. Guex who collected specimens for LeConte. Other forms were described as E. childreni Mulsant, E. latiusculus Casey, and E. marginipennis deflectens Casey. Leng (1908) reported that all the varieties were represented in a series of specimens collected near St. Louis, Missouri, and that the pale form was more common in the southern states. In Louisiana, the black varieties were collected only in the Florida parishes while the red varieties were usually collected west of the Mississippi River. Both black and red varieties were collected in East Baton Rouge and West Feliciana parishes.

Subfamily Coccidulinae Sasaji

Coccidulinae Sasaji, 1968, p. 22.

Body weakly or moderately convex, pubescent. Head capsule normal with truncate apex and clypeus not expanded. Antennae eight- to eleven-segmented, laterally inserted. Compound eyes sometimes coarsely faceted. Mandibles bifid apically and toothed basally. Terminal segments of maxillary palpi strongly divergent and securiform. Elytral epipleura usually broad and entire without distinct foveae for reception of femoral tips. Mesosternum and metasternum narrowly articulate. Abdomen composed of 5 or 6 visible sterna. Tarsal formulae obviously tetramerous, cryptotetramerous, or true trimerous.

Three of the four tribes included in this subfamily occur in North America.

Key to the tribes of the Coccidulinae of Louisiana

1. Antennae eight-segmented; labrum distinctly broader than clypeus; tarsi cryptotetramerousNoviini Ganglbauer
Antennae eleven-segmented; labrum narrower than clypeus; tarsi true trimerousCoccidulini Costa

Tribe Coccidulini Costa

Coccidulini Costa, 1849, p. 104.

Antennae eleven-segmented, rather long, usually longer than head capsule. Labrum narrower than clypeus. Compound eyes coarsely faceted. Base of mentum not very narrow. Prosternum T-shaped, surface nearly horizontal. Junction between mesosternum and metasternum moderate in width. Abdomen with 6 visible sterna. Tibiae simple, not angulate externally. Tarsi cryptotetramerous.

Three genera occur in the United States, one of which is found in Louisiana.

Genus Lindorus Casey

Lindorus Casey, 1899, p. 162.

Antennae eleven-segmented. Labrum narrower than clypeus. Epistoma deeply emarginate. Eyes coarsely faceted. Mandibles each with subapical tooth. Apical segments of maxillary palpi securiform. Prosternum T-shaped, prosternal carinae straight, complete to anterior margin. Each hypomerone with narrow deep groove extending from apex

nearly to middle, parallel to lateral margin. Mesosternum shallowly emarginate at apex. Abdomen of 6 visible sterna, sixth very small. Postcoxal lines on first abdominal sternum complete. Tarsi cryptotetramerous. Tarsal claws slender, arcuate, bases slightly wider; male with first 2 pairs bifid.

The genus contains one species.

Lindorus lophanthae (Blaisdell)

Scymnus lophanthae Blaisdell, 1892, p. 51.

Elongate-oval, pubescent; pubescence consisting of black erect hairs and recumbent yellowish hairs. Head and pronotum reddish orange. Pronotum usually with dark cloud just before middle, variable in size and distinctness. Elytra brownish black with metallic lustre. Male genitalia figured on Pl. III, Fig. 8, 9. Length, 1.8-2.6 mm; width, 1.3-1.8 mm.

Specimens examined: 124 were collected from January 27 to December 30.

Distribution records: Allen, Beauregard, Caddo, Calcasieu, DeSoto, East Baton Rouge, East Feliciana, Franklin, Jefferson Davis, Natchitoches, Orleans, Ouachita, Pointe Coupee, Rapides, Sabine, St. Landry, Tangipahoa, Tensas, Vernon, West Baton Rouge, and West Feliciana parishes.

Discussion: This species was introduced into California from Australia. It has been collected on camellia and Ilex sp. infested with Fiorinia theae Green and on Melia azedarach L. infested with a bark scale. Lindorus lophanthae was recorded as a predator of Chrysomphalus dictyospermi (Morgan) by Cressman (1933).

Tribe Noviini Ganglbauer

Noviini Ganglbauer, 1899, p. 954.

Antennae eight-segmented and weakly clubbed. Eyes finely faceted. Labrum distinctly broader than clypeus. Mentum with very narrow base. Labial palpi two-segmented. Surface of prosternal lobe strongly raised. Junction between mesosternum and metasternum very narrow. Tibiae angulate externally. Tarsi true trimerous.

One genus occurs in Louisiana.

Genus Rodolia Mulsant

Rodolia Mulsant, 1850, p. 902.

Body oval to round, moderately convex, pubescent. Antennae

eight-segmented, each with first segment broadly lobed, second globose, remainder smaller, club weak. Terminal segments of maxillary palpi broadly securiform. Each mandible with subapical tooth remote from apex. Abdomen with 6 visible sterna. Postcoxal lines on first abdominal sternum complete, rarely extending beyond middle of segment. Tibiae bluntly angulate externally. Tarsi three-segmented. Tarsal claws dimorphic, cleft in male, each with broad basal tooth in female.

One species has been introduced into the United States from Australia.

Rodolia cardinalis (Mulsant)

Vedalia cardinalis Mulsant, 1850, p. 906.

Head black, antennae and mouthparts red. Pronotum black with large rectangular area at each anterior angle, anterior and lateral margins red; or red with broad black bar at base. Elytra red with black marks; each elytron with spot partially enclosing humeral callus; a sutural stripe laterally expanded at basal third, continuing around apex as marginal stripe which joins outer of 2 postmedian spots; spots connected (Pl. VII, Fig. 17). Male with deep notch in sixth abdominal sternum. Length, 2.8-3.8 mm; width, 2.3-3.1 mm.

Specimens examined: 39 were collected from May 30 to June 10 and from October 9 to November 14 in East Baton Rouge Parish. A number of specimens were collected on magnolia or nandina infested with cottonycushion scale.

Discussion: This is the famous vedalia lady beetle which was introduced into California and later to Florida for the biological control of the cottonycushion scale. Louisiana entomologists first noticed the scale in 1912 (Tucker, 1914). It is not known when the lady beetle entered Louisiana, but specimens were collected in Baton Rouge in 1921.

Subfamily Coccinellinae Ganglbauer

Coccinellinae Ganglbauer, 1899, p. 954.

Body large to medium-sized, dorsal surface glabrous. Antennae long, eleven-segmented and inserted more or less dorsally. Each mandible with basal tooth, bifid apically or with several teeth arranged in row. Apical segments of maxillary palpi distinctly securiform. Mentum relatively narrowly articulated with submentum and strongly divergent apically. Prosternum T-shaped. Mesosternum relatively narrowly articulated with metasternum; mesepimeron nearly triangular and its posterior margin slightly bent. Abdomen always composed of 6 visible sterna. Femora elongate and not flattened. Tarsi always cryptotetramerous.

Sasaji (1968) places the tribes Coccinellini and Psylloborini in this subfamily.

Key to the tribes of the Coccinellinae of Louisiana

1. Anterior margin of clypeus with anterior projection on each side; mandibles always bifid apicallyCoccinellini Weise
- Anterior margin of clypeus truncate without anterior projection on each side; mandibles usually multidentate apically
-Psylloborini Casey

Tribe Coccinellini Weise

Coccinellini Weise, 1885, p. 7.

Anterior margin of clypeus with anterior projection on each side, absent in some species of Hippodamia. Antennal insertion rather approximate to eyes. Anterior margin of pronotum usually deeply emarginate and with angulate anterior corners. Mandibles always bifid apically. Maxillary galea conical.

The tribe Coccinellini corresponds to the tribes Synonychini and Coccinellini of Korschefsky (1932) including the Hippodamiini and Anisostictini of Watson (1956). There are seventeen genera in America north of Mexico.

Key to the genera of the tribe Coccinellini of Louisiana

1. Body elongate, not markedly convex; femora extending well beyond sides of body when directed outwardly; head not deeply inserted, pronotum sinuate, but not covering eyes 2
- Body rounded, convex, compact; femora not generally extending beyond sides of body; head deeply inserted, pronotum covering large part of eyes 4
2. Tarsal claws toothed or cleft 3
- Tarsal claws simply widened basally, neither toothed nor cleft; pronotum with basal marginal bead; postcoxal lines on metasternum distinct; postcoxal lines on first abdominal sternum absentNaemia Mulsant
3. Each tarsal claw cleft at middle; pronotum without basal marginal bead; postcoxal lines on metasternum absent; postcoxal lines on first abdominal sternum present or absent . . .Hippodamia Chevrolat
- Each tarsal claw with subrectangular basal tooth; base of pronotum with fine entire marginal bead; postcoxal lines on metasternum and first abdominal sternum absentColeomegilla Timberlake
4. Each tarsal claw cleft near middleNeomysia Casey
- Each tarsal claw with large tooth at base 5

5. Postcoxal lines arcuate, extending past middle of first abdominal sternum before recurving toward base of abdomen. . . . Adalia Mulsant
Postcoxal lines incomplete, curving laterally along first abdominal suture 6
6. Prosternum strongly convex at middle and prominent at middle of apex; mesosternum deeply sinuate at apex; pronotum with median black M-shaped design; elytra maculate Anatis Mulsant
Prosternum and mesosternum not as above. 7
7. Pronotum always black with large quadrangular white spot in each anterior corner; elytral epipleura horizontal or only slightly concave; mesosternum truncate anteriorly; postcoxal plates on first abdominal sternum divided by oblique lines . . . Coccinella Linnaeus
Pronotal pattern and epipleura not as above. 8
8. Form elongate-oval, not strongly convex. 9
Form round, strongly convex. 10
9. Pronotal and elytral margins broadly reflexed; postcoxal plates divided by oblique lines which meet postcoxal lines; color pattern dimorphic. Neoharmonia Crotch
Pronotal and elytral margins not broadly reflexed; postcoxal plates with oblique lines obsolete; elytra immaculate in Louisiana specimens; vittate elsewhere Mulsantina Weise
10. Elytra immaculate, yellowish orange or reddish orange.
. Cycloneda Crotch
Elytra maculate, color pattern dimorphic, gray with black spots or black with 2 red spots. Olla Casey

Genus Naemia Mulsant

Naemia Mulsant, 1850, p. 30.

Body elongate-oval, loosely formed, with femora extending beyond sides of body when extended outward. Pronotum with basal marginal bead. Prosternal lobe without carinae. Metasternum with postcoxal lines. First abdominal sternum without postcoxal lines. Tarsal claws simple.

The genus contains one species which Timberlake (1943) has divided into two subspecies, Naemia seriata seriata (Melsheimer) and Naemia seriata decepta (Blatchley). The former occurs in Louisiana.

Naemia seriata seriata (Melsheimer)

Coccinella seriata Melsheimer, 1847, p. 177.

Head black, mouthparts and antennae pale. Pronotum pale reddish yellow with 2 large black spots at base connected at median line and 2 smaller spots attached anterior-laterally, roughly forming a W. Elytra pale reddish yellow; each elytron with lateral row of 3 large black spots, usually connected, and 3 spots along suture (Pl. IV, Fig. 4). Length, 4.8-6.6 mm; width, 2.9-3.9 mm.

Specimens examined: 70 were collected from March 13 to October 16.

Distribution records: Acadia, Allen, Cameron, East Baton Rouge, East Feliciana, Iberia, Iberville, Jefferson, Lafourche, Livingston, Orleans, Plaquemines, St. Bernard, St. Landry, St. Tammany, Terrebonne, and Vermilion parishes.

Discussion: According to Leng (1903a) this species occurs in maritime regions. Glick (1939) collected a specimen by airplane over Tallulah.

Genus Coleomegilla Timberlake

Coleomegilla Timberlake, 1919b, p. 139.

Body elongate-oval, loosely formed with femora extending beyond sides of body when directed outward. Base of pronotum with fine entire marginal bead. Prosternal lobe without carinae. Metasternum and first abdominal sternum without postcoxal lines. Each tarsal claw with subquadrate basal tooth. Male with tarsi and antennae unmodified.

Coleomegilla was first used by Timberlake in 1919. In 1920 he credited the name to T. D. A. Cockerell who had given it to him as a replacement for Megilla Mulsant, 1850, which was preoccupied. Credit, however, must be given to the person who first published the name. Leng (1920) erroneously synonymized Megilla with Ceratomegilla Crotch.

The genus contains one species, Coleomegilla maculata (Degeer), which Timberlake (1943) divided into 12 subspecies and varieties, three of which occur in the United States. Timberlake also pointed out that Megilla fuscilabris decepta Blatchley was misidentified and is actually a southern race of Naemia seriata (Melsheimer).

The two subspecies which occur in Louisiana differ in size, color, pattern, and distribution, although their ranges overlap.

Key to the subspecies of Coleomegilla maculata of Louisiana

1. Pronotal spots large, triangular; elytral spots 2 and 3 united to form large oval mark, usually equidistant from suture and side margin; spot 5 nearly always united with its mate on suture; elytra red or pink. lengi Timberlake
Pronotal spots reduced, oval or curvilinear; elytral spot 2 usually free, forming a smutting detached black spot near side margin; spots 5 separate; spots 4, 5, 6, reduced, usually subequal in size; elytra reddish or yellowish orange. . . fuscilabris (Mulsant)

Coleomegilla maculata lengi Timberlake

Coleomegilla maculata lengi Timberlake, 1943, p. 9.

Head black with median red triangle. Pronotum red with large triangular black spot each side of middle at base, rarely confluent

at middle. Elytra red with 2 common black spots, one scutellar and one at three-fourths; each elytron also with 4 spots arranged longitudinally, one on callus, one large median one, usually equidistant from suture and side margin, one at three-fourths and one subapical, not touching suture (Pl. VII, Fig. 1). Length, 4.9-6.4 mm; width, 2.8-3.9 mm.

Specimens examined: 138 were collected from February 13 to December 27.

Distribution records: This is a very common species on aphid-infested plants throughout the state and is the one referred to by various authors as C. fuscilabris or C. maculata. It was collected in 50 parishes but rarely occurs in the most southern ones.

Coleomegilla maculata fuscilabris (Mulsant)

Naemia fuscilabris Mulsant, 1866, p. 22.

Head black with median pale triangle. Pronotum and elytra reddish or yellowish orange. Pronotum with oval or curvilinear black spot each side of middle. Each elytron with 7 small black spots: spot $\frac{1}{2}$ at scutellum united with its mate; spot 1 at humerus; spot 2 usually free, forming smutting detached black spot near side margin; spot 3 at middle, rectangular; spots 4, 5, and 6 reduced, usually subequal, but sometimes one may be half as large as others, spot 5 free from suture (Pl. VII, Fig. 2). Length, 4.1-5.8 mm; width, 2.4-3.3 mm.

Specimens examined: 60 were collected from March 13 to August 22.

Distribution records: Cameron, East Baton Rouge, Iberia, Iberville, Livingston, Natchitoches (Leng, 1903), Orleans (Mulsant, 1866), Plaquemines, St. John, St. Tammany, Tangipahoa, Terrebonne, and Vermilion parishes.

Discussion: Mulsant (1866) described C. m. fuscilabris from New Orleans. Leng (1903a) was apparently unaware of this description, for he redescribed the species as C. m. floridana from Florida and Vowells Mill, Louisiana. In this study the species was not collected north of Baton Rouge, although Glick (1939) collected a specimen by airplane over Tallulah. It is more common in the southern parishes of the state.

Genus Hippodamia Chevrolat

Hippodamia Chevrolat, 1837, p. 456.

Body elongate, loosely formed with femora extending beyond sides of body when directed outwardly. Male antennae not modified. Pronotum without basal marginal bead and with anterior margin nearly straight. Mesosternum without postcoxal lines. First abdominal sternum with or

without postcoxal lines. Legs with two spurs on each middle and hind tibia; in a few species, the first segment of each anterior and middle male tarsus distinctly dilated; tarsal claws cleft at middle.

Brown and de Ruelle (1962) reported that the name Hippodamia first appeared in the third edition of the Dejean catalog and was validated there like the names of the chrysomelid genera discussed by Barber and Bridwell (1940) and attributed by them to Chevrolat. Brown and de Ruelle also stated that the abdominal postcoxal lines are always lacking in some species but are present and quite distinct in some but not all specimens of all other species in northern America that are placed in the genus.

Although both Casey (1899, 1908) and Leng (1903a) reviewed this genus, the first adequate classification was provided by Timberlake (1919a) who divided the genus into four groups of species. Chapin, reviewing the genus in 1946, accepted three of the four groups proposed by Timberlake, divided a fourth into two coordinate groups and added a sixth group for a newly described species. Brown and de Ruelle (1962) added another species to the genus, bringing the total in America north of Mexico to seventeen, two of which occur in Louisiana.

Key to the species of Hippodamia of Louisiana

1. Each elytron with spots $\frac{1}{2}$ to 6; spots small, black, and isolated; spots $\frac{1}{2}$, 1, 2, and 3 often greatly reduced or lacking; elytra often immaculate convergens Guérin-Ménéville
Each elytron with spot $\frac{1}{2}$ an elongate dash either side of suture, sometimes joining spot 3 or absent altogether; spot 3 extended laterally, sometimes united with spot 2; spots 4 and 5 separate or united quindecimmaculata Mulsant

Hippodamia quindecimmaculata Mulsant

Hippodamia quindecimmaculata Mulsant, 1850, p. 20.

Head black at base, white anteriorly with black triangle near each antennal base. Pronotal disc black, enclosing two white divergent dashes, anterior and lateral margins white. Elytra reddish orange; each elytron with 6 or 7 large black spots; spot $\frac{1}{2}$ an elongate dash either side of suture, sometimes joining spot 3 or absent; spot 3 extended laterally, sometimes united with spot 2; spots 4 and 5 separate or united; spots 1 and 6 present (Pl. IV, Fig. 6). Length, 6.6-7.3 mm; width, 4.1-4.6 mm.

Specimens examined: Eight specimens were collected May 16 and June 4 in West Feliciana Parish.

Discussion: Wingo (1952) examined a specimen in the Fall collection at the Museum of Comparative Zoology at Harvard University which was collected at Tallulah, Louisiana, on VII-19-30 by P. A. Glick. Chapin

(1946) stated that the species did not appear to be abundant in its range.

Hippodamia convergens Guérin-Méneville

Hippodamia convergens Guérin-Méneville, 1844, p. 321.

Head black at base, white anteriorly with black spot near each antennal base. Pronotal disc black enclosing two white divergent dashes, anterior and lateral margins white. Elytra reddish or yellowish orange; elytral pattern consisting of spots $\frac{1}{2}$ to 6; spots small, black and isolated; spots $\frac{1}{2}$, 1, 2, and 3 often greatly reduced or lacking; elytra often immaculate (Pl. IV, Fig. 5). Length, 5.3-7.1 mm; width, 3.3-4.4 mm.

Specimens examined: 131 were collected from February 12 to December 10.

Distribution records: The convergent lady beetle is very common on aphid-infested plants throughout the state. It was collected in 53 parishes.

Genus Neoharmonia Crotch

Neoharmonia Crotch, 1871, p. 2.

Form elongate-oval, not strongly convex. Lateral margins of elytra reflexed. Elytral punctures moderately strong. Elytral epipleura slightly concave, slanted toward lateral margins. Mesosternum convex and emarginate at apex. Postcoxal lines incomplete curving to run parallel to first abdominal suture. Postcoxal plates divided by oblique lines which meet postcoxal lines near first abdominal suture. Each tarsal claw with large basal tooth.

The genus was reviewed by Gordon (1974c). One subspecies composed of two color forms is found in Louisiana.

Neoharmonia venusta venusta (Melsheimer)

Coccinella venusta Melsheimer, 1847, p. 178.

Light form: head black, anterior margin and curved line by each eye pale. Pronotum and elytra reddish or yellowish marked with black. Pronotum with two apical median spots and two oblique basal vittae. Each elytron with two basal spots, middle row of two spots, median one prolonged obliquely forward along suture, and apical spot joining sutural vitta which ends at middle of length (Pl. V, Fig. 6).

Melanic form: head black, anterior margin yellow; pronotum black, anterior angles and sometimes narrow anterior and lateral margins reddish orange to yellowish white. Elytra black; each elytron

with pale transverse fascia at middle extending to lateral margin; anterior margin of fascia deeply sinuate at middle forming two acute points; posterior margin slightly sinuate or occasionally each elytron with single triangular pale spot on disc (Pl. V, Fig. 5). Length, 4.6-6.6 mm; width, 3.4-5.1 mm.

Specimens examined: 44 were collected from February 22 to July 29 but none were collected in March. About half the specimens were collected in boll weevil sex attractant traps.

Distribution records: Assumption, Avoyelles, Catahoula, East Baton Rouge, Grant, Iberia, Iberville, Livingston, Point Coupee, Rapides, St. James, St. John, St. Tammany, Tensas, West Baton Rouge, and West Feliciana parishes.

Discussion: Mulsant (1850) described both color forms under the name of Harmonia notulata and said that according to Sâlle the species was found in Louisiana on young willows in the marshes. This species was erroneously referred to as Coccinella affinis Randall by Summers (1874) and Townsend (1885).

Genus Coccinella Linnaeus

Coccinella Linnaeus, 1758, p. 364.

Form broadly oval, convex. Head black with two pale spots on front or with pale band between eyes. Pronotum black with large quadrangular or triangular white spot in each anterior angle, sometimes joined together by pale band along anterior pronotal margin and rarely extended to basal pronotal angles. Elytra yellow, orange or red with variable black pattern, sometimes immaculate. Mesosternum truncate anteriorly. Elytral epipleura horizontal or only slightly concave. Postcoxal lines incomplete, curving to first abdominal suture and running parallel to it; postcoxal plates divided by distinct oblique lines which meet postcoxal lines very close to first abdominal suture. Each tarsal claw with tooth at base.

Early studies of the North American species of Coccinella were conducted by Casey (1899, 1908) who recognized more than twice as many forms as separate species as did Leng (1903b). Dobzhansky (1931) stated that the genus is primarily holarctic in distribution. Using male genitalia as the principal character, he recognized 11 species and as many subspecies. Brown (1962) arranged the 18 forms considered to merit names as 12 species. The principal difference between his work and that of Dobzhansky was in the application of the subspecies concept.

Coccinella novemnotata Herbst

Coccinella 9-notata Herbst, 1793, p. 269.

Head with broad yellowish white band between eyes, black anteriorly

and posteriorly. Pronotum with front margin and rectangular area at each front angle yellowish white. Elytra orange. Each elytron with 5 black spots; scutellar, confluent with its mate; small humeral spot; small spot near lateral margin in basal half; large median spot and large apical spot; spots variable in size and sometimes connected; elytral suture narrowly black (Pl. IV, Fig. 3). Male with pale spot on anterior face of each prothoracic coxa and pale stripe on ventral surface of each prothoracic femur. Length, 5.1-7.4 mm; width, 3.9-5.8 mm.

Specimens examined: 83 were collected from March 10 to October 23.

Distribution records: Dobzhansky (1931) recorded this species from Tallulah and Mound. It was collected in 34 parishes and is a common species on many crops north of Baton Rouge. One specimen was collected in Cameron Parish in extreme southwest Louisiana.

Genus Cycloneda Crotch

Cycloneda Crotch, 1873, p. 371.

Body rounded, very convex. Elytra immaculate. Mesosternum truncate anteriorly or at most slightly sinuate at middle. Postcoxal lines incomplete, curving toward lateral margins parallel to first abdominal suture; oblique lines of postcoxal plates obsolete. Epipleura more or less concave and slanted toward external elytral margins. Each tarsal claw with tooth at base.

"The center of the specific diversity of Cycloneda lies in Central and South America, where it, and some related genera, replace Coccinella completely," reported Dobzhansky (1931).

Timberlake (1943) stated that he had conducted reciprocal crosses between the three North American species of Cycloneda, C. sanguinea (Linnaeus), C. munda (Say), and C. polita Casey, which showed that they were interspecifically sterile. Two species occur in Louisiana, and they have been confused in the literature.

Key to the species of Cycloneda of Louisiana

1. Pronotal pattern with isolated white spots; male with metathoracic tibiae black; male genitalia with basal lobe knobbed at tip; mesothoracic and metathoracic tibiae black in female
..... sanguinea (Linnaeus)
Pronotal pattern lacking isolated white spots; male with metathoracic tibiae pale; male genitalia with basal lobe pointed at apex; female with all tibiae pale munda (Say)

Cycloneda sanguinea (Linnaeus)

Coccinella sanguinea Linnaeus, 1763, p. 10.

Head white in male, vertex black; white with median black triangle in female. Pronotum with large median black basal area surrounding 2 lateral white spots; anterior margin, lateral margins and hind angles white; male with apical median white prong; occasionally white spots are connected posteriorly with white lateral margins. Scutellum black. Elytra yellowish orange to reddish orange (Pl. VII, Fig. 3). Male with prothoracic and mesothoracic legs pale, external margins sometimes black; metathoracic legs mostly black. Legs of female with femora black, tips pale; prothoracic tibiae pale; mesothoracic and metathoracic tibiae black; tarsi pale. Male genitalia with basal lobe knobbed at tip. Length, 4.1-6.1 mm; width, 3.3-5.1 mm.

Specimens examined: 148 were collected from January 20 to November 21.

Distribution records: This species was collected in 48 parishes and is the more common of the two species of Cycloneda, especially in the southern part of the state. Wingo (1952) collected a single specimen in Missouri during the course of his study.

Cycloneda munda (Say)

Coccinella munda Say, 1835, p. 202.

Head white in male, vertex black; white with median black triangle in female. Pronotum black at base, anterior margin, lateral margins and hind angles white; white anterior margin extended posteriorly as 2 long curved lateral branches and narrow median triangular branch; lateral branches sometimes reaching base, isolating a black spot; occasionally white pronotal spots almost enclosed by black. Scutellum black. Elytra vary from yellowish orange to reddish orange (Pl. VII, Fig. 4). Legs of male pale; metathoracic femora black except at tips; female with femora black except at tips, tibiae and tarsi pale. Male genitalia with basal lobe pointed at apex. Length, 3.6-5.4 mm; width, 2.9-4.4 mm.

Specimens examined: 100 were collected from March 10 to November 21. One specimen was collected February 13 from ground trash near a soybean field.

Distribution records: This species was collected in 45 parishes and is more abundant in the northern part of the state. Wingo (1952) reported that it is common in all the states of the upper Mississippi basin.

Discussion: Cycloneda munda differs from C. sanguinea in the following respects: in both sexes the pronotal pattern lacks isolated white spots and possesses an apical median white prong; the male has the metathoracic tibiae pale; the basal lobe of the male genitalia is pointed at the apex; and the female has all the tibiae pale.

Genus Olla Casey

Olla Casey, 1899, p. 93.

Rounded, convex. Elytral epipleura concave and strongly slanted toward external margins. Prosternal lobe with 2 carinae, variably distinct, parallel or convergent. Mesosternum emarginate at apex. Postcoxal lines incomplete, curving toward lateral margins parallel to first abdominal suture; oblique lines of postcoxal plates frequently distinct but incomplete. Each tarsal claw with large basal tooth.

The genus is represented in the United States by a single species which is composed of two color forms.

Olla abdominalis (Say)

Coccinella abdominalis Say, 1824, p. 95.

Head gray with two black spots on vertex. Pronotum gray with seven black spots; two diagonal spots at center, three along basal line, separate or fused to form M-shaped figure; each lateral margin with spot behind middle. Elytra gray; each elytron with transverse series of four small black spots at base, median series of three spots and posterior spot near lateral margin. Occasionally each elytron with 1 or 2 of inner spots of basal row lacking; or, large black spot on disc behind middle, transversely sinuate anteriorly, oval posteriorly, with two isolated black spots near lateral margin, one at anterior and one at posterior margin of larger spot, posterior spot sometimes lacking (Pl. VI, Fig. 1, 2).

Melanic form: head white with two black spots on vertex, sometimes spotted with black on front. Pronotum with large median black spot; anterior margin, medial spur and lateral margins white; occasionally black area bears lateral spurs which rarely become separate spots. Elytra black; each elytron with yellow or red spot before middle (Pl. VI, Fig. 3). Length, 4.1-6.1 mm; width, 3.4-5.1 mm.

Specimens examined: 197 were collected from January 17 to November 21. The species is common on aphid-infested plants.

Distribution records: The species was collected in 52 parishes and is generally distributed throughout the state.

Discussion: Blaisdell (1931) illustrated the variation in the elytral pattern of the pale form of O. abdominalis collected in one locality in California. The form named O. arizonae Casey fits very well at one end of his series. The black forms named O. plagiata Casey and O. sobrina Casey differ from each other principally in the color pattern of the pronotum. Specimens can be arranged in a series to illustrate the range of variation.

Both the pale and the melanic form of this species have been

collected on the same plants in most areas of the state, but the black form has been collected more often. The male genitalia of the two forms are identical.

Genus Adalia Mulsant

Adalia Mulsant, 1850, p. 49.

Form elongate-oval, not strongly convex. Postcoxal lines almost complete, extending past middle of first abdominal sternum before recurving to end just before coxal cavities. Each tarsal claw with large basal tooth.

There are two species in this genus which is northern in distribution.

Adalia bipunctata (Linnaeus)

Coccinella 2-punctata Linnaeus, 1758, p. 364.

Head black with white spot adjacent to each eye. Pronotum yellowish white with median M-shaped mark varying to median area black; lateral margins broadly pale. Elytra red; each elytron with round black spot at the middle (Pl. VII, Fig. 5). Length, 4.8-5.1 mm; width, 3.8-4.1 mm.

Specimens examined: Three specimens were collected June 10 in Caddo Parish.

Discussion: This is a northern species reported by Wingo (1952) from all the states of the upper Mississippi basin. The author has examined specimens from Arkansas and Starkville, Mississippi.

Genus Mulsantina Weise

Mulsantina Weise, 1906, p. 34.

Form elongate-oval, moderately convex. Prosternal lobe without carinae. Mesosternum convex and slightly sinuate medially in front. Postcoxal lines incomplete, curving toward lateral margins parallel to first abdominal suture; oblique lines of postcoxal plates absent. Each tarsal claw with large basal tooth.

Weise (1906) proposed Mulsantina as a new name for Cleis Mulsant, 1850, which was preoccupied. Pseudocleis Casey, 1908, is a synonym.

Two species occur in the United States, one of which is described as new.

Key to the species of Mulsantina of Louisiana

1. Pronotum with median black M-shaped mark and black spot attached at

middle of each lateral leg; elytra reddish orange, immaculate in Louisiana, maculate in other areas picta (Randall)
Pronotum with slightly curved black stripe each side of middle and black spot in each lateral area, sometimes joined to median stripes basally; elytra yellowish orange, immaculate . . . luteodorsa Chapin

Mulsantina picta (Randall)

Coccinella picta Randall, 1838, p. 51.

Head black with 3 pale spots, sometimes joined at middle. Pronotum yellowish white with median black M-shaped mark and black spot attached at middle of each lateral leg; pattern sometimes reduced to its component spots. Elytra reddish orange, immaculate (Pl. VI, Fig. 4); in some areas of United States, each elytron with dark vitta running from callus to near apex connected with transverse bars before middle and at apex, variable in extent of pigmentation. Male genitalia (Pl. III, Fig. 12, 13) with basal lobe slightly longer than parameres, curved dorsally at apical third with apex between tips of parameres; apex of basal lobe bluntly rounded; each paramere with apex blunt with long hairs which extend halfway down medial margin; siphon with apical fourth abruptly narrower. Length, 4.3-5.3 mm; width, 3.1-4.1 mm.

Specimens examined: 52 were collected from February 25 to August 21, but none were collected in July. Most of them were collected on aphid-infested slash pine or spruce pine infested with Toumeyella sp.

Distribution records: East Baton Rouge, Livingston, Pointe Coupee, St. James, Tensas, and West Feliciana parishes.

Discussion: The genitalia of the maculate and immaculate forms of this species are identical, but the latter is the only one which has been collected in Louisiana. Specimens have also been examined from Starkville, Mississippi, and College Station, Texas.

Since the early coleopterists named so many color forms, it is rather surprising that this one did not receive more attention. Randall (1838) and Crotch (1873) mention it as one of the extremes of variation in the color pattern of M. picta. Weise (1895) named it M. impictipennis, but the name was apparently unknown to American taxonomists until the publication of Korschefsky's catalog in 1932. Casey (1899) did not mention it at all. Leng (1903b) reported that the elytra of male M. picta were immaculate while those of the female, the apparently more abundant sex, were more or less variegated with black. Johnson (1910), apparently unaware of Weise's work, renamed the form M. 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.

Gaines (1933) collected a series of this form at College Station, Texas, and reported that Dr. E. A. Chapin knew of no species like it. He listed it as M. concolor Crotch although he realized the specimens

did not fit the description in all respects.

Wingo (1952) did not mention examining specimens with immaculate elytra. He considered M. hudsonica Casey to be a synonym of M. picta (Randall). The distribution of this species was listed as generally northern, although occasional specimens were collected in the southern states of the upper Mississippi basin.

Mulsantina luteodorsa Chapin

Mulsantina luteodorsa Chapin, 1973, p. 1073.

Head white in male, vertex black; in female, head white, black anteriorly and posteriorly, labrum dark; antennae white. Pronotum white with slightly curved black stripe each side of middle, extending from base almost to apex, stripes sometimes joined basally; an isolated black spot in each lateral pale area, sometimes joined to median stripe basally. Scutellum pale. Elytra yellowish orange, immaculate (Pl. VI, Fig. 5). Males with first 2 pairs of legs pale, metathoracic legs with femora black, paler at bases and apices; females with femora black, pale apically; tibiae and tarsi pale, tibiae sometimes streaked with black externally. Male genitalia (Pl. III, Fig. 14, 15) with basal lobe as long as parameres, curved dorsally near tip, its apex between tips of parameres; apex of basal lobe bluntly pointed; each paramere curved inward at tip which is pointed and more heavily sclerotized with short hairs subapically; siphon abruptly narrowed at tip. Length, 3.8-4.6 mm; width, 3.1-3.4 mm.

Specimens examined: 13 were collected April 11 and 24 and June 2.

Distribution records: Caddo, East Baton Rouge, and Sabine parishes.

Discussion: The Baton Rouge specimens were collected on basket oak.

The genitalia of this species is very similar to M. picta (Randall), but is distinctly shorter. The basal lobe is shaped differently when viewed ventrally and the tip is narrower. The tips of the parameres are narrowly pointed and the hairs are shorter. The narrow portion at the tip of the siphon is considerably shorter than it is in M. picta.

The pronotal pattern of M. luteodorsa differs from that found in other members of the genus, but the male genitalia are of the same type.

Blackwelder (1945) lists 7 specific names in the genus from North and Central America and the West Indies. The genitalia of this species are different from those of M. picta (Randall), M. cyathigera (Gorham), and M. mirifica (Mulsant). Timberlake (1943) reported that M. lynx (Mulsant) has genitalia identical to M. mirifica and agreed with Crotch that it was only a variety of the latter. A female of M. concolor (Crotch) was examined and did not agree with females of this species. No specimens of M. labyrinthica (Sicard), 1929, or M. picta nubilata (Casey), 1924, but the pronotal and elytral patterns are different according to the original descriptions.

Genus Anatis Mulsant

Anatis Mulsant, 1846, p. 133.

Broadly oval, convex. Size large, more than 5 mm in length. Antennae long, extending beyond middle of prosternum. Prosternum broad between coxae; strongly convex at middle and prominent at middle of apex. Mesosternum deeply sinuate at apex. Postcoxal lines incomplete, ending at posterior margin of first abdominal sternum. Each tarsal claw with large basal tooth.

McKenzie (1936) reported that two species and two subspecies occur in North America. One species is found in Louisiana.

Anatis quindecimpunctata (Olivier)

Coccinella quindecimpunctata Olivier, 1808, p. 1027.

Head black with yellow spot next to each eye. Pronotum yellow with median black M-shaped mark extending almost to anterior border and black spot at each lateral margin just behind middle. Elytra yellow or reddish brown; each elytron with 8 black spots in 3 rows; basal row with 2 spots, middle and posterior rows each with 3 spots (Pl. V, Fig. 4). Length, 7.8-7.9 mm; width, 6.6-6.8 mm.

Specimens examined: 2 were collected April 20 and May 22.

Distribution records: Jackson and Tensas parishes.

Discussion: Wingo (1952) stated that this was the most common species of the genus in the southern half of the upper Mississippi basin.

Genus Neomysia Casey

Neomysia Casey, 1899, p. 98.

Body broadly oval, convex, minutely punctate. Size large, more than 5 mm in length. Antennae long, extending beyond middle of prosternum. Prosternum narrow between coxae and feebly convex along median line. Mesosternum slightly sinuate. Postcoxal lines incomplete, ending at first abdominal suture. Tarsal claws cleft near middle.

Casey (1899) proposed the name Neomysia because he believed the American species differed from the European genotype of Mysia Mulsant, 1846. By 1905 he was inclined to think that American and European species were congeneric, but pointed out that Neomysia would have to replace Mysia which was a preoccupied name. Timberlake (1943) believed the North American species were so similar to N. oblongoguttata

that they should be considered as races. He did not, however, examine all the species described in the genus.

Neomysia oblongoguttata pullata (Say)

Coccinella pullata Say, 1826, p. 301.

Head pale with median triangular black spot. Pronotum yellowish white with median trapezoidal black or dark brown area; anterior and lateral margins pale with black spot, usually isolated, in each lateral margin. Elytra brownish yellow, sometimes with faint vittae laterally and posteriorly (Pl. V, Fig. 3). Male with slight notch in sixth abdominal sternum. Length, 6.6-7.1 mm; width, 4.9-5.6 mm.

Specimens examined: 4 were collected from April 24 to July 19, but none were collected in June.

Distribution records: East Baton Rouge and West Feliciana parishes.

Discussion: Many specimens of this species were collected on catalpa nectaries and persimmon flowers in Arkansas by L. D. Newsom.

Tribe Psylloborini Casey

Psylloborini Casey, 1899, p. 100.

Anterior margin of clypeus truncate without anterior projection on each side. Antennal insertion more frontally situated. Anterior margin of pronotum weakly sinuate and with rounded corners. Mandibles often multidentate apically. Maxillary galea quadrate.

One genus occurs in the United States.

Genus Psyllobora Chevrolat

Psyllobora Chevrolat, 1837, p. 458.

Body broadly oval, moderately convex, small; color pale with darker spots; integument thin. Pronotum diaphanous at edges and broadly reflexed. Each mandible with basal tooth and several teeth at apex. Prosternal lobe without carinae. Mesosternum truncate. Postcoxal lines on first abdominal sternum incomplete, joining posterior margin. Tibial spurs absent. Each tarsal claw with large quadrate tooth at base.

Timberlake (1943) provided a key to some of the North American species based on differences in the male genitalia. He also stated that many of the species described by Casey were unjustly merged as varieties of P. vigintimaculata in the Leng catalog (1920).

The three Louisiana species can be separated on the basis of their color patterns. Many specimens were collected on crapemyrtle and elm infested with powdery mildew.

Key to the species of Psyllobora of Louisiana

1. Each elytron with 9 spots of uniform color, some of which may be confluent 2
Each elytron with 2 basal spots, large reniform discal spot, and usually, spot near suture at 1/3 and subapical spot; pronotum with 5 brown spots, lateral ones usually fused renifera Casey
2. Pronotum with 5 black spots, antescutellar spot small, sometimes obsolete; siphon of male genitalia with very long tenuous portion at apex vigintimaculata (Say)
Pronotum with 5 pale brown spots, sometimes so faint that disc appears nebulously darker; siphon with short slender point at apical end parvinotata Casey

Psyllobora vigintimaculata (Say)

Coccinella 20-maculata Say, 1824, p. 96.

Head pale, vertex black. Pronotum and elytra yellowish white. Pronotum with 5 median black spots, 2 at middle and 3 at base, antescutellar spot small, sometimes obsolete. Each elytron with 9 black spots: 2 subbasal; 2 near the suture at one-third and two-thirds; 3 near lateral margin at one-third, two-thirds and subapical; and 2 discal, latter often connected and sometimes joining others together (Pl. VI, Fig. 10). Male genitalia with siphon elongate, tapering from just before middle into very long tenuous portion. Length, 1.9-2.4 mm; width, 1.4-1.8 mm.

Specimens examined: 66 were collected from February 25 to October 2, but none were collected in September.

Distribution records: Acadia, Assumption, Avoyelles, Caddo, Calcasieu, Catahoula, DeSoto, East Baton Rouge, East Feliciana, Franklin, Grant, Jefferson Davis, Lafayette, LaSalle, Madison, Natchitoches, Ouachita, Pointe Coupee, Rapides, Red River, Sabine, St. Landry, Tangipahoa, Tensas, and West Baton Rouge parishes.

Psyllobora parvinotata Casey

Psyllobora parvinotata Casey, 1899, p. 101.

Head pale, vertex black. Pronotum and elytra yellowish white or gray. Pronotum with 5 median pale brown spots, 2 at middle, 3 at base, antescutellar spot often absent, sometimes all spots indistinct. Each elytron with 9 black spots: 2 subbasal; 2 near suture at one-third and two-thirds; 3 near lateral margin at one-third, two-thirds and subapical, two discal, latter sometimes connected (Pl. VI, Fig. 11).

Siphon of male genitalia tapering to short slender point at apical end. Length, 2.1-2.6 mm; width, 1.6-1.9 mm.

Specimens examined: 29 were collected February 25 and from May 15 to June 14.

Distribution records: Acadia, Calcasieu, Jefferson Davis, and Lafayette parishes.

Discussion: Casey (1899) stated that P. parvinotata is very similar to P. vigintimaculata in elytral maculation, but differs in the absence of the antescutellar spot on the pronotum. The spot may be present or absent in both species. In P. vigintimaculata the pronotal spots are black, and the apical end of the siphon is very long and thread-like. In P. parvinotata the pronotal spots are pale brown, sometimes so faint that the disc appears nebulously darker, and the apical end of the siphon ends in a short fine point.

Psyllobora renifera Casey

Psyllobora renifer Casey, 1899, p. 102.

Head pale, vertex dark brown. Pronotum and elytra yellowish white or gray. Pronotum with 5 median brown spots, lateral spots usually fused. Each elytron with 2 basal spots, sometimes united, spot near the suture at one-third, large bilobed discal spot extending from basal third to apical fifth, and subapical spot, sometimes obsolete; some or all spots may be joined to extensive discal spot (Pl. VI, Fig. 12). Length, 1.9-2.6 mm; width, 1.6-1.9 mm.

Specimens examined: 80 were collected from May 10 to June 8 and from October 2 to 4.

Distribution records: Bossier, Calcasieu, Catahoula, DeSoto, East Baton Rouge, Iberville, Ouachita, St. Landry, Tensas, and West Baton Rouge parishes.

Discussion: This species resembles P. parvinotata in pronotal pattern and male genitalia, but in P. renifera the pronotal spots are always present and darker.

Subfamily Epilachninae Ganglbauer

Epilachninae Ganglbauer, 1899, p. 947.

Medium-sized to large beetles, more than 6 mm long, strongly convex. Dorsal surface always pubescent. Antennae eleven-segmented, inserted more between than before eyes. Each mandible multidentate at tip and without basal tooth. Apical segments of maxillary palpi securiform. Mentum very broadly articulated with submentum and convergent apically. Mesepimeron quadrate, its posterior margin

distinctly angulate. Abdomen with 6 visible sterna. Tarsi always cryptotetramerous.

One genus of this subfamily occurs in the Western Hemisphere.

Genus Epilachna Chevrolat

Epilachna Chevrolat, 1837, p. 460.

Oval, convex. Dorsal surface pubescent. Elytral punctures both coarse and fine. Epipleura flat. Postcoxal lines on first abdominal sternum usually complete to base of abdomen. Abdomen of 6 visible sterna, sixth loosely hinged, sometimes retracted or deflected dorsally; in female, sixth may or may not be divided longitudinally. Each tarsal claw bifid, with or without basal tooth.

The genus is a tropical one. Dieke (1947) reviewed the species of Asia, Europe, and Australia.

Key to the species of Epilachna of Louisiana

1. Yellowish orange; pronotum usually with 4 black spots; each elytron with 7 large round black spots; sixth abdominal sternum of female divided longitudinally borealis (Fabricius)
Pale yellowish brown; pronotum immaculate; each elytron with 8 small black spots; sixth abdominal sternum of female not divided longitudinally varivestis Mulsant

Epilachna borealis (Fabricius)

Coccinella borealis Fabricius, 1775, p. 82.

Body yellowish orange. Head, mouthparts and antennae pale. Pronotum pale with apical and basal black spot on median line, basal spot larger, sometimes composed of two spots, a black spot near each lateral margin; spots sometimes reduced or absent. Scutellum dark. Elytra pale; each elytron with 7 black spots, 3 subbasal, 3 median, and an apical one larger than the rest; inner subbasal and median spots united or not at suture (Pl. IV, Fig. 1). Sixth abdominal sternum notched at apex in male, divided longitudinally in female. Length, 7.6-8.5 mm; width, 6.3-7.3 mm.

Specimens examined: 82 were collected from January 13 to December 23, but none were collected in February and March.

Distribution records: Acadia, Ascension, Calcasieu, Concordia, East Baton Rouge, Iberia, Iberville, LaFourche, Ouachita, Rapides, St. Helena, St. James, and West Feliciana parishes.

Discussion: This is the common squash beetle which feeds on various cucurbitaceous plants.

Epilachna varivestis Mulsant

Epilachna varivestis Mulsant, 1850, p. 815.

Body pale yellowish brown. Head and pronotum pale. Scutellum dark. Elytra pale, each elytron with 8 small black spots in 3 transverse rows, 3 subbasal, 3 median and 2 apical, inner spot more anterior (Pl. IV, Fig. 2). Sixth abdominal sternum notched at apex in male, entire in female. Length, 6.8-7.6 mm; width, 5.4-6.1 mm.

Specimens examined: 73 were collected from May 16 to September 7.

Distribution records: East Baton Rouge, Madison, Tensas, Washington (Eddy, 1940), and West Baton Rouge parishes.

Discussion: Chapin (1936) pointed out the reasons why the scientific name of this species was changed from E. corrupta to E. varivestis. The Mexican bean beetle appeared in Louisiana for the first time at Bogalusa in 1938, according to Eddy (1940). Beans infested with this species have been examined in several locations since then.

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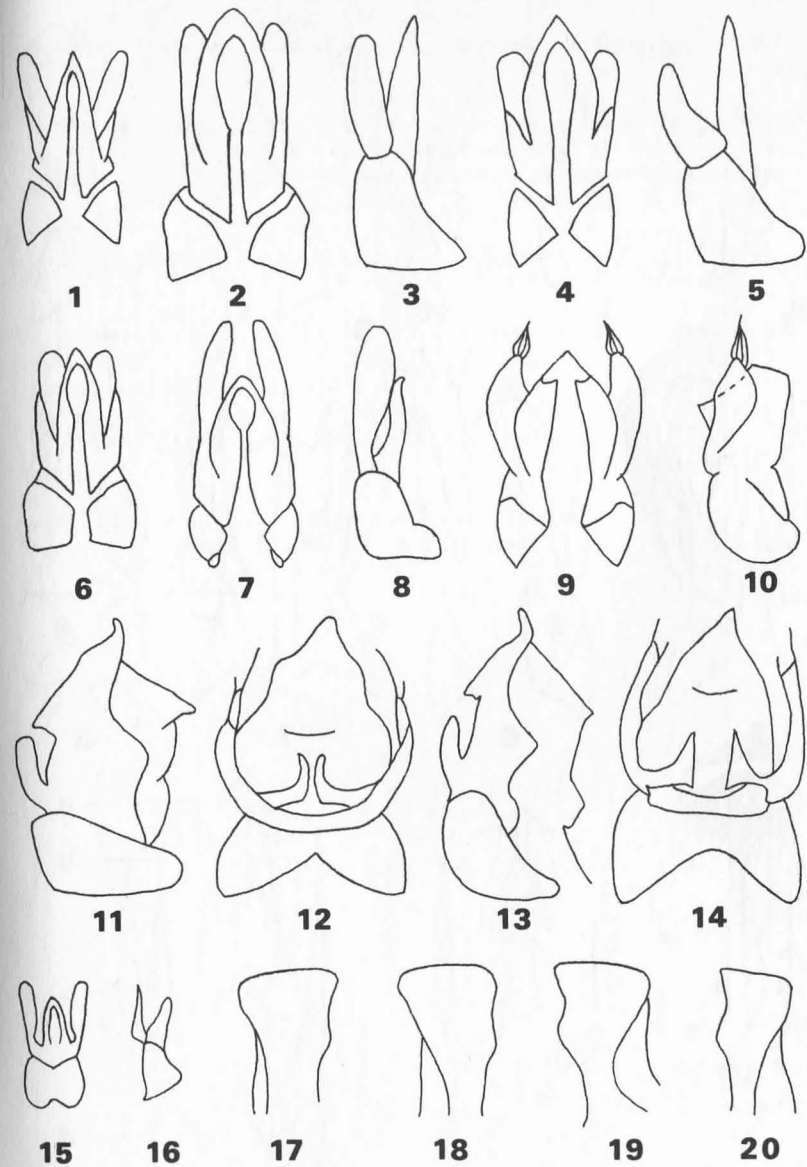


Plate I. Fig. 1-8.--Ventral and lateral views of male phallobases without hair tufts on parameres: 1, Scymnus indianensis; 2, 3, S. apicanus; 4, 5, S. paracanus; 6, S. circumspectus; 7, 8, S. nebulosus. Fig. 9, 10.--S. securus: 9, phallobase, ventral view; 10, same, lateral view. Fig. 11, 12.--S. louisianae: 11, phallobase, lateral view without parameres; 12, same, dorsal view with parameres. Fig. 13, 14.--S. fraternus: 13, phallobase, lateral view without parameres; 14, same, dorsal view with parameres. Fig. 15, 16.--S. intrusus: 15, phallobase, ventral view; 16, same, lateral view. Fig. 17-20.--Basal lobes of phallobases: 17, Hyperaspis signata, four-spotted form; 18, H. signata, two-spotted form; 19, H. congressi, four-spotted form; 20, H. congressi, two-spotted form. (All figures are 64X.)

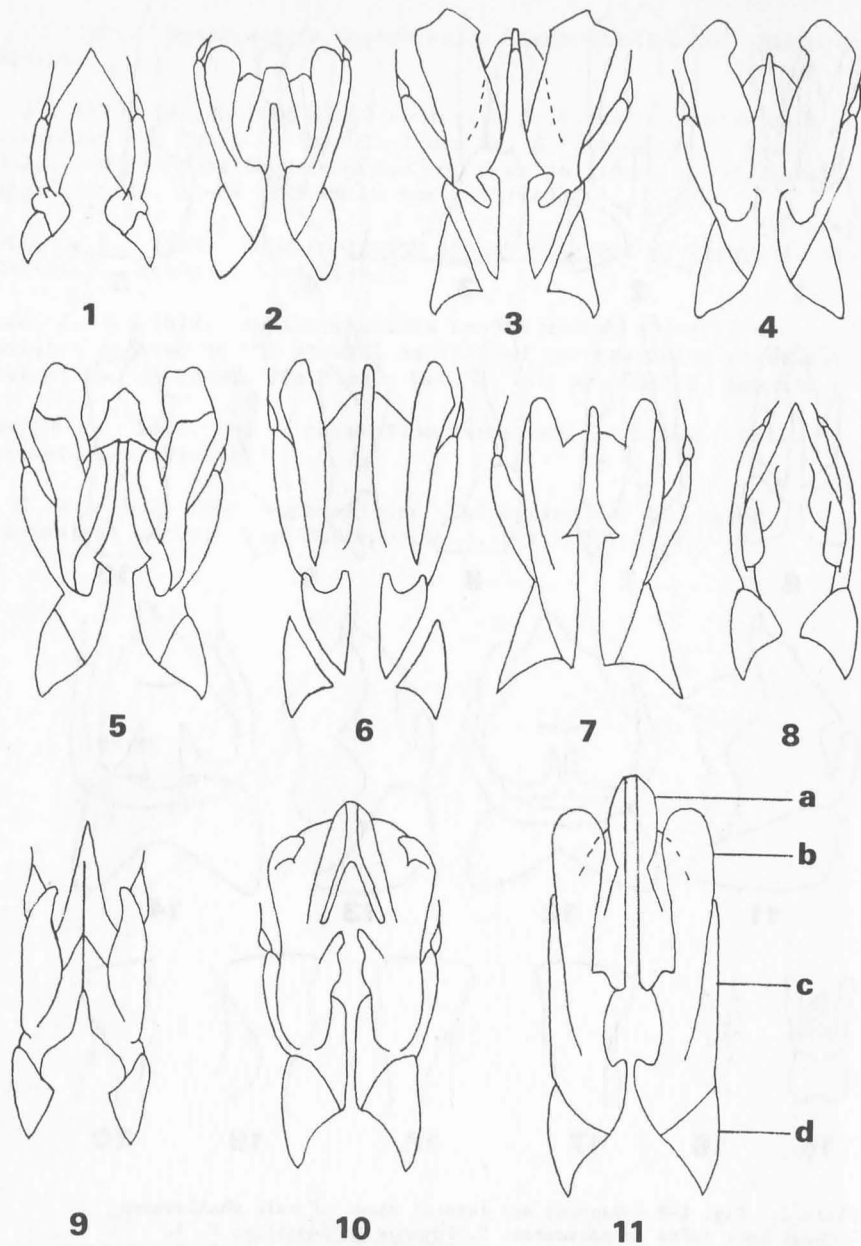


Plate II. Fig. 1-11.--Ventral views of male phallobases: 1, *Scymnus loewii*; 2, *S. compar*; 3, *S. tenebrosus*; 4, *S. socer*; 5, *S. uncus*; 6, *S. puncticollis*; 7, *S. natchezianus* of Wingo; 8, *S. rubricaudus*; 9, *S. cervicalis*; 10, *S. creperus*; 11, *S. brullei*: a, basal lobe; b, ventral ala; c, paramere; d, basal piece. (All figures are 68X.)

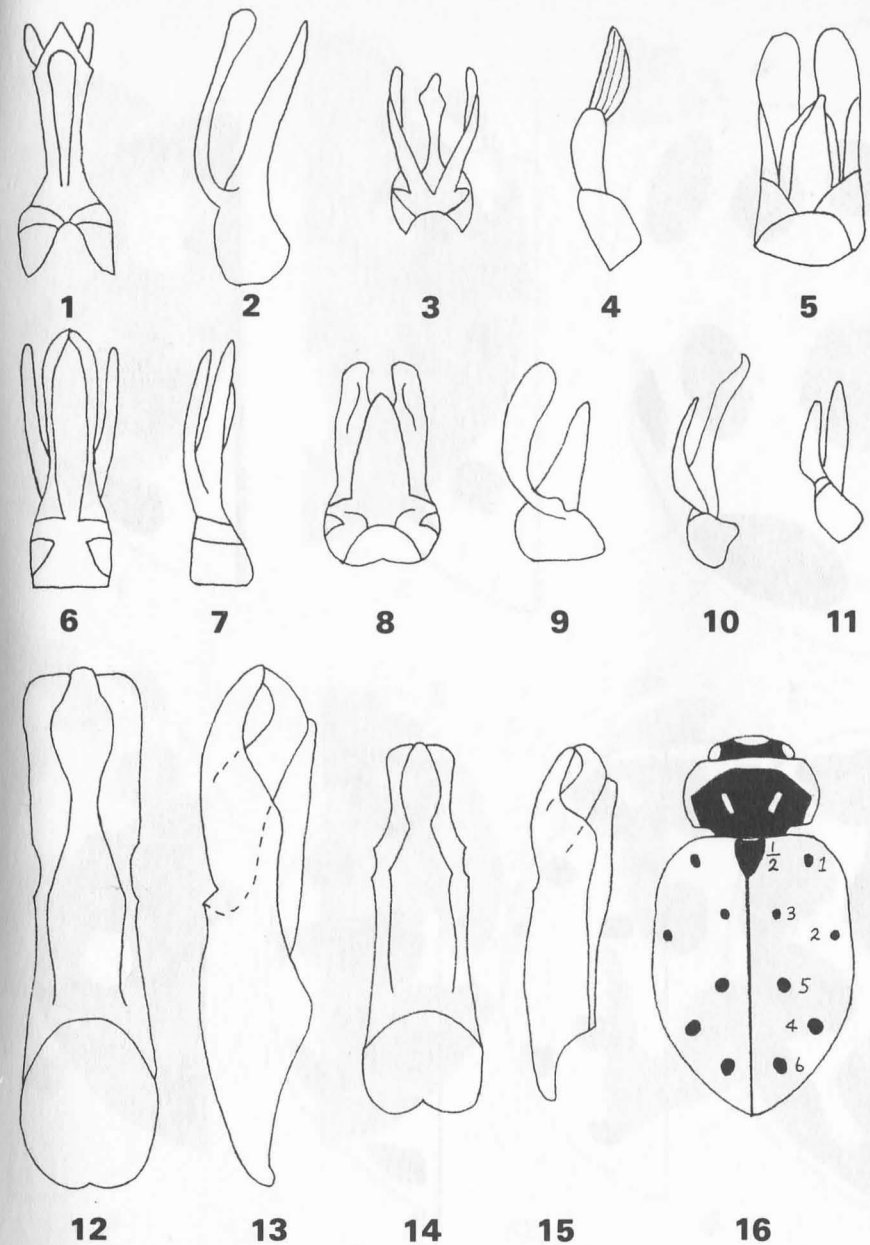
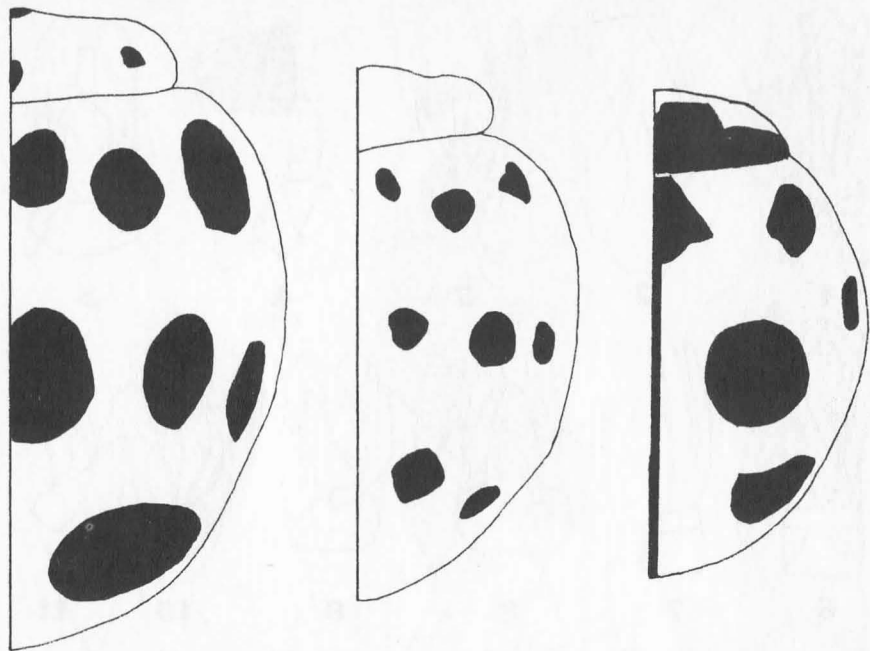


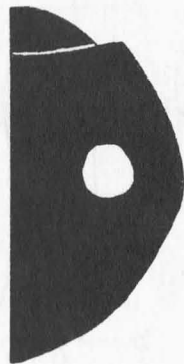
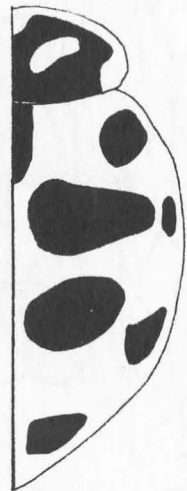
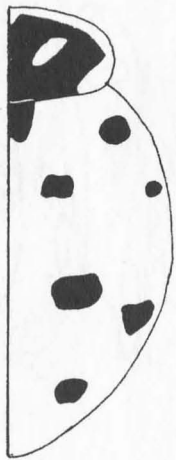
Plate III. Fig. 1-15.--Ventral and lateral views of male phallobases, Fig. 3, 5-7, 10-15 without hair tufts on parameres: 1, 2, *Scymnus flavifrons*; 3, 4, *S. amabilis*; 5, *S. terminatus*; 6, 7, *Scymnillus aterrimus*; 8, 9, *Lindorus lophanthae*; 10, *Stethorus punctum*; 11, *S. utilis*; 12, 13, *Mulsantina picta*; 14, 15, *M. luteodorsa*. Fig. 16.--*Hippodamia convergens*, dorsal view illustrating numbering of elytral spots. (Figures 1 to 11 are 68X; figures 12 to 15 are 53X.)



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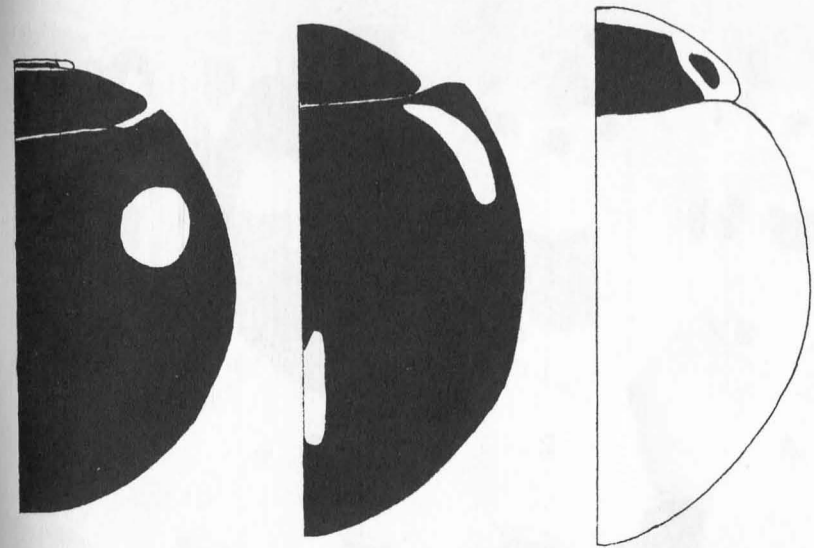
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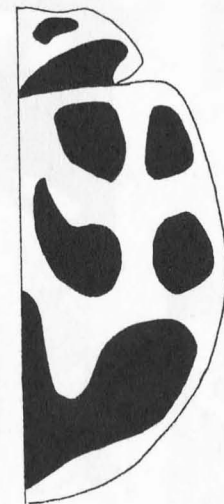
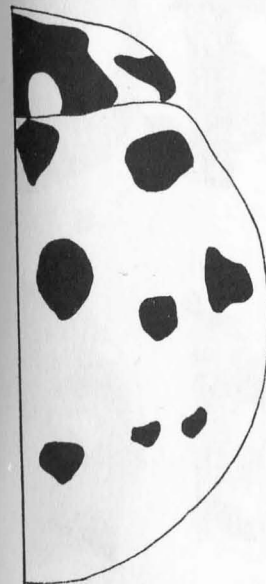
Plate IV. Dorsal views of right halves of lady beetles. 1, *Epilachna borealis*; 2, *E. varivestis*; 3, *Coccinella novemnotata*; 4, *Naemia seriata seriata*; 5, *Hippodamia convergens*; 6, *H. quindecimmaculata*; 7, *Chilocorus stigma*. (All figures are 9X.)



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Plate V. Dorsal views of right halves of lady beetles. 1, *Axion plagiatum*, ♂; 2, *A. tripustulatum*; 3, *Neomysia oblongoguttata pullata*; 4, *Anatis quindecimpunctata*; 5, 6, *Neoharmonia venusta venusta*. (All figures are 9X.)

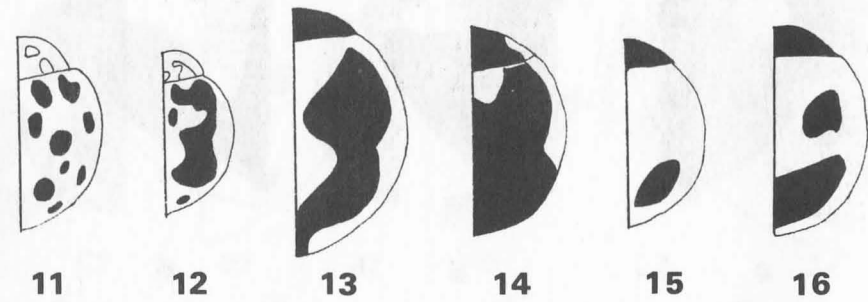
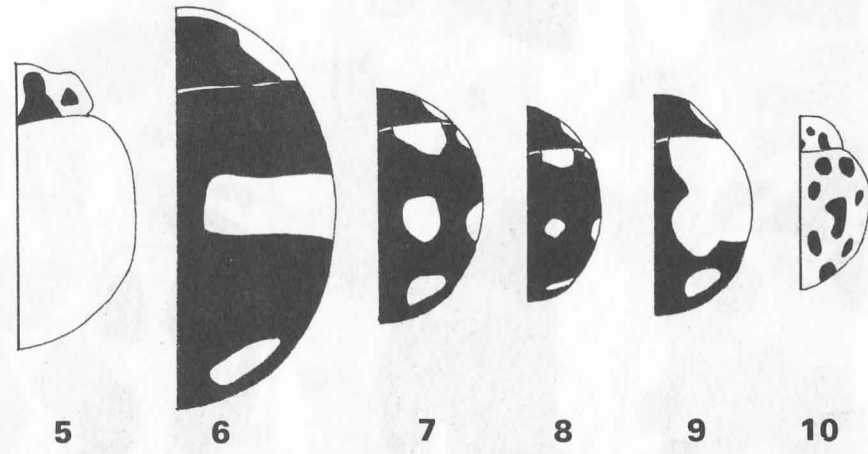
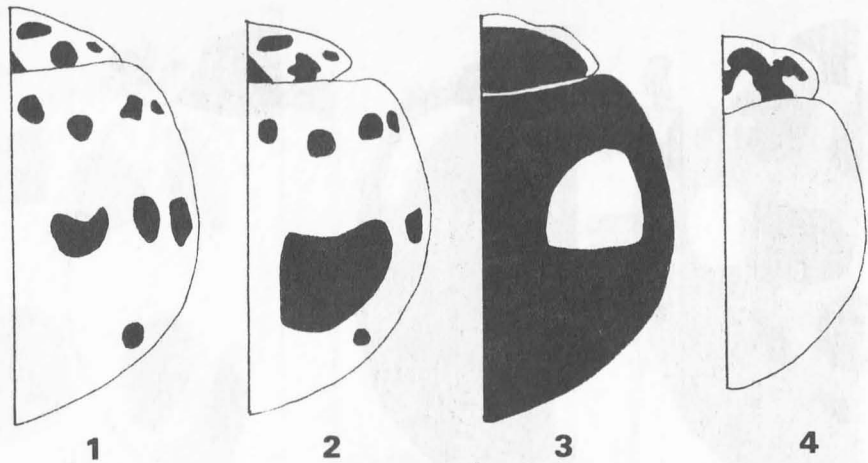


Plate VI. Dorsal views of right halves of lady beetles. 1-3, *Olla abdominalis*; 4, *Mulsantina picta*; 5, *M. luteodorsa*; 6, *Brachyacantha dentipes*; 7, *B. ursina*; 8, *B. felina*, ♀; 9, *B. bollii*; 10, *Psyllobora vigintimaculata*; 11, *P. parvinotata*; 12, *P. renifera*; 13-16, *Exochomus marginipennis*; 13, 15, 16, ♀♀; 14, ♂. (All figures are 9X.)

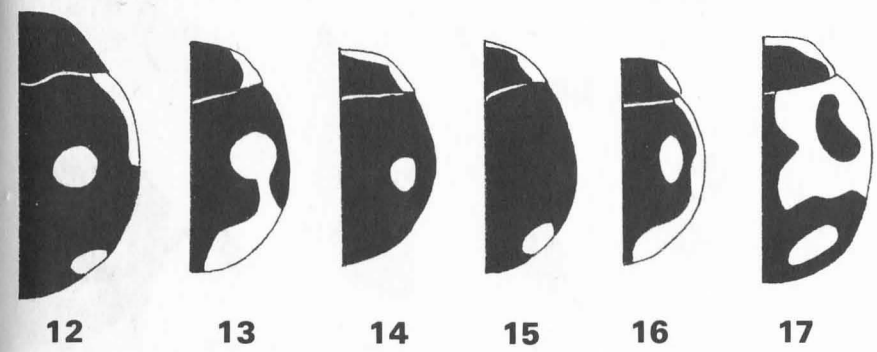
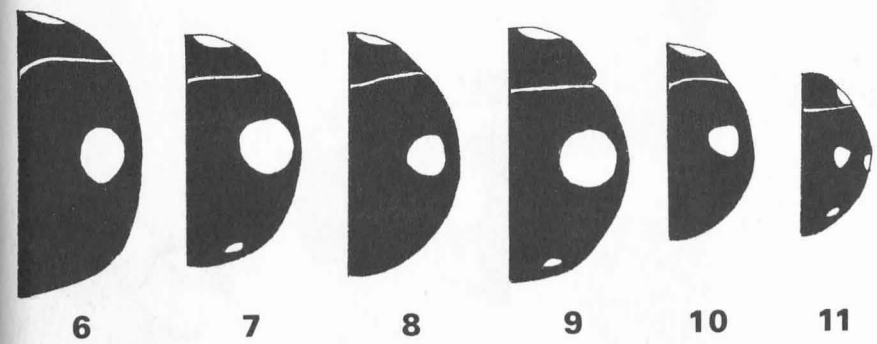
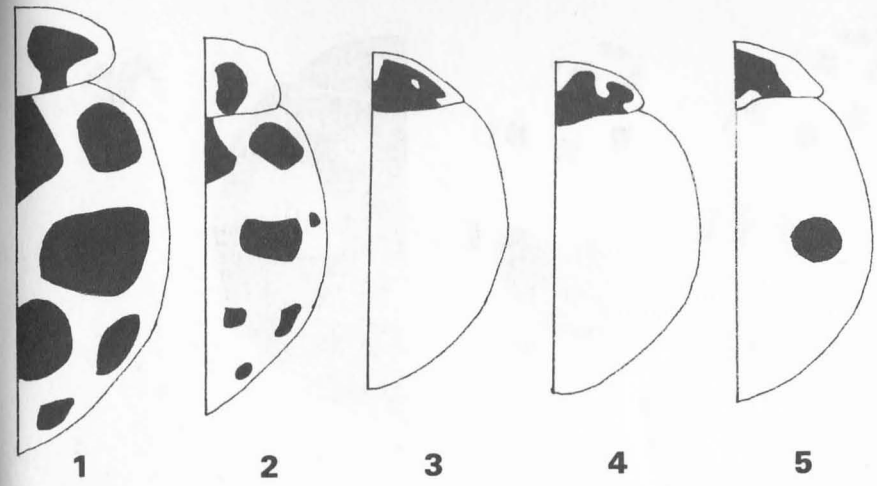


Plate VII. Dorsal views of right halves of lady beetles. 1, *Coleomegilla maculata lengi*; 2, *C. m. fuscilabris*; 3, *Cycloneda sanguinea*; 4, *C. munda*; 5, *Adalia bipunctata*; 6, 7, *Hyperaspis signata*, ♂♂; 8, 9, *H. congressi*, ♂♂; 10, *H. binotata*, ♂; 11, *H. pratensis*, ♀; 12, *H. lateralis*, ♀; 13, *H. connectens*, ♀; 14, *H. pinorum*, ♂; 15, *H. bigeminata*, ♂; 16, *H. undulata*, ♀; 17, *Rodolia cardinalis*. (All figures are 9X.)